CA Mainframe Application Tuner

User Guide

Version 9.0.00

ca technologies

CA Technologies Product References

This document references the following CA Technologies products:

- CA Datacom®
- CA Endevor® Software Change Manager (SCM)
- CA Ideal™
- CA IDMS™
- CA Librarian®
- CA Mainframe Application Tuner (CA MAT)
- CA Optimizer®
- CA Optimizer®/II
- CA Panvalet®
- Performance Management Assistant (PMA)

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- Information about user communities and forums

- Product and documentation downloads

- CA Support policies and guidelines

- Other helpful resources appropriate for your product

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Documentation Changes

The following documentation updates have been made since the last release of this documentation:

Following are the updates made for many topics:

- Changed the release number from r8.5 to V9.0

- Updated the release numbers in the screens: changed Release: 8.5.00 to Version: 9.0.00

- Added the standard **Follow these steps:** subheading that introduces the steps for a procedure.

- Rewrote procedure steps to start with an action verb.

- Reorganized tables that contain keywords and descriptions to a horizontal structure that provides better understanding.

Following are the updates made to selected topics:

- Create a Monitor Definition—Changed the EXPLAIN SQL description to read Specify that information about the DB2 access path selection is to be collected for DB2 SQL statements.

- Create a Monitor Definition—Removed the EXPLAIN Harvested SQL information.

- Create a Monitor Definition—Changed the Use DB2 Catalog to read Specifies whether the plan or package statements are to be extracted from the DB2 catalog or extracted directly from DB2 control blocks when monitoring a DB2 application.

- Monitor Criteria for DB2—Updated the DB2 Monitor Criteria panel. Removed the intro text as DB2 Monitor Criteria panel does not use the point and shoot fields. Changed EXPLAIN Sampled SQL to EXPLAIN SQL. Removed the information about the batch option and EXPLAIN Harvested SQL.

- Interactive Analysis Option 0 - OverView—Updated the Monitor Options from Profile subreport.

- Tuncall Verb and Keywords—Removed the reference to the BATCH option in the DB2EXPL section. Removed the DB2HEXPL keyword information. Changed the default to 'NO' and removed the last two list items in the DB2CTSQL keyword.

- Using your product in a DB2 Environment—Removed information under Use DB2 Catalog keyword. Removed the information about the batch option.

- DB2 Monitor Profiles—Removed EXPLAIN Harvested SQL and all its explanation.

- Moved the statement to indicate the NO is the default and recommended value.

- Removed the What Next section in the chapter "Analyzing Monitor Data."

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Chapter 1: Introduction

This chapter provides an overview of CA Mainframe Application Tuner (CA MAT).

This section contains the following topics:

Conventions

This book uses the following general conventions:

The following syntax notation is used in this manual. Do not enter the special characters.

- Brackets, [ ], enclose optional parameters or keywords.

- Braces, { }, enclose a list of parameters; one must be chosen.

- A vertical line, |, separates alternative options; one can be chosen.

- An italicized or underlined parameter is the default.

- AN ITEM IN CAPITAL LETTERS must be entered exactly as shown.

- Items in lowercase letters are values you supply.

What is CA Mainframe Application Tuner?

CA Mainframe Application Tuner (CA MAT) is a CA Technologies product that identifies application performance delays and utilization.

CA MAT monitors application programs to pinpoint delays. It observes and samples program activity, showing you the application's view of performance. CA MAT presents detailed application-specific delay information, allowing you to improve the performance of your application.

From a single program–monitoring session, CA MAT can answer questions for the application programmer, systems programmer, and database administrator. This ability saves time and reduces machine resources that are used in resolving program bottlenecks or delays.

Application Tuning

Application tuning is the process of analyzing and adjusting the performance of an application with the goal of maximizing efficiency and effectiveness. By focusing on the major causes of delay associated with an application, CA MAT leads you to the best solutions for your worst problems. Consider the following reasons for tuning your applications:

- To improve the success of a business

- To meet increasing performance demands

- To reduce costly, highly-visible delays due to inefficient applications

- To evaluate applications under development and compare third-party software

- To identify the source of batch, CICS, DB2®, and IMS loops and waits

- To plan and position for a shrinking batch timeframe

This book includes several chapters devoted to aiding the user with specific application–tuning issues.

The Interface

CA MAT uses an easy-to-understand ISPF interface called the TSO Client. The TSO Client consists of a series of panels. Each panel is designed to link to the next logical panel, enabling you to focus on finding straightforward answers to performance questions.

When CA MAT is invoked, the first panel you see is the Primary Option Menu.

```
----------  CA Mainframe Application Tuner -- Primary Option Menu  -----------
OPTION ===>

   0  Parameters      - Enter user-specific parameters        Userid: TUNUSER
                                                           Server ID: MATUNER
   1  Monitor         - Create and analyze Monitor Sets       Status: INACTIVE
                                                              Version: 9.0.00
   2  Active          - Select an active job to monitor
   3  Registration    - Register source listings
   4  Grouping        - Define groups of monitors
   5  External        - Analyze other user's monitor files

   S  Status          - Display and manage invoked monitors
   G  Global          - Global monitoring and listing registration
   A  Administration  - CA MAT system administration
   M  Messages        - List CA MAT messages
   T  Tutorial        - CA MAT tutorial

      ****************************************************************
      *             CA Mainframe Application Tuner V9.0           *
      *          Copyright (c) 2012 CA.  All rights reserved.     *
      ****************************************************************
                                    Copyright 2009
Enter an option or press END to exit     AQM Solutions, a TRILOGexpert Company
```

The chapter "Working in the Environment" describes the Primary Option Menu in detail and explains how to use other aspects of the interface.

Point and Shoot

Where possible, panels make use of ISPF's *point and shoot* facility. This lets you place the cursor on most menu items and primary commands, and then press ENTER to choose the menu item or execute the command.

You can place the cursor on the desired location by pointing a device like a mouse, by using the arrow keys, or by using the TAB key if *Tab to point-and-shoot fields* has been enabled in your ISPF settings.

One exception to using point-and-shoot is the AddHelp command. This command expects the cursor to be on the item for which help is needed.

Online Tutorial

CA MAT contains an online tutorial that guides you through the main features of CA MAT, including the process of setting up a monitor and analyzing the resulting data to help solve performance problems. CA Technologies recommends that you view this tutorial before using CA MAT for the first time. Select Option T from the Primary Option Menu to begin the tutorial.

Internal Operation

The Server Space, a multi-address space structure, provides for noninvasive observation and sampling of the target application address space. Monitor sessions are defined and analyzed by using the TSO Client.

CA MAT observes and samples the target application by using a DIE/SRB routine to determine which program is running for each task, where the program is executing, and if and why it is waiting. Samples are written to a file for later analysis, along with CSECT, STEPLIB, LINKLIB, and other information related to the job.

See the *Installation Guide* for a detailed description of the internal operation of CA MAT.

Basic Tasks

You can perform the following tasks with CA MAT:

- Creating monitor definitions

- Invoking a monitor

- Analyzing monitor data

Monitor Definitions

A monitor definition is the set of information that CA MAT uses when taking observations and sampling an application. A monitor definition is identified by its profile name. You create a monitor definition by specifying a set of monitoring criteria. Monitoring criteria include

- A description of the monitor

- Whether a batch report is generated

- The job name of the target application

- The system on which the target is running

- The job step, procedure step, and program name to monitor

- The duration, number of observations, start delay, and time range of the monitor

- The schedule for the monitor

- Multiple monitoring sessions for a single execution of a job step

- The number of times a job step is monitored

- The names of the multiple job steps to be monitored

- Environment-specific information involving CICS, IMS, ADABAS, DB2, Natural, CA Ideal, and CA Datacom

The chapter "Setting up a Monitor Definition" describes in detail how to set up and use monitor definitions.

Invoke a Monitor

When you invoke a monitor, you use the specified criteria to start the observation and sampling of the target application. A monitor request is passed to the Server Space. The Server Space manages pending and active monitor sessions. See the *Installation Guide* for a detailed description of how the Server Space monitors an application.

Invoke a monitor in one of the following ways:

- By invoking a monitor definition for managed or scheduled monitor

- By choosing a job which is actively running for immediate results

- By invoking a monitor from outside the TSO Client for automated operations

The chapters "Invoking a Monitor" and "Open Application Program Interface" describe how to start a monitor session.

Monitor Data

After the monitor has completed, sample data that has been stored in the monitor data can be analyzed. The monitor data set is pointed to by either the User Information File (UIF) or the Global Information File (GIF). The Interactive Analysis Facility formats this data into a set of panels that Displays the information in a format that you can use to solve performance problems.

Report Results

CA MAT reports delay information as percentages of the total monitored period. Program activity is divided between active and wait states, where the delay related to a particular module is shown as a percentage of the monitored period when the module was actively using a CPU and when it was waiting for a CPU. The combined percentage is also reported.

Autonavigation

The Autonavigation feature helps you find the information you are looking for quickly and directly. By placing the cursor on an item in a display panel and pressing Enter, the next most logical panel is displayed, based on the selected content. For more information, see Autonavigation (see page 41).

Different Analysis Types

You can choose to display monitor results in one of several ways:

- **Analyze Normal -** Information that is not directly related to the target application is eliminated. Data is reported as follows:

  - Samples related to delay categories such as Waiting for CPU, LPAR delay, and Swap delay are omitted from reports.

  - DelayView, TimeView, DataView, and ModView show all relevant delays for the application. All relevant samples for both Active and Wait are reported.

  - CodeView and related histograms report only active samples that emphasize the most CPU-intensive portions of the program code. Wait samples, which can mask this activity, are not included.

- **Analyze All -** Percentages are calculated based on all samples. This data allows you to compare delays occurring when the program is executing in both active and wait states.

- **Analyze Active -** Percentages are calculated based on samples where the program was actively using CPU. Samples that contain only wait information are filtered out, which allows you to make normalized CPU comparisons of program activity.

- **Analyze Wait -** Percentages are calculated based on samples where the program was in a wait state. Samples that contain only active information are filtered out, which allows you to make normalized comparisons of program wait activity.

For more information about the Interactive Analysis Facility, see the chapter "Analyzing Monitor Data."

CA MAT can produce batch reports based on this data. For more information about producing batch reports, see the chapter "Generating Batch Reports."

The Interactive Analysis Menu Options

After you have specified an analysis option for a monitor definition, CA MAT loads the data and displays the Interactive Analysis menu. Each option on this menu displays the data from a different perspective.

```
CA MAT -------------------- Interactive Analysis --------------------------
OPTION ===>

Enter option to analyze the monitored job:                    Profile: DCOMIDL
                                                              Options: NORMAL
  CA MAT Monitor Information              Subsystem Details
  --------------------------------------  ------------------------------
  0  OverView   - Monitor session information  10  DB2 - View all SQL
  1  TaskView   - Activity by task             11  IMS - IMS Transactions
  2  DelayView  - Program delays               12  JVM - Java Virtual Machine
  3  CodeView   - Program activity             13  WAS - WebSphere Trans.
  4  TimeView   - Samples by time              14  CIC - CICS Summary Stats
  5  DataView   - Dataset information          15 IDMS - CA-IDMS Activity
  6  TranView   - Activity by transaction      16  DCM - CA-Datacom Activity
  7  ModView    - Module layout                17  IDL - CA-Ideal Activity
  8  PoolView   - Buffer pools                 18  ADA - Adabas Activity
  9  USSView    - Unix System Services         19  NAT - Natural Activity

  ACTIVE - switch mode to ACTIVE     WAIT - switch mode to WAIT
  NORMAL - switch mode to NORMAL     ALL  - switch mode to ALL

Press END to exit analysis
```

These menu options are described next.

OverView option 0

Displays information about the monitoring process, as well as key global statistics about the monitored application.

These statistics can help you determine the next most logical panel to display as you continue your analysis effort.

TaskView option 1

Displays information about the performance of each z/OS task in the monitored address space.

If you select a task, CA MAT recomputes the values by using only samples from the selected task on all subsequent screens that you display, which enables you to focus on the performance of that task.

DelayView option 2

Divides the program into functional delay types.

Delay types comprise everything that contributes to the elapsed time of the program, including the time that the program was executing. See the chapter "Tuning Your Applications" for a comprehensive list of delay types identified by DelayView.

CodeView option 3

Displays the execution and wait time of each module used by the program.

You can display this information in greater detail down to the CSECT level. You can define Pseudo Groups, which are specific to your environment, to summarize the information for multiple modules. This feature enables you to identify time consuming areas of code and to associate subroutines within a program and program modules within an application framework.

TimeView option 4

Displays program activity in time sequence.

Each row of information represents a single sample taken during the monitored period. This format helps you determine a program's execution path and looping logic. This format also gives a good indication of which code sections executed and when they executed during the monitored period.

DataView option 5

Displays data sets, databases, IMS, and DB2 statements that caused activity during the monitored period.

The data is sorted in descending order by activity. You can select a particular data set, database, IMS, or DB2 statement to display greater detail.

TranView option 6

Shows IMS or CICS activity in terms of individual transactions

It displays the percentage of time CA MAT detected activity for each transaction in the six major activity and delay categories. If you select a transaction, CA MAT recomputes the values on all subsequent screens that you display by using only samples from the selected transaction. This feature enables you to focus on the performance of that transaction.

ModView option 7

Displays the activity of each load module.

From ModView, you can hyperlink to module details or to a panel that suggests a linkage order for reducing system paging.

PoolView option 8

Displays statistics about IMS VSAM/LSR and VSAM/GSR buffer pool usage.

PoolView provides information about hit ratios, size and number of buffers, and total space requested. You can also display information about the data sets attached to a pool.

USSView option 9

Displays information about USS activity on a process basis

This option allows you to see delay information by process, code details by process, and process level information.

DB2 option 10

Displays statistics about DB2 activity.

IMS option 11

Displays statistics about IMS activity.

JVM option 12

Displays statistics about Java Virtual Machine (JVM) activity.

WAS option 13

Displays statistics about WebSphere Application Server activity.

CIC option 14

Displays summary statistics about CICS activity.

IDMS option 15

Displays statistics about CA IDMS activity.

DCM option 16

Displays statistics about CA Datacom activity.

IDL option 17

Displays statistics about CA Ideal activity.

ADA option 18

Displays statistics about Adabas activity.

NAT option 19

Displays statistics about Natural activity.

Switch between Interactive Analysis Modes

You can easily switch between the different analysis modes that are accessed from the Interactive Analysis menu without having to return to that menu. For example, if you are viewing samples that are actively using CPU and want to see those that are waiting, you can enter one of the following commands to switch analysis modes.

Use the commands listed next to switch between the different analysis modes.

ACTIVE

Delay percentages are calculated using only the samples found to be actively using CPU. By running CA MAT with this option multiple times, you can make normalized CPU comparisons of program activity.

WAIT

Delay percentages are calculated using samples found to be in a wait state. By running CA MAT with this option multiple times, you can make normalized comparisons of program wait activity.

NORMAL

All wait-related delays which are not controlled by the application are removed. The CodeView panel is sorted based on Active samples (where the application was actively using CPU). This option will provide the best view of the data for normal use.

ALL

Delay percentages are calculated using every sample collected.

Other Features

CA MAT has several additional features that can assist you with tuning your applications to get the maximum benefit. These features are described in the following sections:

Analyzing monitor data sets

You can analyze data from a monitor data set that is created by someone else by adding it to your list of external monitor data sets.

For more information, see Analyze Monitor Data Sets Created by Other Users (see page 211).

Registering program listings

By registering program listings, CA MAT can relate program activity to actual high-level language statements, instead of to CSECT offsets only. You can register program listings in Assembler, COBOL, PL1, NATURAL, FORTRAN, IBM® C/C++, and SAS C. Programs must be compiled with specific compiler options before they can be registered.

You can register a program online with the TSO Client, or offline by using the batch registration procedure *hilevel*.TNBATREG. When registering a program online through the TSO Client, you can choose to register the listings locally or globally. A listing that is registered locally is only available to the TSO Client that performed the program registration; a listing that is registered globally is available to all users.

For more information about registering a program listing, see Register Source Program Listings (see page 235).

Associating functional descriptions of CSECTs

You can define functional descriptions for CSECTs. These descriptions appear on interactive analysis panels, such as CodeView, DelayView, and ModView. During analysis, you can use these functional descriptions to identify what each CSECT does. CA MAT supplies over 5000 functional descriptions for system, COBOL, PL/1, and LE routines.

For more information about defining CSECTs, see Add CSECT Descriptions (see page 219).

Grouping related program modules by using pseudo groups

By grouping related program modules into pseudo groups, CA MAT can provide summarized reporting on these modules in the CodeView panel. This feature allows data representation by functions rather than by module/CSECT names alone. CA MAT supplies many pseudo groups for IBM modules.

For more information about using Pseudo Groups, see Define Pseudo Groups (see page 220).

Adding content-sensitive Help

To add online Help information for specific CSECTs, pseudo groups, and delay categories, CA MAT provides help members that you can modify. This help information is accessed by placing the cursor on a highlighted field and pressing PF1 on the DelayView, CodeView, Histogram, or DataView panels.

For more information about adding content-sensitive help, see the chapter "Updating Content-sensitive Help."

Using global monitors

You can also define and start monitor sessions without using the TSO Client. Monitor sessions invoked from outside the TSO Client are called global monitors. Global Monitor Definitions are associated with the Server, not a specific user, and are primarily used when the monitor sessions are invoked outside of the TSO Client by using the Open Application Program Interface (Open API). This Open API allows you to monitor an application when conditions are most critical, for example when a critical performance threshold is exceeded.

The information that is collected by a global monitor is analyzed and administered by using the Global Monitoring Menu option. Because global monitors are not assigned to a specific user, the data is written to the Global Monitors data set.

For more information about using global monitors, see Create and Use Global Monitors (see page 209).

For more information about the Open API, see the chapter "Open Application Program Interface."

Creating monitor schedules

By creating a schedule for a monitor session, you can define when a program is to be monitored. While creating a monitor definition, you can specify monitoring by day-of-week, time and date. You can specify scheduling criteria for individual monitor definitions, or select from permanent "shift" definitions defined by the administrator. For example, you might have schedules for weekend processing that can be reused every weekend.

For more information on creating schedules, see Create a Monitor Schedule (see page 87).

Monitoring a multistep job

If you would like to create monitors for an entire region rather than just for specific job steps, you can create a group of monitor definitions (or profiles) that are activated by a trigger monitor. This monitor ensures that you have the necessary data for analysis of all job steps in a multistep process.

For more information on grouping monitor definitions, see Create a Multijob Monitor: Grouping (see page 83).

Performing system administration

CA MAT is typically used by a group of users. To facilitate consistency, the Administration option allows viewing only of System and User default parameters. These are the default parameters that are specified for all users in a group.

For more information about system and user default parameters, see the *Installation Guide.*

Displaying messages

The Messages option shows all of the messages that can be issued by the Server Space during routine operation. You can select a message to display further detail.

For more information, see Message Help (see page 37).

Using the online tutorial

If you are new to CA MAT, complete the online tutorial that is provided with CA MAT. The tutorial introduces the features and operation of CA MAT and demonstrates an example application.

Chapter 2: Working in the CA Mainframe Application Tuner Environment

This chapter shows you how to use the basic features of CA MAT.

This section contains the following topics:

Start from a TSO Session

To invoke CA MAT under TSO, you must be running ISPF.

CA MAT requires a TSO region size of at least 4 MB.

Start from ISPF

Type the following TSO command on the ISPF COMMAND line:
TSO EXEC '*hilevel*.UTRSAMP(MATUNERC)'

where MATUNERC is the name of the TSO REXX EXEC specified during customization.

The TSO EXEC is used to execute the CLIST that was created during the customization process (see the *Installation Guide*). Consult your System Administrator for the correct name and location of the CLIST.

You can copy the start-up procedure from *hilevel*.UTRSAMP to a library used by your TSO users to execute CLISTS or REXX procedures.

The first time each user invokes CA MAT, the User Information File Allocation panel is displayed.

Set Up User Options

The User Information File Allocation panel enables you to automatically copy your existing monitor definitions from your current tables data set to the new User Information File.

```
CA MAT    --------------- User Information File Allocation ---------------------
COMMAND ===>

CA MAT requires a User Information File to store user-specific data.
The name of this data set is: 'prefix.userid.MAT90.TABLES'
This data set must be allocated before you can use CA MAT.
If you choose not to allocate this data set, CA MAT will terminate.

Do you want CA MAT to allocate this data set now ? YES (Yes or No)

  Allocate data set on volume ===> *          (Required for non-SMS or * for SMS)
 Number of tracks to allocate ===> 90         (Required)
        SMS Management Class ===>             (Optional for SMS data sets)
           SMS Storage Class ===>             (Optional for SMS data sets)
              SMS Data Class ===>             (Optional for SMS data sets)

A table was found for your TSO user ID from a previous release of CA MAT.
The data set is: 'prefix.userid.MAT85.TABLES'
Would you like to have the entries from the previous release of the CA MAT
tables data set migrated to the new CA MAT release of the User Information
File? YES (Yes or No)

Press HELP for more information
Press END to cancel data set allocation and exit without starting CA MAT
```

This panel is not displayed if the system default DISPLAY_ALLOC_PANEL = NO is specified in the Global Tables Data Set (using *hilevel*.UTRPARM member TUNSDEFS). The User Information File is allocated by using the default values. For more information, see the *Installation Guide*.

If the data set is to be managed by SMS, you can specify an asterisk (*) as the volume serial ID.

When you press the Enter key, the following message is received:

TN0004I Please wait while User Information File is initialized (*xxxxxxxx*).

In the message, *xxxxxxxx* is the current maintenance level of the ISPF client.

If you select NO to the question about migrating the User Information File from a previous version, no additional messages will be received.

If you select YES to the question about migrating the User Information File from a previous version, messages similar to the following text will be received:

```
Merging User Information Files
Merging 55 Monitor Profiles with history and schedules
  Completed 55 of 55
Merging 94 External Dataset Definitions
  Completed 94 of 94
Merging 345 Registered Listings
  Completed 100 of 345
  Completed 200 of 345
  Completed 300 of 345
  Completed 345 of 345
Merging 5 Group Definitions with schedules
  Completed 5 of 5
Merging 1 Registered Module
  Completed 1 of 1
```

Navigation

After invoking CA MAT, the first panel displayed is the Primary Option Menu. You access all functions from this menu.

```
----------  CA Mainframe Application Tuner -- Primary Option Menu  -----------
OPTION ==>

   0  Parameters      - Enter user-specific parameters        Userid: TUNUSER
                                                           Server ID: MATUNER
   1  Monitor         - Create and analyze Monitor Sets        Status: INACTIVE
                                                             Version: 9.0.00
   2  Active          - Select an active job to monitor
   3  Registration    - Register source listings
   4  Grouping        - Define groups of monitors
   5  External        - Analyze other user's monitor files

   S  Status          - Display and manage invoked monitors
   G  Global          - Global monitoring and listing registration
   A  Administration  - CA MAT system administration
   M  Messages        - List CA MAT messages
   T  Tutorial        - CA MAT tutorial


      ******************************************************************
      *              CA Mainframe Application Tuner V9.0          *
      *           Copyright (c) 2011 CA.  All rights reserved.        *
      ******************************************************************
                                      Copyright 2009
Enter an option or press END to exit     AQM Solutions, a TRILOGexpert Company
```

This ISPF menu is standard. You can type either ISPF commands or options in the OPTION field.

The fields in the upper right corner of the menu display the following information:

- Your User ID

- Server Space ID and Status, which is active or inactive

- Release level

The options available from the Primary Option Menu are described next. You can specify any option at any time.

Option 0 (Parameters)

Displays the Profile Parameters panel that allows you to set defaults for various options of CA MAT.

For more information, see the *Installation Guide*.

Option 1 (Monitor)

Displays the Monitor Definition panel that enables you to create, invoke, and display a monitor definition.

You can use one of the four analysis line commands, A, AA, AW, or AL to analyze the data from a particular monitor definition.

For more information, see the appendix "Setting up a monitor definition.".

Option 2 (Active)

Displays the Active Jobs panel that allows you to create and invoke a monitor session for any active job.

For more information, see the chapter "Invoking a Monitor".

Option 3 (Registration)

Displays the Program Listing Registration panel that allows you to register program listings to relate program activity to actual high-level language statements.

For more information, see Register Source Program Listings (see page 235).

Option 4 (Grouping)

Displays the Monitor Profile Groups panel that allows you to define groups of job steps that can be monitored together while also specifying the job step that initiates (or "triggers") the monitoring of the group.

For more information, see Create a Multijob Monitor: Grouping (see page 83).

Option 5 (External)

Displays the External Data Set List panel that allows you to analyze monitor data sets created by other users.

For more information, see Analyze Monitor Data Sets Created by Other Users (see page 211).

Option S (Status)

Displays the Invoked Monitors panel that shows information on the progress of each active monitor request.

Option G (Global)

Displays the Global Monitoring Menu panel that allows you to set up a monitor definition, invoke a monitor session or analyze data gathered during a monitor session.

For more information, see Use the Global Monitoring Menu (see page 209).

Option A (Administration)

Displays the Administration Option Menu. From this menu, you can perform a variety of administrative functions, such as register source program listings, create CSECT associations, define pseudo groups, schedule monitor requests, and update content-sensitive help.

For more information, see Perform Administrative Functions (see page 216).

You can also view global system and user default values (see the *Installation Guide*).

Option M (Messages)

Displays the Messages panel that contains a list of messages and their message IDs.

The message text explains the message and suggests actions that you can take. For more information, see Message Help (see page 37).

Option T (Tutorial)

Launches the online tutorial that provides a guided tour through many of the features and functions.

Move forward through the tutorial by pressing Enter and backwards by pressing PF10. The tutorial takes approximately 30 minutes to complete. If you are using CA MAT for the first time, it is recommended that you complete the tutorial.

Display Status

To display a current list of all active and deferred monitor requests, enter the primary command STATUS from any CA MAT ISPF panel.

Online Help

CA MAT features an extensive online Help facility that explains all of the panels and fields. The Help facility uses pop-up panels with hyperlinks to related topics. There are four types of Help information:

- Screen help

- Field help

- Content-sensitive help

- Message help

Screen Help

Screen Help is information relating to a panel. To display Help from anywhere in CA MAT, press PF1 for Help.

A Help pop-up panel overlays the panel.

```
---------- CA Mainframe Application Tuner -- Primary Option Menu  ----------
 OPTION ===>
   _____
   | CA Mainframe Application Tuner        More: + |    Userid: TUNUSER
   | Command ===>                   Scroll ===> HALF |  Server ID: MATUNER
   | ----------------------------------------------- |    Status: ACTIVE
   | CA MAT is an ISPF-based product which enables you |  Version: 9.5.00
   | to find delays in applications. Before using the |
   | Primary Option Menu, make sure the CA MAT server |
   | address space is running on this MVS image.    |
   |                                                |
   | To begin using CA MAT, select Option 1 (Monitor). |
   | This enables you to:                           |
   |                                                |
   |    o Set up a monitor definition               |s
   |    o Invoke a monitor session                  |
   |    o Analyze the data gathered during a monitor |rs
   |      session                                   |istration
   |                                                |
   | For information about items on this menu, place |
   | your cursor on a topic and press Enter.        |
   |                                                |
   | PARAMETERS      Define user-specific parameters |
 En|_____|TRILOGexpert Company
```

Hyperlinked fields are highlighted on the Help panel. Use the following procedure to hyperlink to related Help text.

Follow these steps:

1. Place the cursor on the highlighted field and press Enter.

2. Press End to exit the Help facility and return to CA MAT.

3. To exit the Help facility if multiple help panels are displayed, you can either press End multiple times or type QUIT on the Help panel's COMMAND line and press Enter.

Field Help

Field Help is information related to a specific field on a panel.

Follow these steps:

1. Place the cursor on the name of the field for tabular panels or in the input area of the field for data-entry panels.

    You may also use the Tab key to position the cursor.

2. Press PF1 for Help.

    Help information is displayed.

Content-Sensitive Help

If the content of a field is colored red, yellow, or white, content-sensitive Help is available. When you place the cursor on one of these fields and press PF1, the Help that is displayed is specific to that content.

Note: For more information, see Update content-sensitive Help.

Message Help

During operation, the Server Space might generate a message to alert you of any problems that have occurred. You can obtain additional information about the message.

Follow these steps:

1. Record the Message ID. This ID is used to link to the correct information.

2. Select Option M on the Primary Option Menu.

   The Messages panel is displayed:

```
CA MAT -------------------------- Messages --------------- Row 1 to 14 of 432

Primary commands: PMSG - Print messages

   Line commands: S - Select

LC Msg ID   Message Text
    _____  _____
>---------------------------------------------------------------------------
__ DAUxxxx  Internal error messages
__ TN0001E  TUNLEVEL member of TRSAMP not found -- CA MAT terminating
__ TN0002I  Content-sensitive help is being initialized
__ TN0003I  Content-sensitive help is being updated (TPNnnnn)
__ TN0004I  Please wait while User Information file is being initialized
__ TN0005I  User Information File update in progress (TPNnnnn)
__ TN0006E  Table create requested for 'table' is not known
__ TN0007I  Migration of User Information File in progress from release xxx
__ TN0008E  User Information File allocation error
__ TN0009E  Open failed for Content-sensitive help table RC= cc RS= rr
__ TN0010E  Unable to allocate 'tuntable' on 'volser' ( 'trks' tracks )
__ TN0011E  Syntax error in record: 'record'
__ TN0012E  Profile 'profile' not found -- batch reporter terminating
__ TN0013E  Monitor data set 'data set' is not found or not available
```

3. Use the LOCATE primary command to find a specific message ID.

4. You can also place a filter on the Msg ID or Message Text fields to find a message.

5. Type S in the LC field of the desired message and press Enter.

   A Help pop-up panel is displayed for the message. This panel will include an explanation of the message, as well as suggested actions to take.

6. Use the PMSG command to copy the Help text (for all messages) to a printable data set.

7. Type S in the LC field of the desired message and press Enter.

   A Help pop-up panel is displayed for the message. This panel includes an explanation of the message and suggested actions to take.

Use the PMSG command to copy the Help text (for all messages) to a printable data set.

```
CA MAT     --------- Print CA MAT Messages -------------------------------
COMMAND ==>

ISPF library:
  Project ==>
  Group   ==>
  Type    ==>
  Member  ==>                      (Blank or pattern for member selection list)

Other partitioned or sequential dataset:
     Dataset name  ==> 'CAMAT.MSGS.PRINT'
     Volume serial ==> dev220   (If not cataloged)

Lines per page: 66

Press END to print messages or CANCEL to exit


     Please wait while messages are written to:
'CAMAT.MSGS.PRINT'
```

The information that is displayed in the Messages Help panel includes:

■ **Reason**—A detailed description of the message, including why the message was issued

■ **System Action**—An explanation of what action is taken by CA MAT when the message is issued

■ **User Action**—The required or suggested steps to take

■ **Origin**—The module that generated the message

8. Press End to exit the Help facility and return to CA MAT.

Scroll Panels

To scroll the contents of a panel, use the standard ISPF scroll commands: UP (PF7), DOWN (PF8), LEFT (PF10), and RIGHT (PF11). When you scroll right, the fixed fields remain at the left margin. If more fields are available, the panel displays an arrow on the far left between the column header and the data rows. The arrow indicates which direction you can scroll to see more fields:

■ >—Indicates that more fields are available by scrolling right

■ <—Indicates that more fields are available by scrolling left

■ <>—Indicates that more fields are available by scrolling left or right

Use PF Keys

Because CA MAT is an ISPF application, the definitions you set for your PF keys are completely independent from other applications. You can set your PF keys for use with CA MAT.

Follow these steps:

1. Type KEYS from any panel.

2. Press Enter.

   The PF Key Definitions and Labels panel is displayed:

```
PF Key Definitions and Labels - Primary Keys
Command ==>
                                                           More:    +
Number of PF Keys  . . 24                    Terminal type  . . 3278

PF1 . . . HELP
PF2 . . . SPLIT
PF3 . . . END
PF4 . . . RETURN
PF5 . . . RFIND
PF6 . . . RCHANGE
PF7 . . . UP
PF8 . . . DOWN
PF9 . . . SWAP
PF10  . . LEFT
PF11  . . RIGHT
PF12  . . RETRIEVE

PF1  Label  . .          PF2  Label  . .          PF3  Label  . .
PF4  Label  . .          PF5  Label  . .          PF6  Label  .
PF7  Label  . .          PF8  Label  . .          PF9  Label  . .
PF10 Label  . .          PF11 Label  . .          PF12 Label  . .

Press ENTER key to display alternate keys.  Enter END command to exit.
```

3. Define your PF keys.

4. Press End.

Locate a String in a Display

To locate a particular string and move it to the top of a display, on the command line type L *target*.

where *target* is a jobname, module, or other type of information in the leftmost field.

If you change the sort value of a panel, target is the field by which the panel is sorted.

The Locate command supports wildcard characters (*, %, ?). If the target you specify does not appear, the message LOCATE ARG NOT FOUND appears in the upper right corner.

Some panels do not support the Locate command. Issuing Locate from these panels produces the message INVALID OPTION in the upper right corner.

Sort the Display

You can sort the information displayed on a panel by any field using the SORT primary command. With the SORT command, you have the power to display the most over- or under-utilized resources at a glance.

Follow these steps:

1. Type SORT A on the COMMAND line to sort in ascending order or SORT D to sort in descending order. The default is A.

2. Place the cursor on the field that you want to sort.

3. Press Enter.

   You can sort only one field per panel. If you type the SORT command for a second field, the first sort criterion is replaced.

4. Type NOSORT on the COMMAND line and press Enter to remove sort criteria from a panel.

   CA MAT returns to its initial sort order.

You can also add or remove sort criteria using the Screen Customization panel.

Autonavigation

The DelayView, CodeView, and DataView panels feature Autonavigation. This feature allows you to go directly to the next most logical panel, based on a selected content.

Follow these steps:

1. Place the cursor anywhere in the line containing the information for which you want more detail.

2. Press Enter.

    A panel is displayed based on the type of information you selected.

    Place the cursor anywhere on the Data Delay - IO Queued line in the DelayView panel.

```
CA MAT -------------------------- DelayView -------------- Row 1 to 11 of 11
COMMAND ===>                                            SCROLL ===> CSR

Primary commands: DETail on/off        Module: *          Profile: TUNIVP1
                  ADDHelp               Csect: *          Options: NORMAL
                                        Offset: *           Detail: ON
    Line commands:  A - Address
                    S - Distribution

LC Major category       Minor category     Actv% Wait% Totl% Visual
   _____ _____ _____ _____ _____ _____
   ----------------------------------------------------------------------------
__ Program Active       Program Active     53.34  0.00 53.34 ========>
__ System Active        Getmain SVC        20.86  0.00 20.86 ==>
__ System Active        Regmain SVC        13.18  0.00 13.18 =
__ Data Delay           IO Queued           0.00  7.11  7.11 >
__ File Mgmt Delay      Eov SVC             0.24  4.22  4.46
__ System Active        Protect SVC         0.00  0.68  0.68
__ File Mgmt Delay      Close SVC           0.00  0.16  0.16
__ Data Delay           Excpvr SVC          0.08  0.00  0.08
__ DASD Mgmt Delay      Obtain SVC          0.04  0.00  0.04
__ Resource Conflict    Global Serialization 0.04 0.00  0.04
__ System Active        Getmain 120 SVC     0.04  0.00  0.04
```

3. Press Enter.

    The DataView panel is displayed:

```
CA MAT   ------------------------- DataView ------------------ ROW 1 to 4 of 4
COMMAND ==>                                                SCROLL ==> CSR

Primary commands: LINklist on/off                        Profile: TUNIVP1
                                                         Options: NORMAL
  Line commands: S - Select                              Linklist: OFF


LC DD name  Dataset name                                 Delay% Visual
   _____  _____  _____ _____
>-----------------------------------------------------------------------------
__ UNBLOCK  SYS99140.T113840.RA000.TUNIVP1.DOUT3.H03      18.11 =======>
__ BIGBLOCK SYS99140.T113840.RA000.TUNIVP1.DOUT1.H03       0.67
__ STEPLIB  TR.XTSTI.COBLOAD                               0.00
__ STEPLIB  SYS1.VSCOBII.SYS.COB2LIB                       0.00
```

4. Place the cursor anywhere on the UNBLOCK line and press Enter.

    The Data Set Details panel for UNBLOCK is displayed.

```
CA MAT   -------------------- Data Set Details ------------ Row 1 to 27 of 30
COMMAND ==>                                                SCROLL ==> PAGE

DDNAME: UNBLOCK                                          Profile: TUNIVP1

Opened for: PUT LOCATE    Access Method: QSAM  Concatenation Count: 0

Data Set Information for: SYS03182.T133728.RA000.TUNCOB01.DOUT3.H03
            File Type: Physical Sequential
            Description: Fixed

------ SMS ------- ------ Allocation ------ ----------- Format ----------------
DATACLAS: **NONE** Unit:            TRK DS Org:       PS Rec FM:        F
STORCLAS: **NONE** Primary:           5 Log Rec Len:   200 Blk Size:    200
MGMTCLAS: **NONE** Secondary:         5 Buffer Count:   5 Buf Size:    1000
                   Volume Count:      1 Stripes:        0 Concat #:      0
                   Curr Extent Count: 1

            --------------- Data Set Performance ----------------
            Avg Response Time:      2.34  Avg IOSQ Time:   0.00
                  Active Rate:     22.03  Avg Pend Time:   1.12
                  Total EXCPs:      3150  Avg Disc Time:   0.05
            Total Connect Time:          823.94  Avg Conn Time:   1.17

Volume Information for Volume PUBA01 -----------------------------------------

  Unit No.: 8359         Avg Resp Time:  1.72    Avg IOSQ Time:   0.00
  Dev Type: 3390-380     Active Rate:   72.00    Avg Pend Time:   0.20
 Alloc Cnt: 0              Dev Res:      0.00     Avg Disc Time:   0.03
  Open Cnt: 0              Dev Util:     0.00     Avg Conn Time:   1.50
   Mounted: PUBLIC
Cache Act.: CFW CAC DFW
****************************** End of Report ******************************
```

5. Press End to return to the previous panel.

Display Column Totals

You can display numeric totals and subtotals for any tabular panel. Column totals are the sum of all lines in the table, not just the lines displayed on the screen. Column subtotals are displayed when a panel is filtered. Column totals are fixed and remain on the screen when you scroll through the data.

You can display column totals by default.

Note: For more information, see the *Installation Guide*.

Follow these steps:

1. Type TOTals on the COMMAND line.

    The numeric totals for the panel will appear at the bottom of the panel.

```
CA MAT  ------------------------ TaskView ---------- Screen CUSTOMIZ changed
COMMAND ==>                                            SCROLL ==> CSR

Primary commands: SELect, RECall, ADDHelp               Profile: TUNSAMP
                                                        Options: NORMAL

   Line commands: T - Tag    C - Code Details
                  U - Untag  D - Delay Details

LC Program  T Actv% Data% System% VolWait% InvWait% Other% Total%
   _____ _ >.03_ ____ _____ _____ _____ _____ _____
   ----------------------------------------------------------------
__ DFHD2EX3  8.31 44.21  0.00    0.06    0.00    0.00  52.58
__ DFHD2EX3  0.82 13.22  0.00    0.01    0.00    0.00  14.06
__ DFHD2EX3  0.66  8.80  0.00    0.06    0.22    0.00   9.74
__ DFHKETCB  0.32  4.06  0.00    4.78    0.00    0.00   9.16
__ DFHD2EX3  0.19  3.00  0.00    0.20    0.00    0.00   3.38
__ DFHD2EX3  0.69  2.29  0.00    0.01    0.00    0.00   3.00
__ DFHD2EX3  0.13  2.64  0.00    0.04    0.00    0.00   2.81
__ DFHD2EX3  0.09  0.68  0.00    0.01    0.00    0.00   0.78
__ DFHD2EX3  0.04  0.39  0.00    0.12    0.14    0.00   0.69
__ DFHD2EX3  0.43  0.22  0.00    0.03    0.00    0.00   0.68
   -------------------------- Subtotals and Totals ---------------------
            11.72 79.95  0.00    5.33    0.36    0.00  97.36
            11.88 82.24  0.00    5.49    0.39    0.00 100.00
```

If you specify a filter for a field, the subtotals, which are the totals for the filtered data only, are displayed above the totals for all of the data.

```
CA MAT   ------------------------ TaskView ---------- Screen CUSTOMIZ changed
COMMAND ==>                                            SCROLL ==> CSR

Primary commands: SELect, RECall, ADDHelp                Profile: TUNSAMP
                                                         Options: NORMAL

   Line commands: T - Tag    C - Code Details
                  U - Untag  D - Delay Details

LC Program  T Actv% Data% System% VolWait% InvWait% Other% Total%
   _____ _ >.03_ ____ _____ _____ _____ _____ _____
   ------------------------------------------------------------------------------
__ DFHD2EX3    8.31 44.21  0.00    0.06    0.00   0.00  52.58
__ DFHD2EX3    0.82 13.22  0.00    0.01    0.00   0.00  14.06
__ DFHD2EX3    0.66  8.80  0.00    0.06    0.22   0.00   9.74
__ DFHKETCB    0.32  4.06  0.00    4.78    0.00   0.00   9.16
__ DFHD2EX3    0.19  3.00  0.00    0.20    0.00   0.00   3.38
__ DFHD2EX3    0.69  2.29  0.00    0.01    0.00   0.00   3.00
__ DFHD2EX3    0.13  2.64  0.00    0.04    0.00   0.00   2.81
__ DFHD2EX3    0.09  0.68  0.00    0.01    0.00   0.00   0.78
__ DFHD2EX3    0.04  0.39  0.00    0.12    0.14   0.00   0.69
__ DFHD2EX3    0.43  0.22  0.00    0.03    0.00   0.00   0.68
   -------------------------- Subtotals and Totals ----------------------
             11.72 79.95  0.00    5.33    0.36   0.00  97.36
                   11.88 82.24  0.00    5.49    0.39   0.00 00.00
```

2. Type TOTals again to remove the totals from the display.

Wildcard Characters

Certain fields accept wildcard characters. Valid wildcard characters are asterisk (*), percent sign (%), and question mark (?).

Asterisk: Use an asterisk at the beginning, middle, or end of a string to indicate the minimum acceptable value.

Asterisk as Wildcard Examples:

■ ABC* matches anything that starts with the characters ABC, regardless of what the string ends with.

■ *XYZ matches anything that ends with the characters XYZ, regardless of what the string begins with.

■ ABC*XYZ matches anything that begins with ABC and ends with XYZ, regardless of how many characters are in between.

Percent Sign: Use a percent sign to indicate that the position must be occupied by a number.

Percent Sign as Wildcard Example:

XYZ%% matches all instances of XYZ followed by two numbers. XYZ30 and XYZ42 satisfy the condition, but XYZ173 and XYZ2A do not.

Question Mark: Use a question mark to indicate that a given position must be occupied by any nonblank character, regardless of its type.

Question Mark as Wildcard Example:

JOB?A% matches all jobs that have JOB in the first three positions, any character in the fourth, an A in the fifth, and a number in the last position. JOB1A6 and JOB#A7 are matches, but JOB1Z is not.

Filter the Display

You can filter the information on a panel. By filtering on a field, you can alter the displayed data to the specific data you are interested in.

Follow these steps:

1. Choose a field with underscores beneath its title.

2. Press the Tab key to move to the underscores.

3. Type an operand and the filter criteria.

4. Press Enter.

   The display contains only data matching the filter criteria you specified.

Rules for Setting Filters

Use any of the following operands to filter information in a panel:

Operand	Description
>	greater than
<	less than
=	equals; the default
¬	not equal to
¢	not equal to

~	not equal to
>=	greater than or equal to
<=	less than or equal to

Wildcard characters are allowed in filters. For a list of valid wildcards, see Wildcard Characters (see page 44).

If you use a wildcard within a numeric value, that number is treated as a character string. For example, you can use the filter ??9 to filter a field to show only three-digit numeric values that end with the number 9.

If more than one filter is established for a panel, both conditions must be satisfied for the data to appear. If you want to use a filter that is wider than a column, you must use screen customization.

Filter Example

The Active Jobs panel is shown following without any filters in place. All jobs running on SYSI, SYSM and SYSO are shown.

```
CA MAT  ------------------------ Active Jobs ------------- Row 1 to 11 of 774
COMMAND ===>                                               SCROLL ===> CSR

Primary commands: STAtus                          Server ID: MATUNER
                                                     Status: ACTIVE
   Line commands: M - Display Monitoring Criteria  Local SYSID: SYSO
                  I - Invoke Monitor
                  S - Display Active Select Command


                              Sysplex         A/S Cur    CPU   EXCP
LC Jobname  Stepname Procstep SysName  ASID  Type Pos REAL Rate  Rate  SMFID
   _____ _____  _____  _____  ____  ___  __  ____ ____  ____  ____

>-------------------------------------------------------------------------
__ *MASTER*                   SYSI      1 STC  NS  1633            SYSI
__ *MASTER*                   SYSM      1 STC  NS  3210            SYSM
__ *MASTER*                   SYSO      1 STC  NS  5721            SYSO
__ PCAUTH   PCAUTH            SYSI      2 STC  NS    55            SYSI
__ PCAUTH   PCAUTH            SYSM      2 STC  NS    55            SYSM
__ PCAUTH   PCAUTH            SYSO      2 STC  NS    56            SYSO
__ RASP     RASP              SYSI      3 STC  NS   120            SYSI
__ RASP     RASP              SYSM      3 STC  NS   122            SYSM
__ RASP     RASP              SYSO      3 STC  NS   122            SYSO
__ TRACE    TRACE             SYSI      4 STC  NS   113            SYSI
__ TRACE    TRACE             SYSM      4 STC  NS   137            SYSM
```

By placing >2 in the CPU Rate field, the display is limited to active jobs with a CPU Rate of over 2 percent, as shown next.

```
CA MAT  ------------------------ Active Jobs ------------- Row 1 to 11 of 774
COMMAND ===>                                                SCROLL ===> CSR

Primary commands: STAtus                               Server ID: MATUNER
                                                           Status: ACTIVE
   Line commands: M - Display Monitoring Criteria      Local SYSID: SYS0
                  I - Invoke Monitor
                  S - Display Active Select Command

                             Sysplex       A/S  Cur    CPU   EXCP
LC Jobname  Stepname Procstep SysName  ASID Type Pos REAL Rate  Rate  SMFID
   _____  _____  _____  _____  ____ ____ ___ ____  >2__  ____  ____
>----------------------------------------------------------------------------
__   *MASTER*                 SYSI      1 STC  NS  1633            SYSI
__   *MASTER*                 SYSM      1 STC  NS  3210            SYSM
__   *MASTER*                 SYS0      1 STC  NS  5721            SYS0
__   PCAUTH   PCAUTH          SYSI      2 STC  NS    55            SYSI
```

By adding SYS0 to the field for Sysplex SysName, only the jobs running on SYS0 with a CPU Rate of over 2 percent are displayed, as shown next.

```
CA MAT ------------------------ Active Jobs ----------------- Row 131 of 779
COMMAND ===>                                                SCROLL ===> CSR

Primary commands: STAtus                               Server ID: MATUNER
                                                           Status: ACTIVE

   Line commands: M - Display Monitoring Criteria      Local SYSID: SYS0
                  I - Invoke Monitor
                  S - Display Active Select Command

                             Sysplex       A/S  Cur    CPU   EXCP
LC Jobname  Stepname Procstep SysName  ASID Type Pos REAL Rate  Rate  SMFID
   _____  _____  _____  _____  ____ ____ __ ___   >2__  ____  ____
>----------------------------------------------------------------------------
__  MMASYS0  MMASYS0 SSASYSPQ SYS0       49 STC NS 1364  2.06  7.05 SYS0
__  MV$PASK  PAS0    PAS      SYS0      230 STC NS  28K 11.32 143.1 SYS0
__  MV$CASK  CAS0    CAS      SYS0      236 STC NS  20K  9.82  7.63 SYS0
```

The filters established for both the CPU Rate and Sysplex SysName fields remain visible, so that you can always see the filters currently in effect.

Customize Panels

You can modify the display properties for each panel using the Screen Customization panel. This panel allows you to define how information is presented when a panel is displayed.

Follow these steps:

1. Type CUST on the COMMAND line of the panel.

2. Press Enter.

   The Screen Customization panel is displayed.

3. Use the line commands listed on the customization panel to define how you want the panel to display data.

4. Press End to return to the panel.

   You will see the customized display; however, the customization has not been saved. The customization is saved when the panel is exited.

   The following display shows the Screen Customization panel for the Active Jobs panel. The contents of the FIELD column are almost identical to the fields on the panel. These are the internal field names used by the SORT command.

```
CA MAT --------- Screen Customization for: CA MAT Display Active   ----------
COMMAND ===>                                                 SCROLL ==> CSR

Line commands: E - exclude  I - include  M - move  A - after  B - before
               S or SA - sort ascending  SD - sort descending  H - field help

S  FIELD     SORT INCL/ FLD  FILTER
                  EXCL  TYPE


>----------------------------------------------------------------------------
__  LC            INCL  CHR
__  JOBNAME       INCL  CHR   _____
__  STEPNAME      INCL  CHR   _____
__  PROCSTEP      INCL  CHR   _____
__  SYSID         INCL  CHR   _____
__  ASID          INCL  NUM   _____
__  ASIDX         EXCL  HEX   _____
__  TYP           INCL  CHR   _____
__  POS           INCL  CHR   _____
__  DPPR          INCL  NUM   _____
__  REAL          INCL  NUM   _____
__  CPURATE       INCL  NUM   _____
__  CPUTIME       EXCL  NUM   _____
__  TCBTIME       EXCL  NUM   _____
__  SRBTIME       EXCL  NUM   _____
__  DCPUTIME      EXCL  NUM   _____
__  DTCBTIME      EXCL  NUM   _____
__  DSRBTIME      EXCL  NUM   _____
__  EXCP          EXCL  NUM   _____
__  DELTEXCP      EXCL  NUM   _____

Press ENTER and END to apply changes or CANCEL to exit with no change
```

Fixed Fields

Notice that the first two fields, LC and JOBNAME, are highlighted. This highlighting identifies those fields as fixed fields. A fixed field remains at the left margin when you scroll the panel to see additional columns so that you can relate a jobname or other type of identifying information to the data being displayed.

Fixed fields are established by CA MAT and cannot be included, excluded, or moved. In addition, other fields cannot be moved in front of a fixed field. For more information about fixed fields, see Scroll Panels (see page 38).

Sort the data on a panel

Follow these steps:

1. Type **SD** next to the field you want to sort by, in the S column to sort in descending order

   or

   Type **SA** to sort in ascending order.

   If a sort condition already exists for a panel, an A or a D appears in the SORT field.

   A panel can be sorted by only one field at a time.

2. Type **NOSORT** on the **COMMAND** line to remove sort criteria from a panel.

Exclude or Include Fields from the Display

To exclude a field from view, type an **E** in the S column next to the field.

To include a previously excluded field, type an **I** next to the field.

Reorder Fields

Follow these steps:

1. Type **M** in the S column next to the field to be moved.

2. Type **A** for after or **B** for before to indicate where the field must go.

Add a Filter

To add a filter, type the operand and the value in the **FILTER** field; for example, >2, =15, =MAK*.

The following wildcards are valid for the FILTER field:

- ■ * Indicates any character.
- ■ % Indicates any single digit.
- ■ ? Indicates any single character.

Remove a Filter

To remove a filter, blank out the filter in the **FILTER** field.

Display Field Help

Follow these steps:

1. Type **H** in the S column next to a field

    The Help pop-up panel for that field is displayed.

2. Press **End** to return to the Screen Customization panel.

Reset the Display

To delete changes made to the display, type RESET on the COMMAND line and press Enter. The display reverts to the previously saved customization format. If customization changes have not been added and saved, the RESET command reverts to default parameters.

Customization changes are saved in your ISPF PROFILE in a member called TUNPROF. To restore all panels to their original configuration, delete the TUNPROF member from your ISPF profile data set.

Confirm Screen Customization

Only changes made using the Screen Customization pop-up panel can be saved. Changes made by altering the filter or sort criteria directly on a panel are discarded as soon as another panel is displayed.

When you exit a panel you have customized, the Confirm Screen Customization pop-up panel is displayed:

```
|-----------------------------------------------------------------|
|CA MAT  --------- Confirm Screen Customization ----------------|
|                                                                 |
|                                                                 |
|Screen TUNDACT has been customized.  To save the customized    |
|  screen, press ENTER .  To cancel any changes, enter END .    |
|_____|
```

■   To save your changes, press Enter

    The next time you access CA MAT, the customized version of the panel is displayed.

■   To discard your customized panel and restore the original version, press End.

Save the Information on a Panel

CA MAT allows you to save the data displayed on any panel for later use by exporting the information to an ISPF data set. You can then include the data in another report, download the data for use in a PC spreadsheet program, or perform many other operations.

Export a Panel

Use the following procedure to export a panel.

Follow these steps:

1. Display the panel that you want to export; for example, CodeView.

2. Type EXPORT on the COMMAND line.

3. Press Enter.

    The Screen Export Information panel is displayed:

```
CA MAT  --------- Screen Export for: CodeView                    --------
COMMAND ==>

ISPF library:
  Project ==>
  Group   ==>
  Type    ==>
  Member  ==>                     (Blank or pattern for member selection list)

Other partitioned or sequential dataset:
      Dataset name  ==>
      Volume serial ==>           (If not cataloged)

Export options:
        Disposition ==> REPLACE   (Replace or Append)
  Edit after export ==> NO        (Yes or No)
      Output format ==> CSV       (CSV or ASIS)
               Rows ==> ALL       (All or Filtered)

Press ENTER to export screen or END to exit with no export
```

4. Type the name of the data set and member to which you want to export the panel in the ISPF library fields or Other partitioned or sequential data set field.

5. Specify the four parameters for Export options, as described next.

    Disposition

    Specify **Replace** if you want to replace an existing data set.

    Specify **Append** to add the data at the bottom of the existing data set or member.

Edit after export

- Specify **NO** to transfer the data to the specified data set and return to the panel. You may edit the data at a later time.

- Specify **YES** to transfer to the data set and member in standard ISPF edit mode.

Note that for performance reasons, CA MAT sets the ISPF RECOVERY parameter to OFF.

Output format

Specify **ASIS** if you want the format to appear as it does online.

Specify **CSV** if you want the exported data to be in Comma Separated Value format. The CSV format is useful if you are downloading data to a spreadsheet.

Note that if you have set your ISPF decimal delimiter variable (ZDEC) to a value other than a decimal point (.), a semicolon (;) is used instead of a comma (,) to separate the values.

Rows

Specify **ALL** if you want to ignore any filters that might be in effect and export all the data.

Specify **FILTERED** to export the data as displayed on the panel.

The amount of data exported is determined by the size of the data set to which you export, not by the size of your terminal display. For example, suppose you have an 80-byte terminal monitor and must scroll to the right to see all the fields on a particular panel.

When you export the panel to a 121-character data set, CA MAT exports the full 121 characters worth of data, not just the 80 bytes currently visible.

If you are planning to create a data set expressly to export panels, it is recommended that the data set be allocated with a logical record length of 589 characters, which will accommodate the widest panel.

6. Press End to end the edit session and save the data or type CANCEL to quit without saving.

Write Data from a Table to SYSOUT

The Report primary command enables you to write the data displayed in a panel to a SYSOUT data set.

Follow these steps:

1. Type REPORT on the COMMAND line on a panel.

2. Press Enter.

   The following report information panel is displayed, if the Report command is not available for a particular panel, CA MAT issues a message:

```
CA MAT  --------- Report for: CodeView                   -------------
COMMAND ==>

Output Information:
   SYSOUT class     ==> A
   Lines per page   ==> 60              (from 10 to 99)
   Report width     ==> 133             (from 80 to 255)
   Carriage control ==> ANSI            (ANSI or MACHINE)
   Destination ID   ==>                 (Valid JES DESTID or blank)
   Report form      ==>                 (Valid JES form name or blank)

Table Format Information:
   Include rows     ==> FILTERED (ALL or FILTERED)

User Data:
   User heading     ==>

Press ENTER to generate report or END to exit with no report
```

3. Specify each of the fields as explained next.

   SYSOUT class

   Specify the JES SYSOUT class for the printed report.

   Lines per page

   Specify the number of lines, including the header, to be written to a single page before a new page is initiated.

   Report width

   Specify the width of the report. If there are columns to the left of the panel, they are included in the report up to the width of the report.

   Carriage control

   Specify whether ANSI or MACHINE carriage control characters are to be used.

Destination ID

Specify the one- to eight-character node name of the JES destination that the SYSOUT report is to be written to. In addition, you can specify a one- to eight-character user ID. If you specify a user ID, it must follow the node name and must be separated from the node name with a period.

Report form

Specify a one- to four-character JES form name for the destination that the report is to be written to.

Include rows

Specify **ALL** if you want to report on all the data, regardless of the filters in effect. Specify FILTERED to report on just the data that satisfies the filter criteria.

User heading

Specify a user title of up to 47 characters to be included as part of the report heading.

Issue Commands in a Sysplex Environment

The following console commands are specific to use of CA MAT in a sysplex environment. These commands permit you to shut down all servers within the sysplex group or temporarily change a parameter for one or more servers in an XCF group.

To shut down all servers, issue the following command:
`F MATUNER,PERFORM SHUTDOWN TARGSYS1(*)`

To change a parameter for one or more servers in an XCF group, issue the following command:
`F MATUNER,PERFORM SETPARM TARGSYS1(*) parameter(operand)`

where the asterisk is a wild card used to represents the target system names, *parameter* represents the parameter to be changed, and the *operand* is the new value.

The following example demonstrate the use of the SETPARM command to change the MAXACT parameter from its current setting to10 for all servers in the XCF group.
`F MATUNER,PERFORM SETPARM TARGSYS1(*) MAXACT(10)`

To change the MAXACT value for a single server, you would identify the server using the TARSYS1 operand rather than inserting a wild card, as shown in the following example.
`F MATUNER,PERFORM SETPARM TARGSYS1(SYSA) MAXACT(10)`

Using SETPARM temporarily changes the parameter value for the selected server.

To permanently change the parameter value, edit TUNSSP00.

The available parameters for use with the SETPARM command are discussed next.

MAXACT

Specifies the maximum number of active monitor requests.

Value: nnn

QTLIMIT

Specifies the maximum number of hours before CA MAT automatically stops the waiting monitor (168 hours is one week).

Value: nnn

CAFSTALL

Specifies the maximum number of seconds CA MAT will catalog records as it waits for DB2® to respond. It is recommended that this value be set to at least 90 seconds.

Value: nnn

DSNPREFX

Specifies the 1-8 character name that is used as the first qualifier of the monitor data set names.

Value: ssss

CICSNAME

Specifies the CICS start-up program if it is not the standard CICS name of DFHSIP.

Value: ssss

CAPS

Indicates if CA MAT is set to translate all messages to uppercase (ON) or not (OFF). The purpose of this feature is to make sure CA MAT is compatible with katakana consoles.

Values: ON|OFF

LOGGING

Indicates whether internal logging is to be turned on or off and at what detail level. Log records are written to TUNLOG.

Values: L1|L2|

Chapter 3: Setting up a Monitor Definition

This chapter describes how to create and manage monitor definitions.

This section contains the following topics:

Samples and Observations

Starting with release 4.0 of CA MAT, there is a change in the definition of how samples are gathered.

Formerly, when you requested the number of *samples* to be gathered, the request was actually for the number of times CA MAT observes the complete activity of the address space. That is, the request was for the number of times the address space is swapped out, nondispatchable, delayed by LPAR/disabled work, actively using CPU, and waiting. Only the last two activities (actively using CPU and waiting) actually generate samples.

Because of this situation, CA MAT is introducing the concept of *Observations* and *Samples*. When you define how an address space is to be monitored (measured), you will request the number of times the address space activity is observed. Observations and observation rate are the only things you can influence, because you cannot predict beforehand the number samples that CA MAT will gather.

A sample within CA MAT reflects the activity of a TCB during an observation. The number of samples per observations can fluctuate tremendously from 0 to the total number of TCBs attached at the time of the observation.

So, an *observation* is the number and rate that CA MAT will examine the activity of the address space to be measured. A *sample* is created to reflect the activity of a TCB during an observation. There can be many samples gathered during an observation or 0 samples gathered, depending on the activity.

Sampling Rules

When samples are created to reflect the activity of a TCB, there are certain rules which determine if the sample shows any noteworthy activity. These rules are as follows:

- If a TCB is actively using the CPU, a sample is always written for the TCB.

- If the TCB is waiting and is not the jobstep task (subtask) and the ECB that the TCB is waiting for cannot be related to anything that CA MAT reports (file activity, database activity, and so on), the sample is discarded. For instance, if a subtask is waiting for an ECB for an internal work queue that is only known to the application, the sample is discarded. If the ECB relates to file activity, the sample is considered noteworthy and is written to the monitor file.

- If the TCB is the jobstep TCB, all waiting activity is recorded with one exception. If the ECB or an ECB within an ECB list contains the termination ECB of a subtask, the waiting sample for the jobstep TCB is discarded. It is assumed by CA MAT that if a task waits for a subtask to be completed, it is performing the same functionality as a LINK but doing it with ATTACH instead.

Because of these rules, there can be large fluctuations in % Samples Active and % Samples Waiting. Without knowledge about the application and the address space type, the numbers might appear to be invalid in a multitasking and multi-CPU environment.

What is a Monitor Definition?

A monitor definition tells CA MAT which program to monitor. It specifies details about the job step and its programs, transactions, 4GL languages, or external databases. You create a monitor definition by specifying a set of monitoring criteria. You invoke a monitor definition to collect a set of sample data for analysis.

CA MAT maintains monitor definitions across sessions. This feature allows you to reuse the same monitor definition when you want to repeat a certain analysis after making changes to the program code based on a previous analysis. You can examine the impact of your changes by using this iterative approach to performance tuning. For each subsequent invocation of a monitor definition, you do not need to respecify data which ensures that CA MAT uses the same monitoring criteria.

Invoke a Monitor Definition

A monitor definition becomes a monitor request from the time it is invoked until the observation and sampling processes are complete. The Server Space tracks the monitor requests of all users on the z/OS image on which CA MAT is active. Any number of monitor requests can be active at the same time, depending on the value that is specified on the MAXACT TRPARM parameter. See the *Installation Guide*.

A monitor can be invoked in the following ways:

■ By invoking a monitor definition for managed or scheduled monitoring

■ By choosing a job that is actively running for immediate results

■ From outside the TSO Client for automated operations

Monitor requests are written to the Global Information File (GIF), which allows for persistence of the request, even if the Server Space is deactivated or if the entire system is shut down. When the Server Space is started through a batch job or during IPL, it reads the monitor request from the GIF and reinstates any waiting monitor requests.

For more information, see the chapter "Invoking a Monitor (see page 93)."

You can invoke a monitor automatically when you exit the Monitoring Criteria panel. Specify YES or CONFIRM in the Invoke Monitor field on the Profile Parameters panel.

For a complete description of the Profile Parameters panel, see the *Installation Guide*.

Analyze Monitor Data

After the monitor request terminates, you can analyze the data you collected by using the Interactive Analysis Facility.

Note: For more information, see the chapter "Analyzing Monitor Data (see page 113)."

Create a Monitor Definition

Before CA MAT begins monitoring a program, create a monitor definition that describes the target program and the observation criteria.

Follow these steps:

1. Select Option 1 from the Primary Option Menu.

   The Monitor Definition panel opens.

```
CA MAT  -------------------------- Monitor Definition --------- Row 1 to 1 of 1
COMMAND ===>                                                  SCROLL ===> CSR

Primary commands: ADD xxxx, STAtus                       Server ID: MATUNER
                                                              Status: ACTIVE
Line commands: S - Select   A  - Analyze Normal  D  - Delete
               I - Invoke   AL - Analyze All     DD - Delete w/dsns
               H - History  AA - Analyze Active  B  - Batch Reports
               C - Copy     AW - Analyze Wait    V  - CSV Reports
               X - Export Monitor Data           J  - Display Job Card

LC Profile  Status    Schedule Runs Description            Jobname  Stepname|


   _____ _____ _____ ___ _____ _____ _____
>-----------------------------------------------------------------------------
******************************************************* End of Table *******
```

The list of commands available on the Monitor Definition panel are as follows:

ADD

Adds the monitor definition to the Monitor Definition panel.

Note: For more information, see <u>Add a Monitor Definition</u> (see page 68).

STAtus

Displays information about the progress of the observation and sampling process that is associated with all monitor requests.

Note: For more information, see <u>Display Monitor Request Status</u> (see page 96).

S - Select

Lets you select an existing monitor definition you want to edit.

Note: For more information, see <u>Edit a Monitor Definition</u> (see page 82).

I - Invoke

Starts a monitor from the TSO client using the existing monitoring criteria.

Note: For more information, see <u>Invoke a Monitor from the TSO Client</u> (see page 94).

H - History

Displays the Monitor History panel, which lists information about each monitor session invoked for the monitor profile selected. From here, you might analyze the data that is gathered during any monitor session.

For more information, see Display Monitor History.

C - Copy

Lets you create multiple versions of the same monitor definition without having to retype all the monitoring criteria.

Note: For more information, see Copy a Monitor Definition (see page 82).

A - Analyze Normal

Displays information that is not directly related to the target application is eliminated. Data is reported as follows:

The following samples are eliminated from analysis: Non-dispatched (.NONDISP), No CPU available (.DISPWT), Processor Delay (.PROCDLY), Page wait (.PAGEWT), Swapped (.SWAPWT), and No activity (.OTHERWT). These samples are considered for the overall OverView activity percentages and runtimes.

CodeView and related histograms are sorted based on Active percentages, not total percentages. The Visual field reflects the Active percent only. Wait samples are included. Percentages are calculated on total samples; all activity values have equal weight.

AL - Analyze All

Allows you to compare delays occurring when the program is executing in both active and wait states.

Percentages are calculated based on all samples.

AA - Analyze Active

Allows you to analyze information and calculate the percentages based on samples where the program was actively using CPU. Samples that contain only wait information are filtered out, which allows you to make normalized CPU comparisons of program activity.

AW - Analyze Wait

Allows you to analyze information and calculate percentages based on samples where the program was in a wait state. Samples that contain only active information are filtered out which allows you to make normalized comparisons of program wait activity.

D - Delete

Removes the monitor definition and the monitor's history but does not delete the associated monitor data sets.

Note: For more information, see Delete a Monitor Definition (see page 83).

DD - Delete w/ dsns

Deletes the data sets that were created by monitoring sessions under that definition and then deletes the monitor definition

Note: For more information, see Delete a Monitor Definition (see page 83).

B - Batch Reports

Lets you generate batch reports any time after you invoke the monitor and data collection has been completed.

Note: For more information, see Submit a Job to Generate Batch Reports (see page 285).

V - CSV Reports

Accesses the CSV Reporting panel that allows you to submit a batch job to create comma-separated value output of analysis reports for the selected profile. These reports can be imported for use with the Spreadsheet Converter.

Note: For more information, see Create Spreadsheet Reports (see page 295).

J - Display Job Card

Displays the batch reports job card that is associated with the selected Monitor profile.

X - Export Monitor Data

Creates an export file of the monitor data set suitable for electronic transmission. Use this command when sending monitor data to CA Technical Support.

The fields on the Monitor Definition panel are described next.

Profile

Defines the profile name that is specified when you created the monitor definition.

This field is also referred to as the Monitor Definition name.

Status

Displays the status of the monitor request.

Status is refreshed each time you press **Enter**. Status contains one of the following values:

Waiting

Indicates that the request has been submitted to CA MAT but the target is not active. CA MAT is waiting for an opportunity to begin monitoring the target application.

Active

Indicates that the CA MAT is actively monitoring the indicated target. (Observations are being taken and samples are being collected.)

Inactive

Indicates that the monitor definition is available, but the Server Space has not been requested to begin monitoring.

Delete

Indicates that the request is no longer tracked by the Server Space. Output data is available in the monitor data set.

Incomplete

Indicates that the request is no longer tracked by the Server Space. The output data set is not found.

Unknown

Indicates that communications could not be established with the Server Space. The Server Space might need to be activated.

Schedule

Displays the name of an associated schedule for the monitor to run.

Runs

Displays the number of monitor invocations after the definition was created.

This value is the number of data sets that are available in the Monitor History panel.

Description

Displays the text describing the monitor definition.

Batch

Indicates whether a preset series of reports are created in batch mode after the monitor is complete.

Jobname

Displays the name of the job to be monitored

2. Scroll right to display the following fields:

Procstep

Displays the name of the procedure step to be monitored if the job step uses a cataloged or in-stream procedure.

Stepname

Displays the name of the job step to be monitored.

If no cataloged procedure is used, displays the step name on the EXEC statement that invoked the program. If a cataloged procedure is used, displays the name of the step that invoked the procedure.

Program

Displays the name of the program on the JCL EXEC statement of the job to be monitored.

Multi-Step Monitoring

Indicates if the profile has multistep monitoring specified.

Step Monitoring

Indicates if the profile specifies that the entire job step is to be monitored.

Date

Displays the date of the last monitor to be analyzed.

Time

Displays the time of the last monitor to be analyzed.

Monitor Dataset

Displays the data set name of the file to monitor for each profile.

This name generally contains variables. For a complete description, see Add a Monitor Definition (see page 68).

Actual Dataset

Data set name of the monitor data set with variables substituted.

TCB incl-1 to TCB incl-4

Specifies that the tasks identified by these names are included in the monitor.

No other tasks are monitored.

TCB excl-1 to TCB excl-4

Specifies that the tasks identified by these names are excluded from the monitor.

All other tasks are monitored.

Observation Interval

Displays the number of milliseconds between observations.

CA MAT calculates this number and adjusts it during the monitoring period.

Observations

Displays the number of observations requested.

Elapsed

Displays the amount of time in seconds that the job step is monitored.

Strt Delay

Displays the delay in seconds for startup of the monitor request.

You might want to specify a delay to skip monitoring the initialization functions within the job step.

Monitors per job step execution

Displays the number of monitoring sessions to be started for a single execution of a job step.

When a monitor session reaches its target observation count, CA MAT closes the monitor data set, and continues monitoring with a new monitor data set. When a monitor data set is closed, it is available for analysis. This process is known as successive monitoring.

The number is specified on the Job Monitoring Criteria panel, which appears from the All Jobs field of the Monitoring Criteria panel.

To specify successive monitoring, enter a value equal to or greater than 1 in the following field:

Run up to 0 monitors per job step execution

Number of job step runs to monitor

Displays the number of times a monitor is run for a job step.

This field allows for multiple monitor runs for only one invocation.

The number is specified on the "Job Monitoring Criteria" panel (which appears from the All Jobs field of the Monitoring Criteria panel).

To specify recurrent monitoring, enter a value equal to or greater than 1 in the following field:

Monitor this job the next 0 times it runs

Strt Window

Displays the start of a time range during which the monitor request is valid.

If the job step to be monitored ends before the start time, the monitor does not start. If the job step is running at the start time, monitoring begins at that time.

End Window

Displays the end time of a time range during which the monitor request is. valid

If the job step to be monitored does not start before the end time, the monitor request is canceled.

DB exit

Displays the name of the exit routine for monitoring non-DB2 databases.

4GL exit

Displays the name of the exit routine for monitoring 4GL languages.

Target 1- Target 4

Specifies the target systems in a sysplex where a job is monitored.

Blank specifies local system only. "*" specifies all systems in the sysplex.

Trans. 1 - Trans. 4

Specifies that the transaction codes are to be monitored for IMS and CICS jobs only.

Term 1 - Term 4

Specifies that the terminal IDs are to be monitored for IMS and CICS jobs only.

User 1 - User 4

Specifies that the user IDs to be monitored for IMS and CICS jobs only.

EXPLAIN SQL

Specifies that information about the DB2 access path selection is to be collected for DB2 SQL statements.

Use DB2 Catalog

Specifies whether the plan or package statements are to be extracted from the DB2 catalog or directly extracted from the DB2 control blocks when monitoring a DB2 application.

OLTP

Displays the type of transaction processing system, if any, that was monitored for IMS and CICS jobs only.

Tasklib

Specifies the name of an alternate DDNAME from which the monitored program loads other programs.

CA MAT requires the location of program load modules to obtain the information required to display CSECT offsets during analysis.

WAS Expert

Specifies whether to enable PSW sampling when a WebSphere application server application is monitored.

Specify Y to enable this feature, N to disable it.

Disabling this feature reduces the amount of data collected. CA MAT analysis is limited to WebSphere data only.

Created By

Defines the TSO User ID of the creator of this monitor definition.

Date Created

Defines the date on which this monitor definition was created.

Time Created

Defines the time at which this monitor definition was created.

Changed By

Defines the TSO User ID of the last person to change this monitor definition.

Date Changed

Defines the date on which this monitor definition was last changed.

Time Changed

Defines the time at which this monitor definition was last changed.

Add a Monitor Definition

Use the following procedure to add a monitor definition and specify the required parameters for monitoring a session.

Follow these steps:

1. Type ADD xxxx on the COMMAND line to add a new monitor definition. *xxxx* is a one- to eight-character unique identifier for the monitor definition.

   The identifier is maintained as the profile name for the monitor you are adding. Profile names are displayed on the Monitor Definition panel and are sorted alphabetically.

2. Press Enter.

   The Monitoring Criteria panel opens.

```
CA MAT  ---------------------- Monitoring Criteria --------------------------
COMMAND ==>

Specify parameters for monitoring session:                    Profile: X
     Description ==>
   Batch reports ==> N (Y or N)
Monitor dataset ==> '&USERID.&PROFILE.&SYSDATE.&SYSTIME'

Specify target name: (Job required)
    Job ==> X        Step ==>          Pstep ==>          Prog ==>
     Multi-Step Monitoring ==> NO  (YES or NO)
Specify target systems in SYSPLEX: (default is local system only)
System ==>                   >                   >                   >

Specify parameters for target job name:
        Monitor duration ==> 60S    (Used as estimate)
      Monitor entire step ==> NO     (Yes or No)
   Observations Requested ==> 6000
DD name for load modules ==>
Tab to the environment for additional monitoring options and press
ENTER to select:   All Jobs  CICS  IMS  DB2
                   WebSphere Application Server

Press END to save changes; enter CANCEL to exit without saving
```

3. Specify all required information for your monitor definition.

   Fields identified as Optional might narrow down the selection and generate fewer but more precise samples.

4. Press End to save your changes, or type CANCEL to exit without saving changes.

The fields in the Monitoring Criteria panel are described next.

Specify parameters for monitoring session

   Profile

      Indicates the profile name specified with the ADD *xxxx* command.

Description (Optional)

Specify a one- to 24-character description of the monitor definition.

The description appears in the Monitor Definition pane.

Batch reports (Optional)

Specify Y or N to determine if CA MAT creates a user-defined series of reports in batch mode after the monitor is completed. This setting overrides the default set on the Profile Parameters panel. See the chapter, "Generating Batch Reports (see page 285)" for information about defining batch reports.

Monitor dataset

Specify the name of the data set to receive the output data from the monitor request. Each node of the monitor data set might contain either fixed text or one of the following variables:

&USERID

Indicates the TSO ID of the user who initiated the monitor request.

&PREFIX

Indicates the TSO prefix or value specified in TUNCALL PREFIX keyword.

&PGMNAME

Indicates the program name obtained at ATTACH time.

&PROFILE

Indicates the name of the monitor definition profile used to start the request

&SYSTIME

Indicates the time that a request was initiated, in the following format: 'T'*hhmmsst.*

&SYSDATE

Indicates the date that a request was initiated, in the following format: 'D'*ccyyddd.*

&SYSNAME

Indicates the z/OS system name.

&JOBNAME

Indicates the name of the job.

&STEPNAME

Indicates name of the job step.

&PROCSTEP

Indicates name of the procedure step.

&JOBID

Indicates the JES job identification number.

If the data set name is not enclosed in quotation marks, the user prefix is appended as the first node of the name. For more information, see the *Installation Guide*.

Specify target name

Job (Required)

Type the name of the job to monitor. Wildcard characters are allowed. See the section on Wildcard Characters for a list of valid wildcards.

Step (Optional)

Type the name of the step to monitor. Within a multistep job that uses cataloged procedures, you must specify a Step name and a Pstep name or a Program name to select the correct program.

If the target of the Step name is a cataloged procedure or an instream procedure, you must further define the step that you want to monitor by using Pstep name.

P-step (Optional)

Type the name of the procedure step to monitor. Use this parameter only if the job step uses a cataloged or instream procedure.

Prog (Optional)

Type the name of the program to monitor.

If you do not specify Program name, you must specify Step name, and Pstep name, when appropriate.

Multi-Step Monitoring

Specify YES if CA MAT is to monitor every job step that matches the criteria that is specified in the Step**,** Pstep**,** and Prog fields of the Monitoring Criteria panel.

Specify NO if only the *first* job step that matches the criteria should be monitored.

If you specify YES, the results are collected into multiple data sets and each data set must be analyzed.

Specify target systems in SYSPLEX

System

Type the name of the target systems in the System fields. You can specify up to four system names. Each name can specify a single system or a generic name by using a wildcard indicator; for example, PR*. The default is blank, which specifies the local system only. "*" specifies all systems in the sysplex. See Specify Target Systems for Parallel Sysplex.

Specify parameters for target job name

Monitor duration

Specify the duration in seconds for which the observation process is active. You can also specify minutes by appending an uppercase M to the numeral: 10M. Monitor duration must be a numeric value from 1 to 999997 (16,666 minutes). The default is 60 seconds.

This value is used to set the observation rate based on the number of observations requested.

Specify NA to request that the monitor collect a number of samples equal to the number of Observations Requested regardless of how many observations or how much time it takes to collect that number of samples.

The value NA is not honored if CA MAT detects we are monitoring a Websphere servant and the Websphere Application Server Criteria Expert Mode option is set to N.

Monitor entire step

Specify YES in this field to gather information about an entire job step.

Specify NO to monitor until the requested number of observations are made.

Do not use YES in this field for long-running jobs because this option causes significant delays in loading the data for interactive analysis.

Note: For more information, see Determine Number of Observations to Take and Total Time to Monitor.

Observations Requested

Specify the number of observations to take during the monitor period. The default value is 6000 observations.

Note: For more information, see Determine Number of Observations to Take and Total Time to Monitor.

DD name for load modules (Optional)

Select an additional DD name to consider for load modules. Some applications load programs from a specific DD name. CA MAT searches the PDSs allocated to this DD name to get module and CSECT information during the monitor session.

Additional monitoring options

ALL JOBS (Optional)

Use the Tab key to move to this field and press Enter to display a pop-up panel that allows you to choose tasks to include or exclude.

Note: For more information, see Monitor Criteria for ALL JOBS.

CICS (Optional)

Use the Tab key to move to this field and press Enter to display a pop-up panel that allows you to specify transaction codes, terminal IDs, and user IDs.

Note: For more information, see Monitor Criteria for CICS.

IMS (Optional)

Use the Tab key to move to this field and press Enter to display a pop-up panel that allows you to specify IMS transaction codes, terminal IDs, and user IDs.

Note: For more information, see Monitor Criteria for IMS.

DB2 (Optional)

Use the Tab key to move to this field and press Enter to display a pop-up panel that allows you to specify options concerning collection of access path information and SQL text.

Note: For more information about DB2, see Monitor Criteria for DB2.

WebSphere Application Server (Required for monitoring WebSphere Application Server)

Use the Tab key to move to this field and press Enter to display a window that allows you to specify application URL and system class filters for monitoring WebSphere Application Server. You can also specify if you want to collect PSW samples and enable Expert Mode.

Note: For more information about this application, see Monitor Criteria for WebSphere Application Server.

Specify Target Systems for Parallel Sysplex

CA MAT allows you to view an entire sysplex as a single system. If you want to monitor a job that is running on a specific system (or one of several systems), type the name of the system in the System field. You can specify up to four system names. Each name can specify a single system or a generic name by using a wildcard indicator; for example, PR*.

Depending on what you specify for System, CA MAT will monitor a job as follows:

- **No target systems specified (blank):** CA MAT monitors jobs that are running in the local system only. This option is known as a local request. No target systems specified is the default.

- **One target system:** CA MAT monitors a job only if it is running in the specified system. Any jobs with the same name that are executing on a different system are ignored. This option is known as a target request.

- **Multiple target systems:** CA MAT monitors the first job to execute on any of the specified systems. CA MAT only monitors the first job to start, and any other matching jobs are ignored.

- **All systems: (*)** CA MAT monitors jobs that are running on all systems in the sysplex. CA MAT only monitors the first job to start, and any other matching jobs are ignored.

Data is sent back to the local system for recording because allocation of a data set on the target system might be precluded by shared DASD restrictions, security, or SMS DASD policies. If the local system is not available, recording takes place on the target system.

Determine Number of Observations to Take and Total Time to Monitor

The accuracy of analysis by CA MAT is determined primarily by the number of observations taken over a specified period. The number of observations made, and subsequently the number of samples taken, are determined by the values that you supply in the Monitor duration and the Observations Requested fields on the Monitor Criteria panel. The observation rate, which is how often an observation is taken, is calculated internally by CA MAT.

For example, if you specify 6000 observations to be taken in 60 seconds, CA MAT automatically calculates the observation rate as follows:

```
60 seconds ¸ 6000 observations = .01 seconds
```

For this situation, CA MAT makes one observation every 10 milliseconds in the address space (if only one task is found).

If you want to monitor the entire duration of a job step, specify YES in the Monitor entire step field.

As a minimum, CA MAT takes the requested number of observations over a variable time frame. The actual number of observations taken might exceed the requested number of observations, but the number of observations considered for the reports is between the number of observations requested and no more than a maximum of 2 times the number of observations requested minus 1. This result assumes that the job step ran long enough to allow CA MAT to capture the requested number of observations at the highest observation rate.

Under certain circumstances, you might need to take significantly more observations. However, taking more observations requires more analysis time. It is recommended that you take between 3000 and 10000 observations for an effective balance of accuracy and performance.

Specify Additional Monitoring Criteria

The Monitoring Criteria panel contains fields that enable you to specify information specific to a particular environment. Navigate to the environment that you plan to monitor and press Enter to display a pop-up panel. Use the fields in the pop-up panel to specify the monitoring conditions to CA MAT.

Monitor Criteria for ALL JOBS

Regardless of the type of job you are monitoring, you can select ALL JOBS to display the Job Monitoring Criteria panel.

```
CA MAT ---------------- Job Monitoring Criteria -----------------------
COMMAND ===>

Scheduling:
  Current schedule ===>           (enter a / for schedule list or + for
                                   the schedule only for this monitor)

Additional monitoring criteria:
  Run up to 1     monitors per jobstep execution
  Monitor this job the next 1     times it runs
  Delay monitoring 0     seconds after step start
  Call user written 4GL exit programs for this monitor     1:
                                                           2:
  Call user written Data Base exit program for this monitor:

For all jobs:
  Tasks to include ===>          >          >          >
  Tasks to exclude ===>          >          >          >

Press END to return to Monitor Criteria.
```

Scheduling

You can limit the period where CA MAT attempts to schedule a monitor session by either associating the request with a specific Schedule or specifying scheduling criteria that is specific to this monitor definition only. To use an existing schedule, either enter the name of the schedule, or enter a slash (/) to see a list of existing Schedules. To specify unique scheduling criteria for this monitor definition, enter a plus sign (+).

For more information about schedules, see <u>Create a Monitor Schedule</u> (see page 87).

Additional Monitoring Criteria

With these fields, you can specify whether the profile has successive or recurrent monitoring associated with it.

Run up to

Specify the number of monitoring sessions to be started for a single execution of a job step. When a monitor session reaches its target observation count, CA MAT closes the monitor data set, and continues to monitor with a new monitor data set. The range is 1 to 9999.

When a monitor data set is closed, it is available for analysis.

Monitor this job

Specify the number of times this job step will be monitored. The range is 1 to 9999. The default is 1. Specifying a larger value causes CA MAT to monitor each recurrent execution of this job step until the specified limit is reached. This monitoring is especially useful for jobs that execute in response to some external event or job steps that you want to monitor every time they run. Specifying a value greater than 1 removes the need for reinvoking the monitor after the job has run the first time.

Delay monitoring

Specify the delay (specified in seconds) for the startup of the monitor session. You might want to specify a delay in order to skip monitoring the initialization functions within the job step. The range is 1 to 9999.

Call user written 4GL

Specify the name of a 4GL program to be called by CA MAT during the monitor session.

4GL Exits allow CA MAT to relate activity to the user-written Fourth-Generation Language statements that caused the activity, instead of the default of identifying only the service routines of the 4GL Language being used.

Call user written Data Base

Specify the name of a database exit to be called by CA MAT during the monitor session.

Database Exits allow CA MAT to relate the database activity to the application components responsible for the activity, such as SQL statements of database calls invoked by application programs.

Include and Exclude Tasks

A subtask is a uniquely dispatchable unit of work within z/OS. Some jobs might have active serial subtasks to perform various work for the application.

Use the Tasks to include field to restrict monitoring to specific subtasks within the address space. Specify up to four tasks to be sampled in a multitasking environment.

Use the Tasks to exclude field to omit up to four tasks from sampling in a multitasking environment. You might not want to monitor all subtasks within the address space if their functions have nothing to do with your application.

Wildcard characters are allowed. For a list of valid wildcards, see Wildcard Characters (see page 44).

After sampling is complete and you begin your analysis, use TaskView to display a list of the tasks that are monitored by CA MAT. For more information, see Interactive Analysis Option 1 - TaskView (see page 137).

If the Tasks to include field on the Job Monitoring Criteria panel contains an entry for DSNECP10, only one sample can be collected per observation taken into the region.

Monitor Criteria for CICS

If you are monitoring a CICS job, select the CICS field to display the CICS Monitoring Criteria panel.

```
CA MAT ---------------- CICS Monitoring Criteria -----------------
COMMAND ===>

For CICS transactions:
  Transaction codes ===>        >         >         >
        Terminal IDs ===>        >         >         >
            User IDs ===>        >         >         >

Specify values. Press END to return to Monitoring Criteria
```

Only one online transaction processing system can be specified within a monitor definition. If you enter any information into the CICS Monitoring Criteria panel, the IMS option cannot be selected. To cancel CICS, blank out all Transaction codes, Terminal IDs, and User IDs, and exit the panel.

Transaction codes

Specify up to four CICS transaction codes to monitor. If you specify multiple transaction codes, they are ORed together.

Wildcard characters are allowed. For a list of valid wildcards, see Wildcard Characters (see page 44).

Terminal IDs

Specify up to four CICS terminal IDs to monitor. If you specify multiple terminal IDs, they are ORed together.

Wildcard characters are allowed. For a list of valid wildcards, see Wildcard Characters (see page 44).

User IDs

Specify up to four CICS user IDs to monitor. If you specify multiple user IDs, they are ORed together.

Wildcard characters are allowed. For a list of valid wildcards, see Wildcard Characters (see page 44).

If you specify a combination of transaction codes, terminal IDs, and user IDs, all criteria must be met.

Monitor Criteria for IMS

If you are monitoring an IMS job, you can select the IMS field to display the IMS Monitoring Criteria panel.

```
CA MAT ----------------- IMS Monitoring Criteria -----------------
COMMAND ===>

For IMS transactions:
  Transaction codes ===>          >          >          >
        Terminal IDs ===>          >          >          >
            User IDs ===>          >          >          >

Specify values. Press END to return to Monitoring Criteria
```

The fields in the IMS Monitoring Criteria panel are described next.

Only one online transaction processing system can be specified within a monitor definition. If you enter any information into the IMS Monitoring Criteria panel, the CICS option cannot be selected. To cancel IMS, blank out all Transaction codes, Terminal IDs, and User IDs, and exit the panel.

Transaction codes

Specify up to four IMS transaction codes to monitor.

Wildcard characters are allowed. See the section on Wildcard Characters for a list of valid wildcards.

Terminal IDs

Specify up to four IMS terminal IDs to monitor.

Wildcard characters are allowed. See the section on Wildcard Characters for a list of valid wildcards.

User IDs

Specify up to four IMS user IDs to monitor.

Wildcard characters are allowed. See the section on Wildcard Characters for a list of valid wildcards.

Monitor Criteria for DB2

If you are monitoring a DB2 job, you can select the DB2 field to display the DB2 Monitoring Criteria panel.

```
CA MAT ----------------- DB2 Monitoring Criteria -----------------
 COMMAND ===>

 For DB2 SQL Statements:
                    Explain SQL:  NO  (YES or NO)
       Collect SQL from Catalog:  YES (YES or NO)

 Press END to return to Monitoring Criteria
```

The fields in the DB2 Monitoring Criteria panel are described next.

EXPLAIN SQL

Requests that information regarding DB2 access path selection be obtained from DB2 SQL statements by issuing the EXPLAIN command and externalizing the data.

YES

Specifies that DB2 EXPLAIN data is collected for all statements seen. The call for Explain data is made while the address space is being measured. If YES is specified then Use DB2 Catalog for EXPLAIN must also be YES.

NO

Specifies that no DB2 EXPLAIN data is gathered. This is the default.

Collect SQL from Catalog

Use this option to determine whether or not CA MAT should extract the plan or package statements from the DB2 catalog or extract them directly from DB2 control blocks when monitoring a DB2 application. Suppressing the collection of the SQL statements from the DB2 catalog can result in the incorrect statement being identified during the sample process.

YES

Indicates that SQL data is collected for each plan or package sampled or harvested from the DB2 catalog. This is the default and is recommended.

NO

Indicates that the SQL statement is not collected from the DB2 catalog.

If EXPLAIN SQL is YES then the Use DB2 Catalog for EXPLAIN is forced to YES (in case, the value was NO previously) because the DB2 Catalog must be accessed to collect EXPLAIN data.

More information:

Monitor Criteria for Adabas

As of CA MAT Version 9.0.00, it is no longer necessary to install or use user exits to measure an address space issuing Adabas direct calls. Support for Adabas is now fully integrated with CA MAT.

Monitor Criteria for Natural

As of CA MAT Version 9.0.00, it is no longer necessary to install or use user exits to measure an address space executing Natural programs. Support for Natural is now fully integrated with CA MAT.

Monitor Criteria for CA DATACOM

As of CA MAT Version 9.0.00, it is not necessary to install or use user exits to measure an address space running CA Datacom programs. Support for CA Datacom is now fully integrated with CA MAT.

Monitor Criteria for CA Ideal

As of CA MAT Version 9.0.00, it is on longer necessary to install or use user exits to measure an address space running CA Ideal programs. Support for CA Ideal is now fully integrated with CA MAT.

Monitor Criteria for WebSphere Application Server

Select the WebSphere Application Server field to display the WebSphere Application Server Monitoring Criteria panel.

```
CA MAT ------------- WebSphere Application Server Criteria ---------------
COMMAND ===>

Expert Mode ==> N    Y - Collect PSW samples
                     N - Disable PSW sampling

Specify Application URL Filters:
=> url1*
=> url2*
=> url3*
=> url4*

Specify System Class Filters:
=> sys1*
=> sys2*
=> sys3*

Specify values. Press END to return to Monitoring Criteria
```

If you are monitoring a WebSphere Application Server application, specify Y or N to indicate whether you want to run in Expert Mode. You can also specify up to four application URL filters and up to three system class filters. For a description of each of these keywords, see the WebSphere Monitoring Criteria section.

When no URL filters are specified in the WebSphere monitoring criteria panel, CA MAT does not collect Class data (Application, Via, or Current) or activity statistics. Only WebSphere transactions, garbage collection, environment, and SQL data is collected. In this case, a list of transactions displays, which you can use to define URL filters for subsequent monitors.

Press End to return to the Monitor Criteria panel.

Copy a Monitor Definition

The C line command is useful if you want to create multiple versions of the same monitor definition without having to retype all the monitoring criteria. For example, if you wanted to monitor individual steps of the same job, you could create one monitor definition for the first step that you want to monitor, copy each of the original steps, and change only the step names.

Follow these steps:

1. Type C in the LC field next to the profile that you want to copy, and press Enter.

   The Copy Profile pop-up panel displays.

```
CA MAT ---------------- Monitor Definition ---------- Row 61 to 70 of 860
 COMMAND ===>                                             SCROLL ===> CSR

 Primary commands: ADD xxxx, STAtus                      Server ID: MATUNER
                                                            Status: ACTIVE

Line comman | COMMAND ===> _____ |    - Delete
            |                               | D - Delete w/dsns
            | Profile name ===>             |    - Batch Reports
            |_____|    - CSV Reports


 LC Profile  Status      Schedule Runs Description              Jobname

    _____  _____  _____ ____  _____ _____
 >------------------------------------------------------------------
 C_ CL08     Inactive            6                                TUNCIC52
 __ CL09     Inactive            6                                TUNCIC52
 __ CL10     Inactive            6                                TUNCIC52
 __ CL11     Inactive            6                                TUNCIC52
```

2. Specify the name of the profile that you want to use in the Profile Name field.

3. Press Enter to return to the Monitor Definition panel, which displays the new profile.

Edit a Monitor Definition

Use the following procedure to modify the parameter values of an existing monitor definition.

Follow these steps:

1. Select the corresponding profile name on the Monitor Definition panel by using the Select line command. The Monitoring Criteria panel displays with the current parameters listed for the selected monitor definition.

2. Type over the existing data in the fields that you want to change

3. Press End.

   Your changes are saved when you press End to return to the Monitor Definition panel.

   Type CANCEL to return to the Monitor Definition panel without saving any changes.

Delete a Monitor Definition

When you no longer need a particular monitor definition, you can remove it by using the delete request. There are two forms of the delete request.

- The Delete line command (D) removes the monitor definition and the monitor's history but does not delete the associated monitor data sets.

- The Delete w/dsns line command (DD) deletes the data sets that were created by monitoring sessions under that definition and then deletes the monitor definition.

The following shows how to remove only the monitor definition while keeping the monitor data sets that existed for that definition.

1. Type D on the Monitor Definition panel for the definition that you want to delete.

   Depending on your profile settings, a panel might appear prompting you to confirm your delete request before actually executing the operation.

2. Confirm the delete request by typing YES or cancel the request by typing NO.

   To delete the monitor definition, as well as all of its associated monitor data sets, perform the procedure described above by using the DD line command.

   You can reuse the same data set as many times as you want. However, CA MAT overwrites the data set anytime you invoke a monitor definition that points to this data set.

Create a Multijob Monitor: Grouping

If you would like to create monitors for an entire region and not just for specific job steps, you can create a group of monitor definitions (or profiles) that are activated by a trigger monitor. This method ensures that you have the necessary data for analysis of all job steps in a multistep process.

Follow these steps:

1. Select Option 4, Grouping from the Primary Option menu.

   The Monitor Profile Groups panel displays.

```
CA MAT ---------------- Monitor Profile Groups ------------- Row 1 to 1 of 1
COMMAND ==>                                                SCROLL ==> CSR

Primary commands: ADD name                          Server ID: MATUNER
                                                       Status: ACTIVE

  Line commands: S - Edit  D - Delete  U - Update Entry
                 C - Copy  I - Invoke

LC Group    Description                    Associated Schedule Modified
                                           Profiles          By:
   _____ _____ _____ _____ ____
>-------------------------------------------------------------------------
__  TUNCIC61                                    8         TAC0011
```

The commands and fields available on this panel are described next.

ADD

Specify a new group name (1- to 8-characters) to create a monitor group. The Group Definition panel displays, where you can specify a monitor schedule and a description.

S - Edit

Edit the profiles included in the group.

C- Copy

Copy the profile group, with a new group name.

D - Delete

Delete the profile group.

I - Invoke

Invoke a monitoring session for the profile group. The session will begin immediately (does not use the specified schedule).

U - Update Entry

Update the schedule or description for the monitor group.

Group

Displays the 1- to 8-character name of the group.

Description

Displays a description of the group.

Associated Profiles

Displays the number of associated profiles.

Schedule

Displays the name of the schedule that is associated with the group.

Modified By

Displays the user ID of the person who last modified the group profile.

2. Type ADD xxxxxxxx to add a new monitor definition and create a trigger monitor.

The Group Definition panel displays and you can specify a schedule name and enter a brief description.

```
CA MAT ------------------- Group Definition -------------------------------

COMMAND ==>

 Group name ==> TUNTEST

   Schedule ==>              (enter a / for a list of schedules or
                              a + to display the schedule for this group)

Description ==>

Press END to save or type CANCEL to discard changes.


```

For more information about schedules for monitors, see Create a Monitor Schedule.

3. Enter the ADD primary command to display a list of the available monitor definitions, and use the S (select) line command to add profiles to be included in the group.

```
CA MAT ----------------- Monitor Profile Groups ------------- Row 1 to 2 of 2
COMMAND ==>                                                SCROLL ==> CSR

Primary commands: ADD name                        Server ID: MATUNER
                                                     Status: ACTIVE
   Line commands: S - Edit  D - Delete  U - Update Entry
                  C - Copy  I - Invoke

LC Group     Description                   Associated Schedule Modified
                                           Profiles          By:

   _____ _____ _____ _____ _____
>--------------------------------------------------------------------------
__ TUNCIC61                                   8           TUNUSER
__ TUNTEST                                    0           TUNUSER
****************************** End of Table ******************************
```

4. Use the T (trigger) line command on the Group Monitor List panel to assign (or remove) a profile to be a trigger.

```
CA MAT ------------------- Group Monitor List --------------- Row 1 to 8 of 8
COMMAND ==>                                                   SCROLL ==> CSR

Primary commands: ADD                                   Server ID: MATUNER
                                                           Status: ACTIVE
   Line commands: R - Remove  T - Trigger                    Group: TUNCIC61

LC Profile  Description                 Trigger Batch Jobname  Procstep Stepname


   _____ _____ _____ ____ _____ _____ _____
>-------------------------------------------------------------------------------
__ GPCIC611 TPNS Gend - GPCIC611    Y      N    TUNCIC61
t_ GPCIC612 TPNS Gend - GPCIC612    N      N    TUNCIC61
__ GPCIC613 TPNS Gend - GPCIC613    N      N    TUNCIC61
__ GPCIC614 TPNS Gend - GPCIC614    N      N    TUNCIC61
__ GPCIC615 TPNS Gend - GPCIC615    N      N    TUNCIC61
__ GPCIC616 TPNS Gend - GPCIC616    N      N    TUNCIC61
__ GPCIC617 TPNS Gend - GPCIC617    N      N    TUNCIC61
__ GPCIC618 TPNS Gend - GPCIC618    N      N    TUNCIC61
```

The trigger profile name turns blue and the value in the Trigger field changes from N to Y.

```
CA MAT ------------------- Group Monitor List --------------- Row 1 to 8 of 8
COMMAND ==>                                                   SCROLL ==> CSR

Primary commands: ADD                                   Server ID: MATUNER
                                                           Status: ACTIVE
   Line commands: R - Remove  T - Trigger                    Group: TUNCIC61

LC Profile  Description                 Trigger Batch Jobname  Procstep Stepname


   _____ _____ _____ ____ _____ _____ _____
>-------------------------------------------------------------------------------
__ GPCIC611 TPNS Gend - GPCIC611    N      N    TUNCIC61
__ GPCIC612 TPNS Gend - GPCIC612    Y      N    TUNCIC61
__ GPCIC613 TPNS Gend - GPCIC613    N      N    TUNCIC61
__ GPCIC614 TPNS Gend - GPCIC614    N      N    TUNCIC61
__ GPCIC615 TPNS Gend - GPCIC615    N      N    TUNCIC61
```

To stop a multijob monitor, issue the STAtus primary command from the Monitor Definition or Active Jobs panel. The Invoked Monitors panel displays. In the LC column, type P next to the waiting monitor request.

Create a Monitor Schedule

While creating a monitor definition, you can specify monitoring by day-of-week, time, and date. You can specify scheduling criteria for individual monitor definitions, or select from permanent *shift* definitions that are defined by the administrator. For example, you might have schedules for weekend processing that can be reused every weekend.

Follow these steps:

1. Select Option A, Administration from the Primary Option menu.

    The Administration Option Menu displays.

```
CA MAT ----------------- Administration Option Menu -----------------------
OPTION ==>

    1  Associations     - Define module/Csect functions        Userid: TUNUSER
    2  Pseudo           - Define pseudo groups             Server ID: MATUNER
    3  Content Help     - Update content-sensitive help        Status: ACTIVE
    4  Scheduling       - Create monitor schedules            Version: 9.0.00
    5  Registration     - Shared source listing registration

    S  System Settings  - View system settings for clients
    U  User Settings    - View user settings for clients
    I  Environment      - Display CA MAT and environmental information


Enter an option or press END to return to the CA MAT Primary Option Menu
```

2. Select Option 4, Scheduling.

    The Monitor Schedules panel displays.

```
CA MAT ----------------- Monitor Schedules ------------- Row 1 to 4 of 4
COMMAND ==>                                            SCROLL ==> HALF

Primary commands: ADD name                           Server ID: MATUNER
                                                        Status: INACTIVE

    Line commands: S - Edit  D - Delete  C - Copy

LC Schedule Description                   Modified
                                          By:     On:        At:

   _____ _____ _____ _____ _____
--------------------------------------------------------------------------------
__  SCHED1    Weekdays after 1800         BMVJJM1 2005/06/27 09:56:47.2
__  SCHED2    Weekends                    BMVJJM1 2005/06/27 09:58:00.9
__  SCHED3    0600 to 1700                BMVJJM1 2005/06/27 09:58:23.0
__  SCHED4    2005/07/01                  BMVJJM1 2005/06/27 10:00:56.9
***************************** End of Table *****************************
```

The commands and fields that are available on this panel are described next.

ADD name

> This field is used to specify a new schedule name (1- to 8-characters). The Monitor Scheduling Criteria panel displays, where you can specify the days and times for a monitor to run.

S - Edit

> This field is used to edit an already existing schedule.

D - Delete

> This field is used to delete the schedule.

C- Copy

> This field is used to copy the schedule.

Schedule

> This field displays the 1- to 8-character name of a schedule.

Description

> This field displays the up-to 25-character optional description of the schedule (up to 25 characters).

Modified By

> This field displays the user ID of the last user who edited or created the schedule

On

> This field displays the date the schedule was created or last edited.

At

> This field displays the time the schedule was created or last edited

3. Use the ADD xxxxxxxx primary command where xxxxxxxx is a user-specified one-to eight-character name of a schedule, to create a new schedule.

The Monitoring Scheduling Criteria panel displays.

```
CA MAT --------------- Monitoring Scheduling Criteria ----------------------
COMMAND ==>


                                                      Schedule: SCHDA01

 Description ==> Monday

 Date range:
  Valid dates     Starting ==> &MONDAY    Ending ==> &MONDAY    (YYYY/MM/DD)
                  Monitor request valid for ==>    (days)

 Day of week settings:
  Day of week             Weekdays          / Monday      Thursday    Sunday
  selection criteria      Weekends or         Tuesday     Friday
                        / Specific days . .   Wednesday   Saturday

 Generic time ranges:
  Monitor valid      1 ==>      ==>         (hhmm 24 hour clock)
  during time        2 ==>      ==>
  ranges of          3 ==>      ==>
                     4 ==>      ==>

Enter END to save parameters or CANCEL to exit without change.
Trilog AG., Confidential and Proprietary Information
```

The commands and fields that are available on this panel are described next.

Schedule

Indicates the name of the schedule.

Starting

Enter a starting date in *YYYY/MM/DD* format for the monitor schedule to begin.

Ending

Enter an ending date in *YYYY/MM/DD* format for the monitor schedule to end. CA MAT will not start a monitor session on or after this date.

You can also use the following variables instead of dates in the Starting and Ending fields:

&MONDAY

&TUESDAY

&WEDNESDAY

&THURSDAY

&FRIDAY

&SATURDAY

&SUNDAY

&TODAY

&TOMORROW

CA MAT calculates these variables into the correct dates for you.

When using a variable for the starting date, the current day is always used as the starting date, or the next occurrence of that day. For example, if the current day is Wednesday and you specify &WEDNESDAY as the variable, the schedule starts that day. However, if the current day is Wednesday and you specify &MONDAY as the variable, the schedule starts the following Monday.

Monitor Request valid for (days)

Specify from 1 to 9999 days duration for the monitor. This field is used in conjunction with the Starting field only. When you use this field, do not use the Ending field.

Weekdays

Specify a slash (/) if you want the schedule to run on weekdays during the period.

Weekends

Specify a slash (/) if you want the schedule to run on weekends during the period.

When creating the schedule, place a slash (/) next to Weekdays or Weekends or, select specific days by placing a slash next to **Specific days** and also placing a slash next to names of the days.

Specific days

Specify a slash (/) if you want the schedule to run on certain days during the period. You must select each day with a slash.

Monday - Friday

Specify a slash (/) next to each day that you want the monitor to run.

Time ranges

Specify in HHMM format (up to four times) during which you want the monitor to run. If no range is specified, the monitor is valid for the entire 24 hour day.

The table in the section Create a Monitor Schedule shows an example of a completed Monitoring Scheduling Criteria panel.

```
CA MAT --------------- Monitoring Scheduling Criteria ----------------------
COMMAND ===>

                                                      Schedule: SCHONE
 Description ===>

 Date range:
  Valid dates    Starting ===> 2007/06/16 Ending ===>           (YYYY/MM/DD)
                 Monitor request valid for ===> 20  (days)

 Day of week settings:
  Day of week              Weekdays            Monday     Thursday   Sunday
  selection criteria       Weekends or         Tuesday  / Friday
                         / Specific days . .   Wednesday / Saturday

 Generic time ranges:
 Monitor valid          1 ==> 1200 ===> 1300 (hhmm 24 hour clock)

  during time           2 ===>      ===>
  ranges of             3 ===>      ===>
                        4 ===>      ===>
```

When you invoke a monitor with a schedule, the monitor remains invoked until the end of the schedule. However, the monitor only starts if the target job is executed during the specified time range of the schedule. After the end of the schedule is reached, the monitor is stopped automatically.

To exit this panel without specifying a schedule, press Cancel. Pressing End associates a schedule with the monitor request.

Chapter 4: Invoking a Monitor

After you create the monitor definition, you can start making observations and collecting sample data about your target program. You start the observation and sampling process by invoking a monitor definition. You might also define and invoke monitors offline by using the Open Application Interface. For more information, see the chapter, "Open Application Program Interface."

Starting CA MAT Version 9.0.00, you can also invoke a monitor from the CA MAT graphical user interface.

For a description of the internal operation of CA MAT, including what happens when a monitor is invoked, see the *Installation Guide*.

This section contains the following topics:

Invoke a Monitor from the TSO Client

Use the following procedure, to invoke a monitor from the TSO client.

Follow these steps:

1. Select Option 1 from the Primary Option Menu.

   The Monitor Definition panel displays.

```
CA MAT -------------------- Monitor Definition ------------ Row 1 to 9 of 16
COMMAND ==>                                                 SCROLL ==> CSR

Primary commands: ADD xxxx, STAtus                       Server ID: MATUNER
                                                            Status: ACTIVE
Line commands: S - Select    A  - Analyze Normal   D  - Delete
               I - Invoke    AL - Analyze All      DD - Delete w/dsns
               H - History   AA - Analyze Active    B  - Batch Reports
               C - Copy      AW - Analyze Wait      V  - CSV Reports
               X - Export Monitor Data             J  - Display Job Card

LC Profile   Status      Schedule Runs Description              Jobname


   _____  _____  _____  ___  _____  _____
>-------------------------------------------------------------------------
__ ADACICS  Inactive             8 Adabas CICS            CICSC9NZ
__ ADATEST  Inactive             2 Adabas                 USER014X
__ ADATEST1 Inactive             3 Adabas                 USER014X
__ CA11     Waiting              0 DEFINED WITH OLD CLIENT X
__ CA31     Waiting              0 DEFINED WITH NEW CLIENT X
__ DATACOM  Inactive             1 Datacom                USER014X
__ DCOMEXIT Inactive             1 datacom missing exit tst USER014X
__ IDLBATCH Inactive            18 Ideal Batch            USER014X
__ IDLCICS  Inactive            11 Ideal CICS             CICSC9NZ
```

   This panel is the same panel where you set up monitor definitions. For a description of the fields in this panel, see Create a Monitor Definition (see page 60).

2. Type I next to the profile name of the monitor definition that you want to monitor to start a monitor by using the existing monitoring criteria, and press Enter.

3. Type S next to the profile name of the monitor definition to view or change the monitoring criteria.

   The Monitoring Criteria panel is displayed. Change the criteria as required.

4. Press End to return to the Monitor Definition panel.

   If a Started Task that you are monitoring has a jobname that is the same as another active job, you must invoke the monitor from the Active Jobs panel to ensure that the correct address space is monitored. For more information, see Invoke a Monitor for an Active Job (see page 105).

Invoke a Monitor Automatically

You can invoke a monitor automatically when you exit the Monitoring Criteria panel. Select option 0 Parameters from either the Primary Options Menu or the Global Monitoring Menu, Option G in the Primary Options Menu. The Profile Parameters panel displays. Specify YES or CONFIRM for the Invoke monitor parameter on the Profile Parameters panel.

Monitor Request

When you invoke a monitor definition, it is called a monitor request. A monitor request is active from the time you invoke the monitor definition until one of the following situations occurs:

- Observations and sampling are complete.

- The monitor request is canceled.

- The schedule expires.

If the target is active, CA MAT starts making observations and collecting sample data immediately. If CA MAT cannot find the target at the time you invoke the monitor definition, it sends a message back to your TSO session that your request was deferred, and the monitor request status on the Monitor Definition panel is shown as Waiting.

CA MAT continuously monitors the job step initiation activity on the z/OS system on which it is running. When CA MAT detects that the requested target is available, it activates the observation and sampling process automatically. The monitor starts immediately, unless you specified a delay after step start. When CA MAT begins monitoring a target address space, the status of the request on the Monitor Definition panel switches from Waiting to Active.

After you invoke a monitor request, you no longer need to be connected to CA MAT or even logged on to TSO. However, if you remain connected to TSO/ISPF, CA MAT notifies you when the monitoring terminates.

For more information, see the *Installation Guide.*

Monitor Persistence

Monitor requests are written to the Global Information File (GIF), which allows for persistence of the request, even if the Server Space is deactivated or if the entire system is shut down. When the Server Space is started through a batch job or during IPL, it reads the GIF and reinstates any active monitor requests.

Display Monitor Request Status

To obtain information about the progress of the observation and sampling process that is associated with all monitor requests, issue the STAtus primary command on the Monitor Definition panel.

The Invoked Monitors panel displays.

```
CA MAT -------------------- Invoked Monitors --------------- Row 1 to 2 of 2
COMMAND ===>                                               SCROLL ===> CSR

Line commands: P - Stop      J  - Display Job Card         Server ID: TUN85JQ


                                                               Percent
LC Profile  Jobname  Stepname Procstep PGMname  SysName  Status  Complete
   _____  _____  _____  _____ _____  _____  _____ _____
>----------------------------------------------------------------------------
__ CA11     X                                    CA11     Waiting       0
__ CA31     X                                    CA11     Waiting       0
****************************** End of Table ******************************
```

The Invoked Monitors panel displays the following information:

- All monitor requests currently queued or being processed by the Server Space for all users

- The status of the monitoring process

- An estimate of the percentage of completion of a monitor request

- The number of observations (scroll right to display this field)

- The token assigned to the monitor profile (scroll right to display this field)

The remainder of the fields on the Invoked Monitors panel are identical to those on the Monitor Definition panel.

Press Enter to update the displayed information.

If the target address space terminates before CA MAT makes the requested number of observations, the monitor request terminates, such as when a batch job terminates before reaching the end of the range that is specified in the Monitor time range field.

Stop a Monitor Request

This section discusses how to stop a selected monitor request.

Follow these steps:

1. Issue the STAtus primary command from the Monitor Definition or Active Jobs panel.

   The Invoke Monitors panel is displayed. All pending or active monitors for this CA Mainframe Application Tuner server will be displayed.

2. Type P next to the monitor request that you want to stop. The job status can be either active or waiting.

   You can only stop a monitor request that you invoked and has your User ID.

   A message will be displayed indicating that the monitor has been stopped. The monitor request is removed from the display. Any data that has already been gathered is retained and is available for analysis.

Analyze Monitor Results

To analyze the monitoring results, use one of the analysis line commands (A, AL, AA, or AW) to display the Interactive Analysis menu. The chapter "Analyzing Monitor Data" describes how to analyze the data that you collected.

Display Monitor History

The monitor history is a record of all the instances that you invoked for a particular monitor profile. Use the following procedure to see the history of a monitor profile from the Monitor Definition panel.

Follow these steps:

1. Enter line command H (History) next to the profile and press Enter.

   The Monitor History panel is displayed. This panel lists all data sets for the selected monitor profile.

   Note: For more information about the collected data, see Samples and Observations (see page 57), and Sampling Rules (see page 58).

```
CA MAT ----------------------- Monitor History -------------- Row 1 to 1 of 1
COMMAND ==>                                                SCROLL ==> CSR

Line commands: A  - Analyze Normal    D - Delete            Profile: VSAMPGM1
               AA - Analyze Active    B - Batch Reports
               AL - Analyze All       V - CSV Reports
               AW - Analyze Wait      X - Export Monitor Data
                                      J  - Display Job Card

   Measured Run  Start      CPU       EXCP SIO    Percent Percent Percent
LC Job           Date       Time      Count Rate  Active  Wait    NonDisp
   _____ ____ _____ _____ _____ _____ _____ _____ _____
>---------------------------------------------------------------------------
__ USER014V   1 2010/10/28 00:00:22.1 50162 820.98   35.58   64.41    0.00
****************************** End of Table ******************************
```

2. Press PF11 to scroll right and see more fields.

   The fields on the Monitor History panel are described next:

   Measured Job

   Indicates the name of the job measured by CA MAT.

   Run

   Indicates the sequence of monitor runs. If five monitor runs were scheduled for a single job step execution, the first run is Run Number.

   Start Date

   Indicates the date this monitor session began.

CPU Time

Indicates the length of time the monitor session ran (HH:MM:SS).

Exception Count

Number of input and output operations for the job-step during the monitored period. This number includes I/O counts that are not reflected in the I/O counts at the DD name level.

SIO Rate

Indicates the number of start I/O operations per second for the job during the monitored period.

% Active

Indicates the percentage of active samples. This number is the ratio of samples with CPU active to the total number of samples.

% Wait

Indicates the sample WAIT percentage. This number is the ratio of samples with CPU not active to the total number of samples.

% NonDispatch

Indicates the ratio of samples when the job was ready to run but was prevented from running because of higher priority work in the system to the total number of samples.

Percent ProcDelay

Percentage of the monitored period when CA MAT detected the address space was unable to be dispatched because a processor could not be made available.

While this situation is occurring, the application is unable to execute.

Percent Swapped

Sample SWAPPED percentage.

This number is the ratio of samples when the job was swapped out to the total number of samples.

Observation Rate

Final observation rate, which is the number of observations per millisecond, calculated by CA MAT.

CA MAT might have adjusted this rate during the monitor.

For information about monitoring the entire duration of a job step, see Determine Number of Observations to Take and Total Time to Monitor.

Samples Collected

Number of samples collected during the monitored period.

A significant difference between samples collected and samples used might be noted during step-level monitoring.

Samples Used

Number of samples used in the last analysis request.

Elapsed Time

Length of time the monitor session ran in HH:MM:SS format.

Measured Job ID

JES job identifier of the job that was monitored.

This field is valid for jobs that were initiated under a job entry subsystem.

Measured Step

Displays the name of the job step that was monitored.

Measured ProcStep

Displays the name of the job step within a cataloged procedure that was monitored.

Measured Program

Displays the name of the program on the EXEC statement of the JCL of the job that was monitored.

Measured ASID

Displays the address space identifier of the job that was monitored.

System

Displays the name of system where job was monitored.

SMF ID

Displays the one- to four-character name assigned with the system.

The SMFID is written as a field in any SMF record created by this system.

Exists

Displays the indicator of data set availability.

You can display the following values in this field:

YES

Indicates that the data set containing the sample data for the monitor instance is available and has not been migrated.

NO

Indicates that the data set is not found.

ML1

Indicates that the data set containing the sample data for the monitor instance exists but is migrated to the DFSMShsm ML1 migration pool. ML1 migration generally goes to disk.

ML2

Indicates that the data set containing the sample data for the monitor instance exists but is migrated to the DFSMShsm ML2 migration pool. ML2 migration generally goes to tape.

INV

Indicates that the data set name is invalid. If this value is displayed, verify the validity of the data set name before continuing.

PER

Indicates that a program error occurred. This value can indicate a catalog error other than the data set not being found. For more information, contact your technical support staff.

Dataset name

Displays the data set name of the monitor data set.

Invocation Time

Displays the date this sample monitor was invoked.

Invocation Date

Displays the time this sample monitor was invoked.

Requested Observations

Displays the number of observations requested in the monitor definition.

Error samples

Displays the number of samples that contain errors.

The samples are not included in the monitor data set.

Storage Above

Displays the high-water amount of virtual storage above the 16-MB line that is used by the job.

Storage Below

Displays the high-water amount of virtual storage below the 16-MB line that is used by the job.

Page in Count

Displays the number of page-in operations for the job.

A high value in this field can indicate job delays.

z/OS level

Displays the release level of the operating system where the target job was executed.

CPU type

Displays the CPU type of the system on which this monitor instance executed.

CPU Mdl

Displays the CPU model number of the system on which this monitor instance executed.

CPU Serial

Displays the CPU serial number of the system on which this monitor instance executed.

This section lists the Monitor History panel line commands and describes where to find more information about each command.

A - Analyze Normal

Displays information that is not directly related to the target application is eliminated. Data is reported as follows:

The following samples are eliminated from analysis: Non-dispatched (.NONDISP), No CPU available (.DISPWT), Processor Delay (.PROCDLY), Page wait (.PAGEWT), Swapped (.SWAPWT), and No activity (.OTHERWT). These samples are considered for the overall OverView activity percentages and runtimes.

CodeView and related histograms are sorted based on Active percentages, not total percentages. The Visual field reflects the Active percent only. Wait samples are included. Percentages are calculated on total samples; all activity values have equal weight.

AA - Analyze Active

Allows you to analyze information and calculate the percentages based on samples where the program was actively using CPU. Samples that contain only wait information are filtered out, which allows you to make normalized CPU comparisons of program activity.

AL - Analyze All

Allows you to compare delays occurring when the program is executing in both active and wait states.

Percentages are calculated based on all samples.

AW - Analyze Wait

Allows you to analyze information and calculate percentages based on samples where the program was in a wait state. Samples that contain only active information are filtered out which allows you to make normalized comparisons of program wait activity.

D - Delete

Removes the monitor definition and the monitor's history but does not delete the associated monitor data sets.

Note: For more information, see Delete a Monitor Definition (see page 83).

B - Batch Reports

Lets you generate batch reports any time after you invoke the monitor and data collection has been completed.

Note: For more information, see Submit a Job to Generate Batch Reports (see page 285).

V - CSV Reports

Accesses the CSV Reporting panel that allows you to submit a batch job to create comma-separated value output of analysis reports for the selected profile. These reports can be imported for use with the Spreadsheet Converter.

Note: For more information, see Create Spreadsheet Reports (see page 295).

X - Export Monitor Data

Creates an export file of the monitor data set suitable for electronic transmission. Use this command when sending monitor data to CA Technical Support.

J - Display Job Card

Displays the batch reports job card that is associated with the selected Monitor profile.

If the monitor request has not been completed, or has been abnormally terminated, these fields might appear as BLANK, ZERO, or NA. The fields are populated the first time you analyze the monitor.

Invoke a Monitor for an Active Job

CA MAT allows you to start or to view information about a monitor for any job, Started Task, or TSO user currently executing in the system.

To display the Active Jobs panel, select Option 2 from the Primary Option Menu.

```
CA MAT  ------------------------ Active Jobs ------------- Row 1 to 11 of 774
COMMAND ===>                                              SCROLL ===> CSR

Primary commands: STAtus                             Server ID: MATUNER
                                                        Status: ACTIVE
   Line commands: M - Display Monitoring Criteria    Local SYSID: SYS0
                  I - Invoke Monitor
                  S - Display Active Select Command


                           Sysplex         A/S  Cur    CPU   EXCP
LC Jobname  Stepname Procstep SysName ASID  Type Pos REAL Rate  Rate  SMFID
   _____ _____ _____ _____ _____ ____ ___ ____ _____ _____ _____
>----------------------------------------------------------------------------
__ *MASTER*                   SYSI        1 STC  NS  1633            SYSI
__ *MASTER*                   SYSM        1 STC  NS  3210            SYSM
__ *MASTER*                   SYS0        1 STC  NS  5721            SYS0
__ PCAUTH   PCAUTH            SYSI        2 STC  NS    55            SYSI
__ PCAUTH   PCAUTH            SYSM        2 STC  NS    55            SYSM
__ PCAUTH   PCAUTH            SYS0        2 STC  NS    56            SYS0
__ RASP     RASP              SYSI        3 STC  NS   120            SYSI
__ RASP     RASP              SYSM        3 STC  NS   122            SYSM
__ RASP     RASP              SYS0        3 STC  NS   122            SYS0
__ TRACE    TRACE             SYSI        4 STC  NS   113            SYSI
__ TRACE    TRACE             SYSM        4 STC  NS   137            SYSM
```

The section Active Job Fields contains a description for each field in the Active Jobs panel. Fields marked with an asterisk (*) are excluded from view by default.

To display these fields, you must use the CUST primary command.

Monitor a job by using default monitoring criteria

Follow these steps:

1. Type I in the LC field next to the profile name of the job that you want to monitor.

2. Press Enter.

Monitor a job by using criteria other than the defaults

Follow these steps:

1. Type M in the LC field next to the profile name of the monitor definition that you want to invoke.

2. Press Enter.

   The Monitoring Criteria panel is displayed. The profile name will be the same as the job name.

3. Change the monitoring criteria as needed

4. Press End to save your changes, or type CANCEL on the COMMAND line and press Enter to return to the Active Jobs panel without starting a monitor.

5. Type I in the LC field next to the profile name of the job

6. Press Enter.

   After a monitor has been invoked for an active job, you can display its progress or cancel the request by using the STAtus primary command. For more information, see Display Monitor Request Status (see page 96).

   If multiple active address spaces have the same job name, you must invoke the monitor from the Active Jobs panel to ensure that the correct address space is monitored.

The fields on the Active Jobs panel are described next:

Jobname

Job name of the address space.

Stepname

Job step name or TSO procedure name for TSO users.

Procstep

Procedure step name or terminal name for TSO users.

Sysplex SysName

One- to eight-character name that is associated with the currently running system within the sysplex.

ASID

Numeric identifier, between 1 and 32766, of the address space.

ASID (hex)

Hexadecimal identifier of the address space.

This number can be between x'0001' and x'FFFF'.

A/S Type

Type of address space:

- **ASC** - APPC server address space

- **BAT** - job initiated in an initiator

- **MNT** - mount in progress

- **OMV** - USS address space

- **STC** - Started Task

- **TSU** - TSO user

Cur Pos

Current position of the job. Possible values are as follows:

- **IN** - in Storage

- **OT** - swapped out and ready

- **LO** - logically swapped out

- **NS** - non-swappable

- **WM** - wait queue: MSO

- **WL** - wait queue: long wait

- **WT** - wait queue: terminal wait

- **WO** - wait queue: reasons other than WM, WL, or WT

- **DL** - RTO delay

- **PR** - privileged

- **>>** currently being swapped out

- **<<** currently being swapped in

Dsp Pri

Dispatching priority of the address space.

This value determines the ability of the address space to gain control of the CPU resource when competing with other jobs in the system.

REAL

The total amount of storage backed by central (real) storage that is currently in use by the address space.

CPU Rate

Percentage of CPU time that is used by the job.

The value is updated when you press Enter and indicates the CPU Rate since the last time you pressed Enter. The value is adjusted for multiple CPUs, if applicable.

Excp Rate

Number of SSCH instructions issued per second for the current transaction or job step.

CPU Time

Amount of processor time, including both TCB and SRB, that is used by the current job step.

TCB Time

Amount of TCB processor time in seconds that is used by the current job step.

SRB Time

Amount of SRB time in seconds that is used by the current job step.

Delta CPU Time

Number of CPU seconds that is used by the job.

The value is updated when you press Enter and indicates the number of CPU seconds that were used since the last time you pressed Enter. The value is adjusted for multiple CPUs, if applicable.

Delta TCB Time

Number of TCB seconds that were used by the job.

The value is updated when you press Enter and indicates the number of TCB seconds that were used since the last time you pressed Enter.

Delta SRB Time

Number of SRB seconds that were used by the job.

The value is updated when you press Enter and indicates the number of SRB seconds that were used since the last time you pressed Enter.

EXCP Count

Total number of EXCPs that were issued by the current job step.

Delta EXCP

Number of SSCH instructions that were issued by the job.

The value is updated when you press Enter and indicates the number of SSCH instructions that were issued since the last time you pressed Enter.

Scroll right to display the following fields:

SMFID

One- to four- character name assigned with the currently running system.

The SMFID is written as a field in any SMF record that is created by this system.

FF Bel

Number of fixed-storage frames below 16 megabytes that are held by the job.

If the data gathered for this value is not valid, this field is blank. Fixed storage refers to frames in central storage that cannot be paged-out. Fixed storage is used by programs that cannot tolerate a page fault.

X M

Cross memory address space.

This field contains an X for address spaces considered to be 'cross memory address spaces'. An X implies that the address space provides services that are used by other address spaces, and that the address space is accessed in cross memory mode. If the address space is not a cross memory address space, this field is blank.

Priv FF

Number of private fixed-storage frames that are held by the job.

If the data gathered for this value is not valid, this field is blank.

Prf Grp

One-to-four digit number of the performance group that is associated with the address space.

Performance groups are used to assign specific service objectives and execution priority to a group of address spaces.

Dmn

One-to-three digit number of the domain.

A domain is a collection of performance groups that is defined by a system administrator.

Lst Swp

Last swap out that is associated with the job.

If the current position of the job is NS, IN, or PR, this field is blank. Possible values are as follows:

- **TI** - terminal wait
- **TO** - terminal output wait
- **LW** - long wait
- **XS** - auxiliary storage shortage
- **RS** - central storage shortage
- **DW** - detected wait
- **RQ** - requested swap
- **NQ** - enqueue exchange

- **EX** - exchange swap based on recommendation value

- **US** - unilateral

- **TS** - transition swap

- **IC** - improve central storage usage

- **IP** - improve system paging rate

- **MR** - make room to swap in a user that has been swapped out too long

- **AW** - APPC wait

- **IW** - USS input wait

- **OW** - USS output wait

Service Class

One-to-eight character name of the service class.

A service class is a group of work within a workload with similar performance goals and characteristics; for example, average response time. You can further divide a service class into performance periods. Periods assign different service objectives and execution priorities to a transaction within a service class, based on the transaction's resource consumption.

Service Period

Performance period of a service class.

Possible values range from 1 to 8, which specify varying performance goals and characteristics of transactions of a service class. While executing and consuming resources, transactions can move to a higher period.

Workload

One-to-eight character name of the workload that is assigned to the address space.

A workload is a group of work to be monitored, managed, and reported. It consists of one or more service classes.

Resource Group

One-to-eight character name of the resource group.

Assigning a service class to a resource group effectively guarantees a minimum capacity and sets a maximum capacity for the transactions belonging to the service class.

ProcessID

The USS assigned Process ID for this address space. If there are multiple processes active within the address space, the Process ID shown will be the first active process within the address space.

Parent ProcessID

The Process ID that caused the creation of this address space (and process) using a USS FORK or SPAWN.

Parent Process

The address space name of the parent process that caused the creation of this address space using a USS FORK or SPAWN.

Parent ASID

The address space ID of the parent process that caused the creation of this address space using a USS FORK or SPAWN.

ECPU Time

The amount of CPU time used directly by the address space or current job step in seconds.

ECPU Rate

The ECPU Rate field contains the percentage of CPU time used directly by the job step or address space since the ENTER key was last pressed. The value is adjusted for multiple CPUs, if applicable, but is not adjusted for partition weights.

Delta ECPUTime

The amount of CPU time used directly by the address space or current job step in seconds since the last time ENTER was pressed.

ASST Time

The amount of CPU time used by preemptible SRBs running on behalf of this address space or job step in seconds.

PHTM Time

The amount of CPU time used by preemptible SRBs running within this this address space or job step in seconds.

Analyze Monitor Results

You cannot display the results of your analysis directly from the Active Jobs panel. However, when you invoke a monitor from Active Jobs, CA MAT adds the profile to the Monitor Definition panel automatically.

To analyze the monitoring results, return to the Primary Option Menu and select Option 1. Look for the profile with the name of the job or address space that you monitored. Use one of the analysis line commands (A, AA, AL or AW) to display the Interactive Analysis menu.

The chapter "Analyzing Monitor Data" describes how to analyze the data that you collected.

Active Jobs Select Command

Type **S** next to a Jobname and press Enter to invoke the Display Active Select command that is specified in your user profile (see the *Installation Guide*). The command will be issued on the local system, even if the selected job is running on a different system in the sysplex.

Split screen mode might not be available when you invoke the Display Active Command.

Chapter 5: Analyzing Monitor Data

This chapter describes how to use the Interactive Analysis Facility to analyze the data that is collected during a monitor session.

This section contains the following topics:

Start Interactive Analysis

Follow these steps:

1. Select Option **1** from the Primary Option Menu.

   The Monitor Definition panel displays:

```
CA MAT -------------------- Monitor Definition ------------ Row 1 to 9 of 16
COMMAND ==>                                                 SCROLL ==> CSR

Primary commands: ADD xxxx, STAtus                    Server ID: TUN85JQ
                                                         Status: ACTIVE
Line commands: S - Select   A  - Analyze Normal   D  - Delete
               I - Invoke   AL - Analyze All      DD - Delete w/dsns
               H - History  AA - Analyze Active   B  - Batch Reports
               C - Copy     AW - Analyze Wait     V  - CSV Reports
               X - Export Monitor Data            J  - Display Job Card


LC Profile  Status     Schedule Runs Description           Jobname

   _____ _____ _____ ___ _____ _____
  >-----------------------------------------------------------------------
__ ADACICS  Inactive           8 Adabas CICS          CICSC9NZ
__ ADATEST  Inactive           2 Adabas               USER014X
__ ADATEST1 Inactive           3 Adabas               USER014X
__ CA11     Waiting            0 DEFINED WITH OLD CLIENT  X
__ CA31     Waiting            0 DEFINED WITH NEW CLIENT  X
__ DATACOM  Inactive           1 Datacom              USER014X
__ DCOMEXIT Inactive           1 datacom missing exit tst USER014X
__ IDLBATCH Inactive          18 Ideal Batch          USER014X
__ IDLCICS  Inactive          11 Ideal CICS           CICSC9NZ
```

2. Type one of the following line commands in the LC field next to the profile that you want to analyze.

   H—History

   Displays the Monitor History panel, which lists information about each monitor session invoked for the monitor profile selected. From here, you might analyze the data that is gathered during any monitor session.

   For more information, see Display Monitor History.

A—Analyze Normal

Displays information that is not directly related to the target application is eliminated. Data is reported as follows:

The following samples are eliminated from analysis: Non-dispatched (.NONDISP), No CPU available (.DISPWT), Processor Delay (.PROCDLY), Page wait (.PAGEWT), Swapped (.SWAPWT), and No activity (.OTHERWT). These samples are considered for the overall OverView activity percentages and runtimes.

CodeView and related histograms are sorted based on Active percentages, not total percentages. The Visual field reflects the Active percent only. Wait samples are included. Percentages are calculated on total samples; all activity values have equal weight.

AL—Analyze All

Allows you to compare delays occurring when the program is executing in both active and wait states.

Percentages are calculated based on all samples.

AA—Analyze Active

Allows you to analyze information and calculate the percentages based on samples where the program was actively using CPU. Samples that contain only wait information are filtered out, which allows you to make normalized CPU comparisons of program activity.

AW—Analyze Wait

Allows you to analyze information and calculate percentages based on samples where the program was in a wait state. Samples that contain only active information are filtered out which allows you to make normalized comparisons of program wait activity.

X—Export Monitor Data

Creates an export file of the monitor data set suitable for electronic transmission. Use this command when sending monitor data to CA Technical Support.

J—Display Job Card

Displays the batch reports job card that is associated with the selected Monitor profile.

3. Press Enter.

    The Interactive Analysis menu displays:

```
CA MAT  --------------------- Interactive Analysis --------------------------
OPTION ==>

Enter option to analyze the monitored job:                    Profile: DCOMIDL
                                                              Options: NORMAL
  CA MAT  Monitor Information                  Subsystem Details
  -------------------------------------------  ------------------------------
  0  OverView   - Monitor session information  10  DB2 - View all SQL
  1  TaskView   - Activity by task             11  IMS - IMS Transactions
  2  DelayView  - Program delays               12  JVM - Java Virtual Machine
  3  CodeView   - Program activity             13  WAS - WebSphere Trans.
  4  TimeView   - Samples by time              14  CIC - CICS Summary Stats
  5  DataView   - Dataset information          15  IDMS - CA-IDMS Activity
  6  TranView   - Activity by transaction      16  DCM - CA-Datacom Activity
  7  ModView    - Module layout                17  IDL - CA-Ideal Activity
  8  PoolView   - Buffer pools                 18  ADA - Adabas Activity
  9  USSView    - Unix System Services         19  NAT - Natural Activity

  ACTIVE - switch mode to ACTIVE     WAIT - switch mode to WAIT
  NORMAL - switch mode to NORMAL     ALL  - switch mode to ALL

Press END to exit analysis
```

4. Place the cursor on the Options field and press Enter to display current analysis information.

    A pop-up panel displays that shows the analysis type and any tasks or transactions selected.

5. Type the number of the analysis option to select and press Enter.

    Each option is described in the following sections.

6. Use the commands listed in the following section to switch between Interactive Analysis mode.

    You can easily switch between the different analysis modes that are accessed from the Interactive Analysis menu without having to return to that menu. For example, if you are viewing samples that are actively using CPU and want to see those that are waiting, you can enter one of the following commands to switch analysis modes.

    ACTIVE

    Delay percentages are calculated using only the samples found to be actively using CPU. By running CA MAT with this option multiple times, you can make normalized CPU comparisons of program activity.

    WAIT

    Delay percentages are calculated using samples found to be in a wait state. By running CA MAT with this option multiple times, you can make normalized comparisons of program wait activity.

NORMAL

All wait-related delays which are not controlled by the application are removed. The CodeView panel is sorted based on Active samples (where the application was actively using CPU). This option will provide the best view of the data for normal use.

ALL

Delay percentages are calculated using every sample collected.

Note: Starting CA MAT Version 9.0.00, you can also analyze a monitor session in the CA MAT graphical user interface.

Overview of the Interactive Analysis Options

The following table describes each interactive analysis option, including the available line commands and subsequent displays. The line commands (LC) are listed for each panel, followed by the panel or pop-up panel that displays when you press Enter. If more than one panel is listed for a single line command, the panel that displays depends on the type of information selected.

Analysis option	LC	Displays	LC	Displays	LC	Displays
0 - OverView	—	Monitor OverView panel				
1 - TaskView	T	TaskView for selected tasks only				
	U	TaskView for selected tasks only (minus cleared tasks)				
	C	Code Details for selected task	A	CSECT Associations panel		
			C	Caller ID panel	L	ISPF program listing
			D	Delayed Resources panel		
			I	Module/CSECT Info panel		
			L	ISPF program listing		
			N	Long Name panel		
			S	Delay Distribution panel		

Analysis option	LC	Displays	LC	Displays	LC	Displays
			H NH	Histogram	D	DelayView panel
					L	ISPF program listing
	D	DelayView Details for selected task	A	**Note:** See the line command A description for Option 2 - DelayView		
2 - DelayView	A	Delay Locations panel	A	Associate		
			N	Long Name panel		
			L	ISPF program listing		
			D	Delayed Resources panel	S	Data Set Details panel
						Delayed Resource panel
						Delay Detail Data panel
			C	Callerid panel	L	ISPF program listing
			CA, CC, CV	Extended Callerid panel	A	Callerid Activity panel
			I	Module/CSECT Info panel		
	S	Delay Distribution panel or IDMS Delays panel	D	IDMS Detail panel		
3 - CodeView	A	CSECT Associations panel				
	C	Callerid panel	L	ISPF program listing		
			A	CSECT Associations panel		
			I	Module/CSECT Info panel		
			N	USS Long Name panel		
	CA, CC, CV	Extended Callerid panel	A	Callerid Activity panel		

Analysis option	LC	Displays	LC	Displays	LC	Displays
	D	DelayView panel	S	Delay Distribution panel or IDMS Delays panel		
					D	IDMS Detail panel
	I	Module/CSECT Info panel				
	L	ISPF program listing				
	S	Code Distribution panel				
	H, NH	Histogram panel	D	DelayView panel		
			L	ISPF program listing		
	N	Long Name				
4 - TimeView	D	Delayed Resources panel	S	Data Set Details panel		
				Delayed Resource panel		
				Delay Detail Data panel	S	Data Set Details panel
5 - DataView	S	Data Set Details panel				
		DB2® Statements panel	S	SQL Statements panel	E	Explain panel
			SD	DCL Statement panel		
			E	Explain panel		
			C	Code Details		**Note:** See the line commands description for Option 3 - CodeView.
		IMS Statements panel	S	Segment Search Arguments panel		
		Adabas Statements panel				
		CA Datacom Statements panel				
		IDMS Delays panel	D	IDMS Detail panel		
		Queue Manager Activity panel	S	Queue Activity panel	I	Queue Information panel
					C	Code Details

Analysis option	LC	Displays	LC	Displays	LC	Displays
			C	Code details	**Note:** See the line commands description for Option 3 - CodeView.	
			I	Queue Manager Information panel		
6 - TranView	T	TranView for selected transactions only				
	U	TranView for selected transactions only (minus cleared transactions)				
	C	Code Details for selected task	A	CSECT Associations panel		
			C	Callerid panel	L	ISPF program listing
					A	CSECT Associations panel
					I	Module/CSECT Info panel
					N	Long Name panel
			D	Delayed Resources panel		
			I	Module/CSECT Info panel		
			L	ISPF program listing		
			S	Delay Distribution panel		
			H, NH	Histogram	D	DelayView panel
					L	ISPF program listing
	D	DelayView Detail for selected task	A	**Note:** See line command A for Option 2 - DelayView.		
	N	Data details for selected task				
	S	additional transaction statistics for the selected transaction				

Analysis option	LC	Displays	LC	Displays	LC	Displays
7 - ModView	S	Module/CSECT Info panel				
	U	Link Suggestions panel				
	A	CSECT Associations panel				
8 - PoolView	S	Shared Pools panel	S	Pool Details panel		
			D	Pooled Data Sets panel	S	Data Set Details panel
9 - USSView	C	Code Details for selected task	A	CSECT Associations panel		
			C	Callerid panel	L	ISPF program listing
					A	CSECT Associations panel
					I	Module/CSECT Info panel
					N	Long Name panel
			D	Delayed Resources panel		
			I	Module/CSECT Info panel		
			L	ISPF program listing		
			S	Delay Distribution panel)		
			H, NH	Histogram	D	DelayView panel
					L	ISPF program listing)
	D	DelayView Detail for selected task	A	**Note:** See line command A for Option 2 - DelayView.		
	T	USS Threads panel	C	Code Details		**Note:** See the line commands description for Option 3 - CodeView.
			D	DelayView Detail		**Note:** See line command A for Option 2 - DelayView.
			F	USS Functions panel	Code Details	**Note:** See the line commands description for Option 3 - CodeView.

Analysis option	LC	Displays	LC	Displays	LC	Displays
	S	Process Information	N/A			
	F	Function information	C	Code Details		**Note:** See the line commands description for Option 3 - CodeView.

For more information about other options:

- Option 10 - DB2—See the chapter "Using the Product in a DB2 environment (see page 315)."

- Option 11 - IMS—See the chapter "Using the Product in an IMS environment (see page 415)."

- Option 12 - JVM—See the chapter "Using the Product in a Java Virtual Machine (JVM) environment (see page 433)."

- Option 13 - WAS—See the chapter "Using the Product in a WebSphere Application Server environment (see page 447)."

- Option 14 - CIC—See the chapter "Using the Product in a CICS environment (see page 365)."

- Option 15 - IDMS—See the chapter "Using the Product in a CA IDMS environment (see page 475)."

- Option 16 - DCM—See the chapter "Using the Product with Other Databases (see page 487)."

- Option 17 - IDL—See the chapter "Using the Product with Other Databases (see page 487)."

- Option 18 - ADA—See the chapter "Using the Product with Other Databases (see page 487)."

- Option 19 - NAT—See the chapter "Using the Product with Other Databases (see page 487)."

Navigate with Interactive Analysis Primary Commands

The menu items on the Interactive Analysis menu can be selected from any analysis panel by entering one of the commands (or first three characters) shown following on the command line.

Following lists the available commands you can use to navigate between the interactive analysis views.

OVErview

> Monitor session information

TASkview

> Activity by task

DELayvie

> Program delays

CODeview

> Program activity

TIMeview

> Samples by time

DATaview

> Data set information

TRAnview

> Activity by transaction

MODview

> Module layout

POOlview

> Buffer pools

USSview

> Unix System Services

DB2view

> SQL statements

IMSview

> IMS transactions

JVMview

> Java Virtual Machine activity

WASview

> WebSphere transactions

CICsview

> CICS summary statistics

IDMsview

CA IDMS activity

Interactive Analysis Option 0 - OverView

The OverView option displays the Monitor OverView report, which includes information about the monitoring process, key global statistics about the monitored application, and sampler messages related to the analysis of your job.

These statistics can help you determine the next most logical panel to display as you continue your analysis.

Scroll down to view the entire report. Monitor Overview Fields Part 1 explains the information in the Monitor OverView report.

```
CA MAT ---------------------- Monitor OverView ----------- Row 1 to 18 of 98
COMMAND ===>                                            SCROLL ===> CSR

Monitor DSN: USER014.TUN85JQ.DATACOM.D2010273.T1507036       Profile: DATACOM
                                                             Options: NORMAL


-- Job Information --  ------ Job Statistics ------  --- Monitor Statistics ---

Jobname  . . USER014X  TCB Time . . . . 00:00:01.02  Start Date . . 2010/09/30
Stepname . . STEP2     SRB Time . . . . 00:00:01.23  Start Time . . 15:07:03
Procstep . . COBSAMG                                 Duration . . . 00:01:01
Program  . . DBSPCPR   ECPU Time  . . . 00:00:02.25
ASID . . . . 1043      zAAP Time  . . . 00:00:00.00  Observations:
(HEX)  . . . 0413      Elig zAAP Time . 00:00:00.00  Final rate . . 10Msec
User ID  . . USER014   zIIP Time  . . . 00:00:00.00  Requested  . . 6000
Job ID . . . JOB02615  Elig zIIP Time . 00:00:00.00  Used . . . . . 6000
Comp Code  . 000/0000

Datacom Lvl  12.0      Swapped Out  . . 00:00:00.00  Samples:
                       Non Disp . . . . 00:00:00.00  Used . . . . . 6000
                       LPAR/DIS Delay . 00:00:00.00  % Active . . . 1.93
                       Wait . . . . . . 00:00:59.82  % Wait . . . . 98.07
                       CPU Svc Units  . 40396

                       EXCP count . . . 2             Avg TCBs Act . 1.00
                       EXCP rate  . . . 0.03

< Rgn Lim  . 8168K     < Rgn Used HwM . 308K          CMN HwM Used . 129K
> Rgn Lim  . 1107M     > Rgn Used HwM . 596K          Page-ins . . . 0
Rgn Request  0M                                       Page-in Rate . 0.00
Dynamic Linklist:
LNKLST00




---------------------------- System Information -----------------------------

Sys Name . . CA31      OS FMID  . . . . HBB7760       CPU Model  . . 2097-712
SMFID  . . . CA31      OS Name  . . . . z/OS          CPU Version  . 00
                       OS Level . . . . 01.11.00      CPU Serial . . CE000
                       OS Owner . . . . IBM CORP      CPU Rate Adj . 404
```

```
------------------------- Working Set Size Chart ----------------------------

       Min = 346        Max = 385          Frames per Row = 4

       Avg. Frame Count
--------1---------2---------3---------4---------5
              382               378                                    +
              374       ++  ++ ++  ++  + +     +++ +   +++     +     + +++
              370         ++      +   + + +  ++    +  ++    ++  + +++ +
              366                     +     +                  +
              362
              358                         +        +            +
              354
              350            +  +                              +
              346




------------------------- Resource Demand Chart ----------------------------

       Resource   Type ----1----2----3----4----5----6----7----8----9----0
       VSAM3100   CPU  1..1.. .....1..1..1. .........1. .... ....1..1 ...
       VSAMDATA   I/O  .... .... .... .... .. .... .. ........... ... ...


--------------------------- Monitor Messages -------------------------------

       TN0495I Profile: PRDVSM01 CAMAT ECSA packet initialized at 1B973000
       TN0101I Profile: PRDVSM01 now monitoring JOB: PRDVSM01 PGM: VSAM3100
       TN0102I Profile: PRDVSM01 USERID: USRLKS1  Data set:
               PRDVSM01.VSAM3100.D2009319.T1358292
       TN0104I Profile: PRDVSM01 Initial Observation rate: 0010,
               Observations: 006000, Elapsed: 00060
       TN8090I Profile: PRDVSM01 Monitoring completed for JOB: PRDVSM01
       TN8091I Profile: PRDVSM01 Monitor counters:
               006000/006003/000000/000000/000000
       TN0106I Profile: PRDVSM01 Final Observation rate: 0010, Observations:
               006000, Elapsed: 00060
       TN0108I Profile: PRDVSM01 ECSA Used:   132848 (bytes); SRB CPU time:
               00:00:02.259




----------------------- Monitor Options from Profile -----------------------

Jobname  . . . PRDVSM01     Incl Task1 .              Excl Task1 .
Step Name  . .              Incl Task2 .              Excl Task2 .
Procstep . . .              Incl Task3 .              Excl Task3 .
Program Name .              Incl Task4 .              Excl Task4 .

Incl Tran 1  .              User  ID 1 .              Term  ID 1 .
Incl Tran 2  .              User  ID 2 .              Term  ID 2 .
Incl Tran 3  .              User  ID 3 .              Term  ID 3 .
Incl Tran 4  .              User  ID 4 .              Term  ID 4 .

DB2 EXPLAIN FOR SQL . . . . . . . YES
OBTAIN SQL FROM DB2 CATALOG . . . YES


Batch Reports  . . . . . . .          Batch Report EXEC . .
```

```
Total Time to Monitor  . . . . 60
Observations Requested . . . . 6000
DD name for load modules . . .
Delay after step start . . . . 0
Monitor valid range  . .  from 0000 to 0000
```

Determine the Validity of the Sample Data

The Monitor OverView report presents a high-level view of the application you are monitoring, gives you a preliminary indication of job performance, and helps you determine if the sample is valid for the unit of work you have targeted. For more information about the collected data, see Samples and observations and Sampling rules.

Verify the following fields to determine if the monitor is valid.

Samples Used

Number of samples should be enough to help ensure accurate data.

The number should be greater than 1000. A number closer to 10000 is preferred.

Program

Name of the program that you intended to monitor displays.

Sampler Messages

Number of recoverable errors is less than one percent of the total number of samples.

For message TN8091I, help ensure that samples were collected; for example, help ensure the monitor target address space was not swapped or non-dispatchable each time the DIE routine is executed.

Message TN8091I indicates:

■ The number of times the DIE routine executed

■ The number of times the SRB executed

■ The number of times the SRB had a recoverable error

■ The number of times the DIE routine executed and the target address space was swapped out

■ The number of times the DIE routine executed and the target address space was non-dispatchable

The fields of the Monitor Overview panel are described next.

Monitor Data Set

Name of the data set containing the sample data from the monitor.

Profile

Name of the profile that you specified when you created the monitor definition.

Options

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

Job Information

Jobname

Name of the job that was monitored.

Stepname

Step name on the EXEC statement that invoked the program (if no cataloged procedure is used).

Name of the step that invoked the procedure (if a cataloged procedure is used).

Procstep

Procedure step name (if a cataloged procedure is used).

Program

Name of the program on the EXEC statement of the JCL for the job.

ASID

Address space identifier of the job that was monitored.

User ID

Identifier of the user who requested the monitor.

If the monitor was invoked by a batch job using TUNCALL, this field displays the name of the batch job.

Job ID

JES job identifier of the job that was monitored.

Comp Code

The three-digit system and four-digit user completion codes for the job being monitored.

CICS Lvl

Release level of the CICS system that was used by the job.

This field is not displayed unless CICS was detected for the job being monitored.

DB2 Lvl

Release level of the DB2 system that was used by the job.

This field is not displayed unless DB2 was detected for the job being monitored.

IMS Lvl

Release level of the IMS system that was used by the job.

This field is not displayed unless IMS was detected for the job being monitored.

MQS Lvl

Release level of the MQ Series (MQS) system that was used by the job.

This field is not displayed unless MQS was detected for the job being monitored.

SAP Lvl

Release level of the SAP® system that was used by the job.

This field is not displayed unless SAP was detected for the job being monitored.

USS Lvl

Release level of the UNIX® System Services (USS) system that was used by the job.

This field is not displayed unless USS was detected for the job being monitored.

WAS Lvl

Release level of the WebSphere Application Server (WAS) system that was used by the job.

This field is not displayed unless WAS was detected for the job being monitored.

IDMS Lvl

Release level of the CA IDMS system that was used by the job.

This field is not displayed unless CA IDMS was detected for the job being monitored.

Datacom Lvl

Release level of the CA Datacom system that was used by the job. This field is not displayed unless CA Datacom was detected for the job being monitored.

Ideal Lvl

Release level of the CA Ideal system that was used by the job. This field is not displayed unless CA Ideal was detected for the job being monitored.

Adabas Lvl

Release level of the Adabas system that was used by the job. This field is not displayed unless Adabas was detected for the job being monitored.

Natural Lvl

Release level of the Natural system that was used by the job. This field is not displayed unless Natural was detected for the job being monitored.

< Rgn Lim

Requested region size for the step being measured below the 16-MB line.

> Rgn Lim

Requested region size for the step being measured above the 16-MB line.

Rgn Request

Amount of storage requested by the job being monitored.

Dynamic Linklist

User-specified dynamic linklist, if using a linklist different from a linklist specified during IPL.

Job Statistics

TCB Time

Amount of CPU time that was used by execution of code in task mode during the monitored period.

This value is obtained from the ASCB.

SRB Time

Amount of SRB time used by this address space during the time it was being measured.

The SRB time used by CA MAT is not reflected in this value.

ECPU Time

Amount of CPU time used within this address space in HH:MM:SS.TH format.

zAAP Time

Amount of CPU time used by this address space in a zSeries Application Assist Processor (zAAP) in HH:MM:SS.TH format.

Elig zAAP Time

Total time that there was Java work eligible to run on a zSeries Application Assist Processor (zAAP).

Within a particular application, some work might be Java and the JVM has designated the work as zAAP-eligible, while other work might be non-Java, or might be Java work that was not marked zAAP-eligible by the JVM. The zAAP-eligible work can be switched to a zAAP for processing, and when the work that is not zAAP-eligible is ready to execute, this work would execute on a standard CP. A Switch Service is in place to work with the z/OS Dispatcher, managing the dispatching of zAAP-eligible work between the standard CPs and the zAAP Engines.

This field can help identify opportunities where a zAAP processor would benefit processing and identify issues with available zAAP processors not being fully utliized. New zAAP users must refer to the JVM Startup Options for zAAPs such as **-**Xifa: and new parameters in the IEAOPT*xx* of SYS1.PARMLIB such as IFACrossover**.**

zIIP Time

Amount of CPU time that was spent actually executing on an Integrated Information Processor (zIIP) in HH:MM:SS.TH format.

Elig zIIP Time

Total time that there was work eligible to run on a zSeries Integrated Information Processor (zIIP) engine.

Note: Only enclave SRB work is eligible to run on the zIIP. DB2 and IPSEC are two of the initial exploiters.

Within a particular application or subsystem, only the Enclave SRB work is designated as zIIP-eligible. A Switch Service is in place to work with the z/OS Dispatcher, managing the dispatching of zIIP-eligible work between the standard CPs and the zIIP engines.

This field can help identify opportunities where a zIIP processor would benefit processing, and identify issues with available zIIP processors not being fully utilized. There is one external tuning option, zIIPAWMT, which controls the *needs help* dispatcher.

Also note APAR OA20045 that enables the IIPHONORPRIORITY=Yes/No Specification for z/OS 1.8.

Swapped Out

Amount of time the address space was observed to be swapped out during the measurement in HH:MM:SS.TH format.

Non Disp

Amount of time the address space was observed to be nondispatchable (the ASCB nondispatchability flags were on) during the measurement in HH:MM:SS.TH format.

LPAR/DIS Delay

Amount of time the address space was observed to be delayed because of either LPAR delay or other disabled work on the processor during the time of the measurement in HH:MM:SS.TH format.

Wait

Elapsed time that this monitor spent waiting.

This time is the time that is not reflected in the CPU time, Swapped Out, Non Disp, and LPAR/DIS Delay fields.

CPU Svcs Units

CPU Service units, which are an interval of CPU time normalized by a CPU processor-specific adjustment rate.

EXCP count

Number of EXCPs or I/Os issued by the address space during the duration of the measurement.

EXCP Rate

Number of EXCPs or I/Os per second being issued by the address space during the duration of the measurement.

< Rgn Used HWM

High-water-mark value for the used region size below the 16-MB line.

This value might actually be larger than the requested size if modified by other products or SMF exits.

> Rgn Used HWM

High-water-mark value for the used region size above the 16-MB line.

This value might actually be larger than the requested size if modified by other products or SMF exits.

Page-ins

Number of page-in operations for the job.

A high value in this field can indicate job delays.

Page-in Rate

Number of page-in operations per second.

A high rate can indicate job delay due to storage constraints.

When reference is made to a page of virtual storage that does not appear in central storage, the page is brought in from DASD or expanded storage to replace a page in central storage. The newly referenced page is said to have been *paged in*. The page-in (not page-out) rate is of primary concern because page-in activity occurs synchronously (for example, the task stops until the page fault is resolved).

Monitor Statistics

Start Date

Date the monitor started.

Start Time

Time the monitor started.

Duration

Duration of time the address space was measured by CA MAT for this monitor in HH:MM:SS format.

Observations: Final Rate

Final rate at which CA MAT observed the activity of the address space.

Note: This value was formerly known as the sampling rate. For more information, see Specify Additional Monitoring Criteria (see page 74).

Observations: Requested

Number of requested observations in the monitor profile as requested by the user.

Observations: Used

Actual number of observations made by CA MAT.

Samples: Used

Number of samples used from the measurement.

For more information about Samples: Used, see Specify Additional Monitoring Criteria (see page 74).

Samples: % Active

Percentage of samples used that were recorded when the application was actively using CPU.

Samples: % Wait

Percentage of samples used that were recorded when the application was not using CPU and was waiting on a resource.

Avg TCBs Act

Average number of TCBs that were actively using the CPU during an observation.

This value can be from 0 up to the number of online CPUs.

CMN HWM Used

High-water-mark amount of common (ECSA) storage used by CA MAT to measure the job.

This value can be used for planning purposes on setting the maximum active number of monitors allowed.

System Information

System Name

Eight-character system name identifier for the z/OS image on which the monitor was executed.

SMFID

Four-character System Management Facility identifier for the z/OS image on which the monitor was executed.

OS FMID

Release level of the MVS system where the target job executed.

OS Name

Name of the operating system.

OS Level

Release level of the operating system.

OS Owner

Name of the operating system owner.

CPU Model

CPU model number of the system on which the monitor was executed.

CPU Version

CPU version of the system on which the monitor was executed.

CPU Serial

Serial number of the processor on which the monitor was executed.

CPU Rate Adj

Processor-specific adjustment rate used in the calculation of CPU service units.

This value is based on the number of instructions per CPU second for a given processor.

Working Set Size Chart

The Working Set Size Chart displays the average frame count usage over time. The total monitor period is divided into 50 equal intervals. Each + on the chart represents the average frame count for an interval.

The chart contains ten rows whose range is determined by the minimum and maximum average frame count used for the monitored period. The number of frames per row is calculated as

(Max Avg. Frame Count - Min Avg. Frame Count)/9

Resource Demand Chart

Approximate percentage of time the application spent either running on a CPU or being delayed for data over the life of the monitor run. The total monitor run is split into 50 equal periods, each period being 2 percent of the total run. The activity is summarized into each slot by resource type. In this way, you see an overview of the resource demands during the monitor run.

Resource

Task name, file name, or database ID that uniquely identifies the resource being reported.

Type

Type of resource, which can be one of the following types:

- CPU—application active on processor for a task resource

- I/O—application delayed for I/O on a DD name resource

- DB2—application delayed for a DB2 statement on a DBRM resource

- MQS—application delayed for MQSeries resources

- SAP—application delayed for SAP resources

- ADA—application delayed for an Adabas statement

- DCM—application delayed for a Datacom statement

- IMS—application delayed for an IMS segment on a PSB resource

- OTHR—application delayed for an unidentifiable resource

Chart

Fifty columns of numbers and symbols depicting the time spent by the program either executing on a CPU or delayed for data for each period.

The values shown represent from 0 percent to 100 percent of the total resource demand. When the percentage of resource demand is 0 percent, a blank displays. When the percentage of resource demand is greater than 0 percent but less than 5 percent, a period (.) is displayed. When the percentage of resource demand is 5 percent or greater but less than 95 percent, a single digit from 1 to 9 is displayed. When the percentage of resource demand is 95 percent or greater, a plus sign (+) displays.

Monitor Messages

Messages that are issued by the Server Space during the monitored period are displayed here. These messages provide additional information about execution and completion.

Monitor Options from Profile

Monitor options that you specified in the Monitor Criteria panel are displayed here.

DB2 Monitoring, Intercept, and Flag settings

Monitoring parameters specifying DB2 data collection information are displayed here. The values are defined in UTRPARM member TUNSSP00.

Note: For more information about parameteres in TUNSSP00, *see* the *Installation Guide*.

```
---------------- DB2 Monitoring, Harvester, and Flag settings -----------------


  DB2 Monitoring and Harvesting data granularity control ....
  DB2HVLOC = YES  Add Requester Location to the summarization key.
  DB2HVCOR = YES  Add Correlation ID to the summarization key.
  DB2HVIID = YES  Add OPER ID to the summarization key.
  DB2HVTHD = YES  Add Thread address to the summarization key.


 DB2 Harvester ....
  DB2HRVST = YES  The DB2 Harvester is Active.
```

Interactive Analysis Option 1 - TaskView

TaskView provides information about the components of the monitored address space. When first invoked, the TaskView panel displays all of the monitored tasks. You might select specific tasks to focus your analysis.

```
CA MAT ------------------------ TaskView ----------------- Row 1 to 5 of 5
COMMAND ===>                                            SCROLL ==> CSR

Primary commands: SELect, RECall, ADDHelp              Profile: DB2SAMP
                                                       Options: NORMAL

    Line commands: T - Tag    C - Code Details
                   U - Untag  D - Delay Details

LC Program  T Actv% Data% System% VolWait% InvWait% Other% Total%
   _____ _ _____ _____ _____ _____ _____ _____ _____
   ------------------------------------------------------------------------
   -------
__  DFHKETCB   13.47 38.37   0.00    33.88    0.00   0.00  85.71
__  DFHD2EX3    3.67  0.00   0.00     3.27    0.00   0.00   6.94
__  DFHD2EX3    1.63  0.00   0.00     2.45    0.00   0.00   4.08
__  DFSPAT00    0.41  2.45   0.00     0.00    0.00   0.00   2.86
__  **N/A**     0.41  0.00   0.00     0.00    0.00   0.00   0.41
```

TaskView displays one line for each unique task that is detected during the monitored period. From this perspective, you see which tasks are delayed and the reasons for the delay. CA MAT reports on all tasks in the address space except the initiator and dump services.

The available commands for TaskView are described next.

SELect

Selects only the tagged tasks for analysis.

RECall

Displays all tasks for analysis.

ADDHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

T

Tag line command that is used to select up to five tasks for analysis.

U

Untag line command that is used to clear a selected task.

C

CodeView Detail line command that is used to display the CodeView Detail panel showing activity detected by CA MAT.

The CodeView Detail panel is described next.

D

DelayView Detail line command that is used to display the DelayView Detail panel showing the types of delays encountered by CA MAT.

The DelayView Detail panel is described later.

The delay information that displays on the TaskView panel is described next.

Profile

Name of the profile that you specified when you created the monitor definition.

Options

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis.

Place the cursor on the **Options** field value and press **Enter** to display a pop-up panel listing the selected tasks/transactions.

Program

Program name associated with the task.

If a program name cannot be identified, the value **n/a** is substituted.

T

"X" indicates that the task has been tagged for analysis.

Actv%

Percentage of the monitored period that the CPU was actively processing the monitored application.

Data%

Percentage of the monitored period that the application was delayed because of an I/O request.

System%

Percentage of the monitored period that the application used system services.

Examples of these services are storage management and security checking.

VolWait%

Percentage of the monitored period that the application voluntarily waited for an event

InvWait%

Percentage of the monitored period that the application waited because one of the following situations occurred:

■   The address space was swapped out and unable to run.

■   The address space was swapped in, but was not given control of the CPU.

Other%

Percentage of the monitored period that was not attributable to any of the categories known to CA MAT.

Total%

Sum of the other six categories of delay.

Visual

Graphical representation of the Total% field.

Select Tasks for Analysis

1.   Type T next to the tasks that you want to select for analysis.

2.   Press Enter.

An X will be displayed in the T column indicating which tasks are selected.

To clear a task, type **U** next to it and press Enter.

3.   Type **SEL**.

4.   Press Enter.

The TaskView panel shows only the selected tasks, with all percentages calculated for the selected tasks only.

5.   To redisplay all tasks, type REC and press Enter.

The task **N/A** (not associated) is calculated from samples representing activity not associated with any particular task; for example, address space swapping.

CodeView Detail

Use the CodeView Detail (C) line command from the TaskView panel to display the
program activity that is associated with a specific task.

```
CA MAT ------------------- CodeView Detail ----------------- Row 1 to 8 of 27
COMMAND ===>                                                SCROLL ===> CSR

            Task: DFHKETCB                              Profile: DB2SAMP
                                                        Options: NORMAL
                                                           Mode: CSECT

Primary commands: MOde Pseudo/Module/Csect/4GL,
                  PSEudo, REGister, ADDHelp

    Line commands: A - Associate    C - Callerid    D - Delays   N - Long Name
                   I - Info         L - Listing     S - Distribution
                   H - Histogram    NH - Normalized Histogram

LC Module   Csect    Description               L C Actv% Wait% Totl% Visual

   _____ _____ _____ _ _ _____ _____ _____ _____
 >--------------------------------------------------------------------------
 __ DFHSIP   DFHDSSR  DS domain - suspend/resum A Y  0.00 41.63 41.63 ========>
 __ DFHSIP   DFHDSDS3 DS domain - main dispatch A Y  1.22 25.31 26.53 ====>
 __ JIMSDATE JIMSDATE                          A Y  2.04  0.00  2.04
 __ IDA019L1 IDA019R3 VSAM I/O driver          A Y  0.00  1.63  1.63
 __ .NUCLEUS ISGGRHS1 Global resource serializa B Y  0.00  1.22  1.22
 __ DFHSIP   DFHSMGF  SM domain - getmain/freem A Y  1.22  0.00  1.22
 __ .COMMON  .COMMON  In common space            Y  1.22  0.00  1.22
 __ .NUCLEUS IEACVT   Supervisor services      B Y  0.00  0.82  0.82
```

This panel identifies modules and CSECTs that delayed a task in the Task: field. The
commands you can issue and field headings are identical to the CodeView panel. All
subsequent associated panels report information for the specified task.

The CodeView Detail panel reports both Active and Wait activity percentages for
Analyze Normal mode, which accounts for all activity reported in TaskView.

DelayView Detail

Use the DelayView Detail (D) line command to display the delay categories that are associated with a specific task and detected by CA MAT

```
CA MAT ------------------ DelayView Detail ----------------- Row 1 to 4 of 4
COMMAND ===>                                               SCROLL ===> HALF

           Task: IDMSDC                                    Profile: IDMS1
                                                            Detail: ON

Primary commands: DETail on/off,       Module: *
                  ADDHelp               Csect: *
                                       Offset: *
   Line commands: A - Address

LC Major Category      Minor Category      Actv%  Wait%  Totl%  Visual
   _____    _____    _____  _____  _____  _____
   ---------------------------------------------------------------------------
__ Voluntary Wait      Wait/Waitr SVC       0.00  75.77  75.77 ========>
__ Data Delay          IDMS Delay           0.00  24.15  24.15 ==>
__ Program Load Delay  LOAD SVC 122-9       0.00   0.05   0.05
__ System Active       WTO SVC              0.00   0.02   0.02
****************************** End of Table ******************************

-------------------------------- Totals -----------------------------------

                                             0.00  99.98  99.98
```

This panel displays information about what caused a task to be delayed in its execution. The commands you can issue and field headings are identical to the DelayView panel. All subsequent associated panels report information for the specified task.

Interactive Analysis Option 2 - DelayView

CA MAT divides program delays into delay categories. The DelayView option shows the percentage of the monitored period that the program was in a wait state for each category. From the DelayView panel, you can further investigate a delay, by using the Delay Locations, Delayed Resources, Delay Distribution, and Data Set Details panels.

CA MAT uses the term delay to encompass all aspects of elapsed time, including time that the program was using CPU.

```
CA MAT ------------------------ DelayView ---------------- Row 1 to 5 of 5
COMMAND ===>                                              SCROLL ===> CSR

Primary commands: DETail on/off          Module: *          Profile: DB2SAMP
                  ADDHelp                  Csect: *          Options: NORMAL
                                          Offset: *           Detail: OFF
   Line commands:  A - Address
                   S - Distribution

LC Major category      Actv%  Wait%  Totl%  Visual

   _____  _____  _____  _____ _____
  ---------------------------------------------------------------------------
  __  Voluntary Wait      0.00  39.59  39.59 =======>
  __  CICS File Ctl Delay 0.00  38.37  38.37 =======>
  __  Program Active     15.92   0.00  15.92 ===>
  __  Data Delay          1.63   2.45   4.08 >
  __  System Active       2.04   0.00   2.04
```

The available commands for DelayView are described next.

DETail on/off

   ON displays minor delay reasons; **OFF** summarizes minor delay reasons by major categories.

ADDHelp

   Invokes the content-sensitive Help application to update or create a Help entry for the selected content.

A

   Address - shows all code locations associated with this type of delay.

   Displays the Delay Locations panel (see Display Delay Locations (see page 145)).

S

   Distribution - shows the tasks or transactions that have this type of delay.

   Displays the Delay Distribution application (see Display Delay Distribution) (see page 158) or the CA IDMS Delays application (see Display CA IDMS Delays (see page 475)).

The information that displays on the DelayView panel is described next.

Module

   Asterisk (*) means all modules in the sample set were considered.

   For more information about displaying information about a particular module, see Display Delay Locations (see page 145).

CSECT

Asterisk (*) means all the CSECTs in the sample set were considered.

For more information about displaying information about a particular CSECT, see Display Delay Locations (see page 145).

Offset

Asterisk (*) means all the offsets in the sample set were considered.

For more information about displaying information about a particular offset, see Display Delay Locations (see page 145).

Profile

Name of the profile that you specified when you created the monitor definition.

Options

Indicates the type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the **Options** field value and press **Enter** to display a pop-up panel listing the selected tasks/transactions.

Detail

Indicates the display mode of ON or OFF for delay details.

Major category

Five major categories of delays are shown here:

- **Voluntary Wait**—The application is voluntarily waiting for resources.

- **CICS File Ctl Delay**—The application is waiting for I/O's to CICS files.

- **Program Active**—The application or a called support routine is using CPU.

- **Data Delay**—The application is accessing a file.

- **System Active**—The application is using operating system functions such as storage administration or system security.

For a complete list of categories, see the chapter, "Tuning Your Applications (see page 303)."

Minor category

More detailed delay category classification.

This field is blank if DETAIL OFF is specified. To view the minor delay categories, use the primary command DETAIL ON.

Actv%

Percentage of the monitored period that CA MAT detected CPU usage for this category of delay.

Wait%

Percentage of the monitored period that CA MAT detected that the program was in a wait state for this category of delay.

Totl%

Summation of the Actv% and Wait% fields.

Visual

Graphical representation of the Totl% field.

Display Minor Delay Categories

DelayView divides each major delay category into minor categories. Minor delay categories are only displayed if Detail:ON is specified for the panel. The default display value is specified on the Profile Parameters panel. You can change the display by using the DETail on/off primary command.

Both major and minor delay categories are shown in the previous panel, as indicated by Detail:ON on the right side of the screen. To see only major delay categories, use the primary command DETail OFF.

Display Delay Locations

To find the location of a specific delay, type A next to a delay category and press Enter. For example, type A next to the Data Delay line on the DelayView panel and press Enter.

The Delay Locations panel displays.

```
CA MAT ---------------------- Delay Locations ----------- Row 1 to 14 of 786
COMMAND ===>                                               SCROLL ===> HALF

      Delay type: Program Active                          Profile: CALUSS1

Primary commands: REGister, ADDHelp, LONgname

   Line commands: L - Listing    D - Details    A - Associate
                  C - Callerid    I - Info      N - Long Name

Extended Callerid:  CA - Application  CC - Current  CV - Via

LC Module   Csect    Offset   Csect Description   Stmt   D C X Pct   Visual
   _____ _____ _____ _____ _____ _ _ _ _____ _____
  >----------------------------------------------------------------------------
__  IBMPEV11 @BMPHZIQ 000000F2                            Y Y Y  2.01 ========>
__  IBMPEV11 @BMPHZIQ 000000D8                            Y Y Y  1.95 =======>
__  IBMPEV11 @BMPHZIQ 000000DC                            Y Y Y  1.66 =======>
__  IBMPEV11 @BMPHZIQ 00000356                            Y Y Y  1.22 =====>
__  IBMPEV11 @BMPHZIQ 000000DE                            Y Y Y  1.05 ====>
__  IBMPEV11 @BMPHZIQ 000000EA                            Y Y Y  1.05 ====>
__  IBMPEV11 @BMPHZIQ 000000EC                            Y Y Y  0.99 ===>
__  IBMPEV11 @BMPHZIQ 000000D2                            Y Y Y  0.93 ===>
__  IBMPEV11 @BMPHZIQ 00000388                            Y Y Y  0.79 ==>
__  IBMPEV11 @BMPHZIQ 000005E6                            Y Y Y  0.64 ==>
__  IBMPEV11 @BMPSMOA 0000055C                            Y Y Y  0.49 =>
__  IBMPEV11 @BMPHZIQ 0000035A                            Y Y Y  0.47 =>
__  IBMPEV11 @BMPSODA 00000068                            Y Y Y  0.47 =>
__  IBMPEV11 @BMPSODA 0000006A                            Y Y Y  0.44 =>
```

The Delay Locations panel displays a list of CSECT module names, CSECTs, and offsets where the delays were detected. If CA MAT finds more than one location where a data delay took place, the data is listed in order of decreasing significance.

The available commands for the Delay Locations panel are described next.

REGister

Displays the Program Listing Registration panel, where you can register a program with CA MAT.

ADDHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

L

Listing—Displays the program listing if the program has been registered.

D

Details—Displays the Delayed Resources panel with information about the resources and modules related to a delay.

Valid only if the D field indicates Y.

C

Callerid—Displays the Callerid panel, which contains the names of any calling module, CSECT, or offset to this program.

I

Info—Displays module information such as size, location, and link date for the selected module or CSECT.

N

Long Name—Displays the full Long name for the USS/Java short name. This command is valid for USS and Java applications only.

CA

Application—Displays the Extended Callerid panel in Application mode, which shows information about the lowest level module identified as application code (non-system).

Note: For more information, see Extended Callerid (see page 151).

CC

Current—Displays the Extended Callerid panel in Current mode, which shows information about the module that is in control at the time of the sample.

Note: For more information, see Extended Callerid (see page 151).

CV

Via—Displays the Extended Callerid panel in Via mode, which shows information about the most recent module called by the user application code.

Note: For more information, see Extended Callerid (see page 151).

The information displayed on the Delay Locations panel is described next.

Profile

Name of the profile that you specified when you created the monitor definition.

Module

Module name.

CSECT

Control section within the module.

Offset

Hexadecimal offset within the CSECT, or, if the CSECT is not known, the module.

CSECT Description

Description of the CSECT, if available.

Stmt

Number of the high-level language statement.

This field displays information only for registered programs. For information about registering a program, see Register Source Program Listings (see page 235).

D

Y in the D (Detail) column indicates that additional information is available by using the **D**etails line command to help isolate the cause of the delays.

C

Contains a Y if Callerid information is available for this CSECT.

Callerid provides detailed information about which programs called the CSECT being queried.

X

Contains a Y if Extended Callerid information is available for this CSECT.

Pct

Percentage of the monitored period that a delay for this offset is detected.

Visual

Graphical representation of the Pct field.

Display Delayed Resources

If a Y appears in the D column on the Delay Locations panel, you can view another level of information. Type D and press Enter.

The Delayed Resources panel displays.

```
CA MAT --------------------- Delayed Resources ------------- Row 1 to 4 of 4
COMMAND ===>                                               SCROLL ===> CSR

   Delay type: IO Queued                                    Profile: DB2SAMP
                                                             Module: IGG019AR
Line commands: S - Select                                     Csect: IGG019AR
                                                             Offset: 00000084
LC Resource            Component                           Pct    Visual


    _____ _____ ____ _____
>----------------------------------------------------------------------------
__  SKWA0              FILE LIST                          40.74 ========>
__  SIWA30             FILE LIST                           6.82 >
__  SKWAI              FILE LIST                           0.05
__  ITRANS            FILE LIST                           0.02
```

The Delayed Resources panel shows resources and components that are related to a delay. Based on the type of delay, the Resource field contains different types of information. Use the **S**elect line command to display more information about the selected resource.

The information displayed on the Delayed Resources panel is described next.

Delay type

Category of delay from the DelayView panel for which details are now displayed.

Profile

Name of the profile that you specified when you created the monitor definition.

Module

Module name.

CSECT

Control section within the module.

Offset

Hexadecimal offset within the CSECT, or, if the CSECT is not available, within the module.

Resource

Resources delaying the program.

Resources vary depending on the delay category. For more information about the types of resources that can cause delays, see the chapter "Tuning Your Applications."

Component

Component of the resource delaying the program. Components vary based on the resource.

Pct

Percentage of time during the monitored period that this resource delayed the application.

Visual

Graphical representation of the Pct field.

Display Delay Detail

You can display further information about the source of a delay. Type **S** next to a resource on the Delayed Resources panel and press Enter. Depending on the type of resource, one of three panels displays.

If the resource is a data set, the Data Set Details panel displays.

```
CA MAT  --------------------- Data Set Details ------------ Row 1 to 19 of 38
COMMAND ===>                                             SCROLL ===> CSR

DDNAME: SKWAO                                            Profile: DB2SAMP

Opened for: PUT LOCATE    Access Method: QSAM  Concatenation Count: 0

Data Set Information for: FW.FWD008.FW660.TSKWA3.G3056V00
            File Type: Physical Sequential
            Description: Fixed

------ SMS ------- ------ Allocation ------ ----------- Format ----------------
DATACLAS: **NONE** Unit:            CYL DS Org:       PS Rec FM:         FB
STORCLAS: STANDARD Primary:        2000 Log Rec Len:   293 Blk Size:  27835
MGMTCLAS: MA@NODEL Secondary:       250 Buffer Count:    8 Buf Size: 222680
                Volume Count:         2 Stripes:         0 Concat #:      0
                Curr Extent Count:    7

          ---------------- Data Set Performance ------------
          Avg Response Time:      14.91  Avg IOSQ Time:  0.00
                Active Rate:       9.29  Avg Pend Time:  0.38
                Total EXCPs:          0  Avg Disc Time:  0.23
          Total Connect Time: 125583.10  Avg Conn Time: 14.30
```

If the resource is not a data set, the Delay Locations panel displays.

```
CA MAT  ---------------------- Delay Locations ----------- Row 1 to 14 of 786
COMMAND ===>                                              SCROLL ===> HALF

      Delay type: Program Active                       Profile: CALUSS1

Primary commands: REGister, ADDHelp, LONgname

   Line commands: L - Listing   D - Details   A - Associate
                  C - Callerid   I - Info     N - Long Name

Extended Callerid:  CA - Application  CC - Current  CV - Via

LC Module   Csect    Offset  Csect Description   Stmt   D C X Pct   Visual
   _____ _____ _____ _____ _____ _ _ _ _____ _____
>-----------------------------------------------------------------------
__ IBMPEV11 @BMPHZIQ 000000F2                          Y Y Y  2.01 ========>
__ IBMPEV11 @BMPHZIQ 000000D8                          Y Y Y  1.95 =======>
__ IBMPEV11 @BMPHZIQ 000000DC                          Y Y Y  1.66 ======>
__ IBMPEV11 @BMPHZIQ 00000356                          Y Y Y  1.22 =====>
__ IBMPEV11 @BMPHZIQ 000000DE                          Y Y Y  1.05 ====>
__ IBMPEV11 @BMPHZIQ 000000EA                          Y Y Y  1.05 ====>
__ IBMPEV11 @BMPHZIQ 000000EC                          Y Y Y  0.99 ===>
__ IBMPEV11 @BMPHZIQ 000000D2                          Y Y Y  0.93 ===>
__ IBMPEV11 @BMPHZIQ 00000388                          Y Y Y  0.79 ==>
__ IBMPEV11 @BMPHZIQ 000005E6                          Y Y Y  0.64 ==>
__ IBMPEV11 @BMPSMOA 0000055C                          Y Y Y  0.49 =>
__ IBMPEV11 @BMPHZIQ 0000035A                          Y Y Y  0.47 =>
__ IBMPEV11 @BMPSODA 00000068                          Y Y Y  0.47 =>
__ IBMPEV11 @BMPSODA 0000006A                          Y Y Y  0.44 =>
```

If the resource includes multiple data sets, the Delay Detail Data panel displays. From this panel, you can use the Select line command to display the Data Set Detail panel.

```
CA MAT  --------------------- Delayed Resources ------------- Row 1 to 4 of 4
COMMAND ===>                                              SCROLL ===> CSR

   Delay type: VSAM I/O Wait                          Profile: DB2SAMP
                                                       Module: IDA019L1
Line commands: S - Select                               Csect: IDA019R3
                                                        Offset: 000000EC
LC Resource              Component                     Pct   Visual

   _____ _____ _____ _____
>-----------------------------------------------------------------------
S_ MDYU1000                                            0.41 ========>
__ MDY2000                                             0.41 ========>
__ MDYU3000                                            0.41 ========>
__ MDY3000                                             0.41 ========>
```

Display Callerid and Extended Callerid

If the C column contains a Y for a module on the Delay Locations panel, you can display a list of callers for the Module or CSECT. The list of callers is ordered by activity. Type C in the LC field for a module and press Enter.

The Callerid panel displays.

```
CA MAT ------------------------- Callerid ----------------- ROW 1 to 2 of 2
COMMAND ===>                                              SCROLL ===> CSR

Primary commands: REGister, ADDHelp                       Profile: TUNIVP1
                                                           Module: TUNCOB01
   Line commands: L - Listing                               Csect: IGZCIN1

LC Module   Csect    Offset   Stmt  Csect Description        Pct   Visual
   _____  _____  _____  _____ _____  _____ _____
-------------------------------------------------------------------------------
__ TUNCOB01 TUNCOB01 000008C6   157 Cobol test program distri 17.27 =======>
__ TUNCOB01 TUNCOB01 0000088C   148 Cobol test program distri  0.88
```

The fields on the Callerid panel are the same as on the Delay Locations panel.

Extended Callerid

Extended Callerid provides a sampling of application program functions using the caller's chain of save area (SA) and Language Environment (LE) dynamic save area (DSA). At interval sample time the SA/DSA chain is scanned to identify and provide the load module and function names for up to three program entries.

If the X column contains a Y for a module on the Delay Locations panel, you can display information about the load modules and functions of the following programs:

■ Application (CA) - the lowest level non-system module is identified as application code or previous non-system if two in sequence

The application module is identified by back tracing through previous callers in the chain and identifying the first application (non-system) module. If the previous module to this one is also an application module, it will be identified as the application and the first one found will be the via (CV) module.

■ Current (CC) - module that is in control at the time of the sample

The current or active SA and module is identified utilizing the current PSW and registers for the sampled environment. The current module is the active program or last program at the end of the save area chain.

■ Via (CV) - most recent module called by the user application code

The via module is the last program called by the application function.

Type CA, CC, or CV in the LC field for a module and press Enter.

The Extended Callerid panel displays.

```
CA MAT ------------------ Extended CallerID ---------------- Row 1 to 4 of 4
COMMAND ===>                                          SCROLL ===> HALF


Display Mode: Current                                     Profile: CALUSS2
                                                          Options: NORMAL
Primary Commands: CURrent, APPlication, VIA                Module: CEEPLPKA
                                                            Csect: CEE4DSQT
Line Commands: M - Module Name      A - Activity             Offset: *
               F - Function Name


LC Load Module            Function              Actv% Wait% Totl% Visual


   _____ _____ _____ _____ _____ _____
--------------------------------------------------------------------------
__  rjrf1/u/ctest/uss3bp27 thread               5.30 18.44 23.74 ========>
__  CEEPLPKA               CEEOTERM             0.28  0.00  0.28
__  CEEPLPKA               CEEOPE               0.02  0.00  0.02
__  CEEPLPKA               CEEOXKTD             0.01  0.00  0.01
****************************** End of Table ******************************
```

You can use line command A from the Extended Callerid panel to see the Callerid Activity shown next.

```
CA MAT ------------------- Callerid Activity -------------- Row 1 to 15 of 17
COMMAND ===>                                          SCROLL ===> CSR

Display Mode: Current                                     Profile: USS3BP27
                                                          Options: NORMAL
Line Commands: M - Module Name                             Module: CEEPLPKA
               F - Function Name                            Csect: CEEBHINE
                                                           Offset: 00000320


LC Load Module  Function     Function Module   Actv% Wait% Totl% Visual
                             Offset   Offset

   _____ _____ _____ _____ _____ _____ _____ _____
--------------------------------------------------------------------------
__  est/uss3bp27 thread    00000000 00000AB8  8.99  0.00  8.99 ========>
__                         000000E8 00000BA0  0.38  0.00  0.38
__                         000000BE 00000B76  0.33  0.00  0.33
__                         000000BA 00000B72  0.27  0.00  0.27
__                         000000C6 00000B7E  0.27  0.00  0.27
__                         000000FE 00000BB6  0.14  0.00  0.14
__                         000000F6 00000BAE  0.14  0.00  0.14
__                         000000F0 00000BA8  0.13  0.00  0.13
__                         000000C2 00000B7A  0.08  0.00  0.08
__                         00000102 00000BBA  0.06  0.00  0.06
__                         000000D6 00000B8E  0.06  0.00  0.06
__                         0000010A 00000BC2  0.05  0.00  0.05
__                         000000B6 00000B6E  0.04  0.00  0.04
__                         000000E4 00000B9C  0.03  0.00  0.03
__                         000000CE 00000B86  0.03  0.00  0.03
------------------------------ Totals -----------------------------------
```

The fields that are displayed on the Extended Callerid panel are described next.

Display Mode

Displays the current display mode: Current, Application, or Via.

Profile

Displays the name of the profile that you specified when you created the monitor definition.

Options

Displays the type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

Offset

  Csect

  Displays the hexadecimal offset from the beginning of the CSECT.

  Module

  Displays the load address of the module.

Load Module

Displays the name of the LE load module.

If this value is truncated, use the M line command to display the full name. If it is a USS module, the path name is also shown.

Function

Displays the LE function name.

If this value is truncated, use the F line command to display the full file name. For LE compliant modules, the function name is shown.

Actv%

Displays the percentage of the monitored period when the calling module was using CPU.

CA MAT calculates this value as the ratio of samples in which it detected callerid activity to the total number of samples.

Wait%

Displays the percentage of the monitored period when the module was not using CPU.

CA MAT calculates this value as the ratio of samples in which it detected no activity to the total number of samples. This field is not displayed for Analyze Normal mode.

Totl%

Displays the summation of the Actv% and Wait% fields.

Visual

Displays the graphical representation of the Totl% field.

The fields that are displayed on the Callerid Activity panel are described next.

Display Mode

Displays the current display mode: Current, Application, or Via.

Profile

Displays the name of the profile that you specified when you created the monitor definition.

Options

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

Module

Displays the module name.

Csect

Displays the control Section within the module.

Load Module

Displays the name of the LE load module.

If this value is truncated, use the M line command to display the full name.
If it is a USS module, the path name is also shown.

Function

Displays the name of the LE function.

If this value is truncated, use the **F** line command to display the full file name.
For LE compliant modules, the function name is shown.

Function Offset

Displays the address offset from the beginning of the LE function of the last call (branch) made from this load module function.

This offset provides the displacement within the function in order to identify the source statement using the compiler pseudo assembler listing output.

Module Offset

Displays the address offset from the beginning of the load module of the last call (branch) made from this load module function.

This offset provides the displacement within the load module for non-LE modules.

Actv%

Displays the percentage of the monitored period when the calling module was using CPU.

CA MAT calculates this value as the ratio of samples in which it detected callerid activity to the total number of samples.

Wait%

Displays the percentage of the monitored period when the module was not using CPU.

CA MAT calculates this value as the ratio of samples in which it detected no activity to the total number of samples. This field is not displayed for Analyze Normal mode.

Totl%

Displays the summation of the Actv% and Wait% fields.

Visual

Displays the graphical representation of the Totl% field.

Display Program Listings

The Callerid panel provides the names of callers of a particular routine. This interaction can be especially helpful when identifying which program called a high level language library routine. To view the program listing, type L and press Enter.

The program listing displays in ISPF Browse mode, at the location of the routine.

The program must be registered with CA MAT to view the listings. If you keep your program listings in PROTSYM or CA Endevor with footprinting enabled, CA MAT can register these listings automatically, using dynamic registration support. For more information, see the section Set Up Profile Parameters in the chapter "Customization" in the *Installation Guide*.

TUNCOB01 program listing

```
******************************* Top of Data***************************
PP 5655-G53 IBM Enterprise COBOL for z/OS and OS/390 3.2.0                Date 11
Invocation parameters:
OBJECT,LIST,SOURCE
Options in effect:
    NOADATA
      ADV
      QUOTE
      ARITH(COMPAT)
    NOAWO
      BUFSIZE(4096)
    NOCICS
      CODEPAGE(1140)
    NOCOMPILE(S)
    NOCURRENCY
LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6---
000001         000100  IDENTIFICATION DIVISION.
000002         000200  PROGRAM-ID.  TUNCOB01.
000003         000300*-----------------------------------------------------------
000004         000400*
000005         000500*  THIS TEST PROGRAM IS USED TO VERIFY THE INSTALLATION O
000006         000600*  CA MAT AND TO DEMONSTRATE ITS CAPABILITIES.
000007         000700*
000008         000800*  IN THIS PROGRAM WE WILL EXPLORE TWO AREAS AND
000009         000900*  THEIR EFFECT ON PROGRAM PERFORMANCE.
000010         001000*
000011         001100*  1. FILE I/O AND BLOCKING OF SEQUENTIAL FILES
000012         001200*     WRITE A RECORD TO TWO FILES 3000 TIMES
000013         001300*  2. CODING TECHNIQUES
000014         001400*     A. USE OF INSPECT VERB
000015         001410*     B. SUBSCRIPTING
000016         001500*     C. INDEXING
000017         001600*     D. INLINE CODING
```

Display Module/CSECT Information

To view detailed information about a load module and CSECT that is listed on the Delay Locations panel, type I for a module and press Enter.

The Module/CSECT Info panel displays.

```
CA MAT  ------------------------- ModView --------------- Row 1 to 12 of 12
C +----------------------------------------------------------------+ > CSR
  | CA MAT  --------------- Module/Csect Info --------------------- |
P | Command ===>                                                   | AMPGM1
  |                                                                | RMAL
  |           Module name: VSAMPGM1         Rent: N                | Q
  |               Address: 00007DC8         Reus: N                |
  |                Length: 00002238         Ovly: N                |
L |            Date stamp: 2010/07/01       Load: N                | ual
  |        Link component: 5695PMB01        Exec: Y                | _____
> |               Dataset: QUIJ014.LOADLIB                         | -------
_ |    CA Endevor Footprint: Available                            |
_ |                                                                |
_ |             Csect name: VSAMPGM1        Amode: 31             |
_ |                Length: 00002238          Type: SD            |
_ |         Translator id: 569623400                              |
_ |          Compile Date: 2010/07/01                             |
_ |    CA Endevor Footprint: Available                            |
_ +----------------------------------------------------------------+
_
__  IGG0193B IGG019TV 00005658 00056C QSAM EOB I/O DASD       0.10
__  VSAMPGM1          00007DC8 002238                      B  0.00
S_  VSAMPGM1 VSAMPGM1 00000000 002238                         99.58 ========>
****************************** End of Table *******************************
```

The information in the Module/CSECT Info panel is similar to the information that displays in the ModView panel.

If a CA Endevor footprint was captured for the CSECT, the word AVAILABLE appears in reverse video next to the heading CA Endevor SCM Footprint. Display the footprint by placing the cursor on the word AVAILABLE and pressing Enter.

The CA Endevor SCM Footprint panel displays:

```
CA MAT  -------------------------- CodeView ---------------- Row 1 to 8 of 8
C +-----------------------------------------------------------------------+
  | CA MAT  ------------------- Module/Csect Info ----------------------   |
P | C +-------------------------------------------------------------------+ |
  | | CA MAT  ------------ CA Endevor SCM Footprint ------------------   | |
  | | Command ===>                                                      | |
L | |                                                                  | |
  | |          System Name: CUSTLIST          Stage: 1                 | |
  | |       Subsystem Name: ORDERS      Version.Level: 01.01            | |
  | |         Element Name: VSAMPGM1          Site ID: 0               | |
E | |         Element Type: ASM         Footprint Date: 2011/03/11      | |
  | |     Environment Name: PROD        Footprint Time: 10:42           | |
  | |                                                                  | |
L | +------------------------------------------------------------------+ |
  |              Length: 00000E66           Type: SD                     | _
> |       Translator id: 566895801                                      | -
I |        Compile Date: 2011/03/11                                     | >
_ | CA Endevor SCM Footprint: Available                                 |
  +-----------------------------------------------------------------------+
_
__  IGG0193B IGG019TV 00005658 00056C QSAM EOB I/O DASD        0.10
__  VSAMPGM1          00007DC8 002238                       B  0.00
S_  VSAMPGM1 VSAMPGM1 00000000 002238                          99.58 =======>
****************************** End of Table ****************************
```

For more information on CA Endevor footprints, see the *CA Endevor® Software Change Manager Footprints Guide*.

Display Delay Distribution

To find the tasks that are causing a specific delay, type S next to a delay category on the DelayView panel and press Enter. The Delay Distribution panel displays (and overlayed on the DelayView panel as a pop-up panel):

```
CA MAT -------------------------- DelayView --------------- Row 1 to 11 of 11
C |--------------------------------------------------|           SCROLL ===> CSR
  | CA MAT  ------- Delay Distribution -------------|
P | COMMAND ===>                   SCROLL ===> CSR  |         Profile: TUNCOB01
  |                                                |          Options: NORMAL
  |  Delay type: Program Active                    |           Detail: ON
  |                                                |
  | _____ _____ _____                        |
L | -----------------------------------------------|   %  Totl%  Visual
  | TUNCOB01 100.0 =======>                         |  __ _____ _____
- |  **************** End of Table ***************  |  --------------------
```

The Delay Distribution panel displays the distribution of samples that were attributed to a specific task during the monitored period. The percentage of the number of samples that relate to each task displays.

For IMS or CICS, the display shows the distribution of samples for the specific transactions run by the transaction manager and not for the tasks in the address space.

Interactive Analysis Option 3 - CodeView

CodeView displays the execution and wait time of each module that is used by the program. You can display this information in greater detail. You can define Pseudo Groups specific to your environment to summarize the information for multiple modules. This summarization enables you to identify time-consuming areas of code and to associate subroutines within a program and program modules within an application framework.

The CodeView panel displays information from the perspective of the monitored program.

```
CA MAT -------------------------- CodeView -------------- Row 1 to 13 of 46
COMMAND ===>                                             SCROLL ===> HALF

Primary commands: MOde Pseudo/Module/Csect/4GL,           Profile: CALUSS1
                  PSEudo, REGister, ADDHelp               Options: NORMAL
                                                          Mode: CSECT
Line commands: A - Associate    C - Callerid    D - Delays    N - Long Name
               I - Info         L - Listing     S - Distribution
               H - Histogram    NH - Normalized Histogram

Extended Callerid: CC - Current  CA - Application  CV - Via


LC Module    Csect    Description          L C X Actv% Wait% Totl% Visual
   _____ _____ _____ _ _ _ _____ _____ _____ _____
>-------------------------------------------------------------------------
__ IBMPEV11 @BMPHZIQ PL/I support routines A Y Y 25.31  6.11 31.41 ========>
__ IBMPEV11 @BMPSDLM PL/I support routines A Y Y 10.62  2.04 12.65 ===>
__ IBMPEV11 @BMPSMOA PL/I support routines A Y Y  9.98  2.65 12.62 ==>
__ IBMPEV11 @BMPSODA PL/I support routines A Y Y  7.27  1.51  8.78 =>
__ IBMPEV11 @BMPSEDB PL/I support routines A Y Y  4.77  0.99  5.76 >
__ IBMPEV11 @BMPSIOA PL/I support routines A Y Y  3.90  0.70  4.60 >
__ IBMPEV11 @BMPHDK  PL/I support routines A Y Y  3.26  0.81  4.07 >
__ IBMPEV11 @BMPHHXP PL/I support routines A Y Y  3.00  0.64  3.64 >
__ IBMPEV11 @BMPSXCB PL/I support routines A Y Y  2.47  0.52  3.00
__ IBMPEV11 @BMPSPOA PL/I support routines A Y Y  2.15  0.32  2.47
__ IBMPEV11 IBMPOFPT PL/I support routines A Y Y  1.16  0.26  1.43
__ CIDTST2  CICTST21                       A Y Y  1.13  0.26  1.40
__ IBMPEV11 @BMPSIOT PL/I support routines A Y Y  1.11  0.44  1.54
```

The primary and line commands that are available for CodeView are described next.

MOde

specifies the way module/CSECT information displays

Type one of the following commands and press **Enter**:

- **MODE PSE -** to display a summarization of module activity by pseudo group. The CSECT field will not be displayed.

- **MODE MOD -** to display the activity of each module detected by CA MAT during the monitored period. The CSECT field will not be displayed.

- **MODE CSE -** to display the activity of each CSECT detected by CA MAT during the monitored period. This setting is the default.

- **MODE 4GL -** to display the activity of Adabas, Natural, and CA Datacom routines. For more information, see the chapter "Using the Product with Other Databases."

PSEudo

Displays the Pseudo Group Definitions panel, where you can group Modules into functional groups.

For more information, see Define Pseudo Groups (see page 220).

REGister

Displays the Program Listing Registration panel, where you can register a program with CA MAT.

ADDHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

A

Associate—Accesses the CSECT Associations application.

I

Info—Retrieves information such as size, location, and link date for the selected load module.

H

Histogram—Creates an address execution map of the program.

Shows where the application was executing or waiting for data or service.

C

Callerid—Identifies the callers of this module/CSECT by name and offset.

L

Listing—Displays the program listing.

Valid only if the listing is registered with CA MAT, or if dynamic registration support is enabled.

NH

Normalized Histogram—Creates an address execution map of the program that shows where the application was executing or waiting for data or service.

This command is the same as the H line command except the percentages shown are normalized for the selected CSECT.

D

> **Delays**—Provides detailed location information about delays within this delay type.

S

> **Distribution**—Shows the proportion of time a specific module or module/CSECT that are executed under a task or transaction.

N

> **Long Name**—Displays the full Long name for the USS/Java short name. This command is valid for USS and Java applications only.

CA

> **Application**—Displays the Extended Callerid panel in Application mode, which shows information about the lowest level module identified as application code (non-system). For more information, see Display Callerid and Extended Callerid (see page 151).

CC

> **Current**—Displays the Extended Callerid panel in Current mode, which shows information about the module that is in control at the time of the sample. For more information, see Display Callerid and Extended Callerid (see page 151).

CV

> **Via**—Displays the Extended Callerid panel in Via mode, which shows information about the most recent module called by the user application code. For more information, see Display Callerid and Extended Callerid (see page 151).

The fields that are displayed on the CodeView panel are described next.

Profile

> Name of the profile that you specified when you created the monitor definition.

Options

> Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

> An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter **t**o display a pop-up panel listing the selected tasks/transactions.

Mode

> Current display mode: PSUEDO, MODULE, CSECT, or 4GL.

Group

> Pseudo group name defined for the module.

> For more information, see Define Pseudo Groups.

Module

Module name.

CSECT

Control Section within the module.

Description

Description of CSECTs, if available.

Scroll right to display the extended description.

L

If the program was loaded above the 16MB line in extended virtual memory, this field contains the "greater than" symbol (>).

If the program was loaded below the 16MB line, this field contains the symbol <. If CA MAT cannot detect where the program was loaded, this field is blank.

C

If Callerid information is available, this field contains a Y; otherwise, this field is blan.

X

Contains a Y if Extended Callerid information is available for this CSECT.

Actv%

Percentage of the monitored period when a CPU was in use.

CA MAT calculates this value as the ratio of samples in which it detected CPU activity to the total number of samples.

Visual

Graphical representation of the Totl% field.

Overlap%

Percentage of the monitored period when both the CPU was active and file access was occurring.

Scroll right to display this information.

Wait%

Percentage of the monitored period when the CSECT was not using CPU.

CA MAT calculates this value as the ratio of samples in which it detected no activity to the total number of samples. This field is not displayed for Analyze Normal mode.

Totl%

Summation of the Actv% and Wait% fields.

Display CSECT Activity Locations

The Histogram panel shows the activity that is associated with a CSECT. A CSECT is divided into segments of a specified size in bytes, and the activity detected in each segment displays.

You can view activity locations using the following procedure.

Follow these steps:

1. Use either the **H**istogram or the **N**ormalized **H**istogram line command.

   – If you use the H line command, the values displayed in Histogram add up to the value of the selected CSECT (from the Totl% field).

   – If you use the NH line command, the values displayed in Histogram add up to 100 percent.

2. Press Enter.

   The Histogram panel displays:

```
CA MAT  ------------------------- Histogram --------------- Row 1 to 13 of 15
COMMAND ===>                                                 SCROLL ===> CSR

  Group ===> 32     (Group size in bytes or STMT)          Profile: TUNIVP1
                                                          Normalized: NO
Primary commands: REGister, ADDHelp                       Module name: TUNCOB01

   Line commands: D - Delays  L - Listing

LC Csect    Offset   Length Actv% Wait% Totl% Visual
   _____ _____  _____ ____ ____ ____ _____
   ------------------------------------------------------------------------------
__ TUNCOB01 00000000  1696  0.00  0.00  0.00
__         000006A0    32  0.08  0.00  0.08
__         000006C0    64  0.00  0.00  0.00
__         00000700    32  0.15  0.23  0.38
__         00000720   128  0.00  0.00  0.00
__         000007A0    32  0.15  0.00  0.15
__         000007C0    64  0.00  0.00  0.00
__         00000800    32  2.86  1.58  4.44 ⇒
__         00000820    32 10.08  3.61 13.68 ===⇒
__         00000840    32  7.14 14.51 21.65 ======⇒
__
```

Specify Histogram Group Size

The group size defines the resolution of the histogram. The initial size is set by using the Instruction group field of the Profile Parameters panel (see the *Installation Guide*). The default value is 32 bytes.

1. To change the value of the group size, type over the existing value and press Enter. The minimum size accepted is 2 bytes.

   Specify 2 in the GROUP field to analyze execution at the lowest possible level.

2. If the source code for the program is registered with CA MAT, or if dynamic registration support is enabled, specify STMT in the Group field to display the verb that is associated with the statement, as shown next.

```
CA MAT  ------------------------ Histogram --------------- Row 1 to 11 of 11
COMMAND ==>                                                SCROLL ==> CSR

  Group ==> STMT   (Group size in bytes or STMT)         Profile: TUNIVP1
                                                         Normalized: NO
Primary commands: REGister, ADDHelp                      Module name: TUNCOB01

   Line commands: D - Delays  L - Listing

LC Csect    Stmt   Verb        Actv% Wait% Totl% Visual

   _____ _____ _____ ____ ____ ____ _____
   -----------------------------------------------------------------------
__ TUNCOB01   100 PERFORM      0.08  0.00  0.08
__            102 PERFORM      0.15  0.23  0.38
__            131 MOVE         0.15  0.00  0.15
__            134 GO           0.15  0.00  0.15
__            135 GO           0.00  0.08  0.08
__            142 ADD         20.38 19.70 40.08 =====>
__            143 ADD          0.30  0.45  0.75
__            144 IF           0.15  0.00  0.15
__            145 MOVE         0.08  0.00  0.08
__            152 MOVE         1.20  0.38  1.58
__            153 INSPECT      0.15  0.00  0.15
****************************** End of Table ******************************
```

Display the Program Listing

If the program you are analyzing has been registered with CA MAT, you can display the program listing at the module/CSECT. To view the program listing, type L and press Enter. The program listing displays in ISPF Browse mode.

The program must be registered with CA MAT to view the listings. If you keep your program listings in PROTSYM or CA Endevor with footprinting enabled, CA MAT can register these listings automatically, using dynamic registration support. For more information, see the section Set Up Profile Parameters in the chapter "Customization" in the *Installation Guide*.

TUNCOB01 listing
```
000155      011600*--------------------------------------------------------
000156      011700*   INSPECT AGAIN
000157      011800*--------------------------------------------------------
000158      011900
000159      011910  INSPECT1-100.
000160      012000     MOVE    "EVEN MORE DATA FOR THE INSPECT TO DO" TO DA
000161      012100     INSPECT DATA-CONST2 TALLYING COUNT-03 FOR CHARACTERS
000162      012200      AFTER INITIAL "E" REPLACING ALL "O" BY "Z".
000163      014910
000164      015100  STOP-100.
000165      015200     CLOSE BIGBLOCK.
000166      015300     CLOSE UNBLOCK.
000167      015400     STOP RUN.
```

Display Delay Location Information

From the CodeView panel, you can link to the DelayView panel to display the locations and categories for a module/CSECT. Type D next to a module and press Enter. The DelayView panel displays.

```
CA MAT ------------------------- DelayView --------------- Row 1 to 10 of 10
COMMAND ===>                                             SCROLL ===> CSR

Primary commands: DETail on/off        Module: *           Profile: TUNIVP1
                  ADDHelp               Csect: *            Options: NORMAL
                                        Offset: *            Detail: ON
   Line commands:  A - Address
(AutoNav enabled)  S - Distribution

LC Major Category        Minor Category      Actv%  Wait%  Totl%  Visual

   _____      _____     _____  _____  _____  _____
   ---------------------------------------------------------------------------
__ Other Delays          Waiting for CPU      0.00  56.31  56.31 ========>
__ Program Active        Program Active      24.18   0.00  24.18 ===>
__ System Active         Getmain SVC         12.47   0.00  12.47 ==>
__ System Active         Regmain SVC          6.28   0.00   6.28 =>
__ File Mgmt Delay       Eov SVC              0.00   0.33   0.33
__ PC routine delay      PC Call              0.09   0.06   0.15
__ Data Delay            IO Queued            0.00   0.12   0.12
__ File Mgmt Delay       Close SVC            0.00   0.09   0.09
__ DASD Mgmt Delay       Obtain SVC           0.03   0.00   0.03
__ System Active         Protect SVC          0.00   0.03   0.03
******************************* End of Table *******************************
```

For complete information about using DelayView, see Interactive Analysis Option 2 – DelayView.

Display Code Distribution

To display the Code Distribution panel, use the S (Distribution) line command for a specific module or CSECT. This panel displays the selected module and CSECT name, along with all associated tasks or transactions. CA MAT attributes each sample to one of these tasks or transactions and displays the percentage of samples that are associated with each.

```
CA MAT -------- Code Distribution --------------
COMMAND ===>                       SCROLL ===> CSR

        Module: DB2SMPGM     Csect: DB2SAMP

Trancode Pct   Visual

_____ _____ _____
-------------------------------------------------
DTED     100.0 ========>
```

For IMS or CICS, the display shows the distribution of samples for the specific transactions run by the transaction manager, not for the tasks in the address space.

Display Callerid and Extended Callerid

From CodeView, you can use Callerid to determine which programs called various subroutines that are causing delays. Callerid information is available if a Y appears in the C column on the CodeView panel.

Extended Callerid information is available if a Y appears in the X column on the CodeView panel.

Extended Callerid provides a sampling of application program functions using the caller's chain of save area (SA) and Language Environment (LE) dynamic save area (DSA). At interval sample time the SA/DSA chain is scanned to identify and provide the load module and function names for up to three program entries.

You can display information about the load modules and functions of the following programs:

■ Current (CC) - module that is in control at the time of the sample

    The current or active SA and module is identified utilizing the current PSW and registers for the sampled environment. The current module is the active program or last program at the end of the save area chain.

■ Application (CA) - the lowest level non-system module is identified as application code or previous non-system if two in sequence

The application module is identified by back tracing through previous callers in the chain and identifying the first application (non-system) module. If the previous module to this one is also an application module, it will be identified as the application and the first one found will be the via(CV) module.

■ Via (CV) - most recent module called by the user application code

The via module is the last program called by the application function.

Callerid and Extended Callerid are also available from the Delay Locations panel. For a complete description, see Display Callerid and Extended Callerid.

Interactive Analysis Option 4 - TimeView

TimeView displays program activity in time sequence. Each row of information on the TimeView panel represents a single sample taken during the monitored period. This format helps you determine a program's execution path and looping logic. This format also gives a good indication of which code sections executed and when they executed during the monitored period.

```
 CA MAT -------------------------- TimeView ------------- Row 1 to 13 of 3147
 COMMAND ===>                                              SCROLL ===> CSR

 Primary commands: ADDHelp                                Profile: TUNCOB01
                                                          Options: NORMAL

     Line commands: D - Details (Auto-Navigation)

 LC Sequence Observation Module   CSECT    Offset   S Det Calling  Calling
    Number   Number                                         Module   CSECT

    _____ _____ _____ _____ _____ _ ___ _____ _____
 >-------------------------------------------------------------------------
 __       1          1 IGZCPAC  IGZCIN1  00000B9C W
 __       2          2 TUNCOB01 TUNCOB01 000009E2 A     TUNCOB01 TUNCOB01
 __       3          3 TUNCOB01 TUNCOB01 000009E2 A     TUNCOB01 TUNCOB01
 __       4          4 TUNCOB01 TUNCOB01 000009DA W
 __       5          5 IGZCPAC  IGZCIN1  00000B9E A     TUNCOB01 TUNCOB01
 __       6          6 IGZCPAC  IGZCIN1  00000868 W
 __       7          7 IGZCPAC  IGZCIN1  000006D0 A     TUNCOB01 TUNCOB01
 __       8          8 TUNCOB01 TUNCOB01 00000A7C A     TUNCOB01 TUNCOB01
 __       9          9 IGZCPAC  IGZCIN1  0000077E A     TUNCOB01 TUNCOB01
 __      10         10 IGZCPAC  IGZCIN1  000006D0 A     TUNCOB01 TUNCOB01
 __      11         11 TUNCOB01 TUNCOB01 000009AE A     TUNCOB01 TUNCOB01
 __      12         12 IGZCPAC  IGZCIN1  00000B4C A     TUNCOB01 TUNCOB01
 __      13         13 IGZCPAC  IGZCIN1  00000792 A     TUNCOB01 TUNCOB01
```

The primary and line commands available for TimeView are described next.

ADDHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

D

Details - provides detail data for the sample.

Detail data is available if the **Det** column displays YES.

The data that displays on the TimeView panel is described next.

Profile

Name of the profile that you specified when you created the monitor definition.

Options

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the **Options** field value and press **Enter** to display a pop-up panel listing the selected tasks/transactions.

Sequence Number

Sample sequence numbers, listed consecutively, from one to the number of samples that you requested.

Observation Number

Number of the observation.

There can be multiple occurrences of the same observation number in a multiple-TCB environment, such as CICS.

There also might be multiple samples taken, potentially one for each TCB seen during an observation.

Module

Name of the load module related to the collected sample.

CSECT

Name of the control section that was in control for the sample.

Offset

Offset where the interrupt occurred for the sample.

The offset begins from the start of the control section shown in the CSECT field. Offset displays in hexadecimal notation.

S(tatus)

Indicates the status, which can be either A (Active) or W (Wait).

Active indicates that the CSECT was executing on a CPU.

Wait indicates that the CSECT was not executing on a CPU.

Det

YES in the Det column indicates that additional information is available by using the **D**etails line command to isolate the cause of delays.

Calling Module

Name of the module that issued a call for the module in control during the sample.

Calling CSECT

Name of the control section that called the routine that was in control during the sample.

You might need to scroll right to display the following fields:

Caller Offset

Offset from the start of the control section shown in the Calling CSECT field where the call to the current module was made.

Caller Offset displays in hexadecimal notation.

Task ID

Name of the program (including the TCB address) controlling the MVS task associated with this sample.

Transact Code

Transaction code from either an IMS/TM or a CICS environment.

Display Detail Data

If the DET field contains YES, you can display additional detail information about the data set or resource. Use the **D**etails line command to display the Delayed Resources panel, as described in Display Delayed Resources.

Interactive Analysis Option 5 - DataView

DataView displays data sets, databases (IMS, Adabas, and CA Datacom), DB2 statements, Queue Manager activity, and CA IDMS requests that caused activity during the monitored period. The data on the DataView panel is sorted in descending order by activity. You can select a data set, database, DB2 statement, MQ, or CA IDMS request to display greater detail.

```
CA MAT -------------------------- DataView --------------- Row 1 to 10 of 64
COMMAND ===>                                                SCROLL ===> CSR

Primary commands: LINklist on/off                       Profile: RADIDMSP
                                                        Options: NORMAL
   Line commands: S - Select                            Linklist: OFF


LC DD name  Dataset name                               Delay% Visual
   _____ _____ _____ _____
>----------------------------------------------------------------------------
s_ .IDMS    CA IDMS Delay                                24.16 ========>
__ ACCOUNTB CAI.IDMS.DBCRAPPL.ACCT.B                      0.70
__ ACCOUNTH CAI.IDMS.DBCRAPPL.ACCT.H                      0.68
__ ACCOUNTC CAI.IDMS.DBCRAPPL.ACCT.C                      0.67
__ ACCOUNTI CAI.IDMS.DBCRAPPL.ACCT.I                      0.63
__ ACCOUNTG CAI.IDMS.DBCRAPPL.ACCT.G                      0.60
__ ACCOUNTF CAI.IDMS.DBCRAPPL.ACCT.F                      0.52
__ ACCOUNTA CAI.IDMS.DBCRAPPL.ACCT.A                      0.50
__ ACCOUNTD CAI.IDMS.DBCRAPPL.ACCT.D                      0.50
__ ACCOUNTE CAI.IDMS.DBCRAPPL.ACCT.E                      0.50
-------------------------------- Totals ------------------------------------

                                                        30.44
```

Display Linklist Information

To display information about LINKLIST and LPALIST data sets, use the primary command LINKlist ON. To hide the information after it displays, use the primary command LINKlist OFF.

Display Data Set Information

You can display relevant information about data sets using the following procedure.

Follow these steps:

1. Use the **S**elect line command to display the Data Set Details panel. If the data set is a VSAM data set, you might see an enhanced Data Set Details panel.

   Data set statistics might not be available for very short measurements, or for data sets that are allocated and unallocated for brief intervals (less than two seconds).

   The DataView panel opens.

2. Complete the following fields:

   Profile

   Name of the profile that you specified when you created the monitor definition.

   Options

   Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

   An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the **Options** field value and press **Enter** to display a pop-up panel listing the selected tasks/transactions.

   Linklist

   Current Linklist setting of ON or OFF.

   DD name

   DDNAME that was used to allocate the data set.

   For a concatenation, multiple lines are displayed with identical DDNAMEs for each associated data set. For I/O that CA MAT cannot identify, the pseudo-DDNAME .IO*nnnn* appears in this field, where *nnnn* is the unit address.

   Dataset name

   Full name of the data set.

   For a concatenation, multiple lines are displayed with identical DDNAMEs for every data set that is associated with the DDNAME.

   Delay%

   Percentage of the monitored period that activity was detected against the DD statement shown.

   If several data sets are allocated to a single DD statement, this number is repeated for every data set.

   Visual

   Graphical representation of Delay%.

3. Scroll right to display the following fields:

Block Size

> Block size of the data set.

Record Length

> Logical record length of the records that were created by the application.

RECFM

> Format of the records that were written to the data set. The following list explains each value:
>
> ■ **F -** fixed records
>
> ■ **FB -** fixed blocked records
>
> ■ **V** - variable records
>
> ■ **VB -** variable blocked records
>
> ■ **U** - undefined records

EXCPs

> Number of EXCPs that were issued during the monitor period for this data set.
>
> An EXCP is equivalent to reading or writing a single block to or from the data set.

Connect Time

> Number of milliseconds during the monitored period that represents the end-to-end time for transferring data to or from the external media and memory.
>
> **Note:** This time might exceed the monitored period because of data overlap. This overlap occurs when multiple blocks of data are moved to or from memory concurrently.

R/W

> This represents 'open intent', if the DDNAME is for a data set, this field displays the intention of the program in opening the data set.
>
> If the DDNAME is for a database, this field displays the type of database. For data sets, this field contains one of the following values: DIRECT, GET MOVE, GET LOCATE, PUT MOVE, PUT LOCATE, READ, WRITE, MEMBER READ, MEMBER WRITE, PROGRAM LOADING, UNDETERMINED. For databases, this field contains one of the following values: ADA, DB2, DCM, IMS, MQ, and IDMS.

DSORG

Organization of the data set. The following list explains the possible values:

- **DA** - direct access
- **PS** - physical sequential
- **IS** - indexed sequential
- **VSAM -** virtual sequential access method
- **PO** - partitioned organization

Access Method

Access method that was used to read from or write to the data set. Possible values are as follows

- **BPAM** - basic partitioned access method
- **BTAM** - basic telecommunications access method
- **EXCP** - execute channel program
- **GRPH -** graphics access method
- **DA** - direct access method
- **ISAM** - indexed sequential access method
- **SAM** - sequential access method
- **SUBS** - JES subsystem access
- **TAP** - TCAM application access
- **TCAM** - telecommunications access method
- **VSAM** - Virtual Sequential Access Method
- **VTAM** - Virtual Telecommunications Access Method

Buffer Size

Buffer size for the data set.

This size is generally the same as the Block Size.

Buffer Number

Number of buffers that are allocated for the data set.

Number Extents

Number of physical extents that are allocated to the data set.

For non-VSAM data sets, this number might be in the range of 1 to 16. VSAM allows up to 128 extents for a data set.

Alloc Unit

Allocation unit for the data set. This field contains one of the following values:

- **BLK -** Space is allocated in blocks.

- **CYL** - Space is allocated in cylinders.

- **TRK** - Space is allocated in tracks.

- **DSN** - The DDNAME indicates a database rather than a data set.

- (blank) - CA MAT did not detect the unit of allocation.

PRI Size

Primary Unit - the initial allocation of cylinders, tracks, or blocks for a data set on direct access

Depending on the allocation unit, this field contains the following value:

- For CYL, the number of cylinders allocated.

- For TRK, the number of tracks allocated.

- For BLK, the number of blocks allocated.

SEC Size

Secondary Unit - The secondary allocation of cylinders, tracks, or blocks for a data set on direct access

Depending on the allocation unit, this field contains the following value:

- For CYL, the number of cylinders allocated.

- For TRK, the number of tracks allocated.

- For BLK, the number of blocks allocated.

Seq Nr.

CA MAT sequence number of the record

This sequence number is incremented by CA MAT for each scheduling of the sampler into the target address space.

UCB Addr

Unit Control Block number for this data set.

The UCB is the logical device number, expressed in hexadecimal, on which this data set resides.

VOLSER(s)

First six volume serial numbers on which this data set resides.

The volume serial numbers are not separated by commas.

Display Detail and Performance Information

The following describes detail and performance data returned for non-VSAM and VSAM data sets.

The following panel shows an example of the Data Set Details panel containing data for a non-VSAM data set.

```
CA MAT  -------------------- Data Set Details ------------ Row 1 to 19 of 64
COMMAND ===>                                            SCROLL ===> CSR

DDNAME: MDYU3000                                        Profile: DB2SAMP

Access Method: VSAM       Cluster: CAMAT.TUNCIC61.MDYUDATA.CC3000
   Opened for: DIRECT        Data: CAMAT.TUNCIC61.MDYUDATA.CC3000.DATA
Share Options: 2 3          Index: CAMAT.TUNCIC61.MDYUDATA.CC3000.INDEX
 Organization: KSDS

Data Component Information for: CAMAT.TUNCIC61.MDYUDATA.CC3000.DATA


------ SMS ------- ------ Allocation ------- ---------- Format --------------
DATACLAS: **NONE** Unit:           CYL Rec Len:      43 CI Size: 4096
STORCLAS: **NONE** Primary:          5 # CIs per CA:  180 Strings:    0
MGMTCLAS: **NONE** Secondary:        2 CA Freespace:    0 Buffers:    2
                   Volume Count:     1 CI Freespace:    0
                   Total Extent Count:  1 Stripes:      0

---- VSAM Statistics ----------------------------------------------------------
Number of records: 0
     Records Read: 0        Records Updated: 0       CA Splits:    0
    Records Added: 0        Records Deleted: 0       CI Splits:    0
```

For field related information for the Allocation and Format sections, see the previous section. Field descriptions for the Data Set Performance fields section for non-VSAM data set are described next.

SMS Fields

DATACLAS

For Systems Managed data sets, this class is a named collection of data set and space attributes.

STORCLAS

For Systems Managed data sets, this class is a named collection of performance and device availability attributes.

MGMTCLAS

For Systems Managed data sets, this class is a named collection of migration, backup, and expiration attributes.

Data Set Performance Fields

Avg Resp Time

Average data set response time during the monitoring interval.

Active Rate

Average number of I/Os per second being performed against the file during the monitoring interval.

Total EXCPs

Total number of EXCPs (I/Os) performed against the file during the monitoring period.

Total Conn Time

Total data set connect time during the monitoring interval.

This value is expressed in 128 milliseconds units and includes data transfer time, connect search time, protocol, and reconnect time.

Avg IOSQ Time

Average IOS Queue Time experienced by the data set during the monitoring interval expressed in ms units. IOSQ TIME is computed by using the formula:

$$\text{Average IOS queue time} = \frac{(QC / S)}{R}$$

where

■   QC is the total number of requests found on the IOS queue

■   S is the total number of samples taken

■   **R** is the active rate

Avg Pend Time

Average number of milliseconds that an I/O request remains queued to the channel.

This value reflects the amount of time that elapses between when the SSCH (Start SubChannel) function is accepted by the subchannel and when the first command that is associated with the SSCH function is accepted at the device.

Pending time accrues when the request is waiting for an available channel path or control unit, as well as when shared DASD contention occurs.

Avg Disc Time

Average number of milliseconds that the device had an active I/O request but was disconnected from the channel path.

Disconnect time includes

- Time waiting to be reconnected after a SET SECTOR, this time is called rotational position sensing (RPS) delay

- Head Movement time (SEEK TIME) between cylinders

- Latency or search time

Avg Conn Time

Average number of milliseconds the device was connected to a channel path and actively transferring data between the device and central storage.

This value is calculated as follows:

Average Connect time = Total connect time / Measurement Even count

An example of the Data Set Details panel containing data for a VSAM data set follows.

```
CA MAT  --------------------- Data Set Details ------------ Row 1 to 19 of 35
COMMAND ===>                                             SCROLL ===> CSR

DDNAME: NSUSSN3                                          Profile: TUNSAMP

Access Method: VSAM        Cluster: TAC.H159NPS.SESS.MGR.SESSN3.CLUS
   Opened for: DIRECT         Data: TAC.H159NPS.SESS.MGR.SESSN3.DATA
Share Options: 2 3          Index: N/A
 Organization: ESDS

Data Component Information for: TAC.H159NPS.SESS.MGR.SESSN3.DATA


------ SMS ------- ------ Allocation ------- ---------- Format ---------------
DATACLAS: STANDARD Unit:               CYL Rec Len:     32752 CI Size: 32768
STORCLAS: FAST     Primary:            800 # CIs per CA:    22 Strings:     0
MGMTCLAS: MA@NODEL Secondary:           20 CA Freespace:     0 Buffers:    16
                   Volume Count:         1 CI Freespace:     0
                   Total Extent Count:  29 Stripes:          0


---- VSAM Statistics -----------------------------------------------------------
Number of records: 28776
     Records Read: 1895      Records Updated: 835      CA Splits:      0
    Records Added: 0         Records Deleted: 0        CI Splits:      0
---- Data Set Performance --------------------
  Avg Resp Time:     4.39 Avg IOSQ Time:  0.00
    Active Rate:     0.68 Avg Pend Time:  0.29
    Total EXCPs:     2727 Avg Disc Time:  1.51
Total Conn Time:  7062.53 Avg Conn Time:  2.59
```

The field descriptions for the Data Set Performance fields section for VSAM data set are described next.

Access Method

Identifies the access method used to read from or write to the data set.

Opened For

Intention of the program when performing I/Os for this data set. Valid values are:

■ READ

■ WRITE

■ DIRECT

Share Options

Displays two numeric values.

The first value is the level (1, 2, 3, or 4) of cross-region sharing allowed by VSAM. The second value is the level (3 or 4 only) of cross-system sharing allowed by VSAM.

■ At level 1, the data set can be shared by any number of users for read processing, or can be accessed by only one user for read and write.

■ At level 2, the data set can be accessed by any number of users for read processing, and can also be accessed by one user for write processing.

■ At level 3, the data set can be fully shared by any number of users.

■ At level 4, the data set can be fully shared by any number of users, and buffers used for direct processing are refreshed for each request.

Organization

Physical organization of the data stored in this data set.

Can be one of the following types:

■ KSDS

■ ESDS

■ RRDS

Cluster

Full name of the data set.

If this organization is KSDS, CA MAT displays the names of the DATA and INDEX components.

Data

Is the data set name of the DATA component of the VSAM file.

Index

Is the data set name of the INDEX component of the VSAM file.

VSAM KSDS data sets are indexed using a multilevel structure. The number of levels can have an impact on the performance of the data set if there are insufficient index buffers.

Format

Rec Len

Specified length of the records that are residing in this data set.

CIs per CA

Count of CIs allocated within a control area for the data in this data set.

CA Freespace

Percentage of free space in the control area.

Defined when the data set was created.

CI Freespace

Percentage of free space in the control interval.

Defined when the data set was created.

Stripes

For extended sequential data sets, the number of stripes that are used to read/write the data.

This number will be nonzero if the extended sequential data set is allocated with multiple stripes.

CI Size

Size of the control interval for the data in this data set.

Strings

Number of strings for the data set.

This value indicates the number of concurrent operations that might be started for the data set.

VSAM Statistics

Records Read

Total number of records that were retrieved during the monitored period.

Records Added

Total number of records that were added during the monitored period.

Records Updated

Total number of records that were written during the monitored period.

Records Deleted

Total number of records that were deleted during the monitored period.

CA Splits

Total number of control area splits that have occurred since the file was defined.

CI Splits

Total number of control interval splits that have occurred since the file was defined.

Data Set Performance Fields

Avg Resp Time

Average data set response time during the monitoring interval.

Active Rate

Average number of I/Os per second being performed against the file during the monitoring interval.

Total EXCPs

Total number of EXCPs (I/Os) being performed against the file during the monitoring period.

Total Connect Time

Total data set connect time during the monitoring interval.

This value is expressed in 128 milliseconds units. Includes data transfer time, connect search time, protocol, and reconnect time.

Avg IOSQ Time

Average IOS Queue Time that was experienced by the data set during the monitoring interval expressed in ms units. IOSQ TIME is computed by using the formula:

```
                  (QC / S)
  Average IOS  =  ----------
   queue time         R
```

where

■ QC is the total number of requests found on the IOS queue

■ S is the total number of samples taken

■ R is the active rate

Avg Pend Time

Average number of milliseconds that an I/O request remains queued to the channel.

This value reflects the amount of time that elapses between when the SSCH (Start SubChannel) function is accepted by the subchannel and when the first command associated with the SSCH function is accepted at the device. Pending time accrues when the request is waiting for an available channel path or control unit, as well as when shared DASD contention occurs.

Avg Disc Time

Average number of milliseconds that the device had an active I/O request but was disconnected from the channel path.

Disconnect time includes

■ Time waiting to be reconnected after a SET SECTOR; this time is called rotational position sensing (RPS) delay.

■ Head Movement time (SEEK TIME) between cylinders

■ Latency or search time.

Avg Conn Time

Average number of milliseconds that the device was connected to a channel path and actively transferring data between the device and central storage.

This value is calculated as follows:

Average Connect time = Total connect time / Measurement Even count.

Buffer Performance

Pool ID

Pool identifier that was used to satisfy requests for this file.

Buffer Size

Size of the buffer that was used from the pool identified by 'Pool ID'.

Ratio

Percentage of READ requests that were satisfied from the buffer pool without an EXCP.

# of Buffers

Number of buffers that are available in the shared pool.

Steal Writer

Number of non–user-initiated WRITES that were initiated for this buffer pool.

A value here usually indicates a serious performance consideration. (LSR/GSR).

For either a non-VSAM or VSAM data set, you can scroll down to see additional volume information:

```
Volume Information for Volume PUBA01 ----------------------------------

  Unit No.: 8359          Avg Resp Time:  40.41    Avg IOSQ Time: 086.30
  Dev Type: 3390-380        Active Rate: 239.66    Avg Pend Time:  23.71
 Alloc Cnt: 12                 Dev Res:   0.03     Avg Disc Time:   1.61
  Open Cnt: 1                  Dev Util: 400.01    Avg Conn Time:  15.08
   Mounted: PUBLIC
Cache Act.: CFW CAC DFW
```

The field descriptions for the Data Set Performance fields section for VSAM data sets are described next.

Volume Information Fields.

> These statistics are for the entire volume and not just for the data set. This way, you can use CA MAT to determine reasons for data sets not performing correctly and compare the performance of the data set with the entire volume.

Volume

> Volume serial name

Unit Number

> UCB Unit number (address)

Dev Type

> Device type

Aloc Count

> Number maximum number of users allocated to the volume during the monitoring period.

Open Count

> Maximum number of open data sets on the volume during the monitoring period.
>
> The open count directly influences the IOS Queue time to the device.

Mounted

> Method that the volume was mounted to z/OS. Can be PRIVATE, PUBLIC, or STORAGE. This value is used to determine how data sets are allocated on the device.

Cache Act

Indicates active caching options for the device. If present, the option is active. The options are as follows:

- CFW Cache Fast-Write is active.

- CAC basic caching is active.

- DCP is active.

- DFW Device Fast Write is active for the device.

These options can greatly affect the performance of the volume.

Avg Resp Time

Average data set response time during the monitoring interval.

This value is in milliseconds units.

Active Rate

Average number of I/Os per second being performed against the volume during the monitoring interval.

Dev Res

Percentage of time the device was found to be reserved during the monitored period.

Dev Util

Percentage the device was in use during the monitoring period.

This value includes both the time the device was performing I/O operations and the time that the device was reserved, but not necessarily active. The calculation is as follows:

Device Utilization Percentage = 100 * [(DCT +TDT / T) + (RS / S)]

where

- DCT is the device connect time

- TDT is the device disconnect time

- T is the length of the monitoring session

- RS is the number of times the devices was reserved but not busy

- S is the total number of samples

Avg IOSQ Time

Average IOS Queue Time experienced by the data set during the monitoring interval expressed in ms units. IOSQ TIME is computed by using the formula:

$$\text{Average IOS queue time} = \frac{(QC / S)}{R}$$

where

- ■ QC is the total number of requests found on the IOS queue

- ■ S is the total number of samples taken

- ■ R is the active rate

Avg Pend Time

Average number of milliseconds that an I/O request remains queued to the channel.

This value reflects the amount of time that elapses between when the SSCH (Start SubChannel) function is accepted by the subchannel and when the first command that was associated with the SSCH function is accepted at the device. Pending time accrues when the request is waiting for an available channel path or control unit, as well as when shared DASD contention occurs.

Avg Disc Time

Average number of milliseconds that the device had an active I/O request but was disconnected from the channel path.

Disconnect time includes

- ■ Time waiting to be reconnected after a SET SECTOR; this time is called rotational position sensing (RPS) delay.

- ■ Head movement time (SEEK TIME) between cylinders

- ■ Latency or search time

Avg Conn Time

Average number of milliseconds the device was connected to a channel path and actively transferring data between the device and central storage.

This value is calculated as follows:

Average Connect time = Total connect time / Measurement Even count

Display DB2, IMS, Adabas, MQ, IDMS, or CA Datacom Information

If you are monitoring an IMS, DB2, Adabas, CA Ideal or CA Datacom application, you may notice one of the rows containing a value in the DD name field that corresponds to the application. When you select this field, CA MAT displays a screen with more detailed information about that application.

For the application	DD name field contains	Selecting this field displays	For more information, see
DB2	.DB2	DB2 Statements	Chapter "Using the Product in a DB2 Environment (see page 315)"
IMS	.IMS	IMS Statements	Chapter "Using the Product in an IMS Environment (see page 415)"
Adabas	.Adabas	ADABAS Statements	Chapter "Using the Product with Other Databases (see page 487)"
CA Datacom	.DCOM	CA Datacom Statements	Chapter "Using the Product with Other Databases (see page 487)"
IDMS	.IDMS	IDMS Statements	Chapter "Using the Product in a CA IDMS Environment (see page 475)"
Queue Manager	.MQ	Queue Manager activity	Chapter "Using the Product in a WebSphere for MQ Environment (see page 475)"

Interactive Analysis Option 6 - TranView

TranView shows IMS or CICS activity in terms of individual transactions. It displays the percentage of time that CA MAT detected activity for each transaction in the six major activity and delay categories. If you select a transaction, CA MAT recomputes the values by using only samples from the selected transaction on all subsequent screens that you display. Using TranView enables you to focus on the performance of that transaction.

For information about using the TranView display with CICS, see TranView for CICS.

```
CA MAT -------------------------- TranView ----------------- Row 2 to 7 of 7
COMMAND ===>                                              SCROLL ===> CSR

Primary commands: SELect, RECall, ADDHelp              Profile: CICSTS32
              STC - CICS Summary Stats   IDL - CICS Idle Time  Options: NORMAL
Line commands: T - Tag   U - Untag   D - Delay Details (Auto-Navigation)
               C - Code Details      N - Data Details
               P - CallerID Details  S - Additional Tran Statistics

LC TRAN     T D #Trans Avg RESP Avg CPU  Actv%  Data%  Other% Total% Visual

   _____ _ _ _____ _____ _____ _____ _____ _____ _____ _____
>------------------------------------------------------------------------------
__ MVB2     Y    1 30.25732  0.02672 12.50  3.75   0.00  16.25 =====>
__ MVB3     Y    1 31.57696  0.04382 11.25  1.25   3.75  16.25 =====>
__ MVB4          1 30.19894  0.01891  5.00  0.00  10.00  15.00 =====>
__ MVB5     Y    3 30.29251  0.01075  7.50  0.00   5.00  12.50 ====>
__ MVB1     Y    0  0.00000  0.00000  6.25  0.00   5.00  11.25 ===>
__ CATR          1  0.01592  0.00512  0.00  0.00   1.25   1.25
******************************* End of Table ******************************
```

The available commands for TranView are described next.

SELect

Selects only the tagged transactions for analysis.

RECall

Reverses the effect of the SELect line command.

This command recalls any excluded transactions.

ADDHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

STC

Displays CICS summary statistics For more information, see CICS Summary Statistics.

IDL

Displays statistics about CICS Idle Time For more informaiton, see CICS Idle Time.

T

(Tag line command) selects up to five tasks for analysis.

U

(Untag line command) clears a selected task.

C

(CodeView Detail line command) displays the CodeView Detail panel showing activity detected by CA MAT.

P

(Callerid Detail line command) displays the Callerid Detail panel showing the programs that are associated with the selected transaction.

D

(DelayView Detail line command) displays the DelayView Detail panel showing the types of delays encountered by CA MAT.

N

(DataView Detail line command) displays the DataView panel.

S

Displays additional transaction statistics for the selected transaction. For more information, see CICS Transaction Statistics.

A description for each field in TranView follows.

Profile

Name of the profile that you specified when you created the monitor definition.

Options

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the **Options** field value and press **Enter** to display a pop-up panel listing the selected tasks/transactions.

Tran

Name of a transaction that was detected by CA MAT during the monitoring of an IMS or CICS region.

If a transaction name cannot be identified, the value **n/a** is substituted.

T

"X" indicates the transaction has been tagged for analysis.

#Trans

Number of times the transaction completed processing during the monitored period.

Avg RESP

Average time (in seconds) for this transaction during the monitored period.

Tot CPU

Cumulative CPU seconds for this transaction during the monitored period.

AVG CPU

Average CPU time required for this transaction during the monitored period.

Actv%

Percentage of time during the monitored period that the CPU was actively processing the monitored transaction.

Data%

Percentage of time during the monitored period that the transaction was delayed because of an I/O request.

Other%

Percentage of time during the monitored period that was not attributable to any of the categories known to CA MAT.

Totl%

Summation of the categories of delay.

Visual

Graphical representation of the total delay that was associated with the transaction.

Total SUs

Total amount of CPU time in service units used by this transaction.

CA MAT calculates this amount by using the following formula:

(Tot CPU * 16000000) / CPU Adjustment Rate

The CPU Adjustment Rate can be seen on the OverView report.

Average SUs

Average number of CPU Service Units required to process a transaction.

CA MAT calculates this amount by using the following formula:

(Avg CPU * 16000000) / CPU Adjustment Rate

The CPU Adjustment Rate can be seen on the OverView report.

CodeView Detail

Use the CodeView Detail (C) line command from the TranView panel to display the program activity that is associated with a specific transaction.

```
CA MAT ------------------- CodeView Detail ----------------- Row 1 to 8 of 16
COMMAND ===>                                                SCROLL ===> CSR

     Transaction: D8PT                                      Profile: DB2SAMP
                                                            Options: NORMAL
                                                               Mode: CSECT

Primary commands: MOde Pseudo/Module/Csect/4GL,
                  PSEudo, REGister, ADDHelp

   Line commands: A - Associate      C - Callerid     D - Delays    N - Long Name
                  I - Info           L - Listing      S - Distribution
                  H - Histogram     NH - Normalized Histogram

LC Module   Csect    Description                 L C Actv% Wait% Totl% Visual

   _____ _____ _____ _ _ _____ _____ _____ _____
 >----------------------------------------------------------------------------
 __ DSNVSR   DSNVSR   ASM-SUSPEND/RESUME/CANCEL A Y  0.41  2.86  3.27 ========>
 __ DFHD2EX1 D2EX1    CICS-DB2 Task Related Use A Y  0.82  0.00  0.82 =>
 __ DFHD2EX3 DFHD2EX3 CICS-DB2 subtask program A Y  0.82  0.00  0.82 =>
 __ .NUCLEUS IXLRQLCK Cross-system extended ser B Y  0.41  0.00  0.41 >
```

This panel displays the modules and CSECTs that delayed a task which is identified in the Transaction field. The commands you can issue and field headings are identical to the CodeView panel. All subsequent associated panels report information for the specified task.

The CodeView Detail panel reports both Active and Wait activity percentages for Analyze Normal mode, which accounts for all activity reported in TaskView.

DelayView Detail

Use the DelayView Detail (D) line command to display the delay categories that were detected by CA MAT and associated with a specific task.

```
CA MAT ------------------ DelayView Detail ------------------ Row 1 to 5 of 5
COMMAND ===>                                                   SCROLL ===> CSR

     Transaction: D8PT                                    Profile: DB2SAMP
                                                           Detail: ON

Primary commands: DETail on/off,        Module: *
                  ADDHelp                 Csect: *
                                         Offset: *
   Line commands: A - Address

LC Major category       Minor category      Actv% Wait% Totl% Visual
   _____  _____  _____ _____ _____ _____
---------------------------------------------------------------------------
__ Program Active      Program Active       5.71  0.00  5.71 ========>
__ Voluntary Wait      Wait/Waitr SVC       0.00  2.86  2.86 ====>
__ Data Delay          DB2 Statement        0.82  0.00  0.82 >
__ System Active       Post SVC             0.41  0.00  0.41

```

This panel displays what caused a task to be delayed in its execution. The commands you can issue and field headings are identical to the DelayView panel. All subsequent associated panels report information for the specified task.

The Delay Detail panel does not support the S (Distribution) line command.

DataView Detail

Use the DataView Detail (N) line command to display the DataView Detail panel that shows CA MAT has collected data set information for a specific transaction. If a Y appears in the D column on the TranView panel, data set information exists for that transaction, as shown next.

```
CA MAT ------------------- DataView Detail ---------------- Row 1 to 10 of 10
COMMAND ===>                                            SCROLL ===> CSR

Primary commands: LINklist on/off                         Profile: DB2SAMP
                                                          Options: NORMAL
   Line commands: S - Select                              Linklist: OFF

      Transaction: DTEU


LC DD name  Dataset name                              Delay% Visual
   _____  _____      _____ _____
 >-----------------------------------------------------------------------
 __ MDYU3000 CAMAT.TUNCIC61.MDYUDATA.CC3000            5.31 =====>
 __ JULU3000 CAMAT.TUNCIC61.JULUDATA.CC3000            4.49 ====>
 __ MDYU1000 CAMAT.TUNCIC61.MDYUDATA.CC1000            2.86 ==>
 __ JULU1000 CAMAT.TUNCIC61.JULUDATA.CC1000            2.45 =>
 __ JUL1000  CAMAT.TUNCIC61.JULDATA.CC1000             1.63 >
 __ MDYU2000 CAMAT.TUNCIC61.MDYUDATA.CC2000            1.63 >
 __ JULU2000 CAMAT.TUNCIC61.JULUDATA.CC2000            1.22 >
 __ MDY3000  CAMAT.TUNCIC61.MDYDATA.CC3000             0.82
 __ JUL3000  CAMAT.TUNCIC61.JULDATA.CC3000             0.41
```

Interactive Analysis Option 7 - ModView

ModView displays the linkage editor map for all load modules that are located in the target address space. Only load module entries and those CSECTs with detected activity are listed. From ModView, you can hyperlink to module details or to a panel that suggests a linkage order for reducing system paging.

```
CA MAT -------------------------- ModView --------------- Row 24 to 36 of 60
COMMAND ===>                                              SCROLL ===> CSR

Primary commands: USAge, SEQ, ADDHelp                     Profile: DB2SAMP
                                                          Options: NORMAL
   Line commands: S - Select  A - Associate                  Sort: SEQ
                  U — Suggest (Auto-NavigateVi)

LC Module   Csect    Offset   Length Csect Description     L Pct   Visual
   _____  _____  _____  _____ _____ _ _____ _____
>------------------------------------------------------------------------------
__ DFHSIP   DFHDSSR  0000E168 001D60 DS domain - suspend/res  41.63 ========>
__ DFHSIP   DFHDSDS3 00010FA0 002128 DS domain - main dispat  26.53 =====>
__ DSNVSR   DSNVSR   00000100 001C20 ASM-SUSPEND/RESUME/CANC   6.53 >
__ TUNDATE  TUNDATE  00000020 00106A                          2.04
__ DFSREP00 DFSREP00 00000000 002FF8 IMS dispatcher internal   1.63
__ IDA019L1 IDA019R3 00007330 0006C8 VSAM I/O driver           1.63
__ .NUCLEUS ISGGRHS1 0000726C 000694 Global resource seriali   1.22
__ DFHSIP   DFHSMGF  000230F8 002960 SM domain - getmain/fre   1.22
__ .NUCLEUS IEACVT   00009D38 0005E4 Supervisor services       0.82
```

The primary and line commands that are available for ModView are described next.

USAge

Sorts the display by activity within a load module in descending order.

CSECTs that executed most within a load module are shown first.

SEQ

Sorts the display by CSECT location within a load module in ascending order.

ADDHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

S

Select provides detailed information about the selected load module, such as the library from which it was loaded, the module load address, length, date of link edit, component identifier of linkage editor, and the data set of origin.

U

Suggest suggests an improved link order for the selected load module based upon the frequency of execution of its CSECTs during the monitored period.

A

> **Associate** accesses the CSECT Associations application.

The fields in ModView are described next.

Profile

> Name of the profile that you specified when you created the monitor definition.

Options

> Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

> An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the **Options** field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

Sort

> Display mode (USAGE or SEQ).

Module

> Name of the load module.

CSECT

> Name of the CSECT within the load module.

Offset

> For modules, the hexadecimal address in virtual storage where the module was loaded.

> For CSECTs, the hexadecimal offset of the CSECT within the module.

Length

> Hexadecimal length of the module or the CSECT.

CSECT Description

> Description of the CSECT, if available.

L

> Location of the module in virtual memory:

> **<** indicates the module resides below the 16MB line

> **>** indicates the module resides above the 16MB line

Pct

> Percentage of the monitored period that CA MAT detected that this CSECT was in use.

Visual

> Visual representation of the Pct field.

Scroll right to display the following fields:

Entry Type

> Type of Module/CSECT name. This value might be the name of a pseudo CSECT that was created by the linkage editor and compiler. This entry can be one of several types:

- **CM** - common code section

- **ER** - strong external reference

- **LL** - load module entry (versus an ESD entry)

- **LR** - label reference

- **NU** - null entry

- **PC** - private code section

- **SD** - code section

- **WX** - weak external reference

Date Stamp

> Linkage editor date in Julian format for the load module.

Processor ID

> Component identifier of the translator that created the CSECT, or the component identifier of the linkage editor that assembled the load module.

Processor Version

> Component release of the translator that created the CSECT.

AMODE

> Addressing mode specifies the address length a program is prepared to handle upon entry.

> Valid addressing modes are

- **24** - 24-bit addressing

- **31** - 31-bit addressing

- **ANY** - Either 24-bit or 31-bit addressing

RMODE

> Residence mode. Specifies where the module is to be loaded in virtual storage:

- **24** - Indicates the module must be loaded within 24-bit addressable virtual storage below the 16-megabyte virtual storage line.

- **Any** - Indicates the module might be loaded anywhere in virtual storage either above or below the 16-megabyte virtual storage line.

RN

Reentrant option.

Displays Y if the module is link-edited with the reentrant option. Displays N if the module is not reentrant.

RU

Reusable option.

Displays Y if the module is link-edited with the reusable option. Displays N if the module is not reusable.

OV

Overlay.

Displays Y if the module is link-edited in the overlay format. Displays N if the module is not in the overlay format.

LD

Loadable.

Displays Y if the module is loadable. Displays N if the module is not loadable.

EX

Executable.

Displays Y if the module is executable. Displays N if the module is not executable.

Dataset

Data set from which the module was loaded.

Determine Addressing Mode (AMODE):

The loader determines the addressing mode for the entry point as follows:

■ The default AMODE of 24 is assumed.

■ If the AMODE is specified in the ESD data for the entry point as an assembler statement, that specification replaces the default. The loader assigns the AMODE value from the control section or private code that contributes to the loaded module, ignoring identically named control sections and private code, which are replaced.

■ If AMODE is specified as a parameter in the PARM field of the EXEC statement, that specification replaces the previously determined value.

Determine Residence Mode (RMODE):

The loader determines the residence mode for the loaded program as follows:

- The default RMODE of 24 is assumed.

- If the RMODE is specified in the ESD data for the first control section or private code that contributes to the loaded module as an assembler statement, that specification replaces the default.

- If the RMODE is specified as a parameter in the PARM field of the EXEC statement, that specification replaces the previously determined RMODE.

- If the ESD data for any subsequent control section or private code that contributes to the loaded module specifies an RMODE of 24, the RMODE for the entire module is reset to 24. If loading begins above the 16-megabyte virtual storage line on the basis of an early determination of RMODE=ANY, and the RMODE is later reset to 24, an error message is issued and loading is restarted below the 16-megabyte virtual storage line.

Link Suggestions

To display the Link Suggestions panel, use the U (Suggest) line command for a module. This panel shows the suggested link order for a previously selected load module, based upon the execution frequency of its CSECTs during the measurement period. This suggestion minimizes paging and reduces the working set that is size required.

You can create linkage editor ORDER statements by using the EXPORT command. These statements should be included in your linkage editor deck to gain improved performance. See Save the Information on a Panel.

```
CA MAT --------------------- Link Suggestions ------------ Row 1 to 16 of 19
COMMAND ===>                                                SCROLL ===> CSR

Primary Commands: ADDHelp                                   Profile: DB2SAMP
                                                            Module: DFSREP00

Csect    Offset   Length   Pct   Visual

_____ _____ _____ _____ _____
----------------------------------------------------------------------------
DFSREP00 00000000 00002FF8  1.63 ========>
DFSIINIT 00000000 00000000  0.00
DFSIXMIT 00000000 00000000  0.00
DFSIXMRS 00000000 00000000  0.00
DFSKSETL 00000000 00000000  0.00
DFSISDSW 00000000 00000000  0.00
DFSKXMSW 00000000 00000000  0.00
DFSKCKXM 00000000 00000000  0.00
DFSIPOTC 00000000 00000000  0.00
DFSISUSP 00000000 00000000  0.00
DFSN0113 00002FF8 00000000  0.00
DFSNORES 00002FF8 00000000  0.00
DFSKTECB 00002FF8 00000000  0.00
DFSXMSWC 00002FF8 00000000  0.00
DFSIROPN 00002FF8 00000000  0.00
DFSIPEXT 00002FF8 00000000  0.00
```

The fields in the Link Suggestions panel are described next.

Profile

Name of the profile that you specified when you created the monitor definition.

CSECT

Control section within the module and linked from a subroutine library.

If CSECT is blank, the entry is for the load module.

Offset

Hexadecimal offset within the CSECT, or, if the CSECT is not available, within the module.

Length

Hexadecimal length of the CSECT or load module.

Pct

> Percentage of time during the monitored period that this CSECT was in use.

Visual

> Graphical representation of the Pct field.

Interactive Analysis Option 8 - PoolView

PoolView displays statistics about VSAM/LSR and VSAM/GSR buffer pool usage. The PoolView panel provides information about hit ratios, size and number of buffers, and total space requested. You can also display information about the data sets attached to a pool.

If no pool data is in the monitor data set, the PoolView option is not available.

```
CA MAT ------------------------- PoolView ------------------ Row 1 to 1 of 1
COMMAND ===>                                              SCROLL ===> CSR

Line commands: S - Select                                Profile: IMSDLI81
                                                         Options: NORMAL
LC Type Group Category

   ___ _____ _____
  -----------------------------------------------------------------------------
s_ VSAM LSR   VSAM Local Shared Resource pool

CA MAT ----------------------- Shared Pools ---------------- Row 1 to 6 of 6
COMMAND ===>                                              SCROLL ===> CSR

                  Pool type: LOCAL                       Profile: IMSDLI81
             Total pool size: 134348                     Options: NORMAL
     Hit ratio for all subpools: 0   %

Line commands: S - Select, D - Datasets


              Pool  No. of  Buffer Buffer No. Requests  Requests  Hit
LC Type Group SP  Type  Buffers size   fixed  Str w/read    wo/read   Ratio

   ___ _____ ___ _____ _____ _____ _____ ___ _____ _____ _____
>-------------------------------------------------------------------------------
__ VSAM LSR    0 BOTH      64    512 NO      3       0        0 *N/A*
__ VSAM LSR    0 BOTH      64  1,024 NO      3       0        0 *N/A*
__ VSAM LSR    0 BOTH      64  2,048 NO      3       0        0 *N/A*
__ VSAM LSR    0 BOTH      64  4,096 NO      3     161        0 0   %
__ VSAM LSR    0 BOTH      64  8,192 NO      3       0        0 *N/A*
__ VSAM LSR    0 BOTH      10 32,768 NO      3       0        0 *N/A*
```

For information about using PoolView with CICS, see Use PoolView. For information about using PoolView with IMS, see

Each field in PoolView is described next.

Profile

Name of the profile that you specified when you created the monitor definition.

Options

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

Type

Type of pool, either IMS or VSAM.

Group

Defines the group as LSR or GSR.

LSR refers to VSAM Local Shared Resources where the buffer pool is maintained in the user's storage (PRIVATE). GSR refers to VSAM Global Shared Resources where the buffer pool is maintained in z/OS common storage (ECSA).

Category

Literal name of the pool.

Interactive Analysis Option 9 - USSView

The USSView option displays information about USS activity on a process basis (which is very similar to having a TaskView for USS display).

The USSView panel provides information about delay information by process, code details by process, and process level information. The DelayView and Delay Locations displays include information for all processes. Process level delays would look similar.

If no USS data is in the monitor data set, the USSView option is not available.

```
CA MAT ------------------------- USSView ----------------- Row 1 to 2 of 2
COMMAND ===>                                            SCROLL ===> CSR

Primary commands: ADDHelp                                    Profile: USS
                                                             Options: NORMAL
Line commands: C - Code Details  T — Threads
               D - Delay Details S - Process Info F — Functions

LC Process ID Initial Command              Actv% Wait% Total% Visual

  _____ _____ _____ ____ _____ _____
--------------------------------------------------------------------------------
_t 33685520                                0.00  10.00 10.00  ===>
__    131092                               0.00  10.00 10.00  ===>
****************************** End of Table ******************************
```

The available commands for USSView are described next.

ADDHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

C

(CodeView Detail line command) displays the CodeView Detail panel showing activity detected by CA MAT.

D

(DelayView Detail line command) displays the DelayView Detail panel showing the types of delays encountered by CA MAT.

T

Displays the Thread IDs associated with the selected Process ID.

S

Displays statistics and information about the selected Process ID.

F

Displays the USS Functions associated with the selected Process ID.

Each field in USSView is described next.

Process ID

Numerical Process ID value.

Initial Command

Program (or CSECT) that invoked USS.

If CA MAT cannot determine the program name, This field can be blank.

Activ%

Percentage of the monitored period when a CPU was in use.

CA MAT calculates this value as the ratio of samples in which it detected CPU activity to the total number of samples.

Wait%

Percentage of the monitored period where CA MAT detected USS waiting for resources.

Total%

Sum of the Activ% and Wait% fields.

Visual

Graphical representation of the Total% field.

CodeView Detail

Use the CodeView Detail (C) line command from the USSView panel to display the program activity that is associated with a specific task.

```
CA MAT ------------------- CodeView Detail ----------------- Row 1 to 1 of 1
COMMAND ===>                                                 SCROLL ===> CSR
      Process ID: 33685520         Function: select          Profile: USS
       Thread ID: 133F14F000000002                           Options: NORMAL
                                                                 Mode: CSECT
Primary commands: MOde Pseudo/Module/Csect/4GL,
                  PSEudo, REGister, ADDHelp

Line commands: A - Associate     C - Callerid     D - Delays   N - Long Name
               I - Info          L - Listing      S - Distribution
               H - Histogram    NH - Normalized Histogram

LC Module   Csect    Description                  L C Actv% Wait% Totl% Visual
   _____ _____ _____ _ _ _____ _____ _____ _____
>----------------------------------------------------------------------------
__ .NUCLEUS BOPJCST  OS/390 UNIX system servic B Y  0.00 10.00 10.00 ========>
```

This panel displays the modules and CSECTs that delayed a task which is identified in the Process ID: field. The commands you can issue and field headings are identical to the CodeView panel. All subsequent associated panels report information for the specified task.

The CodeView Detail panel reports both Active and Wait activity percentages for Analyze Normal mode, which accounts for all activity reported in USSView.

DelayView Detail

Use the DelayView Detail (D) line command to display the delay categories that are associated with a specific task and detected by CA MAT.

```
CA MAT ----------------- DelayView Detail ----------------- Row 1 to 3 of 3
COMMAND ===>                                             SCROLL ===> CSR

      Process ID: 50331728                              Profile: USS
                                                         Detail: ON

Primary commands: DETail on/off,      Module: *
                  ADDHelp              Csect: *
                                       Offset: *
    Line commands: A - Address

LC Major category       Minor category      Actv% Wait% Totl% Visual
   _____     _____    _____ _____ _____ _____
   -------------------------------------------------------------------------
__ Unix System Services pfsctl (BPX1PCT)    0.01  0.54  0.54 ========>
__ Unix System Services Unix System Services 0.00  0.01  0.01
__ Unix System Services w_getpsent (BPX1GPS) 0.01  0.00  0.01
****************************** End of Table ******************************
```

This panel displays information about what caused a task to be delayed in its execution. The commands you can issue and field headings are identical to the DelayView panel. All subsequent associated panels report information for the specified task.

Threads Panel

Issuing the Threads line command displays the USS Threads panel where the IDs that are associated with the selected Process ID are shown.

```
CA MAT --------------------- USS Threads ----------------- Row 1 to 1 of 1
COMMAND ===>                                             SCROLL ===> CSR

Primary Commands: PROcess Info                           Profile: USS
                                                         Options: NORMAL
    Line Commands: C - Code Detail                    Process ID: 33685520
                   D - Delay Detail F — Functions

LC Thread ID          Actv% Wait% Total% Visual
   _____     _____ _____ _____ _____
   -------------------------------------------------------------------------
f__ 133F14F000000002 0.00 10.00 10.00 ========>
```

The available commands for USS Threads panel are described next.

PRO

Displays Process statistics and information about the selected Thread ID.

C

(CodeView Detail line command) displays the CodeView Detail panel showing activity detected by CA MAT.

D

(DelayView Detail line command) displays the DelayView Detail panel showing the types of delays encountered by CA MAT.

F

Displays the USS Functions associated with the selected Process ID.

Each field in USS Threads panel is described next.

Thread ID

Numerical Thread ID value.

Activ%

Percentage of the monitored period when a CPU was in use.

CA MAT calculates this value as the ratio of samples in which it detected CPU activity to the total number of samples.

Wait%

Percentage of the monitored period where CA MAT detected USS waiting for resources.

Total%

Sum of the Activ% and Wait% fields.

Visual

Graphical representation of the Total% field.

Process Information Panel

Issuing the S - Process Info line command displays the Process Information panel where the IDs that are associated with the selected Process ID are shown.

```
CA MAT ------------ Process Information ------------ Row 1 to 18 of 18
COMMAND ==>                                         SCROLL ==> CSR

Primary Commands: THReads                            Profile: USS
                                                     Options: NORMAL


Process ID  . . . . . . 50331728    USS Real User ID . . . . .      0
Process Group Number  . 50331728    USS Real Group ID . . . . .     0
Parent Process ID . . .        1    Session ID  . . . . . . . . 50331728

Kernal CPU Time . . 00:00:00.018    Callable Services Count . . 1513

I/O Block Counts                    Path Name Counts
----------------------------------  ----------------------------------------
DIR Read  . . . . . . . 472         Logical look-up Calls . . . 0
Standard Read . . . . . 262         Physical look-up Calls  . . 0
Standard Write  . . . . 0           Logical Generation Calls  . 48
Char Special Read . . . 0           Physical Generation Calls . 118
Char Special Write  . . 0
Pipe Read . . . . . . . 0           Message Send Bytes  . . . . 0
Pipe Write  . . . . . . 0           Message Receive Bytes . . . 0
Remote Socket Read  . . 0           Sync() Calls  . . . . . . . 0
Remote Socket Write . . 0
```

The available command for Process Information panel is described next.

THR

> Displays the USS Threads panel.

Each field in the Process Information panel is described next.

Process ID

> OpenMVS process ID number

Process Group Number

> OpenMVS process group ID number

Parent Process ID

> OpenMVS parent process ID number

USS Real User ID

> OpenMVS real user ID number

USS Real Group ID

> OpenMVS real group ID number

Session ID

OpenMVS session ID number

Kernel CPU Time

Total CPU time spent in OpenMVS kernel

Callable Services Count

Total OpenMVS callable services.

This value includes callable services performed internally by the kernel. It does not include all trivial callable services.

DIR Read

Directory read I/O blocks

Standard Read

Standard file read I/O blocks

Standard Write

Standard file write I/O blocks

Char Special Read

Character special read I/O blocks

Char Special Write

Character special write I/O blocks

Pipe Read

Pipe read I/O blocks

Pipe Write

Pipe write I/O blocks

Remote Socket Read

Remote socket read I/O blocks

Remote Socket Write

Remote socket write I/O blocks

Logical look-up Calls

Path name lookup calls to logical file system lookup routine

Physical look-up Calls

Path name lookup calls to physical file system lookup routine

Logical Generation Calls

Path name generation calls to logical file system

Physical Generation Calls

Path name generation calls to physical file system lookup routine

Message Send Bytes

Number of message send bytes

Message Receive Bytes

Number of message receive bytes

Sync() Calls

Number of calls to sync()

USS Functions

Issuing the F - Functions line command displays the USS Functions panel where the functions that are associated with the selected Process ID are shown.

```
CA MAT --------------------- USS Functions ----------------- Row 1 to 3 of 3
COMMAND ===>                                             SCROLL ===> CSR

Primary Commands: PROcess Info                              Profile: USS
                                                           Options: NORMAL
   Line Commands: C - Code Detail                        Process ID: 50331728

                     MVS
LC Function          Program  Actv% Wait% Total% Visual
   _____ _____ _____ _____ _____ _____
   -------------------------------------------------------------------
__ pfsctl          BPX1PCT  0.01  0.54  0.54  =======>
__ Unix            System   0.00  0.01  0.01
__ w_getpsent      BPX1GPS  0.01  0.00  0.01
****************************** End of Table ******************************
```

The available commands for USS Functions are described next.

PRO

Displays Process statistics and information about the selected Thread ID.

C

(CodeView Detail line command) displays the CodeView Detail panel showing activity detected by CA MAT.

Each field in USS Functions panel is described next.

Function

Function name

MVS Program

MVS programs name for the USS function

Activ%

Percentage of the monitored period when a CPU was in use.

CA MAT calculates this value as the ratio of samples in which it detected CPU activity to the total number of samples.

Wait%

Percentage of the monitored period where CA MAT detected USS waiting for resources.

Total%

Sum of the Activ% and Wait% fields.

Visual

Graphical representation of the Total% field.

Chapter 6: Using Additional Features

In addition to the basic tasks of defining, invoking, and analyzing monitors, several features are available that can assist you with tuning your applications. This section provides information about these features, which are accessed from the Primary Option Menu.

This section contains the following topics:

Create and Use Global Monitors

Global Monitoring Definitions are associated with the Server and not a specific user. Use the Global Monitoring Menu to manage monitor information that is located in the Global Information File (GIF). This information includes monitors invoked by using the Open API.

Global Monitoring Menu

The Global Monitoring Menu is used to set up a new monitor definition; to modify or delete existing definitions; to invoke a monitor, and to check the status of data collection for monitor definitions. After data collection is complete, use the External option to analyze the results.

Select Option G to display the Global Monitoring Menu.

```
CA MAT  -------------------- Global Monitoring Menu -------------------------
OPTION  ==>

   0  Parameters        - Enter global monitor parameters      Userid: TUNUSER
                                                             Server ID: MATUNER
   1  Monitor           - Create and analyze Monitor Sets        Status: ACTIVE
                                                               Version: 9.0.00
   2  Active            - Select an active job to monitor
   3  Registration      - Shared listing registration
   4  Grouping          - Define groups of monitors
   S  Status            - Display and manage invoked monitors


Enter an option or press END to return to the CA MAT  Primary Option Menu
```

The options available on the Global Monitoring Menu are described next.

Option 0 (Parameters)

Displays the Profile Parameters panel where you can modify the default display settings.

These global parameters are identical to the user profile parameters. For more information, see the *Installation Guide.*

Option 1 (Monitor)

Displays the Monitor Definition panel where you can set up a new monitor definition, modify or delete an existing definition, and view the status of data collection.

Option 2 (Active)

Displays the Active Jobs panel, which allows you to create and invoke a monitor session for any active job.

For more information, see the chapter "Invoking a Monitor (see page 93)."

Option 3 (Registration)

Displays the Program Listing Registration panel where you can specify program listings for Assembler and high-level languages with CA MAT.

This option allows CA MAT to correlate program activity to the high-level language statements instead of to only offsets with modules or CSECTs.

Option 4 (Grouping)

Displays the Monitor Profile Groups panel that allows you to define groups of job steps that can be monitored together while also specifying the job step that initiates (or "triggers") the monitoring of the group.

For more information, see Creating a Multijob Monitor: Grouping (see page 83).

Option S (Status)

Displays the Invoked Monitors panel, where you can check the status of all currently invoked Global Monitor Profiles, and issue the Stop command to stop an ongoing measurement or deactivate a waiting profile.

Change the Global Monitor Definition Default Criteria

When you invoke a monitor using TUNCALL, default monitoring criteria are used unless otherwise specified. The default values are contained in the Global Profile Parameters table. To change the default values:

1. Select Option 0 from the Global Monitoring Menu.

2. Press Enter.

   The Profile Parameters panel displays.

3. Change the criteria as required.

   For more information, see the *Installation Guide*.

4. Press End to exit the panel and save the default values.

Analyze Global Monitor Data Sets

Global monitor data sets are analyzed the same way as normal monitors. You can display the Interactive Analysis menu by using the A, AL, AA, or AW line commands for the data set name. These line commands work the same way as they do for the Monitor Definition panel, as described in Starting interactive analysis.

Analyze Monitor Data Sets Created by Other Users

CA MAT allows you to analyze monitor data sets that are created by other users. From the Primary Option Menu, select Option 5.

The External Data Set List panel displays:

```
CA MAT  ---------------- External Data Set List ------------- Row 1 to 3 of 3
COMMAND ===>                                             SCROLL ===> CSR

Primary commands: ADD     - Manually add an external monitor data set
                  INCLude - Include monitor profiles from other users

   Line commands: A  - Analyze Normal   B  - Batch Reports
                  AL - Analyze All      V  - CSV Reports
                  AA - Analyze Active   R  - Remove
                  AW - Analyze Wait     HR - DFHSM Recall
                                        X  - Export Monitor Data

LC Monitor Data Set Name                       Exists Profile  User ID

_____ _____ _____ _____
>-----------------------------------------------------------------------
__  'CAMAT.C822519.DB2.MONITOR1'            NO     JPDBMON1 TUNUSER2
__  'CAMAT.C822519.DB2.MONITOR1'            YES    JPNOEXPL TUNUSER2
__  'CAMAT.C903991.MONITOR'                 YES    KKH      TUNUSER2
```

The fields in the External Data Set List panel are described next.

Monitor Data Set Name

Data set name of the monitor data set.

Exists

Indicates data set availability.

The following values can be displayed in this field:

- **YES**: the data set containing the sample data for the monitor instance is available and has not been migrated

- **NO**: the data set is not found

- **ML1**: the data set containing the sample data for the monitor instance exists but is migrated to the DFSMShsm ML1 migration pool

  ML1 migration generally goes to disk.

- **ML2**: the data set containing the sample data for the monitor instance exists but is migrated to the DFSMShsm ML2 migration pool

  ML2 migration generally goes to tape.

- **INV**: the data set name is invalid. If this value displays, check the entry to make sure the data set name is valid before continuing

- **PER**: a program error occurred

  This value can indicate a catalog error other than the data set not being found. For more information, contact your technical support staff.

Profile

Displays the unique identifier that designates a particular monitor definition. This identifier can be one to eight alphanumeric characters.

User ID

Displays the identifier of the person (or batch job) who last invoked the monitor definition.

The identifier can be one of the following types:

- A TSO user ID if the request was submitted from the Monitor Definition panel or the Display Active panel.

- A batch job name if the request was submitted from TUNCALL in a batch job.

User Prefix

Displays the TSO data set prefix.

This prefix is a one-to-seven character alphanumeric value saved as part of the user's TSO profile.

Date

Displays the date on which the monitor was started.

Time

Displays the time when the monitor was started.

Description

Displays the user-specified description of the monitor definition.

Include a Monitor Data Set from an External User

When you first display the External Data Set List panel, it does not contain any monitor data set names. You must add the names of the data sets that you want to include. Monitor data sets are listed in the User Information File for each user. You can access another user's User Information File by using the INCLude primary command:

1. On the COMMAND line, type INCL.

2. Press Enter.

   The Include Monitor Data Set panel displays:

```
CA MAT  ---------------- External Data Set List ------------- ROW 0 to 0 of 0
.--------------------------------------------------------------------------.
| CA MAT  ---------------- Include Monitor Data Set ----------------------  |
| COMMAND ===>                                                             |
|                                                                          |
| User Identification:                                                     |
|          User ID ===> MATUSER                                            |
|          Prefix  ===> MATUSER                                            |
|                                                                          |
| User Information File                                                    |
|   Data set name  ===>                                                    |
|                       Type GLOBAL for Global Monitor Definitions         |
|                                                                          |
| Note: If a User Information File name is not provided, the name is        |
|       constructed from the User ID and Prefix fields.                    |
|                                                                          |
| Press ENTER to continue or END to cancel.                                |
'--------------------------------------------------------------------------'
```

3. Specify the data set name of the monitor data sets that you want included.

   By default, a user's tables' data set name is *prefix*.*userid*.TRI85.TABLES. If your site uses the default tables data set names, access a user's data set by specifying the user's TSO user ID and prefix in the User Identification fields. If your site does not use the default tables data set names, you must specify the correct value in the Data set name field.

   To add Global monitor data sets, specify GLOBAL. For more information, see the chapter, "Open Application Program Interface."

4. Press Enter to display the Monitor Profiles panel.

   This panel displays the profiles that are available within the specified User Information File.

```
CA MAT  --------------------- Monitor Profiles ------------ Row 1 to 13 of 78
COMMAND ==>                                                 SCROLL ==> CSR

 Primary commands: INClude                                  User ID: TUNUSER
                                                             Prefix: TUNUSER

    Line commands: S - Select  H - History

LC Profile  Userid   Prefix   Description             Status      Jobname

   _____  _____  _____  _____  _____  _____
>--------------------------------------------------------------------------
__  #ABM     TUNUSER2                                Inactive    #ABM*
__  A        TUNUSER2                                Inactive    A
__  ABMAF12T TUNUSER2                                Inactive    ABMAF12T
__  ABMFAA2T TUNUSER2                                Inactive    ABMFAA2T
__  ABMGBA2D TUNUSER2                                Inactive    ABMGBA2D
__  TUNCIC53 TUNUSER2                                Inactive    TUNCIC53
__  TUNCIC61 TUNUSER2                                Inactive    TUNCIC61
_H  TUNCIC62 TUNUSER2                                Inactive    TUNCIC62
__  TUNIVP01 TUNUSER2                                Inactive    TUNIVP01
```

5. To select the most recent monitor data set for a profile, type S next to the appropriate profile name and press Enter.

6. To display a list of all monitor data sets that are associated with a profile, type H next to the appropriate profile name and press Enter.

   The Monitor History panel displays:

```
CA MAT  ----------------------- Monitor History -------------- Row 1 to 2 of 2
COMMAND ==>                                                   SCROLL ==> CSR

                                                   Profile: LSCIDTST
Line commands: S  - Select monitor data set        User ID: BMV*
                                                    Prefix:

LC Date       Time    Dataset name                            Exists
   _____  _____  _____  _____
----------------------------------------------------------------------------
__  2007/08/02  05:59:31  'BMVSST.LSCIDTST.D2007214.T0559313'     YES
__  2007/08/02  05:58:15  'BMVSST.LSCIDTST.D2007214.T0558201'     YES
****************************** End of Table ******************************
```

7. Type S next to the appropriate data sets and press Enter.

8. Press End to return to the External Data Set List panel.

   The monitor data sets for the selected profile have been added to the External Data Set List.

Add a Monitor Data Set

You can also manually enter a specific data set name of a monitor data set to analyze monitor data that is not associated with a particular User or Global Information File. To add a monitor data set manually:

1. On the COMMAND line, type ADD.

2. Press Enter.

   The Manual Monitor Data Set Add panel displays.

```
CA MAT --------------- Manual Monitor Data Set Add ----------------------

COMMAND ==>

      Profile Name ==>

 Monitor Data Set ==>

       Description ==>
```

3. Enter the profile name and the monitor data set name.

4. (*Optional*) Enter a description for the profile.

5. Press End to return to the External Data Set List panel.

Analyze External Data Sets

Now that the External Data Set List contains monitor data sets, you can display the Interactive Analysis menu by using the A, AL, AA, or AW line commands for the data set name. These line commands work the same way as they do for the Monitor Definition panel, as described in Start Interactive Analysis.

To recall in the background a data set that has been migrated, type HR next to the appropriate profile name and press Enter.

Remove External Data Sets

To remove an external data set from your list, type R next to it and press Enter. The original data set will not be deleted.

Perform Administrative Functions

The following sections describe these functions:

- The Administration Option Menu

- Register Source Program Listings

- Define Pseudo Groups

- Update Content-Sensitive Help

- Display CA MAT and environmental Information

Administration Option Menu

If you are an administrator, use the Administration Option Menu panel to register program listings for Assembler and high-level languages with CA MAT. Registration allows CA MAT to relate program activity to the high-level language statements instead of to offsets within modules and CSECTs.

```
CA MAT ------------------ Administration Option Menu -----------------------
OPTION ===>

   1  Associations     - Define module/Csect functions        Userid: TUNUSER
   2  Pseudo           - Define pseudo groups              Server ID: MATUNER
   3  Content Help     - Update content-sensitive help        Status: ACTIVE
   4  Scheduling       - Create monitor schedules            Version: 9.0.00
   5  Registration     - Shared source listing registration

   S  System Settings  - View system settings for clients
   U  User Settings    - View user settings for clients
   I  Environment      - Display CA MAT and environmental information


Enter an option or press END to return to the CA MAT Primary Option Menu
```

The options available on the Administration Option Menu panel are described next.

Option 1 (Associations)

Displays the CSECT Associations panel, which allows you to assign functional descriptions to CSECTs.

These functional descriptions appear on analysis panels, such as CodeView, DelayView, and ModView. For more information, See Add CSECT Descriptions.

Option 2 (Pseudo)

Displays the Pseudo Group Definitions panel, which allows you to group related program modules into pseudo groups.

Pseudo groups enable CA MAT to provide simplified reporting on these modules. For more information, see

Option 3 (Content Help)

Displays the Content-sensitive Help panel, which allows you to add content-sensitive online Help.

By updating Help, you can provide specific information about delay causes, pseudo groups, and CSECTs. For more information about content-sensitive Help, see Update Content-Sensitive Help.

Option 4 (Scheduling)

Displays the Schedule Definitions panel where you can create shifts/schedules for monitoring activity.

For information, see Creating a monitor schedule.

Option 5 (Registration)

Displays the Program Listing Registration panel, which allows you to register program listings to relate program activity to actual high-level language statements.

For more information, see Register Source Program Listings.

Option S (System Settings)

Displays the default parameter values set for a system.

These values are set with the TUNSDEFS batch procedure (they cannot be changed from this panel). For more information, see the *Installation Guide*.

Option U (User Settings)

Displays the default parameter values set for new users.

These values are set with the TUNUDEFS batch procedure (they cannot be changed from this panel). For more information, see the *Installation Guide*.

Option I (Environment)

Displays CA MAT and environmental information that should be examined with the assistance of Customer Support personnel.

This option contains information such as the maintenance level, storage blocks, and the z/OS environments in which the server and client are running. See Display and Environmental Information .

CSECT Associations

Associating functional descriptions to CSECTs aids you during analysis in identifying what each CSECT does. These CSECT descriptions appear on the CodeView, ModView, and Callerid analysis panels.

CA MAT comes with thousands of IBM® system routines, COBOL library routines, PL1/, DB2® routines, and CICS routines already defined.

The CSECT Associations application is also available using the Associate line command (A) when you are displaying either the TimeView panel, or the CodeView panel with CSECT=ON.

Add CSECT Descriptions

1. Select Option 1 from the Administration Option Menu.

   The Csect Associations panel displays:

```
CA MAT -------------------- Csect Associations ------- ROW 103 TO 136 OF 5301
COMMAND ===>                                              SCROLL ===> CSR


Primary commands: ADD, ADDHELP

 Line commands: S - Select  D — Delete

 LC CSECT    Csect Description
    _____  _____
 -------------------------------------------------------------------------
 __ DFHCMAC  CICS ME CICS CMCA
 __ DFHCMP   CICS CICS Mon
 __ DFHCPIC  CICS SAA comm intfc
 __ DFHCPIN  CICS CPI init
 __ DFHCPIRR CICS SAA rcvy
 __ DFHCRNP  CICS Interreg conn
 __ DFHCRQ   CICS ATI purge
 __ DFHCRR   CICS Interreg rcvy
 __ DFHCRS   CICS Rmt Sched
 __ DFHCRSP  CICS CICS IRC start
 __ DFHCRT   CICS APPC Tm Rout
 __ DFHCSVC  CICS SVC startup
 __ DFHDBAT  CICS DBCTL
 __ DFHDBCT  CICS DBCTL
```

The Csect Associations panel allows you to enter new descriptions of CSECTs or to modify existing CSECT descriptions.

CSECT field

   Lists the names of CSECTs for which a reference has been established.

CSECT Description

   Lists the description for the CSECT. Many of the common CSECTs found while monitoring programs in COBOL, CICS, or DB2 environments are listed on the Csect Associations panel already.

2. Type ADD on the COMMAND line to add a new CSECT description and press Enter.

   The CSECT Associations pop-up panel displays.

```
+----------------------------------------------------+
| CA MAT------- Csect Associations ---------------   |
| COMMAND ===>                                       |
|                                                    |
|        Csect ===>                                  |
|                                                    |
|  Description ===>                                  |
|                                                    |
|  Update Help ===> NO (Yes or No)                   |
|                                                    |
| Press ENTER to save; enter END to cancel           |
|                                                    |
'----------------------------------------------------'
```

3. Use the Select line command (S) to modify an existing CSECT description. The Csect Associations pop-up panel displays with the description of the current CSECT.

4. Type both the name of the CSECT and a description for the new CSECT, or edit the existing CSECT description.

   You can type up to 57 characters for the description. CA MAT displays the CSECT description on the initial panel display on the Delay Locations, Callerid, CodeView, and ModView panels.

   Due to screen width limitations, the CSECT Description field shows a truncated version of the description on some terminal types. To view the full text of the description, scroll right until you see the Extended CSECT Description field where the entire 57 character description displays.

5. Specify YES in the Update Help field to add content-sensitive Help for the CSECT. For more information, see Update Content-Sensitive Help (see page 224).

6. Press Enter when finished.

   The new or updated CSECT description will appear on the Csect Associations panel.

Define Pseudo Groups

CA MAT uses the concept of pseudo groups to treat related modules as a single group in the CodeView application. Elapsed time in all modules within a pseudo group is reported by using the pseudo group name.

A pseudo group contains modules with names that start with the prefix or prefixes that are assigned to the pseudo group. You can include any number of prefixes in a single pseudo group, but the same prefix should not be a part of multiple pseudo groups.

Associate Modules with Pseudo Groups

Use the following procedure to associate modules with Pseudo Groups.

Follow these steps:

1. Select Option **2** from the Administration Option Menu.

    The Pseudo Group Definitions panel displays.

    You can also access the Pseudo Group Definitions panel directly from CodeView by using the PSEudo primary command.

```
CA MAT --------------- Pseudo Group Definitions ---------- Row 1 to 14 of 151
COMMAND ==>                                               SCROLL ==> HALF

Primary commands: ADD, ADDHELP

   Line commands: S - Select  D — Delete

LC Module   Pseudo   Description

   _____ _____ _____
   ------------------------------------------------------------------------------
__ ACF      .CA ACF2 CA ACF2
__ ADF      .TSO     TSO/E
__ ADR      .DSS       DF/DSS
__ ADY      .DAE     DAE
__ AHL      .GTF     Generalized Trace Fac
__ AKJ      .LNKLDGO Link/Edit/Go
__ AMA      .SPZAP   Superzap
__ AMB      .AMBLIST AMBLIST
__ AMD      .SADUMP  Stand-Alone Dump
__ AMS      .RMFSAM  RMF
__ ANT      .SDM     SDM
__ AOM      .AOM     AOM
__ ARC      .HSM     DFSMShsm
__ ASA      .REUSE   REUS
```

The Module column contains the module prefix for a module or group of modules beginning with this prefix that are to be included in the pseudo group.

The Pseudo column contains the name of the pseudo group to which you have assigned the module.

2. Type the ADD primary command to add a new module to a pseudo group.

3. Type S next to the module that you want to modify to change an existing entry.

4. Press Enter.

    The PSEUDO Group Definition panel displays.

    ```
    CA MAT ----- PSEUDO Group Definition -----------
    COMMAND ===>

     Module pattern ===>

      PSEUDO group ===>

       Description ===>

    Press ENTER to save; enter END to cancel
    ```

5. Type one to eight characters of the module name to be associated with an existing or new pseudo group in the Module pattern field. For IBM modules, this name is usually three characters; for example, TSO modules begin with IKJ.

6. Type the name of the pseudo group to which the module is to be associated in the PSEUDO group field,. The name entered in this field can be either a new pseudo group name or the name of an existing pseudo group.

7. (*Optional*) Include a description of the pseudo group (25 character maximum) in the Description field. This description displays in CodeView - Pseudo Mode.

    The name for the pseudo group must not be longer than seven characters. A pseudo group name is always prefixed by a period (.). Do not type the period in this field; it is added automatically.

Add Help Information for Pseudo Groups

You can add content-specific Help for a pseudo group by using the ADDHelp primary command. For more information, see Update Content-Sensitive Help. When using the CodeView application with MODULE: OFF, the module's activity displays with its specified pseudo group.

Display Pseudo Groups

Pseudo groups are displayed in the CodeView interactive analysis panel, based on the display mode selected.

PSEUDO mode:

Activity displays by pseudo group.

Use the MOde PSEudo primary command. Pseudo descriptions are displayed.

MODULE mode:

Activity displays by module, with pseudo group information included.

Module descriptions are displayed.

CSECT mode:

Pseudo group information is not displayed.

4GL mode:

Pseudo group information is not displayed.

```
CA MAT------------------------- CodeView ---------------- Row 1 to 6 of 6
COMMAND ===>                                             SCROLL ===> CSR

Primary commands: MOde Pseudo/Module/Csect/4GL,         Profile: TUNIVP1
                  PSEudo, REGister, ADDHelp             Options: NORMAL
                                                           Mode: PSEUDO


                                                        Over
Group     Description              Actv% Wait% Totl% Visual   Lap%

_____ _____ ____ ____ ____ _____ ____
>-----------------------------------------------------------------------
.COBOL   COBOL Routine            45.67  7.00 52.67 ======>  0.00
.CA MAT  CA MAT services          32.23  5.34 37.57 ====>    0.00
.EUSER   In extended user space    1.29  0.37  1.66          0.00
.DATAMGT Data Management           0.18  1.10  1.29          0.00
.LE      Language Environment      0.00  6.45  6.45          0.00
.APPL    Application address space 0.00  0.37  0.37          0.00
****************************** End of Table *****************************
```

```
CA MAT ------------------------- CodeView ---------------- Row 1 to 7 of 7
COMMAND ===>                                             SCROLL ===> CSR

Primary commands: MOde Pseudo/Module/Csect/4GL,         Profile: TUNIVP1
                  PSEudo, REGister, ADDHelp             Options: NORMAL
                                                           Mode: MODULE
Line commands: A - Associate    D - Delays
               S - Distribution N - Long Name
               I - Info

LC Group     Module   Description              Actv% Wait% Totl% Visual
   _____ _____ _____ ____ ____ ____ _____
>-----------------------------------------------------------------------
__ .COBOL   IGZCPAC Cobol                    45.67  6.81 52.49 ======>
__ .CA MAT  TUNCOB01 Cobol test program distri 32.23  5.34 37.57 ====>
__ .EUSER   .EUSER   In extended user space    1.29  0.37  1.66
__ .DATAMGT IGG019AR QSAM put next buffer      0.18  1.10  1.29
__ .APPL    BCSMSSM0 Application address space  0.00  0.37  0.37
__ .COBOL   IGZEQOC Cobol                      0.00  0.18  0.18
__ .LE      CEEBINIT Batch initialization/term 0.00  6.45
****************************** End of Table *****************************
```

Update Content-Sensitive Help

CA MAT features content-sensitive, online Help information for CSECTs, pseudo groups, and delay categories. To display this information, place the cursor on a highlighted field and press PF1. You can add to the Help topics provided by CA MAT by writing your own help for any topic to customize the information to your site.

There are two components for content-sensitive Help information:

Entry

Identifies the Help information by Content, Content Type, Help Member, Help Topic, and Info Level.

This information displays in the Content Sensitive Help panel.

Text

Is the actual Help information displayed when content-sensitive Help is requested.

Help text is located in a Help member. Each Help member can contain several Help topics. Help members are located in the *hilevel.*UTRHELP data set for your site.

To display content-sensitive Help, select Option 3 from the Administration Option Menu. The Content-sensitive Help panel displays:

```
CA MAT  ----------------- Content-sensitive Help ---------- Row 1 to 12 of 298
COMMAND ===>                                              SCROLL ===> CSR

Primary commands: ADD

   Line commands: CE - Copy entry  DE - Delete entry  UE - Update entry
                  BT - Browse help text  ET - Edit help text

LC Field Specific Contents        Type     Help     Help     I S LAST
                                           Member   Topic    L L USER

   _____ _____ _____ _____ _ _ _____
>------------------------------------------------------------------------------
__  ACCEPT                        COBVERB  TUCCBLNG ACCEPT   3 D CAMAT
__  ADD                           COBVERB  TUCCBLNG ADD      3 D CAMAT
__  ALTER                         COBVERB  TUCCBLNG ALTER    3 D CAMAT
__  CALL                          COBVERB  TUCCBLNG CALL     3 D CAMAT
__  CANCEL                        COBVERB  TUCCBLNG CANCEL   3 D CAMAT
__  CLOSE                         COBVERB  TUCCBLNG CLOSE    3 D CAMAT
__  COMPUTE                       COBVERB  TUCCBLNG COMPUTE  3 D CAMAT
__  CONTINUE                      COBVERB  TUCCBLNG CONTINUE 3 D CAMAT
__  DELETE                        COBVERB  TUCCBLNG DELETE   3 D CAMAT
__  DISPLAY                       COBVERB  TUCCBLNG DISPLAY  3 D CAMAT
__  DIVIDE                        COBVERB  TUCCBLNG DIVIDE   3 D CAMAT
__  ENTRY                         COBVERB  TUCCBLNG ENTRY    3 D CAMAT
```

The available line commands are described next.

CE - Copy entry

Displays the Content Help Copy panel, which allows you to copy the selected table entry and Help text.

DE - Delete entry

Removes a user-created Help topic.

This line command is not valid if the SL field contains the value D.

UE - Update entry

Displays the Content Help Update panel.

Use this panel to change information for an existing entry. You can change the information level, the Help member, or the Help topic, and edit the Help text. This line command is not valid if the SL field contains the value D.

BT - Browse help text

Displays a pop-up panel with the Help text for the topic.

Use this panel to verify that the Help text is formatted correctly.

ET - Edit help text

Displays the Help member in edit mode.

See Write Content-Sensitive Help Text for information about typing Help text. This line command is not valid if the SL field contains the value D.

Each field in the Content-sensitive Help panel is described next.

Field Specific Contents

contents of the field for which the Help topic was written

Type

Category for the Help information; valid types are:

CSECT

load module CSECTs

DB2PLAN

DB2 plan names

DB2TYPE

DB2 calls

MAJDELAY

major delay descriptions

MINDELAY

minor delay descriptions

MODULE

load module names

TRANCODE

CICS/IMS transaction names

Help Member

Member name of the *hilevel.*UTRHELP data set in which the text for the topic is found.

Help Topic

one- to eight-character identifier for the Help information

The Help Topic is a subtopic of the Help Member.

I L

Information level of the Help information.

This value indicates the importance or severity of the information and defines the highlight color of the field content:

■   Info level 1 (red) indicates a known cause of problems

■   Info level 2 (yellow) indicates a potential cause of problems

■   Info level 3 (white) indicates informational content.

S L

Source level of the available Help:

■   U indicates user-written Help information that is provided by your site

■   D indicates distributed Help information that is provided by CA Technologies

Last User

User ID of the last person to update the Help topic.

For distributed Help information, the user ID is CA MAT.

Date

Date that the Help was last updated.

Time

Time that the Help was last updated.

Following, the Help text is shown for the Attach SVC minor delay category. The text is located in *hilevel*.UTRHELP member TUCMALOD under the topic ATTACHSV. The type of Help is MINDELAY.

```
CA MAT              Attach SVC            More: +
Command ===>                        Scroll ==> PAGE
------------------------------------------------

Create a new unit of work in the system and start
that unit of work. The Attach SVC will perform the
following functions:
    o Create the task management control blocks
    o Determine if the module is in memory
    o Locate the module in the specified library
    o Allocate storage for the module
    o Read the module into storage and relocate
      addresses
    o Build and update control blocks to track the
      module
    o Place the new unit of work on the MVS/ESA
      dispatcher queues.

CA MAT  TIP:
  Use the A - Address line command to determine
  which programs were waiting for the Attach SVC.
  If Detail data is available, you can view the
  names of the modules that were attached that
  caused the delay.
```

Add Content-Sensitive Help

You can add Help information for a specific content either from the Content-sensitive Help panel or from the DelayView, CodeView, Histogram, or DataView interactive analysis panels. For more information, see the chapter, "Analyze Monitor Data."

Follow these steps:

1. Type ADD on the COMMAND line.

    The Content Help Addition panel displays.

```
.-------------------------------------------------------.
| CA MAT ------- Content Help Addition ---------------  |
| COMMAND ==>                                           |
|                                                       |
|        Content ==>                                    |
|   Content Type ==>                                    |
|    Help Member ==>                                    |
|     Help Topic ==>                                    |
|     Info Level ==> 3 (1, 2, or 3)                     |
|                                                       |
| Edit after Add ==> YES (Yes or No)                    |
|                                                       |
|        Press ENTER to add; press PF3 or enter         |
|             CANCEL to exit without adding.            |
'-------------------------------------------------------'
```

2. Specify the following values in the fields:

   Content

   Specify the content for which the Help topic is to be written; for example, if you are writing Help for the IGZXCDI CSECT, type IGZXCDI in this field

   Content Type

   Specify the type of content; for example, if you are providing Help for Data Delay (a major category), type MAJDELAY in this field

   Help Member

   Specify the eight-character name of the *hilevel.*UTRHELP member into which this Help topic will be written

   You can have several Help topics in one Help member.

   Help Topic

   Specify the eight-character name of the subtopic in the Help member

   Typically, this name is the same or similar to the name of the content.

   Info Level

   Specify 1 (red), 2 (yellow), or 3 (white)

   Edit after Add

   Specify YES to display an edit session for the Help topic; specify NO to create the new Help topic without adding Help text at this time

3. Press ENTER when the panel is completed.

4. Specify YES in the Edit after Add field, and type the information that must be displayed when a user is seeking information about the specific content.

   You can use text only, or you can use a set of control characters to format the text. For more information, see the Write Content-Sensitive Help text.

5. Press End to return to the Content-sensitive Help panel after you complete writing the Help text.

Copy a Content-Sensitive Help Entry

To change a distributed Help entry and text, you must first make a copy of the information. You cannot edit distributed Help topics directly.

1. Type CE next to the Help topic that you want to copy and press Enter.

   The Content Help Addition panel displays with the current information for the topic.

2. Change Help Member to a new name.

   The new name must be a valid PDS or PDSE name, and cannot begin with the letters TUC.

3. In the Edit after Add field, specify YES if you want to edit the Help topic text.

    See Edit Content-Sensitive Help Text.

4. When you have finished, press End to return to the Content-sensitive Help panel.

    The edited Help topic will appear on the Content-sensitive Help panel with the Source Level field set to U. The original entry remains unchanged. When you display content-sensitive Help information, the user-level text displays.

Update a Content-Sensitive Help Entry

1. Type UE next to the Help topic that you want to update and press Enter.

    The Content Help Addition panel displays with the current information for the topic.

2. Change the information as required. Specify YES in the Edit after Add field to edit the Help text.

3. When you have finished, press End to return to the Content-sensitive Help panel.

Edit Content-Sensitive Help Text

1. Type ET next to the existing topic on the Content-sensitive Help panel and press Enter.

    The member displays in ISPF edit mode.

2. Using ISPF edit, edit the text as required.

    You can use text only, or you can use a set of control characters to format the text.

3. When you have finished editing the Help text, press End to return to the Content-sensitive Help panel.

Write Content-Sensitive Help Text

Before you begin writing Help, you need to understand the following features of the Help processor:

■   An :H1 tag is added automatically to the selected member of *hilevel.*UTRHELP. This tag has an associated ID= attribute. The ID= attribute contains the Help topic member and the name of the content. You must not change this ID= attribute or CA MAT will not be able to locate the Help text.

■   A :p. tag is added automatically to the line after the :H1 tag. This tag acts as a separator between the header and the Help text.

Type your Help text below the :p. tag. See the table in Edit Help Text for information about using markup tags to format your text.

CA MAT automatically adds one space between each continuous word or character string, regardless of the actual number of spaces or line breaks. If you need to display text exactly as typed, use the example tag, :xmp.

When you are finished writing the Help for the topic, press End to return to the Content-sensitive Help panel.

```
Command ===>                                          Scroll ===>
****** ************************** Top of Data ******************
=NOTE= ********************************************************
=NOTE= * Please do not change the :H1 tag line. It is required
=NOTE= * for proper help processing.
=NOTE= ********************************************************
000001 :H1 id=ABCDE.ABCDE
000002 :p.

''''''
''''''
```

The tags that are available for writing content-sensitive Help are described next.

:H1

creates a heading and is followed by an ID= attribute, which is automatically filled in with the same value that is specified in the Topic field of the Content-sensitive Help panel

Do not change this value. CA MAT relies on this value to find the correct Help text.

This value is followed by a period, followed by the title that is to appear in the Help panel. The value that you specify in the Content field of the Content-sensitive Help panel is used automatically as the title. To change the title, overtype this value.

:p.

Creates a blank line between paragraphs.

:dl.

Creates a definition list and must also be used with the :dt. (topic) and :dd. (description) tags and followed with the :edl. (end definition list) ta.

:ul.

Creates a bulleted list and must also be used with :li. (list item) tags and must be followed by the :eul. (end unordered list) tag.

:hp1.

Highlights text following the tag and must be followed with the :ehp1. tag after the text that you want highlighted.

:xmp.

Creates text that shows an example and must be followed by the :exmp. tag following the example text.

Text displays exactly as typed, including spaces.

:note.

Creates a note and must be followed by the :enote. tag.

:suggest.

Creates a suggestion and the text within is highlighted in yellow.

The suggestion text must be followed by the :esuggest. tag.

:hottip.

Creates a tip where the tip heading is highlighted in yellow, the text is highlighted in white and must be followed with a :ehottip. tag.

:warning.

Creates a warning where the text is highlighted in red and the warning text must be followed by the :ewarning. Tag.

Content-Sensitive Help Example

The following panel shows the Content Help Addition panel for an example topic.

```
.----------------------------------------------------------.
| CA MAT ------- Content Help Addition ---------------      |
| COMMAND ===>                                             |
|                                                          |
|        Content ===> EXAMPLE                              |
|   Content Type ===> CSECT                                |
|    Help Member ===> SAMPLE                               |
|     Help Topic ===> SAMPLE                               |
|     Info Level ===> 3 (1, 2, or 3)                       |
|                                                          |
| Edit after Add ===> YES (Yes or No)                      |
|                                                          |
|        Press ENTER to add; press PF3 or enter            |
|              CANCEL to exit without adding.              |
'----------------------------------------------------------'
```

The following example shows an example of how you can use the tags described in the table in Edit Help Text to create your own Help text.

```
:H1 id=SAMPLE.EXAMPLE
:p.
Here is an example of how you use the tags to write help text.
We'll start with a definition list:
:p.
:dl.
:dt.Term1
:dd.Explanation1
:dt.Term2
:dd.Explanation2
:edl.
:p.
Next we'll create a bulleted list:
:ul.
:li.Item1
:li.Item2
:eul.
:p.
:xmp.
 This is an example. It appears e  x actly as typed.
:exmp.
:p.
:note.
Here is an example of a note. The word :hp1.note:ehp1. Is
highlighted.
:enote.
:p.
:suggest.
This is a suggestion. It is displayed in yellow.
:esuggest.
:p.
:hottip.
This is a tip. It includes useful information.
:ehottip.
:p.
:warning.
This is a warning. It is displayed in red.
:ewarning.
```

The following panel shows the Help text as it displays on the screen.

```
CA MAT              EXAMPLE                    HELP
Command ===>                     Scroll ===> PAGE
-------------------------------------------------

Here is an example of how you use the tags to
write help text. We'll start with a definition
list:

Term1          Explanation1
Term2          Explanation2

Next we'll create a bulleted list:
   o Item1
   o Item2

This is an example. It appears e   x actly as type

Note: Here is an example of a note. The word note
      is highlighted.

Suggestion:
  This is a suggestion. It is displayed in
  yellow.

CA MAT TIP:
  This is a tip. It includes useful information.

WARNING:
  This is a warning. It is displayed in red.
```

The following panel shows the example listed on the Content-sensitive Help panel.

```
CA MAT ----------------- Content-sensitive Help ---------- ROW 1 to 11 of 245
COMMAND ===>                                             SCROLL ===> CSR

Primary commands: ADD

   Line commands: CE - Copy entry  DE - Delete entry  UE - Update entry
                  BT - Browse help text  ET - Edit help text

LC Field Specific Contents          Type    Help      Help      I S LAST
                                            Member    Topic     L L USER

 >--------------------------------------------------------------------------
 __ .OTHERWT                         CSECT   TUCCSALL OTHER     3 D TUNUSER
 __ .PAGEWT                          CSECT   TUCCSALL PAGEWT    3 D TUNUSER
 __ .SWAPWT                          CSECT   TUCCSALL SWAPWT    3 D TUNUSER
 __ .USER                           CSECT   TUCCSALL USER      3 D TUNUSER
 __ EXAMPLE                          CSECT   SAMPLE   SAMPLE    3 U TUNUSER
 __ IGG019AF                         CSECT   TUCCSIGG IGG019AF 3 D TUNUSER
 __ IGG019AQ                         CSECT   TUCCSIGG IGG019AQ 3 D TUNUSER
 __ IGG019AR                         CSECT   TUCCSIGG IGG019AR 3 D TUNUSER
 __ IGG019BQ                         CSECT   TUCCSIGG IGG019BQ 3 D TUNUSER
 __ IGZCIN1                          CSECT   TUCCSIGZ IGZCIN1  3 D TUNUSER
 __ IGZCLDL                          CSECT   TUCCSIGZ IGZCLDL  3 D TUNUSER
```

Display Environmental Information

The Environment panel displays CA MAT and environmental information that should be examined with the assistance of Customer Support personnel. It contains information such as the maintenance level, storage blocks, and the z/OS environments in which the server and client are running. The following panel shows an example of the panel.

To display the Environment panel, select Option I from the Administration Options Menu.

```
CA MAT --------------------- CA MAT Environment ----------------------------
COMMAND ===>
                                                            More:     +
CA MAT Information
Server ID              : SPTRITUN     Job Name              : SPTRITUN
Status                 : ACTIVE       JES Job ID            : STC04339
Server Release         : 4.4.00       ASID                  : 189 (00B
Client PTF Level       : BASE85
Server GIF name        : CAMAT.V85.UTRGIF
Client GIF name        : CAMAT.V85.UTRGIF

MVS Information
MVS system name   . . . : SJSE
SMFID   . . . . . . . . : SJSE
MVS   . . . . . . . . . : SP7.0.7
MVS FMID . . . . . . . : HBB7720
OS/390 release . . . . : Z/OS   01.07.00
CPU   . . . . . . . . . : 2094-00
CPU serial number  . . : 1622EA

TSO and ISPF Information
TSOE . . . . . . . . . : 3.06.0
ISPF (internal number) : 5.7
OS/390 ISPF component  : ISPF FOR Z/OS 01.07.00

Misc. Component Information
RACF . . . . . . . . . : 7.72.0
DFHSM. . . . . . . . . : 0.3..0
Primary JES ID . . . . : JES2
Primary JES Release  . : Z/OS 1.7

SMS Information
DFSMS . . . . . . . . . 1.7.0
Subsystem ID . . . . . : SMS

CA MAT Internal Information
PSX Address            : 04B6F140     SVC 85 ICB            : 00F92D80
PSD Address            : 00020000     SVC 85 ICB STATUS     : -ACTIVE-
OMB Address            : 7E770000     SVC 85 Owning Server  : SPTRITUN
Mon DS Prefix          :              SVC 85 ICB Intercept  : 84BDF190
ASCB Address           : 00F90100     SVC 85 Old Address    : 84DD78A0
                                      SVC 85 Jobsteps       : 125
                                      SVC 42 Matches        : 1
```

The specific information on this panel are described next.

Server ID

Alphanumeric identifier for the Server Space.

Status

Status of the Server Space; possible values are.

Active

Inactive

Server Release

Release level of the Server Space.

Server GIF name

Data set name of the Global Information File for the Server Space.

Client GIF name

Data set name of the Global Information File for the TSO Client.

Job Name

z/OS job name of the Server Space.

JES Job ID

Job number assigned by the Job Entry Subsystem (JES).

ASID

Number for the address space that is associated with the job.

Client PTF level

Latest PTF level of the TSO Client.

Register Source Program Listings

If you use PROTSYM or CA Endevor with footprinting enabled to store program listings, you do not have to manually register any listings. Simply enable the dynamic registration support. For more information, see the *Installation Guide*, "Customization", under the section heading Set Up Profile Parameters.

Even if you use dynamic registration support, review the Compile the Program section. You must set compilation options as indicated for the various languages regardless of the repository used for the listing.

By registering source program listings, you allow CA MAT to relate program activity to high-level language statements, instead of only CSECT offsets. When you register a program, you are requesting a routine to read the listing of the compiled program and create a table, which is used during interactive analysis.

You can register a program online with the TSO Client, or offline by using the sample batch registration procedure *hilevel*.TNBATREG. You set up the batch registration procedure during installation by using the product customization facility.

When registering a program online through the TSO Client, you can choose to register the listings locally or globally. A listing that is registered locally is available only to the TSO Client that performed the program registration; a listing that is registered globally is available to all users. If a listing is registered both locally and globally, CA MAT selects one, based on the following rules:

- If the monitor you are analyzing is a global monitor, CA MAT looks for a global registration. If one is not found, and dynamic registration support is enabled, CA MAT looks for a listing in the repository that is defined in the global profile parameters. Otherwise, CA MAT issues a message.

- If the monitor you are analyzing is local to the TSO Client, CA MAT looks for a local registration. If a local registration is not found, CA MAT looks for a global registration for that program. If no registration is found, and dynamic registration support is enabled, CA MAT looks for a listing in the repository that is defined in the local profile parameters. Otherwise, CA MAT issues a message.

You can register program listings for Assembler, COBOL, PL/1, NATURAL, Fortran, IBM C/C++, and SAS C. There are two steps for registering program listings:

- Compiling the program
- Registering the listings

Export a Monitor Data Set

Use this procedure to export a data set.

Follow these steps:

1. Locate the data set you wish to export from any of the following panels:
   - Monitor Definition panel
   - Monitor History panel
   - External Data Set List panel

2.   Type the line command X next to the profile or data set name.

If the data set exists, the Monitor Data Set Export panel appears with the selected data set name near the top. If you typed the command from the Monitor Definition panel, the latest monitor data set for that profile will be used.

```
CA MAT  ----------------- Monitor Data Set Export --------------------------
COMMAND ==>

Preparing: '&USERID.&PROFILE.&SYSDATE.&SYSTIME'

 This feature will prepare the selected data set for download and Internet
 transmission to Customer Support.  The original data set is not altered.

 Enter the data set name and allocation parameters for the output data set
 (to contain the exported data). If the data set does not exist, it will
 be allocated.  If the data set already exists, it must be a sequential
 data set with 80-byte fixed length records.

Required Information:
     Data set name ==> '&USERID.&PROFILE.&SYSDATE.&SYSTIME.EXP'
   Tracks Primary  ==> 45              Secondary        ==> 30

    Volume Serial  ==>         or    Storage Class     ==>
            Unit  ==> SYSALLDA       Data Class        ==>
                                     Management Class  ==>

Scroll UP or DOWN for more options.  Press ENTER to prepare dataset; press
END to cancel.
```

3.   Verify the exported data set name and allocation information at the bottom of the panel. Change it as needed according to your site conventions, and press Enter.

The monitor data set will be prepared for download and a confirmation panel opens.

```
CA MAT  ----------------- Monitor Data Set Export --------------------------
COMMAND ==>

 The Monitor Data set has been prepared for download and created in:

   '&USERID.&PROFILE.&SYSDATE.&SYSTIME.EXP'

 Download the above data set to your workstation as a binary file.  Do not
 download the data set with the options of ASCII and CRLF.  Once downloaded,
 the file can be attached and sent by e-mail to Customer Support.  Large files
 can be compressed using WINZIP before Internet transmission.

 Be sure to include the ticket number in the subject line of your e-mail.
```

Compile the Program

Compile the program with specific options, as shown in the following table. If you make changes to the program, you must recompile and reregister the program to maintain accuracy.

The compilation step that produces the input to the registration routine must be the same as the compilation step that produces the object code seen by the measurement routines. If the compilation steps are not the same, the statement numbers that are identified by the analysis routines could be incorrect.

Compiler	Levels supported	Required options
Assembler	VS, F, G, H	LIST ESD PRINT GEN
AD/Cycle	1.2 and later	LIST
COBOL	VS, ANSI versions 2, 3, 4	SOURCE PMAP VERB
COBOL	VS COBOL II COBOL for z/OS and VM	SOURCE SOURCE NOLIST OR LIST OFFSET NOOFFSET NONUMBER
	CA OPT 5.3 CA OPTII 1.1	SOURCE NOCLIST PMAP

PL/1	Enterprise 3.2.0
	Visual Age 2.3.0
		OBJECT OBJECT
		LIST OR LIST
		SOURCE SOURCE
		NOSTMT STMT
		           MACRO
		           OPTIONS

	Enterprise V3 releases 5, 6, and 7	SOURCE OBJECT OFFSET **Note:** LIST option required with V3.R5 to correctly register internal procedure offsets to correct statements.

Compiler	Levels supported	Required options
Fortran	2.2.0 and later	XREF LIST MAP
IBM C/C++	MVS/ESA: 3.2 and later OS/390: 1.1 and later	LIST
SAS C	5.0 and later	OMD
NATURAL	3.1 and later	n/a

List Managers

CA MAT supports listings stored in

- IBM PDS and PDS/Es

- DDIO by Compuware

- Computer Associates Librarian

- Panvalet files

- Serena ChangeMan

- CA Endevor

- CA Ideal

- PROTSYM files

If your listings are stored in DDIO format, you must use the DDIO Enhanced Listing format for registration and list the program with the following DDIO options:
```
COBOL (OUTPUT(PRINT))
COBOL (OUTPUT (NODDIO))
PROCESSOR (OUTPUT(DDIO))
PROCESSOR (TEXT(ALL))
DDIO (OU(NOLI, NOPM, NOOF, NOCL, NOXR, NODM, FIND, CO))
```

If you recompile a program, you must reregister it with CA MAT to maintain accurate statement information.

Register IBM C/C++ Listings with Language Environment Support

IBM C/C++ support is implemented in a similar manner to the other compilers. One notable exception is the need to enter the name of the load module that reflects the IBM C/C++ listing. Unlike non-Language Environment compiler support where a listing is related to a CSECT, Language Environment (LE) support relates a listing to a load module, not a CSECT. Depending on your site's data set naming standards, the load module name might not match the listing member name. During registration, a small pop-up panel appears, asking you to specify the load module name.

When you register a listing from the Histogram panel, the pop-up panel does not appear because CA MAT automatically assigns the load module name from the Histogram report to the listing for you.

When analyzing an IBM C/C++ program with LE, CA MAT automatically detects that the listing is registered to the load module, instead of the CSECT, and makes the proper adjustments to the analysis reports. During analysis, no intervention is required on your part.

Register the Listing

1. Select one of the following menu options:

   ■ Option 3 from the Primary Option Menu

   ■ Option 5 from the Administration Option Menu (for global registrations)

   ■ Option 3 from the Global Monitoring Menu (for global registrations)

   The Program Listing Registration panel displays.

```
CA MAT  ---------------- Program Listing Registration -----------------------
OPTION ==> I

   A  ASM      - Assembler listings
   C  COBOL    - ANS and COBOL II listings
   P  PL/I     - IBM optimizing PL/I listings
   F  Fortran  - VS Fortran listings
   N  Natural  - Software AG Natural listings
   C1 IBM C/C++ - IBM C/C++ with Language Environment
   C2 SAS C/C++ - SAS C/C++ listings
   C3 AD/Cycle  - AD/Cycle C listings
   I  IDEAL    - IDEAL listings

   Listing manager ==> IDEAL      (PDs, DDio, ENdevor, PRotsym, PAnvalet,
                                   LIbrarian, CHangeman, or IDeal)

Enter an option or press END to exit
```

Register the Module

The output listing from the final link-edit of the load module needs to be registered in order to successfully register CSECT listings. The MAP option must be used to obtain a map of generated CSECT names.

Generated CSECT names are linked to the actual CSECT listing based on the CSECT length. If more than one CSECT has the same length, the incorrect CSECT listing might be used.

Follow these steps:

1. Select the **Registration** option.

2. Select option **C1 - IBM/C** from the Program Listing Registration menu.

   The Registered Listings: IBM/C panel displays.

3. Issue the **MOD**ule primary command.

   The Registered Listings: Modules panel displays.

4. Issue the **ADD** primary command.

5. Specify the data set information for the Link-edit output listing.

   If the module listing is in a PDS, a list of members displays from which you can select the correct member.

6. Press **Enter** to register the listing.

   A message indicates whether the module has been registered successfully and you can return to the Registered Listings: IBM/C panel to register the CSECT listings that are included in the registered module normally. There are a few considerations:

   - If a CSECT cannot be found in the load module listing, the Completion field indicates this situation, and the CSECT is not registered. Verify that the correct CSECT or Module listings are being used.

   - If a data set contains multiple CSECT listings, or if multiple listing members are processed (using the 'REGister All' command), each listing is registered by using the same module.

   - A new command has been added to the 'Member List' panel. Use the **REG**ister all command to register all members that are displayed on the panel.

   - For Language Environment C++ listings, all CSECTs will be registered by using the same module. You will only need to specify the module name.

7. To select the language of the program that you want to register, type the code in the Option field.

8. To select the listing manager that you want to register, type the first two letters of the manager. The listing manager indicates where the listings reside.

   - **PD**s - Listings are stored in PDSs or PDSEs.

- **DD**io - Program listings are stored in the Compuware Common Services DDIO file. You must know the name of the listing and the DDIO file in which it resides before you can register the program.

- Only COBOL listings can be registered from DDIO files.

- **EN**devor - Program listings are stored and managed by CA Endevor. You must know which member and library the program listing is in before it can be registered.

- **PA**nvalet - Program listings are stored and managed by CA Panvalet. You must know which member and library the program listing is in before it can be registered.

- **PR**otSym - Program listings are stored and managed by ProtSym. You must know which member and library the program listing is in before it can be registered.

- **LI**brarian - Program listings are stored and managed by CA Librarian. You must know which member and library the program listing is in before it can be registered.

- **CH**angeman - Program Listings are stored and managed by Serena Changeman. You must know the Changeman Link Library where the SERCOPY program is located (default: 'serena.CHGMAN.LINKLIB', where serena is the high-level qualifier), the listing data sets, and member name where the program listings are stored.

Depending on the language you select and the listing manager, a panel showing all COBOL, Assembler, PL/1, Fortran, IBM C/C++, NATURAL, or SAS C programs that are currently registered with CA MAT displays. From this panel, you can either add new listings or delete old listings. If you add a listing that already exists, the new listing replaces the existing listing.

9. Press Enter to register the listings.

   A message indicates when the registration is complete.

Example: Registering COBOL listings

Follow these steps:

1. Select Option C and any one of the listing managers.

2. Press Enter.

    The Registered Listings: COBOL panel displays.

```
CA MAT -------- Registered Listings: COBOL      ------------ ROW 0 to 0 of 0
 COMMAND ===>                                               SCROLL ==> CSR

 Primary commands: ADD, REBuild, ADDHelp

 Line commands: B - Browse  R - Register  D – Delete

 LC CSECT    Type   Dataset name


    _____ _____ _____
 >--------------------------------------------------------------------------
 ***************************** END OF TABLE *****************************
```

The commands available for the Registered Listings panel are described next.

ADD

>   Registers a new listing.

>   CA MAT prompts for the data set in which the listing resides.

REBuild

>   Registers all listings that are displayed in the Administration panel.

>   This command is helpful when working with a larger application.

ADDHelp

>   Invokes the content-sensitive Help application to update or create a Help entry for the selected content.

Browse

>   Displays the registered listing.

Register

>   Reregisters the listing.

>   Use this option if you modify a program after registering it with CA MAT.

Delete

>   Deletes the listing registration table for the selected program.

The fields on the Registered Listings panel are described next.

CSECT

Displays the CSECT name of the program that you have registered.

The name is extracted from the listing and might not be the member name of the listing data set.

Type

Displays the compiler type that created the listing.

Size (Hex Bytes)

This shows the length (in hex) of the program as determined from the registered listing.

Note: If the value is zeroes the program size could not be reliably determined from the listing.

data set name

Displays the data set name where the program listing resides.

VOLSER

Displays the Volume serial number of the listing data set.

The serial number displays only for uncataloged data sets.

CompDate

Displays the date that the listing was compiled.

This date is extracted from the listing.

CompTime

Displays the time that the listing was compiled.

This date is extracted from the listing.

Listing Manager

Listing manager in which the program listing resides.

3. Type ADD on the COMMAND line.

4. Press Enter.

   The COBOL Map Resolution panel displays.

   Each listing manager has its own map resolution panel.

```
CA MAT ---------------- COBOL Map Resolution -----------------------
COMMAND ==>

Specify Listing Dataset(s) below:
   Project ==>
   Group   ==>          ==>          ==>          ==>
   Type    ==>
   Member  ==>

Other partitioned or sequential dataset:
   Dataset name   ==>
   Volume serial  ==>          (If not cataloged)


Press ENTER key to select members
Enter END command to cancel.
```

5. **PDS only:** if you select the PDS listing manager, type the name of the data set containing the listings and press Enter.

   The Member List panel for PDS displays.

```
CA MAT ------------------------ Member List ------------- ROW 1 to 21 of 28
COMMAND ==>                                            SCROLL ==> CSR

Dataset: TUN.TEST.COB2LIST

Line commands: S - Select  B — Browse


                                              Change   Change
LC Name      Completion            W MM Created Date    Time   User
   _____ _____ __ __ _____ _____ _____ ___
>------------------------------------------------------------------
-
__ ACCT00
__ ACCT00#
__ ACCT01
__ ACCT02
__ CAC080
__ COBDIV00
```

6. Type S next to the source module names that you want to register with CA MAT and press Enter.

   A message indicates when the listing has been registered. It might take several seconds for the source member to complete registration.

The fields in the Member List panel are described next.

Name

Displays the name of the member in the listing data set.

This name is specified during the execution of the compiler on the SYSPRINT DD statement.

Completion

Displays the status of the listing registration.

The text can be one of the following statements

- Successfully registered
- Not a program listing
- No offset map found

VV

Displays the version level for the member when changed with ISPF EDIT.

If the member was not changed by using ISPF EDIT, this field is blank.

MM

Displays the modification level for the member when changed with ISPF EDIT.

If the member was not changed by using ISPF EDIT, this field is blank.

Created

Displays the time this member was created by using ISPF EDIT.

If the member was not created by using ISPF, this field is blank.

Change Date

Displays the date the member was last modified or created by using ISPF EDIT.

If the member was not created or modified by using ISPF EDIT, this field is blank.

Change Time

Displays the time the member was last modified or created by using ISPF EDIT.

If the member was not created or modified by using ISPF EDIT, this field is blank.

User

Displays the TSO user ID of the user that created or last modified this member by using ISPF EDIT.

If the member was not created or modified by using ISPF EDIT, the field is blank.

Size

Displays the number of lines that the member currently contains.

If the member was not changed by using ISPF EDIT, this field is blank.

Init

Displays the initial size of the member when it was created by using ISPF EDIT.

If the member was not created by using ISPF EDIT, this field is blank.

Mod

Displays the number of lines that are marked as modified when using ISPF EDIT.

If the member was not changed by using ISPF EDIT, this field is blank.

7. **DDIO, ProtSym, Panvalet, Librarian, CA Endevor, or ChangeMan:** If you select Option C and the DDIO, ProtSym, Panvalet, Endevor, Librarian or ChangeMan listing manager, a COBOL Map Resolution panel similar to the following example displays.

```
CA MAT ------------------- COBOL Map Resolution      ---------------
COMMAND ===>

Specify DDIO listing data set and member below:
  Listing data set choice  ===>    (1 through 8)
            Member name  ===>

    Listing data sets 1  ===>
                      2  ===>
                      3  ===>
                      4  ===>
                      5  ===>
                      6  ===>
                      7  ===>
                      8  ===>

Press ENTER to register listing
Enter END to cancel
```

8. Specify the data set that contains the program listing and press Enter.

   It might take several seconds for the source member to complete registration.

Register Natural Programs

To register a Natural program, you must first extract the listing into either a sequential data set or a member of a partitioned data set (PDS). (See instructions to Extract the Listing (see page 248).)

Once that step is completed, you can register the program by using the TSO client. (See instructions to Register the Program (see page 249).)

Extract the Listing

An example of the JCL that can be used to extract the listing to a sequential data set is shown following.

```
//xxxxxxxx JOB (job card info)
//NATBAT  EXEC PGM=NATvrmBA,
//            PARM=(Natural parameters)
//* STEPLIB  DD DISP=SHR,DSN=SAGLIB.NATvrm.LOAD
//DDPRINT   DD SYSOUT=*
//DDDRUCK   DD SYSOUT=*
//CMPRINT   DD DISP=(,CATLG,DELETE),
//            DSN=yourhlq.NATURAL.LISTING,
//            UNIT=SYSDA,SPACE=(TRK,(15,15),RLSE)
//CMPRT01   DD SYSOUT=*
//CMSYNIN   DD *
LOGON <Natural-Library-Name>
LIST PROGRAM <Natural-Program-Name>
```

To use this JCL, you must change it as follows:

1. A valid job card must be supplied.

2. The correct name of the Natural batch program must be provided on the EXEC PGM= statement.

   For more information, contact the person who installed Natural at your company. The JCL shows the default naming convention used in the Software AG installation materials.

3. Any Natural parameters that your installation requires must be provided on the PARM= statement.

   For more information, contact the person who installed Natural at your company. CA MAT requires no special Natural parameters.

4. If the Natural load library is not part of the system linklist concatenation, then the STEPLIB DD statement must be uncommented and the name of the Natural load library must be specified.

   For more information, contact your system programmer or the person who installed Natural at your company. The JCL shows the default naming convention used in the Software AG installation materials.

5. A valid high-level qualifier must be provided for the data set named on the CMPRINT DD statement.

   This is the data set that will be used in the registration process.

   A sequential data set is shown in the JCL; however, a PDS can be used if desired. Simply make the appropriate changes to the JCL.

6. On the Natural LOGON statement, in place of the term <Natural-Library-Name>, substitute the actual name of the Natural library that contains the program to be registered.

7. On the Natural LIST PROGRAM statement, in place of the term <Natural-Program-Name>, substitute the actual name of the Natural program to be registered.

After these changes have been made, execute the job.

The job should finish with condition code zero, and it should produce a data set that contains a listing of the program to be registered.

In addition to the program listing, this data set may contain certain messages from Natural. This situation is normal and completely expected.

Register the Program

Once the job has finished successfully, you can register the program by using the TSO client, as follows:

Follow these steps:

1. Select one of the following menu options:

   ■ Option 3 from the Primary Option Menu

   ■ Option 5 from the Administration Option Menu (for global registrations)

   ■ Option 3 from the Global Monitoring Menu (for global registrations)

   The Program Listing Registration panel displays.

```
CA MAT ---------------- Program Listing Registration -----------
OPTION ===>

  A  ASM      - Assembler listings
  C  COBOL    - ANS and COBOL II listings
  P  PL/I     - IBM optimizing PL/I listings
  F  Fortran  - VS Fortran listings
  N  Natural  - Software AG Natural listings
  C1 IBM C/C++ - IBM C/C++ with Language Environment
  C2 SAS C/C++ - SAS C/C++ listings
  C3 AD/Cycle - AD/Cycle C listings
  I  IDEAL    - IDEAL listings


  Listing manager ===> PDS        (PDs, DDio, ENdevor, PRotSym, PAnvalet,
                                   LIbrarian, CHangeman, or IDeal)

Enter an option or press END to exit
```

2. Specify PDS for the Listing Manager.

   When PDS is specified, the input data set can be either a partitioned or a sequential data set.

3. Select option N for Natural.

   The Registered Listings: Natural pane displays.

```
CA MAT ----- Registered Listings: Natural    ----- Row 1 to 1 of 1
COMMAND ==>                                        SCROLL ==> CSR

Primary commands: ADD, REBuild, DELete, ADDHelp

   Line commands: B - Browse  R - Register  D - Delete

LC Csect    Dataset name                               Type


   _____ _____ _____
>---------------------------------------------------------------
__ AQMTEST  USRJEQ1.NAT.LST(AQMTEST)                    NAT
************************* End of Table *************************
```

4. Issue the ADD primary command.

   The NATURAL Map Resolution panel displays.

```
CA MAT ------------ NATURAL Map Resolution    -------------------
COMMAND ==>

Specify listing dataset below:
   Project ==>
   Group   ==>          ==>          ==>          ==>
   Type    ==>
   Member  ==>

Other partitioned or sequential dataset:
   Dataset name  ==>
   Volume serial ==>        (If not cataloged)


Press ENTER to select members
Enter END to cancel
```

5. Under the section Other partitioned or sequential dataset:, next to Dataset name ===>, enter the same data set name that you used on the CMPRINT DD statement in the batch job used earlier.

   If the listing data set is a PDS, you can specify the member name in parenthesis, or you can omit it to obtain a list from which you can select the correct member.

   If the data set name does not begin with the high-level qualifier that matches the user ID or TSO prefix of the TSO user who is logged on, then you must enclose the data set name in single quotes (").

6. Press Enter to register the listing.

   A message indicates whether the listing has been registered successfully.

7. Press PF3 to return to the Registered Listings: Natural panel.

You should see the Natural program name appearing in the Csect column, the name of the listing data set in the Dataset Name column, and NAT in the Type column.

Register CA Ideal Programs

The CA Ideal utility calculates offsets during measurement, since statement numbers are not readily available.

There are two ways to register CA Ideal program listings. One is a manual process, and the other happens automatically when a histogram displays.

Manual Process

Navigate to the registration panel within CA MAT in several ways. Registration stores the registered listing in the User Information file (UIF) when called from the Primary Option Menu, Administration Option Menu, and during analysis with the REGister primary command. When called from the Global Monitoring Menu, listings are stored in the Global Information file (GIF).

You can register program listings manually using the following procedure.

Follow these steps:

1. Access the Program Listing Registration panel in one of the following ways by:

   ■ Choosing option 3 from the Primary Option Menu and pressing Enter.

   ■ Choosing option 3 from the Global Monitoring Menu and pressing Enter.

   ■ Choosing option 3 from the Administration Option Menu and pressing Enter.

   ■ Choosing the REGister primary command during analysis from any of the following panels: CodeView, CallerID, and Histogram and pressing Enter.

   The Program Listing Registration panel opens:

```
CA MAT  ---------------- Program Listing Registration ----------------------
OPTION  ==> I

   A  ASM      - Assembler listings
   C  COBOL    - ANS and COBOL II listings
   P  PL/I     - IBM optimizing PL/I listings
   F  Fortran  - VS Fortran listings
   N  Natural  - Software AG Natural listings
   C1 IBM C/C++ - IBM C/C++ with Language Environment
   C2 SAS C/C++ - SAS C/C++ listings
   C3 AD/Cycle  - AD/Cycle C listings
   I  IDEAL    - IDEAL listings

   Listing manager ==> IDEAL     (PDs, DDio, ENdevor, PAnvalet,
                                   LIbrarian, CHangeman or IDeal)

Enter an option or press END to exit
```

2. In the Program Listing Registration panel that opened, select option I, set the Listing manager field to IDEAL, and press Enter.

   Note: Using incorrect combinations of Option and Listing manager causes the Unsupported List Manager message to appear. Pressing PF1 provides a more detailed error message.

The Registered Listings: IDEAL panel opens:

```
CA MAT --------- Registered Listings: IDEAL      ------------- Row 0 to 0 of
COMMAND ==>                                                   SCROLL ==> CSR

Primary commands: ADD, REBuild, DELEte

   Line commands: B - Browse  R - Register  D - Delete

           Obj Src Sys
LC Program  Ver Ver ID  Object Data Set Name

   _____ ___ ___ ___ _____
>-------------------------------------------------------------------------------
****************************** End of Table ******************************
```

Note: An empty table indicates that no listings have been registered.

3. Choose the ADD primary command and press Enter to register a listing.

    The CA Ideal Map Resolution panel opens.

```
CA MAT -------------------- CA Ideal Map Resolution ------------------------
COMMAND ==>

Specify CA Ideal program information below:

                Program name  ==>
            Object version  ==>
            Source version  ==>
               System ID  ==>
     Object Data Set Name  ==>
     Source Data Set Name  ==>

Press ENTER to register program
Enter END to cancel
```

Note: To register a CA Ideal program manually, gather all of the requested information. Press PF1 on the CA Ideal Map Resolution panel to display a help pop-up panel that explains the requested information.

4. Press Enter.

    The program source is obtained from the CA Ideal subsystem. If the process takes more than a few seconds, the REGISTERING message appears. Once the registration is complete, you see the CA Ideal Map Resolution panel with the information retained. You can use the retained information to register another program.

5. Press PF3 once all programs have been registered.

You return to the Registered Listings: IDEAL panel, where you can see the registered listings.

```
CA MAT ----------- Registered Listings: IDEAL     ------------- Row 1 to 1 of
COMMAND ==>                                             SCROLL ==> CSR

Primary commands: ADD, REBuild, DELEte

   Line commands: B - Browse  R - Register  D - Delete

           Obj Src Sys
LC Program  Ver Ver ID  Object Data Set Name
   _____ ___ ___ ___ _____
>-----------------------------------------------------------------------------
__  CUSTLIST PRD 003 $ID 'APM.IDEL.R11.ID$IDOBJ'
******************************* End of Table *******************************
```

Scrolling to the right shows the remaining column of the Registered Listings: IDEAL panel.

```
CA MAT ----------- Registered Listings: IDEAL     ------------- Row 1 to 1 of
COMMAND ==>                                             SCROLL ==> CSR

Primary commands: ADD, REBuild, DELEte

   Line commands: B - Browse  R - Register  D - Delete


LC Source Data Set Name
   _____
<-----------------------------------------------------------------------------
__  'APM.IDEL.R11.ID$IDSRC'
******************************* End of Table *******************************
```

Note: The REBuild command works only if there are listings registered. The command causes looping through the entries on the panel and the reregistration of each program.

Note: The DELEte command works only if there are listings registered. The command causes looping through the entries on the panel and the deletion of each program.

Note: Place the cursor on any field of the CA Ideal Map Resolution panel and press F1 to display help panels that describe the individual fields.

Automated Process

You can register CA Ideal program listings manually or automatically.

You can register program listings the automated way using the following procedure.

Follow these steps:

1. Access the CodeView panel in 4GL mode.

   The CodeView panel opens:

```
CA MAT  ------------------------- CodeView ---------------- Row 1 to 1 of 1
COMMAND ==>                                            SCROLL ==> CSR

Primary commands: MOde Pseudo/Module/Csect/4GL,        Profile: IDLBATCH
                  PSEudo, REGister, ADDHelp            Options: NORMAL
                                                          Mode: 4GL
Line commands: A - Associate
               I - Info
               H - Histogram    NH - Normalized Histogram

Extended Callerid: CC - Current  CA - Application  CV - Via

                            Obj Pgm Src Pgm
LC Language System Program  Version Version Actv% Wait% Totl% Visual
   _____ _____ _____ _____ ____ ____ ____ _____
>--------------------------------------------------------------------------
__ IDEAL    $ID   CUSTLIST PRD    003      1.57  8.07  9.63 ======>
******************************* End of Table ******************************
```

2. Type H (Histogram) or NH (Normalized Histogram) on the command line.

   If the program listing is not available, CA MAT will automatically register the listing using information found in the monitor data set. The Registering message pop-up appears, followed by the Histogram:

```
CA MAT  --------------------- 4GL Histogram ---------------- Row 1 to 9 of 9
COMMAND ==>                                            SCROLL ==> CSR

  Language --- IDEAL                                   Profile: IDLBATCH
  System   --- $ID                                     Normalized: NO
  Program  --- CUSTLIST   Version  PRD(003)

Stmt  Actv% Wait% Totl% Visual      Source line
____ ____ ____ ____ _____ _____
--------------------------------------------------------------------------
 201  0.00  0.05  0.05             SET LINE-NUM = 99
 218  2.02 19.79 21.82 ======>     MOVE CUSTOMERS TO DTL BY NAME
 221  2.32 22.54 24.86 ======>     FOR FIRST SALESMAN-DW
 223  0.15  0.47  0.62             MOVE SALESMAN-DW.NAME TO DTL.SA
 606  0.05  0.07  0.12             SET TOT.SALES = $EDIT(TOT-SALES,
 607  2.80 22.81 25.61 ======>     MOVE TOT TO PRT-LINE
 704  0.02  0.07  0.10             SET HDR1-PAGE = $EDIT(PAGE-NUM)
 708  2.17 21.06 23.24 ======>     IF $SUBSTR(HDR1-PAGE,START=1,LEN
 720  0.02  0.32  0.35             MOVE HDR1 TO PRT-LINE
******************************* End of Table ******************************
```

Use Interactive Analysis with Registered Programs

After you have registered a program, you can view a CSECT's source code directly by using the Listing line command (L) on the Delay Locations, Histogram, and CodeView interactive analysis panels. CA MAT also provides statement references in the Stmt field on the Delay Locations and Histogram panels. For more information, see the chapter "Analyzing monitor data." Several examples follow.

The following panel shows the statement information on the Delay Locations panel, which displays when you issue the Address line command (A) for a specific delay category on the DelayView panel.

```
CA MAT ----------------------- Delay Locations -------------- Row 1 to 4 of 4
COMMAND ===>                                            SCROLL ===> CSR

     Delay type: IO Queued                              Profile: TUNIVP1

Primary commands: REGister, ADDHelp

   Line commands: L - Listing    D — Details
                  C - Callerid   I — Info

LC Module   Csect    Offset   Csect Description     Stmt  D C Pct   Visual
   _____ _____ _____ _____ ____ _ _ _____ _____
 >----------------------------------------------------------------------
 __ IGG019AR IGG019AR 00000086 QSAM SYNCH PUT          162 Y    4.42 ========>
```

The Stmt field is an 8-digit number for the registered listing. Most panels display only the low order 6 digits. For Enterprise PL/1 listings, the statement number (Stmt field) consists of a file number in the 3 high order digits and a line number in the low order 5 digits.

The following panel shows the CodeView panel. Issue the Listing line command (**L**) to display the source code listing.

```
CA MAT -------------------------- CodeView ---------------- Row 1 to 8 of 8
COMMAND ===>                                              SCROLL ===> CSR

Primary commands: MOde Pseudo/Module/Csect/4GL,            Profile: TUNIVP1
                  PSEudo, REGister, ADDHelp               Options: NORMAL
                                                             Mode: CSECT
Line commands: A - Associate    C - Callerid    D - Delays   N - Long Name
               I - Info         L - Listing     S - Distribution
               H - Histogram   NH - Normalized Histogram


LC Module   Csect    Description             L C Actv% Wait% Totl% Visual
   _____ _____ _____ _ _ _____ _____ _____ _____
>------------------------------------------------------------------------
__ IGZCPAC  IGZCIN1  Cobol                    A Y 45.67  6.81 52.49 ========>
__ TUNCOB01 TUNCOB01 Cobol test program distri A Y 32.23  4.97 37.20 ======>
__ .EUSER   .EUSER   In extended user space     Y  1.29  0.37  1.66
__ IGG019AR IGG019AR QSAM put next buffer     B Y  0.18  1.10  1.29
__ BCSMSSM0 BCSMSSM0                          A    0.00  0.37  0.37
__ TUNCOB01 IGZEBST  Cobol                    A    0.00  0.37  0.37
__ IGZEQ0C  IGZEQ0C  Cobol                    B    0.00  0.18  0.18
__ CEEBINIT CEEPMLOD Loader for OS/390        B    0.00  6.45  6.45
****************************** End of Table ******************************
```

Register Listings during Interactive Analysis

When measuring the performance of programs in online subsystems consisting of many different load modules with each module possibly containing several CSECTs, you seldom need to register every CSECT. If you find that you need CSECT information on a specific module, you can register the module by using the following Interactive Analysis panels:

■   Delay Locations

■   CodeView

■   Histogram

■   Callerid

Compare Dates, Sizes and Compiler Types

CA MAT compares the dates, CSECT sizes, and compiler types of registered listings to the monitored program when the Histogram line command is entered from the CodeView panel.

Registered listing dates are stored in the following format: *yyyy/mm/dd.*

If a mismatch is detected, a warning message, such as the one below, is issued:

    Dates do not match

Press PF1 to get additional information; for example:

Dates do not match - The date of the running program, 2007/06/12, and the registered listing, 2007/06/07, do not match. This might cause misleading or inaccurate information to be displayed.

CA MAT does not attempt to validate CSECT sizes for COBOL VS, CA OPTIMIZER 5, CA OPTIMIZER/II, or Enterprise PL/1 compiled with the NOLIST option.

Chapter 7: Open Application Program Interface

This section contains the following topics:

What is the Open Application Program Interface?

In addition to defining and invoking monitor sessions online with the TSO Client, you can start a session by using the Open Application Program Interface (Open API). This feature allows you to monitor an application when conditions are most critical, including

- When a critical performance threshold is exceeded

- When a program is executed under specific conditions

- If you are using a console automation tool

- If you are using a program change control system

Invoke the TUNCALL Program

The TUNCALL program is used to define and start a monitoring session and you can invoke it different ways:

- As a TSO command (from either REXX or CLIST EXECs)

- As a batch job

- As a called program

TUNCALL

The TUNCALL program is a single load module with several aliases that resides in *hilevel*.CEESPLD. You can copy TUNCALL into your Link Pack Area (LPA) for convenient access, but remember to also copy the alias definitions as well.

TUNCALL Functions

TUNCALL supports several types of requests:

- Invoking new monitors (measurement sessions)

- Obtaining the status of a pending or active monitor session

- Canceling a pending or active monitor

What Global Monitors Are

When you use TUNCALL, all monitor-related actions are associated with global monitors. Just as each user has his or her own set of monitor definitions that are stored in the UIF (User Information File), monitors that are managed by TUNCALL are collected together in a GIF (Global Information File).

Because TUNCALL users might not be defined users with UIFs, TUNCALL-managed monitors are considered to be global and do not belong to any specific user. You can view the global monitors from the Primary Menu under Global Monitors.

Global Monitors are the exact same as local or user (level) monitors with two exceptions:

- Definitions are stored in the GIF (Global Information File), not in a UIF.

- All users have access to global monitor definitions (provided proper security access has been granted).

When using TUNCALL, remember to use the Global Monitor option from the Primary Menu to view the results of the monitor session.

TUNCALL Syntax

TUNCALL syntax is similar to z/OS utilities such as IDCAMS. The basic syntax for each TUNCALL statement is as follows:

serverid, verb keyword(operand1, operand2, operand3, ...) keyword(operand1, operand2, operand3,...) keyword keyword

The TUNCALL syntax is described next.

serverid

Name of the server that is locally running on the same system where TUNCALL is executing.

verb

Type of request.

MONITOR is the only supported verb.

MONITOR:

Specifies how to manage monitor requests.

You must put a comma between the serverid keyword and the verb keyword. The serverid and the verb keywords are positional and the serverid must be the first word followed by the verb with a comma between the two.

Spaces are supported.

additional keywords

After the verb, enter the keywords with the associated operands.

Each keyword must be separated by at least one space and the operands must be enclosed in parentheses. You must separate multiple operands with a comma.

Any number of spaces can be included with the comma.

In addition, character strings can be specified by enclosing the string with either single (') or double quotation marks ("); however, the quotation marks must be paired. The string does not need to be quoted if it contains only alphanumeric characters. In the latter case, the string is translated automatically to uppercase characters as well.

If you provide commands to TUNCALL with the TUNIN DD-statement, the commands can be continued to the next statement with a dash (-) as the last character on the line.

Blank lines are ignored, and comment lines can begin with an asterisk (*) or be embedded with paired slashes and asterisks (/*, */).

The following example is a valid monitor request:
```
//SMON JOB 1,'TUNCALL IT',MSGCLASS=A, CLASS=A
//*
//TUNCALL EXEC PGM=TUNCALL
//STEPLIB    DD DISP=SHR,DSN=CAMAT.V85.CEESPLD
//*
//TUNPRINT DD SYSOUT=*
//TUNIN DD *
 * This is a comment line
 /* This is another comment */
CA MAT, -
 MONITOR -
 INVOKE -
 JOBNAME(PROD01)    /* Another comment */
```

Certain keywords permit wildcard characters. For a list of valid wildcards, see Wildcard Characters (see page 44).

TUNCALL Verbs and Keywords

The following sections describe keywords that can be used with the TUNCALL verb MONITOR.

MONITOR INVOKE

The INVOKE keyword specifies that a monitor request is queued to measure one or more jobs. The parameters indicate the jobs and how they will be measured.

When invoking a monitor, you must specify a profile name, an address space ID, or a job name.

If you specify a job name or an address space ID, a profile is created by using the address space name. If the profile already exists then it may be updated.

If you specify a profile name, the jobs to be measured are taken from that profile. Similar to invoking a monitor with the ISPF client, if no matching job is found, the monitor is queued and waits until the start of a matching job step is detected.

When invoking monitors other options help refine the job or jobs to be measured, the number of jobs to be measured, the job steps, and the duration of the measurement.

With CA MAT, the address spaces can be selected on one of five different keywords provided next:

ASID

Specifies the address space ID.

When this option is used, the other four are ignored.

ASID is a length of 4, for example, 0473.

JOBNAME

Specifies the name of the address space.

This field can contain wildcard characters.

Max length: 8.

STEPNAME

Specifies the step currently executing.

This field can contain wildcard characters.

Max length: 8.

PROCSTEP

Indicates the current procedure step, if there are JCL procedures involved.

This field can contain wildcard characters.

Max length: 8.

PROGRAM

Specifies the name of the program at job step start.

Normally, this keyword is on the EXEC PGM=name JCL statement.

Max length: 8.

Because some of these options can contain wildcard characters, it is possible that multiple jobs might match the criteria at the same time. If this situation occurs, CA MAT will select the job with the lowest address space ID (ASID). If JOBNAME, STEPNAME, PROCSTEP, or PROGRAM is blank, none of those steps are considered when locating a matching job to measure.

Schedules can also be associated with the monitor but the schedule is not stored with the monitor profile. It exists only for the life of the measurement request.

This section provides the list of valid keywords for MONITOR INVOKE.

PROFILE

Specifies the name of the monitor profile to be used.

If no monitor profile exists with this name, one will be created.

The field cannot contain wildcard characters.

Length: 1-8 characters

Default: None

JOBNAME

Specifies the name of the address space to be measured.

If the ASID keyword is used, this keyword is ignored.

This field can contain wildcard characters.

Length: 1-8 characters

Default: None

STEPNAME

Specifies the name of the job step to be measured.

If the ASID keyword is used, this keyword is ignored.

This field can contain wildcard characters.

Length: 1-8 characters

Default: None

PROCSTEP

Specifies the name of the procedure-step to be measured.

If the ASID keyword is used, this keyword is ignored.

This field can contain wildcard characters.

Length: 1-8 characters

Default: None

PROGRAM

Specifies the name of the program at step-initiation time to be measured.

If the ASID keyword is used, this keyword is ignored.

This field can contain wildcard characters.

Length: 1-8 characters

Default: None

ASID

Specifies the absolute ASID of the job to be measured.

Length: 4 characters

Default: None

FROMUSER

Specifies the TSO User ID that receives any messages issued on behalf of the monitor request.

Length: 1-8 characters

Default: None

ELAPSTIME

Displays the monitor duration in seconds for which the observation process is active.

Normal duration is 60 seconds.

Do any of the following:

■ Specify the duration in seconds for which the observation process is active; the default value is 60 seconds. You can also specify minutes by appending an uppercase M to the numeral: 10M. Monitor duration must be a numeric value from 1 to 999997 (16,666 minutes).

This value is used to set the observation rate based on the number of observations requested.

■ Specify NA to request that the monitor collect a number of samples equal to the number of Observations Requested regardless of how many observations or how much time it takes to collect that number of samples.

The value NA may not be honored if CA MAT detects that we are monitoring a Websphere servant and the Websphere Application Server Criteria Expert Mode option is set to N.

Default: 60

SAMPLECNT

Specifies the number of observations requested.

Use this keyword with ELAPSTIME to set an initial observation rate.

Defaults cause CA MAT to observe the address space every 10 minutes.

Note: SAMPLECNT is being retained as a parameter for compatibility with other products.

Range: 10-999999

Default: 6000

DUMP

Directs CA MAT to take an SVC dump when the measurement session ends.

This field is for diagnostic purposes only; it does not require any operands.

Default: No operands

RECCNT

Specifies the number of job steps to measure.

You can start multiple measurement sessions with a single command by specifying RECCNT greater than 1, and by using wildcard characters on one of the job selection fields.

Range: 1-9999

Default: 1

SUCCNT

Specifies the number of times the same job step is successively measured.

When a measurement session ends, another starts immediately if the same job step is executing and the SUCCNT count has not been reached.

Range 1-9999

Default: 1

DESCRIPTION

Specifies the 24-character description that can be associated with the monitor profile.

If the profile already exists, this field updates its contents

Default: None

SCHEDULE

Specifies the name of the schedule.

For TUNCALL requests, this keyword is for documentation purposes only, and indicates the scheduling fields are to be used and validated

If the scheduling fields are nonblank and SCHEDULE is blank, the scheduling fields are ignored

Length: 1-8 characters

Default: None

MSTEP

Indicates that four job selection keywords (JOBNAME, STEPNAME, PROCSTEP, and PROGRAM) can be used to select all steps within the job to be measured.

Specify YES to monitor all steps in the job that match any Step/Procstep/Program criteria specified.

Default: NO

SMON

Specifies that the entire job step is to be measured.

If YES, ELAPSTIME is used as an estimate of the job step execution time to set the initialing observation rate only.

Default: NO

SAMPDELAY

Specifies the number of seconds CA MAT delays measuring the job after the job step starts.

This feature helps bypass measuring one-time events like housekeeping routes.

Range: 0-999.

Default: 0

INCTASK1-4

Indicates that 1 to 4 different tasks are measured within the job step.

Tasks are identified by the program name provided as part of the ATTACH macro.

This field can contain wildcard characters.

Length: 1 to 8 characters

Default: None

EXCTASK1-4

Indicates that 1 to 4 different task names are excluded from sampling.

Tasks are identified by the program name provided as part of the ATTACH macro.

This feature helps eliminate unwanted wait-time or active time that is not pertinent to the measurement.

Fields can contain wildcard characters.

Length: 1 to 8 characters

Default: None

TRAN1-4

Indicates that specific CICS or IMS transactions are measured.

If the transaction is not running, no sample is taken.

Fields can contain wildcard characters.

Length: 1 to 8 characters

Default: None

TERM1-4

Indicates the specific CICS or IMS terminal that is measured.

If there is no activity on the specified terminal, no sample is taken.

Fields can contain wildcard characters.

Length: 1 to 8 characters

Default: None

USERIS1-4

Indicates the specific CICS or IMS user IDs that are measured.

If the listed user IDs have no activity, no sample is taken.

Length: 1 to 8 characters

Default: None

DB2EXPL

Requests that the information regarding DB2 access path selection be obtained from DB2 SQL statements by issuing the EXPLAIN command and externalizing the data.

YES

Indicates that Explain data is collected for each dynamic SQL statement and all SQL statements in a DBRM package.

If DB2CTSQL (Obtain SQL from Catalog) is NO then it is forced to YES because it is necessary to access the DB2 Catalog to collect EXPLAIN data.

NO

Indicates that no DB2 Explain data is to be gathered.

The call for explain data is made while the address space is being measured.

EXPLAIN is performed for all static SQL found in the DBRM or package, as bound into the DB2 catalog.

Default: NO

DB2CTSQL

Determines whether or not CA MAT must extract the plan or package statements from the DB2 catalog or extract them directly from DB2 control blocks when monitoring a DB2 application.

YES

Collects the SQL data for each plan or package sampled or harvested from the DB2 catalog.

NO

Does not collect the SQL statement from the DB2 catalog.

If DB2EXPL has been set to YES then DB2CTSQL is forced to YES because it is necessary to access the DB2 Catalog to collect EXPLAIN data.

Default: NO

TASKLIB

Specifies the DD statement in the measured address space from where programs are loaded.

The libraries included in this DD statement are used to assist in CSECT-level resolution of program activity and wait time.

Length: 1 to 8 characters

Default: None

MONDSN

Specifies the name of the monitor data set or a monitor data set name pattern used to create a new monitor data set when the measurement starts.

Certain data set name node variables can be used to keep the name dynamic, such as &SYSTEM, &SYSDATE, or &SYSTIME.

For more information, see Monitor Data Set Name in the *Installation Guide.*

Default: User default

USEREXIT1-2

Specifies the name of a user exit that CA MAT calls during the measurement session

This exit is loaded into common storage and is called for each matching TCB in the address space for each observation made of the target job

Default: none

JOBCARD1-4

Specifies the job cards that are used when BATCHREPORTS is indicated and CA MAT submits the batch jobs to generate the batch reports at the end of a measurement session.

Length: 1 to 8 characters

Default: None

MONDSTRKS

Specifies the number of tracks CA MAT allocates as the monitor data set's primary space allocation.

Default: 20 tracks

MONDSSEC

Specifies the number of tracks CA MAT allocates as the monitor data set's secondary space allocation.

Default: 20 tracks

MONDSGEN

Specifies the device generic name where the data set is allocated.

Default: SYSDA

MONDSVOL

Specifies the optional volume-serial name where the data set resides.

Default: None

MONDCLAS

Specifies the name of an SMS Data construct for the monitor data set.

Default: None

MONMCLAS

Specifies the name of an SMS Management construct for the monitor data set.

Default: None

MONSCLAS

Specifies the name of an SMS Storage construct for the monitor data set.

Default: None

TARGSYS1-4

Specifies 1 to 4 names of matching sysplex images where the monitor request is sent.

These fields can contain wildcard characters.

If blank, the request is sent only to the local system.

Default: None

BATCH REPORTS

Sets CA MAT to submit a batch job to generate batch reports at the end of a measurement session.

Default: None

REPDSN

Specifies a data set name to receive the generated batch report

Do any of the following:

■ Leave this field blank to write the report to SYSOUT.

■ Specify.MONDSN to use the data set name of the monitor file.

A .BAT node will be appended to the monitor file name to create the file name.

Some truncation may occur if the resulting name is longer than 44 characters.

If the data set is not found, it is created.

Default: None

REPPTRKS

Specifies the number of tracks CA MAT allocates as the primary space allocation of the report data set.

Default: 20 tracks

REPSTRKS

Specifies the number of tracks CA MAT allocates as the secondary space allocation of the report data set.

Default: 20 tracks

REPUNIT SYSDA

Specifies the device generic name where the report data set is to be allocated.

Default: None

REPVOL

Specifies the optional volume-serial name where the report data set resides.

Default: None

REPDATA

Specifies the name of an SMS Data construct for the report data set.

Default: None

REPMGMT

Specifies the name of an SMS Management construct for the report data set.

Default: None

REPSTOR

Specifies the name of an SMS Storage construct for the report data set.

Default: None

Scheduling Fields

This section provides the list of keywords for scheduling fields:

STARTDATE

Defines the starting date for the schedule.

The value must be in CCYY/MM/DD format.

Default: none

ENDDATE

Specifies the ending date of the schedule.

The value must be in the format of CCYY/MM/DD.

This field is mutually exclusive with DAYS.

Default: none

DAYS

Specifies the number of days the schedule is active.

If the monitor session is still waiting at the end of the schedule, it is automatically terminated.

Range 1-999

Default: 1

WEEKDAYS

Specifies that the schedule checks are only for days that are part of weekdays.

This field is mutually exclusive with SPECIFICDAYS.

Default: no operands permitted.

WEEKENDS

Specifies that the schedule checks are only for days that are part of weekends.

This field is mutually exclusive with SPECIFICDAYS.

Default: no operands permitted.

SPECIFICDAYS

Specifies that the schedule is to be active only on specific dates.

One of the following days must be specified if SPECIFICDAYS is used: MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, or SUNDAY.

Default: No operands permitted.

MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, SUNDAY

Specifies the days of the week where the request is active (looking for a matching job).

If one or more of these are listed, SPECIFICDAYS must also have been specified.

Default: no operands permitted

STARTTIME1-4 and ENDTIME1-4

Displays up to 4 different panels within a day where the schedule panel is open for matching jobs.

Default: 0000 - 2359

GROUP

Specifies 1-8 character name assigned to the profile group.

Default: None

TRIGGER

Indicates whether a profile is a trigger.

Y means that monitor sessions is started for all profiles in the group when the trigger profile is started.

Default: NO

This section provides the list of keywords for websphere monitoring criteria:

WASEXPRT

Indicates the WebSphere Expert Mode.

Specify Y to collect normal PSW sample data when a WebSphere application is monitored.

Specify N to disable PSW sampling (CA MAT will only collect WebSphere samples).

Default: N

URLFILT1

Indicates the transaction URL filter pattern 1.

Specify filters for the application-level transaction URL names that you want to monitor (up to 72 bytes).

Use * as a wildcard.

You can specify several filters and separate each pattern with a comma.

Each URL filter field (1 through 4) will be concatenated together.

Any transaction not matching a filter pattern will not be monitored.

Default: None

URLFILT2

Indicates the transaction URL filter pattern 2.

Specify filters for the application-level transaction URL names that you want to monitor (up to 72 bytes).

Use * as a wildcard.

You can specify several filters and separate each pattern with a comma.

Each URL filter field (1 through 4) will be concatenated together.

Any transaction not matching a filter pattern will not be monitored.

Default: none

URLFILT3

Indicates the transaction URL filter pattern 3.

Specify filters for the application-level transaction URL names that you want to monitor (up to 72 bytes).

Use * as a wildcard.

You can specify several filters and separate each pattern with a comma.

Each URL filter field (1 through 4) can be concatenated together.

Any transaction not matching a filter pattern may not be monitored.

Default: None

URLFILT4

Indicates the transaction URL filter pattern 4.

Specify filters for the application-level transaction URL names that you want to monitor (up to 72 bytes).

Use * as a wildcard.

You can specify several filters and separate each pattern with a comma.

Each URL filter field (1 through 4) will be concatenated together.

Any transaction not matching a filter pattern will not be monitored.

Default: none

SYSFILT1

Indicates the system class filter pattern 1

Specify filters for any system class names that you do not want to monitor (up to 72 bytes).

Use * as a wildcard.

You can specify several filters and separate each pattern with a comma.

Any system class URL matching a filter will not be sampled.

These filters are used in conjunction with the Global system class filters that are defined in TRPARM member TUNWSC00.

Default: None

SYSFILT2

Indicates the system class filter pattern 2.

Specify filters for any system class names that you do not want to monitor (up to 72 bytes).

Use * as a wildcard.

You can specify several filters and separate each pattern with a comma.

Any system class URL matching a filter will not be sampled.

These filters are used in conjunction with the Global system class filters that are defined in TRPARM member TUNWSC00.

Default: None

SYSFILT3

Indicates the system class filter pattern 3.

Specify filters for any system class names that you do not want to monitor (up to 72 bytes).

Use * as a wildcard.

You can specify several filters and separate each pattern with a comma.

Any system class URL matching a filter will not be sampled.

These filters are used in conjunction with the Global system class filters that are defined in TRPARM member TUNWSC00.

Default: None

Example 1

This example shows a request that invokes a monitor for the job PROD01 where 6000 observations are to be made within 60 seconds. The output is to be sent to the monitor data set of 'CAMAT.&PROFILE.&SYSDATE.&SYSTIME'.

The variables within the monitor data set name are substituted at the time the monitor actually starts measuring the job. Because no profile name was specified, the profile name of PROD01 (the job name) is used.

The double quotation marks around monitor data set name ensures the single quotation marks around the monitor data set name are preserved. All messages are to be sent to the TSO user named PCNTL01.

```
MONITOR INVOKE -
   JOBNAME(PROD01) -
   SAMPLECNT(6000)
   ELAPSTIME(60) -
   MONDSN("'CAMAT.&PROFILE.&SYSDATE.&SYSDATE'") -
   FROMUSER(PCNTL01)
```

Example 2

This example shows a request that measures jobs in which the first four characters of the job name starts with PROD and in which the program names start with PAY.

This monitor has a schedule associated with the monitor request as well. This schedule, called PAYROLL, looks only for matching jobs on Monday nights starting at 11:00 PM until Tuesday morning at 3:00 AM and on Wednesday nights starting at 11:00 PM until Thursday morning at 3:00 AM.

The monitor data set name is to be set. Each measurement session is to last three minutes and will make 9000 observations. The schedule starts on the day the monitor is invoked and lasts for seven days.

```
MONITOR INVOKE -
    JOBNAME(PROD*) -
    PROGRAM(PAY*) -
    SAMPLECNT(9000) -
    ELAPSTIME(3M) -
    MONDSN("'CAMAT.&PROFILE.&SYSDATE.&SYSDATE'") -
    SCHEDULE(PAYROLL) - /* USED AS DOCUMENTATION */
    STARTDATE(&TODAY) -
    DAYS(7) -
    SPECIFICDAYS MONDAY WEDNESDAY -
    STARTTIME(2330) ENDTIME(0300)
```

MONITOR CANCEL

If you want to cancel a monitor that is currently measuring an address space or a monitor that is pending, you can do so with TUNCALL. When CA MAT queues up an invoked monitor request, a unique token number is assigned to the request. You can see the token number on the Monitor Status screen. TOKEN is the only required field.

This section provides a list of valid keywords for MONITOR CANCEL.

TOKEN

Specifies the CA MAT assigned request number for the pending or active monitor request.

Required field.

Default: none

PROFILE

Indicates the additional field to verify that the request pending or active monitor is the one to be stopped.

Default: none

MONDSN

Indicates the additional field to verify that the request pending or active monitor to be stopped is the desired one.

Default: none

TARGSYS1-4

Specifies the system where the request is to be stopped.

If a single monitor request is scheduled for multiple systems, they will all contain the same TOKEN number.

This keyword will permit you to cancel a monitor on a specific system within the sysplex.

If blank, the request is sent only to the local system.

Default: none

JOBNAME

Indicates the additional field to verify that the requestor has the authority to cancel this pending request or active monitor

Default: none

MONITOR STATUS

You can use TUNCALL to determine the status of a specific monitor. When CA MAT queues up an invoked monitor request, a unique token number is assigned to the request. You can see the token number on the Monitor Status screen. TOKEN is the only required field.

This section provides a list of valid keywords for MONITOR STATUS.

TOKEN

Specifies the CA MAT assigned request number for the pending or active monitor request (required field).

Default: none

PROFILE

Indicates the additional field to verify that the request pending or active monitor is the one to be stopped.

Default: none

MONDSN

Indicates the additional field to verify that the request pending or active monitor to be stopped is the desired one.

Default: none

TARGSYS1-4

Specifies the system from which the status is to be returned.

If blank, the status is returned only from the local system.

Default: none

Invoke a Monitor from a TSO Command, CLIST, or REXX EXEC

TUNCALL requests can also be made as normal TSO commands. The following example shows TUNCALL being executed as a TSO command from a REXX EXEC:

```
/* Rexx */
address TSO "TUNCALL CAMAT, MONITOR INVOKE PROFILE(PAYPROD1)"

 rc /= 0 then do

   say 'TUNCALLED FAILED'
   exit rc
end
```

Invoke TUNCALL from a Batch Job

You can execute TUNCALL from a batch job as shown in the following example:

```
//JOBNAME JOB (ACCT),'CALL CAMAT',CLASS=A,MSGCLASS=A
//*
//TUNCALL EXEC PGM=TUNCALL,
// PARM='CAMAT,MONITOR INVOKE PROFILE(PAYPROD1)'
```

This example writes the messages to the console and can process only a single request.

Route Message Output to a File

To route the output of the log to a file instead of the console and to specify more than a single TUNCALL request, use syntax shown in the following example:

```
//JOBNAME JOB (ACCT),'CALL CAMAT',CLASS=A,MSGCLASS=A
//*
//TUNCALL EXEC PGM=TUNCALL,
//TUNPRINT DD SYSOUT=*
//TUNIN DD*
 /* Monitor the next payroll job */
 MATUNER,MONITOR INVOKE PROFILE(PAYPROD1)
 MATUNER,MONITOR INVOKE PROFILE(ABC*) -
       FROMUSER(TEST1) -
       ELAPSTIME(90) SAMPLECNT (9000)
```

This example processes multiple requests and sends all messages and results to the TUNPRINT DD statement.

Invoke a Monitor from Within a Program

When invoking CA MAT as a called program, you must pass it the following parameter list:

Parameter	Value	Notes
Parameter 1	(+0)	Value must point to a fullword with an integer of 1. Value indicates the TUNCALL parameter list format.
Parameter 2	(+4)	This value is a pointer to the start of the command being processed. The command being sent to TUNCALL in this manner is a single buffer. No comments or continuation cards are allowed. Buffer can be up to 32K in size.
Parameter 3	(+8)	This value is the address of an integer fullword containing the length of the command buffer specified in parameter 2.
Parameter 4	(+12)	This value is the address of a 16 byte area where the token is to be returned for MONITOR INVOKE. Currently, only the first 4 bytes of the area is actually used.
Parameter 5	(+16)	This value is the address of 2 consecutive 112 byte fields that contain messages upon return from TUNCALL.
Parameter 6	(+20)	This value is the address of a fullword of storage that contains the return code passed back by the server as a response to the request. If TUNCALL ends with a return code of 16, this field should be examined further.
Parameter 7	(+24)	This value is the address of a fullword of storage to contain the reason code passed back by the server as a response to the request. If TUNCALL ends with a return code of 16, this field should be examined further.

Return and Reason Codes

All requests sent to CA MAT that use TUNCALL have two levels of responses. The first level is from TUNCALL and this return code represents any errors that occurred when sending the request to the server. This section provides a list of return codes.

Return Code	Description
0	TUNCALL execution was successful. The results of the STATUS command execution will be reflected in the Reason Code in Register 0 or the parameter list (see below).

Return Code	Description
4	Server was found but was inactive.
8	Server was not found or has never been started.
12	TNUCALL release did not match that of the server.
16	Request ended with a nonzero return code. The results of the command execution will be reflected in the Reason Code in Register 0 or the parameter list (see below).
24	User is not authorized to access the requested server.
28	Insufficient storage available to queue request to server.
32	Internal error occurred. Error code in Register 0 indicates the type of error. Provide this code when contacting Customer Support.
36	An abend occurred while processing request within the server.
40	Request was sent to the server, but has timed out.

If the request has been successfully sent to the server, and the request was completed with a nonzero return code, TUNCALL ends by issuing a return code of 16. This response indicates that the return code field provided in the parameter list was not zero.

In general, if TUNCALL returns anything other than a 16 in Register 15, you do not need to examine the reason code in Register 0, or the return and reason code fields that are provided in the parameter list. However, the STATUS command will return a 0 in Register 15, and the status will be indicated by a reason code in register 0 and in the reason code field in the parameter list. If TUNCALL ends with register 15 containing 16, the return code and reason code fields provided in the parameter list indicate the reason for the failure.

This section provides a complete list of command return and reason codes.

Return Code	Reason Code	MONITOR Command	Description
0	0	INVOKE	Command successful. Monitor Token is provided in R0 and in messages when TUNCALL is invoked with a TSO command, CLIST, Rexx Exec, or batch job. Monitor Token is provided in R0 and return area pointed to by parameter 4 when TUNCALL is invoked from within a program.
0	0	CANCEL	Command successful. Monitor is cancelled.

Return Code	Reason Code	MONITOR Command	Description
0	0	STATUS	Monitor is waiting.
0	4	STATUS	Monitor is active.
0	8	STATUS	Monitor is inactive.
0	12	STATUS	Monitor was cancelled.
0	16	STATUS	Monitor has completed.
0	>16	STATUS	Monitor was not found.
16	4	INVOKE	Duplicate monitor already exists.
16	8	CANCEL	Matching monitor was not found.
16	12	INVOKE	Maximum number of queued or active monitor requests have been reached. This value is set in the TUNSSPxx member with the MAXREQ keyword.
16	16	All	The user's UIF (User Information File) could not be allocated or opened by the server. A message with additional information is sent to the user by way of TPUT if this condition is raised.
16	32	All	Syntax error was detected. The message areas pointed to by the parameter list contain detailed information on the nature of the syntax error.
16	Not listed above	All	A general failure of TUNCALL occurred. Review the messages returned in the message areas that are provided for detailed information regarding the failure.
24	NA	All	The user is not permitted access to the function requested.
28	NA	All	The server did not have enough storage to process request.
32	NA	All	An internal error occurred. For more information, review messages that are provided in the areas passed in the parameter list.
36	NA	All	An abend occurred while processing a request. A small indicative dump is provided by CA MAT. This indicative dump is written out to SYSLOG.
52	NA	All	When sending the request to a specific system within the sysplex, no matching systems were found.
56	NA	All	The request was queued when the system was being shut down and the request is not honored.

Assembler Example:

The following figure shows an example of TUNCALL being used from assembler coding.

```
...
LA       R14,=F'1'              Parameter List Type
LA       R15,CMD         Point to command.
LA       R0,CMDL         Point to command length.
LA       R1,RETOKEN              Point to area to receive token.
LA       R2,MSGS         Point to message areas.
LA       R3,OIRC         Point to return code area.
LA       R4,OIRS         Point to reason code area.
STM      R14,R4,PLIST    Save parameter list.
OI       PLIST+24,X'80'  Mark end of Parameter list.
LA       R1,PLIST        Point to start.
LINK     EP=TUNCALL      Invoke TUNCALL.
LTR      R15,R15         Worked ok?
BZ       CONT1           Yes, no need to check further.
CH       R15,=H'16'      Request accepted by CA MAT?
BE       REQFAIL         Yes, see why it failed in server.
         Request did not make it to Server.  Indicate why.
         Check return code in R15.


B        CONT2


         Request went to server but failed. Determine why.
REQFAIL DC       0H'0'


         MVC     WTOL+4(112),MSG1   Copy message one to WTO area
         WTO   mf=(E,WTOL)          Issue message in return area 1.
         MVC     WTOL+4(112),MSG2   Copy message two to WTO area.
         WTO   mf=(E,WTOL)          Issue message in return area 2.
         B       CONT2              Continue processing.
CMD              DC      C'MONITOR INVOKE PROFILE(PAYPROD)'
CMDL             DC      A(L'CMD)
RETOKEN DC       CL16' '
MSGS             DC      0CL224' '
MSG1             DC      CL112' '
MSG2             DC      CL112' '
OIRC             DC      F'0'
OIRS             DC      F'0'
PLIST            DC      7A(0)
WTOL    WTO     '                                      ',MF=L
...
```

Chapter 8: Generating Batch Reports

This chapter explains how to set up and generate batch reports. These reports contain information similar to that in the Interactive Analysis panels. You can generate batch reports automatically each time you invoke a monitor, or anytime after a monitor has collected data.

This chapter also contains information about how to use the Spreadsheet Converter.

This section contains the following topics:

Generate Batch Reports Automatically

You can generate batch reports automatically each time you invoke a monitor definition.

1. In the Profile Parameters panel, specify Y in the Batch Reports field.

2. Set up a batch report definition for the job, as described in Set up a Batch Report Definition.

   You can override the batch reports setting for a specific monitor definition by specifying YES or NO on the Monitor Criteria panel.

   If you issue the Stop line command against a monitor request, the batch reports are not generated.

Submit a Job to Generate Batch Reports

You can generate batch reports any time after you invoke the monitor and data collection has been completed.

Follow these steps:

1. Type B in the LC field next to the profile for the job in the Monitor Definition panel.

2. Press Enter.

   The Batch Report panel displays.

3. Set up a batch report definition for the job, as described in Set up a batch report definition.

4. Submit the job using one of the following ways:

    ■   On the command line, type SUBmit.

        A message appears indicating that the job has been submitted.

    ■   On the Command line, type EDIt.

        An ISPF Edit panel displays with the generated JCL for the batch reports. Make any further changes, then use the ISPF SUBmit command to submit the changed JCL.

        The changed JCL will be retained in a work data set that you can use outside of CA MAT as a model for future reports. You cannot save this changed JCL within CA MAT.

        Press END when done. You return to the Batch Reports panel.

5. Press End to return to the Monitor Definition panel.

Set up a Batch Report Definition

You can use the Batch Report panel for a job at any time. The default values for batch reports can be set globally (see the *Installation Guide*). Global defaults can be changed for each user through the Profile Parameters panel.

1. Type B next to the profile name of the job for which you want to generate batch reports, from the Monitor Definition panel.

2. Press Enter.

    The Batch Report panel displays.

```
CA MAT ----------------------- Batch Report ----------------------------
                                                       Profile: TUNCIC
                                                               More:
 Output Data Set Options  (scroll down for allocation parameters)

 Report Dataset Name  ==>
                            (Blank for SYSOUT, Dataset name, or .MONDSN)
   CSV Dataset Name  ==> 'MATUSER.TUNCIC.CSV'
                            (Blank for default, .TEMP or .MONDSN)


 Job Cards    (scroll down for JES Parameters)
 ==> //JOBNAME   JOB (ACCT),'TUNBATCH',CLASS=Q,
 ==> //          MSGLEVEL=1,MSGCLASS=X
 ==> //*
 ==> //*TUNJCL JCLLIB ORDER=CAMAT.V85.UTRSAMP


 Report Title  ==>

 Report Thresholds (Minimum percentages for Summary and detail reports)
   Active Threshold   ==> 5    (CPU activity for Summary and Delay Details)
   Wait Threshold     ==> 10   (Wait activity for Summary and Delay Details)
   Detail Threshold   ==> 1    (Total activity for Summary and Detail reports)
   Transact Threshold ==> 10   (Transaction activity for Summary report)


 Reporting options
   Analysis Mode    ==> NORMAL      Analysis Summary  ==> Y
   Monitor History  ==> Y           DelayView         ==> Y
   CodeView         ==> Y           DataView          ==> Y
   TaskView         ==> Y           TranView          ==> Y
   ModView          ==> Y           PoolView          ==> Y
   USSView          ==> Y


 Subsystem Details
   DB2View          ==> Y           IMS Transactions  ==> Y
   JVM Information   ==> Y           WebSphere         ==> Y


 Options for DelayView
   Delay details    ==> ON
```

```
Options for CodeView
    Threshold        ===> 1              CodeView mode
    All or top 5     ===> Y              Csect   ===> Y
    Histogram Csect 1 ===>               Module  ===> N
    Histogram Csect 2 ===>               Pseudo  ===> N
    Histogram Csect 3 ===>               4GL     ===> Y
    Histogram Csect 4 ===>

Options for DataView
    Linklist         ===> N     DB2 Code Detail   ===> Y

  Options for TranView
    Code Detail      ===> Y              Delay Detail    ===> N
    Data Detail      ===> ALL
    Transaction 1    ===> *              Transaction 2   ===>
    Transaction 3    ===>                Transaction 4   ===>

  Options for TaskView
    Task  1          ===> *              Task 2          ===>
    Task  3          ===>                Task 4          ===>

  Report Scope
    Report Detail    ===> Y    (Y for full report, N to omit detail
eports)
    Field Detail     ===> Y    (Y for full report, N to omit trivial
ields)

  JES Parameters
    Lines per page   ===> 66             Sysout class    ===> *
    Column width     ===> 132            Sysout form     ===>
    JES writer-name  ===>
    Destination      ===>

 Dataset Allocation Parameters  (for report datasets and CSV files)
     Tracks: Primary ===> 15             Secondary       ===> 15

        Volume Serial ===>         or   Storage Class    ===>
               Unit  ===> SYSALLDA       Data Class       ===>
                                         Management Class ===>
Scroll UP or DOWN for more options. Enter SUBmit to submit a batch job, EDIt
to edit the batch job before submitting, press END to exit and save changes,
or enter CANCEL to exit without saving.
```

3.   Specify the report title, report format, output destination, and the reports that you want to include.

The fields in the Report Definition panel are described next.

Output Data Set Options

Save the output file for the Batch Reports in CSV format.

Job Cards

Modify the default ISPF job card as needed.

Note that you can use the JCL ORDER statement to specify the library from which the batch programs are fetched, as shown in the panel Bach Report panel: top portion.

Report Title

Specify a unique title to appear at the top of each page of the report.

Report Dataset Name

Specify a data set name to receive the generated batch report.

Leave this field blank to write the report to SYSOUT.

Specify .MONDSN to use the data set name of the monitor file. A .BAT node will be appended to the monitor file name to create the file name. Some truncation may occur if the resulting name is longer than 44 characters. If the data set is not found, it will be created.

Reporting Thresholds

Active Threshold

Specify the minimum percentage of CPU activity for Summary and Detail reports (default is 5).

Wait Threshold

Specify the minimum percentage of wait activity for Summary and Detail reports (default is 10).

Detail Threshold

Specify the minimum percentage of combined CPU and wait activity for Summary and Detail reports (default is 1).

Transact Threshold

Specify the minimum percentage of transaction activity for Summary reports (default is 10).

Reporting Options

Analysis Mode

Specify one of the following values:

- **NORMAL:** Information that is not directly related to the target application is eliminated; data is reported as follows:

  - Samples related to delay categories such as Waiting for CPU, LPAR delay, and Swap delay are omitted from reports.

  - DelayView, TimeView, DataView, and ModView show all relevant delays for the application. All relevant samples, both active and wait, are reported.

  - CodeView and related histograms report only active samples to emphasize the most CPU-intensive portions of the program code. Wait samples, which can mask this activity, are not included.

- **ALL**: The results of the analysis reflect all samples that were obtained during the monitor period.

- **ACTIVE:** The results of the analysis reflect only those samples in which the program was actively using CPU.

- **WAIT:** The results of the analysis reflect only those samples in which the program was in a wait state.

Analysis Summary

Specify Y (default) to include the Analysis Summary report in the Batch Reports.

This report shows the highest delay causes, and therefore the programs and resources that might best benefit from tuning, in one report.

Monitor History

Specify **Y** (default) to generate the batch history report.

Specify **N** for no report.

DelayView

Specify Y (default) to generate a DelayView report.

Specify N for no DelayView report.

CodeView

Specify Y (default) to generate a CodeView report.

Specify N for no CodeView report.

DataView

Specify Y (default) to generate a DataView report.

Specify N for no DataView report.

TaskView

Specify Y (default) to generate a TaskView report.

Specify N for no TaskView report.

TranView

Specify Y to generate a TranView report.

Specify N (default) for no TranView report.

ModView

Specify Y (default) to generate a ModView report.

Specify N for no ModView report.

PoolView

Specify Y to generate a PoolView report.

Specify N (default) for no PoolView report.

USSView

Specify Y to generate a USSView report.

Specify N (default) for no USSView report.

Subsystem Details

DB2View

Specify Y to generate a DB2® Subsystem report.

Specify N for no DB2 Subsystem report.

IMS Transactions

Specify Y to generate a IMS Subsystem report.

Specify N for no IMS Subsystem report.

JVM Information

Specify Y to generate a JVM Subsystem report.

Specify N for no JVM Subsystem report.

WebSphere

Specify Y to generate a WebSphere Application Server report.

Specify N for no WebSphere Application Server report.

Options for DelayView

Detail

Specify ON if you want the DelayView report to contain detailed information about the delay causes.

Specify OFF if you want the DelayView report to contain only high-level information about delay causes (default is ON).

Options for CodeView

Threshold

Specify the threshold value (0 to100) for CodeView.

Modules or CSECTs that have a total activity percentage below this value are not included in the batch CodeView report (CSECT and Module modes only). The sum total of all activity below the threshold is included as Module/CSECT **N/A**. Specify a threshold of 0 (zero) to include all modules or CSECTs. The default is 1 (1%).

All-User-Top 5

You can specify one of the following choices:

■ Specify the threshold value (0 to100) for CodeView.

Modules or CSECTs that have a total activity percentage below this value are not included in the batch CodeView report (CSECT and Module modes only). The sum total of all activity below the threshold is included as Module/CSECTs **N/A**. Specify a threshold of 0 (zero) to include all modules or CSECTs. The default is 1 (1%).

■ Specify Y to create histograms for the five CSECTs showing the greatest activity or delay in CodeView.

■ CSECTs with total activity below the CodeView Detail Threshold are omitted.

■ Specify A to create histograms for all CSECTs reported by CodeView.

■ Specify **U** to create histograms for User CSECTs only (only those CSECTs which do NOT have an associated base-level CSECT description).

■ Specify N to suppress generation of histograms.

CSECT histograms are produced in order of descending activity. Histograms are not produced for CSECT that show no activity.

CodeView mode

Specify the mode for CodeView batch reports.

Possible modes are CSECT, MODULE, PSEUDO, or 4GL. The default is CSECT. For more information, see "Interactive analysis option 3 - CodeView."

Histogram CSECT 1 - Histogram CSECT 4

Specify up to four CSECT names for which you want to create histograms.

To suppress the generation of histograms for certain classes of CSECTs, you can specify the leading characters of the CSECTs to exclude. In the Options for CodeView section, the four Histogram CSECT fields have been updated to allow the user to exclude CSECTs, as follows:

■ Enter the NOT character '' (SHIFT+6), followed by the initial characters of the Csect names that you want to exclude.

As an example, IBM® will exclude any CSECTs that begin with IBM (such as IBMRBGK1).

■ If the 'TOP 5' option is selected, excluded CSECTs will not be counted as part of the five CSECTs.

■ Do not use any wildcard characters ('*','#'). You can use as many characters as needed.

■ Excluded CSECTS can be specified in the Profile Parameters panel (Option 0), to be used for all new batch reports (existing profiles will need to be updated separately).

Options for DataView

Linklist

Specify Y to include the names of the LINKLIST libraries for your installation as part of the DataView report

Specify N (default) for no LINKLIST information

DB2 Code Detail

Specify Y (default) to generate the DB2 Code Detail report

Specify N for no report

Options for TranView

Code Detail

Specify Y to generate the batch report

Specify N (default) for no report

Delay Detail

Specify Y to generate the batch report

Specify N (default) for no report

Data Detail

Specify the transactions on the TranView panel that will have a link to the DataView Detail panel, if data set information is available for that transaction

Specify Y (yes) for the top five transactions, N for none, or ALL for all transactions that have data set information.

Transaction 1 – Transaction 4

Select up to four specific transactions to appear in the following reports:

- CodeView (including histograms)

- DelayView

- TaskView

- TranView

This field supports the use of wildcard characters. See the section on Wildcard Characters for a list of valid wildcards. If you want all transactions to appear, specify an asterisk (*) in this field. Asterisk is the default.

Options for TaskView

Task 1 – Task 4

Select up to four specific tasks to appear in the following reports:

- CodeView (including histograms)

■ DelayView

■ TaskView

■ TranView

This field supports the use of wildcard characters. See the section on Wildcard Characters for a list of valid wildcards. If you want all tasks to appear, specify an asterisk (*) in this field. Asterisk is the default.

Options for Report Scope

Report Detail

Specify the overall level of detail that is included in the Batch Report

Specify Y to include all reports. To omit the Delay Distribution, Delay Detail, and Code Detail reports, specify N. The default is Y.

Field Detail

Specify the field-level of detail that is included in the DataView and ModView reports

Specify Y to include all fields. To omit the noncritical fields, specify N. The default is Y.

JES Parameters

Lines per page

Specify the number of lines on each page of the batch report (the default is 66).

Sysout class

Specify an output destination for the batch reports (default is an asterisk (*))

The asterisk (*) ensures that CA MAT generated reports use the same SYSOUT class as the job card.

Column width

Specify the width of the batch reports.

The default is to 132.

Sysout form

Specify a one- to four-character form name for the destination to which the report is written.

JES writer-name

Specify a program name as part of the SYSOUT definition that JES uses to process the data set.

Some SYSOUT management products use the writer-name as routing information instead of using an actual program name.

Destination

Specify the one- to eight-character node name of the JES destination.

In addition, you can specify a one- to eight-character user ID to which the SYSOUT report is written. If you specify a user ID, it must follow the node name and must be separated from the node name with a period.

The following panel shows the Analysis Summary Report that is created by CA MAT when you specify Y on the Batch Report panel.

```
*-------------------------------> SUMMARY <-------------------------------*
TRANSACTION INFORMATION *************************************************
   (TRANSACTIONS ACCOUNTING FOR OVER 10.00% OF ACTIVITY)

  TRANSACTION #TRANS TOT CPU  AVG CPU  ACTV% WAIT% TOTL% VISUAL
  ----------- ------ -------- -------- ----- ----- ----- ----------
       Q904     4361 33.60984  0.00771 37.06 30.06 67.12 ====>
       M710      544  8.92706  0.01641  2.71 14.58 17.30 >

DB2 DELAYS ****************************************************************
  (REPRESENTING 59.33% OF TOTAL DELAYS)

  COLLECTION PACKAGE  STMT   TYPE      ACTV%  WAIT%  TOTL%  VISUAL
  ---------- -------- ------ -------- ------ ------ ------ ----------
    BWOQACO  QX2CBWI1 5731   SELECT    16.43   0.60  17.02 >
    BWOBGCO  BG2C7060 4928   FETCH      3.21   0.03   3.25
    BWOBGCO  BG2CB401 2909   SELECT     0.03   3.19   3.22
    BWOBGCO  BG2CB401 3322   SELECT     0.00   3.21   3.21
    BWOMCCO  MC7C8500 15688  SELECT     0.00   3.05   3.05
    BWOBGCO  BG7C5730 20305  INSERT     0.04   2.28   2.32
    BWOMCCO  MC7C8000 10789  UPDATE     0.00   1.80   1.80
    BWOBGCO  BG7C5730 21287  INSERT     0.01   1.11   1.12
    BWOBGCO  BG2CB401 3047   SELECT     0.00   1.11   1.11

PROGRAM ACTIVE DELAYS ****************************************************
  (REPRESENTING 23.10% OF TOTAL DELAYS)

  MODULE   CSECT    OFFSET   STMT   TOTAL%   CSECT DESCRIPTION
  -------- -------- -------- ------ -------  -----------------
  DFHD2EX3 DFHD2EX3 000003B8          11.37  CICS-DB2 SUBTASK PROGRAM
  DFHSIP   DFHDSDS3 00000940           8.95  DS DOMAIN - MAIN DISPATCH LOOP

IO WAIT DELAYS ***********************************************************
  (REPRESENTING 0.74% OF TOTAL DELAYS)

  MODULE   CSECT    OFFSET   STMT   TOTAL%   CSECT DESCRIPTION
  -------- -------- -------- ------ -------  -----------------
  DFHSIP   DFHDSDS3 000010F6           1.26  DS DOMAIN - MAIN DISPATCH LOOP
*************************** END OF SUMMARY REPORT **************************
```

Create Spreadsheet Reports

This section describes how to use the Spreadsheet Converter (for Microsoft Excel 2007) to export data from the Interactive Analysis panels into Microsoft Excel spreadsheets.

After you have converted the data to Microsoft Excel spreadsheets, you can use the functions within Microsoft Excel to create reports, graphs, and otherwise manipulate your data. For information about using Microsoft Excel, refer to your Microsoft Excel documentation.

The Spreadsheet Converter for Microsoft Excel supports different number formats, as defined by the Windows Regional Settings control panel. The numbers displayed will conform to the regional setting (example - use comma as the decimal point).

This following sections are included:

- Installing the spreadsheet converter for Microsoft Excel 2007
- Generating spreadsheet reports
- Maintenance and support

Install the Spreadsheet Converter for Microsoft Excel 2007

To use the Spreadsheet Converter, you must first download and install the Spreadsheet Converter Add-In. Once installed, you can use simple menu commands to import the monitor data into Microsoft Excel spreadsheets.

This section describes how to install the Spreadsheet Converter Add-In and how to remove it:

- Download the Spreadsheet Converter for Microsoft Ex
- Install the Spreadsheet Converter Add-In
- Removing the Add-In

Download the Spreadsheet Converter for Microsoft Excel 2007

The Spreadsheet Converter Add-In is delivered with CA MAT as a member (TUNSSC) in *hilevel*.CEESDATA. You need to download the Excel Add-In to your PC.

Follow these steps:

1. Create a folder on your PC to be used for storing the spreadsheet converter and the converted reports.

2. Transfer the TUNSCC member of data set *hilevel*.CEESDATA to your PC by using a file transfer program such as IND$FILE.

   To verify that Microsoft Excel read the file, you must first transfer the file in BINARY format with NO CRLF codes, and then use the XLA file extension when naming the new file.

3. Name the new file on your PC:

TUNSSC.XLA

Install the Spreadsheet Converter Add-In

After the Spreadsheet Converter Add-In is downloaded to your PC, it must be installed. See your Microsoft Excel documentation for information, if necessary.

1. Open Microsoft Excel (Office 2007 or later).

2. Click the Office Button in the upper-left corner of the screen.

3. Cick Excel Options on the bottom of the drop-down list.

The Excel Options dialog opens.

4. Click the Add-Ins menu item in the left pane.

The View and manage Microsoft Office add-ins dialog displays in the right pane.

5. Click the Manage drop-down list at the bottom of the pane, highlight Excel Add-Ins, and click Go.

The Add-Ins dialog opens.

6. Click Browse and navigate to the directory where you installed the Spreadsheet Converter Add-In, and select TUNSSC.XLA.

7. Click OK.

The CA MAT Spreadsheet Converter is included in the list of Add-Ins .
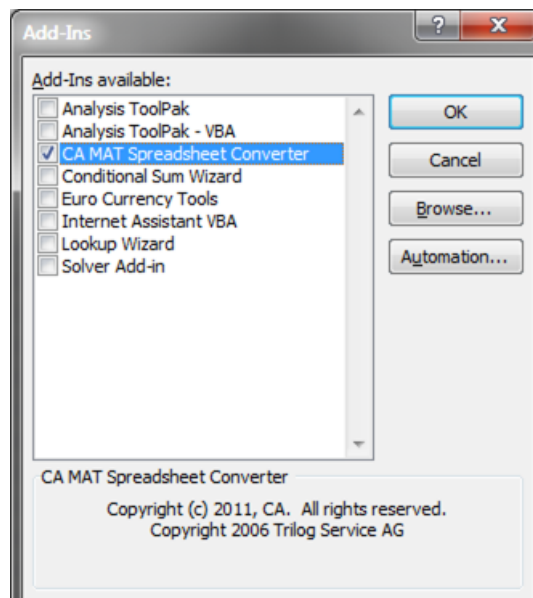
8. Click OK.

    The Add-Ins selection is included on the menu bar.
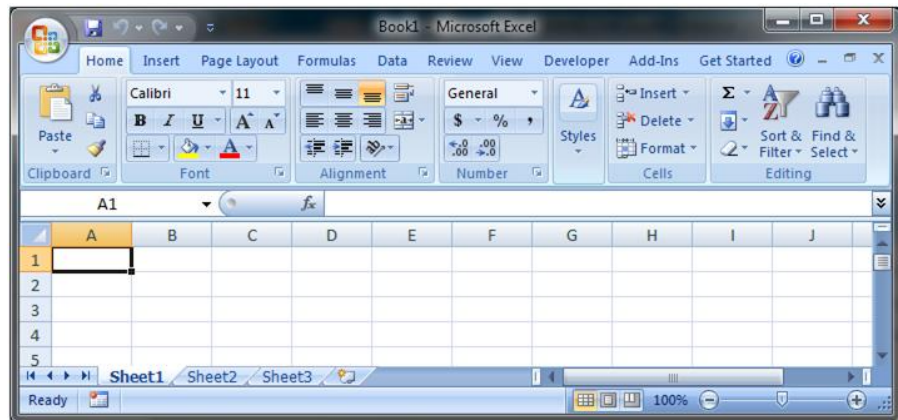
9. Click the Add-Ins menu item.

    The CA MAT custom command item opens.
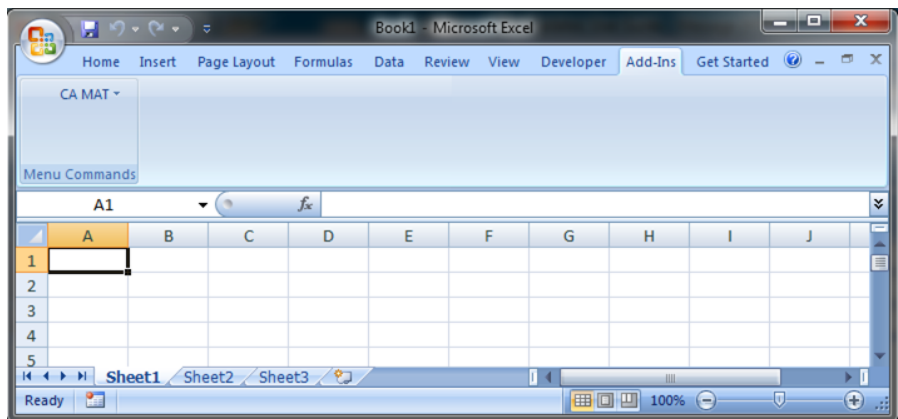
Remove the Add-In

To remove the Spreadsheet Converter Add-In

1. Click the Office Button in the upper left corner of the screen.

2. Click the Excel Options button on the bottom of the drop-down list.

3. Click the Add-Ins menu item in the left pane on the Excel Options panel.

    The View and manage Microsoft Office add-ins displays in the right pane.

4. Click the Manage drop-down list at the bottom of the pane, highlight Excel Add-Ins, and click Go.

5. Uncheck the Spreadsheet Converter entry on the Add-Ins dialog, and click OK.

6. Click the Add-Ins item on the menu bar.

7. Right click the custom command item.

    The sub menu opens.

8. Click the Delete Custom Command item.

9. In the Delete Custom Command confirmation dialog, click YES.

    If CA MAT was the only add-in, the Add-Ins menu item disappears from the menu bar.

    The Spreadsheet Converted Add-In remains in the directory where you installed it, and on the Add-in selection list.

    To re-install, see Install the Spreadsheet Converter for Microsoft Excel 2007.

Generate Spreadsheet Reports

Using the Spreadsheet Converter, you can upload data into Microsoft Excel and generate a set of basic reports. Using the functions within Microsoft Excel, you can also modify these basic reports, or create new ones by using the data.

Export Monitor Data

You can export data from the Monitor Definition panel, the Monitor History panel, or the External Data Set List panel.

Follow these steps:

1. Issue the V (CSV Export) line command for the monitor profile that you want to export.

    The CSV Reporting panel displays. The CSV options are identical to the Batch options.

2. Select the Data Set and Reporting options that you want to export.

3. Issue the SUBmit command.

    The data is exported to the specified data set.

4. Transfer the data set to your PC in ASCII format (text) using a file transfer program.

    It is recommended that you create a special folder to contain your data.

```
CA MAT ----------------------- CSV Reporting ------------------------------
COMMAND ==>
                                                      Profile: AAAAA
                                                            More:    +
 Output Data Set Options
      Data set name  ==> 'BMVJJM.BMVJJM4.AAAAA.CSV'
                          (Blank for default, or .MONDSN)
     Tracks Primary  ==> 15              Secondary       ==> 15

      Volume Serial  ==>          or    Storage Class    ==>
              Unit   ==> SYSALLDA        Data Class       ==>
                                         Management Class ==>
 Job Cards
 ==> //JOBNAME  JOB (ACCT),'CAMAT BATCH REPORT',
 ==> //  CLASS=A,MSGCLASS=A,NOTIFY=&SYSUID
 ==> //*
 ==> //*TUNJCL JCLLIB ORDER=CAMAT.JCL.LIBRARY

 Report Title  ==> CAMAT ANALYSIS

 Report Thresholds (Minimum percentages for Summary and detail reports)
    Active Threshold  ==>  5.00 (CPU activity for Summary and Delay Details)
      Wait Threshold  ==> 10.00 (Wait activity for Summary and Delay Details)
    Detail Threshold  ==>  1.00 (Total activity for Summary and Detail reports)
 Transact Threshold  ==> 10.00 (Transaction activity for Summary report)

 Reporting options
    Analysis Mode       ==> NORMAL       Analysis Summary  ==> Y
    Monitor History     ==> Y            DelayView         ==> Y
    CodeView            ==> Y            DataView          ==> Y
    TaskView            ==> Y            TranView          ==> Y
    ModView             ==> Y            PoolView          ==> Y
    USSView             ==> Y

 Subsystem Details
    DB2View             ==> Y            IMS Transactions  ==> Y
    JVM Information     ==> Y            WebSphere         ==> Y

 Options for DelayView
 Delay details      ==> ON

 Options for CodeView
    Threshold          ==> 1.0          CodeView mode
    All-User-Top5      ==> Y             Csect  ==> Y
    Histogram Csect 1 ==>                Module ==> N
    Histogram Csect 2 ==>                Pseudo ==> N
    Histogram Csect 3 ==>                  4GL  ==> Y
    Histogram Csect 4 ==>
```

```
Options for DataView
   Linklist          ==> Y      DB2 Code Detail   ==> Y

Options for TranView
   Code Detail       ==> N                Delay Detail      ==> N
   Data Detail       ==> N
   Transaction 1     ==> *                Transaction 2     ==>
   Transaction 3     ==>                  Transaction 4     ==>

Options for TaskView
   Task  1           ==> *                Task 2            ==>
   Task  3           ==>                  Task 4            ==>
```

Create Reports

To create reports with the Spreadsheet Converter Add-In

1. Open Microsoft Excel (Office 2007 or later).

2. Click the Add-Ins menu item in the menu bar.

3. Click the menu command.

4. In the drop-down list, click Convert CA MAT Reports.

5. Navigate to the directory where you stored the downloaded CSV file and select it.

6. Click OK.

    The data is loaded, and you see the Conversion Log, which lists the reports generated, and any errors encountered.
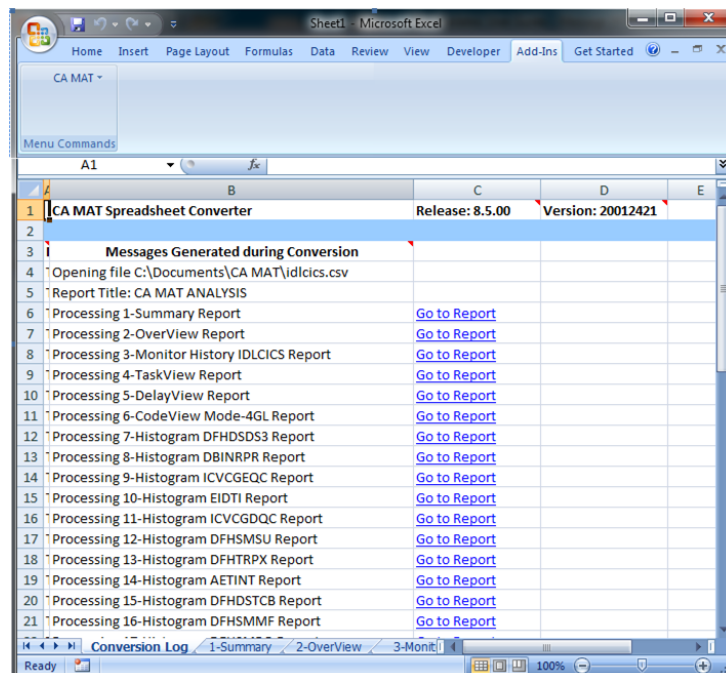
Maintenance and Support

Because the Spreadsheet converter is distributed as a mainframe file, it is maintained by using standard SMP/E tools.

Maintenance

Updates to the spreadsheet converter are distributed by way of PTF maintenance. The instructions for applying the SMP/E PTFs are in the "Installing Maintenance" section of the *Installation Guide*.

Whenever a spreadsheet converter PTF is received, the HOLDDATA file will alert you that an updated version needs to be downloaded. Use the same procedures for downloading as described in Install the Spreadsheet Converter for Microsoft Excel 2000.

Customer Support

For incidents with the spreadsheet converter, Customer Support personnel need a copy of the reports. Because the report and spreadsheet files reside on your PC, you should be able to send them as an attachment to an email message, or place them on the FTP server.

Chapter 9: Tuning Your Applications

CA MAT measures delays incurred by an application program, both from outside sources and within the program's own code. CA MAT panels provide information about a variety of delay types. The best place to start looking for delays is with DelayView. With DelayView, you can see which types of operations were executed and how much elapsed time was spent in each operation type.

This section contains the following topics:

Overview of Delay Categories

In CA MAT, autonavigation enables you to go directly from a delay category to a more detailed panel that provides relevant information about the delay. This section presents an overview of delay types, with recommendations about how to use CA MAT to find out more about why your job is experiencing a delay.

Program Active

The program or one of its subroutines is in control of a CPU.

Place your cursor anywhere on the line and press Enter, or select Option 3 to see which modules have the highest CPU usage.

Voluntary Wait

The program has voluntarily relinquished control of a CPU.

Use the Address line command (A) to determine the delay locations within your application.

Abend Procedure Delay

A component of the application is terminating abnormally or gathering diagnostic information for a problem.

Use the Address line command (A) to determine where the program invoked the abend procedures.

Data Delay

The program is waiting for data to be returned.

Place your cursor anywhere on the line and press Enter, or select Option 5 to see which files caused the greatest delay.

Resource Conflict

The program is delayed because another program has exclusive use of a required resource, such as a file or program.

Use the Address line command (A) to determine which modules spent time waiting for resources.

System Active

The program is using operating system functions, such as storage administration or system security.

Place your cursor anywhere on the line and press Enter, or select Option 3 to see which modules have the highest CPU usage.

File Management Delay

The program is delayed by a file management operation such as locating or opening a file.

Use the Address line command (A) to determine which modules spent time waiting for file management activities.

Program Load Delay

The program is delayed by the operating system while it performs program management functions.

Program management includes locating a program on DASD, obtaining storage, reading the program, or converting the relative addressing information into absolute addresses. Use the Address line command (A) to determine which modules spent time waiting for program load activity.

DASD Management Delay

The program is delayed because of a DASD file management function that is not part of normal file management.

Use the Address line command (A) to determine which modules spent time waiting for DASD management functions.

CICS Delays

The CICS subsystem delays are divided into the following categories:

■ CICS System Delay

■ CICS TransData

■ CICS StorCtl Delay

■ CICS TaskCtl Delay

■ CICS FileCtl Delay

■ CICS JourCtl Delay

■ CICS TempStor Delay

■ CICS ProgCtl Delay

■ CICS TermCtl Delay

■ CICS DL/I Delay

Other Delays

The program is delayed for a reason not listed in this section.

These delays can be related to paging, swapping, nondispatching, or other reasons.

Program Active Delays

This section describes the various types of program active delays, and the possible reasons for them.

Algorithms

An algorithm in the program or one of its subroutines is using CPU time.

High Level Language options

High overhead compiler options, such as DEBUG or TRACE were specified.

Data definitions and conversion

High-level languages can use significant CPU time to convert numeric data intended for display to a format that can be used in computation, such as a subscript, that accesses table entries defined in the program or one of its subroutines.

Voluntary Wait Delays

This section describes the various types of voluntary wait delays, and the possible reasons for them.

Wait for intertask function

The program or one of its subroutines is waiting for another task or address space to present information or is waiting to receive a work request.

Calls to database system other than IMS, DB2, Adabas, NATURAL or CA Datacom

Indicates one of the following reasons:

The program or one of its subroutines is requesting data from a database of which CA MAT has no internal knowledge

The delay is reported but not attributed to a specific database system.

Wait/Waitr SVC

Performance of the active task cannot continue until one or more specific events have occurred.

Abend Procedure Delays

This section describes the various types of abend procedure delays, and the possible reasons for them.

Too many SNAP dumps

The process of taking SNAP dumps is taking a significant amount of processing time.

Reduce the number of SNAP dumps to decrease overall processing time.

Program using abend processing

A program or one of its subroutines is using z/OS abend services to process invalid data.

You should use means other than z/OS abend services to eliminate or reduce abend processing time.

Data Delays

This section describes the various types of data delays, and the possible reasons for them.

Placement of data sets

Queueing delays are occurring because data sets used by the program or one of its subroutines reside on busy DASD volumes.

Insufficient buffers for sequential access methods

Too few buffers are defined for a file to provide timely sequential data set access processing.

Block size too small for sequential access methods

Indicates one of the following reasons:

The block size is too small and causing too many I/O operations.

Delays are reported for both the processing time to start and to complete the I/O operation and for the wait for data to be returned.

File is fragmented into many extents

Indicates one of the following reasons:

The file used by the program or one of its subroutines is in many extents.

This fragmentation causes additional seeking to take place on the device, which delays the program.

VSAM files poorly buffered

An insufficient number of index and data buffers are defined for VSAM files, or the buffers are too small.

VSAM files use share options (4,4)

Indicates one of the following reasons:

When VSAM data sets must be open in more than one address space for updating, each application must use share options that preserve the integrity of the data

When these share options are used, each read requires an I/O operation to refresh the data because another address space might have updated the data.

Insufficient buffers for VSAM files that use local or global shared resources

Indicates one of the following reasons:

If a program uses VSAM shared resources for multiple files to better utilize virtual memory, not having enough buffers of a required size causes delays waiting for buffers to become available.

This situation is especially important for read operations because the intent is to find the data in the memory buffer as often as possible.

Reduce data delays by tuning the buffers to the workload that uses the buffer pool.

DB2 SQL process time

Indicates one of the following reasons:

An application might spend an inordinate amount of time waiting for data to be returned for an SQL statement.

This problem can be caused by excessive page scans if an INDEX is not available to speed the data retrieval. For more information about SQL delays, see the chapter "Using the Product in a DB2 Environment."

IMS database process time

An application might spend inordinate amounts of time waiting for data from an IMS database to be returned.

For more information about IMS delays, see the chapter "Using the Product in an IMS Environment."

Resource Conflict Delays

This section describes the various types of resource conflict delays, and the possible reasons for them.

Data set in use by another application

Indicates one of the following reasons:

When jobs are executed concurrently, z/OS provides data integrity by using system-wide enqueues.

If a job allocates a data set by using DISP=SHR, it has concurrent access, but each program must ensure data integrity. If a job allocates a data set by using DISP=OLD, the z/OS operating system provides data integrity and requires all other programs to wait until the data set is free.

Reduce resource conflicts by ensuring that jobs use the same resources in a serial manner.

Logical resources in use by another application

z/OS provides the ENQUEUE/DEQUEUE facility to ensure that logical resources are protected when multiple jobs or tasks require serialization.

For example, when the program uses the ENQUEUE facility to provide a queueing function for a server task, the requesting tasks waiting in ENQUEUE are delayed.

Reduce resource conflicts, caused when queueing is emulated with the ENQ/DEQ services, by using another queueing algorithm.

System Active Delays

This section describes the various types of system active delays, and the possible reasons for them.

Repeated calling of DATE/TIME services

A program or one of its subroutines repeatedly calls the date/time operating system services.

Reduce this type of delay by obtaining the date once and use it for the entire program execution.

Excessive storage management activity

Indicates one of the following reasons:

A program or one of its subroutines is allocating and freeing areas of virtual memory excessively.

Storage management is an expensive function that causes application delays if not properly utilized.

You can reduce delays resulting from excessive storage management by designing the program to allocate and free storage less frequently.

Excessive use of timer services

Indicates one of the following reasons:

A program or one of its subroutines uses the timers provided by z/OS or an application enabler such as CICS, to control a time-dependent feature of the application.

Timer services should be used sparingly since their use can cause system delays.

Extensive security calls

Indicates one of the following reasons:

A security system protects all physical and logical system resources, and calls to the protection routines are causing excessive CPU use.

Excessive security implementation in an online environment can account for up to 10 percent of processor usage.

File Management Delays

This section describes the various types of file management delays, and the possible reasons for them.

Wait for tape mount

Indicates one of the following reasons:

A program or one of its subroutines is waiting for a tape mount.

Tape mount delays are experienced in the OPEN and End of Volume system services. End of volume processing is the function that requests subsequent volumes of a multivolume data set, which usually resides on tape.

Excessive OPEN and CLOSE requests for a file

A program or one of its subroutines might OPEN a file, perform a single I/O operation, and then immediately CLOSE the file. OPEN/CLOSE requests are very expensive operating system functions that contribute heavily to overall delay.

Small data set extent allocation

Additional time is spent allocating additional data set extents as the data set expands.

Reduce this type of delay by allocating a large enough data set to eliminate additional extent allocation.

High VSAM catalog activity

Indicates one of the following reasons:

When a VSAM data set is OPENed or CLOSEd, a number of accesses are made to the CATALOG service routines to fetch control blocks or to write statistics.

It is not possible to control the time spent in CATALOG services, but files might be OPENed too often or unnecessarily.

Program Load Delays

This section describes the various types of program load delays, and the possible reasons for them.

Request to bring modules into memory

Indicates one of the following reasons:

Delays occur when a module is brought repeatedly into memory or when the search for the module on DASD takes a long time.

Factors that influence search times include concatenated libraries, large directories, or poor placement of the libraries.

Large concatenation used for program library

A program or one of its subroutines uses a large concatenation of data sets that reside on different volumes and require a significant amount of I/O to process the program management activity.

DASD Management Delays

This section describes the various types of DASD management delays, and the possible reasons for them.

Insufficient space allocated initially for the data set

Indicates one of the following reasons:

If the job JCL allocates too little space for a data set, z/OS allocates secondary extents as necessary to hold all the data.

The data set allocated should be large enough to hold all of the data initially, preventing unnecessary allocations from taking place.

Other Delays

This section describes the various other types of delays, and the possible reasons for them.

Demand paging

One or more of the following situations might be present in the program or in one of the subroutines it calls:

■ a program is link-edited inefficiently

■ data arrays are used incorrectly

■ too many data buffers are specified

VIO paging

Indicates one of the following reasons:

VIO data sets are simulated files that can significantly reduce I/O delays.

They are essentially paging files that are managed by z/OS. The only drawback is that, if the application requests a record that is not in the VIO panel, a page fault will occur that will not be processed concurrently with the application program and the application will experience delay.

Swapping

This delay is caused when

■ the program or one of its subroutines is requesting system resources that are unavailable.

■ the site's tuning parameters are improperly set.

Chapter 10: Using the Product in a DB2 Environment

CA MAT is compatible with DB2® versions 8.1 or later. If executing DB2 release 8.1, the DB2 *New Function Mode* is required for the Explain function.

After you have monitored your application, you can begin analysis.

You must specify DB2 system information prior to monitoring. It is recommended that you follow the automatic customization procedure that is documented in the *Installation Guide*.

This section contains the following topics:

Analyze DB2 Data

Delays in processing SQL statements are usually caused by improperly designed applications and databases, inadequate indexing, and programming errors. CA MAT can help identify application problems that occur when performing the following activities:

- Designing the application program

- Determining when an application should be rebound

- Determining the access path chosen for a query

- Designing the database

CA MAT enables you to analyze DB2 data to the SQL statement level.

Display the DB2 Statements Panel from the DataView Panel

Displaying the DB2 Statements panel from the DataView panel shows the monitored activity of DB2 and which SQL statements were consuming CPU during the monitoring period. The display shows measurements collected from only sampled SQL. To view DB2 Intercept data on the DB2 Statements panel, you can use the **S** (Select SQL) line command.

Use the following procedure to see the SQL statements for a DB2 job.

Follow these steps:

1. Select Option **5** from the Interactive Analysis menu to display the DataView panel.

```
CA MAT -------------------------- DataView ----------------- Row 1 to 8 of 8
COMMAND ===>                                              SCROLL ===> HALF
Primary commands: LINklist on/off                        Profile: PROFT9
                                                         Options: NORMAL
   Line commands: S - Select                             Linklist: OFF


LC DD name  Dataset name                                 Delay% Visual
   _____  _____  _____ _____
>-------------------------------------------------------------------------
__  .DB2     DB2 Statement Delay                          97.68 ======>
__ STEPLIB  DB2.DIA.SDSNEXIT                               0.00
__ STEPLIB  DSN910.SDSNLOAD                                0.00
__ SYSABEND USRMMM1.USRDB2T9.JOB07313.D0000104.?           0.00
__ SYSPRINT USRMMM1.USRDB2T9.JOB07313.D0000103.?           0.00
__ SYSTSIN  USRMMM1.USRDB2T9.JOB07313.D0000101.?           0.00
__ SYSTSPRT USRMMM1.USRDB2T9.JOB07313.D0000102.?           0.00
__ SYS00001 USRMMM.TSO.LOAD                                0.00
***************************** End of Table *****************************
```

2. Type **S** next to .DB2 in the DD name field

3. Press Enter.

The DB2 Statements panel displays:

```
DB2 Statements panel selected from DataView panel (part 1 of 3)
CA MAT --------------------- DB2 Statements ------------- Row 1 to 11 of 11
COMMAND ===>                                          SCROLL ===> CSR
Primary Commands: ADDHelp, SQL all/sampled, SEQ (sort)       Profile: DB2STPRO
                                                             Options: NORMAL
 Line commands:  S - Select SQL    E - Explain SQL               SQL: Sampled
                SD - Show Declare   I - Explain Information      Sort: Activity
                 C - Code Details   D - Statement Detail     DB2 SSID: DB9G
                                                            DB2 Rel: 9.1.0
   DBRM or  D Data                      Declare Total                      Call
LC Package  S From Stmt Num Type          Stmt    Samps  Actv% Wait% Totl% Count
   _____ _ ___ _____ _____        _____  _____ ____ ____ ____ _____
 >-----------------------------------------------------------------------------
 __ D91@PROG S B            632 FETCH    100900  3057 27.98 1.57 29.54  1000001
 __ D91@PROG S B            460 OPEN     100826   591  4.49 1.22  5.71        1
 __ D91@PROG S B            469 FETCH    100826   243  2.27 0.08  2.35    76924
 __ D91@PROG S B            580 OPEN     100881   220  1.57 0.56  2.13        1
 __ D91@PROG S B            201 SELECT       NA   101  0.83 0.14  0.98        1
 __ D91@PROG S B            232 SELECT       NA   100  0.81 0.15  0.97        1
 __ D91@PROG S B            263 SELECT       NA    89  0.71 0.15  0.86        1
 __ D91@PROG S B            538 OPEN     100862    87  0.75 0.09  0.84        1
 __ D91@PROG S B            589 FETCH    100881    22  0.00 0.21  0.21        1
 __ D91@PROG S B            388 SELECT       NA     3  0.01 0.02  0.03        1
 __ D91@PROG S B            623 OPEN     100900     1  0.00 0.01  0.01        1
```

The DB2 Statements panel is sorted by the Totl% field. Statements with the highest overall delay appear at the top.

4. Scroll to the right to see additional data, as shown in the following figures:

```
DB2 Statements panel selected from DataView panel (part 2 of 3)
 CA MAT ---------------------- DB2 Statements ------------- Row 1 to 11 of 11
 COMMAND ===>                                          SCROLL ===> CSR

 Primary Commands: ADDHelp, SQL all/sampled, SEQ (sort)       Profile: DB2STPRO
                                                              Options: NORMAL
  Line commands:  S - Select SQL    E - Explain SQL               SQL: Sampled
                 SD - Show Declare   I - Explain Information      Sort: Activity
                  C - Code Details   D - Statement Detail     DB2 SSID: DB9G
                                                             DB2 Rel: 9.1.0
    DBRM or  D Data                                         Total
 LC Package  S From Stmt Num Type     Total CPU  CPU-P-Call Resp Time

    _____ _ ___ _____ _____    _____  _____ _____
  <-----------------------------------------------------------------------------
  __ D91@PROG S B            632 FETCH   30.286899  0.000030 37.179097
  __ D91@PROG S B            460 OPEN     9.063884  9.063884 13.145094
  __ D91@PROG S B            469 FETCH    2.575384  0.000033  2.934821
  __ D91@PROG S B            580 OPEN     2.968967  2.968967  4.958089
  __ D91@PROG S B            201 SELECT   1.582823  1.582823  2.285674
  __ D91@PROG S B            232 SELECT   1.363766  1.363766  2.285488
  __ D91@PROG S B            263 SELECT   1.302925  1.302925  2.143666
  __ D91@PROG S B            538 OPEN     1.403580  1.403580  2.040191
  __ D91@PROG S B            589 FETCH    0.000356  0.000356  0.459179
  __ D91@PROG S B            388 SELECT   0.006287  0.006287  0.076504
  __ D91@PROG S B            623 OPEN     0.002196  0.002196  0.015715
```

```
DB2 Statements panel selected from DataView panel (part 3 of 3)
CA MAT --------------------- DB2 Statements ------------- Row 1 to 11 of 11
COMMAND ===>                                          SCROLL ===> CSR

Primary Commands: ADDHelp, SQL all/sampled, SEQ (sort)      Profile: DB2STPRO
                                                            Options: NORMAL
 Line commands:  S - Select SQL    E - Explain SQL              SQL: Sampled
                SD - Show Declare  I - Explain Information      Sort: Activity
                 C - Code Details  D - Statement Detail    DB2 SSID: DB9G
                                                           DB2 Rel: 9.1.0

   DBRM or  D Data                       Average
LC Package  S From Stmt Num Type         Resp Time
   _____  _ ___ _____  _____  _____
<-----------------------------------------------------------------------
__ D91@PROG S B        632 FETCH      0.000037
__ D91@PROG S B        460 OPEN      13.145094
__ D91@PROG S B        469 FETCH      0.000038
__ D91@PROG S B        580 OPEN       4.958089
__ D91@PROG S B        201 SELECT     2.285674
__ D91@PROG S B        232 SELECT     2.285488
__ D91@PROG S B        263 SELECT     2.143666
__ D91@PROG S B        538 OPEN       2.040191
__ D91@PROG S B        589 FETCH      0.459179
__ D91@PROG S B        388 SELECT     0.076504
__ D91@PROG S B        623 OPEN       0.015715
```

After you identify the statement that caused an excessive delay, use the Explain function to perform further analysis of how DB2 might process the SQL statement. For more information, see

Field Descriptions for the DB2 Statements Panel

The fields that are displayed on the DB2 Statements panel are described next.

Command Descriptions for the DB2 Statements Panel

The line commands available on the DB2 Statements panel are described next.

ADDHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

SQL all/sampled

Switches between sample-based statements (which CA MAT measured) or intercept-based data (all statements which executed) and the display is indicated by the SQL: field.

SEQuence

Switches between how the data is sorted (by measured activity or sequence of execution) as indicated by the Sort: field.

Select (S)

Is the SQL Statements pane, which shows the full text of the selected SQL statement

Show Declare (SD)

Displays the DECLARE Statement panel, which shows the DECLARE statement coded by the application programmer for this DB2 verb.

This line command is valid for OPEN, FETCH, and CLOSE statements and UPDATE/DELETE statements that contain the clause WHERE CURRENT OF <cursor_name>. This command is not valid when DB2NOCAT=YES is specified. Customization for the Explain function must be completed.

Explain (E)

Interacts with the Explain panel for the SQL statement.

Customization for the Explain function must be completed.

Code Details (C)

Displays the CodeView Detail panel.

The CodeView Detail panel reports the activity of each Module and CSECT that is associated with the selected DB2 plan/package name and statement number (as active and wait percentages of all samples in the monitor data set).

From the Code Detail panel, you can create a Histogram showing the locations within a CSECT where delays occurred, or you can list the types of delay found within a CSECT.

Explain Information (I)

Displays the messages that are generated based on the results of the DB2 EXPLAIN command. For more information, see Displaying Messages.

If the statement has an associated DECLARE CURSOR indicated by a number in the Declare Stmt column, the Explain data will be from the DECLARE CURSOR and not from the statement itself.

Statement Detail (D)

Displays the contents of the row in tabular format in the DB2 Statement Detail panel.

Each field name and its value are shown. Zero , blank, and N/A entries are skipped.

If a long name value exists, you can then use line command N from the DB2 Statement Detail panel to display the complete long name.

Display the SQL Statements from the DB2 Statements Panel

You can display the SQL statement belonging to a DBRM/Package name that is listed on the DB2 Statements panel.

Follow these steps:

1. Type **S** next to the DBRM/Package name in the LC (line command) column from the DB2 Statements panel.

2. Press Enter.

   The SQL Statements panel displays.

```
CA MAT --------------------- SQL Statements ------------- Row 1 to 3 of 3
COMMAND ===>                                             SCROLL ==> HALF

   DBRM name: STPROC91                            Profile: PROFT9
   Statement: 97                                  DB2 SSID: DIA3
   Stmt type: SELECT                              DB2 Rel: 9.1.0
   Timestamp: 08.030 15:12:33                      Source: CATALOG
                                                    Block: DB2

   Line commands: E - Explain  I - Explain Information

LC SQL Text

   _____
--------------------------------------------------------------------------------
__ SELECT HEXROW , PACKROW , PRINTROW , NEGROW , CHARROW1 , CHARROW2 ,
   CHARROW3 , CHARROW4 , CHARROW5 , CHARROW6 INTO : H , : H , : H , : H , : H
    , : H , : H , : H , : H , : H FROM DB2DATA WHERE HEXROW = 1000000
***************************** End of Table ******************************
```

This panel displays the SQL text for the statement. Extra spaces have been removed from the statement text. CA MAT obtains this SQL statement from DB2 space block (SPA).

CodeView Detail Panel for DB2

From the DB2View panel, you can display the program activity that is associated with an SQL statement from a specific DBRM/Package.

Follow these steps:

1. Type **C** next to the desired DBRM/Package in the LC (line command) column from the DB2View panel.

2. Press Enter.

   The CodeView Detail panel displays.

```
CA MAT ------------------- CodeView Detail --------------- Row 1 to 13 of 20
COMMAND ===>                                              SCROLL ==> HALF

    Package/DBRM: D91PROG     Statement Number: 587           Profile: PROFT9
                                                              Options: NORMAL
                                                                 Mode: CSECT
Primary commands: MOde Pseudo/Module/Csect/4GL,
                  PSEudo, REGister, ADDHelp

   Line commands: A - Associate     C - Callerid     D - Delays   N - Long Name
                  I - Info          L - Listing      S — Distribution
                  H - Histogram     NH - Normalized Histogram

Extended Callerid:   CC - Current    CA - Application    CV — Via


LC Module   Csect    Description            L C X Actv% Wait% Totl% Visual
   _____ _____ _____ _ _ _ ____ ____ ____ _____
 >-------------------------------------------------------------------------
 __ .DISPWT  DIA3DBM1 Waiting for the CPU         12.68  0.00 12.68 ======>
 __ .XMS0041 DIA3DBM1 Cross Memory Routine    Y    2.12  0.49  2.61 =>
 __ .NUCLEUS IWMW2ETM Workload manager        B    0.58  0.07  0.65
 __ .NUCLEUS IEAVEECT External flih         B    0.47  0.14  0.61
 __ DSNXGRDS DSNXROHB DB2 routine            A    0.11  0.41  0.52
 __ DSNIDM   DSNIRNXT DM-FETCH NEXT ROW      A    0.02  0.47  0.49
 __ DSNXGRDS DSNXERT  RDS-APPL CALL RTN      A    0.00  0.36  0.36
 __ DSNXGRDS DSNXERD  RDS-TOPMOST RDS CSECT  A    0.05  0.31  0.36
 __ .NUCLEUS IEAVTSFR SETFRR Service         B    0.25  0.05  0.31
 __ DSNXGRDS DSNXECP  RDS-COPY APPL STRUCTURE A   0.05  0.16  0.22
 __ DSNXEEZ  DSNXEEZ  RDS-DATABASE PGM REQUES A   0.00  0.20  0.20
 __ .NUCLEUS IRARMFIP System Resources Manage B   0.16  0.04  0.20
 __ DSN3EPX  DSNAPRHX SSS-PGM REQUEST NONDELE A Y 0.05  0.07  0.13
```

This panel identifies modules and CSECTs that delayed the SQL statement in the SQL: field for the specified DBRM/Package in the DBRM/Package: field. The commands you can issue and field headings are identical to the CodeView panel (see page 158 and page 159). All subsequent associated panels report information for the specified SQL statement from the specified DBRM/Package named.

The CodeView Detail panel reports both Active and Wait activity percentages for Analyze Normal mode, which accounts for all activity reported in DB2View.

Display the DB2View Panel from the Interactive Analysis Panel

You can also display the DB2View panel directly from the Interactive Analysis panel by selecting Option 10.

Follow these steps:

1.   Select Option 10 from the Interactive Analysis menu to display the DB2 View panel.

```
CA MAT-------------------- Interactive Analysis -------------------------
OPTION ==>

Enter option to analyze the monitored job:                Profile: PROFT9
                                                          Options: NORMAL
  CA MAT Monitor Information              Subsystem Details
  -------------------------------------   ------------------------------
  0  OverView   - Monitor session information  10  DB2 - View all SQL
  1  TaskView   - Activity by task             11  IMS - IMS Transactions
  2  DelayView  - Program delays               12  JVM - Java Virtual Machine
  3  CodeView   - Program activity             13  WAS - WebSphere Trans.
  4  TimeView   - Samples by time              14  CIC - CICS Summary Stats
  5  DataView   - Dataset information          15 IDMS - CA IDMS Activity
  6  TranView   - Activity by transaction      16  DCM - CA-Datacom Activity
  7  ModView    - Module layout                17  IDL - CA-Ideal Activity
  8  PoolView   - Buffer pools                 18  ADA - Adabas Activity
  9  USSView    - Unix System Services         19  NAT - Natural Activity


  ACTIVE - switch mode to ACTIVE      WAIT - switch mode to WAIT
  NORMAL - switch mode to NORMAL      ALL  - switch mode to ALL

Press END to exit analysis
```

The DB2View panel displays.

```
CA MAT -------------------- DB2View ------------------------ Row 25 of 50
COMMAND ==>                                              SCROLL ==> CSR

Primary Commands: ADDHelp, SQL all/sampled, SEQ (sort)      Profile: DB2STPRO
                                                            Options: NORMAL
 Line commands:  S - Select SQL    E - Explain SQL               SQL: All
                SD - Show Declare   I - Explain Information      Sort: Sequence
                 C - Code Details   D - Statement Detail    DB2 SSID: DB9G
                                                            DB2 Rel: 9.1.0
     DBRM or  D Data              Call                               Total
LC Package   S From Stmt Num Type   Count    Total CPU  CPU-P-Call Resp Time
   _____  _  B___ _____ _____ _____  _____  _____  _____
             _  B
 >--------------------------------------------------------------------------
 __  D91@PROG S B          201 SELECT         1   1.582823  1.582823   2.285674
 __  D91@PROG S B          232 SELECT         1   1.363766  1.363766   2.285488
 __  D91@PROG S B          263 SELECT         1   1.302925  1.302925   2.143666
 __  D91@PROG S B          388 SELECT         1   0.006287  0.006287   0.076504
 __  D91@PROG S B          460 OPEN          1   9.063884  9.063884  13.145094
 __  D91@PROG S B          469 FETCH      76924   2.575384  0.000033   2.934821
 __  D91@PROG S B          538 OPEN          1   1.403580  1.403580   2.040191
 __  D91@PROG S B          580 OPEN          1   2.968967  2.968967   4.958089
 __  D91@PROG S B          589 FETCH         1   0.000356  0.000356   0.459179
 __  D91@PROG S B          623 OPEN          1   0.002196  0.002196   0.015715
 __  D91@PROG S B          632 FETCH   1000001  30.286899  0.000030  37.179097
```

2. Scroll to the right to see additional data, as shown in the following figures:

```
CA MAT -------------------- DB2View -------------------------- Row 25 of 50
COMMAND ===>                                               SCROLL ===> CSR

Primary Commands: ADDHelp, SQL all/sampled, SEQ (sort)        Profile: DB2STPRO
                                                              Options: NORMAL
 Line commands:  S - Select SQL    E - Explain SQL                SQL: All
                SD - Show Declare  I - Explain Information       Sort: Sequence
                 C - Code Details  D - Statement Detail      DB2 SSID: DB9G
                                                             DB2 Rel: 9.1.0
    DBRM or  D Data                      Average   Declare Total
LC Package  S From Stmt Num Type         Resp Time Stmt    Samps  Actv%  Wait%
            _ B___ _____ _____ _____ _____ _____ _____ _____
 <>-----------------------------------------------------------------------------
 __ D91@PROG S B         201 SELECT      2.285674      NA   101   0.83   0.14
 __ D91@PROG S B         232 SELECT      2.285488      NA   100   0.81   0.15
 __ D91@PROG S B         263 SELECT      2.143666      NA    89   0.71   0.15
 __ D91@PROG S B         388 SELECT      0.076504      NA     3   0.01   0.02
 __ D91@PROG S B         460 OPEN       13.145094  100826   591   4.49   1.22
 __ D91@PROG S B         469 FETCH       0.000038  100826   243   2.27   0.08
 __ D91@PROG S B         538 OPEN        2.040191  100862    87   0.75   0.09
 __ D91@PROG S B         580 OPEN        4.958089  100881   220   1.57   0.56
 __ D91@PROG S B         589 FETCH       0.459179  100881    22   0.00   0.21
 __ D91@PROG S B         623 OPEN        0.015715  100900     1   0.00   0.01
 __ D91@PROG S B         632 FETCH       0.000037  100900  3057  27.98   1.57
```

```
CA MAT -------------------- DB2View -------------------------- Row 25 of 50
COMMAND ===>                                               SCROLL ===> CSR

Primary Commands: ADDHelp, SQL all/sampled, SEQ (sort)        Profile: DB2STPRO
                                                              Options: NORMAL
 Line commands:  S - Select SQL    E - Explain SQL                SQL: All
                SD - Show Declare  I - Explain Information       Sort: Sequence
                 C - Code Details  D - Statement Detail      DB2 SSID: DB9G
                                                             DB2 Rel: 9.1.0
    DBRM or  D Data
LC Package  S From Stmt Num Type     Totl%
            _ B___ _____ _____ _____
 <------------------------------------------------------------------------------
 __ D91@PROG S B         201 SELECT   0.98
 __ D91@PROG S B         232 SELECT   0.97
 __ D91@PROG S B         263 SELECT   0.86
 __ D91@PROG S B         388 SELECT   0.03
 __ D91@PROG S B         460 OPEN     5.71
 __ D91@PROG S B         469 FETCH    2.35
 __ D91@PROG S B         538 OPEN     0.84
 __ D91@PROG S B         580 OPEN     2.13
 __ D91@PROG S B         589 FETCH    0.21
 __ D91@PROG S B         623 OPEN     0.01
 __ D91@PROG S B         632 FETCH   29.54
```

Describe Differences between the DB2 Statements and DB2View Panels

You can access DB2 Statements panels from three different options:

- From Option 2, DelayView, by looking for Major Category Data Delay with Minor Category DB2 Statement, then putting the cursor in the LC (line command) column and simply pressing Enter.

- From Option 5, DataView, by looking for .DB2 in the DD Name column and DB2 Statement delay in the Dataset Name column, then entering S on the LC column.

- From Option 6, TranView, for getting to DB2 statements for CICS monitors by determining which transaction you are interested in and then, using line command D - Delay Details simply putting the cursor at the line command and pressing Enter. This action takes you to DelayView for that transaction and from there you follow the same path described above.

  Also from TranView you can select N - Data Details, which brings you to DataView for that transaction and then you can follow the same path for DataView described above.

  The displays from TranView are different than those from DelayView and DataView because they are intended to be specific to the transaction and they are based on sample data only.

When you access Option 10, DB2View, the DB2 statements in this view are intercepted by the DB2 Harvester and are displayed in order of occurrence.

The DB2 Statements displays from DataView and DelayView emphasize sampled data and the initial columns are presented accordingly. Sample-based percentages are shown first and the display is sorted based on Total%. DB2View data emphasizes data intercepted by the DB2 Harvester and the initial columns are presented accordingly with the intercepted data shown first.

The DB2 Statement displays from Options 2, 5 and 10 can all alternate between showing sampled data only or all data (both sampled and intercepted by the Harvester) by using the SQL command previously described.

These displays are designed to provide a basic subset of data on initial entry then allow you to drill down through the detailed data offered by available command options. If you prefer to see different or more data on the initial screen, use the CUST command to include or exclude, order, or sort the fields available for the display. The panel presented for CUST has a HELP option; simply put H in the Line Command column next to the field you want to review and a description of the field is shown.

Field Descriptions for the DB2View Panel

The fields that are displayed on the DB2View panel are described next.

DBRM or Package

Is the name of a package (DBRM) that describes the SQL statement

This field is limited to eight characters. If this value exceeds eight characters, use the D **(**Statement Detail**)** line command to view the entire field value.

D S

Is the type of SQL being executed; either D for Dynamic or S for Static SQL.

Data From

Represents the method used to collect the SQL data being presented.

CA MAT collects data about SQL using two different methods. One is through the sampling process and the other is by the Harvester intercepting the SQL as it processes.

H

Indicates that this SQL data was collected by the DB2 Harvester and was not sampled as part of the sampling process. In this situation, fields that normally contain sample-based data contain zeros. Examples of those fields are **%Active** and **%Wait**.

S

Indicates that this SQL data was collected by the DB2 sampling SRB and was not intercepted by the DB2 Harvester. In this situation, fields that normally contain Harvester-collected data contain zeros. Examples of those fields are **Call Count** or any of the CPU fields, such as **Total CPU**.

B

Indicates that this SQL data was collected by both the Harvester and sampler.

SQL statements that contain data from both the Harvester and the sampler provide the most complete view of that SQL statement's performance.

Note: There are a number of reasons why data might not be collected by either the DB2 Harvester or the sampling process, based on the DB2 options selected during customization or by the administrator of the environment after customization.

Stmt Num

Is the number of the unique SQL statement that is contained in a Package or Pla.

Type

Indicates the type of operation that is being performed with the statement .

CA MAT displays ???????? when the DB2 control block is not yet valid. Some values for the operation type are as follows:

- OPEN

- FETCH

- CLOSE

- PREPARE

- SELECT

- INSERT

- DELETE

- UPDATE

Call Count

Is the number of times during the monitoring session that CA MAT detected that this SQL statement was called from the target address space. A zero in this field indicates that this statement was not harvested by the Synchronous Data Gatherer and the data being presented was obtained by the sampling process.

The Synchronous Data Gatherer must be fully initialized before the first call to DB2 is issued. If the first call is in progress, then the Harvester will not **see** it. In addition, when the first call is not captured, several data fields will contain information accumulated from the start of the unit-of-work. This data is also bypassed and can result in a zero call count.

It is not uncommon for one or two rows to show zero call counts, while multi-thread environments, such as CICS, might show even more. This situation is not an error. It is an effort to provide the most accurate data possible for each call.

Total CPU

Is the amount of CPU time in seconds needed by DB2 to process all DB2 calls for this SQL statement by using sampling data collected during the measurement.

CPU-P-Call

Is the amount of CPU time in seconds needed by DB2 to process each DB2 call for this SQL statement by using sampling data collected during the measurement.

Total Resp Time

Is the total time (in seconds) for the SQL statement to be completed.

Average Resp Time

Is the average response time for the SQL statement to be completed.

Enclave CPU

Is the amount of CPU time, in seconds, for this SQL statement while it was running under an Enclave.

zIIP CPU

Is the amount of zIIP processor CPU time, in seconds, for this SQL statement.

zIIP Qualified

Is the amount of CPU that was qualified to run on a zIIP processor.

zIIP On standard

Is the amount of CPU that was qualified to run on a zIIP processor, but ran on a standard processor instead.

Section

Is the section number within the package for this statement.

Get Pages

Is the number of sequential and nonsequential GETPAGE requests issued for this SQL statement.

This field addresses selectivity of the SQL statement and might indicate clustering problems.

When a GETPAGE request is made, the Buffer Manager checks if the page is already available in the pool. A high value can indicate a low selectivity of the SQL statement (database design) or a clustering problem.

Having a lot of GETPAGEs per SQL statement indicates that indexing of additional columns might improve performance. Every time a GETPAGE results in a hit (page being located in the pool), the application can begin processing the data immediately. Reducing this number improves performance.

In some cases, using compressed data results in an increase in the number of GETPAGEs, lock requests, and synchronous read I/Os. Sometimes, updated compressed rows cannot fit in the home page, and they must be stored in the overflow page. This condition can cause additional GETPAGE and lock requests.

If a page contains compressed fixed-length rows with no free space, an updated row probably has to be stored in the overflow page. To avoid the potential problem of more GETPAGE and lock requests, add more free space within the page. Start with 10% additional free space and adjust further, as needed. If, for example, 10% free space was used without compression, start with 20% free space with compression for most cases. This recommendation is especially important for data that is heavily updated.

Pages Read From DASD

Is a calculated value that you might find useful. It is calculated as follows:

Sync Pages Read **+** Async Pages Read

From DASD%

Is a calculated value that you might find useful. It is calculated as follows:

((Pages Read From DASD **-** Additional Pages Read**) * 100) /** Get Pages

Pages Read From Pools

Is a calculated value that you might find useful. It is calculated as follows:

Get Pages **- (**Pages Read From DASD **-** Additional Pages Read**)**

From Pools%

Is a calculated value that you might find useful. It is calculated as follows:

(Pages Read From Pools *** 100) /** Get Pages

Additional Pages Read

Is a calculated value that you might find useful. It is calculated as follows:

Pages Read From DASD **-** Get Pages

Index Get Pages

Is the number of Index GETPAGE requests issued for this SQL statement.

Synch Pages Read

Is the number of synchronous read pages issued for this SQL statement.

Synchronous read I/Os are one type of physical DB2 I/O. They address the effectiveness of the DB2 buffer pools.

This value is the number of synchronous I/O operations. When a logical read operation results in a buffer pool miss, a synchronous read occurs.

Tuning Tip: Unnecessary read I/Os are one of the principal culprits in poorly tuned applications. While random I/O cannot be avoided, critical re-referenced indexes and tables can be kept in memory. At other times, the strategy is to get the data into memory before the application needs it, typically when processing the data pages sequentially. This procedure is done with prefetch and possibly with parallel processing.

This field only appears if at least one row has a non-zero value.

Asynch Pages Read

Is the number of asynchronous pages read by prefetch operations that were issued for this SQL statement.

Tuning Tip: Generally, unless the application is totally random, the higher the prefetch number, the more likely it is that the data will be in memory when needed. The more successful that read-ahead buffering is, the faster the application should perform.

This field only appears if at least one row has a non-zero value.

Sequential Pre Fetch

Is the number of sequential prefetch requests that were issued for this SQL statement.

Sequential prefetch is performed concurrently with other operations of the originating application program. It brings pages into the buffer pool before they are required and reads several pages with a single I/O operation. Sequential prefetch can be used to read data pages, by table space scans or index scans with clustered data reference. It can also be used to read index pages in an index scan. Sequential prefetch allows CP and I/O operations to be overlapped.

Tuning Tip: A buffer pool must be at least 1000 pages to get the full benefit of sequential prefetch. In addition, a sufficient number of sequential pages must be allowed in the buffer pool assigned to the accessed table (VPSEQT parameter). Otherwise, the prefetch quantity might be reduced, or prefetch disabled.

This field only appears if at least one row has a non-zero value.

List Pre Fetch

Is the number of list prefetch requests that were issued for this SQL statement.

List prefetch reads a set of data pages determined by a list of RIDs (ROW IDs) taken from an index. The data pages need not be contiguous. The maximum number of pages that can be retrieved in a single list prefetch is 32 (64 for utilities). List prefetch can be used in conjunction with either single or multiple index access. List prefetch is used in the following circumstances:

- usually with a single index that has a cluster ratio lower than 80%

- sometimes on indexes with a high cluster ratio, if the estimated amount of data to be accessed is too small to make sequential prefetch efficient, but large enough to require more than one regular read

- always to access data by multiple index access

- always to access data from the inner table during a hybrid join

- usually for updatable cursors when the index contains columns that might be updated

This field only appears if at least one row has a non-zero value.

Dynamic Pre Fetch

Is the number of dynamic prefetch requests issued for this SQL statement.

Dynamic prefetch can reduce paging and improve performance over sequential prefetch for some data access that involves data that is not on consecutive pages.

At runtime, dynamic prefetch might or might not actually be used. Dynamic prefetch is used in prefetch situations when the pages that DB2 will access are distributed in a nonconsecutive manner. If the pages are distributed in a sufficiently consecutive manner, sequential prefetch will be used instead.

Tuning Tip: Normally dynamic prefetch assists programs by providing read-ahead buffering for processing; GETPAGEs that would have to wait for synchronous I/O now find the page in the buffer pool. This number should be monitored because the more dynamic prefetch requests activated, the more buffer pool resources can be strained. It might be necessary to alter the buffer pool size or sequential steal threshold to manage increased demands of dynamic prefetch.

This field only appears if at least one row has a non-zero value.

LOB Get Pages

Is the number of GETPAGE requests issued to satisfy a Large OBject column SQL request.

This field only appears if at least one row has a non-zero value.

Rows Returned or Changed

Is the number of rows that are returned by a FETCH, updated by an UPDATE, inserted by an INSERT, or returned from cache for a PREPARE.

This field only appears if at least one row has a non-zero value.

Declare Stmt

Is the statement number of the DECLARE that is associated with the statement or NA if no DECLARE is associated with the statement.

Length

Is the length of the SQL statement. The statement has had all extra spaces removed.

Parallel Subtasks

Number of parallel subtasks created on behalf of this statement. This field only appears if at least one row has a non-zero value.

Parallel Groups

Number of parallel groups executed for this SQL statement. This field only appears if at least one row has a non-zero value.

Statement Triggers

Number of times a statement trigger was activated by this SQL statement. This field only appears if at least one row has a non-zero value.

Row Triggers

Number of times a row trigger was activated by this SQL statement. This field only appears if at least one row has a non-zero value.

Re-Optimized

Number of times re-optimization occurred for this SQL statement. This field only appears if at least one row has a non-zero value.

In cache KEEPDYN(Y)

Number of times that a prepare for this SQL statement was avoided because KEEPDYNAMIC(YES) was used along with prepared statement caching and DB2 still had a copy of the executable version of the statement. This field only appears if at least one row has a non-zero value.

Found in cache

Number of times that a PREPARE request for this statement was satisfied by making a copy from the prepared statement cache.

Not found in cache

Number of times that a PREPARE request for this statement was received, but a matching statement was not found in the prepared statement cache.

Incremental Binds

Is the number of times DB2 executed an incremental bind to account for changes in the DBRM. This field only appears if at least one row has a non-zero value.

Requesting Location

Is the name of the location which originated this statement. This field is limited to eight characters. If this value exceeds eight characters, use the D (Statement Detail) line command to view the entire field value.

Correlation

Is the correlation ID of the DB2 thread, for example:

■ for IMS, the correlation ID is the PSB name

■ for CICS, the correlation ID is the transaction name

■ for Batch type threads, the correlation ID is the Job Name

■ for Remote and RRSAF threads, the value in this field is dependent on the requesting application

OPER ID

Is the original primary auth ID of the requesting user. This field is limited to eight characters. If this value exceeds eight characters, use the D (Statement Detail) line command to view the entire field value.

Plan

Is the plan name that describes the SQL statement. This field is limited to eight characters. If this value exceeds eight characters, use the D (Statement Detail) line command to view the entire field value.

Collection

Is the name of the group of packages that have the same qualifier. This field is limited to eight characters. If this value exceeds eight characters, use the D (Statement Detail) line command to view the entire field value.

Thread

Is the address of the Agent Control Element for this DB2 thread.

Thread Count

Is a counter, controlled by DB2, which is incremented each time the agent calls DB2. The size of this counter is two bytes and will wrap to zero and begin again when the two byte size limit is exceeded.

Requesting Job Name

Is the name of the requesting address space Job Nam.

Executing Job Name

Is the name of the executing address space Job Name. For example, this name is the name of Stored Procedures address space when a CALL is executed or a FUNCTION is used.

WLM

Is the z/OS Workload Manager Service Class name for a DDF thread.

APPLENV

Is the name of the Application Environment defined for this Stored Procedure or Function. This field is limited to eight characters. If this value exceeds eight characters, use the D **(**Statement Detail**)** line command to view the entire field value.

Cursor Name

Is the name of the cursor for this SQL statement. This field is limited to eight characters. If this value exceeds eight characters, use the D **(**Statement Detail**)** line command to view the entire field value.

Routine Name

Is the qualified DB2 stored procedure name or qualified function name invoked by the application program.

The name is derived from the qualifier followed by the name as defined by the creator of stored procedure or function.

This field is limited to 17 characters. If this value exceeds 17 characters, use the D **(**Statement Detail**)** line command to view the entire field value.

Type - extended

Displays the complete 24-character call type issued with this statement as an argument. Some values for extended call type are:

■ FETCH RELATIVE

■ FETCH ABSOLUTE

■ FETCH BEFORE

- FETCH AFTER

- FETCH ROWSET NEXT

- FETCH ROWSET RELATIVE

- FETCH ROWSET ABSOLUTE

- SET CURRENT PACKAGESET

- SET HOST VAR

Note: Some fields might not be displayed automatically when data for those fields has not been collected.

Command Descriptions for the DB2View Panel

The commands available on the DB2View panel are described next.

ADDHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

SQL all/sampled

Switches between sample-based statements (which CA MAT measured), or intercept-based data (all statements that executed). The current display mode is indicated by SQL: field

SEQuence

Switches between how the data is sorted (by measured activity or sequence of EXECUTION) and is shown in the Sort: field.

Select (S)

Is the SQL Statements panel, which shows the full text of the selected SQL statement.

Show Declare (SD)

Is the DECLARE Statement panel, which show the DECLARE statement coded by the application programmer for this DB2 verb.

This line command is valid for OPEN, FETCH, and CLOSE statements and UPDATE/DELETE statements that contain the clause WHERE CURRENT OF <cursor_name>. This command is not valid when DB2NOCAT=YES is specified. Customization for the Explain function must be completed.

Explain (E)

Interacts with the Explain panel for the SQL statement. Customization for the Explain function must have been completed.

Code Details (C)

Displays the CodeView Detail panel. The CodeView Detail panel reports the activity of each Module and CSECT that is associated with the selected DB2 plan/package name and statement number (as active and wait percentages of all samples in the monitor data set).

From the Code Detail panel, you can create a Histogram showing the locations within a CSECT where delays occurred, or you can list the types of delay found within a CSECT.

Explain Information (I)

Displays the messages that are generated based on the results of the DB2 EXPLAIN command. For more information, see Displaying Messages.

If the statement has an associated DECLARE CURSOR indicated by a number in the Declare Stmt column, the Explain data will be from the DECLARE CURSOR and not from the statement itself.

Statement Detail (D)

Displays the contents of the row in tabular format in the DB2 Statement Detail panel. Each field name and its value are shown. Zero , blank, and N/A entries are skipped.

If a long name value exists, you can then use line command N from the DB2 Statement Detail panel to display the complete long name.

Display Statement Details and Long Names

Follow these steps:

1. Type D in the LC field on either the DB2 Statements panel or the DB2 View panel and press Enter.

   The DB2 Statement Detail panel displays.

```
CA MAT ---------------- DB2 Statement Detail ----------- Row 3 to 24 of 38
COMMAND ===>                                              SCROLL ===> PAGE

   Primary Commands: SQL - Display SQL Text              Profile: PROFT9
                                                         Options: NORMAL
     Line Commands: N - Display Long Name                DB2 SSID: DIA3
                                                         DB2 Rel: 9.1.0

LC Field Name      Field Value
   _____    _____
------------------------------------------------------------------------------
   Location        DIA
   Plan            D91PRG
__ Collection      D91PROGZ_BIG_PACKAGE_LITTLE_PACKAGE_PACKAGE_LONGER_AND_LONG
   Package         D91PROG
   Section Number  2
   Stmnt Number    425
   Statement       OPEN
   SQL Type        Static
   Total Count     1
   Total CPU       15.123193
   CPU per Call    15.123193
   Total Resp Time 34.591737
   Avg Resp Time   34.591737
   Enclave CPU     15.124186
   Get Pages       69340
   Pages from DASD 47598
   From DASD%      68.64
   Pages from Pools 21742
   From Pools%     31.36
   Index Get Pages 2
   Sync Read I/0   1217
   Async Pages Read 46381
   SEQ Pre Fetch   2448
   Declare Stmnt   769
   Length          46
   Correlation     USRDB2T9
   OPER ID         USRMMM1
   Thread          1CEF5DB8
   Thread Count    7006
   Req Job Name    USRDB2T9
   Exec Job Name   USRDB2T9
   Cursor Name     BT_D91PROG_CURSOR_FOR_TESTING_LONG_NAMES
   Unique Samps    1
   Total Samps     358
   Max Conc Samps  1
   Active%         4.51
   Wait%           1.92
   Total%          6.44
****************************** End of Table ******************************
```

This panel displays the contents of the row in tabular format. It shows each field name and its value. Zero, blank, and N/A entries are skipped.

2. Use the SQL command to view the full text of the selected SQL statement in the SQL Statements panel.

   If a long name value exists, you can use line command N to view the DB2 Long Name panel.

```
CA MAT --------------------- DB2 Long Name -------------- Row 1 to 2 of 2
COMMAND ===>                                              SCROLL ===> PAGE

  Field Name: Collection                                 Profile: DB2STRP
                                                          Options: NORMAL


--------------------------------------------------------------------------------
D81PROGZ_BIG_PACKAGE_LITTLE_PACKAGE_PACKAGE_LONGER_AND_LONGER_AND_LONGER_AND
_LONGER_AND_LONGER_AND_STILL_LONGER
```

This panel shows the complete long name and the field name for the selected field.

Display a DECLARE Statement

Follow these steps:

1. Type SD in the LC field on the DB2 Statements panel and press Enter.

   The DECLARE Statement panel displays.

   The SD line command is valid for OPEN, FETCH, and CLOSE statements and UPDATE/DELETE statements that contain the clause WHERE CURRENT OF <cursor_name>.

Customization for the Explain function must be completed.

```
CA MAT ------------------- DECLARE Statement -------------- Row 1 to 9 of 9
COMMAND ===>                                            SCROLL ===>  PAGE

        DBRM name: D91PROG                                Profile: PROFT9
        Statement: 769                                    DB2 SSID: DIA3
        Timestamp: 09.035 12:46:13                         DB2 Rel: 9.1.0

SQL Text

_____
------------------------------------------------------------------------
-
DECLARE BT_D91PROG_CURSOR_FOR_TESTING_LONG_NAMES CURSOR FOR SELECT A .
HEXROW , B . PACKROW , A . PRINTROW , B . NEGROW , A . CHARROW1 , B .
CHARROW2 , A . CHARROW3 , B . CHARROW4 , A . CHARROW5 , B . CHARROW6 FROM
DB2DATA A , DB2PART B WHERE A . PACKROW = B . PACKROW AND A . CHARROW4 = B
. CHARROW4 AND A . CHARROW4 = 'BBBBB' AND B . CHARROW4 = 'BBBBB' UNION
SELECT A . HEXROW , B . PACKROW , A . PRINTROW , B . NEGROW , A . CHARROW1
, B . CHARROW2 , A . CHARROW3 , B . CHARROW4 , A . CHARROW5 , B . CHARROW6
FROM DB2DATA A , DB2PART B WHERE A . PACKROW = B . PACKROW AND A . CHARROW4
= B . CHARROW4 AND A . CHARROW4 = 'BBBBB' AND B . CHARROW4 = 'BBBBB'
****************************** End of Table ******************************
```

This panel shows the DECLARE statement that is coded by the application programmer for this DB2 verb.

Explain Function

As a complement to workload analysis, CA MAT provides an integrated DB2 EXPLAIN function.

CA MAT calls DB2 and issues the EXPLAIN command for both dynamic and static SQL.

CA MAT issues an SQL EXPLAIN command for the statements found during the Monitor process. The command is executed on a thread created by CA MAT to the DB2 subsystem that the target address space is attached to. This thread is independent of the target job being monitored.

If objects such as tables are DROPped, ALTERed, or CREATEd while the job is being monitored, the DB2 EXPLAIN command could receive a return code of -204 (Undefined Name). The DB2 EXPLAIN could also, after an ALTER, return a -206 (name is not valid in the context where it is used).

You can display additional key information about the SQL statement by using the EXPLAIN line command (E) on either the DB2 Statements panel or the SQL Statements panel. You can see useful information in the following areas:

■   Statistical and textual information about the access path

■   Suggestions about how to improve SQL statement performance

See Viewing an Explained SQL Statement to see an example of the output from the Explain line command.

The source of the SQL statements that are explained is dependent on a combination of global parameter values in the TUNSSP00 UTRPARM member, and options that can be specified at profile definition on the DB2 Monitor Criteria panel. If the recommendations were followed, static SQL is extracted from the DB2 catalog and explained. Dynamic SQL is extracted from internal DB2 objects and then passed to the EXPLAIN command.

The two monitor time options settings that control if the EXPLAIN command is issued are shown next. The options can be overridden on the "DB2 Monitor Criteria" panel when defining the monitor profile. See an example of this panel in the Monitor Criteria for DB2 chapter.

EXPLAIN SQL

Requests that information regarding DB2 access path selection be obtained from DB2 SQL statements by issuing the EXPLAIN command and externalizing the data.

YES

Specifies that DB2 EXPLAIN data is collected for all statements seen. The call for Explain data is made while the address space is being measured. If YES is specified then Use DB2 Catalog for EXPLAIN must also be YES.

NO

Specifies that no DB2 EXPLAIN data is gathered. This is the default.

EXPLAIN Harvested SQL

Requests that information regarding the DB2 access path selection is obtained from DB2 SQL statements that were extracted using the Synchronous Data Gatherer.

YES

Specifies that Explain data is collected for each dynamic SQL statement and all SQL statements in a DBRM or package that are seen by the Synchronous Data Gatherer.

Note: DB2EXPL=YES must be specified with this option.

NO

Specifies that no DB2 Explain of the harvested SQL is performed. This is the default.

CA MAT uses the DB2 EXPLAIN command to acquire access path data. The DB2 EXPLAIN command uses three tables to store this information. The table names used by the EXPLAIN command are

- PLAN_TABLE

- DSN_STATEMNT_TABLE

- DSN_FUNCTION_TABLE

The qualifier, as required by CA MAT, is CAMAT.

CAMAT.PLAN_TABLE, CAMAT.DSN_STATEMNT_TABLE, and CAMAT.FUNCTION_TABLE are created in the installation process during Step 10.

The sample BIND statements following show the package name that is required to be bound in the DB2 plan. The BIND for the DB2 plan is distributed in CEESJCL member TNCEBND.

```
DSN SYSTEM(DIA3)
      BIND PACKAGE(MAT85) MEMBER(TNMESQLM) +
            QUALIFIER(MAT85DB2) +
            ACTION(REP) ISOLATION(CS) +
            RELEASE(COMMIT) +
            ENCODING(EBCDIC) +
            DEGREE(ANY) ENABLE(*)
*
************************************************
* BIND PERFORMANCE PRODUCTS MAIN PLAN              *
************************************************
*
      BIND PLAN(MAT85DB2) +
            OWNER(DB2USR)       +
            QUALIFIER(MAT85DB2) +
            RETAIN              +
            ISOLATION(CS)       +
            VALIDATE(BIND)      +
            ACTION(REPLACE)     +
            ENCODING(EBCDIC) +
            PKLIST(*.MAT85.*)
```

View an Explained SQL Statement

Type **E** in the LC field on the DB2 Statements panel and press Enter. The Explain panel displays.

```
CA MAT ---------------------- DB2 Explain Data ----------- Row 1 to 22 of 68
COMMAND ===>                                             SCROLL ===> HALF
                                                        Profile: PROFT9
                                                        DB2 SSID: DIA3
                                                        DB2 Rel: 9.1.0
PLAN_TABLE        QMF     |  PLAN_TABLE Selected Row: 001 OF 002
COLUMN            HEADING |  EXPLAIN Data... Scroll --> for next PLANTABLE row

_____ _____ _____
>---------------------------------------------------------------------------
CA MAT   ........ EXPDBRM |  D91PROG
CA MAT   ........ EXPSTM# |  769
                         |
QUERYNO ........ QUERY_NO |  1296126539
QBLOCKNO ....... QRY_BLK  |  3
QBLOCK_TYPE .... EXPQTYPE |  NCOSUB
                         |
GROUP_MEMBER ... EXPGPMEM |  DIA3
                         |
APPLNAME ....... PLANNAME |  D91PRG
VERSION ........ VERSION  |  **N/A**
PROGNAME ....... PROGRAM  |  D91PROG: (CA MAT Monitoring)
COLLID ......... COL_LID  |  D91PROGZ_BIG_PACKAGE_LITTLE_PACKAGE_PACKAGE_LONGE
                         |
WHEN_OPTIMIZE .. EXPWOPT  |  **N/A**
LAST_BIND_TIME . EXPBNTIM |  2009-02-04-07.46.20.199913
                         |
PLANNO ......... QBLKSTEP |  1
METHOD ......... METH ... |  0: (First Table Accessed)
                         |
TNAME .......... TABLNAME |  DB2DATA
TABNO .......... ........ |  3
CREATOR ........ CREATOR  |  RDWM91
```

```
|
ACCESSTYPE ..... TYPE ... |  R: (TableSpace Scan)
ACCESSCREATOR .. ........ |  **N/A**
ACCESSNAME ..... INDEX .. |  **N/A**
                         |
MATCHCOLS ...... MCOL ... |  0
INDEXONLY ...... I ...... |  NO
MIXOPSEQ ....... MULT_IDX |  0
                         |
SORTN_UNIQ ..... S_N_U .. |  NO
SORTN_JOIN ..... S_N_J .. |  NO
SORTN_ORDERBY .. S_N_O .. |  NO
SORTN_GROUPBY .. S_N_G .. |  NO
                         |
SORTC_UNIQ ..... S_C_U .. |  NO
SORTC_JOIN ..... S_C_J .. |  NO
SORTC_ORDERBY .. S_C_O .. |  NO
SORTC_GROUPBY .. S_C_G .. |  NO
                         |
TSLOCKMODE ..... LCK_MOD  |  IS: (Intent Share LOCK)
                         |
PREFETCH ....... P_F .... |  S: (Sequential PREFETCH can be used)
COLUMN_FN_EVAL . COLFNEVL |  **N/A**: (Evaluation Time Unknown)
                         |
ACCESS_DEGREE .. EXPACDGR |  NULL value
ACCESS_PGROUP_ID EXPACPGP |  NULL value
JOIN_DEGREE .... EXPJODGR |  NULL value
JOIN_PGROUP_ID . EXPJOPGP |  NULL value
SORTC_PGROUP_ID  EXPSTCPG |  NULL value
SORTN_PGROUP_ID  EXPSTNPG |  NULL value
PARALLELISM_MODE EXPPMODE |  NULL value
                         |
JOIN_TYPE ...... EXPJTYPE |  **N/A**: (Inner JOIN or No JOIN)
MERGE_JOIN_COLS  EXPMRGJC |  NULL value
                         |
CORRELATION_NAME EXPCORNM |  A
PAGE_RANGE ..... EXPPRNGE |  **N/A**
                         |
OPTHINT ........ EXPOPTHN |  **N/A**
HINT_USED ...... EXPHINTU |  **N/A**
PRIMARY_ACCESS.. EXPPRMAC |  **N/A**
                         |
TIMESTAMP ...... TIMSTAMP |  2009020411125462
                         |
REMARKS ........ ........ |  **N/A**
******************************* End of Table *******************************
```

Information on the Explain Panel

You can find out additional information about Explain and how its output can help you make performance evaluations of a particular SQL statement in the IBM® manual, *DB2 Application Programming and SQL Guide*. A partial list of the key issues you should attempt to resolve for long-running or often-used SQL is shown next.

Index matching did not work

An index was available for the table that was accessed, but no matching columns were found.

This situation is often a result of a difference in the length of the data item in the program and the length of the column in the DB2 table.

Not using Sequential Prefetch

Sequential Prefetch reads multiple pages of a table into the buffer pool with a single I/O operation.

This situation significantly reduces delays for SQL access when large amounts of data are accessed.

Not using List Prefetch

List Prefetch is a way of accessing data pages efficiently.

List Prefetch can be used in conjunction with either single or multiple index access.

Not specifying parallel operations

Parallel operations specify that pages of a partitioned table might be prefetched by using multiple I/O streams.

This solution improves access significantly.

Display Messages

Type I in the LC field on the DB2 Statements panel and press Enter.

The Explain Information panel displays.

```
CA MAT ---------------------- Explain Information ------------- Row 1 to 20
COMMAND ===>                                          SCROLL ===> HALF

       DBRM name: D91PROG                              Profile: PROFT9
       Statement: 769                                  DB2 SSID: DIA3
       Stmt type: DECLARE                              DB2 Rel: 9.1.0

    Line commands: H - Display Help Text

LC Rule Text


  _____
  ----------------------------------------------------------------------------
 __ TE0000 Step No. 1 is accessing RDWM91.DB2DATA.
 __ TE0002 This table is not being accessed with an index.
 __ TE0003 This is the first table in the query.
 __ TE0011 The table will be accessed using a tablespace scan.Every pagein the
    tablespace will be scanned by DB2 to provide an answer.
 __ TE0012 Note: Unless this statement is retrieving most of the rows in this
    table, consider adding an index on the most restrictive columns in the
    predicate. Examine the columns in the indexes on this table and add them o
    the predicate if possible.
 __ TE0026 The table data pages will be accessed to satisfy this portion of he
    query. This requires additional overhead.
 __ TE0043 The data will be retrieved using Sequential Prefetch.
 __ TE0046 Column function evaluation is not used OR column function evaluation
    will be determined at execution time.
 __ TE0000 Step No. 2 is accessing RDWM91.DB2PART.
 __ TE0002 This table is not being accessed with an index.
 __ TE0007 This table is being accessed using a Merge Scan Join. The composite
    table and the new table are scanned in the order of the join columns and are
    joined for matching rowss.
 __ TE0008 MERGE SCAN: Both tables have groups of duplicates on the join column.
    The composite table has an index on the join column, eliminating the sort.
    The table with fewer qualified rows/columns is the new table.
 __ TE0011 The table will be accessed using a tablespace scan. Every page in the
    tablespace will be scanned by DB2 to provide an answer.
 __ TE0012 Note: Unless this statement is retrieving most of the rows in this
    table, consider adding an index on the most restrictive columns in the
    predicate. Examine the columns in the indexes on this table and add them o
    the predicate if possible.
```

The Explain Information panel displays messages that are generated based on the results of the DB2 EXPLAIN command.

If the statement has an associated DECLARE CURSOR indicated by a number in the Declare Stmt column, the Explain data will be from the DECLARE CURSOR and not from the statement itself.

DB2 Data Collection

CA MAT can gather and display data from SQL statements. The gathered data provides valuable information about performance and resource use of DB2 applications. With CA MAT, you do not require expensive DB2 SQL traces to gather data. CA MAT collects all relevant performance measurements in real time for every SQL statement that is executed in a DB2 subsystem.

The collected data is then summarized and stored for analysis. This method of collecting data provides detailed information about the performance and resource usage of DB2 applications, while avoiding the costly overhead and large volumes of data that is associated with other DB2 performance aids.

CA MAT collects data from DB2 internal objects and the DB2 catalog. Beginning with version 8.1, DB2 maintains some character information in UNICODE. This data is stored using a code page of 1208, which is similar to ASCII for characters with a numeric representation below 128.

CA MAT automatically converts this information to a more readable EBCDIC format.

CA MAT uses three methods of data collection to obtain DB2 data:

- Asynchronous sampling

- Background DB2 catalog extraction

- The Synchronous Data Gather

DB2 Asynchronous Sampling

Sampling for DB2 is the same as sampling for any other target. At specified intervals, data is collected about the target. The more samples collected from the same location within the target, the better areas that might have tuning opportunities are identified. For DB2, the area within the target is identified by a DB2 SQL statement. The more samples that are taken during the execution of a SQL statement, the higher the probability that a tuning opportunity exists.

The principle drawback for sampling DB2 is that DB2 reuses structures. When a sample is taken there is a chance that the data in the object being sampled is left over from a previous call to DB2. CA MAT uses a number of techniques to resolve any discrepancies, but they may occur, especially when collecting the source of the SQL statement. The SQL statement is collected from other sources as well as sampling.

Sampling is not the only source of the SQL statement.

Background DB2 Catalog Extraction

DB2 maintains information about applications requesting DB2 services in its catalog. The SQL statements contained in a package or DBRM, for example, are stored by the BIND process. This information, along with table statistics and other data, is used to determine an optimum access path to execute the SQL statement.

CA MAT can access the DB2 catalog to obtain static SQL statements and collect access path information through the DB2 EXPLAIN process. This process runs as a background function and can run longer than the actual monitor, especially if a great deal of dynamic SQL is present or a DBRM or package contains many SQL statements.

For static statements, obtaining the SQL statement from the DB2 catalog is more reliable than the sample process. The statement that is stored in the DB2 catalog is the same statement coded in the application with extraneous spaces and HOST variables removed. For performance reasons, CA MAT extracts the SQL statements from the DB2 catalog for each package or DBRM encounter during sampling. This can become an issue if the package or DBRM is used for many functions and contains SQL that is not always used by every program. The result is an extended monitor while CA MAT extracts the SQL and obtains access path information for each statement.

To access DB2, the server needs to know the plan and package that was used during the installation process. The plan and package values are specified in the monitor time options and must match the plan and package values specified in the DB2 BIND control statements.

DB2PACK

DB2 package name. Specify the name of the DB2 package assigned during the DB2 BIND job during customization.

The default is MAT*nn*, where *nn* is the value specified for the DB2LIBS keyword (normally the release number of CA MAT).

DB2PLAN

DB2 plan name. Specify the name of the DB2 plan assigned during the DB2 BIND job during customization.

The default is MAT*nn*DB2, where *nn* is the value specified for the DB2LIBS keyword (normally the release number of CA MAT).

If obtaining the SQL statements from the DB2 catalog is an issue, CA MAT provides an option on the DB2 Monitor Criteria panel to suppress the collection of SQL from the DB2 catalog.

Synchronous Data Gatherer

The third method of data collection that CA MAT uses is the Synchronous Data Gatherer.

Data is collected (harvested) on each call to DB2 at a point when processing of the statement is near completion.

The harvested information is more reliable than sampling because data collection occurs at the same point for each call and after all DB2 objects have been fully populated.

The Synchronous Data Gatherer is activated by an entry in the TUNSSP00 member.

DB2HRVST

Synchronous Data Gatherer activation.

During initialization of the Server, this parameter prepares the environment for the Harvester to accept START and STOP exit commands.

When the DB2 Harvesters are in place, absolute DB2 counts, CPU time, and elapsed times are gathered.

The following are valid responses:

YES activates the DB2 Harvester facility and allows CA MAT to gather data.

NO prevents the activation of the DB2 Harvester facility and CA MAT will not gather data.

The default is DB2HRVST=NO (for no DB2 support).

Recommendation: When customizing for DB2 support, set this value to YES.

Limit Harvested SQL

As in sampling and catalog extraction, the Harvester can also obtain SQL statements. The harvested statements are from internal DB2 objects and are a more reliable source than sampling, due to the synchronous nature of the process.

There might be circumstances, however, where the harvested SQL is redundant or too voluminous to be processed efficiently. To avoid these instances, CA MAT automatically eliminates redundant SQL records.

Data Collection Granularity Qualifiers

During the monitor process, data is collected in an effort to pinpoint opportunities to improve performance.

In DB2, the object of interest is the SQL statement and the name of the package that it belongs to. Sometimes knowing what package the SQL statement belongs to is sufficient information in a standard batch type job, but it is not enough information in online or distributed environments. For example, in CICS, either the transaction name or the DB2 user ID might be useful.

The Synchronous Data Gatherer provides four additional data qualifies to assist in analyzing monitored SQL statements. Some of these qualifiers are automatically turned on, depending on the type of DB2 connection.

CA MAT provides these commands in the TUNSSP00 member.

DB2HVLOC

Harvest the requesting location.

The requesting location name is generally of importance for distributed DB2 threads. It can help to identify where the SQL originated from.

Most other threads will originate from the local location.

The following are valid responses:

YES - Use LOCATION as part of the key to gather information.

NO - Do not add LOCATION to the key.

The default is DB2HVLOC=YES.

DB2HVCOR

Use correlation ID as part of the key.

Collect the DB2 correlation ID for the DB2 data in both the Harvester and the sampling process.

This option adds a higher level of granularity to the DB2 data being collected.

For IMS, the correlation ID is the PSB name.

For CICS, the correlation ID is the transaction name.

For Batch type threads, the correlation ID is the job name.

For remote and RRSAF threads, the value in this field is dependent on the requesting application.

The following are valid responses:

YES - Use the DB2 correlation ID in building the key.

NO - Do not add correlation ID to the key.

The default is DB2HVCOR=YES.

DB2HVIID

Use operator ID as part of the key.

Collect the DB2 primary operator ID for the DB2 data in both the Harvester and the sampling process.

This option adds a higher level of granularity to the DB2 data being collected.

The following are valid responses:

YES - Use the DB2 operator ID in building the key.

NO - Do not add operator ID to the key.

The default is DB2HVIID=YES.

DB2HVTHD

Use thread address as part of the key

Add the DB2 Thread Agent Control Element address to the data being collected by the Harvester and the sampling process.

The following are valid responses:

YES - Use the DB2 thread address in building the key.

NO - Do not add the DB2 thread address to the key.

The default is DB2HVTHD=YES.

Harvester Error Processing Control

In the remote possibility that the Synchronous Data Gatherer encounters an unrecoverable problem when harvesting data, diagnostic information is written to the operating system logrec and a message will be displayed on the server JES log.

As some problems are repetitive in nature, the Harvester data collector has built-in-limit the number of messages displayed. It also shuts itself down after a built-in number of errors are exceeded.

The messages displayed are as follows:

- When the message count exceeds the built-in value of 100 messages, the following message displays:

  TN3441W

  Max Harvester internal ABEND message count exceeded for pppppppp jjjjjjjj

  where

  pppppppp

  > Specifies the profile name.

  jjjjjjjj

  > Specifies the job name being monitored.

- When an error occurs, the Harvester writes diagnostic information to LOGREC and displays the following message on the server JES log:

  TN3438W

  Harvester Abend cccccccc aaaaaaaa dddddddd tttttttt ssssssss pppppppp jjjjjjjj

  TN3439I

  Harvester processing continues. pppppppp jjjjjjjj

  where

  cccccccc

  > Specifies the abend code.

  aaaaaaaa

  > Specifies the next instruction address.

  dddddddd

  > Specifies displacement of instruction.

  tttttttt

  > Specifies the count of abends.

  ssssssss

  > Specifies the intercept sequence number.

  pppppppp

  > Specifies the profile name.

  jjjjjjjj

  > Specifies the job name being monitored.

■ Harvesting processing continues until the built-in maximum count of 100 abends is exceeded. At this time, the following message displays:

TN3440W

Max Harvester internal ABEND count has been exceeded. Harvester processing ended for pppppppp jjjjjjjj

where

pppppppp

Specifies the profile name.

jjjjjjjj

Specifies the job name being monitored.

Then, the Harvester stops collecting data.

Harvester Exits

The Synchronous Data Gatherer uses Harvester exits to collect data from DB2. Each exit has an arbitrary name that bears no relationship to its purpose. Currently, DB2 has three exits defined. They are DB2E1, DB2E2, and DB2E3.

■ DB2E1 harvests data from most SQL calls to DB2 with the major exception being COMMIT.

■ DB2E2 harvests data from COMMIT calls only.

■ DB2E3 combines the DB2E1 and DB2E2 into a single exit for managing purposes.

Exits are started by calling a command processor specifying the name of the target DB2 subsystem and the name of the exit to start. The command processor can be called when the server starts or when a monitor session discovers processing in a DB2 address space. Once started, an exit is active until a stop command is issued or the server is shut down. If more than one server has active exits, any exit that is shared by multiple servers will remain active until the last server has issued a stop command for that exit.

In order to start the harvesting process when a monitor session discovers processing in DB2, CA MAT must know the name of the exit. The exit name is supplied in the TUNSSP00 member with the DB2HVEXT command. Any start command issued by the monitoring session will specify this exit.

Exits can also be started when the server is started. A command in the TUNSSP00 member can be used to list the DB2 subsystems to which the start command should be issued. There is a command for each exit currently defined for DB2.

DB2HVEXT

Exit name.

Specify the name of the exit to be used when a Harvester is started during a monitor session.

The following are valid values:

■ DB2E1 — harvest non-COMMIT SQL calls to DB2
(see also DB2HVSE1 below)

■ DB2E2 — harvest only COMMIT calls to DB2
(see also DB2HVSE2 below)

■ DB2E3 — harvest both COMMIT and other SQL calls to DB2
(see also DB2HVSE3 below)

Recommendation:

■ Use the default parameter, DB2E3, to collect the most complete data.

■ When using the default, you should also review DB2HVSE3 to define the DB2 subsystems where you would like CA MAT to implant the DB2 Harvester during startup processing.

The default is DB2HVEXT=DB2E3.

DB2HVSE1

Plant DB2 Harvester exit DB2E1 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E1 exit.

The format is DB2HVSE1=ssid,ssid,ssid,...

This parameter should only be used when DB2HVEXT=DB2E1 is specified.

There is no default.

DB2HVSE2

Plant DB2 Harvester exit DB2E2 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E2 exit.

The format is DB2HVSE2=ssid,ssid,ssid,...

This parameter should only be used when DB2HVEXT=DB2E2 is specified.

There is no default.

DB2HVSE3

Plant DB2 Harvester exit DB2E3 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E3 exit

The format is DB2HVSE3=ssid,ssid,ssid,...

This parameter should only be used when DB2HVEXT=DB2E3 is specified.
Note: DB2HVEXT=DB2E3 is the default.

There is no default.

Using DB2E1 and DB2E2 together as opposed to DB2E3, allows the flexibility of stopping one exit without affecting the other. For example, in a transaction environment such as CICS, COMMITs are generated by the DB2 subsystem when a transaction reaches a synchronization point. This situation can generate more information than is useful. To fix this problem, the COMMIT exit can be stopped or not started without affecting the harvesting of other SQL calls.

Manual Commands for Harvester Exits

The Synchronous Data Gatherer harvesting exits can be started or stopped by using a server MODIFY command.

To start a Harvester exit on a given processor

Enter the following command on a z/OS console:

F *server*,HARVESTER,START,*ssid*,*exit*

where

- *server* is the server name.

- *ssid* is the DB2 subsystem ID.

- *exit* is the Harvester exit name (DB2E1, DB2E2, or DB2E3).

HARVESTER can be abbreviated as **HAR**.

Example:

F MATUNER,HARVESTER,START,DIA3,DB2E1

The following messages will be displayed on the z/OS console:

```
TS0020I CA MAT Synchronous Data Gatherer Harvesting has been activated. MATUNER START
TS0003I CA MAT Token = 1200C3B4CD11A96C7594282CB500000001040003
TS0019I CA MAT Synchronous Data Gatherer command processing completed. MATUNER START
```

If the exit is already active for any server, the following messages will be displayed:

```
TS0019I CA MAT Synchronous Data Gatherer command processing completed. MATUNER START
TN3431I Harvester command processed for: START,DIA3,DB2E1
```

To stop a Harvester exit on a given processor

Enter the following command on a z/OS console:

F *server*,HARVESTER,STOP,*ssid,exit*

where

- *server* is the server name.

- *ssid* is the DB2 subsystem ID.

- *exit* is the Harvester exit name (DB2E1, DB2E2, or DB2E3).

Example:

F MATUNER,HARVESTER,STOP,DIA3,DB2E1

The following messages will be displayed on the z/OS console:

```
TS0021I CA MAT Synchronous Data Gatherer Harvesting has been deactivated. MATUNER STOP
TS0003I CA MAT Token = 1200C3B4CD11A96C7594282CB500000001040003
TS0019I CA MAT Synchronous Data Gatherer command processing completed. MATUNER STOP
TN3431I Harvester command processed for: STOP,DIA3,DB2E1
```

If the exit is active for another server, the following messages will be displayed:

TS0019I CA MAT Synchronous Data Gatherer command processing completed. MATUNER STOP
TN3431I Harvester command processed for: STOP,DIA3,DB2E1

If the exit has not been started, the following messages will be displayed:

TS0023I CA MAT Synchronous Data Gatherer Harvesting has not been started. MATUNER STOP
TS0019I CA MAT Synchronous Data Gatherer command processing completed. MATUNER STOP
TN3431I Harvester command processed for: STOP,DIA3,DB2E1

To list active and inactive Harvester exits on a given processor

Enter the following command on a z/OS console:

F *server*,HARVESTER,LIST

where *server* is the server name.

A display similar to the following will be sent to the z/OS console:

TS0031I CA MAT Synchronous Data Gatherer System DIA3   is active.
TS0031I CA MAT Synchronous Data Gatherer Target DIA3DBM1 is active.
TS0031I CA MAT Synchronous Data Gatherer HVCode DB2E3   is inactive.
TS0031I CA MAT Synchronous Data Gatherer Server TRI85MM is inactive.
TS0031I CA MAT Synchronous Data Gatherer HVCode DB2E1   is active.
TS0031I CA MAT Synchronous Data Gatherer Server TRI85KM is active.

Reload the Harvester IRB Driver

To reload the latest Harvester IRB Driver without requiring an IPL, run the RELoad command.

Enter the following command on a z/OS console:
F *server*,HARVESTER,REL

where *server* is the server name.

Example:
F MATUNER,HARVESTER,REL

The following messages appear in the z/OS console:
TS0033I The old length for CA MAT Synchronous Data Gatherer service was *nnnnnnnn*.
TS0034I The new length for CA MAT Synchronous Data Gatherer service is *nnnnnnnn.*
TN3431I Harvester command processed for: REL

where *nnnnnnnn* specifies the size of TSDGCMDI

Display DB2 Server Settings

Z/OS MODIFY commands can be used to display or change most of the DB2 Harvester and data collection commands in the server.

You can perform the following tasks:

- Change a Setting (see page 355)

- Display a Setting (see page 356)

- Display DB2 Harvester and Data Collection Commands in the Server (see page 356)

Change a Setting

Issue the following command to change a setting:

F *server*,HARVESTER,SETFLAG,*command,value*

where

server

Specifies the server name.

command

Specifies one of the commands listed in the section Synchronous Data Gatherer.

value

Specifies the new value.

DB2HVSE1, DB2HVSE2, and DB2HVSE3 cannot be modified.

Example:

F MATUNER,HARVESTER,SETFLAG,DB2HVLOC,NO

The following messages will be displayed in the server JES log:

TN3443I The old setting for DB2HVLOC was YES
TN3444I The new setting for DB2HVLOC is NO
TN3431I Harvester command processed for: SETFLAG,DB2HVLOC,NO

Display a Setting

Issue the following command to display a setting:

F *server*,HARVESTER,SHOWFLAG,*command*

where

- *server* is the server name.
- *command* is one of the commands listed in the section Synchronous Data Gatherer.

Example:

F MATUNER,HARVESTER,SHOWFLAG,DB2HVLOC

The following messages will be displayed in the server JES log:

```
TN3445I The setting for DB2HVLOC is NO
TN3431I Harvester command processed for: SHOWFLAG,DB2HVLOC
```

Display DB2 Harvester and Data Collection Commands in the Server

Issue the following command to display all the DB2 Harvester and data collection commands in the server:

F *server*,HARVESTER,SHOWFLAG,DB2

where

server

Specifies the server name.

Example

F MATUNER,HARVESTER,SHOWFLAG,DB2

The following messages is displayed in the server JES log:

```
TN3445I The setting for DB2PLAN  is MAT85DB2
TN3445I The setting for DB2PACK  is MAT85
TN3445I The setting for DB2HRVST is YES
TN3445I The setting for DB2HVLOC is NO
TN3445I The setting for DB2HVCOR is YES
TN3445I The setting for DB2HVIID is YES
TN3445I The setting for DB2HVTHD is YES
TN3445I The setting for DB2HVEXT is DB2E3
TN3445I The setting for DB2HVSE1 is NONE
TN3445I The setting for DB2HVSE2 is NONE
TN3445I The setting for DB2HVSE3 is DB8G,DB9G,DIA1,DIA2,DIA3,IA4,IA5
TN3431I Harvester command processed for: SHOWFLAG,DB2
```

Summary of DB2 Customization Parameters

The collection of DB2 data during a monitor is controlled by two sets of options:

- Global options set in the UTRSAMP TUNSSP00 member that are in effect for all profiles.

- Monitor specific options that can be set in the DB2 Monitor Criteria panel when a monitor profile is defined. These options would be in effect only for the monitor session associated with the profile.

The DB2 parameters in TUNSSP00 are designed to be hierarchical in nature. The concept is that the administrator of CA MAT can determine the site's preference for how the data should be collected.

Select one the following methods:

- Sampling by using the standard sampling architecture

- Interception of data from DB2 by using the Harvester

The data collected with the Sampler is based only on active or waiting samples as the samples are taken during the monitor session. Therefore, you see active and waiting sample percentages on the DB2 displays.

The data collected with the Harvester is based on statistics that are maintained and managed by the DB2 subsystem itself. This data includes (but is not limited to) such things as CPU time, counts of the times an SQL statement is executed, buffer counts, and so on.

Data can also be collected by the Sampler and the Harvester at the same time.

The administrator can then determine how granular the data needs to be. Is there a need for thread, or operator or location information? If so, set the appropriate options listed in the section Synchronous Data Gatherer.

If Explain information is necessary for either the sampled SQL, the harvested SQL, or both, set the appropriate Explain options listed in the section DB2 Monitor Profile Options.

Harvester Parameters	Granularity Parameters
DB2HRVST	DB2HVLOC
DB2HVEXT	DB2HVCOR
DB2HVSE1	DB2HVIID
DB2HVSE2	DB2HVTHD

Harvester Parameters	Granularity Parameters
DB2HVSE3	

More information:

Synchronous Data Gatherer (see page 346)

DB2 Harvester and Data Collection Settings

Following lists the DB2 Harvester and data collection settings in TUNSSP00 that are used by CA MAT.

DB2HRVST

Synchronous Data Gatherer activation.

During initialization of the Server, this parameter prepares the environment for the Harvester to accept START and STOP exit commands.

When the DB2 Harvesters are in place, absolute DB2 counts, CPU time, and elapsed times are gathered.

The following are valid responses:

■ **YES** activates the DB2 Harvester facility and allows CA MAT to gather data.

■ **NO** prevents the activation of the DB2 Harvester facility and CA MAT does not gather data.

The default is DB2HRVST=NO (for no DB2 support).

Recommendation: When customizing for DB2 support, set this value to YES.

DB2HVEXT

Exit name.

Specify the name of the exit to be used when a Harvester is started during a monitor session.

The following are valid values:

■ DB2E1 — harvest non-COMMIT SQL calls to DB2
(see also DB2HVSE1)

■ DB2E2 — harvest only COMMIT calls to DB2
(see also DB2HVSE2)

■ DB2E3 — harvest both COMMIT and other SQL calls to DB2
(see also DB2HVSE3)

Recommendation:

Use the default parameter, DB2E3, to collect the most complete data.

When using the default, you should also review DB2HVSE3 to define the DB2 subsystems where you would like CA MAT to implant the DB2 Harvester during startup processing.

The default is DB2HVEXT=DB2E3.

DB2HVSE1

Plant DB2 Harvester exit DB2E1 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E1 exit.

The format is DB2HVSE1=ssid,ssid,ssid,...

This parameter should only be used when DB2HVEXT=DB2E1 is specified.

There is no default.

DB2HVSE2

Plant DB2 Harvester exit DB2E2 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E2 exit.

The format is DB2HVSE2=ssid,ssid,ssid,...

This parameter should only be used when DB2HVEXT=DB2E2 is specified.

There is no default.

DB2HVSE3

Plant DB2 Harvester exit DB2E3 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E3 exit.

The format is DB2HVSE3=ssid,ssid,ssid,...

This parameter should only be used when DB2HVEXT=DB2E3 is specified. Note: DB2HVEXT=DB2E3 is the default.

There is no default.

DB2HVLOC

Harvest the requesting location.

The requesting location name is generally of importance for distributed DB2 threads. The name can help to identify where the SQL originated from.

Most other threads originate from the local location.

The following are valid responses:

- YES - Use LOCATION as part of the key to gather information.

- NO - Do not add LOCATION to the key.

The default is DB2HVLOC=YES.

DB2HVCOR

Use correlation ID as part of the key.

Collect the DB2 correlation ID for the DB2 data in both the Harvester and the sampling process.

This option adds a higher level of granularity to the DB2 data being collected.

- For IMS, the correlation ID is the PSB name.

- For CICS, the correlation ID is the transaction name.

- For Batch type threads, the correlation ID is the job name.

- For remote and RRSAF threads, the value in this field is dependent on the requesting application.

The following are valid responses:

- YES - Use the DB2 correlation ID in building the key.

- NO - Do not add correlation ID to the key.

The default is DB2HVCOR=YES.

DB2HVIID

Use operator ID as part of the key.

Collect the DB2 primary operator ID for the DB2 data in both the Harvester and the sampling process.

This option adds a higher level of granularity to the DB2 data being collected.

The following are valid responses:

- **YES** - Use the DB2 operator ID in building the key.

- **NO** - Do not add operator ID to the key.

The default is DB2HVIID=YES.

DB2HVTHD

Use thread address as part of the key.

Add the DB2 Thread Agent Control Element address to the data being collected by the Harvester and the sampling process.

The following are valid responses:

- YES - Use the DB2 thread address in building the key.

- NO - Do not add the DB2 thread address to the key.

The default is DB2HVTHD=YES.

CAFSTALL

DB2 CAF interface timeout value.

Specify a timeout value in seconds.

When CA MAT issues calls to DB2 to obtain Explain data, CA MAT sets a timer. If the timer expires before the Explain data is returned, CA MAT assumes the DB2 region is stalled. For large DB2 systems, the default of 90 seconds might not be sufficient to return DB2 Explain data. For these cases, CAFSTALL allows the site to specify the timer amount in seconds.

Default is 90.

DB2LIBS

DB2 parameter member suffix.

Specify a TUNDB2*xx* member with this keyword.

The CAF Interface loads DB2 interface modules to obtain the SQL statement text from the DB2 catalog. For each version of DB2 you have installed at your site, you need to specify a load library where DSNHLI is located. These load libraries are in the parameter library member of TUNDB2*xx*, where *xx* is a two-character suffix or &SYSCLONE.

Default is xx, where *xx* is the release number of CA MAT.

DB2PACK

DB2 package name.

Specify the name of the DB2 package assigned during the DB2 BIND job during customization.

This job must be run against every DB2 subsystem against which monitors are run.

The default is MAT*nn*, where *nn* is the value specified for the DB2LIBS keyword (usually the release number of CA MAT).

DB2PLAN

DB2 plan name.

Specify the name of the DB2 plan assigned during the DB2 BIND job during customization.

This job must be run against every DB2 subsystem against which monitors is run.

The default is MAT*nn*DB2, where *nn* is the value specified for the DB2LIBS keyword (usually the release number of CA MAT).

DB2 Monitor Profile Options

It is possible to set options that pertain only to individual measurements. By default, CA MAT will not issue the EXPLAIN command to request information about the access path for SQL statement. By default, it will collect SQL text from the DB2 catalog. Any of these options can be overridden for an individual monitor by specifying other values on the DB2 Monitor Criteria panel.

EXPLAIN SQL

Requests that information regarding DB2 access path selection be obtained from DB2 SQL statements by issuing the EXPLAIN command and externalizing the data.

YES

Specifies that DB2 EXPLAIN data is collected for all statements seen. The call for Explain data is made while the address space is being measured. If YES is specified then Use DB2 Catalog for EXPLAIN must also be YES.

NO

Specifies that no DB2 EXPLAIN data is gathered. This is the default.

Collect SQL from Catalog

This option determines if CA MAT extracts the plan or package statements from the DB2 catalog or extracts them directly from DB2 control blocks when monitoring a DB2 application.

YES

Specifies the collection of SQL data for each plan or package sampled or harvested from the DB2 catalog.

NO

Specifies no collection of SQL statements from the DB2 catalog. This is the default and is recommended.

If you are using TUNCALL to define a MONITOR, the DB2EXPL and DB2CTSQL keywords correspond to the EXPLAIN SQL and Collect SQL from Catalog options respectively.

Chapter 11: Using the Product in a CICS Environment

This chapter describes the types of delays that are specific to CICS. Use this chapter along with the tables in the chapter "Tuning Your Applications" to analyze the types of delays that are specific to a CICS environment. CA MAT is compatible with CICS TS 3.1 and later releases.

CA MAT detects the delays incurred by transactions and CICS tasks in this environment. The terms *transactions* and *tasks* define units of work within CICS. A transaction might comprise a single task or several tasks.

CICS is a transaction processing system that shares the resources of the region among many concurrently executing tasks. CICS management routines control the transaction's access to all external and internal resources, such as files, databases, storage, programs, and special CICS facilities.

This section contains the following topics:

Support for CICS

This chapter includes several CICS features that are supported only for CICS TS 3.1 and later releases:

- CICS summary statistics

- CICS transaction statistics

- CICS Idle Time

If you attempt to use these features in a pre-CICS TS 3.1 environment, you will receive an Invalid Release message.

If you use an earlier release of CICS, refer to the previous release of this User Guide.

For configuration of these features, see the *Installation Guide*.

Messages for CICS TS 3.1 and later environments and pre-CICS TS 3.1 environments are documented separately in Chapter 5 of the *Message Reference Guide*l.

Transaction Response Times

CICS transaction response times are affected by these major factors:

- **System response time -** depends on the implementation of the code and the speed of the processor

- **DASD response time** - generally responsible for most of the internal processing of a transaction

- **Network response time -** can be in seconds or the internal time can be a fraction of a second

    If the network is overloaded, you will never get good response time

    CA MAT helps you monitor the internal processing time of a transaction but cannot identify problems with your network

- **Existing workload** - might affect the performance because of contention for hardware resources or logical resources

- **Application design** - might affect performance because a task might use excessive resources

CICS Transaction Types

CICS has the following types of transactions:

- **Non-conversational -** a single transaction/task pair that has one input from a terminal user and returns a single output

- **Conversational** - a single transaction and corresponding task that can interact with the terminal user by using several input and output operations

    This type of work can use excessive CICS resources and risk causing enqueue delays because the task retains resources between terminal interactions.

- **Pseudo conversational** - a single transaction that might span several tasks

  This type of work benefits a system when your response time is relatively slow because CICS resources are returned to the system during think times.

- **Non-terminal** - no terminal or principal facility is associated with this task, such as tasks initiated with DPL

Analyze CICS Data

To analyze CICS data to the SQL statement level, use the following procedure to display the SQL statements for a CICS job.

Follow these steps:

1. Set up your monitoring criteria so that the Observations Requested field contains a number in the range of 3000 to 10000.

   For more information about specifying monitoring criteria, see the chapter "Setting up a monitor definition."

2. Invoke the monitor using the Invoke line command (I).

3. Analyze the data by using one of the analysis line commands (A, AL, AA, or AW).

4. Select Option 6 from the Interactive Analysis menu.

   The TranView panel displays.

```
 CA MAT -------------------------- TranView ---------------- Row 2 to 7 of 7
 COMMAND ===>                                               SCROLL ===> CSR

 Primary commands: SELect, RECall, ADDHelp                  Profile: CICSTS32
            STC - CICS Summary Stats   IDL - CICS Idle Time  Options: NORMAL
 Line commands: T - Tag   U - Untag   D - Delay Details (Auto-Navigation)
                C - Code Details      N - Data Details
                P - CallerID Details  S - Additional Tran Statistics


 LC TRAN      T D #Trans Avg RESP Avg CPU  Actv%  Data%  Other% Total% Visual
    _____ _ _ _____ _____ _____ _____ _____ _____ _____ _____
 >-----------------------------------------------------------------------------
 __  MVB2     Y     1 30.25732 0.02672 12.50   3.75   0.00  16.25 ====>
 __  MVB3     Y     1 31.57696 0.04382 11.25   1.25   3.75  16.25 ====>
 __  MVB4           1 30.19894 0.01891  5.00   0.00  10.00  15.00 ====>
 __  MVB5     Y     3 30.29251 0.01075  7.50   0.00   5.00  12.50 ===>
 __  MVB1     Y     0  0.00000 0.00000  6.25   0.00   5.00  11.25 ===>
 __  CATR           1  0.01592 0.00512  0.00   0.00   1.25   1.25
 ****************************** End of Table ******************************
```

TranView for CICS

TranView displays activity in terms of the individual transactions detected. It divides the activity of these transactions into six major groups and displays the percentage of time each transaction spends in one of these groups. A description for each field in TranView follows.

Tran

Name of a transaction detected by CA MAT during the monitoring of an IMS or CICS region.

T

"X" indicates the transaction has been tagged for analysis.

#Trans

Number of times the transaction completed processing during the monitored period.

Avg RESP

Average time (in seconds) for this transaction during the monitored period.

Tot CPU

Cumulative CPU seconds for this transaction during the monitored period.

AVG CPU

Average CPU time required for this transaction during the monitored period.

Actv%

Percentage of time during the monitored period that the CPU was actively processing the monitored transaction.

Data%

Percentage of time during the monitored period that the transaction was delayed because of an I/O request.

Other%

Percentage of time during the monitored period that was not attributable to any of the categories known to CA MAT.

Totl%

Summation of the categories of delay.

Visual

Graphical representation of the total delay associated with the transaction.

Total SUs

Total amount of CPU time in service units used by this transaction.

CA MAT calculates this amount by using the following formula:

(Tot CPU * 16000000) / CPU Adjustment Rate

The CPU Adjustment Rate can be seen on the OverView report.

Average SUs

Average number of CPU Service Units required to process a transaction.

CA MAT calculates this amount by using the following formula:

(Avg CPU * 16000000) / CPU Adjustment Rate

The CPU Adjustment Rate can be seen on the OverView report.

CA MAT gives you flexibility when monitoring a job; you can specify user IDs, terminal IDs, and transaction codes, or use generic transaction codes on the CICS Monitoring Criteria panel to focus the monitoring on specific units of work. The data displayed in TranView represents the selected transaction only. To understand how to specify transaction code information, see

Select Transactions for Analysis

TranView helps you identify the transactions on which you want to focus. If you select a transaction from TranView, CA MAT recalculates the values to reflect only the selected transactions. When you display DelayView, CodeView, and TimeView, you can see the recalculated values.

1. Type **T** next to the transactions that you want to select for analysis. You can select up to five transactions.

2. Press Enter.

   An X will be displayed in the T column indicating which transactions are selected.

3. To clear a transaction, type **U** next to it and press Enter.

4. Type the **SELect** primary command and press Enter.

   The TranView panel will only show the selected transactions, with all percentages calculated for the selected transactions only.

5. To redisplay all transactions, type RECall and press Enter.

   The transaction **N/A** is calculated from samples representing activity not associated with any particular transaction.

PoolView

CICS file (or database) accesses are usually the cause of most of the internal processing delays. CICS transactions can access any type of file but usually retrieve their data from VSAM files or a database management system such as IMS/DB or DB2®.

The VSAM response time is especially sensitive to several key definitions, including

- Number of index buffers

- Number of data buffers

- Number of strings

- CI size

- CI and CA splits

CA MAT provides statistics on these critical parameters that can help improve the performance of a transaction.

See also "File and Database Statistics". These statistics can be used to measure the effectiveness of tuning measures (such as file I/O times).

You can access CICS VSAM files by using a facility called Local Shared Resources (LSR). This feature creates a buffer pool in the monitored program's region that can be shared by a number of VSAM files. The number of buffers and strings that you define for the pools can critically affect a transaction's performance. CA MAT allows you to look into your LSR pool with PoolView, which lists each group of buffers and their usage statistics.

Follow these steps:

1. Select Option 8 from the Interactive Analysis menu.

   The PoolView panel displays:

   ```
   CA MAT ------------------------- PoolView ----------------- ROW 1 to 1 of 1
   COMMAND ==>                                                 SCROLL ==> CSR

   Line commands: S - Select                                   Profile: CICSMIX
                                                               Options: NORMAL
   LC Type Group Category
      ___ ____ _____
   ----------------------------------------------------------------------------
   __ VSAM LSR   VSAM Local Shared Resource pool
   ```

2. Type **S**.

3. Press Enter.

The Shared Pools panel displays.

```
CA MAT ----------------------- Shared Pools ---------------- ROW 1 to 4 of 4
COMMAND ==>                                               SCROLL ==> CSR

                     Pool type: LOCAL                     Profile: CICSMIX
                Total pool size: 81408                    Options: NORMAL
      Hit ratio for all subpools: 67.0%

Line commands: S - Select, D - Datasets

                 Pool  No. of Buffer Buffer No. Requests  Requests Hit
LC Type Group SP Type  Buffers size   fixed  Str w/read    wo/read  Ratio
   ___ ____ __ ____ _____ _____ ____ __ _____ _____ ____
>-----------------------------------------------------------------------
__ VSAM LSR    1 BOTH      3    512 NO      1     843     1,717 67.0%
__ VSAM LSR    1 BOTH      3  2,048 NO      1       0         0 *N/A*

__ VSAM LSR    1 BOTH      3 20,480 NO      1       0         0 *N/A*
```

High hit ratios indicate that a significant portion of the read requests are satisfied from buffers rather than from DASD. You can relate VSAM files to a buffer pool by using the data and index CI sizes from the DataView detail panels. If a file indicates large delays, you can alter the number of buffers that are allocated for the CI size that the file uses.

4. To look at more detailed information about a VSAM pool, type **S** and press Enter.

The VSAM Pool Details panel displays. VSAM Pool Details displays the same information as shown in Shared Pools, but in a detail format.

```
CA MAT ------------------------- VSAM Pool Details -------------------------
COMMAND ==>

                        Pool type: VSAM                    Profile: CICSMIX
                       Pool group: LSR
                          Pool ID: 1
                 Number of buffers: 3
                      Buffer size: 512
                 Number of strings: 1
              Placeholders in chain: 0
                        Hit Ratio: 67.0%
            Requests requiring a read: 843
         Requests satisfied from pool: 1717
                User initiated writes: 0
            Non-user initiated writes: 0
                 Retrieves by RBA: 0
                     ESDS inserts: 0
                 Retrieves by key: 0
                     KSDS inserts: 0
                    Buffer alters: 0
                        VSAM GETS: 0
                  Buffer searches: 0
              Error buffers in pool: 0
              Maximum error buffers: 0
```

5. To view a list of VSAM data sets that are opened by using the specified pool, type D and press Enter.

    The Pooled Data Sets panel displays. Each of the data sets uses the buffers provided by this pool for its I/O.

```
CA MAT ----------------- Pooled Data Sets ----------------- ROW 1 to 2 of 2
COMMAND ==>                                              SCROLL ==> CSR

Subpool: 1        BufferSize: 512                       Profile: CICSMIX

Line commands: S - Select

LC DDname    Data Set Name                           Type Comp    CISize
   _____ _____ ___ _____ _____
--------------------------------------------------------------------------------
__ ACCTIX   TUN.CICSTEST.INDEX.ACIXFILE              KSDS INDEX     512
__ ACCTIX   TUN.CICSTEST.DATA.ACIXFILE               KSDS DATA      512
```

The fields on the Pooled Data Sets panel are described next.

Subpool

Identification number of the VSAM subpool.

Buffer size

Size in bytes of each buffer in the subpool.

DDname

DDNAME used to allocate the data set.

Data Set Name

full name of the data set

Type

One of the following VSAM data set types:

■   KSDS - a key sequenced data set that always accompanied by an INDEX component; the index component does not have to use the same subpool.

■   ESDS - an entry sequenced data set.

Comp

One of the following types:

■   DATA .ntains indexing information

CISize

Control Interval Size

This field shows the unit of transfer for VSAM data to and from storage. It is always a multiple of 512 bytes.

6. Type **S** next to one of the DD statements and press Enter to display an enhanced version of the Data Set Details panel.

DelayView

The best place to start looking for delays is with Option 2 on the Interactive Analysis menu. With DelayView, you can see which types of operations were executed and how much elapsed time was spent in each operation type.

For more information, see Interactive analysis option 2 – DelayView.

Overview of CICS Delay Types

This section describes the types of delays that are specific to CICS. CICS statistics, which can give insight into these delays, are discussed in CICS Summary Statistics and CICS Transaction Statistics. Warning signs and possible tuning measures are also discussed.

With autonavigation, you can go directly from a delay category to a more detailed screen that provides relevant information about the delay. For more information, see "Using Autonavigation".

An overview of the delay types that you see in a CICS environment follows along with recommendations about how to use CA MAT to find out more about why your transactions are experiencing delays.

CA MAT groups delays into major and minor categories. An overview of CICS delay categories follows.

CICS System Delays

Either CICS locks were held by the application causing delays or a function was shipped to another CICS region running in an MRO configuration.

CICS Transient Data

Transient data delays include all functions that read, write, or delete records to the transient data in VSAM data sets. Delays associated with actually performing I/O to the VSAM cluster also are included in this category.

CICS Storage Control

Storage allocated for the application includes CICS system-acquired storage for the application, such as areas for the program, data records, terminal areas, and messages. It also includes dynamically acquired user storage needed by the application.

CICS File Control/Database

This category includes the delays associated with performing I/O to CICS files or database operations. The I/O is directly requested by the application or is performed on behalf of the application by CICS.

CICS Journal Control

Journal control delays are those delays associated with performing any actions to the CICS journals. Journaling is performed on behalf of the applications.

CICS Temporary Storage

Temporary storage delays are those delays that are incurred because of read/write activity to the Temporary Storage facility of CICS.

CICS Program Control

This category includes delays incurred by the application when programs are loaded by CICS.

CICS Terminal Control

This category includes all delays incurred when reading or writing data to a terminal, all VTAM related delays, and delays caused when an application is waiting for input from the terminal user.

CICS DL/I Resources

This category includes delays related to application requests to local DL/I resources and to DBCTL regions.

The various types of CICS system delays, and the possible reasons for them are described next.

Lock delays

CICS obtains locks on behalf of the application for a variety of reasons. These locks normally exist for a short period of time. A significant delay can indicate a system definition problem.

MRO Inter-region delays

If your application uses the multiregion option of CICS, it might be delayed because you are unable to establish a session with the remote system. This delay indicates that too few sessions are available on the remote system, or, if the connection has been made, the other system is responding slowly and your request is delayed. CA MAT attempts to identify the name of the other CICS in its detail data.

The following text describes the various types of CICS transient data delays, and the possible reasons for them.

Extrapartition Queue locked

Application can wait when making a request to an extrapartition transient data queue because some other task is using that destination.

TD Queue locked

Transient data queues defined in the DCT as logically recoverable can cause delays because a subsequent task that is making a request to the same queue is forced to wait until the first application terminates or issues a synchpoint command.

Buffer wait

This delay occurs when all of the buffers for the transient data are in use. The application waits until a buffer becomes available.

VSAM string wait

This delay occurs when all of the VSAM strings for the transient data queue are in use. The application waits until a VSAM string becomes available.

VSAM I/O wait

This delay occurs when the transient data request is waiting for the VSAM I/O to the Transient Data VSAM file to complete processing.

VSAM I/O buffer wait

Brief delay that occurs when there is contention for a VSAM control interval.

CICS Storage Control Delays

The various types of CICS storage control delays, and the possible reasons for them are described next.

CICS DSA

USER DSA

CICS EDSA

USER EDSA

CUSHION

Any of these delays can occur when a CICS region is stressed on storage. The two most important reasons for extended storage waits occur when the program or one of its subroutines issues an unconditional GETMAIN for storage and the request is for either

- a very large amount of storage

- a reasonable amount of storage, but the system does not have the storage available because storage is fragmented or the CICS region has reached a short-on-storage condition

This section describes the various types of CICS file control delays, and the possible reasons for them.

VSAM buffer

The application is waiting for a VSAM buffer that is controlled with CICS file control table definition parameters.

Resolve this type of delay by increasing the number of buffers defined in the file control table.

VSAM Upgrade set

The application is attempting to read a record by using a VSAM path while another application is updating the record.

File control state change

The application is attempting to change the state of a file resource, but another task is still using the file.

VSAM I/O

The application is waiting for VSAM I/O to finish. Another job or task in the system can be updating the same file and preventing the CICS I/O from completing its processing.

VSAM String wait

The application is waiting for a VSAM string that the program or one of its subroutines is allocating to request data from a VSAM file.

VSAM file recovery failed

The file recovery failed. Because file recovery is handled by IBM routines, resolve file recovery wait problems with your systems programmer.

Shared resource

The application has requested a MASSINSERT operation and is waiting for a VSAM transaction ID to become available.

VSAM exclusive control

The application has attempted to update a VSAM file and requires exclusive control of a VSAM control interval to complete the update. This type of delay indicates a high level of concurrency of transactions that require access to the same records in the CICS system.

This section describes the various types of CICS journal control delays, and the possible reasons for them.

Subtask

The application is waiting for journal control to submit the archiving jobs to archive the journals.

Available ECB

The application is waiting for a logical ECB. Only a specified number of ECBs is available to journal control, and the wait is due to extensive journaling activity.

Allocate more ECBs by increasing the number of journals allocated to CICS.

Buffer unavailable

The application has issued a journal request and the buffer is nearly full, or the journal is unavailable because of a volume switch.

Flushing buffer

The application is requesting a journal close and is flushing the buffers.

I/O block

The application has issued a journaling request with the WAIT option and is suspended until the I/O completes processing.

I/O complete

The application has issued a CLOSE request for a journal and is waiting for all active I/O operations to finish before completing the CLOSE request.

JACD Get

The application has issued an inquiry request for a journal and the state of the journal is changing, due to switching from one journal to another. An extended delay might indicate that a journal I/O problem exists.

JACD Put

The application has issued a journal request and the state of the journal is changing, due to switching from one journal to another. An extended delay might indicate system I/O problems.

Switch wait reason

The application has issued a journal switch and is waiting for data to be written to the journal before the request can be honored. It is essentially an I/O wait.

Close done reason

The application is waiting is for the OPEN/CLOSE subtask to complete a close request. The application cannot influence this type of delay.

Detach

A task has requested shutdown and is waiting for the detaching of the journal subtask from the operating system. The application cannot influence this type of delay.

Ready

An outstanding write to operator with reply (WTOR) is causing the application to wait. This application cannot influence this type of delay.

Request done

The application is waiting for an OPEN or CLOSE request that another CICS task issued.

Switch

A system-related delay that the application cannot influence has occurred.

Tape2

A system-related delay that the application cannot influence. This delay indicates that a journal tape has been opened with an open ahead request and is not ready for I/O.

This section describes the types of CICS temporary storage delays, and the possible reasons for them.

Auxiliary storage

An application has attempted an unconditional write to temporary storage but sufficient auxiliary storage is unavailable.

Determine if the application is attempting to place a piece of temporary storage, which is too large, to the facility.

Buffer

The application has attempted to write to temporary storage and all buffers are in use.

Increase the number of temporary storage buffers by altering the buffer specification in the TS initialization parameter of the CICS system.

Extend

An application has made a request to extend temporary storage but some other task made the same request. A long delay might indicate a device or VSAM problem.

I/O

The application has made a request to temporary storage and is waiting for I/O completion.

Queue

Indicates one of the following reasons:

The application has made a request to the temporary storage queue, but the queue is already in use by another task that has a lock on the queue.

Many transactions might be using the same temporary storage queue, or the same transaction has many instances running in parallel.

VSAM string

The application has made a temporary storage request and is waiting for a VSAM string.

Activity keypoint

The application is waiting for activity keypointing to complete processing. The delay can be significant when there are many temporary storage queues.

This section describes the various types of CICS program control delays, and the possible reasons for them..

Loader

Indicates one of the following reasons:

The application has made a request to load another program into storage and the task has been suspended.

If the application is loading the program for the first time, the delay is related to the I/O required to move the program into storage.

This section describes the various types of CICS terminal control delays, and the possible reasons for them.

Terminal I/O

The application has issued a request to read or write data to a terminal and the task is waiting until the operation completes processing.

DFHZGET failure

Indicates one of the following reasons:

The application has requested terminal control and is waiting for completion of an internal storage control operation.

Increase the amount of storage available for the CICS region.

LU62

Indicates one of the following reasons:

The application has requested terminal control to perform an operation and an error occurred during the VTAM operation.

The application cannot influence this system-related delay.

This section describes the various types of CICS DL/I resources delays, and the possible reasons for them.

PSB schedule lock

Indicates one of the following reasons:

The application is waiting for the PSB because another task has a lock on the PSB.

Too many tasks are attempting to access the same PSB.

No DL/I thread

The application has made a request for DL/I data and no DL/I threads are available. A DL/I thread is required to access data within IMS databases.

Increase the number of DL/I threads by modifying the CICS initialization parameters.

Termination request

The application is in termination but another task has requested the scheduling of a PSB. The application waits until the other task completes scheduling.

No PSB space

Indicates one of the following reasons:

The application has made a DL/I request and there is no PSB pool space available.

The task has obtained a DL/I thread but the attempt to load the PSB into the pool failed because other tasks performing DL/I are using the space.

No DMB space

Indicates one of the following reasons:

The application has made a DL/I request and no DMB pool space is available.

The task has obtained a DL/I thread and the PSB has been loaded. The attempt to load the DMBs, referenced in the PSB, into the pool failed because other tasks performing DL/I are using the space.

DL/I PSB/DMB load

A hardware error occurred when the application attempted to load a PSB or DMB.

DBCTL user wait

The application has made a DL/I request and is waiting for the DBCTL address space to service the request.

CICS Summary Statistics

CICS summary statistics are normally automatically collected at regular intervals (default 1 minute) by the COLLECT_TRANSACTION (collect CICS requested statistics) - see the *Installation Guide*. If you want to obtain summary statistics that contain data for a given monitoring run, you need to wait until that run has completed; wait until at least 1 COLLECT_TRANSACTION has completed (message TN0846I), and then analyse summary statistics for a subsequent monitoring run.

If it has not been excluded from analysis, you can assess the impact of the COLLECT_TRANSACTION (default name is **TUNC**) on your system using TranView. However, the COLLECT_TRANSACTION will not appear in TranView if it has not completed during a monitor run.

Use one of the following methods to obtain the CICS summary statistics:

- Enter STC from the TranView panel.

- Select option 14 from the Interactive Analysis panel.

You will then see the CICS Summary (requested) Statistics panel shown following.

```
CA MAT -------- CICS Summary (requested) Statistics ---
COMMAND ===>                                              SCROLL ==> CSR
Place cursor on topic and press ENTER :                  Profile: CICSA

DB2    DB2                            DISP  Dispatcher
FILE   Files                         JAVA  JAVA
LOGS   Logstreams                    PAUT  Program autoinstall
RECV   Recovery Manager              SDMP  System dumps
TDMP   Transaction Dumps             STOR  Storage (DSA)
TCPI   TCP/IP                        TDQ   Transient Data (TDQ)
TRNM   Transaction Manager           TSQ   Temporary Storage (TSQ)
URIM   URIMAP                        VTAM  VTAM
TCLS   Transaction Class (TCLASS)    ENQ   Enqueues
LSRF   LSRPOOL (by file)             LSRP  LSRPOOL (by pool)
CONN   IRC/ISC connections
```

The CICS Summary statistics allow you to check if problems in the CICS environment in which a given transaction runs might be affecting that transaction's performance. These statistics can give you insight into the causes of poor transaction performance. Some examples of such problems are:

- Excessive transaction or system dumps pre-empting CICS resources

- Excessive DB2 aborts

- Storage waits

- Transaction Class queueing

- Temporary Storage waits due to insufficient strings or buffers

You can request summary statistics in the categories listed following.

Category	Description
DB2	DB2 statistics
DISP	Dispatcher statistics
JAVA	JAVA statistics (pool)
LOGS	Logstream statistics
PAUT	Program autoinstall statistics
RECV	Recovery Manager statistics
SDMP	System dump statistics
TDMP	Transaction dump statistics
STOR	Storage Manager statistics (DSA)
TCPI	TCP/IP statistics

TDQ	Transient data statistics
TRNM	Transaction Manager statistics
TSQ	Temporary storage statistics
URIM	URIMAP statistics
VTAM	VTAM statistics
FILE	FILE statistics
TCLS	TCLASS statistics
ENQ	Enqueue statistics
LSRF	LSRpool (by file) statistics
LRSP	LSRpool (by pool) statistics
CONN	Connection statistics

Summary Statistics Panels

The following panels are examples of CICS summary statistics panels.

All the summary statistics panels show the following information:

■   when the statistics were requested

■   the last time the statistics counters were reset

Reset of requested statistics occurs when

■   CICS starts

■   A COLLECT STATISTICS or PERFORM STATISTICS was issued with a RESET parameter

■   The expiry of a statistics interval occurs, such as at CICS midnight

You must always check the reset time to establish the validity of the summary statistics for the desired analysis period. Note that not all statistics are reset to zero when a reset occurs. See the *CICS Performance Guide* for the reset characteristics of individual statistics fields.

Transactions do not reset any statistics counters.

The Help panels provide a description of each statistic. For more information about the help panels, see the *CICS Performance Guide*.

If the COLLECT_TRANSACTION has not been run, or if this feature has been turned off (see the *Installation Guide*), all Summary Statistics displays show NO DATA.

DB2 Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive aborts (abending transactions?)
- Excessive thread waits (insufficient pool threads?)

Possible Tuning Criteria:

Ideally, rejects and failures should be zero.

```
CA MAT ------- CICS Statistics - Program Autoinstall ------------ Row 1 to 4
COMMAND ===>                                                SCROLL ===> CSR
          Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile:
ICSA

PAUT   ****************** *************** ***************** **************
PAUT   No. attempts       00000016        No. rejects       00000000
PAUT   No. failures       00000000
PAUT   ****************** *************** ***************** **************
```

Possible Tuning Criteria:

- Reduced string waits
- Improved lookaside ratios

Use PF11/PF10 to scan right and left in the panel shown next.

```
CA MAT ------------ CICS Statistics - LSR (by pool) ------------------ Row 1
COMMAND ===>                                                SCROLL ===> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA
Pool Max Key No.     Peak waited Total waited Peak concurr Data     Data Hiper
     Length  Strings On String  On String    Actv Strings Buffers  Buffers

____ _____ _____ _____ _____ _____ _____ _____

>--------------------------------------------------------------------------
1     255    20       0          0          0                55        0
***************************** End of Table *****************************
```

Possible Tuning Criteria:

- Reduction in aborts
- Reduction in waits

```
Panel 1:

CA MAT ------------ CICS Statistics - DB2 --------------- Row 1 to 16 of 25
COMMAND ===>                                          SCROLL ===> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA


____ _____ _____ _____ _____
-------------------------------------------------------------------------------
DB2   ****************** *************** ****************** **************
DB2   Connection name    RCT1$           DB2 sysid          DB8G
DB2   Release            0810            Groupid            N/A
DB2   PoolPlan           N/A             PlanExit           DSNCUEXT
DB2   PoolAuth           N/A             ComdAuth           N/A
DB2   Conntime GMT       07.198 00:05:03 Conntime Local     07.197 20:05:03
DB2   Disctime GMT       N/A             Disctime Local     N/A
DB2   Maximum TCBs       00000012        Current TCBs       00000000
DB2   HWM TCBs           00000000        Current Free TCBs  00000000
DB2   Tasks TCB READYQ   00000000        Peak TCB READYQ    00000000
DB2   Pool calls         00000000        Pool Signons       00000000
DB2   Pool commits       00000000        Pool aborts        00000000
DB2   Pool single commts 00000000        Pool thrd reuses   00000000
DB2   Pool terminates    00000000        Pool thrd waits    00000000
DB2   Pool thrd limit    00000003        Pool thrds currnt  00000000
DB2   Peak pool threads  00000000        Pool tsks current  00000000

Panel 2:

CA MAT ------------ CICS Statistics - DB2 --------------- Row 17 to 25 of 25
COMMAND ===>                                          SCROLL ===> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA


____ _____ _____ _____ _____
-------------------------------------------------------------------------------
DB2   Peak pool tasks    00000000        Total pool tasks   00000000
DB2   Cur pool RDYQ tsks 00000000        Pk pool RDYQ tasks 00000000
DB2   Pool part. signons 00000000        Comd calls         00000000
DB2   Comd signons       00000000        Comd terminates    00000000
DB2   Comd overflows     00000000        Comd thrd limit    00000001
DB2   Comd thrd current  00000000        Comd thrd HWM      00000000
DB2   Comd AuthType      Userid          Pool AuthType      Userid
DB2   Resync Member      Resync UOWs     Pool AccountRec    Txid
DB2   Pool ThreadWait    Yes             Pool Priority      N/A
****************************** End of Table ******************************
```

Dispatcher Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive CPU time (tasks using too much CPU?)

- Excessive thread waits (insufficient pool threads?)

Possible Tuning Criteria:

Reduction in CPU usage

```
CA MAT ----------- CICS Statistics - Dispatcher -------------- Row 1 to 10

COMMAND ===>                                          SCROLL ===> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

DISP  ***************** ************** ***************** **************
DISP  Curr. ICV time    00001000       Curr. ICVR time  00005000
DISP  Curr. ICVTSD time 00000500       Priority aging   00032768
DISP  Subtasks value    00000000       QR batching (MRO) 00000001
DISP  Curr. no. tasks   00000018       Peak no. tasks   00000046
DISP  Sub-disp strt GMT 07.157 04:16:38 Sub-disp strt LOC 07.157 00:16:38
DISP  Acc. CPU time     00:00:44.0234  Acc. SRB time    00:00:02.3696
DISP  Excess TCB scans  00000000       Scans - no detachs 00000000
DISP  No. excess detachs 00000000
DISP  ***************** ************** ***************** **************
```

JAVA Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

Excessive requests (system over-loaded? - check response times)

Possible Tuning Criteria:

Reduction in requests

```
CA MAT-------------- CICS Statistics - JAVA ------------------- Row 1 to 8
COMMAND ===>                                          SCROLL ===> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

JAVA  ***************** ************** ***************** **************
JAVA  Curr. JVMs        00000001       Peak JVMs        00000001
JAVA  Total JVM pgm reqs 00000001      JVM reqs w. reuse 00000000
JAVA  Total pgm reqs    00000001       Reqs - initialisd 00000001
JAVA  Reqs - mismatch   00000000       Reqs - terminated 00000000
JAVA  Reqs - reset      00000001       Curr. wkr JVMs   00000000
JAVA  Peak wkr JVMs     00000000       Reqs -class cache 00000000
JAVA  ***************** ************** ***************** **************
```

Logstream Statistics

```
CA MAT ------------ CICS Statistics - Logstream ------------------ Row 1 to 4
COMMAND ===>                                              SCROLL ===> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA


LOGS  ***************** *************** ***************** **************
LOGS  Keypt frequency    00004000          Logdefer interval  00000005
LOGS  Keypoints taken    00000001
LOGS  ***************** *************** ***************** **************
```

Program Autoinstall Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Rejects/failures, which can be due to

- Application errors?

- LINKs to invalid program?

- Program autoinstall program bugs?

- Program not present in DFHRPL library?

Recovery Manager Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive shunt time (problems with other systems participating in UOWs?)

- Excessive forced actions (operational errors, failed partner systems?)

Possible Tuning Criteria:

Review operational procedures if these problems recur.

```
CA MAT --------- CICS Statistics - Recovery Manager ------------ Row 1 to 13
COMMAND ===>                                              SCROLL ===> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

RECV  ****************** ************** ***************** **************
RECV  Syncpoints forward 00000043       Syncpoints backwrd 00000000
RECV  Resyncs          00000000         Shunted indoubt    00000000
RECV  Total time shunted 00:00:00.0000  Curr shunted indbt 00000000
RECV  Curr shunted time  00:00:00.0000  Total shunted RO   00000000
RECV  Shunted time RO    00:00:00.0000  Curr. shunts RO    00000000
RECV  Curr. time RO      00:00:00.0000
RECV  Forced trandef   00000000         Forced timeout     00000000
RECV  Forced nowait    00000000         Forced operator    00000000
RECV  Forced other     00000000         Indoubt mismatches 00000000
RECV  Forced nowait TD 00000000         Forced nowait LU61 00000000
RECV  Forced nowait MRO 00000000        Forced nowait RMI  00000000
RECV  Forced nowait othr 00000000
```

System Dump Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive system dumps (system problems, application problems ?)

  Check CICS log and transaction abend statistics.

Possible Tuning Criteria:

- Investigate causes

  Ideally, no system dumps should occur for production CICS systems. Suppress **routine** or **known** system dumps as these can cause major slowdowns.

```
CA MAT ---------- CICS Statistics - System Dumps ----------------- Row 1 to 3
COMMAND ===>                                              SCROLL ===> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

SDMP  ****************** ************** ***************** **************
SDMP  Sys dumps taken   00000000        Sys dumps suppr    00000000
SDMP  ****************** ************** ***************** **************
```

Transaction Dump Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive transaction dumps (system problems, application problems, CSD definition errors?)

  Check CICS log and transaction abend statistics.

Possible Tuning Criteria:

- Investigate causes

  Ideally, no transaction dumps should occur for production CICS systems. Suppress **routine** or **known** transaction dumps as these can cause slowdowns.

```
CA MAT -------- CICS Statistics - Transaction Dumps -------------- Row 1 to 3
COMMAND ===>                                           SCROLL ==> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA


TDMP  ****************** ************** ***************** **************
TDMP  Tran dumps taken   00000000       Tran dumps suppr   00000000
TDMP  ****************** ************** ***************** **************
```

Storage Manager Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Requests causing wait

  Check CICS log (SOS messages?) and transaction abend statistics. The system might be overloaded.

Possible Tuning Criteria:

- Investigate causes

  Ideally, no storage waits should occur in production systems.

```
CA MAT ----------- CICS Statistics - Storage/DSA ----------------- Row 1 to 6
COMMAND ===>                                           SCROLL ==> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA


STOR  ****************** ************** ***************** **************
STOR  Curr. DSA limit    00004096K      Curr. EDSA limit   00204800K
STOR  Curr. DSA total    00001280K      Curr. EDSA total   00028672K
STOR  HWM DSA total      00001280K      HWM EDSA total     00028672K
STOR  wait time for stg  00:00:00.0000  reqs causing wait  00000000
STOR  ****************** ************** ***************** **************
```

TCP/IP Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive delays, timeouts (system TCP/IP problems, network problems, insufficient maxsocket limit?)

Possible Tuning Criteria:

- Reduced delays and timeouts

```
CA MAT -------------- CICS Statistics - TCP/IP ---------------- Row 1 to 11
COMMAND ==>                                           SCROLL ==> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA


TCPI   ***************** *************** ***************** **************
TCPI   Maxsockets limit  00065535        Curr i/b sockets  00000002
TCPI   Peak i/b sockets  00000002        Curr o/b sockets  00000000
TCPI   Peak o/b sockets  00000000        Curr persist o/b  00000000
TCPI   Peak persist o/b  00000000        i/b sockets creatd 00000002
TCPI   o/b sockets creatd 00000000       o/b sockets closed 00000000
TCPI   Times maxsockets  00000000        Total delayed     00000000
TCPI   Delay time        00:00:00.0000   Timeouts          00000000
TCPI   Curr delayed      00000000        Peak delayed      00000000
TCPI   Curr delay time   00:00:00.0000
TCPI   ***************** *************** ***************** **************
```

Transient Data (TDQ) Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive buffer waits (insufficient buffers?)

- String waits (insuffient strings?)

- NOSPACE (DFHINTRA big enough?)

- I/O errors (data set problems?)

- Peak Cis used approaching max Cis (DFHINTRA big enough?)

Possible Tuning Criteria:

- Reduced buffer waits

- Reduced string waits

- No I/O errors

- Peak CI usage comfortably below max CIs

```
Panel 1
CA MAT ------- CICS Statistics - Transient Data (TDQ) ---------- Row 1 to 14
COMMAND ==>                                            SCROLL ==> CSR

Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

  TDQ   ***************** **************** ***************** **************
  TDQ   Buffer stats      **************** ***************** **************
  TDQ   No. buffers       00000003         Peak w. valid data 00000000
  TDQ   Buffer accesses   00000000         Peak concurrent   00000000
  TDQ   Buffer waits      00000000         Peak buffer waits 00000000
  TDQ   CISZ              00004096         Control intervals 00003600
  TDQ   Peak CIs used     00000001         Times NOSPACE     00000000
  TDQ   Dataset stats     **************** ***************** **************
  TDQ   Dataset writes    00000000         Dataset reads     00000000
  TDQ   Format writes     00000000         I/O errors        00000000
  TDQ   String stats      **************** ***************** **************
  TDQ   No. strings       00000003         String accesses   00000000

  TDQ   Peak str waits    00000000

Panel 2


CA MAT ------- CICS Statistics - Transient Data (TDQ) --------- Row 15 to 19
COMMAND ==>                                            SCROLL ==> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

  TDQ   Current stats     **************** ***************** **************
  TDQ   Conc. buff access 00000000         Buffer waits      00000000
  TDQ   Buffrs valid data 00000000         String accesses   00000000
  TDQ   String waits      00000000         CIs in use        00000001
  TDQ   ***************** **************** ***************** **************
```

Transaction Manager Statistics

Warning signs follow.

Warning Signs:

- Maxtask (maxtask limit too low? system overloaded? **rogue** transactions? system at SOS?)

- Delays and queueing (as per Maxtask)

- Possible Tuning Criteria:

■ Zero time at Maxtask

■ Reduced delays and queueing

```
CA MAT ------- CICS Statistics - Transaction Manager ------------- Row 1 to 8

COMMAND ===>                                              SCROLL ==> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

TRNM   ***************** *************** ***************** **************
TRNM   User + sys trans  00000037      Curr MAXTSK limit 00000025
TRNM   Curr user trans   00000002      Curr qd user tran 00000000
TRNM   Times at MAXTASK  00000000      Active user trans 00000005
TRNM   Pk qd user trans  00000000      Tot act user tran 00000014
TRNM   Total delayed     00000000      Tot trn last reset 00000000
TRNM   Q time spent    00:00:00.0000   Curr q time     00:00:00.0000
TRNM   ***************** *************** ***************** **************
```

Temporary Storage (TSQ) Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

■ Excessive buffer waits (insufficient buffers?)

■ Unnecessary use of auxiliary storage (not needed if the queue is not recoverable)

■ String waits (insuffient strings?)

■ Auxiliary storage exhausted (DFHTEMP big enough?)

■ I/O errors (data set problems?)

■ Peak Cis used approaching max Cis (DFHTEMP big enough?)

■ Excessive writes GT CISZ (performance hit)

Possible Tuning Criteria:

■ Reduced buffer waits

■ Reduced string waits

■ Reduced use of auxiliary storage

■ Peak CI usage comfortably below max Cis

■ No I/O errors

■ Reduced writes GT CISZ (adjust CISZ?)

```
Panel 1:

 CA MAT  -------- CICS Statistics - Temp Storage (TSQ) ---------- Row 1 to 15
 COMMAND ===>                                             SCROLL ===> CSR
 Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

 TSQ    ****************** ************** ***************** **************
 TSQ    PUT main stg reqs  00000001       GET main stg reqs  00000003
 TSQ    Peak stg for TS    00000140       PUT aux stg reqs   00000002
 TSQ    GET aux stg reqs   00000000       Peak TS names      00000001
 TSQ    Entries longest q  00000002       Times q created    00000002
 TSQ    CISZ               00004096       Writes GT CISZ     00000000
 TSQ    CIs in TS dataset  00003599       Peak CIs used      00000002
 TSQ    Times aux exhaust  00000000       TS buffers         00000003
 TSQ    Buffer waits       00000000       Pk users waiting   00000000
 TSQ    Buffer writes      00000000       Forced writes      00000000
 TSQ    Buffer reads       00000000       Format writes      00000000
 TSQ    TS strings         00000003       Peak strings       00000000
 TSQ    String waits       00000000       Pk user waits str  00000000
 TSQ    I/O errors         00000000       Curr stg for TS    00000000

Panel 2:

 CA MAT  -------- CICS Statistics - Temp Storage (TSQ) ---------- Row 15 to 22
 COMMAND ===>                                             SCROLL ===> CSR
 Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

 TSQ    TS compressions    00000000       Curr CIs in use    00000001
 TSQ    Users waitng str   00000000       Users waitng buf   00000000
 TSQ    TS names in use    00000000       Longest aux lrecl  00000110
 TSQ    Av. bytes/CI       00004032       Segments/CI        00000063
 TSQ    Bytes/segment      00000064       Shrd pools defnd   00000000
 TSQ    Shrd pools con'd   00000000       Shrd read reqs     00000000
 TSQ    Shrd write reqs    00000000
 TSQ    ****************** ************** ***************** **************
```

URIMAP Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive requests (application problem?)

- Host disabled (definition or operational problem?)

Possible Tuning Criteria:

- Reduced requests

- Zero host disabled

```
CA MAT -------------- CICS Statistics - URIMAP ------------------ Row 1 to 8
COMMAND ==>                                            SCROLL ==> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA
URIM  ***************** *************** **************** **************
URIM  Reference count   00000000       Match disabled     00000000
URIM  Host/path no mtch 00000000       Host/path match    00000000
URIM  Match redirect    00000000       Match analyzer     00000000
URIM  Static content    00000000       Dynamic content    00000000
URIM  Pipeline reqs     00000000       Scheme http reqs   00000000
URIM  Scheme https reqs 00000000       Host disabled      00000000
URIM  ***************** *************** **************** **************
```

VTAM Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive times at RPL max (correct VTAM definitions?)

  This might not be a performance problem, but should be checked.

- Excessive times at SOS (VTAM storage problem - check VTAM definitions, buffer usage)

Possible Tuning Criteria:

- Reduced times at RPL max

- Reduced times at SOS

```
CA MAT -------------- CICS Statistics - VTAM ------------------- Row 1 to 8
COMMAND ==>                                            SCROLL ==> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

VTAM  ***************** *************** **************** **************
VTAM  Times at RPL max  00000007       Max RPLs posted    00000000
VTAM  SOS count         00000001       Dynamic opens      00000000
VTAM  Current LUs       00000001       HWM LUs            00000001
VTAM  PRSS inquires     00000000       PRSS NIBs          00000000
VTAM  PRSS opndsts      00000000       PRSS unbinds       00000000
VTAM  PRSS errors       00000000
VTAM  ***************** *************** **************** **************
```

FILE Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive string waits.

- Excessive times exclusive control conflicts

- Excessive ratio of VSAM EXCPs to VSAM I/O requests

- For CMDTs, a high ratio of source data set reads to data table reads

Possible Tuning Criteria:

- Reduced string waits

- Reduced exclusive control conflicts

- Lower EXCP ratio

- For CMDTs, a low ratio of source data set reads to data set reads

Use PF11/PF10 to scan right and left in the panel shown next.

```
CA MAT ------------- CICS Statistics - FILES ----------------- Row 1 to 8 of
COMMAND ==>                                             SCROLL ==> CSR
Collection Time: 2007/07/09 23:02:07   Reset Time: 00:00:00   Profile: CICSA
FileName Rem DataTable RLS Dataset Close
             Type          Type   Type (DT)

_____ ___ _____ ___ _____ _____
>-----------------------------------------------------------------------------
ACCTIX   N   N         N
DFHCMACD N   N         N   K
DFHCSD   N   N         N   K
DFHDBFK  N   N         N
DFHLRQ   N   N         N   K
EZACACHE N   T         N   K
EZACONFG N   N         N   K
FILEA    N   N         N
***************************** End of Table *****************************
```

TCLASS Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive queueing, queueing time

- Excessive purges

If the transaction queues are excessively long, scan times for the **waiting for dispatch** queue can affect system performance as a whole (see **waiting for 1st dispatch** Dispatcher statistics). You can use the PurgeThreshold and DTIMOUT parameters to control TCLASS queue size. But be aware that excessive transaction purges can also affect system performance.

If you are never at the limit of your transaction class setting, you might consider resetting its value or review whether there is any need to continue specifying any transaction types with that class.

Possible Tuning Criteria:

- Reduced queuing

- Reduced purges

Use PF11/PF10 to scan right and left in the panel shown next.

```
CA MAT ------------ CICS Statistics - TCLASS ---------------- Row 1 to 14 of
COMMAND ===>                                               SCROLL ===> CSR
Collection Time: 2007/07/09 23:02:07   Reset Time: 00:00:00   Profile: CICSA
TCLASS   Maximum  Attaches Purged    Queued  Accepted    Accepted after
         Allowed           Immediate         Immediately Queueing

_____ _____ _____ _____ _____ _____ _____
>-------------------------------------------------------------------------
DFHCOMCL    10       0       0          0        0            0
DFHEDFTC    10       0       0          0        0            0
DFHTCIND    10       0       0          0        0            0
DFHTCL01     1       0       0          0        0            0
DFHTCL02     1       0       0          0        0            0
DFHTCL03     1       0       0          0        0            0
DFHTCL04     1       0       0          0        0            0
DFHTCL05     1       0       0          0        0            0
DFHTCL06     1       0       0          0        0            0
DFHTCL07     1       0       0          0        0            0
DFHTCL08     1       0       0          0        0            0
DFHTCL09     1       0       0          0        0            0
DFHTCL10     1       0       0          0        0            0
DFHTSDEL    25       0       0          0        0            0
```

ENQ Statistic

Warning signs and possible tuning criteria follows.

Warning Signs:

- Excessive waits, waiting time

- Excessive rejects or purges

The enqueue pool names are listed in the *CICS TS Users Guide*. See also "Investigating Enqueue Waits" in the IBM CICS TS InfoCentre. Excessive enqueue waits can be a symptom of a number of different problems, including

■   System slowdown

■   Application design issues

■   Bottlenecks

■   Resource unavailability

Possible Tuning Criteria:

■   Reduced waits

■   Reduced purges

Use **PF11/PF10** to scan right and left in the panel shown following.

```
CA MAT ------------ CICS Statistics - ENQUEUES ---------------- Row 1 to 15 o
COMMAND ==>                                           SCROLL ==> CSR
Collection Time: 2007/07/09 23:02:07   Reset Time: 00:00:00   Profile: CICSA
Pool      Total   Waited  Time               Waiting  Time
                          Waited                      Waiting

_____ _____ _____ _____ _____ _____
>---------------------------------------------------------------------------
DISPATCH      0        0 00:00:00.000            0 00:00:00.000
EXECADDR      0        0 00:00:00.000            0 00:00:00.000
EXECPLEX      0        0 00:00:00.000            0 00:00:00.000
EXECSTRN     34        0 00:00:00.000            0 00:00:00.000
FCDSESWR      0        0 00:00:00.000            0 00:00:00.000
FCDSLDMD      0        0 00:00:00.000            0 00:00:00.000
FCDSRECD      0        0 00:00:00.000            0 00:00:00.000
FCDSRNGE      0        0 00:00:00.000            0 00:00:00.000
FCFLRECD      0        0 00:00:00.000            0 00:00:00.000
FCFLUMTL      0        0 00:00:00.000            0 00:00:00.000
JOURNALS      1        0 00:00:00.000            0 00:00:00.000
KCADDR      249        0 00:00:00.000            0 00:00:00.000
KCSTRING    199        0 00:00:00.000            0 00:00:00.000
LEPTENQS      0        0 00:00:00.000            0 00:00:00.000
LOGSTRM       0        0 00:00:00.000            0 00:00:00.000
```

LSR Pool (by File) Statistics

Warning signs and possible tuning criteria are discussed next.

Warning Signs:

■   Buffer waits

There might be insufficient buffers or one file in the pool is monopolizing the buffers. Consider allocating this file to its own pool if this is the case.

Possible Tuning Criteria:

- Reduced buffer waits

Use **PF11/PF10** to scan right and left in the panel shown next.

```
CA MAT ------------ CICS Statistics - LSR (by file) ------------------ Row 1
COMMAND ===>                                            SCROLL ===> CSR

Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA
File      Pool  Data  Indx  Buffer   Highest
Name      ID    Bufsz Bufsz Waits    Buffer Waits
_____  _____ _____ _____ _____  _____
------------------------------------------------------------------------------
ACCTFIL   1      0     0      0        0
ACCTIX    1      0     0      0        0
DFHCMACD  1      0     0      0        0
DFHCSD    1 20480  1024      0        0
DFHLRQ    1      0     0      0        0
EZACACHE  1      0     0      0        0
EZACONFG  1 20480   512      0        0
FILEA     1      0     0      0        0
****************************** End of Table ******************************
```

LSR Pool (by Pool) Statistics

Warning signs follow.

Warning Signs:

- String waits
- Low lookaside ratios (data and index)

Consider increasing available pool strings if string waits are excessive. Consider allocating heavily-used files to their own pool (see File statistics).

See the *CICS Performance Guide* for further tuning guidelines.

Connection Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive outstanding allocates, queued allocates
- Failed allocates

Outstanding and queued allocates can be a sign of problems in the target CICS region.

You might be seeking an answer to some of the following questions when looking at these statistics:

- Are there enough sessions defined?

- Is the balance of contention winners to contention losers correct?

- Is there conflicting usage of APPC mode groups?

- What can be done if there are unusually high numbers, compared with normal or expected numbers, in the statistics report?

See the *CICS Performance Guide* for further tuning guidelines.

Possible Tuning Criteria:

- Reduced outstanding and queued allocates

- Zero failed allocates

Use **PF11/PF10** to scan right and left in the panel shown next.

```
CA MAT------------ CICS Statistics - Connections ------------------ Row 1 to 1
COMMAND ===>                                              SCROLL ===> CSR

Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA
Conn Access Protocol Netname  AIDs in Generic AIDs Current Max o/stndg
    Method                    Chain   in Chain    Bids    Allocates

____ _____ _____ _____ _____ _____ _____ _____
>-----------------------------------------------------------------------------
GR1G IRC    EXCI     CITGR1GI    0        0          0        0
****************************** End of Table ******************************
```

CICS Transaction Statistics

To obtain additional CICS transaction statistics for a given transaction that displays on the TranView panel, enter the line command S next to the desired transaction. These statistics are derived from CICS Transaction Monitoring data (control block DFHMNTDS) as described in the IBM manual, *CICS Transaction Server for z/OS Data Areas*.

You can request additional transaction statistics in the categories listed next. For more information about these statistics, see the *CICS Performance Guide.*

To correctly interpret these statistics, you must understand the relationships between response times, dispatch times, and wait and exception times. These relationships are described in the *CICS Performance Guide*.

The statistics listed in the following table are presented as averages per transaction, except where an average would not be meaningful (such as high water marks). These exceptions are marked with **.

Category	Description	Relevant Performance Class Categories
ALL	All of the categories listed below	
DB	File and database statistics	DFHDATA, DFHFILE, DFHRMI, DFHSYNC, DFHTASK
DISP	Dispatcher statistics	DFHCICS, DFHTASK
STG	Storage statistics	DFHSTOR
TSQ	Temporary storage statistics	DFHTEMP
TDQ	Transient data statistics	DFHDEST
JNL	Journal/logger statistics	DFHJOUR
IC	Interval control statistics	DFHTASK
PC	Program control statistics	DFHPROG
TERM	Terminal control statistics	DFHTERM
WAIT	Wait/Exception statistics	DFHCICS, DFHTASK - see also "Exception Class Data"
WEB	WEB/EJB/DOC statistics	DFHDOCH, DFHEJBS, DFHWEBB
FEPI	FEPI statistics	DFHFEPI
BTS	Business Transaction Services statistics	DFHCBTS
SOCK	Socket statistics	DFHSOCK

Transaction Statistics Panels

Transaction statistics panels are shown in the following panels.

File and Database Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive requests (application design?)

- Excessive wait times (buffering, DB2 tuning?)

Possible Tuning Criteria:

- Reduction in wait times

```
CA MAT ------------- CICS Transaction Statistics --------------- Row 1 to 13
COMMAND ===>                                             SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL          Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY            Average/transaction
Type                      (unless marked **)
____ _____ _____  _____ _____
----------------------------------------------------------------------------
DB   **************** **************    **************** **************
DB   FC gets         00004300          FC puts         00004300
DB   FC browses      00008700          FC adds         00000000
DB   FC deletes      00000000          FC total requests 00026100
DB   CFDT wait time  00:00:00.00000    FC I/O wait time 00:00:09.20380
DB   IMS requests    00000000          IMS wait time   00:00:00.00000
DB   DB2 requests    00000000          DB2 wait time   00:00:00.00000
DB   DB2 READYQ wait 00:00:00.00000    DB2 connect wait 00:00:00.00000
DB   RMI elapsed     00:00:00.00000    RMI suspend time 00:00:00.00000
DB   Syncpoint requests 00000101       Syncpoint elapsed 00:00:00.02870
DB   Syncpoint delay 00:00:00.00000    RLS wait time   00:00:00.00000
DB   RLS SRB CPU time 00:00:00.00000
DB   **************** **************    **************** **************
```

Dispatcher Transaction Statistics

For a detailed discussion of the various TCB and Key modes (X8, L9 and so on), see the *CICS Performance Guide*.

Warning Signs:

- Maxtask delay
- Dispatch delays (contention, enqueuing?)
- Excessive CPU time
- Change Mode delays (THREADSAFE tuning)

Possible Tuning Criteria:

- Reduction in delays
- Reduction in CPU
- Reduction in Change Mode delays (THREADSAFE tuning)

```
Panel 1:

CA MAT------- CICS Additional Transaction Statistics ----------- Row 1 to 13
COMMAND ===>                                               SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL         Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY           Average/transaction
Type                      (unless marked **)

____ _____ _____ _____ _____
----------------------------------------------------------------------------
DISP ***************** **************    ***************** **************
DISP  Tran count**      00000003
DISP  Abend count**     00000000        TCB attaches      00000000
DISP  HWM TCBs**        00000000        User disp time    00:00:04.53896
DISP  Waiting for disp  00:00:06.66086  Suspend time      00:00:22.08072
DISP  QR mode delay     00:00:06.66086  Max open TCB dely  00:00:00.00000
DISP  Max XPLINK delay  00:00:00.00000  TCB mismatch wait  00:00:00.00000
DISP  CHNGMODE delay    00:00:00.00000  1st disp delay    00:00:00.01195
DISP  1st dsp dely TCLS 00:00:00.00000  1st dsp dely MAXT  00:00:00.00000
DISP  Giveup cntl wait  00:00:00.00000
DISP  QR dispatch time  00:00:04.53896  QR CPU time       00:00:04.05502
DISP  MS dispatch time  00:00:00.00000  MS CPU time       00:00:00.00000
DISP  RO dispatch time  00:00:00.00000  RO CPU time       00:00:00.00000

Panel 2:

CA MAT ------- CICS Additional Transaction Statistics ---------- Row 14 to 20
COMMAND ===>                                               SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL         Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY           Average/transaction
Type                      (unless marked **)

____ _____ _____ _____ _____
----------------------------------------------------------------------------
DISP  Key 8 dispatch tim 00:00:00.00000  Key 8 CPU time   00:00:00.00000
DISP  Key 9 dispatch tim 00:00:00.00000  Key 9 CPU time   00:00:00.00000
DISP  L8 CPU time       00:00:00.00000  L9 CPU time       00:00:00.00000
DISP  J8 CPU time       00:00:00.00000  S8 CPU time       00:00:00.00000
DISP  J9 CPU time       00:00:00.00000  X8 CPU time       00:00:00.00000
DISP  X9 CPU time       00:00:00.00000
DISP ***************** **************    ***************** **************
```

Storage Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive getmains (design problem?)

- Excessive storage usage (design problem?)

Possible Tuning Criteria:

- Reduction in getmains

- Reduction in storage usage

```
CA MAT ------- CICS Additional Transaction Statistics ------------ Row 1 to 13
COMMAND ===>                                                  SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL            Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY           Average/transaction
Type                      (unless marked **)


____  _____ _____   _____ _____
------------------------------------------------------------------------------
STG   **************** **************      **************** **************
STG   Getmains below    00000000          Getmains above    00002250
STG   HWM below**       00002160          HWM above**       00000000
STG   **************** **************      **************** **************
```

Temporary Storage (TS) Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive TS requests (design problem?)

- Unnecessary use of auxiliary storage, TS I/O waits (design problem, buffering?)

Possible Tuning Criteria:

- Reduction in TS requests

- Reduction in TS wait time

```
CA MAT ------- CICS Additional Transaction Statistics ------------ Row 1 to 3
COMMAND ===>                                                  SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL            Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY           Average/transaction
Type                      (unless marked **)


____  _____ _____   _____ _____
------------------------------------------------------------------------------
TSQ   **************** **************      **************** **************
TSQ   Gets              00000000          Puts - aux stg    00000000
TSQ   Puts - main stg   00000000          Total requests    00000000
TSQ   I/O wait time   00:00:00.00000      Shared TS wait  00:00:00.00000
TSQ   **************** **************      **************** **************
****************************** End of Table *****************************
```

Transient Data (TD) Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive TD requests (design problem?)
- I/O waits (design problem, buffering?)

Possible Tuning Criteria:

- Reduction in TD requests
- Reduction in TD I/O wait time

```
CA MAT ------- CICS Additional Transaction Statistics ------------ Row 1 to 4
COMMAND ===>                                               SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL         Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY           Average/transaction
Type                      (unless marked **)

____ _____ _____          _____ _____
--------------------------------------------------------------------------
TDQ  ***************** **************           ***************** **************
TDQ  Gets            00000000                   Puts            00000001
TDQ  Purges          00000000                   Total requests  00000001
TDQ  I/O wait time   00:00:00.00000
TDQ  ***************** **************           ***************** **************
```

Journal/Logger Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive requests (design problem, resources unnecessarily defined as recoverable?)
- I/O waits (design problem, logstream problems?)

Possible Tuning Criteria:

- Reduction in requests

- Reduction in I/O wait time

```
CA MAT ------- CICS Additional Transaction Statistics ------------ Row 1 to 4
COMMAND ===>                                                SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL          Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY             Average/transaction
Type                        (unless marked **)

_____ _____ _____    _____ _____
--------------------------------------------------------------------------
JNL   ***************** **************    ***************** **************
JNL   Writes          00000000           Logger write reqs 00000000
JNL   I/O wait time   00:00:00.00000
JNL   ***************** **************    ***************** **************
```

Interval Control Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive requests (design problem?)

- Excessive delay time (system problems? - see Dispatcher Statistics)

Possible Tuning Criteria:

- Reduction in requests

- Reduction in delay time

```
CA MAT ------- CICS Additional Transaction Statistics ------------ Row 1 to 4
COMMAND ===>                                                SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL          Profile: CICSA

                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY             Average/transaction
Type                        (unless marked **)

_____ _____ _____    _____ _____
--------------------------------------------------------------------------
IC    ***************** **************    ***************** **************
IC    Starts          00000000           Total requests   00000001
IC    Delay time      00:00:00.00000
IC    ***************** **************    ***************** **************
```

Program Control Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive requests (design problem?)

- Excessive load time (system problems?)

Possible Tuning Criteria:

- Reduction in requests

- Reduction in load time

```
CA MAT ------- CICS Additional Transaction Statistics ------------ Row 1 to 4
COMMAND ===>                                              SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL         Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY            Average/transaction
Type                      (unless marked **)

____ _____ _____ _____ _____
----------------------------------------------------------------------------
PC    ****************** **************    ****************** **************
PC    Links           00000002           Xctls            00000000
PC    Loads           00000001           Load time        00:00:00.00000
PC    ****************** **************    ****************** **************
```

Terminal Control Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive messages/characters (design problem?)

- Excessive allocates (system problems?)

- Excessive waits (system problems, problem with remote regions/systems?)

Possible Tuning Criteria:

- Reduction in unnecessary messages/characters

- Reduction in wait time

```
CA MAT ------- CICS Additional Transaction Statistics ------------ Row 1 to 4
COMMAND ===>                                             SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL           Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY            Average/transaction
Type                      (unless marked **)


____ _____ _____ _____ _____
     ------------------------------------------------------------------
TERM  ***************** **************     ***************** **************
TERM  Primary msgs in   00000000         Primary chars in   00000000
TERM  Primary msgs out  00000000         Primary chars out  00000000
TERM  TCTTE allocates   00000000         I/O wait time      00:00:00.00000
TERM  LU61 I/O wait     00:00:00.00000   LU62 I/O wait      00:00:00.00000
TERM  IR I/O wait       00:00:00.00000
TERM  ***************** **************     ***************** **************
```

Wait/Exception Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive waits and delays (design problem, system problems, insufficient buffers or strings?)

- Excessive enqueues (system problems, design problems?)

Possible Tuning Criteria:

- Reduction in waits and delays

- Reduction in enqueues

```
CA MAT ------- CICS Additional Transaction Statistics ----------- Row 1 to 10
COMMAND ===>                                              SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL        Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY          Average/transaction
Type                     (unless marked **)

____ _____ _____ _____ _____
-----------------------------------------------------------------------
WAIT  ***************** **************     ***************** **************
WAIT  Exception waits   00000000          Exc buffer waits  00000000
WAIT  Exc string waits  00000000          Exc wait time     00:00:00.00000
WAIT  Local ENQ delay   00:00:00.00000    Global ENQ delay  00:00:00.00000
WAIT  Lock mngr delay   00:00:00.00000    Wait external wait 00:00:00.00000
WAIT  Wait CICS/event   00:00:00.00000    Server sync wait  00:00:00.00000
WAIT  RRMS/MVS wait     00:00:00.00000    Run trans wait    00:00:00.00000
WAIT  Reqst/recvr wait  00:00:00.00000    Req processor wt  00:00:00.00000
WAIT  Partner wait      00:00:00.00000
WAIT  ***************** **************     ***************** **************
```

WEB/EJB/DOC Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive requests (design problem?)

- Excessive characters sent or received (design problem?)

- Excessive delays (system problems, design problems?)

Possible Tuning Criteria:

- Reduction in requests

- Reduction in characters sent/received

- Reduction in delays

```
Panel 1:

CA MAT ------- CICS Additional Transaction Statistics ----------- Row 1 to 13
COMMAND ===>                                              SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL          Profile: CICSA
                IC    PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY              Average/transaction
Type                        (unless marked **)
_____ _____ _____      _____ _____
      --------------------------------------------------------------------
WEB   ****************** **************      ****************** **************
WEB   OO API requests   00000000            Receive requests  00000000
WEB   Chars recvd       00000000                Send requests     00000000
WEB   Chars sent        00000000               Total requests     00000000
WEB   Repository reads  00000000            Repository writes 00000000
WEB   Extract requests  00000000            Browse requests   00000000
WEB   Read requests     00000000            Write requests    00000000
WEB   Support reads     00000000            Support writes    00000000
WEB   Support receives  00000000            Supp. chrs recvd  00000000
WEB   Support sends     00000000            Supp. bytes sent  00000000
WEB   Support parses    00000000            Support browses   00000000
WEB   Support invokes   00000000
WEB   EJB activations   00000000            EJB passivations  00000000

Panel 2:

CA MAT ------- CICS Additional Transaction Statistics ---------- Row 14 to 22
COMMAND ===>                                              SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL          Profile: CICSA
                IC    PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY              Average/transaction
Type                        (unless marked **)
_____ _____ _____      _____ _____
      --------------------------------------------------------------------
WEB   EJB creations     00000000            EJB removals      00000000
WEB   EJB total reqs    00000000            OTS indoubt wait  00:00:00.00000
WEB   DOC creates       00000000            DOC inserts       00000000
WEB   DOC sets          00000000            DOC retrieves     00000000
WEB   DOC total reqs    00000000            DOC created len   00000000
WEB   Max JVM TCB delay 00:00:00.00000      JVM elapsed init  00:00:00.00000
WEB   JVM elapsed reset 00:00:00.00000      JVM totl elapsed  00:00:00.00000
WEB   JVM totl suspend  00:00:00.00000
WEB   ****************** **************      ****************** **************
```

FEPI Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

■ Excessive FEPI requests (design problem?)

■ Excessive characters sent or received (design problem?)

■ Excessive suspend time (system problems, design problems?)

Possible Tuning Criteria:

■ Reduction in FEPI requests

■ Reduction in characters sent/received

■ Reduction in suspend time

```
CA MAT ------- CICS Additional Transaction Statistics ------------ Row 1 to 4
COMMAND ===>                                               SCROLL ==> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL          Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY           Average/transaction
Type                      (unless marked **)
____ _____ _____     _____ _____
----------------------------------------------------------------------
FEPI  **************** **************     **************** **************
FEPI  Allocates       00000000           Receives         00000000
FEPI  Sends           00000000           Starts           00000000
FEPI  Chars sent      00000000           Chars received   00000000
FEPI  Allocate timeouts 00000000         Receive timeouts 00000000
FEPI  Total requests  00000000           Suspend time     00:00:00.00000
FEPI  **************** **************     **************** **************
```

Business Transaction Services (BTS) Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

■ Excessive BTS requests (design problem?)

■ Excessive length sent or received (check response time/CPU time - design
problem?)

Possible Tuning Criteria:

- Reduction in BTS requests

- Reduction in length sent/received

```
Panel 1:

 CA MAT ------- CICS Additional Transaction Statistics ----------- Row 1 to 13
 COMMAND ===>                                             SCROLL ==> CSR

Primary Commands: ALL  DISP DB   STG  TSQ  TDQ  JNL           Profile: CICSA
                  IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
 Stats TRAN=TUNY          Average/transaction
 Type                     (unless marked **)
 ____ _____ _____ _____ _____
 ---------------------------------------------------------------------------
 BTS    ***************** **************     ***************** **************
 BTS    Run/Prc/Act sync  00000000          Run/Prc/Act async  00000000
 BTS    Link/Prc/Act reqs 00000000          Define Proc reqs   00000000
 BTS    Define Actvy reqs 00000000          Reset proc/actvy   00000000
 BTS    Susp proc/actvy   00000000          Resume prc/actvy   00000000
 BTS    Del actvy/cancel  00000000          Acquire process    00000000
 BTS    Total proc/actvy  00000000          Proc container     00000000
 BTS    Actvy container   00000000          Container reqs     00000000
 BTS    Retr/Reatt event  00000000          Define inpt event  00000000
 BTS    Timer assoc event 00000000          Event requests     00000000
 BTS    Chnl contr reqs   00000000          Chnl contr browses 00000000
 BTS    Chnl contr gets   00000000          Chnl contr puts    00000000
 BTS    Chnl contr moves  00000000          Ch get contr len   00000000

Panel 2:

 CA MAT ------- CICS Additional Transaction Statistics ---------- Row 14 to 15
 COMMAND ===>                                             SCROLL ==> CSR
 Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL           Profile: CICSA
                  IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
 Stats TRAN=TUNY          Average/transaction
 Type                     (unless marked **)

 ____ _____ _____ _____ _____
 ---------------------------------------------------------------------------
 BTS    Ch put contr len  00000000
 BTS    ***************** **************     ***************** **************
```

Socket Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive socket requests (design problem?)

- Excessive characters sent or received (check response time/CPU time - design problem?)

- Excessive delays or I/O waits (system problems?)

Possible Tuning Criteria:

- Reduction in socket requests

- Reduction in characters sent/received

- Reduction in delays and/or I/O waits

```
CA MAT ------- CICS Additional Transaction Statistics ----------- Row 1 to 12
COMMAND ===>                                               SCROLL ===> CSR
Press to select: ALL  DISP DB   STG  TSQ  TDQ  JNL         Profile: CICSA
                 IC   PC   TERM WAIT WEB  FEPI BTS SOCKet
Stats TRAN=TUNY          Average/transaction
Type                     (unless marked **)

_____ _____ _____ _____ _____
-----------------------------------------------------------------------------
SOCK  ***************** **************     ***************** **************
SOCK  Bytes encrypted  00000000           Bytes decrypted   00000000
SOCK  Extracts         00000000           Create non-persist 00000000
SOCK  Create persistent 00000000          Receives          00000000
SOCK  Chars received   00000000           Sends             00000000
SOCK  Chars sent       00000000           Total requests    00000000
SOCK  Inbound receives 00000000           Inbd chars recvd  00000000
SOCK  Inbound sends    00000000           Inbd chars sent   00000000
SOCK  HWM non-perst**  00000000           HWM persist**     00000000
SOCK  I/O wait         00:00:00.00000     Outbound I/O wait 00:00:00.00000
SOCK  Max SSL TCB delay 00:00:00.00000
SOCK  ***************** **************     ***************** **************
```

CICS Idle Time

Idle Time is defined as follows:

Idle Time = Monitor Interval - Sum of (Dispatch Time for user tasks in this Interval)

This could be expressed as the time spent by CICS in the given Monitor Interval not performing **user** work.

User tasks are defined as all tasks not flagged by CICS as system tasks.

To obtain CICS Idle Time on the TranView panel, enter the primary command IDL.

```
CA MAT -------- CICS Idle Time -------------- Row 1 to 4 of 4
COMMAND ===>                                           SCROLL ===> CSR
                                                       Profile: CICSA
User tasks            : 12
Average dispatch time : 00:00:01.6
Average CPU time      : 00:00:01.3
Average suspend time  : 00:00:33.3
Average response time : 00:00:34.9
Monitor started       : 2007/06/19  20:40:54

Totals                      hh:mm:ss Pct of Interval

_____ _____ _____
------------------------------------------------------------------------------
User Task CPU Time       00:00:15     22.0
User Task Dispatch Time  00:00:18     27.0
Idle (Not Dispatched)    00:00:48     73.0
Monitor Interval         00:01:06    100.0
****************************** End of Table ******************************
```

Chapter 12: Using the Product in an IMS Environment

Delays processing IMS calls are usually caused by improperly designed applications and databases, inadequate database indexing, and programming errors. CA MAT can help identify the programs and IMS databases, segments, and calls that require attention. CA MAT is compatible with IMS versions 7.1 and later.

This section contains the following topics:

Analyze IMS Transactions

CA MAT enables you to analyze IMS data to the IMS transaction level. Use the following steps to see the IMS statements for an IMS job:

Follow these steps:

1. Select Option 11 from the Interactive Analysis menu.

```
CA MAT -------------------- Interactive Analysis --------------------------
OPTION ==>

Enter option to analyze the monitored job:                 Profile: BIGBATCH
                                                           options: NORMAL
  CA MAT Monitor Information                Subsystem Details

  ------------------------------------------  ------------------------------
  0  OverView   - Monitor session information  10  DB2 - View all SQL
  1  TaskView   - Activity by task            11  IMS - IMS Transactions
  2  DelayView  - Program delays              12  JVM - Java Virtual Machine
  3  CodeView   - Program activity            13  WAS - WebSphere Trans.
  4  TimeView   - Samples by time             14  CIC - CICS Summary Stats
  5  DataView   - Dataset information         15  IDMS - CA IDMS Activity
  6  TranView   - Activity by transaction     16  DCM - CA-Datacom Activity
  7  ModView    - Module layout               17  IDL - CA-Ideal Activity
  8  PoolView   - Buffer pools                18  ADA - Adabas Activity
  9  USSView    - Unix System Services        19  NAT - Natural Activity

  ACTIVE - switch context to ACTIVE   WAIT - switch context to WAIT
  NORMAL - switch context to NORMAL   ALL  - switch context to ALL

Press END to exit analysis
```

The IMS TranNameView panel displays.

If you have specified one or more transaction codes in the IMS Monitoring Criteria panel (see Monitor Criteria for IMS (see page 78)), the IMS TranNameView panel displays one line with the transaction code. This transaction code represents all other transactions that are intercepted but DO NOT appear in the list of specified IMS Monitoring Criteria transactions.

```
CA MAT -------------------- IMS TranNameView ---------- Row 1 to 4 of 4
COMMAND ==>                                              SCROLL ==> CSR
Primary commands: DBDname PSBname                      Profile: MAT81MPP
                                                    CTL Region: MAT81IMS
Line commands: S - Statements C - Code Detail       MPP Region: MAT81MPP
                                                        IMS ID: MAT8

  Region Active: 00:00:10.875487 ( 99.34%)
    Region Idle: 00:00:00.072232 ( 0.66%)
   Region Total: 00:00:10.947719 (100.00%)
Average Elapsed: 00:00:01.812581 (all transactions)


                      Tran   Total Elapsed Avg Elapsed  DL/I Call
LC TranCode PSB Name  Count  Time (sec)    Time (sec)   Interface Visual
_____ _____ _____ _____ _____ _____ _____
-------------------------------------------------------------------------
__ other    other      9     27.969850     3.169850    ASM    ======>
__ TRITS202 TRITST02   1      1.898589     1.898589    ASM    =>
__ TRITS205 TRITST02   1      1.963751     1.963751    ASM    =>
__ TRITS206 TRITST02   1      1.189338     1.189338    ASM    =>
****************************** End of Table ******************************
```

2. Scroll to the right to see additional fields.

The fields in this panel are described next.

CTL Region

Name of the MVS main storage region that contains the IMS control program.

IFP/BMP/MPP Region

Name of the MVS main storage region that contains the IMS message processing program.

IMS ID

Name of the IMS system.

Region Active

Percentage of time that the IMS Region was active during the monitor session.

Region Idle

Percentage of time that the IMS Region was idle during the monitor session.

Region Total

Total time that the IMS Region was operating during the monitor session.

Average Elapsed

Average elapsed time (in seconds) for all transactions detected.

Tran Code

IMS Transaction name; the panel is sorted on this field.

PSB Name

Name of the PSB to which the transaction is defined.

A PSB can be associated with multiple transactions. In a Message Processing Region (MPR) the PSBname must be the same as the Program name.

Tran Count

Number of times this transaction was executed during the monitor session..

Total Elapsed Time

Total time (HH:MM:SS.NNNNNN) that the transaction was executing.

Avg Elapsed Time

Average time (HH:MM:SS.NNNNNN) that the transaction was executing.

DL/I Call Interface

IMS data manipulation language, which is a common high-level interface between a user application and IMS.

Visual

Depicts the elapsed time of the transaction compared to all transactions.

CPU Time (CPU sec)

Total amount of CPU time required to process all occurrences of the transaction (in CPU seconds). You need to scroll to the right to see this field.

CPU Avg. (CPU sec)

Average amount of CPU time required to process a single occurrence of the transaction (in CPU seconds). You need to scroll to the right to see this field.

Region Idle and Region Total **ONLY** include the period of time between the **first** and **last** DLI call intercepted in the IMS message region being monitored. Therefore Region Total can be equal or less than the total monitor session elapsed time.

3. Enter the PSBname primary command on the COMMAND line and press **Enter** to see the activity and delays for all the detected IMS calls by PSBNAME, PCB #, call type, and segment.

The IMS Statements panel displays.

```
CA MAT --------------------- IMS Statements --------------- Row 1 to 4 of 4
COMMAND ==>                                              SCROLL ==> HALF

Primary commands: DBDname, PSBname, IMSview                Profile: IMS4
                                                            Mode: PSBNAME
   Line commands: S - SSA

LC PSB Name PCB# DBD Name Segment  Call P-Opts Actv% Wait% Totl% Visual
   _____ ____ _____ _____ ____ _____ ____ ____ ____ _____
>----------------------------------------------------------------------

__ DFSSAM04    2 DI21PART PARTROOT GU   A       0.02 27.95 27.97 =>
__ DFSSAM04    2 DI21PART PARTROOT ISRT A       0.02 25.51 25.53 =>
__ DFSSAM07    2 DI21PART PARTROOT ISRT A       0.00 11.60 11.60 >
__ DFSSAM03    2 DI21PART PARTROOT ISRT A       0.00  5.88  5.88
***************************** End of Table *****************************


--------------------------------- Totals ----------------------------------
```

4. Summarize the activity and delays for all the detected IMS calls from the transactions by database by entering the DBDname primary command on the COMMAND line of the IMS TranNameView panel and pressing Enter.

5. Display the IMS Statements panel for a specific transaction by entering the Statements line command (**S**) next to a transaction from the IMS TranNameView panel. The IMS Statements panel displays for that transaction.

```
CA MAT --------------------- IMS Statements --------------- Row 1 to 1 of 1
COMMAND ==>                                               SCROLL ==> CSR

Primary commands: DBDname, PSBname, IMSview                Profile: IMS
                                                            Mode: PSBNAME
   Line commands: S - SSA

     Transaction: ADDPART

 LC PSB Name PCB# DBD Name Segment  Call P-Opts Actv% Wait% Totl% Visual
    _____ ____ _____ _____ ____ _____ ____ ____ ____ _____
 -----------------------------------------------------------------------
 __ DFSSAM04    2 DI21PART PARTROOT ISRT A       0.02 25.51 25.53 =>
 ***************************** End of Table *****************************
```

Use the CodeView Detail (C) line command from the IMS TranNameView panel to display the program activity that is associated with a specific transaction; see the next panel.

Analyze IMS Data

CA MAT enables you to analyze IMS data to the IMS statement level. Use the following steps to see the IMS statements for an IMS job:

1. Set up your monitoring criteria so that the Observations Requested field contains a number in the range of 3000 to 10000.

2. Invoke the monitor by using the Invoke line command (**I**).

3. Analyze the data by using one of the analysis line commands, A, AL, AA, or AW.

4. Select Option **5** from the Interactive Analysis menu.

   The DataView panel displays.

```
CA MAT ------------------------- DataView ------------------ ROW 1 to 4 of 4
COMMAND ==>                                               SCROLL ==> CSR

Primary commands: LINklist on/off                         Profile: IMS
                                                          Options: NORMAL
   Line commands: S - Select                              Linklist: ON


LC DD name  Dataset name                               Delay% Visual

   _____  _____        _____ _____
>--------------------------------------------------------------------------
__  .IMS     IMS Statement Delay                        23.88 ======>
S_  INVDATA  CAMAT.TEST.INVDATA                          1.45
__  INVINDX  CAMAT.TEST.INVINDX                          1.11
__  INVTRAN  CAMAT.TEST.INVTRAN                          0.55
__  DFSRESLB IMS.V7100.RESLIB                            0.00
__  IEFRDER  IMSLOG                                      0.00
__  IMS      IMS.V7100.PSBLIB                            0.00
__  IMS      IMS.V7100.DBDLIB                            0.00
__  LINKLST  SYS1.LINKLIB                                0.00
__  LINKLST  SYS1.MIGLIB                                 0.00
```

5. Type S next to one of the DD statements and press Enter.

An enhanced version of the Data Set Details panel displays. In this example, the INVDATA DD statement was selected.

```
CA MAT--------------------- Data Set Details ------------ Row 1 to 26 of 32
COMMAND ==>                                           SCROLL ==> HALF

DDNAME: INVDATA                                         Profile: IMS


Access Method: VSAM        Cluster: CAMAT.TEST.INVDATA
  Opened for: DIRECT          Data: CAMAT.TEST.INVDATA.DATA
Share Options: 3 3           Index: CAMAT.TEST.INVDATA.INDX
 Organization: KSDS      Alt Index: N/A

Data Component Information for: CAMAT.TEST.INVDATA.DATA

------ SMS ------- ------ Allocation ------- ----------- Format --------------
DATACLAS:         Unit:                 Rec Len:       200 CI Size:    20
STORCLAS:         Primary:            0 # CIs per CA:  315 Strings:     0
MGMTCLAS:         Secondary:          0 CA Freespace:   25
                  Volume Count:     n/a CI Freespace:   25
                  Total Extent Count:  0 Stripes:        0

---- VSAM Statistics ------------------------------------------------------
 Records Read: 0         Records Updated: 0         CA Splits:     19
Records Added: 0         Records Deleted: 0         CI Splits:    559

Index Component Information for: CAMAT.TEST.INVDATA.INDX

------ SMS ------- ------ Allocation ------- ----------- Format --------------
DATACLAS:         Unit:                 Rec Len:      3065 CI Size:    30
STORCLAS:         Primary:            0 # CIs per CA:   15 Strings:     0
MGMTCLAS:         Secondary:          0 CA Freespace:    0
                  Volume Count:     n/a CI Freespace:    0
                  Total Extent Count:  0 Stripes:        0
```

The fields in this panel are described next.

DD Name

DDNAME used to allocate the data set.

Organization

Physical organization of the data stored in this data set,

Possible values are KSDS, ESDS, or RRDS

Dataset name

Full name of the data set.

If the data set organization is KSDS, CA MAT displays the names of the DATA and INDEX components.

Volser

First volume serial of the data set.

Unit

First device address of the data set.

Opened for

Intention of the program when performing I/Os for this data set.

Possible values are READ, WRITE, and DIRECT.

Logical record length

Specified length of the records that reside in this data set.

Share Options

Displays how an alternate index's data or index component is shared among users.

You can select one of the following numbers:

- The data set can be shared by any number of users for read processing, or the data set can be accessed by only one user for read and write.

- The data set can be accessed by any number of users for read processing and it can also be accessed by one user for write processing.

- The data set can be fully shared by any number of users.

- The data set can be fully shared by any number of users, and buffers used for direct processing are refreshed for each request.

Data CI size

Size of the Control Interval for the data in this data set.

Number of CIs per CA

Count of CIs allocated within a control area for the data in this data set

Index levels.

number of index levels

VSAM KSDS data sets are indexed using a multilevel structure. The number of levels can have an impact on the performance of the data set if there are insufficient index buffers.

RPL strings

Number of strings for the data set.

This field indicates the number of concurrent operations that might be started for the data set.

Index buffers

Number of buffers used to perform I/O for the index component.

Data buffers

Number of buffers used to perform I/O for the data component.

Index EXCPs

Number of EXCPs for the INDEX component during the monitored period.

Data EXCPs

Number of EXCPs for the DATA component during the monitored period.

Records retrieved

Total number of records retrieved during the monitored period.

Records written

Number of records written to the data set during the monitored period.

CI splits

Number of times that the control interval was split due to lack of space.

CA splits

Number of times that the control area was split due to lack of space.

CI freespace

Percentage of free space in the control interval. Defined when the data set was created.

CA freespace

Percentage of free space in the control area. Defined when the data set was created.

File uses Shared Resources

The file uses VSAM local and global shared resources (LSR/GSR) and some values are invalid in the main display.

When the message File uses Shared Resources appears, values described below replace those marked n/a.

Pool ID

Pool identifier used to satisfy requests for this file (LSR/GSR).

Buffer Size

Size of the buffer used from the pool identified by Pool ID (LSR/GSR).

Num Buffers

Number of buffers available in the shared pool (LSR/GSR).

Hit Ratio

Percentage of READ requests that were satisfied from the buffer pool without an EXCP (LSR/GSR).

Steal Writes

Number of nonuser-initiated WRITES that were initiated for this buffer pool. A value of greater than 0 in this field can indicate a serious performance problem (LSR/GSR).

6. Press End to return to the DataView panel.

7. To select the .IMS DD statement, type **S** in the LC column and press Enter.

    The IMS Statements panel displays:

```
CA MAT ---------------------- IMS Statements -------------- ROW 1 to 7 of 7
COMMAND ==>                                               SCROLL: CSR

Primary commands: DBDname, PSBname, IMSview             Profile: IMS
                                                           Mode: PSBNAME

   Line commands: S - SSA

LC PSB Name PCB# DBD Name Segment  Call P-Opts Actv% Wait% Totl% Visual

   _____ ____ _____ _____ ____ _____ ____ ____ ____ _____
-------------------------------------------------------------------------------
__ INV2200   2 INVDBD   INVENSEG ISRT A       1.78 17.07 18.86 ======>
__ INV2200   2 INVDBD   INVENSEG GHU  A       2.79  0.11  2.90 >
__ INV2200   2 INVDBD   INVENSEG REPL A       0.78  0.00  0.78
__ INV2200   2 INVDBD   INVENSEG DLET A       0.55  0.00  0.55
__ INV2200   2 INVDBD   INLOCSEG GHU  A       0.44  0.00  0.44
__ INV2200   2 INVDBD   INLOCSEG REPL A       0.22  0.00  0.22
__ INV2200   2 INVDBD   INLOCSEG DLET A       0.11  0.00  0.11
****************************** END OF TABLE ***************************
```

IMS Statements Panel

The IMS Statements panel has two modes. The information that displays depends on the mode you select. Select a mode by issuing either the PSBNAME or the DBDNAME primary commands.

PSBNAME

The default mode is PSBNAME. In this mode, IMS calls are sorted by PSB name. CA MAT displays all calls during the monitored period sorted by the activity level associated by that call. In PSBNAME mode, you can display more detailed information by using the S (SSA) line command to display the Segment Search Arguments (SSA) panel.

```
CA MAT -------------- Segment Search Arguments ---------------- Row 1 to 2 of
COMMAND ===>                                                   SCROLL ===> CSR

                                                          Profile: ATEST

PSBNAME -- TFSSAM08   DBDNAME -- TI21PART    (GU)

SSA# Segment  Cmd Field    Operator
____ _____ ___ _____ _____
--------------------------------------------------------------------------------
   1 PARTROOT    PARTKEY  =
   2 STANINFO    STANKEY  =
```

The default setting for the server parameter IMSSSA, which controls the collection and display of IMS SSA value data, is NO. If you choose to set this parameter to YES, you will see IMS SSA value data displayed in both character and hexadecimal format in this report. IMSSSA=YES must be in effect during both the monitor session of the IMS region and the analysis of the resulting monitor data set. However, we do not recommend that you use this setting because sensitive data may be exposed.

If the Segment Search Argument is a qualified or multi-qualified SSA, and the server parameter IMSSSA is set to YES, the Segment Search Arguments panel displays the following additional information:

■ Value

   The SSA value

   Note: To view SSA values in 74-byte hexadecimal format, type PF11.

■ LogiOp
   The logical operator that is used to link multi-qualified segments

```
SSA# Segment  Cmd Field    Operator Value                                 LogiOp
____ _____ ___ _____ _____ _____ _____
--------------------------------------------------------------------------------
   1 PARTROOT    PARTKEY  >        02AN960C00                              &
   1 PARTROOT    PARTKEY  <        02AN960C99                              &
   1 PARTROOT    PARTKEY  =        02AN960D99
   2 STANINFO    STANKEY  =        02
```

For more information, see TUNSSP00 parameters in the Installation guide.

DBDNAME

All activity that is associated with the database is summarized in a single row. The following panel shows the IMS Statements panel in DBDNAME mode.

```
CA MAT ---------------------- IMS Statements --------------- ROW 1 to 1 of 1
COMMAND ===>                                                 SCROLL ===> CSR

Primary commands: DBDname, PSBname                           Profile: IMS
                                                                Mode: DBDNAME


DBD Name Actv% Wait% Totl% Visual
_____ _____ _____ _____ _____
--------------------------------------------------------------------------------
INVDBD    6.69 17.18 23.88 =======>
```

The fields that are displayed in the IMS Statements panel for PSB Name mode are described next.

PSB Name

Name of the PSB generated to support this application. The PSB comprises one or more PCBs.

PCB#

Relative offset of this PCB from the start of the PSB.

DBD Name

Name of the IMS database that was accessed.

Segment

Name of the segment that was accessed by the application program.

Call

Type of operation that is being performed within the IMS call.

P-Opts

Processing options generated in the PCB during the PSBGEN.

Actv%

Percentage of the monitored period that CA MAT detected that the processing of the IMS statement was using CPU.

Wait%

Percentage of the monitored period that CA MAT detected that the program waited for IMS data to be returned.

Totl%

Sum of the Actv% and Wait% fields.

Visual

Visual representation of the Totl% field.

Analyze IMS Batch Performance Information

CA MAT provides additional information for IMS batch programs. IMS batch operates entirely in a single address space. Database operations are controlled by IMS routines using a VSAM local shared resource pool. Use the following steps to access statistics on the use of this pool.

Follow these steps:

1. Select Option **8** from the Interactive Analysis menu

   The PoolView panel displays:

   ```
   CA MAT  ------------------- PoolView ------------------- ROW 1 TO 1 OF 1
   COMMAND ==>                                              SCROLL ==> CSR

   Line Commands: S - Select                               Profile: IMS
                                                           Options: NORMAL
   LC Type Group Category
      ___ ____ _____
   -----------------------------------------------------------------------------
   __  IMS  LSR   IMS VSAM local pools
   ```

   PoolView lists the shared pools that are used in the batch job.

   The fields in PoolView are decribed next.

   Type

   Type of pool, either IMS or VSAM.

   Group

   Defines the group as LSR, or GSR.

   LSR refers to VSAM Local Shared Resources where the buffer pool is maintained in the user's storage (PRIVATE). GSR refers to VSAM Global Shared Resources where the buffer pool is maintained in common storage (ECSA).

   Category

   Literal name of the pool.

2. Use the Select line command (**S**) to link to the Shared Pools panel. This panel displays all of the unique buffer pools that are defined to the overall pool.

```
CA MAT  ----------------------- Shared Pools ---------------- ROW 1 to 4 of 4
COMMAND ==>                                              SCROLL ==> CSR

                    Pool type: LOCAL                      Profile: IMS
              Total pool size: 59392                      Options: NORMAL
    Hit ratio for all subpools: 88.1%

Line commands: S - Select, D - Datasets

                  No. of  Buffer Buffer Requests  Requests  Hit   Non-user
LC Type Group SP  Buffers size   fixed  w/read    wo/read   Ratio writes
    ___  ____  __  _____ _____  _____ _____   _____   ____  _____
>-----------------------------------------------------------------------------
 __ IMS  LSR   0     4     512 NO        0         158 100 %          0
 __ IMS  LSR   0     4   2,048 NO       69         225 76.5%         34
 __ IMS  LSR   0     4   4,096 NO        0           0 N/A            0
 __ IMS  LSR   0     4   8,192 NO        4         158 97.5%          0
```

The fields on the Shared Pools panel are decribed next.

Pool type

LOCAL or GLOBAL

Local pools are used exclusively for IMS batch jobs and are located in the batch region. GLOBAL pools are located in CSA.

Total pool size

Total size of all the allocated buffers for all the buffer pools for this shared pool.

Hit ratio for all subpools

Measure of buffer pool performance.

A high hit ratio means that a high percentage of reads were satisfied from the buffer pools without having to access external media. The hit ratio is calculated as follows:

100 x (Retrieves wo/read / (retrieves w/read + retrieves wo/read))

Type

Type of pool, VSAM or IMS.

Group

Location of the subpool. LSR is in the user region; GSR is in CSA.

SP

Identifier of the subpool.

No. of Buffers

Number of virtual buffers for this subpool.

Buffer size

Size in bytes of each buffer residing in this subpool.

Buffer fixed

Indicates whether the buffers are fixed in storage for this buffer pool.

Requests w/read

Number of retrieves that were satisfied with an access to external media.

Requests wo/read

Number of retrieves that were satisfied from within the buffers in the pool. No I/O was necessary.

Hit Ratio

Percentage of the monitored period that READ requests were satisfied without a physical I/O.

Non-user writes

Writes initiated by VSAM to make free space in this pool. These types of writes are very expensive and indicate that the pool might be too small. They are also called VSAM steal writes. Scroll right to display the following fields:

User init. writes

Writes by VSAM initiated by the user for synchronization processing.

Retrieves by RBA

Number of retrieves by relative byte address (RBA).

ESDS inserts

Number of inserts to the Entry Sequenced Data Set (ESDS).

Retrieves by KEY

Number of retrieves by key to a Key Sequenced Data Set (KSDS).

KSDS inserts

Number of inserts to a Key Sequenced Data Set (KSDS).

Buffer alters

Number of times a buffer was altered by VSAM.

VSAM gets

Number of VSAM GET requests.

Buffer searches

Number of VSAM search buffer requests.

No. PLH in chain

Number of Placeholders (PLH) in lock chain.

Error buffs in pool

Current number of error buffers in pool.

Max error buffs

Largest number of error buffers ever in the pool since the pool was created.

From the Shared Pools panel, you can display further detail by using one of the line commands:

■ The Select line command (S) displays the VSAM Pool Details panel.

■ The Data Sets line command (D) displays the Pooled Data Sets panel.

VSAM Pool Details displays the same information as shown in Shared Pools, but in a detail format.

```
CA MAT  ------------------------ VSAM Pool Details ---------------------
COMMAND ==>

                      Pool type: IMS                    Profile: IMS
                     Pool group: LSR
                        Pool ID: 0
              Number of buffers: 4
                    Buffer size: 512
          Placeholders in chain: 0
                      Hit Ratio: 100 %
        Requests requiring a read: 0
     Requests satisfied from pool: 158

            User initiated writes: 0
        Non-user initiated writes: 0
               Retrieves by RBA: 0
                    ESDS inserts: 0
                Retrieves by key: 0
                    KSDS inserts: 0
                   Buffer alters: 0
                      VSAM GETS: 0
                Buffer searches: 0
            Error buffers in pool: 0
            Maximum error buffers: 0
```

3. Press END to return to Shared Pools.

4. Type D to display the Pooled Data Sets panel. Pooled Data Sets displays information about any VSAM data set using the specified pool.

```
CA MAT  ----------------- Pooled Data Sets ---------------- ROW 1 to 1 of 1
COMMAND ==>                                                 SCROLL ==> CSR

Subpool: 0        BufferSize: 512                           Profile: IMS

Line commands: S - Select

LC DDname   Data Set Name                         Type Comp    CISize
   _____ _____ ___ _____ _____
--------------------------------------------------------------------------------
__ INVINDX  CAMAT.TEST.INVINDX.DATA                 KSDS DATA      512
```

The fields on the Pooled Data Sets panel are described next.

Subpool

Identification number of the VSAM subpool.

BufferSize

sSze in bytes of each buffer in the subpool.

DDname

DDNAME used to allocate the data set.

Data Set Name

Full name of the data set.

Type

One of the following VSAM data set types:

KSDS - a key sequenced data set that is always accompanied by an INDEX component. The index component does not have to use the same subpool.

ESDS - an entry sequenced data set

Comp

One of the following types:

■   DATA - contains real customer data

■   INDEX - contains indexing information

CISize

Control Interval Size. The unit of transfer for VSAM data to and from storage. It is always a multiple of 512 bytes.

IMS Region Types

IMS processing can occur in a number of environments. CA MAT enables you to resolve performance problems and is capable of monitoring each of the following types of IMS processing.

IMS batch processing

IMS processing might occur in a batch region.

During this type of processing, all IMS activity occurs in one region. A batch program can process all full function IMS databases, but cannot access DEDBs or MSDBs. Batch programs are used when a large number of updates must be done, or when large reports must be created. Batch programs do not require a control region and other programs might not have concurrent access to the databases used by the job.

IMS batch message program

IMS processing might occur in a batch region that is connected to a control region or DBCTL region.

This type of processing is used also when a large number of records are updated or a report is created. This type of processing requires the control region. When you use a control region, recovery is made easier and other programs are allowed to access the databases concurrently.

IMS message processing program

IMS processing might occur in a region called a message processing region or MPR.

The MPR processes transactions that are created in an online environment, which means that a user can be sitting at a terminal entering interactive work and the IMS control region is scheduling work in the MPR. Normally the output message produced by this kind of IMS processing is destined for a terminal user. This type of processing requires a control region to control the terminal I/O and a DBCTL region to control the access to the databases. Other programs can access the databases while messages are being processed.

IMS fast path program

IMS processing might occur in a special region called a Fast Path region.

These regions are usually devoted to processing online transactions that require very fast response times. Programs running in this environment normally access Fast Path databases such as Data Entry Databases (DEDBs) or Main Storage Databases (MSDBs), but might also access full function IMS databases. They have similar requirements to MPR processing.

CICS transaction access

IMS processing might occur on behalf of a transaction that is executed in a CICS environment.

In this environment, the IMS data is either attached locally or attached by using a DBCTL region. The CICS transaction processing is similar to IMS. You enter a query or update and the IMS connection reads or alters the database. If the database is accessed by using a DBCTL, other programs might access the data concurrently. If the database is locally attached, only CICS shared database processing can occur concurrently.

CICS shared database processing

IMS processing might occur in a CICS environment that uses a batch job. You can run a shared database program only in a local DL/I environment. The batch job runs in its own region, but the CICS region synchronizes the updates to the IMS databases by using "mirror" transactions to process each request of the batch job. Shared database programs can use full function IMS databases.

Chapter 13: Using the Product in a Java Virtual Machine (JVM) Environment

This section contains the following topics:

Analyze JVM Data

When CA MAT detects Java Virtual Machine (JVM) activity, the major category (Java Virtual Machine) and minor delay category (JVMPI Trace Activity) are assigned.

In order to collect detail Java application information, the Java support must be installed for the environment.

For more information, see the *Installation Guide*.

You can see the JVM statements for an JVM activity.

Follow these steps:

1. Set up your monitoring criteria.

2. Invoke the monitor by using the I (Invoke) line command.

3. Analyze the data by using one of the analysis line commands, A, AL, AA, or AW.

4. Select Option **2** from the Interactive Analysis menu.

    The DelayView panel displays:

```
CA MAT ------------------------- DelayView ----------------- Row 1 to 9 of 9
COMMAND ==>                                              SCROLL ==> HALF

Primary commands: DETail on/off         Module: *          Profile: JVM1
                  ADDHelp                Csect: *           Options: NORMAL
                                         Offset: *           Detail: ON
   Line commands:  A - Address
(AutoNav enabled)  S - Distribution

LC Major category      Minor category     Actv% Wait% Totl% Visual
   _____   _____    _____ _____ _____ _____
   -----------------------------------------------------------------------
__ Java Virtual Machine JVMPI Trace Activity 58.27  0.00  58.27 ========>
__ Voluntary Wait      Wait/Waitr SVC       1.27 19.38  20.65 ==>
__ Program Active      Program Active      12.02  0.00  12.02 =>
__ CICS Program Ctl Del Loader Delay        0.00  8.35   8.35 >
__ ESR SVC 122 (TYPE2)  Unknown function    0.14  0.00   0.14
__ Program Load Delay  LOAD SVC 122-9       0.14  0.00   0.14
__ Resource Conflict   Global Serialization 0.14  0.00   0.14
__ System Active       Restore SVC          0.14  0.00   0.14
__ Unix System Services loadhfs (BPX1LOD)   0.14  0.00   0.14
**************************** End of Table ****************************
```

    It is important to note that the activity percentage values indicate the activity for all detected JVM activity and do not correspond with sample-based activity percentages that are displayed elsewhere by CA MAT.

5. Position the cursor and press Enter to autonavigate from the DelayView panel to display the JVM Applications panel.

If you autonavigate from the TranView Delay Detail panel, only the JVM activity that is associated with the selected transaction is reported.

You can also select Option 12 - JVM - Java Virtual Machine from the Interactive Analysis menu to display the JVM Applications panel.

```
CA MAT ----------------- JVM Applications ----------------- Row 1 to 3 of 3
COMMAND ===>                                            SCROLL ===> HALF

Primary commands: MOde Process/Application/Via/Current      Profile: JVM1
                                                           Options: NORMAL
   Line commands: A - Application Methods    T - Threads      Mode: Process
                  V - Via Methods          NI - JVM Info      Tran: *
                  C - Current Methods


              JVM     JVM
LC Process ID Release Information                           Pct%  Visual

   _____ _____ _____ ____ _____
--------------------------------------------------------------------------
__   33555438 1.4.2   J2RE 1.4.2 IBM z/OS Persistent Reusable  50.00 ======>
__   16778231 1.4.2   J2RE 1.4.2 IBM z/OS Persistent Reusable  42.48 =====>
__   33555444 1.4.2   J2RE 1.4.2 IBM z/OS Persistent Reusable   7.52 >
***************************** End of Table *****************************
```

The fields that are displayed on this panel are described next.

Process ID

Displays the identification numbers or the processes that are monitored by using a Java Virtual Machine.

JVM release

Displays the release level of the Java Virtual Machine (obtained from java.vm.version).

JVM Info

Displays the Java Virtual Machine System Properties (obtained from java.vm.info).

Pct%

Displays the percentage of all JVM activity measured where CA MAT detected program code to be executing.

This value is calculated based on the total of JVM activity, not the total number of samples. First volume serial of the data set.

Visual

Displays a visual depiction of the Pct% value.

Command Descriptions for the JVM Applications Panel

The commands in this panel when it is in Process mode (initial display) are described next.

MOde [Process/Application/Via/Current]

Enter the MOde command followed by the mode (Process, Application, Via, or Current) to change display modes.

The Mode field indicates the display mode.

■ Process (initial display): The Process IDs used by the monitored application are displayed

■ Application: The class methods (which can be identified as not a system class) for an application are displayed

■ Via: The class methods called by the application are displayed

■ Current: The current active trace entries (last called class methods) are displayed

See also Examples of the JVM Applications panel in other modes.

A - Application Methods

Display the application class methods (which can also be identified as not a system class) for an application.

V - Via Methods

Display the via class methods called by the application.

C - Current Methods

Display the current active trace entries (last called class methods).

T - Threads

Display the thread TCBs (addresses) for the selected process.

NI - JVM Info

Display the Java Virtual Machine information string (by release level).

Example of the JVM Applications Panel in Other Modes

The following sections show examples of the JVM Applications panel in various modes:

■ Application

■ Via

■ Current

The Application, Via, and Current modes display the class methods that are used by the measured application. The full Class.Method and Class Source are displayed. If values in these fields are truncated, use the NM and NS line command to display the full value.

Application Mode

The following panel shows the JVM Applications panel in Application mode.

```
CA MAT ------------------ JVM Applications --------------- Row 1 to 10 of 10
COMMAND ===>                                             SCROLL ===> HALF

Primary commands: MOde Process/Application/Via/Current      Profile: JVM1
                                                           Options: NORMAL
   Line commands: A - Application Methods   P - Processes      Mode: Appl.
                  V - Via Methods          NM - Method Name    Tran: *
                  C - Current Methods      NS - Source Name
                  D - Method Details


LC Class.Method                      Class Source           Pct%  Visual

   _____ _____ _____ _____
   -----------------------------------------------------------------------
__ WaitTest.main                     WaitTest.java          74.51 =======>
__ c/Launcher$AppClassLoader.loadClass Launcher.java         6.07
__ java/lang/ClassLoader.loadClass   ClassLoader.java        5.10
__ com/ibm/cics/server/Wrapper.main  Wrapper.java            4.61
__ om/ibm/cics/server/Wrapper.<clinit> Wrapper.java          4.37
__ /net/URLClassLoader$ClassFinder.run URLClassLoader.java   2.67
__ java/lang/ClassLoader.defineClass0 ClassLoader.java       0.97
__ rity/AccessController.doPrivileged1 AccessController.java 0.73
__ java/lang/ClassLoader.defineClass ClassLoader.java        0.49
__ java/net/URLClassLoader.defineClass URLClassLoader.java   0.49
****************************** End of Table ******************************
```

Via Mode

The following panel shows the JVM Applications panel in Via mode.

```
CA MAT ----------------- JVM Applications --------------- Row 1 to 11 of 15
COMMAND ===>                                            SCROLL ===> HALF

Primary commands: MOde Process/Application/Via/Current      Profile: JVM1
                                                           Options: NORMAL
   Line commands: A - Application Methods   P - Processes     Mode: Via
                  V - Via Methods          NM - Method Name   Tran: *
                  C - Current Methods      NS - Source Name
                  D - Method Details

LC Class.Method                     Class Source           Pct%  Visual

   _____ _____ _____ _____
---------------------------------------------------------------------------
__ java/math/BigInteger.divide       BigInteger.java       64.56 ========>
__ ** No Calls **                                           7.52 >
__ java/lang/ClassLoader.loadClass   ClassLoader.java        7.04 >
__ c/Launcher$AppClassLoader.loadClass Launcher.java         5.10
__ cics/server/Wrapper.collectingTrace Wrapper.java          4.13
__ m/cics/server/Wrapper.callUserClass Wrapper.java          3.88
__ java/net/URLClassLoader.access$500 URLClassLoader.java    2.67
__ java/math/BigInteger.multiply     BigInteger.java         2.18
__ /net/URLClassLoader$ClassFinder.run URLClassLoader.java   0.73
__ urity/SecureClassLoader.defineClass SecureClassLoader.java 0.49
__ ibm/cics/server/Wrapper.driveReInit Wrapper.java          0.49
```

Current Mode

The following panel shows the JVM Applications panel in Current mode.

```
CA MAT ----------------- JVM Applications --------------- Row 1 to 11 of 31
COMMAND ===>                                            SCROLL ===> HALF

Primary commands: MOde Process/Application/Via/Current      Profile: JVM1
                                                           Options: NORMAL
   Line commands: A - Application Methods   P - Processes     Mode: Current
                  V - Via Methods          NM - Method Name   Tran: *
                  C - Current Methods      NS - Source Name
                  D - Method Details

LC Class.Method                     Class Source           Pct%  Visual

   _____ _____ _____ _____
---------------------------------------------------------------------------
__ ath/MutableBigInteger.divideOneWord MutableBigInteger.java 62.38 ========>
__ java/util/zip/ZipFile.open        ZipFile.java            4.37
__ java/util/zip/ZipFile.getEntry    ZipFile.java            4.37
__ WaitTest.main                     WaitTest.java           3.40
__ java/math/BigInteger.divide       BigInteger.java         2.91
__ java/net/URL.openConnection       URL.java                2.67
__ nixFileSystem.getBooleanAttributes0 UnixFileSystem.java   2.18
__ java/math/BigInteger.multiplyToLen BigInteger.java        2.18
__ java/lang/String.replace          String.java            1.94
__ l/jar/JarFile.hasClassPathAttribute JarFile.java          1.70
__ java/math/MutableBigInteger.divide MutableBigInteger.java 1.70
```

The various commands that are available on this panel in Application, Via, and Current modes are described next.

MOde [Process/Application/Via/Current]

Enter the MOde command followed by the mode (Process, Application, Via, or Current) to change display modes.

The Mode field indicates the display mode.

■ Process (initial display): the Process IDs used by the monitored application are displayed

■ Application: the class methods (which can be identified as not a system class) for an application are displayed

■ Via: the class methods called by the application are displayed

■ Current: the current active trace entries (last called class methods) are displayed

A - Application Methods

Display the application class methods associated with a Class.Method.

V - Via Methods

Display the via class methods associated with a Class.Method.

C - Current Methods

Display the current active trace entries associated with a Class.Method.

D - Method Details

Display the source line numbers within the selected method where activity was detected.

P - Processes

Display the process ID's associated with the selected class.

NM - Method Name

Display the full name of the selected method (which might have been truncated on the panel display).

NS - Source Name

Display the full name of the source file of the selected method (which might have been truncated on the panel display).

Display JVM Detail Reports

The following sections describe the different JVM detail reports that are available. The level of detail that displays depends on from where the detail report was called, and is indicated by the Method, Source, Process, and ThrdTCB fields.

Display the JVM Methods Panel

The JVM Methods panel displays the Class.Methods and Class Source information. From here, you can use the D (Method Details) line command to display the line numbers in the class source where the activity was detected and the P (Processes) line command to see the associated Process IDs.

```
CA MAT ---------------------- JVM Methods ----------------- Row 1 to 8 of 8
COMMAND ===>                                              SCROLL ===> HALF

Primary commands: JVM Information                        Profile: JVM1
                                                         Options: NORMAL
   Line commands: D - Method Details   NM - Method Name  Methods: Appl.
                  P - Processes        NS - Source Name    Tran: *

 Method: *
 Source: *
Process: 33555438
ThrdTCB: *

LC Class.Method                       Class Source         Pct%  Visual
   _____ _____ _____ _____
---------------------------------------------------------------------------
__  WaitTest.main                      WaitTest.java        41.50 ========>
__  com/ibm/cics/server/Wrapper.main   Wrapper.java          2.67
__  om/ibm/cics/server/Wrapper.<clinit> Wrapper.java         1.94
__  c/Launcher$AppClassLoader.loadClass Launcher.java        1.94
__  java/lang/ClassLoader.loadClass    ClassLoader.java      0.97
__  rity/AccessController.doPrivileged1 AccessController.java 0.49
__  /net/URLClassLoader$ClassFinder.run URLClassLoader.java  0.24
__  java/lang/ClassLoader.defineClass0 ClassLoader.java      0.24
```

The commands that are available on the JVM Methods panel are described next.

D - Method Details

Display the source line numbers within the selected method where activity was detected.

P - Processes

Display the process IDs that are associated with the selected class.

NM - Method Name

Display the full name of the selected method (which might have been truncated on the panel display).

NS - Source Name

Display the full name of the source file of the selected method (which might have been truncated on the panel display).

Display the JVM Method Detail Panel

Enter the D line command on the JVM Methods panel to display the JVM Method Detail panel. The JVM Method Detail panel displays the line numbers in the class source where activity was detected.

```
CA MAT  ---------------- JVM Method Detail ---------------- Row 1 to 2 of 2
COMMAND ===>                                       SCROLL ===> HALF

 Method: com/ibm/cics/server/Wrapper.main                Profile: JVM1
 Source: Wrapper.java                                    Options: NORMAL
Process: 33555438                                        Methods: Appl.
ThrdTCB: *                                                  Tran: *

Line Number      Pct%  Visual

_____ _____ _____
--------------------------------------------------------------------------------
           1277  2.43 ========>
           1101  0.24 >
***************************** End of Table *****************************
```

Display the JVM Thread TCBs Panel

Enter the T line command on the JVM Applications panel to display the JVM Thread TCBs panel. The JVM Thread TCBs panel displays the Thread TCB (hexadecimal address) and UNIX® Thread ID (16-byte hexadecimal value) that is associated with the selected process ID. The Application, Via, or Current methods that is associated with a thread can be displayed.

```
CA MAT  ------------------- JVM Thread TCBs ---------------- Row 1 to 1 of 1
COMMAND ===>                                       SCROLL ===> HALF

   Line commands: A - Application Methods   I - JVM Info    Profile: JVM1
                  V - Via Methods                           Options: NORMAL
                  C - Current Methods                       Methods: Appl.
                                                              Tran: *
 Method: *
 Source: *
Process: 33555438
ThrdTCB: *

LC Thread TCB UNIX Thread ID   Pct%  Visual

   _____ _____ _____ _____
--------------------------------------------------------------------------------
__ 006B3200   187CE80000000000 50.00 ========>
***************************** End of Table *****************************
```

The various commands that are available on the JVM Thread TCBs panels are described next.

A - Application Methods

Display the application class methods associated with a Class.Method.

V - Via Methods

Display the via class methods associated with a Class.Method.

C - Current Methods

Display the current active trace entries associated with a Class.Method.

I - JVM Info

Display the JVM Information panel where you can issue the **VI** line command to see the full Java name of the selected method or source.

Display JVM Delay Locations

The following sections describe how to display JVM Delay locations from various panels within CA MAT.

TranView for CICS Panel

The following panel shows an example of the TranView for CICS activity panel. From this panel, the D (Delay Details) line command (LC) displays the DelayView Detail panel where you can view JVM activity when a Java application program is running for the transaction.

```
CA MAT --------------------------- TranView ----------------- Row 1 to 8 of 8
COMMAND ==>                                                    SCROLL ==> CSR

Primary commands: SELect, RECall, ADDHelp                    Profile: CICSJAV
          STC - CICS Summary Stats   IDL - CICS Idle Time  Options: NORMAL
Line commands: T - Tag   U - Untag   D - Delay Details (Auto-Navigation)
               C - Code Details      N - Data Details
               P - CallerID Details  S - Additional Tran Statistics

LC TRAN      T D #Trans Avg RESP Avg CPU  Actv%  Data%  Other% Total% Visual
   _____ _ _ _____ _____ _____ _____ _____ _____ _____ _____
>-----------------------------------------------------------------------------
__ JTU4      Y     4 42.65599 125.4748  60.94   0.40   0.02  61.37 ========>
__ JTU3      Y     2 46.97247 124.4241  31.86   0.00   0.01  31.87 =====>
__ MQPT            9  2.75560  0.90153   5.71   0.01   0.26   5.98
__ MQGT            5  0.16780  0.09408   0.33   0.00   0.03   0.37
```

DelayView Detail Panel

The following panel shows the DelayView Detail panel with an example when Java activity is present. The Java Virtual Machine entry under the Major category column shows JVMPI Trace activity under the Minor category. Use autonavigation by placing the cursor on the line and pressing Enter displays additional JVM application data.

```
CA MAT ------------------ DelayView Detail ---------------- Row 1 to 10 of 19
COMMAND ===>                                              SCROLL ===> CSR

    Transaction: JTU2                                    Profile: JVMCIC62
                                                         Detail: ON

Primary commands: DETail on/off,     Module: *
                  ADDHelp             Csect: *
                                      Offset: *
   Line commands: A - Address

LC Major category      Minor category      Actv% Wait% Totl% Visual

   _____ _____ _____ _____ _____ _____
--------------------------------------------------------------------------------
__ Java Virtual Machine JVMPI Trace Activity 36.80  0.00 36.80 =========>
__ Java Virtual Machine ExecuteJava          2.01  0.00  2.01
__ System Active       Getmain SVC           1.96  0.00  1.96
__ Program Active      Program Active        1.22  0.00  1.22
__ CICS Program Ctl Del Loader Delay         0.00  0.88  0.88
__ System Active       Restore SVC           0.22  0.00  0.22
__ Voluntary Wait      Wait/Waitr SVC        0.20  0.00  0.20
__ System Active       Purge SVC             0.14  0.00  0.14
__ Unix System Services sigsuspend (BPX1SSU) 0.09  0.00  0.09
__ System Active       Exit SVC              0.03  0.00  0.03
```

Place the cursor on the line for JVMPI Trace activity and press Enter to view the JVM Applications panel.

```
CA MAT ------------------ JVM Applications ----------------- Row 1 to 2 of 2
COMMAND ===>                                              SCROLL ===> CSR

Primary commands: MOde Process/Application/Via/Current      Profile: JVMCIC62
                                                            Options: NORMAL
   Line commands: A - Application Methods    T - Threads      Mode: Process
                  V - Via Methods           NI - JVM Info     Tran: JTU2
                  C - Current Methods


          JVM     JVM
LC Process ID Release Information                         Pct%  Visual

   _____ _____ _____ _____ _____
--------------------------------------------------------------------------------
__    16778261 1.3.1   J2RE 1.3.1 IBM OS/390 Persistent Reusabl 52.58 ========>
__    16778264 1.3.1   J2RE 1.3.1 IBM OS/390 Persistent Reusabl 45.58 ======>
****************************** End of Table ******************************
```

Delay Locations Detail Panel

On the Delay Locations Detail panel the Module column contains the JVM short name of the Java activity. The Csect Description column shows only a part of the long name of the Java activity.

```
CA MAT --------------- Delay Locations Detail ------------ Row 1 to 8 of 294
COMMAND ===>                                               SCROLL ===> CSR

     Delay type: ExecuteJava                          Profile: JVM

     Transaction: JTU2


Primary commands: REGister, ADDHelp, DETail on/off

   Line commands: L - Listing    D - Details   A - Associate
                  C - Callerid   I - Info      N - Long Name

LC Module  Csect    Offset   Csect Description    Stmt  D C Pct   Visual
   _____ _____  _____  _____  _____ _ _ _____ _____
>------------------------------------------------------------------------
N_ BJITC-01          00000000 w/J1.4/bin/libjitc.so       Y 24.87 ========>
__ IBJVM-01          00000000 bin/classic/libjvm.so       Y  5.15 =>
__ .EUSER  .EUSER   3FE26A0E In extended user spac          1.24
__ .EUSER  .EUSER   3FE30DB2 In extended user spac          0.76
__ .EUSER  .EUSER   3FE26A38 In extended user spac          0.62
__ .EUSER  .EUSER   3FE26A08 In extended user spac          0.59
__ .EUSER  .EUSER   3FE30DD8 In extended user spac          0.55
__ .EUSER  .EUSER   3FE30D9A In extended user spac          0.45
```

To view the entire long name, enter the N (Long Name) line command; a new panel displays with the full long name.

```
CA MAT -------------------- Long Name -------------- Row 1 to 1 of 1
COMMAND ===>                                         SCROLL ===> CSR

  Short Name: BJITC-01                            Profile: JVM
                                                  Options: NORMAL


------------------------------------------------------------------------
/SJSE/var/mtw/J1.4/bin/libjitc.so
```

DelayView Panel

The following panel shows an example of the DelayView panel when Java activity is detected. The Major category column shows Java Virtual Machine and the Minor category column shows ExecuteJava.

```
CA MAT ------------------------- DelayView --------------- Row 1 to 12 of 21
COMMAND ===>                                              SCROLL ===> CSR

Primary commands: DETail on/off        Module: *          Profile: JVM
                  ADDHelp               Csect: *           Options: NORMAL
                                        Offset: *           Detail: ON
   Line commands:  A - Address
(AutoNav enabled)  S - Distribution


LC Major category       Minor category      Actv% Wait% Totl% Visual

   _____ _____ _____ _____ _____ _____
-------------------------------------------------------------------------
__ Program Active      Program Active       63.83  0.00  63.83 =======>
a_ Java Virtual Machine ExecuteJava         22.04  0.00  22.04 ==>
__ Voluntary Wait      Wait/Waitr SVC        0.55  7.12   7.67 >
__ CICS Program Ctl Del Loader Delay         0.00  2.69   2.69
__ Unix System Services read (BPX1RED)       1.93  0.00   1.93
__ Unix System Services realpath (BPX1RPH)   0.48  0.00   0.48
__ Unix System Services lstat (BPX1LST)      0.28  0.00   0.28
__ Unix System Services lseek (BPX1LSK)      0.28  0.00   0.28
__ Unix System Services open (BPX1OPN)       0.17  0.00   0.17
__ PC Call             PC Call               0.14  0.00   0.14
__ Unix System Services Unix System Services 0.07  0.00   0.07
__ Unix System Services loadhfs (BPX1LOD)    0.07  0.00   0.07
```

Enter the A (Address) line command next to Java Virtual Machine to view the Delay Locations panel.

Delay Locations

On the Delay Locations Detail panel the Module column contains the JVM short name of the Java activity. The Csect Description column shows only a part of the long name of the Java activity.

```
CA MAT ---------------------- Delay Locations ----------- Row 1 to 11 of 200
COMMAND ===>                                              SCROLL ===> CSR

      Delay type: ExecuteJava                           Profile: JVM

Primary commands: REGister, ADDHelp, LONgname

   Line commands: L - Listing    D - Details   A — Associate
                  C - Callerid   I - Info      N - Long Name

LC Module   Csect    Offset   Csect Description    Stmt   D C Pct   Visual
   _____  _____  _____  _____   _____ _ _ _____ _____
>-----------------------------------------------------------------------------
_n BJITC-01          00000000 w/J1.4/bin/libjitc.so        Y 7.50 =======>
__ IBJVM-01          00000000 bin/classic/libjvm.so        Y 2.21 =>
__ .EUSER   .EUSER   3FE26A0E In extended user spac          0.35
__ .EUSER   .EUSER   3FE30DB2 In extended user spac          0.28
__ .EUSER   .EUSER   3FE26A6C In extended user spac          0.24
__ .EUSER   .EUSER   3FE26A18 In extended user spac          0.21
__ .EUSER   .EUSER   3FE477A8 In extended user spac          0.17
__ .EUSER   .EUSER   3FE26944 In extended user spac          0.17
__ .EUSER   .EUSER   3FE26954 In extended user spac          0.17
__ .EUSER   .EUSER   3FE26A08 In extended user spac          0.17
__ .EUSER   .EUSER   3FE26A3C In extended user spac          0.17
```

To view the entire long name, enter the N (Long Name) line command; the following panel displays with the full long name.

```
CA MAT -------------------- Long Name -------------- Row 1 to 1 of 1
COMMAND ===>                                         SCROLL ===> CSR

  Short Name: BJITC-01                            Profile: JVM
                                                  Options: NORMAL


------------------------------------------------------------------------------
/SJSE/var/mtw/J1.4/bin/libjitc.so
```

Chapter 14: Using the Product in a WebSphere Application Server Environment

CA MAT is compatible with WebSphere Application Server for z/OS V5.1 and V6.1.

In order to collect detail WebSphere application information, the WebSphere Application Server support must be installed.

See the *Installation Guide*.

This section contains the following topics:

Introduction

The IBM® product, WebSphere, includes two foundation products and several foundation extensions. The two products that represent the heart of the product set are WebSphere MQ and WebSphere Application Server (WAS). WAS is what most people think about today when you say *WebSphere*. WebSphere Application Server is a Java2 Enterprise Edition (J2EE) compliant application server, which means WAS supports the J2EE specification and builds on the J2EE specification.
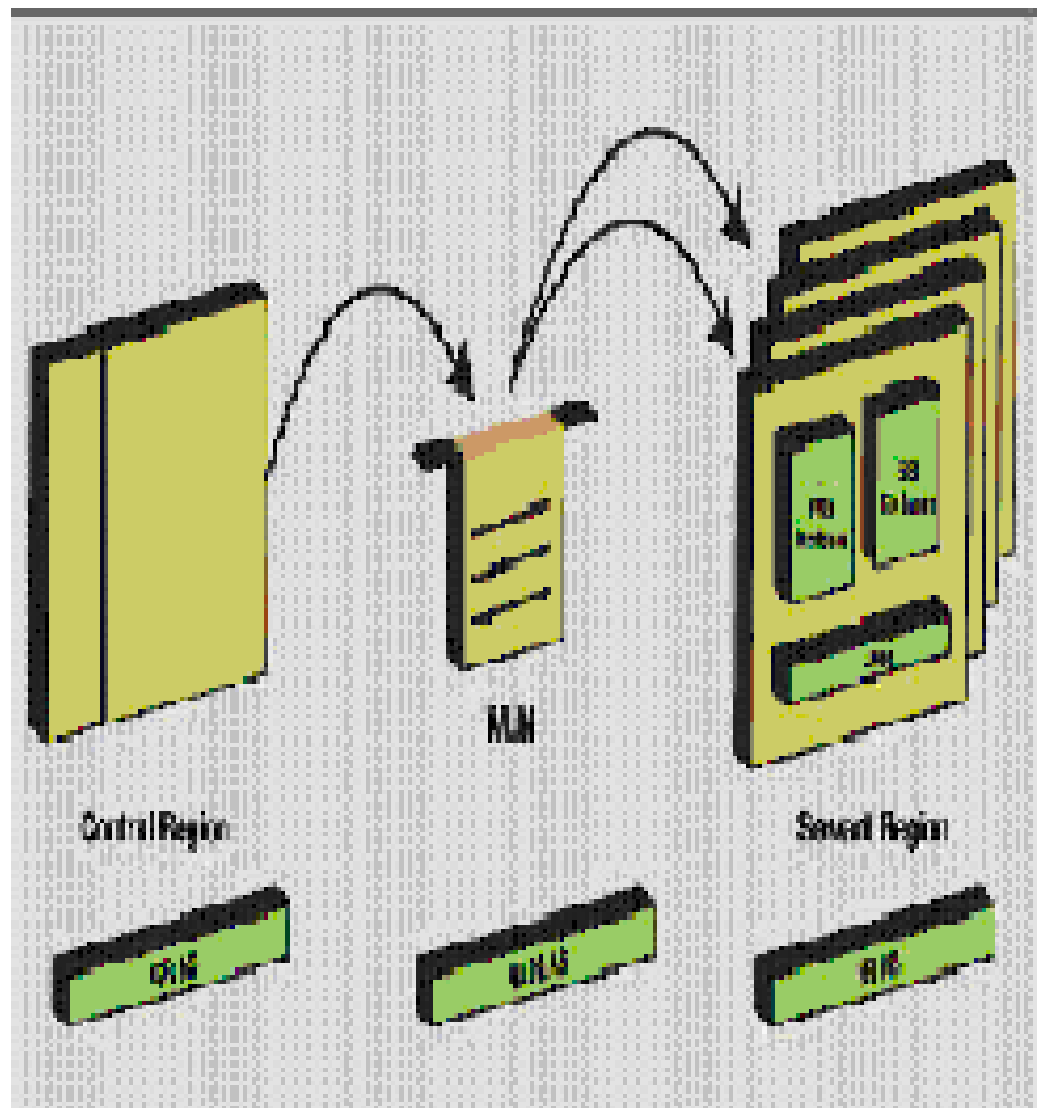
WAS for z/OS has a Server side and a Client side. A Server comprises a Control Region and one or more corresponding Server Regions. The Control Region is a system address space. No application code runs there. The Control Region manages communications into and out of the server, authenticates all client requests, keeps track of the client transactions, and interfaces with Workload Manager (WLM) to schedule the work.

A Servant Region is an application address space where an application and its objects run. Between the Control and Servant Regions is a work queue that is administered by Workload Manager. WLM prioritizes the requests and dispatches them to a Servant Region to meet performance targets that the user has defined.

When an application is deployed, the user specifies the WAS server in which the application will execute.

Monitor WebSphere Application Server

The primary targets for the WebSphere Application Server feature are the Servant Regions of the WAS Server. This situation is unlike a batch application and can be more easily compared to measuring an IMS Message Processing Region, a DB2® Stored Procedures Address Space, or other Service Address Space where several disparate pieces of work might be processing in the same address space.

When you deploy your application, you must also provide the target WAS Server. A given WAS Server can have 1 to *n* Servant Regions that should be measured. CA MAT assumes that you are, in all cases, aware of the name of the affected WAS Server.

Scenario 1—General Tuning

This scenario assumes that you are not aware of specific problems areas but suspect or have been made aware of performance degradation.

In this scenario, you run CA MAT in non-targeted mode without WAS transaction filters. No detailed reports are produced.

1. Submit a monitor for each occurrence of the associated J2EE Servant Regions (not the Control Region), unless you already know the Servant Region.

    When specifying monitoring criteria for WebSphere, leave the Application URL Filters fields blank, as shown following.

    ```
    CA MAT ------------- WebSphere Application Server Criteria ---------------
    COMMAND ==>

    Expert Mode ==> N    Y - Collect PSW samples
                         N - Disable PSW sampling

    Specify Application URL Filters:
    =>
    =>
    =>
    =>

    Specify System Class Filters:
    =>
    =>
    =>
    Specify values. Press END to return to Monitoring Criteria
    ```

    There can be 1 to *n* occurrences of this Servant address space per WAS Server.

2. Analyze the monitor data sets to view the results.

    Select the WebSphere Transactions option to view the transactions detected by CA MAT, as shown following.

    ```
    CA MAT ------------ WebSphere Transactions ----------------- Row 1 to 9 of 9
    COMMAND ==>                                               SCROLL ==> HALF

    Primary commands: GARbage, WAS (Environment info), SQL        Profile: PLANTS1
                                                                  Mode: URL

        Line commands: N - URL Name


                                          Total  Avg      Max      Min
    LC Transaction URL                    Count  Resp     Resp     Resp

        _____  _____ _____ _____ _____
    --------------------------------------------------------------------------

    __ /burn/goReflect                    5 80658.00 86386.00 76104.00
    __ /burn/goWait                       8 14607.25 28045.00   943.00
    __ /burn/go                           5  8141.00 11519.00  5632.00
    __ /PlantsByWebSphere/servlet/Shopp  17  2967.65 16547.00    83.00
    __ /burn/goCache                      5  1584.60  2825.00   679.00
    __ /burn/goVector                     5   512.80  1415.00     3.00
    __ /PlantsByWebSphere/servlet/Image  56   284.36  2157.00    24.00
    __ /burn/gogobble                     8    27.63    74.00     5.00
    __ /PlantsByWebSphere/shopping.jsp    1     8.00     8.00     8.00
    ```

3. Follow up with a subsequent targeted monitor based on the data reported. See scenario 2.

Scenario 2—User Suspects a Specific Problem

This scenario assumes that you are aware of suspected problem areas or have already monitored the suspect transactions in nontargeted mode.

In this scenario, you target specific transactions with the use of transaction filters and generate detailed reports.

1. Request additional WAS targeting data by providing specific transaction filters.

   In the following example the filter value *plants* will cause only those transactions containing the value *plants* to be reported.

```
CA MAT ------------- WebSphere Application Server Criteria ---------------
COMMAND ==>

Expert Mode ==> N    Y - Collect PSW samples
                     N - Disable PSW sampling

Specify Application URL Filters:
=> *plants*
=>
=>
=>

Specify System Class Filters:
=>
=>
=>

Specify values. Press END to return to Monitoring Criteria
```

   You can specify several filter patterns in each input field, separated by a comma (*plants*,*admin*,/burn*).

2. Submit a monitor for each occurrence of the associated J2EE Servant Regions, unless you already know the Servant Region.

   There can be 1 to *n* occurrences of this Servant address space.

3. Analyze the monitor data sets to identify specific causes of application performance issues.

   The WebSphere Transactions report will only contain transactions whose URL names match the filter criteria, as shown next.

```
CA MAT ------------ WebSphere Transactions ----------------- Row 1 to 2 of 2
COMMAND ==>                                            SCROLL ==> HALF

Primary commands: MOde URL/Application/Via/Current,        Profile: PLANTS2
                  GARbage, WAS (Environment info), SQL        Mode: URL

   Line commands: A - Application Classes    S - SQL
                  V - Via Classes            D - Delays
                  C - Current Classes        N - URL Name


LC Transaction URL                    Active% InvWait% VolWait% Total% Visual
   _____ _____ _____ _____ _____ _____
>----------------------------------------------------------------------------

__ /PlantsByWebSphere/servlet/Shopp  83.11    0.00    0.00   83.11 =====>
__ /PlantsByWebSphere/servlet/Image  16.89    0.00    0.00   16.89 =>
******************************End of Table ******************************
```

Analyze WebSphere Application Server Transactions

CA MAT enables you to analyze WebSphere Application Server data at the WebSphere transaction level.

Use the following steps to analyze WebSphere transactions.

Follow these steps:

1. Select Option 13 from the Interactive Analysis menu.

```
CA MAT  -------------------- Interactive Analysis --------------------------
OPTION ===>

Enter option to analyze the monitored job:                    Profile: BIGBATCH
                                                              Options: NORMAL
  CA MAT  Monitor Information                   Subsystem Details
  -------------------------------------------   -------------------------------
  0  OverView   - Monitor session information   10  DB2 - View all SQL
  1  TaskView   - Activity by task              11  IMS - IMS Transactions
  2  DelayView  - Program delays                12  JVM - Java Virtual Machine
  3  CodeView   - Program activity              13  WAS - WebSphere Trans.
  4  TimeView   - Samples by time               14  CIC - CICS Summary Stats
  5  DataView   - Dataset information           15  IDMS - CA IDMS Activity
  6  TranView   - Activity by transaction
  7  ModView    - Module layout
  8  PoolView   - Buffer pools
  9  USSView    - Unix System Services

  ACTIVE - switch context to ACTIVE   WAIT - switch context to WAIT
  NORMAL - switch context to NORMAL   ALL  - switch context to ALL

Press END to exit analysis
```

The WebSphere Transactions panel displays.

```
CA MAT  ------------ WebSphere Transactions ----------------- Row 1 to 6 of 6
COMMAND ===>                                            SCROLL ==> CSR

Primary commands: MOde URL/Application/Via/Current,        Profile: WAS7
                  GARbage, WAS (Environment info), SQL        Mode: URL

   Line commands: A - Application Classes   S — SQL
                  V - Via Classes           D — Delays
                  C - Current Classes       N - URL Name


LC Transaction URL                  Active% InvWait% VolWait% Total% Visual
   _____ _____ _____ _____ _____ _____
>----------------------------------------------------------------------

__  common/GoWait              53.82   0.00    0.00   53.82 =======>
__  common/GoDB2MF             28.45   0.00    0.00   28.45 ===>
__  common/GoReflect           13.49   0.00    0.00   13.49 =>
__  /burn/go                    4.13   0.00    0.00    4.13
__  common/GoGobble             0.10   0.00    0.00    0.10
__  common/GoCache              0.02   0.00    0.00    0.02
**************************** End of Table ****************************
```

The WebSphere Transactions panel presents activity and perfomance information for the transaction URLs that are monitored by CA MAT.

The fields in this panel are desceibed next.

Transaction URL

Name of the sampled transaction URL.

Active%

Percentage of all WebSphere transactions measured where CA MAT detected program code to be executing.

InvWait%

Percentage of all WebSphere transactions measured where CA MAT detected program code to be in an involuntary wait.

VolWait%

Percentage of all WebSphere transactions measured where CA MAT detected program code to be in a voluntary wait.

Total%

Sum of active, voluntary, and involuntary waits.

Visual

Visual representation of the **Total%** value.

Total Count

Total number of URL instances detected.

Avg Resp

Average response time for the transaction in milliseconds.

Max Resp

Maximum response time for the transaction in milliseconds.

Min Resp

Minimum response time for the transaction in milliseconds.

When no URL filters are specified in the WebSphere monitoring criteria panel (see "Monitoring Criteria for WebSphere Application Server"), CA MAT does not collect Class data (Application, Via, or Current) or activity statistics. Only WebSphere transactions, garbage collection, environment, and SQL data is collected. In this case, a list of transactions displays, which you can use to define URL filters for subsequent monitors.

```
CA MAT  ----------- WebSphere Transactions ---------------- Row 1 to 7 of 7
COMMAND ===>                                              SCROLL ===> CSR

Primary commands: GARbage, WAS (Environment info), SQL      Profile: WAS4
                                                               Mode: URL
    Line commands: N - URL Name

                                    Total  Avg      Max      Min
LC Transaction URL                  Count  Resp     Resp     Resp

   _____  _____  _____ _____  _____
 --------------------------------------------------------------------------------

__ /burn/goReflect                    1 13293.00 13293.00 13293.00
__ /burn/goDB2MF                      1 10073.00 10073.00 10073.00
__ /burn/go                           1  2808.00  2808.00  2808.00
__ /burn/gogobble                     1    39.00    39.00    39.00
__ /burn/goCache                      1    24.00    24.00    24.00
__ /burn/goVector                     1     2.00     2.00     2.00
__ /burn/goWait                       1     0.00     0.00     0.00
****************************** End of Table ******************************



                      Transaction only mode
```

2. Enter the MOde primary command on the COMMAND line from the WebSphere Transactions panel and press Enter to see all classes of the selected type (Application/Via/Current). For example:

   ■ Type MO A to see all the Application classes.

   ■ Type MO V to see all the Via classes.

   ■ Type MO C to see all the Current classes.

The WebSphere Classes panel displays.

```
CA MAT  ----------------- WebSphere Classes ----------------- Row 1 to 4 of 4
COMMAND ==>                                           SCROLL ==> CSR

Primary commands: MOde URL/Application/Via/Current         Profile: WAS5
                  GARbage, WAS (Enviroment info), SQL         Mode: Appl.

   Line commands: D - Delays        NC - Class Name
                  S - SQL           NM - Method Name


LC Class Name              Method Name             Line #   Active% InvWait%
   _____ _____ _____ _____ _____
>---------------------------------------------------------------------------

__ common/IoPerform       read             Compiled  48.03   0.00
__ common/CpuPerform      exercise         Compiled  47.35   0.00
__ common/GoHeader        processRequest         41   4.19   0.00
__ common/GoHeader        processRequest         42   0.43   0.00
***************************** End of Table *****************************
```

This panel shows a high-level display of classes for the selected mode.

3. Use line commands A (Application Classes), V (Via Classes), or C (Current Classes) from the WebSphere Transactions panel, to see the classes that are associated with the selected transaction, as shown following.

```
CA MAT  ----------------- WebSphere Classes ----------------- Row 1 to 2 of 2
COMMAND ==>                                           SCROLL ==> CSR

Primary commands: GARbage, WAS (Enviroment info)          Profile: WAS5
                                                             Type: Appl.

   Line commands: D - Delays        NC - Class Name
                  S - SQL           NM - Method Name

Transaction: /burn/go


LC Class Name              Method Name             Line #   Active% InvWait%
   _____ _____ _____ _____ _____
>---------------------------------------------------------------------------

__ common/IoPerform       read             Compiled  48.03   0.00
__ common/CpuPerform      exercise         Compiled  47.35   0.00
***************************** End of Table *****************************
```

The WebSphere Classes panel provides information about the classes and methods that are called by the WebSphere application.

You can also see the method name and line number for the selected transaction URL. Compiled in the Line # column indicates that the method was compiled dynamically and that there is no line number

4. Use line command D (Delays) from the WebSphere Transactions panel to see the delay category for the selected transaction, as shown following.

Possible delay categories are

- IO delay
- network delay
- SQL delay
- JMS delay
- other delay

```
CA MAT  ----------------- WebSphere Delays ----------------- Row 1 to 1 of 1
COMMAND ===>                                          SCROLL ===> CSR

Primary commands: GARbage, WAS (Environment info)          Profile: WAS5
                                                              Type: URL

Transaction: /burn/go
 Class Name: *
Method Name: *
Line Number: *


Delay           Active% InvWait% VolWait% Total% Visual
_____ _____ _____ _____ _____ _____
------------------------------------------------------------------------------

Other Delay     95.38    0.00     0.00    95.38 ======>
****************************** End of Table ******************************
```

The WebSphere Delays panel reports the delays that are attributed to the selected transaction or class.

5. Use line command S (SQL) from the WebSphere Transactions panel, to see the SQL statement information for the selected transaction.

```
CA MAT  ---------- WebSphere SQL Statements ----------------- Row 1 to 3 of 3
COMMAND ===>                                          SCROLL ===> CSR

Primary commands: GARbage, WAS (Environment info)          Profile: WAS5
                                                              Type: URL

   Line commands: S - Display SQL

Transaction: /burn/go
 Class Name: *
Method Name: *
Line Number: *

                                   Total   Avg Resp Max Resp Min Resp
LC SQL Statement                   Count   Time (ms) Time (ms) Time (ms)

   _____ _____ _____ _____ _____
------------------------------------------------------------------------------

__ update COT_School set COT_School     0    0.00    0.00    0.00
__ select ordertype as ordertype, c     0    0.00    0.00    0.00
__ select count(*) as kount, state      0    0.00    0.00    0.00
****************************** End of Table ******************************
```

The WebSphere SQL Statements panel reports the SQL statement information that is associated with the selected transaction or class.

If a statement has been truncated on this panel, you can use line command S again to see the full text of the selected SQL statement.

Or, you can use the SQL primary command to see all detected SQL statements in the following step.

6. Enter the SQL primary command on the COMMAND line from the WebSphere Transactions panel and press Enter to see all detected SQL statements.

```
CA MAT  ---------- WebSphere SQL Statements --------------- Row 1 to 6 of 102
COMMAND ==>                                           SCROLL ==> CSR

Primary commands: GARbage, WAS (Environment info)          Profile: WAS7
                                                              Type: ALL

   Line commands: S - Display SQL   T — Transactions

Transaction: *
 Class Name: *
Method Name: *
Line Number: *


                                Total   Avg Resp  Max Resp  Min Resp
LC SQL Statement                Count   Time (ms) Time (ms) Time (ms)
   _____ _____ _____ _____ _____
-------------------------------------------------------------------------------

__ select count(TEXT8),          50   112.00   219.00    77.00
__ insert into btsrfr.TR          2    96.00   174.00    18.00
__ update btsrfr.TRI85TB          1    68.00    68.00    68.00
__ update btsrfr.TRI85TB          1    62.00    62.00    62.00
__ update btsrfr.TRI85TB          1    62.00    62.00    62.00
__ update btsrfr.TRI85TB          1    61.00    61.00    61.00
```

7. Use line command T (Transactions) from the WebSphere Transactions panel to see the transactions that are associated with the selected SQL statement.

```
CA MAT  ----------- WebSphere Transaction Detail ----------------- Row 1 to 1
COMMAND ==>                                                SCROLL ==> PAGE

Primary commands: GARbage, WAS (Environment info), STMT      Profile: WASAZB1
                                                                  Type: ALL
   Line commands: A - Application Classes    V - Via Classes
                  C - Current Classes        N - URL Name

SQL Stmt: select count(TEXT8), TEXT8 from btsrfr.TRI85TB group by TEXT8 order


LC Transaction URL                    Active% InvWait% VolWait% Total% Visual
   _____ _____ _____ _____ ____ _____
>----------------------------------------------------------------------------

__ /bum/goDB2MF                        7.16    0.00    0.00    7.16 ======>
****************************** End of Table ******************************
```

If the SQL statement text is truncated on this panel, you can use the STMT command to see the full text of the SQL statement.

8. Use line commands A (Application Classes), V (Via Classes), or C (Current Classes) from the WebSphere Transactions panel to see the classes that are associated with the selected transaction.

9. Enter the WAS (Environment info) primary command on the COMMAND line from any of the WebSphere panels and press Enter to see information about the WebSphere environment.

```
CA MAT  --------------- WebSphere Environment -------------- Row 1 to 9 of 9
COMMAND ==>                                                SCROLL ==> CSR

Primary commands: GARbage                                  Profile: WAS7

WebSphere Environment
----------------------------------------------------------------------------


        Process ID: 50332345
               JVM: IBM Corporation          1.4.2
Application Server: WebSphere - z/OS         5.1

 Initial Heap Size: 268.6        (MBytes)
 Maximum Heap Size: 268.4        (MBytes)
```

10. Enter the GARbage primary command on the COMMAND line from any of the WebSphere panels and press Enter to see information about the WebSphere garbage collection information.

```
CA MAT  --------- WebSphere Garbage Collection ------------ Row 1 to 17 of 25
COMMAND ==>                                               SCROLL ==> CSR

Primary commands: WAS (Environment info)                   Profile: WAS7

Garbage Collection
----------------------------------------------------------------------------

# of Events   Initial: 8        Final: 11
            Monitored: 3         Rate: 0.034    (events/sec)

Initial Heap Size: 269.0     (MBytes)
  Final Heap Size: 269.1     (MBytes)
   Occupancy Rate: 0.02      (% of time GC was running during monitor)


----------------------------------------------------------------------------

Memory Usage    (percentage of heap during monitor session)
----------------------------------------------------------------------------

Min =   8.3% (   22.3MB)   Max =  72.8% (  195.8MB)
----------------------------------------------------------------------------

% Heap ---------1---------2---------3---------4---------5
  90
  80
```

The WebSphere Garbage Collection panel provides information about WebSphere memory usage during the monitoring session.

Chapter 15: Using the Product in a WebSphere for MQ Environment

This chapter describes how you can use CA MAT to identify and locate delays in your WebSphere for MQ environment.

CA MAT also recognizes delays incurred by Queue Managers in this environment.

This section contains the following topics:

Analyze WebSphere for MQ Data

To analyze WebSphere for MQ data, no setup is required. If WebSphere for MQ is running, CA MAT discovers it and begins collecting statistical data. Begin your monitoring session from the DelayView or DataView panel. You can also begin your monitoring session from TranView to DelayView Detail to Queue Manager Activity.

```
CA MAT ------------------------- DelayView --------------- Row 5 to 17 of 17
COMMAND ===>                                                 SCROLL ===> HALF

Primary commands: DETail on/off         Module: *           Profile: ASFDFD
                  ADDHelp                Csect: *            Options: NORMAL
                                         Offset: *            Detail: ON
    Line commands:  A - Address
                    S - Distribution

LC Major category      Minor category      Actv%  Wait%  Totl%  Visual
   _____    _____    _____  _____  _____  _____
---------------------------------------------------------------------------

__ MQSeries Delay      MQSeries Delay       0.00   5.50   5.50 >
__ Other Delays        Unknown wait type    0.00   2.12   2.12
__ Voluntary Wait      Stimer SVC           1.41   0.00   1.41
__ Program Load Delay  Load SVC             0.00   1.14   1.14
__ System Active       Storage management   0.96   0.00   0.96
__ System Active       Regmain SVC          0.73   0.00   0.73
__ System Active       Getmain 120 SVC      0.73   0.00   0.73
__ System Active       PC-Time service      0.35   0.00   0.35
__ Resource Conflict   Enq SVC              0.23   0.00   0.23
__ Abend Proc Delays   Sdump SVC            0.08   0.00   0.08
__ Resource Conflict   Global Serialization 0.08   0.00   0.08
__ System Active       System trace         0.08   0.00   0.08
__ System Active       Stae SVC             0.03   0.00   0.03
```

Follow these steps:

1. Select MQSeries Delay and press Enter.

    The Queue Manager Activity panel displays.

    This panel shows the transaction field only if it is from the DelayView Detail screen.

```
CA MAT ------------- Queue Manager Activity ---------------- Row 1 to 1 of 1
COMMAND ==>                                              SCROLL ==> HALF

 Transaction:  MVGT                                      Profile: ASFDFD
                                                         Options: NORMAL


 Line commands: S - Queue Activity   C - Code Detail
                I - Queue Manager Information


   Queue    Queue
LC Manager Description                       Actv%  Wait%  Totl%  Visual
   _____ _____ _____ _____ _____ _____
>-----------------------------------------------------------------------

__  CSQ8    CSQ8, IBM WebSphere MQ for z/OS    0.00   5.50   5.50 ======>
******************************* End of Table ******************************
```

The Queue Manager Activity panel displays information about WebSphere for MQ calls that are detected by CA MAT. Each row indicates the active and wait time for a specific Queue Manager. A description for each field in the Queue Manager Activity panel follows.

Queue Manager

> Four-character subsystem name of the Queue Manager.

Queue Description

> Text description of the function or purpose of the Queue Manager.

> If the description is truncated, scroll the panel to the right to display the full description.

2. Enter the I line command beside the Queue Manager's name to display additional information about a specific Queue Manager.

    The Queue Manager Information panel displays.

```
CA MAT ------------ Queue Manager Information ------------ Row 1 to 18 of 18
COMMAND ==>                                              SCROLL ==> HALF

Queue Manager  . . . . . . CSQ8                          Profile: ASFDFD
                                                         Options: NORMAL

Queue Manager Identifier . CSQ8.B909215A58FB9560
Description  . . . . . . . CSQ8, IBM WebSphere MQ for z/OS - V5.3

Command Level  . . . . . . 5.3.0          Platform Type . . MQPL_MVS
Expiry Interval  . . . . . OFF            Platform Name . . SJSE
Trigger Interval . . . . . 999999999      User ID . . . . .
Queue Sharing Group  . . . QSH3           Syncpoint . . . . MQSP_AVAILABLE

Maximum Handles  . . . . . 256            Max Priority  . . 9
Maximum Message Length . . 104857600      Max Uncommitted . 10000

Queue Names --------------------------------------------------------------


Command Input  . . . . . . SYSTEM.COMMAND.INPUT
Dead Letter  . . . . . . . CSQ8.DEAD.QUEUE
Default XMIT . . . . . . . CSQ8.DEFXMIT.QUEUE
Repository . . . . . . . .
```

The Queue Manager Information panel provides information about the selected Queue Manager. A description for each field in the Queue Manager Information panel follows.

Queue Manager

Four-character subsystem name of the Queue Manager.

Queue Manager Identifier

Unique internally-generated identifier of the Queue Manager.

Description

Queue Manager description.

Command Level

Level of system control commands supported by the Queue Manager.

Expiry Interval

Interval between scans for expired messages. This value can be either a time interval in seconds (1 to 99,999,999) or OFF

Trigger Interval

Time interval (in milliseconds) that is used to restrict the number of trigger messages.

Queue Sharing Group

Name of the queue-sharing group to which the Queue Manager belongs.

Platform Type

Operating system on which the Queue Manager is running.

Platform Name

Name of the operating system.

User ID

User identification of the intra-group queuing agent.

Syncpoint

Indicates whether the Queue Manager supports units of work and syncpointing with the MQGET, MQPUT, and MQPUT1 calls.

Maximum Handles

Maximum number of open handles that any one task can use concurrently.

Maximum Message Length

Maximum message length in bytes

Maximum Priority

Maximum message priority supported by the Queue Manager.

Maximum Uncommitted Messages

Maximum number of uncommitted messages that can exist within a unit of work.

Command Input

Name of the command input queue defined on the Queue Manager. Users can send commands to this queue.

Dead Letter

Name of a queue defined on the Queue Manager. Messages are sent to this queue if they cannot be routed to their correct destination.

Default XMIT

Name of the transmission queue that transmits messages to remote Queue Managers if no other transmission queue is identified.

Repository

Name of a cluster for which this Queue Manager provides a repository-manager service.

If the Queue Manager provides this service for more than one cluster, Repository Namelist specifies the name of a namelist object that identifies the clusters.

Repository Namelist

> Name of a namelist object that contains the names of clusters for which this Queue Manager provides a repository-manager service.

3. Type **C** on the COMMAND line.

The CodeView Detail panel displays.

```
CA MAT ------------------- CodeView Detail ------------------ Row 1 to 1 of 1
COMMAND ==>                                               SCROLL ==> HALF

   Queue Manager: CSQ8          Request Type: N/A           Profile: ASFDFD
      Queue Name: N/A                                       Options: NORMAL
                                                               Mode: CSECT
Primary commands: MOde Pseudo/Module/Csect/4GL,
                  PSEudo, REGister, ADDHelp

Line commands: A - Associate    C - Callerid     D - Delays   N - Long Name
               I - Info         L - Listing      S - Distribution
               H - Histogram    NH - Normalized Histogram

LC Module   Csect   Description              L C Actv% Wait% Totl% Visual
   _____ _____ _____ _ _ ____ ____ ____ _____
>---------------------------------------------------------------------------

__ CSQBSRV  CSQAPRH  MQSeries                 A Y  0.00  5.50  5.50 ======>
```

4. Go back to the Queue Manager Activity panel and use the S line command to display the Queue Activity panel.

```
CA MAT --------------------- Queue Activity ----------------- Row 1 to 3 of 3
COMMAND ==>                                               SCROLL ==> HALF

  Queue Manager: CSQ8                                       Profile: ASFDFD
   Transaction:  MVGT                                       Options: NORMAL

  Line commands: I - Queue Information  C - Code Detail

                                 Queue   Number of
LC Queue Name                    Request Requests  Actv% Wait% Totl% Visual
   _____ _____ _____ ____ ____ ____ _____
>---------------------------------------------------------------------------

__ CAMAT.JRF.QUEUE1              MQGET       2 0.00 3.13   3.13 ===>
__ CAMAT.JRF.QUEUE1              MQPUT       8 0.00 2.35   2.35 ==>
__ CAMAT.JRF.QUEUE1              MQPUT       6 10.77 0.00 10.77 ==>
```

The Queue Activity panel shows the detected activity of each queue within a Queue Manager. Each row shows wait and CPU activity for each queue that is used by the application within the selected Queue Manager. This panel shows the transaction field only if it is from TranView to DelayView Detail to Queue Manager Activity to Queue Activity panel.

A description for each field in the Queue Manager Information panel follows.

Queue Name

Name of the message queue. Message queues are used to store messages sent by programs.

Local queues are owned by the local Queue Manager, and remote queues belong to a different Queue Manager.

Queue Request

Function of the API call that was executed:

- MQCONN: Connect to a Queue Manager.

- MQOPEN: Open a message queue for output.

- MQPUT: Put a message in a queue.

- MQCLOSE: Close a queue.

- MQDISC: Disconnect from a Queue Manager.

- MQPUT1: Equivalent to MQOPEN + MQPUT + MQCLOSE.

- MQINQ: Inquire about the properties of an object.

- MQSET: Set properties of an object.

- MQCONNX: Set standard or fastpath bindings.

- MQBEGIN: Begin a unit of work.

- MQCMIT: Commit a unit of work.

- MQBACK: Back out.

- CMT_PREP: IBM® internal function call. Prepare for two phase commit.

- END_THRD: IBM internal function call.

Queue Description

Text description of the function or purpose of the queue.

If the description is truncated, scroll the panel to the right to display the full description.

Number of Requests

Indicates the number of times the 'Queue Name' Queue is accessed by the 'Queue Request' MQ Commands **MQGET, MQPUT**, and **MQPUT1** during this monitor run. This field is available only if TUNSSP00 MQICEPT=YES is specified or MODIFY command is used to Install an intercept to a MQ queue manager.

API Type

Application Program Interface type used by the queue to communicate with the Queue Manager

MQI Message Queue Interface

AMI Application Messaging Interface.

AMI Function

Object interface function performed by the AMI call.

Min Msg Length

Indicates the length of the shortest message processed by the 'Queue Name' Queue during this monitor run. This field is available only if TUNSSP00 MQICEPT=YES is specified or MODIFY command is used to Install an intercept to a MQ queue manager.

Max Msg Length

Indicates the length of the longest message processed by the 'Queue Name' Queue during this monitor run. This field is available only if TUNSSP00 MQICEPT=YES is specified or MODIFY command is used to Install an intercept to a MQ queue manager.

Avg Msg Length

Indicates the average length of all messages processed by the 'Queue Name' Queue during this monitor run. This field is available only if TUNSSP00 MQICEPT=YES is specified or MODIFY command is used to Install an intercept to a MQ queue manager.

5. Type the I line command to display the Queue Information panel.

```
CA MAT -------------------- Queue Information ------------ Row 1 to 21 of 21
COMMAND ===>                                              SCROLL ==> HALF

 Queue Name . CAMAT.JRF.QUEUE1                          Profile: ASFDFD
Description . CAMAT TESTING                             Options: NORMAL

Queue Manager . . . . . CSQ8          MQ Release . . . . . 7.0.0
Request Type  . . . . . MQGET         Min Buffer Length  . 80
API Type  . . . . . . . MQI           Max Buffer Length  . 250
Environment . . . . . .               Avg Buffer Length  . 168
Language  . . . . . . . not available Max Message Length . 9999
Storage Class    . . . DEFAULT        Max Queue Depth  . . 999999999

Queue Parameters --------------------------------------------------------------

Queue Type  . . . . . . MQQT_LOCAL
Object Type . . . . . . MQOT_Q
Queue Definition Type . MQQDT_PREDEFINED
Message Persistence . . MQPER_NOT_PERSISTENT
Inhibit Gets  . . . . . MQQA_GET_INHIBITED
Inhibit Puts  . . . . . MQQA_PUT_INHIBITED
Options . . . . . . . . MQGMO_SYNCPOINT
                        MQGMO_NO_WAIT
                        MQGMO_ACCEPT_TRUNCATED_MSG


Trigger Information -----------------------------------------------------------

Trigger Control . . . . MQTC_OFF       Trigger Depth  . . . 1
Trigger Type  . . . . . MQTT_FIRST
Trigger Data  . . . . .
```

The Queue Information panel displays information about the selected message queue. Message queues are used to store messages that are sent by programs. Local queues are owned by the local Queue Manager, and remote queues belong to a different Queue Manager. A description for each field in the Queue Information panel follows.

Queue Name

Name of local or remote Queue Manager.

Description

Description associated with the message queue.

Queue Manager

Run-time program that manages queues and messages for applications provides the Message Queuing Interface (MQI) for communication with applications application programs invoke functions of the Queue Manager by issuing API calls.

Request Type

Specifies the function of the API call which was executed:

- MQCONN: Connect to a Queue Manager.

- MQOPEN: Open a message queue for output.

- MQPUT: Put a message in a queue.

- MQCLOSE: Close a queue.

- MQDISC: Disconnect from a Queue Manager.

- MQPUT1: Equivalent to MQOPEN + MQPUT + MQCLOSE.

- MQINQ: Inquire properties of an object.

- MQSET: Set properties of an object.

- MQCONNX: Set standard or fastpath bindings.

- MQBEGIN: Begin a unit of work.

- MQCMIT: Commit a unit of work.

- MQBACK: Back out.

- CMT_PREP: IBM internal function call. Prepare for two phase commit.

- END_THRD: IBM internal function call.

API Type

Displays the Application Program Interface type that is used by the queue to communicate with the Queue Manager:

- MQI   Message Queue Interface

- AMI   Application Messaging Interface

Environment

Displays the environment in which WebSphere for MQ is running.

Language

Displays the specific language.

MQ Release

Displays the release level of WebSphere for MQ.

Min Buffer Length

Indicates the length of the shortest buffer used by the Queue Name' Queue during this monitor run. This field is available only if TUNSSP00 MQICEPT=YES is specified or MODIFY command is used to Install an intercept to a MQ queue manager.

Max Buffer Length

Indicates the length of the longest buffer used by the 'Queue Name' Queue during this monitor run. This field is available only if TUNSSP00 MQICEPT=YES is specified or MODIFY command is used to Install an intercept to a MQ queue manager.

Avg Buffer Length

Indicates the average length of all buffers used by the 'Queue Name' Queue during this monitor run. This field is available only if TUNSSP00 MQICEPT=YES is specified or MODIFY command is used to Install an intercept to a MQ queue manager.

Max Message Length

Indicates the length of the longest physical message that can be handled by the Queue Manager.

Max Queue Depth

Indicates the maximum number of messages allowed in the queue.

Queue Type

Provides the specific purpose of the queue:

- MQQT_LOCAL is a queue owned by the Queue Manager to which the application program is connected. It is used to store messages for programs that use the same Queue Manager.

- MQQT_REMOTE is queue owned by a different Queue Manager (the local definition of a remote queue). A remote queue is not a real queue - it is a structure that contains some of the characteristics of a queue that is hosted by a different Queue Manager.

- MQQT_ALIAS are alias queues that are not real queues but definitions. They are used to assign different names to the same physical queue. These aliases allow multiple programs to work with the same queue, accessing it under different names and attributes.

- MQQT_CLUSTER is a local queue that is known throughout a cluster of Queue Managers. Any Queue Manager that belongs to the cluster can send messages to it without the need of a remote definition, or having to define channels to the Queue Manager that owns it.

- MQQT_MODEL is not a real queue. A model queue is a collection of attributes that are used when a dynamic queue is created.

Object Type

Displays the type of object being named in ObjectName. Possible values are as follows:

- MQOT_Q is Queue.

- MQOT_NAMELIST is Namelist.

- MQOT_STORAGE_CLASS is Storage clas.s

- MQOT_Q_MGR is Queue Manager.

- MQOT_CHANNEL is Channel.

- MQOT_AUTH_INFO is Namelist containing the names of authentication-information objects.

- MQOT_CF_STRUC is Coupling-facility structure.

- Queue Definition Type

- indicates how the queue was defined:

- MQQDT_PREDEFINED is a permanent queue created by the system administrator; only the system administrator can delete it.

- MQQDT_PERMANENT_DYNAMIC is a permanent queue that was created by an application issuing an MQOPEN call.

- MQQDT_TEMPORARY_DYNAMIC is a temporary queue that was created by an application issuing an MQOPEN call.

- MQQDT_SHARED_DYNAMIC is a shared queue that was created by an application issuing an MQOPEN call.

Message Persistence

Indicates whether the message survives system failures and Queue Manager restarts:

- MQPER_PERSISTENT The message survives system failures and Queue Manager restarts.

- MQPER_NOT_PERSISTENT The message does not normally survive system failures or Queue Manager restarts. This situation applies even if an intact copy of the message is found during restart.

- MQPER_PERSISTENCE_AS_Q_DEF If the queue is a cluster queue, the persistence of the message is taken from the Persistence attribute defined at the destination Queue Manager that owns the particular instance of the queue on which the message is placed. If the queue is not a cluster queue, the persistence of the message is taken from the Persistence attribute defined at the local Queue Manager, even if the destination Queue Manager is remote.

Inhibit Get

Controls whether GET operations for this queue are allowed:

- MQQA_GET_INHIBITED GET operations are inhibited.

- MQQA_GET_ALLOWED GET operations are allowed.

Inhibit Puts

Controls whether PUT operations for this queue are allowed:

- MQQA_PUT_INHIBITED PUT operations are inhibited.

- MQQA_PUT_ALLOWED PUT operations are allowed.

Trigger Control

Controls whether trigger messages are written to an initiation queue, in order to cause an application to be started to service the queue:

- MQTC_OFF - Trigger messages are not required. No trigger messages are to be written for this queue.

- MQTC_ON - Trigger messages are to be written for this queue when the appropriate trigger events occur.

Trigger Type

Controls the conditions under which trigger messages are written as a result of messages arriving on this queue:

- MQTT_NONE - No trigger messages are written as a result of messages on this queue.

- MQTT_FIRST - A trigger message is written whenever the number of messages of trigger priority or greater on the queue changes from 0 to 1.

- MQTT_EVERY - A trigger message is written for every message.

- MQTT_DEPTH - A trigger message is written whenever the number of messages of trigger priority or greater on the queue equals or exceeds the defined trigger depth.

Trigger Data

Displays the free-format data that the Queue Manager inserts into the trigger message when a message arriving on this queue causes a trigger message to be written to the initiation queue.

Trigger Depth

Displays the number of messages of trigger priority or greater that must be on the queue before a trigger message is written.

AMI Application

Specifies the application which initiated the AMI call.

AMI Function

Specifies the object interface function performed by the AMI call.

AMI Policy Name

> Specifies the name of the AMI policy in use. Policy controls how AMI functions operate.

AMI Service Name

> Specifies the name of the pre-defined Service, which defines numerous default AMI parameters.

6. Type **C** to display the CodeView Detail panel for the selected queue.

```
CA MAT ------------------ CodeView Detail ----------------- Row 1 to 1 of 1
COMMAND ==>                                               SCROLL ==> HALF

   Queue Manager: CSQ8           Request Type: MQGET        Profile: ASFDFD
     Queue Name: CAMAT.JRF.QUEUE1                           Options: NORMAL
                                                               Mode: CSECT
Primary commands: MOde Pseudo/Module/Csect/4GL,
                  PSEudo, REGister, ADDHelp

   Line commands: A - Associate    C - Callerid    D - Delays   N - Long Name
                  I - Info         L - Listing     S - Distribution
                  H - Histogram    NH - Normalized Histogram

LC Module   Csect   Description              L C Actv% Wait% Totl% Visual
   _____ _____ _____ _ _ ____ ___ ____ _____
 >----------------------------------------------------------------------------

 __ CSQBSRV  CSQAPRH  MQSeries                A Y  0.00  3.13   3.13 =======>
```

7. Type **C** again to display the Callerid Detail panel.

```
CA MAT ------------------ Callerid Detail ----------------- Row 1 to 1 of 1
COMMAND ==>                                               SCROLL ==> HALF

   Queue Manager: CSQ8           Request Type: MQGET        Profile: ASFDFD
     Queue Name: CAMAT.JRF.QUEUE1                            Module: CSQBSRV
                                                              Csect: CSQAPRH
Primary commands: REGister, ADDHelp

   Line commands: L - Listing    A - Associate
                  I - Module/Csect Information

LC Module   Csect    Offset   Stmt  Csect Description       Pct   Visual
   _____ _____ _____ ____ _____ ____ _____
 >----------------------------------------------------------------------------

 __ CSQ4BAP1 CSQ4BAP1 00000810  2245 MQSeries                3.13 =======>
```

This field is available only if TUNSSP00 MQICEPT=YES is specified or MODIFY command is used to Install an intercept to a MQ queue manager.

Chapter 16: Using the Product in a CA IDMS Environment

This chapter describes how you can use CA MAT to identify delays that are specific to CA IDMS.

This section contains the following topics:

Display CA IDMS Delays

The CA IDMS Delays panel enables you to pinpoint bottlenecks due to CA IDMS requests.

On this panel, you can easily see the percentage of CA IDMS samples taken during the monitored period where CA MAT detected tasks in CA IDMS. CA MAT is reporting whether or not each task is executing or waiting at the time the samples were taken.

You can use one of the following methods to access this panel:

- option 15 from the Interactive Analysis Menu

- line command S to select a CA IDMS request from the DataView panel

Follow these steps:

1. Select option 15 from the Interactive Analysis Menu. Alternatively, you can select the line command S to select a CA IDMS request from the DataView panel

   The CA IDMS Delays panel displays.

```
CA MAT ------------------------ IDMS Delays -------------- Row 1 to 9 of 18
COMMAND ==>                                               SCROLL ==> CSR

Primary Commands: MOde TASk / MODule , DML (delays)        Profile: IDMSCV17
                                                           Options: NORMAL
   Line commands: D - Detail  L - Listing                     Mode: Module

 CV number: 97        IDMS Release: 17.0.01      Local Mode: NO

LC TaskCode Module  Offset   Status              Totl% Visual
   _____ _____  _____  _____     ____  _____
>------------------------------------------------------------------------
__ RHDCNP3S RHDCNP3S 00000000 Task is Waiting    16.13 ========>
__ RHDCNP3S RHDCNP3S 00000000 Task is Waiting    12.90 ======>
__ RHDCNP3S RHDCNP3S 00000000 Task Executing      9.68 =====>
__ BYE      RHDCBYE  00000000 Task Executing      9.68 =====>
__ DCUF     RHDCUF00 00000000 Task Executing      6.45 ===>
__ DCMT     RHDCMT00 00000000 Task Executing      6.45 ===>
__ BYE      RHDCBYE  000001BC Task is Waiting     3.23 =>
__ RHDCNP3S RHDCNP3S 00000000 Task is Waiting     3.23 =>
__ RCVR     RCVRTS01 00000000 Task Executing      3.23 =>
---------------------------------- Totals ------------------------------------

                                                 100.0
```

   The previous panel shows CA IDMS delays summarized by Module and Offset, sorted by Totl% (default).

2. See the following panel for an example of these delays summarized by TaskCode.

   A description for each field in the CA IDMS Delays panel follows.

   Profile

   Name of the profile that you specified when you created the monitor definition.

   Options

   Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

   An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

Task

Unique name that identifies a task to CA IDMS DC/UCF.

The user types the task code in response to the DC/UCF system prompt. Task codes are defined at system generation or by using a DCMT VARY DYNAMIC TASK command.

Module

Name of the program requesting CA IDMS DB/DC services, when known, or the name of the program invoked by specifying the task code.

Offset

Relative address within the module to which control will be returned upon completion of the CA IDMS DB/DC service request.

Status

Status of the CA IDMS DB/DC service request, whether it is waiting for resources, ready to execute, or executing.

Totl%

Percentage of CA IDMS samples taken during the monitored period where CA Mainframe Application Tuner detected CA IDMS TASKs either executing or waiting for resources.

Visual

Visual depiction of the Totl% value.

Wait

Identifier of the ECB on which the task is waiting.

The ECB can be internal as defined by CA IDMS macro #ECBDS or external as defined by CA IDMS macro #ELEDS.

Note: Scroll right to see this field on the CA IDMS Delays panel.

3. Use the commands available on the CA IDMS Delays panel as necessary.

MOde TASk

Summarizes the data by task code.

MOde MODule

Summarizes the data by module and offset (default).

DML

Displays delays caused by DML statements.

D

Line command to display detail information about the selected row.

The following panel shows CA IDMS delays summarized by TaskCode, sorted by Totl%.

```
CA MAT ------------------------- IDMS Delays ---------------- Row 1 to 5 of 5
COMMAND ==>                                                SCROLL ==> CSR

Primary Commands: MOde TASk / MODule , DML (delays)         Profile: IDMSCV17
                                                           Options: NORMAL
   Line commands: D - Detail  L - Listing                     Mode: TaskCode

 CV number: 97      IDMS Release: 17.0.01      Local Mode: NO

LC TaskCode Totl% Visual

   _____ ____ _____
---------------------------------------------------------------------------
__ RHDCNP3S 41.94 ======>
__ DCMT     22.58 ===>
__ BYE      16.13 ==>
__ DCUF      9.68 =>
__ RCVR      9.68 =>
****************************** End of Table *****************************

-------------------------------- Totals ----------------------------------

          100.0
```

4. Select the CA IDMS Delay panel by choosing option 15 from the Interactive Analysis Menu if you want to see the CA IDMS Wait reasons. You may need to scroll to the right (depending on your screen size and terminal model) to see the Wait field.

    This field displays the identifier of the ECB on which the task is waiting.

```
CA MAT ------------------------- IDMS Delays --------------- Row 1 to 9 of 18
COMMAND ==>                                                SCROLL ==> CSR

Primary Commands: MOde TASk / MODule , DML (delays)         Profile: IDMSCV17
                                                           Options: NORMAL
   Line commands: D - Detail  L - Listing                     Mode: Module

 CV number: 97      IDMS Release: 17.0.01      Local Mode: NO

LC TaskCode Module   Wait

   _____ _____ _____
<--------------------------------------------------------------------------
__ RHDCNP3S RHDCNP3S DBIO READ ECB
__ RHDCNP3S RHDCNP3S DBIO WRITE ECB
__ RHDCNP3S RHDCNP3S
__ BYE      RHDCBYE
__ DCUF     RHDCUF00
__ DCMT     RHDCMT00
__ BYE      RHDCBYE  DBIO READ ECB
__ RHDCNP3S RHDCNP3S EREECB
__ RCVR     RCVRTS01
-------------------------------- Totals ----------------------------------
```

5. Use line command D to see the details about the selected row.

    The IDMS Detail panel displays the detail information:

```
CA MAT --------------------------- IDMS Detail -------------- Row 1 to 6 of 6
COMMAND ==>                                               SCROLL ==> CSR

                                                          Profile: IDMS17
                                                          Options: NORMAL
Field Name        Field Value

_____  _____
-----------------------------------------------------------------------------
Task Code         RHDCNP3S
Module            RHDCNP3S
Offset            00000000
Status            Task is Waiting
Wait              DBIO READ ECB
Total%            16.13
****************************** End of Table ******************************
```

Display DML Delays

The DML Delays panel enables you to pinpoint bottlenecks due to requests from Data Manipulation Language (DML) statements.

On this panel, you can see the current or most recent DML statement in effect when CA MAT detected CA IDMS waiting for resources.

Follow these steps:

1. Use the DML command from the CA IDMS Delays panel.

    The DML Delays panel displays.

```
CA MAT-------------------------- DML Delays -------------- Row 1 to 10 of 19
COMMAND ==>                                               SCROLL ==> CSR

   Line commands: D - Detail                              Profile: IDMS17
                                                          Options: NORMAL

 CV number: 97        IDMS Release: 17.0.01      Local Mode: NO

LC TaskCode Module   Offset   DML SEQ  Totl% Visual
   _____ _____ _____ _____ ____ _____
 >-----------------------------------------------------------------------
 __ RHDCNP3S RHDCNP3S 00000000 00000000 12.90 ==========>
 __ RCVR     RCVRTS01 00000000 00000000  9.68 =======>
 __ BYE      RHDCBYE  00000000 00000000  9.68 =======>
 __ RHDCNP3S RHDCNP3S 00000000 00000000  6.45 =====>
 __ DCUF     RHDCUF00 00000000 00000000  6.45 =====>
 __ DCMT     RHDCMTPR 00001A6E 00000000  6.45 =====>
 __ DCMT     RHDCMT00 00000000 00000000  6.45 =====>
 __ BYE      RHDCBYE  000001BC 00000000  6.45 =====>
 __ RHDCNP3S RHDCNP3S 00000000 00000000  3.23 =>
 __ DCMT     RHDCMTDY 00000F78 00000000  3.23 =>
 -------------------------------- Totals ----------------------------------

                                  100.0
```

2. Use the fields in the DML Delays panel as necessary.

    A description for each field in the DML Delays panel follows.

    Profile

    Name of the profile that you specified when you created the monitor definition.

    Options

    Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

    An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

    TaskCode

    Unique name that identifies a task to CA IDMS DC/UCF.

    The user types the task code in response to the DC/UCF system prompt. Task codes are defined at system generation or by using a DCMT VARY DYNAMIC TASK command.

    Module

    Name of the program requesting CA IDMS DB/DC services, when known, or the name of the program invoked by specifying the task code.

Offset

Relative address within the module to which control will be returned upon completion of the CA IDMS DB/DC service request.

DML SEQ

An optional precompiler-generated number identifying the physical sequence in which DML statements appear in a program.

Totl%

Percentage of the monitored period where CA MAT detected DML statements waiting for resources.

Visual

Visual depiction of the Totl% value.

Note: Scroll right to see one of the following fields on the DML Delays panel.

DML Verb

Command in a DML statement requesting a data manipulation operation. FINDs are converted to OBTAINs, as appropriate.

DML Target

DML statement object of the requested operation (such as a record or set name).

DML Qualifier

DML statement object qualifying the target (such as an area or set name when the target is a record name).

3. Scroll to the right in the CA IDMS Delays panel to see the DML Verb/Target/Qualifier field.

   This field displays either the command in a DML statement requesting a data manipulation operation, the object of the requested operation, or the object qualifying the target.

```
CA MAT-------------------------- DML Delays -------------- Row 1 to 10 of 19
COMMAND ==>                                              SCROLL ==> CSR

   Line commands: D - Detail                             Profile: IDMS17
                                                         Options: NORMAL

 CV number: 97      IDMS Release: 17.0.01     Local Mode: NO

LC TaskCode Module   Offset   DML Verb
   _____ _____ _____ _____
<>--------------------------------------------------------------------------
__ RHDCNP3S RHDCNP3S 00000000
__ RCVR     RCVRTS01 00000000
__ BYE      RHDCBYE  00000000
__ RHDCNP3S RHDCNP3S 00000000 ERASE ALL MEMBERS
__ DCUF     RHDCUF00 00000000
__ DCMT     RHDCMTPR 00001A6E
__ DCMT     RHDCMT00 00000000
__ BYE      RHDCBYE  000001BC
__ RHDCNP3S RHDCNP3S 00000000 STORE
__ DCMT     RHDCMTDY 00000F78
-------------------------------- Totals ------------------------------------
```

4. Use line command D to display detail information about the selected row, as shown following.

```
CA MAT --------------------------- IDMS Detail -------------- Row 1 to 8 of 8
COMMAND ==>                                              SCROLL ==> CSR

                                                         Profile: IDMS17
                                                         Options: NORMAL
Field Name       Field Value
_____ _____
--------------------------------------------------------------------------
Task Code        RHDCNP3S
Module           RHDCNP3S
Offset           00000000
DML Sequence     00000000
DML Verb         ERASE ALL MEMBERS
DML Target       RESOURCE
DML Qualifier
Total%           6.45
***************************** End of Table *****************************
```

Chapter 17: Using the Product in an SAP Environment

This chapter describes how you can use CA MAT to identify delays that are specific to SAP®.

This section contains the following topics:

Analyze SAP Data

To analyze SAP data, no setup is required. If SAP if running, CA MAT will discover it and begin collecting statistical data.

Follow these steps:

1. Begin your monitoring session from the DelayView or DataView panel.

    The Delay View panel is shown next.

```
CA MAT ------------------------- DelayView ----------------- Row 1 to 3 of 3
COMMAND ==>                                               SCROLL ==> HALF

Primary commands: DETail on/off        Module: *          Profile: SAPTEST
                  ADDHelp               Csect: *           Options: NORMAL
                                        Offset: *           Detail: ON
    Line commands:  A - Address
                    S - Distribution

LC Major category       Minor category      Actv%  Wait%  Totl%  Visual
   _____  _____  _____  _____  _____  _____
   --------------------------------------------------------------------------

__ SAP Delay            SAP Delay           0.00  99.87  99.87 ========>
__ Other Delays         Unknown wait type   0.00   0.09   0.09
__ PC call              PC call             0.00   0.04   0.04
****************************** End of Table *************************
```

2. Select **S**AP Delay and press Enter.

   The SAP Activity panel displays.

```
CA MAT -------------------- SAP Activity------------------ Row 1 to 1 of 1
COMMAND ===>                                            SCROLL ===> HALF

Line commands: I - Information                          Profile: SAPTEST
               C - Code Detail                          Options: NORMAL

   RFC                 Invoking   RFC
LC Function            Program    Destination   Actv% Wait% Totl% Visual
   _____     _____   _____     _____ _____ _____ _____
------------------------------------------------------------------------
__ Function_Name       @ST00001   RFC_Destinaton 0.00 99.87  99.87 =======>
************************************** End of Table *******************
```

The SAP Information panel provides information about the selected RFC Function. A description of each field in the SAP Information panel follows:

RFC Function

Function of the SAP call

Invoking Program

Name of the program which originated the SAP call

RFC Destination

Intended destination of the SAP call

Conversation ID

Hexadecimal identification number of the SAP call

R/3 ID

Identifier of the SAP R/3 system handling the SAP call

R/3 Name

Name of the SAP R/3 system handling the SAP call

Userid

User ID of the SAP caller

Trace

Whether the SAP trace function is ON or OFF

Language

ISO language used

RFC Role

Client or server

RFC Type

>   RFC type of the originating request

RFC Release

>   RFC release level

Total Time

>   Total time (in millisecond) that it took to process the call

3. Enter **I** in the LC column to display additional information on a specific RFC function.

    The SAP Information panel displays.

```
CA MAT ----------------- SAP Information------------------ Row 1 to 13 of 13
COMMAND ==>                                                 SCROLL ==> HALF

                                                            Profile: SAPTEST
                                                            Options: NORMAL


RFC Function . . . . . . . FUNCTION_NAME
Invoking Program . . . . . @ST00001
RFC Destination   . . . . RFC_Destinaton
Conversation ID  . . . . . 33333333
R/3 ID . . . . . . . . . . 61
R/3 Name . . . . . . . . . P61
Userid . . . . . . . . . . CAMAT
Trace  . . . . . . . . . . OFF
Language . . . . . . . . . E
RFC Role . . . . . . . . . Client
RFC Type . . . . . . . . . R/3
RFC Release  . . . . . . . 46C
Total Time (millisec)  . . 900000
```

The SAP Information panel provides information about the selected RFC Function. This section provides a description of each field in the SAP Information panel:

RFC Function

>   Function of the SAP call.

Invoking Program

>   Name of the program which originated the SAP call.

RFC Destination

>   Intended destination of the SAP call.

Conversation ID

>   Hexadecimal identification number of the SAP call.

R/3 ID

Identifier of the SAP R/3 system handling the SAP call.

R/3 Name

Name of the SAP R/3 system handling the SAP call.

Userid

User ID of the SAP caller.

Trace

Whether the SAP trace function is ON or OFF.

Language

ISO language used.

RFC Role

Client or server.

RFC Type

RFC type of the originating request.

RFC Release

RFC release level

Total Time

Total time (in millisecond) taken to process the call

Chapter 18: Using the Product with Other Databases

This chapter describes how to best use CA MAT with the following databases that are distributed from companies other than IBM®:

- Adabas

- Natural

- CA Datacom

- CA Ideal

This section contains the following topics:

Use the Product with Adabas

CA MAT provides a list of Adabas statements that are detected during the monitored period. Use this procedure to display these statements after monitoring a job.

To display Adabas statements

1. Analyze the data by using one of the analysis line commands (A, AL, AA, or AW).

2. Select one of the following two ways to locate the Adabas statements:

   ■ From the Interactive Analysis menu, select Option 18.

   ■ From the Interactive Analysis menu, select Option 5. Ensure that .Adabas is displayed in the DD Name field. Type S next to .Adabas.

The ADABAS Statements panel displays:

```
CA MAT  ------------------- ADABAS Statements ----------- Row 1 to 16 of 50
COMMAND ==>                                              SCROLL ==> CSR

                                                        Profile: CICS63

Actv% DB ID File # CMD     CMD-IDX  CMD-ID Wait% Totl% Visual

_____ ____ _____ _____ _____ _____ ____ ____ _____
--------------------------------------------------------------------------

 0.26 12345    9  L3      D5D3C2D7 NLBP   45.66 45.92 =======>
 0.00 12345   10  S1      00400201 ....    7.65  7.65 >
 0.00 12345    0  RC      01200201 ....    4.59  4.59
 0.00 12345   10  L3      01000201 ....    2.55  2.55
 0.00 12345   10  L3      01100201 ....    2.55  2.55
 0.00 12345   10  S1      00000000 ....    2.04  2.04
 0.26 12345   10  L2      01400201 ....    0.77  1.02
 0.00 12345    9  L9      51000101 ....    0.77  0.77
 0.00 12345   10  L1      00400201 ....    0.77  0.77
 0.00 12345   10  L3      01300201 ....    0.77  0.77
 0.00 12345    0  ET      00000000 ....    0.77  0.77
 0.51 12345   10  L3      01200201 ....    0.26  0.77
 0.00 12345   10  L3      01900201 ....    0.77  0.77
 0.00 12345   10  L1      00000000 ....    0.77  0.77
 0.00 12345   10  L3      00900201 ....    0.51  0.51
 0.00 12345   20  S1      01300201 ....    0.51  0.51
```

The following text describes the fields in the ADABAS Statements panel.

Actv%

Percentage of the monitored period that the processing of the Adabas statement used CPU.

DB ID

Decimal representation of the Adabas database ID containing the file to be accessed. This number can be in the range of 1 to 65535.

File #

Decimal representation of the Adabas file number to be accessed. This number can be in the range of 1 to 5000.

CMD

One of the Adabas commands used to access Adabas databases.

This field displays the database access command. Possible values in this field, and the descriptions of these values, are as follows:

A1

Update records (hold option)

BT

Remove database updates for ET logic users

C1

Write Command ID, PLOG, RABN checkpoint, buffer flush option

C3

Write SYNX-03 checkpoint for exclusive control update users; option to store user data

C5

Write user data on SIBA/PLOG

CL

End/ET session and update database

E1

Delete record (hold option) or Refresh file

ET

End and save current transaction

HI

Prevent record update by other users

L1

Read record of specified ISN

L2

Read records in physical order

L3

Read records in descriptor value order

L4

Read and hold, wait for held record/issue return code option

L5

Read in physical order and hold, wait/issue return code option

L6

Read in descriptor value order with wait/issue return code option

L9

Read ISNs of specified descriptor

LF

Read characteristics of all fields in file

N1

Add new database record with Adabas-assigned ISN

N2

Add new database record with user-assigned ISN

OP

Open user session

RC

Release one or more command IDs or a global format ID for the issuing user

RE

Read ET data for this user, another user, or all users

RI

Release held record and ISN

S1

Return count and ISNs of records meeting the search criteria

S2

Return count of records and ISNs in user-specified order

S4

Return count and ISNs of records meeting the search criteria and hold

S5

Return or save a list of coupled ISNs for the specified file

S8

Combine two ISN lists from the same file with AND, OR, or NOT operation

S9

Sort ISN list in ascending ISN or descriptor-specified sequence

CMD-IDX

Same value as the CMD-ID field in hexadecimal format.

CMD-ID

Identifies users, their transactions, and decoded formats for reuse by subsequent instructions.

The command ID is either user-specified or system-generated. It can be either local or global to specify either internal or globally accessible decoded formats.

Wait%

Percentage of the monitored period that the program waited for Adabas data to be returned.

Totl%

Sum of the Actv% and Wait% fields.

This value represents the total percentage of the Adabas delay time used by this Adabas statement.

Visual

Graphical representation of the sum of the Actv% and Wait% categories for the Adabas statement.

The Visual field provides a graphical representation of the data in the column that immediately precedes it. A graph's color is determined by its value, as follows:

■ Green represents a value between 0 and 20.

■ Yellow represents a value between 20 and 50.

■ Red represents a value between 50 and 100.

The size of the graph is either relative or absolute, depending on the value (Y/N) selected for AutoScale in the Profile Parameters panel

Relative scale

Graphs are sized relative to the highest value. The graph for the highest value extends the maximum length of the field, with all other graphs proportional to it.

For example, if the maximum value on a screen is 10, its graph extends the maximum length of the field. If the next highest value is 5, its graph extends half of the maximum length of the field.

Absolute scale

The graph displays an absolute representation of the value. For example, if the maximum value on the screen is 10, the graph extends 1/10 the length of the field.

Use the Product with CA Datacom

CA MAT provides a list of CA Datacom statements that are detected during the monitored period.

To display statements after monitoring a job

1. Analyze the data by using one of the analysis line commands (A, AL, AA, or AW).

2. Select one of the following two ways to locate the CA Datacom statements panel:

   ■ From the Interactive Analysis menu, select Option 16.

   ■ From the Interactive Analysis menu, select Option 5. Ensure that .DCOM is displayed in the DD Name field. Type S next to .DCOM.

The Datacom Statements panel displays.

```
CA MAT  -------------------- DATACOM Statements ------------ ROW 1 to 1 of 1
COMMAND ==>                                                    Scroll==> CSR
                                                              Profile: TUNIVP1

DBID Table Key    Command Actv% Wait% Totl% Visual
     ID    ID

____ ____ _____ _____ ____ ____ ____ _____
-----------------------------------------------------------------------------
0193 111   KEY00  REDNX   0.00 22.65 22.65 =====>
```

The fields in the CA DATACOM Statements panel are described next.

DBID

Three- or four-digit numeric identifier of the CA Datacom database.

File Table

Three-character name of the CA Datacom table, identifying the logical table being accessed.

Key Name

Five-character alphanumeric name of the search key being used to locate a record in the CA Datacom database.

Command

Five-character CA Datacom command used to access Datacom databases. CA MAT detected the commands that are displayed in this field during the monitored period.

Actv%

Percentage of the monitored period that the processing of the CA Datacom statement used CPU.

Wait%

Percentage of the monitored period that the program waited for CA Datacom data to be returned.

Totl%

Summation of the Actv% and Wait% fields.

Visual

Graphical representation of the Totl% field.

Use the Product with CA Ideal

CA MAT provides a list of CA Ideal statements that are detected during the monitored period.

To display statements after monitoring a job

1. Analyze the data by using one of the analysis line commands (A, AL, AA, or AW).

2. Select one of the following two ways to locate the CA Ideal programs:

   ■ From the Interactive Analysis menu, select Option 17

   ■ From the Interactive Analysis menu, select Option 3 to display the CodeView panel. Issue the MODE 4GL primary command to display the activity that is associated with CA Ideal routines.

The Ideal Programs panel displays. This panel displays the activity of CA Ideal routines that were executing at the time that the monitor was run.

The Language, System, Program Name and Program Version fields are displayed, along with a description of the routine, if available. This information is important when multiple copies of a routine are maintained.

```
CA MAT  ------------------------- CodeView ---------------- Row 1 to 1 of 1
COMMAND ==>                                              SCROLL ==> CSR

Primary commands: MOde Pseudo/Module/Csect/4GL,            Profile: IDLBATCH
                  PSEudo, REGister, ADDHelp               Options: NORMAL
                                                             Mode: 4GL
Line commands: A - Associate
               I - Info
               H - Histogram    NH - Normalized Histogram

Extended Callerid: CC - Current  CA - Application  CV - Via

                          Obj Pgm Src Pgm
LC Language System Program  Version Version Actv% Wait% Totl% Visual

   _____ _____ _____ _____ _____ ____ ____ ____ _____
>-----------------------------------------------------------------------------
__  IDEAL   $ID   CUSTLIST PRD     003     1.57 8.07 9.63 ======>
******************************** End of Table ****************************
```

3. Type line command H or NH to select an Ideal routine.

4. Press Enter.

   The 4GL Histogram panel shows the activity of each statement in the routine.

```
CA MAT  --------------------- 4GL Histogram ----------------- Row 1 to 9 of 9
COMMAND ==>                                              SCROLL ==> CSR

 Language --- IDEAL                                    Profile: IDLBATCH

 System   --- $ID                                     Normalized: NO
 Program  --- CUSTLIST   Version  PRD(003)

Stmt  Actv% Wait% Totl% Visual     Source line

____ ____ ____ ____ _____ _____
-----------------------------------------------------------------------------
 201 0.00  0.05  0.05             SET LINE-NUM = 99
 218 2.02 19.79 21.82 ======>     MOVE CUSTOMERS TO DTL BY NAME
 221 2.32 22.54 24.86 ======>     FOR FIRST SALESMAN-DVw
 223 0.15  0.47  0.62             MOVE SALESMAN-DVw.NAME TO DTL.SA
 606 0.05  0.07  0.12             SET TOT.SALES = $EDIT(TOT-SALES,
 607 2.80 22.81 25.61 ======> MOVE TOT TO PRT-LINE
 704 0.02  0.07  0.10             SET HDR1-PAGE = $EDIT(PAGE-NUM)
 708 2.17 21.06 23.24 ======>     IF $SUBSTR(HDR1-PAGE,START=1,LEN
 720 0.02  0.32  0.35             MOVE HDR1 TO PRT-LINE

****************************** End of Table ****************************
```

The 4GL Histogram panel can also be displayed from the DelayView panel.

The fields in the 4GL Histogram panel for CA Ideal statements are described next.

System

Three character identifier of the CA Ideal System from which the program was executed.

Program

Name of the CA Ideal program.

Program Version

Three digit version number of the program that was executed.

Stmt

Statement number of the currently executed statement of the 4GL routine.

This statement is obtained from the 4GL language processor exit.

Actv%

Percentage of the monitored period that the processing of the CA Ideal statement used CPU.

Wait%

Percentage of the monitored period that the program waited for CA Ideal data to be returned.

Totl%

Summation of the Actv% and Wait% fields.

Visual

Graphical representation of the Totl% field.

Source line

Source of registered program. If the CA Ideal program is registered, the source will appear under this heading.

Use the Product with Natural

CA MAT allows you to select how to display the information collected when a Natural program is monitored. You can view either the Natural executor programs (by which Natural supervises the execution of Natural 4GL routines), or the Natural routines themselves.

1. Analyze the data by using one of the analysis line commands (A, AL, AA, or AW).

2. Select one of the following two ways to locate the Natural statements:

   ■ From the Interactive Analysis menu, select Option 19.

   ■ From the Interactive Analysis menu, select Option 3 to display the CodeView panel. Issue the MODE 4GL primary command to display the activity that is associated with Natural routines.

   The Natural Programs panel displays:

   This panel displays the activity of Natural routines that were executing at the time that the monitor was run. These routines exist in ADABAS databases. The Language, Library, and Routine Name fields display, along with a description of the routine, if available. This information is important when multiple copies of a routine are maintained.

3. Type H or NH.

4. Press Enter.

   The 4GL Histogram panel shows the activity of each statement in the routine.

```
CA MAT  --------------------- 4GL Histogram ----------------- Row 1 to 4 of 4
COMMAND ==>                                                  SCROLL ==> CSR

  Language --- NATURAL                              Profile: NATURAL
  Library  --- AQMAPPS                              Normalized: NO
  Routine  --- AQMFETCH

Stmt  Actv% Visual

____ ____ _____
------------------------------------------------------------------------------

   0  0.00
  60  0.12
 150  2.59 ======>
 170  0.12
****************************** End of Table *****************************
```

The 4GL Histogram panel can also be displayed from the DelayView panel.

The fields in the 4GL Histogram panel for Natural statements are now described.

Library

1-8 alphanumeric name of the Natural **library** from which **routine** was executed .

This *library* resides in the Adabas database on the Natural System or User file.

Routine

Name of the 4GL routine, obtained from the 4GL language processor exit.

Stmt

Statement number of the currently executed statement of the 4GL routine. This statement is obtained from the 4GL language processor exit.

Actv%

Percentage of the monitored period that CA MAT detected a 4GL statement in control. The statement may or may not have been consuming CPU at the time.

Visual

Graphical representation of the Pct field.

Glossary

address space

An executing batch job, system task, or TSO user. Same as *job.*

application tuning

The process of analyzing and adjusting the performance of an application with the goal of maximizing efficiency and effectiveness.

broadcast request

A monitor request that is sent to any system in a sysplex.

CEESPLD

The load library.

CodeView

Interactive analysis option 3. This panel displays the execution and wait time of each module that is used by the target program.

connect time

The number of milliseconds during a monitored period that represent the end-to-end time needed for transferring data to and from external media and memory. Connect time displays on the DataView and Data Set Details panels. Connect time might exceed the monitored period because of data overlap caused when multiple blocks of data are moved to and from memory.

contention

A situation that occurs when there are more requests for a service than there are servers available. For single servers such as drives, control units, and paths, contention occurs when two or more requests for service arrive simultaneously.

content-sensitive help

The online Help information for specific CSECTs, pseudo groups, and major and minor delay categories.

CSECT

An individually linkable component of a program, which may be included in one or more load modules.

CSECT Associations

CA MAT allows a functional description to be associated with individual CSECTs that will be shown on various analysis panels. The user can build a database of functions of CSECTs, which can substantially simplify the later understanding of the presented results.

data set fragmentation

Under z/OS, data sets are allocated in the form of extents, which represent allocation areas on the physical device. A data set might originally be allocated to occupy from one to five extents and might subsequently grow into up to 16 of these allocation groups. The more scattering that occurs, the more a data set is considered to be fragmented. Because data retrieval time increases with fragmentation, this characteristic is considered undesirable.

DataView

Interactive analysis option 5. This panel displays data sets, databases (IMS, Adabas, Natural, CA IDEAL and CA DATACOM), and DB2® statements that caused activity during the monitored period.

delays

CA MAT considers all samples that do not indicate the actual code of the target application program to be processing as some form of delay. This term should not be confused with actual waits and is only a functional indicator from the perspective of the operating system as to what operations are performed at the time of the sample. Delays can cause the task to be in a wait state, executing in RB (application program) or SVRB (operating system) mode.

DelayView

Interactive analysis option 2. This panel displays the target program's performance in terms of the activities that made up the program execution time.

disconnect time

The time in an I/O cycle that a device is not actually transferring or searching for data.

external data set

The monitor data created by another user.

fast path

A predefined link between one screen and another. Executed by placing the cursor on a single value in a field and pressing Enter. The resulting screen displays more detailed information about the selected value.

field

(1) A column of data on a screen. (2) A group of character positions within a screen that are used to enter or display specific information.

field Help

The online information that describes the purpose or contents of a field on a panel. Displayed by placing the cursor anywhere in the field and pressing PF1 (HELP).

filter

The selection criteria established for a column of data. Data that does not meet the selection criteria is not displayed. A filter consists of a character string.

filtered analysis

When requesting CA MAT to analyze the gathered data, the user may indicate that the output data should be filtered before making it available. This process temporarily discards all data pertaining to involuntary waits, which, in most cases, are not under the control of the monitored program but quite often represent a considerable amount of data that slow down the interactive analysis. This method is preferred to the basic (unfiltered) analysis.

fixed field

The fields that are located on the far left side of a screen that you display by scrolling right with PF11 (RIGHT). The presence of fixed fields is indicated by an arrow on the left side of a screen, just below the column headers.

histogram

CA MAT uses the term histogram to refer to a process where the activity of an individual load module or CSECT is statistically broken up into segments of equal size and their activity comparably demonstrated.

Installation Verification Procedure (IVP)

A procedure that is performed after installation that determines if CA MAT is functioning properly.

interactive analysis

The analysis of data that is processed from a user's terminal. This form of analysis is preferable because it allows selective presentation of output and reduces the amount of user data. Several report display options are provided.

invoking a monitor

The process of starting the observation and subsequent sampling of a target application as defined by the *monitor definition.*

involuntary wait

CA MAT considers all nondispatch states that are not directly caused by the target address to be involuntary, including such states as the address spaces being swapped out or not being dispatched due to higher priority work already being in the system.

job

A batch job, Started Task, or TSO session executing in an z/OS address space. Same as *address space.*

load module

Almost all code executed under z/OS is stored and fetched by the operating system in the form of load modules. Load modules comprise individual CSECTs and information about how these CSECTs are to be loaded into memory and resolved.

local request

A monitor request that is only sent to the local system of the TSO user.

module load time

The amount of time the operating system spends retrieving and resolving the instruction image of a load module stored on DASD.

ModView

Interactive analysis option 7. This panel displays the activity of each load module for the target application.

monitor administration

The management of monitor information, including monitor definitions, invocations, analysis, history, and status.

monitor data set

The partitioned data set (PDS) that contains the results of a monitoring session.

monitor definition

The specification a user provides to CA MAT as to what to monitor and in which manner. A user may maintain any number of monitor definitions at any given point in time.

monitor history

The cumulative collection of data sets for a monitor definition.

monitor request

A monitor definition that has been activated by using the Invoke line command (I) in the Monitor Definition panel.

multitasking

The simultaneous or quasi-simultaneous processing of several units of work (tasks) within the same address space. Each of these tasks operates on independent processes, which might or might not preempt each other.

Observation

The beginning of the sample process. An observation occurs at regular intervals based on monitoring criteria that is defined in the monitor profile. It represents an initial assessment of whether a sample can be taken and if it can, TriTine sampling logic is executed.

Open Application Program Interface (Open API)

The method CA MAT uses to define and invoke monitors from outside of the TSO Client (through TSO commands, batch jobs, or from within a program).

Overview

Interactive analysis option 0. This panel displays information about the monitoring process, as well as key global statistics about the monitored application.

pending time

The time between the successful completion of an SSCH and before the execution of the first channel command. Pending time and IOS queue is the total queue time (XA only).

PoolView

Interactive analysis option 8. Displays statistics about VSAM/LSR and VSAM/GSR buffer pool usage.

Primary Option Menu

The panel that displays when CA MAT is first invoked. Provides access to all basic features.

product customization

An online facility for customizing the installation of products. Product customization provides an ISPF panel interface that both presents customization steps in sequence and provides current status information about the progress of installation.

profile name

The name that is specified for a monitor definition. Identifies monitor data sets and analysis panels.

profile parameters

A set of parameters that specify default conditions for each user.

pseudo groups

A feature that enables you to assign unique identifiers to related program modules that cause CA MAT to treat them as a single group during a monitor session. Modules are associated with pseudo groups by using Option 4, Grouping, on the Primary Option Menu.

registration

The process of providing CA MAT with the location of compiled program listings. Used to relate program activity to actual high-level language statements during analysis.

samples

The collective information gathered by all snapshots during one recording interval. This information consists of snapshots for all active and monitored TCBs in the target address space.

screen

A collection of rows and columns of data that displays through the online facility.

screen Help

The online information panels that describe the purpose of a screen. Display screen Help by placing the cursor anywhere on the screen, except on a field, and pressing PF1 (HELP).

snapshot

The capture of the state of one task in the target address space with any related information. This state includes, but is not limited to, the PSW, the wait state bit, the module active at the time, and some of the information pointed to by the current and stored registers.

status

(1) The percentage of completion of a monitor request. (2) The status (Active, Inactive, Waiting) of a monitor request in the Server Space.

target request

A monitor request that is sent to a specified system (or systems) in a sysplex.

tasklib

A DD statement other than STEPLIB or JOBLIB from which a program explicitly initiates the fetch of load modules. The name of the DD statement is at the discretion of the program and varies widely. Examples are DFHRPL for CICS and ISPLLIB for ISPF.

TaskView

Interactive analysis option 1. This panel displays information about the performance of each z/OS task in the monitored address space.

TimeView

Interactive analysis option 4. This panel displays program activity in time sequence. Each row of information represents a single sample taken during the monitored period.

TNISPF1

The REXX EXEC that is used to invoke the ISPF interface.

TNTUNESS

The procedure for starting the Server Space.

TranView

Interactive analysis option 6. This panel shows IMS or CICS activity in terms of individual transactions.

TRSAMP

The data set that contains sample members that are used for the installation and operation of CA MAT.

TSO Client

See *CA MAT TSO Client.*

TUNAVSAM

The procedure that is used to create the Global Tables data set.

TUNBATCH

The procedure that is used by CA MAT for generating batch reports.

TUNCALL

The program that is used to invoke monitors from outside of the TSO Client.

TUNCOB01

The COBOL program provided with CA MAT that is used to verify operation and generate sample monitor data.

TUNSDEFS

UTRPARM member that is used to define system default parameters.

TUNSSP00

UTRPARM member that is used to define operational parameters and for password authorization.

TUNUDEFS

UTRPARM member that is used to define user default parameters.

UTRHELP

The data set that contains online Help and content-sensitive help information.

UTRPARM

A data set that is created during product customization into which samples are copied from the CEESSAMP data set. Users can then modify their own copies without corrupting the original models.

VOLSER

The volume serial number.

volume

A named collection of data sets dealt with as an entity by the I/O supervisor. For tape subsystems, it is a cartridge. For DASD, it is a drive, a logical drive (dual-density), or an actuator (3390 class).

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