CA 1® Tape Management

Overview Guide

Release 12.6.00

Fifth Edition

CA Technologies Product References

This document references the following CA Technologies products:

- CA 7® Job Management (CA 7)
- CA ACF2® Security (CA ACF2)
- CA ARCserve® Backup (CA ARCserve Backup)
- CA ASTEX® Performance (CA ASTEX)
- CA Datacom®/DB Database (CA Datacom/DB)
- CA Earl™ (CA Earl)
- CA IDMS™/DB Database (CA IDMS)
- CA Roscoe® Interactive Environment (CA Roscoe)
- CA TLMS® Tape Management (CA TLMS)
- CA Top Secret® Security (CA Top Secret)
- CA Workload Automation SE (CA Workload Automation SE)

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- Online and telephone contact information for technical assistance and customer services
- 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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Contents

Chapter 1: Introduction

This section contains the following topics:

What CA 1 Does

CA 1 provides absolute protection against the inadvertent destruction of tape files. Additional capabilities enhance tape library management and allow for maximum ease of tape operation with minimal manual intervention.

Tape Data Set Protection

CA 1 provides the following tape protection features:

- All multi-volume data sets are protected as they are created. Chain pointers reference the forward and backward structure of the data set, immediately identifying all associated volumes.
- Each secondary file on a tape has its own identifying record and expiration date in the CA 1 database, and is separately protected and reported on.
- In the event a problem occurs, an Audit data set tracks all changes to the CA 1 database to provide restoration capability up to the instant of failure. Activity reports available from the Audit data set can provide detailed information about the tape processing trends in your installation, and resolve specific tape processing problems.
- Non-label tapes are controlled with the same degree of protection provided for standard label tapes, including input data set name checking, multi-file control, and the chaining of multi-volume data sets.
- Products external to CA 1 can use and manage CA 1 controlled tapes. The External Data Manager (EDM) feature allows systems such as the IBM Hierarchical Storage Manager (DFSMShsm) to *own* a CA 1 controlled volume and indicate when it should be returned to scratch status. These tapes are identified on reports as EDM controlled.

- Complete security integration with external security packages (CA ACF2, CA Top Secret Security, and RACF) allows control of real-time processing, batch jobs, and online interfaces.
- External tape labels are not necessary. Provision is made for both selective label printing and the printing of labels for all output tapes. Protection is provided without the need to externally identify tape data sets.

Management and Control Techniques

CA 1 provides the following tape processing management and control:

- Tapes created and used on a non-IBM CPU can be tracked with the CA 1 Batch Update System.
- Tapes created by selected backup products running on Windows and UNIX systems can be tracked with the CA 1 Distributed Tape Support feature.
- CA 1 can manage tapes created on another CA 1 system with a volume serial number which conflicts with a CA 1 controlled volume. These tapes, known as duplicate tapes, are controlled with the Alternate Internal Volume Substitution (AIVS) facility. AIVS can also manage foreign tapes.
- The Vault Management System (VMS) allows you to automatically route critical tapes to and from off-site vaults or other locations as necessary. Full reporting is provided.
- The complete tape retention system establishes user-defined tape retention rules and defaults.

Robotics and Automated Tape Library Support

CA 1 provides support for the leading robotics and automated tape libraries from Storage Tek, IBM, and other vendors. In many cases, this includes both real-time and batch interfaces allowing you to choose the type of interface that best suits your needs and performance objectives.

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

Virtual Tape Support

Virtual tape solutions offer significant advantages in performance and utilization of tape media. CA 1 provides full integration with the following virtual tape solutions:

- CA Vtape Virtual Tape System
- IBM Virtual Tape Server (VTS)
- STK Virtual Storage Manager (VSM)

Distributed Tape Support

CA 1 enables you to manage tapes created by selected backup products on distributed platforms. This support is provided through integration with free downloadable components known as iGateways and iSponsors. iGateways and iSponsors allow a wide variety of distributed system products to provide data to the CA Storage Portal.

CA 1 uses the iSponsor/iGateway technology to extract media information from the product catalogs of the following products:

- CA ARCserve® Backup for Windows
- CA ARCserve® Backup for UNIX
- Veritas NetBackup for Windows
- Tivoli Storage Manager for Windows

Tapes created by these products can be tracked in the CA 1 TMC. The volume information in the TMC is a copy of the tape volume information extracted from the backup product database. No update to the backup product database is performed. To use this feature, download and install the iSponsor/iGateway components. We recommend that this task is performed by the individuals responsible for UNIX and Windows platforms.

Reports

Some CA 1 utilities generate a flat file suitable for processing by CA Earl or a report writer. This allows reports to be generated in any desired sequence and to include any TMC field. Control statement specifications determine the contents and format of the report. The sample members provided in the source library can produce data set name lists, a volume serial master, scratch forecast lists, reports from Audit data set, and out-of-area lists.

The following reports are available:

Audit Data Set Reports (TMSAUDIT)

Selected Audit records are printed at your request. The following types of Audit records are available:

- Batch or online TMC update activity
- Tape input processing activity
- Tape output processing activity
- Exceptions (nonresident tape processing, password violations, record updates bypassed by user exits, and so forth)
- Tapes rejected for use by CA 1 (not scratch violations)
- TMC structural modification and CA 1 initialization information

Reports on one, all, or a combination of Audit record types can be produced. Sort sequence can be by data set name, volume serial, or Audit date/time. Audit reports can also be requested for specific volume serial numbers or a range of volume serial numbers to assist in researching tape activity.

CA Earl Interface (TMSEARL)

This program allows the selection of any variety of records for reporting. You can select the data to be printed and the output format, such as all tapes not read for input in the last six months or all single file tape volumes that have less than 100 blocks of data. Many sample members are provided in the source library.

Batch TMC Inquiry (TMSBINQ)

This program prints selected TMC records in the following optional formats:

SHORT

Only the most important fields

LONG

All fields

DUMP

A hexadecimal dump of all fields

Specification of records to be printed is by cataloged data set name, volume serial number, or range of volume serial numbers. DSNBs and TMC control records can also be printed.

Vault Management System (VMS)

In an installation that utilizes multiple tape storage locations, the CA 1 Vault Management System (VMS) controls the movement of tape volumes from one location to another. Typically, critical tape volumes are cycled out of the central tape library to progressively more secure and less accessible storage areas (vaults) and finally back to the central library. With VMS, tapes that meet installation-defined vaulting criteria are automatically checked *out-of-area* with the proper vault code, and reports are generated indicating the current location and destination for tapes that require movement.

Under VMS, a vault is defined as any identifiable location. A vault is typically a fireproof safe or an off-site storage location. Any number of locations can be defined, and a maximum number of slots can be defined for each vault. Warning messages are issued when the number of slots in a vault exceed the value specified. Tapes in a vault can be located by slot numbers, which are automatically assigned by VMS and reused as volumes flow out of the vault and new volumes flow in.

Once you have defined the vaults, the data sets to be vaulted, and the vaulting criteria, the VMS automatically manages tape vaulting. Whenever the VMS batch programs are executed, picking, distribution and inventory reports are generated for each vault using the report writer format. The reports can be sorted by slot number, volume serial number, or data set name.

CA 1 system option CYD can be used to define a cycle as consisting of all tapes with the same data set name created on the same date. An exit is available to allow tailoring of the TMC record selection.

Note: For more information about VMS, see the *Administration Guide*.

Retention Criteria

VMS utilizes six basic types of retention criteria. Logical combinations (AND and OR) of the retention criteria are allowed. A tape can be held in a vault based on the following:

- The number of cycles (creations) in the vault
- The number of days since moved to the vault
- The number of days since the volume was created
- A specific, future date
- The expiration date of the tape
- The number of days passed since the volume was last used

Vault Pattern Description Data Set

Movement criteria, location IDs, and data set names are defined in a Vault Pattern Description (VPD) data set. Data sets can be identified by a high-level qualifier, be fully qualified or identified by CA 1 pattern masking specification. Vaults and movement information can be added, changed, or deleted by editing and *redefining* the VPD.

Chapter 2: Tape Library Maintenance

This section contains the following topics:

Tape Volume Scratch

You can scratch tape volumes with either the CA 1 TMSCLEAN program or by an online SCRATCH command.

TMSCLEAN can optionally enforce SMS Management Class maximum retention specifications. Any tape data set found with an expiration date exceeding the SMS Management Class retention is scheduled for SCRATCH processing the following day.

TMSCLEAN determines which of the tapes held by Days Since Last Used Control and Catalog Days Control are to become eligible for scratch or reset to Catalog Control. If the CA 1 system option OCTLG is set to NO, TMSCLEAN process data sets under Catalog Control.

Scratch Tape Generation

When executed with a SCRATCHLIST parameter, TMSCLEAN marks as scratch any eligible volumes and produces a report file reflecting the volumes to be pulled and placed in the scratch pool.

The report file created by TMSCLEAN can be subsequently processed by CA Earl to produce a listing by assigned scratch pool, label type, or any other field contained in the TMC.

Scratch Tape Inventory

When executed with a SCRATCHRELIST parameter, TMSCLEAN generates a report file of all volumes currently in scratch status in the TMC. No additional scratching is performed.

This variation of TMSCLEAN is frequently executed weekly, so that tapes that were not in their slot in the library when pulling the SCRATCHLIST can be placed into the scratch pool.

Tape Cleaning and Certification

You can use the TMSCLNOA utility to indicate which scratch tapes require cleaning based on your criteria. This criteria is passed as parameter input to TMSCLNOA, and can be a number of days since last cleaning, number of uses, number of read/write errors, or any combination of the three. Once the criteria is met, the next time the volume is listed on the scratch list a "clean" indicator is posted. The tape should then be cleaned before it is used as a scratch. When a tape marked for cleaning is used again for output, the fields associated with clean criteria in the TMC record are automatically reset.

Operating System Catalog Correspondence

Keeping the operating system catalog entries for tape data sets synchronized with the TMC entries can help eliminate abends and other related problems.

The following CA 1 facilities assist in keeping the operating system catalog entries for tape data sets synchronized with the TMC entries:

TMSCLEAN

This facility automatically uncatalogs scratched data sets from the operating system catalog during scratch processing. Depending on your selection of the CA 1 system option UNCATA, the uncatalog action either *one* of:

- Applies to all data sets
- Excludes GDG data sets and data sets under Cycle Control or Catalog Control
- Excludes all data sets

The CA Earl output file generated by TMSCLEAN can be saved and used on other systems with the TMSUNCAT utility to uncatalog tape data sets found on system catalogs. This allows for a single TMSCLEAN to execute in an environment without shared catalogs, and still uncatalog those tape data sets from other systems.

TMSOSCAT

This operating system catalog correspondence utility determines the differences between the TMC and the system catalog. The output report lists the records compared and indicates discrepancies.

Various options are available to limit the comparison. An exit is also available to control the TMC records being processed. Two listing sequences are available, one by data set name (the system catalog controls the comparison), the other by volume serial number (the TMC controls the comparison). The information provided can help you research invalid comparisons and perform the appropriate manual updates to either the TMC or the system catalog.

Backup/Restore Facilities

Because the TMC contains the information about the current status of all volumes assigned to CA 1 control, and can significantly affect real-time tape processing, reliable backup and restore capabilities are essential. The batch utility TMSCOPY performs both functions.

The Audit data set is critical to this process. The Audit should reside on a different DASD volume than the TMC (preferably on a different bank/channel). Any real-time, batch, or online update to a TMC record causes an image record to be placed in the Audit data set, with a special code and the date/time stamp of the update.

TMSCOPY backs up the TMC image to two tape volumes (one for vault storage). All Audit records written since the prior TMSCOPY execution are also backed up to tape, and Audit pointers are reset to indicate this action.

The Audit backup data is useful for day-to-day TMC activity reporting, and, in certain instances, can be used in special TMC restore processing.

If a RESTORE is necessary, the latest TMC backup tape is used to recreate the TMC. Then the Audit records written since that backup was taken are automatically applied to the TMC. The resulting TMC is restored to its status at the point of failure.

CA 1 maintains the information as to which Audit records should be applied, how far back to go, when the latest backup was taken and which tape is the latest backup. If another number is presented during restore processing, appropriate warning messages are issued to the console.

The Audit Data Set

The Audit data set is vital to the restore process. CA 1 provides absolute protection to ensure that available Audit data can always restore a damaged TMC to the point of failure. The Audit is formatted, or mapped, with a given number of Audit records (usually enough for two days worth of activity). CA 1 system option THAUDT defines a threshold level of Audit records. When this level has been reached, warning messages are issued to the console indicating a TMC backup is needed.

If the Audit records written since the previous backup actually reach the total allocation, CA 1 abends all tape requests until such time as a TMSCOPY backup can be executed. In this manner, CA 1 can consistently restore a TMC to a point of failure without loss of database integrity, because there is no chance that the Audit data set does not contain all transactions since the previous backup.

If TMC backup processing is carefully planned, the Audit threshold should never be reached. The Audit data set is designed to continue recording transactions even when the TMC backup is running. There is no operating system interference and no need to interrupt tape processing during the TMSCOPY backup execution.

New Tape Volume Initialization

CA 1 control over tape initialization is provided to prevent initialization of nonscratch volumes. The CA 1 tape initialization program TMSTPNIT coordinates tape initialization with the TMC.

Additional facilities:

- CA 1 helps ensure that reinitialization of current volumes is performed only if the record in the TMC is in scratch status.
- The TMC record must reflect scratch status when old volumes are replaced with new ones.
- The TMC record must be in *inactive* (delete) status when new ranges of tapes are activated.
- Allow specification of the owner and ACCESS values for tapes being initialized.
- Verify that the internal VOLSER on a cartridge label matches a tape in the TMC that is in scratch status. You help ensure that a wrong tape was not mounted.

An exit is available to control the processing of the tapes.

Display Tape Header Label Information

When it is necessary to know the contents of the label on a tape, use the TMSTPPRO utility to display the header information on a console. If the tape is under CA 1 control, TMSTPPRO can compare the header and TMC information and report any discrepancy.

Erase Sensitive Data

CA 1 provides the following utilities to erase sensitive data left over from the prior use of a tape:

CTSDEU

This utility erases media types that employ servo tracks and that cannot be bulk erased. CTSDEU erases residual data after new data has been written to the tape. CTSDEU positions to the end of the active data on the volume and performs security erase processing until the end of the physical volume. While positioning to the end of the volume, CTSDEU verifies that the files on the volume match the information saved in the CA 1 TMC.

TMSTPPRO

This utility erases tapes containing sensitive data, once the volume is in scratch status. Set the CA 1 system option DSEALL to force all scratch tapes to be erased before they are allowed to be used again. An exit is available to control the processing of the tapes.

The online ERASE command can be used to indicate that degauss processing has been performed for a volume.

Online Inquiry and Update Facilities

CA 1 online inquiry and update facilities, CA 1 ISPF and TIQ Online Inquiry/Update, enable you to do the following:

- Inquire/update TMC volume records
- Inquire/update TMC DSNB records
- Inquire by cataloged data set name
- Inquire on TMC and Audit data set control records
- Generate external tape label requests

Online access is provided through the following:

- CA GMI
- CA 1 ISPF
- CA 7 Job Management console
- CA Roscoe
- JES3 DSP
- MVS console (started task)
- TSO CLIST

Utility Functions

While field-specific updates are possible, CA 1 provides the following special utility functions to reduce the amount of manual input required for common TMC update functions:

ADD

Marks an inactive (deleted) volume record as active.

CHECKIN

Checks in a tape that has been marked out-of-area.

CHECKOUT

Marks volumes out-of-area (CA 1 ISPF only).

CLEAN

Resets fields in the TMC to reflect that a tape has been cleaned (used when a tape is cleaned prior to being identified as needing cleaning by TMSCLEAN).

DELETE

Marks an active, scratch status volume record as inactive (deleted).

ERASE

Indicates volume has gone through physical degauss.

EXPIRE

Changes the expiration date to the current date.

EXTEND

Extends the expiration date for x number of days from the current expiration date.

LABEL

Generates an external tape label request for a volume.

RETAIN

Sets the expiration date to x number of days from the creation date.

SCRATCH

Scratches a volume set immediately.

Note: ERASE and SCRATCH are available only through the ISPF interface.

Security

Internal and external security is provided to prevent invalid access or update attempts. The required CA 1 Security Table can be tailored to meet your installation standards (default internal security access rules are provided).

CA 1 can interface with your in-house security system (such as CA ACF2 or CA Top Secret Security) to further protect the CA 1 online inquiry and update resources. The CA 1 Data Set Security feature provides protection on a volume-specific level.

Note: For more information about security implementation, see the *Programming Guide.*

EDM Controlled Tapes

CA 1 allows tapes that it controls to be used, and managed by external systems. EDM supports this process for systems such as DFSMShsm. CA 1 options define which products are EDMs and which data sets are to be treated as EDM controlled. CA 1 supports multiple EDMs.

When the correct criteria is presented during OPEN processing, CA 1 sets a status indicator designating EDM control and records the EDMID. The tape is not eligible for scratch processing until the EDM informs CA 1 that it has released the tape for scratch. CA 1 system option REDM can be used by the EDM to specify extended retention criteria for tapes released from EDM control. In addition, a facility is provided to define a scratch pool for each EDM.

CA 1 does not create DSNBs or chain multivolume data sets for tapes that are EDM controlled; each tape is treated as a single volume, single file data set. An exit is available to define the criteria that determines which tapes are to be treated as EDM controlled. However, the ability to assign multiple EDMIDs through the selection criteria in the TMOEDMxx member of CAI.CTAPOPTN minimizes the need for this exit.

Nonresident Tapes

Nonresident tapes should not be confused with EDM controlled tapes. Nonresident tapes are simply identified, not managed. EDM controlled tapes are supported by compatible interfaces between the EDM system and CA 1.

Tape volumes which are not considered part of the installation tape library and are not controlled by CA 1 can be processed by specifying a special keyword in the DD statement that references the nonresident tape.

Standard MVS protection is maintained and the operator is required to verify that the volume being processed is actually a nonresident tape if there is a matching volume serial number in the TMC (during output processing). This verification process helps ensure the integrity of CA 1.

The use of a nonresident tape is recorded in the Audit data set to provide a record of all nonresident processing. The keyword which allows nonresident tape processing is an expiration date of 98000, and is specified as LABEL=EXPDT=98000 or ACCODE=xCANORES in the appropriate DD statement that references the tape.

Nonresident tapes having a volume serial number outside the range of the TMC can be used as input without the nonresident specification. All nonresident output requests must contain the nonresident keyword, regardless of whether there is a corresponding Volume record in the TMC.

An exit is available which allows tapes to automatically bypass CA 1 control.

Chapter 3: The User Interface

This section contains the following topics:

User Interfaces

Online inquiry and update features provide immediate access to the data associated with CA 1 controlled tapes. Updates to these data fields can be made only by authorized users. The CA 1 Interactive System Productivity Facility (CA 1 ISPF) component presents a set of panels which can be used to interface with the system. Other components operate through standard MVS consoles, TSO terminals, JES3 consoles, and CA Roscoe terminals.

CA GMI is a windows-based user interface that provides the following:

- Advanced reporting, graphing and management functionality for CA 1 volumes and files.
- Audit information.

CA GMI is delivered on a separate tape, with Electronic Software Delivery(ESD), or from CA MSM. The Windows Client is delivered on a CD-ROM.

CA GMI User Interface

CA GMI provides a Windows graphical management interface for viewing, reporting, and analyzing storage-related data. CA GMI uses technology from CA Storage Resource Management to provide a graphical interface to other CA products, including:

- CA ASTEX
- CA TLMS
- CA IDMS
- CA Datacom

CA GMI allows you to manage these products using an intuitive Windows-based graphical interface. It also provides some basic storage resource management functions for storage groups, volumes, catalogs and DFSMS.

CA GMI is available to all customers on maintenance at no additional charge.

CA GMI Tools

The easy-to-use tools for examining mainframe storage data include the following:

Advanced GUI

Use the GUI to display more than 10 customizable views of CA 1 data. It runs on any Windows desktop system and does not require advanced hardware. Simply select an object from the CA GMI Object Tree to view information.

Automatic Scheduling

Use the automatic scheduling facilities in CA GMI to define a schedule for updating both regular and web reports. For regular reports, you can create email distribution plans based on schedules defined by your system administrator. You can attach the report in a variety of different formats, including PDF, XML, and HTML. For web reporting, you can schedule automatic updates of your web pages, enabling you to keep users continuously informed of status information.

Common Services

Use common services like the JCL Generator and Submission Service to generate and submit JCL. The JCL is generated using the data contained in the table display. Simply drag and drop the table data into a JCL window to replace the variables with data from the object window resulting in tailored JCL.

Data Analysis

Use wizards and point and click commands to quickly analyze your tape information. Zoom from object to object to drill down into details and quickly view exactly the information you want. Save your customized views for future generations of the same kinds of information.

Export

Export and view storage information for use with any Windows desktop application, making it easy to create your own analysis of tape data.

Graphing

Generate online or printed 3-D graphics to show tape statistics at-a-glance, such as vault inventory at any location. Create compelling presentations, pictorially depicting tape issues for management reports.

Reporting

Use wizards and point and click tools to instantly build customized and on-demand tape management reports, such as volumes under EDM control, 3590 candidates, tapes off-site greater than 30 days, and summaries such as DSN Group, and tape robot ID.

Powerful Actions

Perform actions against CA 1 volumes such as changing the expiration date, updating the movement schedule, and changing the scratch status.

WEB Reporting

Use wizards to automatically generate HTML reports for posting to the Web. These can enhance your intranet while increasing the productivity of your storage IT staff by allowing others to directly receive information affecting their tape data.

The variables that are available for substitution within JCL have names that begin and end with %%. To display a list of these variables, click the Show Variables button on the JCL window.

You can run the JCL immediately or schedule it to run at a later time.

Chapter 4: Data Sets

This section contains the following topics:

Multivolume Data Sets

Multivolume data sets, are data sets that span more than one physical volume. The data sets are protected individually as soon as each volume is created. Multivolume data sets are chained together with backward and forward pointers in the TMC record.

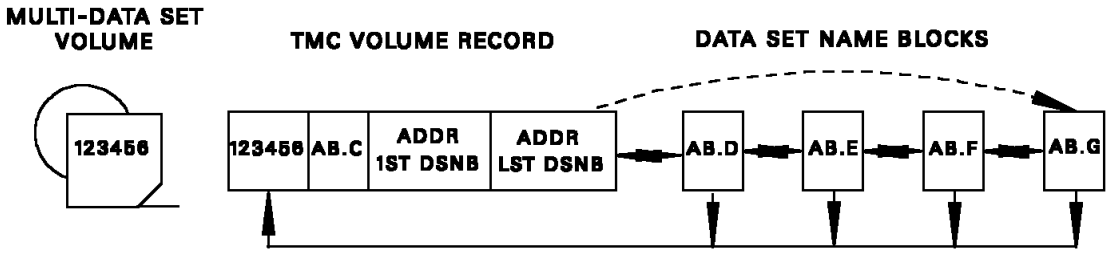
An additional feature of multivolume processing occurs on input for either NL or SL. The volumes must be mounted in the sequence in which they were created. This assures proper processing even when the operator mounts the wrong tape, or when the volume serial numbers are specified in the wrong order in the JCL statement or in the system catalog.

Updates to TMC records for multivolume data sets are through CA 1 online or batch utilities. For some fields such as EXPDT, it must be done only to the first volume. The update is then automatically applied to all volumes of the data set. Updates to fields pertaining to the tape volume only, not the data set, can be made to the single Volume record. System responses to updates for other than the first volume specify the first volume serial number of the set.

Multi-Data Set Volumes

A multi-data set volume refers to a tape that contains more than one physical data set. Multiple data sets on a tape volume are often referred to as *stacked* data sets.

CA 1 keeps information concerning all data sets on a tape volume by using a special record, a Data Set Name Block (DSNB), for each secondary data set. The DSNBs are then chained together by pointers, as shown in the following figure. Secondary data sets are listed on the appropriate reports.



Each DSNB record for secondary files stores the expiration date used when the file was created. During multifile creation, if a numerically higher expiration date is presented for a secondary file, the Volume record for the first file is updated with the higher expiration date, and this becomes the controlling expiration date. With ANSI-labeled tapes, IBM does not permit the expiration date for a secondary file to exceed the expiration date for any previous data set on the volume.

Disposition MOD Processing

Tapes opened with a disposition of MOD are controlled with the same criteria as input processing, which means the data set name in the TMC must match the data set name in the DD statement or the job abends. If the volume has multiple data sets, only the last data set on the volume can be opened with DISP=MOD.

The highest expiration date found in the existing TMC record or the JCL, is assigned to the data set opened with DISP=MOD.

Checkpoint Restart

If a multivolume data set is being processed by checkpoint restart, CA 1 unchains and expires any remaining volumes from an existing multivolume chain. Tapes from the scratch pool can be used to satisfy subsequent output requests.

Data Set Recreation

You are allowed to recreate the last data set on a tape volume if you meet the following conditions:

- Specify the same data set name as the one used to originally create the data set.
- Change the JCL disposition parameter to OLD or SHR. If original BLKCNT=0 then DISP=NEW will also be allowed for recreate. If a multivolume data set is being recreated and uses fewer volumes than the original file, CA 1 has an option to either unchain and expire any remaining volumes from an existing chain, or to keep all existing volumes in the chain. This option is named RECRE8 and is documented in the *Programming Guide*.

CA 1 assumes that you are aware of these conditions and allows the file to be written over. The TMC expiration date for the data set is changed to match the specifications in the JCL of the recreating step if the JCL expiration date is higher than the expiration date already set in the TMC.

Recreation is never allowed if the tape is one of the following:

- A *permanent hold* tape (LABEL=EXPDT=99365 or LABEL=EXPDT=99366 or ACCODE=xCAPERM).
- The tape is marked out-of-area to a location other than a special CA 1 out-of-area code.

An exit is provided to disallow recreating data sets based on data set name and job name. Closed loop GDG processing is allowed by disregarding the generation and version number (G0000V00).

Chapter 5: Data Set Retention

This section contains the following topics:

Overview

The protection and retention of data sets is determined by the expiration date stored in the TMC. This expiration date is automatically updated every time a data set is created on a tape volume.

Expiration dates may be supplied by the following methods:

- In the LABEL parameter of the DD statement
- In the ACCODE parameter in the JCL
- By the CA 1 Default Retention
- By the CA 1 Default Abend Retention
- From the Retention Data Set (processed by the TMSEXPDT program)

Keyword Expiration and Retention

CA 1 provides expiration and retention for tape data sets through specific criteria supplied as values on the JCL EXPDT, RETPD, or ACCODE parameters. If the JCL does not supply either value, the CA 1 Default Retention (CA 1 system option RP) is assigned when the data set is opened.

You can optionally establish retention in batch program TMSEXPDT or the Real-time Expiration feature using the CA 1 Retention Data Set.

CA 1 does treat certain Julian dates as EXPDT keywords with special retention characteristics. They are expressed in Julian format in JCL and in a special keyword format to CA 1 batch utilities.

LABEL Parameter

The following LABEL parameters are available:

LABEL=RETPD=0

A temporary data set. If it is for the first file, the volume remains in scratch status after use.

LABEL=EXPDT=*yyddd*

Standard system Julian expiration date.

LABEL=EXPDT=*yyyy/ddd*

Standard MVS expiration date for DFP 2.3 or above.

LABEL=RETPD=*dddd*

Standard system retention period.

LABEL=EXPDT=88*uuu*

User Control EXPDT keyword that you can create. Specifies that a tape is held permanently.

LABEL=EXPDT=90*ddd*

Catalog Days Control EXPDT keyword plus minimum retention keyword. Specifies that a tape data set is held at least ddd days. Once ddd days has been met, the expiration date is changed to CATALOG and is protected as long as the data set is cataloged.

LABEL=EXPDT=98000

Nonresident EXPDT keyword. Specifies that the tape volume being processed is not under CA 1 control. See Nonresident Tapes.

LABEL=EXPDT=98*ddd*

Days Since Last Used Control EXPDT keyword. Specifies that a tape data set is held as long as it is used every ddd days, and ddd can be any value between 001 and 366. As long as a tape data set is being utilized at least as frequently as every ddd days, it is protected. When the data set is not used for ddd days, it becomes eligible for scratch. This is an excellent means of controlling tapes used for testing.

LABEL=EXPDT=99000

Catalog Control EXPDT keyword. Specifies that a tape data set is protected as long as it has an entry in the system catalog. As soon as CA 1 determines that the data set no longer has an entry in the system catalog, it becomes eligible for scratch. 99000 is frequently used for generation data groups.

LABEL=EXPDT=99*ccc*

Cycle Control EXPDT keyword. Specifies that ccc cycles of a data set are to be held. This retention is based entirely on the number of cycles to be maintained in the TMC. Cycle Control can be used for simple data sets and generation data groups. For GDGs, the number of tapes retained by CA 1 does not necessarily need to equal the number of system catalog entries. The definition of a CA 1 cycle is determined by CA 1 system options CDAY and CJOB.

LABEL=EXPDT=99365

Never scratch EXPDT keyword. Specifies that a tape is held permanently. Data sets held with this keyword cannot be recreated on the same tape; however, these data sets may have additional information MODed on. 99365 is often considered to be "manual" control, as these tapes cannot be scratched until the volume is manually expired.

LABEL=EXPDT=99366

Never scratch EXPDT keyword. Specifies that a tape is held permanently. The same rules apply as for 99365.

Note: If an expiration date supplied in the JCL is less than the system date, CA 1 arbitrarily sets the TMC EXPDT to STATS/001, which is treated as permanent retention. Manual intervention is required to reset the retention actually desired. If a temporary data set is specified but a retention or expiration date into the future is specified, the tape is not considered temporary by CA 1.

ACCODE Parameter

In addition to specifying the expiration date by way of the JCL LABEL parameter, certain dates can be expressed using the JCL ACCODE parameter.

The following ACCODE parameters are available:

ACCODE=*x*CAEXPDT

Specifies that the value specified in the JCL LABEL= parameter is a true expiration date, and not a CA 1 EXPDT keyword.

ACCODE=*x*CAKEYWD

Specifies that the value specified in the JCL LABEL= parameter is a CA 1 EXPDT keyword, and not an explicit expiration date. This applies *only* if the value specified is a valid CA 1 EXPDT keyword value.

ACCODE=*x*CACATLG

Same as LABEL=EXPDT=99000 or the CA 1 EXPDT keyword CATALOG or CATLG.

ACCODE=*x*CANORES

Same as LABEL=EXPDT=98000 or the CA 1 EXPDT keyword FOREIGN.

ACCODE=*x*CAPERM

Same as LABEL=EXPDT=99365 or 99366 or the CA 1 EXPDT keyword PERMANENT or PERM.

ACCODE=*x*CAUSER

Same as LABEL=EXPDT=88000 or the CA 1 EXPDT keyword USER/000.

Note: *x* can be any letter of the alphabet.

CA 1 EXPDT Keywords

The following list shows the JCL Julian format of CA 1 EXPDT keywords and the corresponding CA 1 batch and online keyword expression of these values.

ZEROS

A date with an internal value of zeros is always displayed as zeros. However, the date can only be entered as any number of 0s, or the word ZEROS.

yyyy/ddd

Julian date format. The acceptable range of Julian dates is 1960/001 through 2155/366. CA 1 validates all input dates to help ensure that they fall within this range.

JCL EXPDT: yyyy/ddd

USER/uuu

This keyword allows you to create your own keywords for processing. CA 1 treats this as PERMANENT.

JCL EXPDT: 88uuu

CATLG/ddd

Retain ddd days, then retain while data set is cataloged to the operating system.

JCL EXPDT: 90ddd

FOREIGN

This is a nonresident tape, so do not update the TMC. This value is not stored in the TMC but appears in the Audit data set for type 3 (exception) records. CA 1 does not allow you to set the expiration of a data set to FOREIGN in a TMC record.

JCL EXPDT: 98000

LDATE/ddd

Retain ddd days after date on which tape was last used.

JCL EXPDT: 98ddd

CATLG or CATALOG

Retain while data set is cataloged to the operating system.

JCL EXPDT: 99000

CYCLE/ccc

Retain ccc cycles.

JCL EXPDT: 99ccc

PERM or PERMANENT

Retain data set permanently.

JCL EXPDT: 99365, 99366

STATS/sss

Status of held tape where sss is the reason code indicating why the tape is being held. This keyword has no JCL equivalent. It is set by programs through the SET_KEYWORD function, or is entered through the keyword format STATS/sss, to apply permanent retention (other than 99365) to an unknown situation, such as a broken chain.

STATS/001

The EXPDT in the JCL is less than the current date; therefore, set the EXPDT to STATS/001 to prevent the tape from scratching prematurely.

STATS/002

There is a multivolume chaining error. A TMC volume with this EXPDT is chained to a volume not in the TMC.

STATS/003

In RMM the EXPDT was 98000. In the conversion routine of RMM to CA 1, the EXPDT is set to STATS/003.

TATS/004

In RMM the EXPDT was blanks. In the conversion routine of RMM to CA 1, the EXPDT is set to STATS/004.

Default Retention

An installation-defined Default Retention (CA 1 system option RP) is assigned to any tape data set that is created without an expiration date, retention period or ACCODE parameter in the JCL. The default can be either a given number of days or CA 1 keyword date. A status indicator in the TMC reflects the assignment of the Default Retention.

- When the Default Retention is taken, CA 1 will set another status indicator to indicate that the expiration date is eligible to be overridden if there is an entry for the data set in the Retention Data Set (RDS).
- When the JCL provides an EXPDT, RETPD or ACCODE parameter, this status indicator is not turned on. However, CA 1 system option RO does allow the indicator to be set, regardless of the JCL specification, so that you can use the RDS to enforce tape retention standards in your environment.

In either case, if there is no corresponding entry in the RDS, CA 1 honors the date calculated at OPEN for output.

Default Abend Retention

When a tape data set typically opened for output (DISP=NEW or DISP=MOD) is closed by an abend, the program is probably to be rerun and the normal retention period of the tape may no longer be valid. To allow for this condition, CA 1 changes the expiration date for the tape data sets closed by abend to the Default Abend Retention (CA 1 system option ABE) and sets a status indicator. An exit is available to establish retention other than the Default Abend Retention. The expiration date can also be assigned by the Retention Data Set if the ABEND keyword is specified for the data set.

Retention Data Set

The RDS is used to supply expiration criteria after a tape data set has been created. The batch program TMSEXPDT and the Real-time Expiration option process the RDS and compare the control statements that it contains with the TMC records. For the RDS to override the expiration date, a status indicator in the TMC record must indicate that the data set is eligible to be overridden. This indicator is always turned on when there is no JCL-supplied EXPDT, RETPD or ACCODE parameter.

CA 1 system option RO provides the means to turn this indicator on even when the JCL supplies the retention, giving the RDS the final authority on all tape data set retention. When the option is on, it facilitates centralized enforcement of retention standards. A RDS option of SELECT=ALL allows all TMC records meeting selection criteria to be assigned a new expiration date regardless of the status indicator in the TMC.

The SELECT=ALL RDS option can only be used with the batch program TMSEXPDT. This option is not supported by the Real-time Expiration option.

Work Tapes

CA 1 considers a tape volume a *work tape* when the first file used is specified as temporary. This can be done in one of the following ways:

- LABEL=RETPD=0 is specified in the JCL.
- No data set name is specified unless a future expiration date or retention period is specified.
- A temporary data set name is specified (DSN=&.&xxx). Unless a future expiration date or retention period is specified.
- The JCL specifies DISP=(NEW,DELETE).

CA 1 issues a work tape message in these instances. If the file being processed is not file 1, a work file message is issued (this is also issued if a secondary file is being read for input and there is no corresponding DSNB record in the TMC; CA 1 does not require DSNB records to read secondary files for input).

Work tapes or files can be disallowed by setting the CA 1 system option WRKFLS to NO. In this case, a one day retention is assigned to the data set, disqualifying the volume for a subsequent use as a scratch tape.

Chapter 6: Real-time Processing

This section contains the following topics:

About Real-time Processing

CA 1 gains control at every tape OPEN, CLOSE and End-of-Volume (EOV). All necessary information associated with the tape volume is captured at these times and immediately stored in the Tape Management Catalog (TMC) for all tapes defined to CA 1. Validity checking is performed at OPEN and EOV by checking tape status in the TMC prior to allowing any processing by the program requesting tape I/O.

The TMC contains a single record named a Volume record for each volume assigned to CA 1 control. To track the allocation of secondary data sets, the TMC uses Data Set Name Block (DSNB) records.

Additional CA 1 components are designed to function as real-time processes. The following features function on a real-time basis:

Real-time Stacking

Use this feature to scratch pools of "stacking" volumes to be defined. When files are created that match the stacking scratch pool, their allocation is automatically redirected to be stacked onto a shared tape volume in the stacking pool.

Real-time Catalog Intercept

Use this feature to monitor z/OS system catalog and uncatalog activity, and to manage catalog-controlled volumes.

Real-time Expiration

Use this feature to assign the expiration rules defined in the Retention Data Set (RDS) as the volumes are being created. When this optional feature is activated, the RDS rules are placed in common storage (ECSA) and referenced as the tape files go through CLOSE processing. When a rule matches the file being created the file and volume records in the TMC are updated with the corresponding expiration information.

Data Set Control

CA 1 tape data sets control includes both input and output for the following:

- Standard Label (SL)
- ANSI Label (AL)
- Nonlabel (NL)
- Nonstandard Label (NSL)
- Bypass Label Processing (BLP)

Control is also maintained for files which span more than one physical volume (multivolume data sets) and for tape volumes which contain more than one physical file (multi-data set volumes).

JCL Considerations

JCL changes are not typically required when CA 1 is installed, however, it is important to examine the conventions utilized by CA 1.

CA 1 is concerned with the following DD statement parameters:

DSN

The same data set name is required when reading a tape data set that was used when the data set was created. This applies to NL, BLP, AL, and SL data sets. CA 1 compares the data set name specified in the JCL to the data set name stored in the TMC record during input processing.

Any inequality causes the job to abend. For ease of CA 1 implementation, when the data set name in the TMC is set to HEXZEROS (the default), the actual data set name is stored in the TMC during the initial OPEN for input processing.

VOL=SER

For SL tapes, this parameter is handled in the standard manner. For NL or BLP tapes, the operator is asked to reply the volume serial number through a WTOR issued by CA 1. The operator's reply is compared to the volume serial number specified in JCL. If the comparison is equal, processing continues. If the comparison is unequal, the NL tape is demounted and a mount is issued for the volume specified in the JCL. If no volume serial number is specified (that is, nonspecific output), CA 1 uses the volume serial number supplied by the operator to access the TMC. In addition, the volume serial number is passed to the operating system in such a way that the actual volume serial number (as replied by the operator) appears on the SYSMSG listing even for NL nonspecific output.

The external tape number for NL tapes is supplied to CA 1 through an operator reply. NL nonspecific output tapes can be successfully cataloged. (The operating system without CA 1 generates a pseudo volume serial number for NL nonspecific output tapes, rendering MVS cataloging meaningless.)

DISP

CA 1 allows the recreation of a data set on the same volume if the data set name is exactly the same and the DISP parameter is changed from NEW to OLD or SHR.

LABEL

If either EXPDT or RETPD is specified as a subparameter of the LABEL parameter when a tape is created, that hold criteria is used to protect the data set. There are also several CA 1 EXPDT keywords and ACCODE parameter values which can be used to specify hold criteria. If no JCL retention is specified, the CA 1 Default Retention is used. Hold criteria specified in the Retention Data Set (RDS) can be used to override the CA 1 Default Retention, and, optionally, even JCL-supplied retention.

ACCODE

Certain CA 1 EXPDT keywords and processing options can be specified using the ACCODE JCL keyword. This allows placing Julian dates in the actual HDR1 of standard label tapes while specifying a CA 1 EXPDT keyword. Although ACCODE is primarily for ANSI labeled tape, the first character can be any letter. If the next two characters are "CA", the remainder is used to select the expiration or retention option.

Tape Library Considerations

The efficient operation of the tape library under CA 1 requires every tape to be identified by a unique volume serial number and physically stored in volume serial sequence. Numbers should be assigned consecutively when possible.

CA 1 controls volumes having alphanumeric volume serial numbers; however, a translation of that alphanumeric into a numeric may be necessary. If necessary a translation scheme is specified at installation time through two exit routines and is used for internal system processing only. The TMSBLDUE utility can be used to assist in this translation. Externally, an alphanumeric volume serial number is always used.

Note: To determine if these exits are necessary in your environment, see the *Utilities and Reports Reference Guide*.

If the Scratch Pool Management feature is being used, a request for a pool-controlled tape must be satisfied by mounting a volume within the defined scratch pool range, or the volume is demounted and the request reissued.

Utilities such as DITTO that copy from tape mark to tape mark should not be used to copy tapes under the control of CA 1. This causes a mismatch between the volume serial number on the external reel label and the volume serial number in the tape label record. Utilities such as CA 1 Copycat or IEBGENER that use normal OPEN logic are recommended for tape-to-tape copy functions.

OPEN for Input

CA 1 compares the data set name specified in the DD statement with the corresponding data set name that is recorded for the volume in the TMC. If the data set names are identical, processing is allowed to continue; otherwise, the job is abended. This validity check is performed *after* the operating system has checked the 17-character data set name in the tape header record against the data set name requested in the DD statement. The validity check by CA 1 compares the complete 44-character data set name. After input has been authorized, the *last used* information is updated in the TMC.

This input data set name check, maintains the integrity of the TMC by preventing the wrong volume from being overwritten when there are duplicate VOLSER numbers. If an abend occurs, it usually indicates that a tape has been written on without the knowledge of CA 1. This can be caused by any of the following:

- The standard MVS OPEN routines were bypassed.
- The tape was written on outside the installation without being properly checked out-of-area.
- The special CA 1 EXPDT keyword for nonresident tapes was used incorrectly.

The AIVS Feature

The AIVS feature of CA 1 allows volumes created on another CA 1 system or a foreign volume (one not created on a CA 1 system) to retain their original internal volume serial number, while assigning a new external volume serial number which CA 1 uses to track the tape.

When processing an AIVS volume during OPEN for Input, CA 1 checks that the volume serial number on the tape matches the internal volume serial number recorded in the TMC. Verification of the file name will not proceed unless the internal volume serial number on the tape matches that recorded in the TMC.

OPEN for Output

For nonspecific output requests, any tape which does not meet specific requirements is immediately demounted, and a mount for a new scratch tape is requested. Eligibility for output access is determined entirely by information in the TMC. Any expiration date contained on the tape header label is ignored for CA 1 controlled volumes. An operator has no authority to make decisions as to which volumes can be written on, as with normal tape processing.

A tape volume is only considered eligible for scratch when the following two conditions are met:

- The expiration date in the TMC Volume record is not in the future.
- The status indicator in the TMC Volume record reflects the volume as scratch.

The CA 1 system option LAB allows external tape labels to be printed automatically for every OPEN of an output tape for the first file.

Scratch Pool Management Protection

Further protection is provided with the use of the CA 1 Scratch Pool Management feature, which allows you to restrict nonspecific output access to *tape pools* of CA 1 controlled volume ranges. This feature is not supported for the IBM 3494, 3494/VTs and 3495, SMS managed tape. If any tape is mounted from outside a requested scratch pool range, the tape is demounted and the request is reissued. Similarly, if a tape from a defined pool is mounted for a non-pool request, the volume is demounted and the mount request reissued.

Assignment of volumes to tape pools and definition of access rules is accomplished in the TMOSCRxx and TMONSMxx members of CAI.CTAPOPTN. An exit is provided for customization of processing. If you have changed the scratch subpool rules and are trying to MOD onto a tape, CA 1 continues to enforce using the same subpool as the first tape when requesting the mount of another tape.

Other Labels

The following labels are available:

Nonlabel (NL)

NL tapes are handled in basically the same manner as SL tapes, including input and output validity checking and protection. The volume serial number of the NL tape is supplied by the operator through a console response. This external volume serial number is used to locate the proper TMC record, then moved into the appropriate system control blocks. This allows the following:

- NL nonspecific output tapes to be cataloged to the system
- NL nonspecific output tapes to be used in generation data groups
- The external volume serial number to be printed on the SYSMSG listing

Bypass Label Processing (BLP)

BLP processing is the same as NL processing except that CA 1 processes any file sequence as a file sequence of 1 with BLP. The input data set name validity check as described for SL processing is performed. The data set name found in the TMC record for the volume and the DSN specified in the DD statement are used.

Nonstandard Label (NSL)

Complete protection is available for NSL tapes; however, your NSL routines must be modified to interface with CA 1. This interface consists of calling CA 1 at the appropriate locations in the NSL routines and interpreting the resulting return code after CA 1 has performed the appropriate validity checks.

CLOSE Processing

CLOSE (end-of-file) processing is the same for all label types, except secondary files created with BLP. The TMC is updated to reflect the number of blocks written to the file and any read or write errors that were encountered. A status flag is set to indicate CA 1 tracked the closing of the file.

Special Processing for Input

Normal input processing under CA 1 consists of checking the data set name requested in the DD statement against the data set name recorded in the TMC and updating the TMC fields with *last used* information.

The following special input processing situations may occur:

- When the data set name in the TMC is set to HEXZEROS (the default), the actual data set name is stored in the TMC the first time a tape is read under CA 1.
- Another special processing situation arises for out-of-area tapes. Tapes can be checked out-of-area under CA 1 by inserting an OUTCODE in the TMC Volume record. This indicates the tape has been removed from the premises. If an out-of-area tape is used for input, it is assumed that the tape has been returned and it is automatically checked-in, unless the out-of-area code is assigned to the CA 1 Vault Management System and it has a slot number assigned.

  If a tape has been brought back from the vault, and a manual CHECKIN has been performed on the volume (OUTCODE= VMS), all volumes in the set that have been read are automatically checked-in during open processing. This allows the tapes to be sent back to the vault if they are still eligible. In addition, the CA 1 system option RV ensures the expiration date of the tapes returned from the vault do not expire before the vaulting system sends them back.
- If the tape was checked out-of-area during scratch processing, then read for input under CA 1 control, the tape is automatically checked in and the TMC record is updated with the new data set name and expiration date. The expiration date or retention period can be specified in the DD statement (even though the tape is being used as input).

  If no expiration date or retention period is specified, the CA 1 system option KEYTAP is used to assign the retention. This provides a reliable, simple means of controlling tapes created on systems which are not under CA 1 control, such as key-to-tape processing.

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

Programs Which Bypass OPEN

Occasionally, production systems in an installation may create output tapes which do not go through a normal OPEN. For these cases, a special pool of verified scratch tapes should be used. The information needed to protect these tapes correctly can be entered into the TMC using CA 1 batch or online inquiry and update facilities.

Chapter 7: Messages

This section contains the following topics:

Console Tape Messages

Unique CA 1 console messages are issued to the operator as conditions warrant in standard operating system format. For example, when an NL or BLP tape is opened, the operator is asked to enter the volume serial number. For a specific volume request, the volume serial number entered must be the same as specified in the JCL; if not, CA 1 assumes the wrong tape is mounted and has the tape demounted.

For a nonspecific request, the volume serial number *must* be replied twice. This gives the operator a chance to correct an incorrect response. The volume serial number is then used to access the TMC information.

Provisions are available to process nonresident tapes whose volume serial numbers are identical to those in the CA 1 controlled tape library. When this type of tape is mounted for output and the JCL specifies the keyword indicating a nonresident tape (LABEL=EXPDT=98000 or ACCODE=xCANORES), the operator is asked to verify that the tape actually is a nonresident tape.

Nonresident tapes are protected with the standard system type protection. That is, for SL tapes, if the HDR1 expiration date is greater than the current date, the operator has the option to override the expiration date and allow output, or to demount the tape.

CA 1 also provides protection in the event that dual-density drives are in use, or label types are mixed within the environment. CA 1 system options LCHG and DCHG determine whether dynamic label or density changes can occur in the real-time environment. Appropriate demounts or verification messages are issued, depending on the options in use. System option TCHG controls whether recording technique (TRTCH) changes are allowed.

Note: For more information about console messages and valid responses, see the *Message Reference Guide*.

Non-Scratch Tape Messages

If the operator mounts a tape for output and CA 1 determines the tape cannot be used as a scratch, the operator receives a console message stating it is not a scratch and specifies a reason code. Some possible reasons are the following:

- Nonresident tape was requested but CA 1 tape is mounted
- Wrong tape is mounted for NL, BLP-specific request
- Tape is CA 1 permanent hold
- Tape is marked out-of-area
- Possible duplicate volume serial number (TMC DSN and HDR1 DSN do not match)
- Tape has not been scratched
- Tape is part of a multi-volume data set
- Tape contains secondary files, and the output request is not for file n+1 (tape contains n files)
- Tape has been remounted as part of a multi-volume data set
- Tape is mounted from the wrong scratch pool

In most instances, the tape is demounted and another scratch request is issued. There are circumstances, however, when CA 1 abends the tape job for certain types of processing violations.

Auxiliary Disposition Messages

If Auxiliary Disposition is used, messages issued display the tape drive, volume serial number, and the free-form message text. No console response is required; however, operator action can be specified such as HOLD TAPE FOR THE NEXT JOB.

Auxiliary Disposition messages can be forced to remain on the screen until cleared by the operator.

OPEN and CLOSE Messages

To help the operator identify work tapes (such as sort work files), the creation of any temporary data set on a CA 1 controlled tape causes two messages to go to the console. At both OPEN and CLOSE, the operator receives the drive and volume serial number of the work files.

The OPEN message also includes the job name, ddname, expiration date, and data set name. The CLOSE message includes the comment WORK TAPE (or WORK FILE, for a secondary data set). Once work tapes are demounted, the operator can place them back in the scratch pool.

Abend Messages

Whenever CA 1 issues an abend, a console message is displayed showing the job name, step name, ddname, tape drive address, volume serial number, and data set name. Codes are also provided to indicate the issuing module and reason for the abend. All tape mount messages are prefixed with special message IDs. If the mount request requires a tape from a specific tape pool, the mount message is modified by the Scratch Pool Management feature to include the tape pool identification.

Note: For more information about CA 1 abends, see the *Message Reference Guide*.

Chapter 8: Using CA 1 with Other Systems

This section contains the following topics:

Overview

A non-CA 1 system is one which cannot access the TMC and Audit data sets during data set creation. This can be an MVS CPU which does not share the DASD volumes that contain the TMC and Audit data sets, a non-MVS operating system such as DOS, or a non-IBM operating system such as Windows or UNIX.

In these situations, integrate the tapes that are created on these non-CA 1 systems into the CA 1 environment properly.

- Tapes created by backup products on Windows and UNIX systems may be eligible for automated tracking using the Distributed Tape Support feature.
- Use the AIVS feature, described below, to manage the tapes.
- If all tapes created on non-CA 1 systems are later used as input under CA 1, then the Key Tape Procedure can be followed. (See Key Tape Procedure.)
- If the tapes may or may not be used as input under CA 1, then either the Batch Update System or, if activity is slight, CA 1 online inquiry and update can be used to update the TMC with the new status of the tapes as they are created.

We recommend that all tapes in the environment be initialized in the CA 1 TMC. This allows the management facilities of CA 1 (for example, reports, automatic scratch control, Vault Management System) to be utilized for tapes created on both CA 1 and non-CA 1 systems.

Alternate Internal Volume Substitution

AIVS processing provides an effective way to track tapes created on a non-CA 1 system. With AIVS processing, CA 1 can track foreign and duplicate volumes. Foreign volumes are those volumes created outside of the control of CA 1, while duplicate volumes are those volumes with volume serial numbers which conflict with volumes defined to CA 1. Duplicate volumes are typically volumes which have been created on another CA 1 system whose TMC is being merged with an existing TMC.

AIVS support is provided in CA 1 by recording the internal or actual volume serial number (ACTVOL) from the tape header in the TMC and tracking the tape with an external volume serial number defined to CA 1. When an AIVS tape is to be opened for input processing, the JCL VOL=SER= parameter or system catalog entry for the file must refer to the external volume serial number. The mount message issued contains both the external and actual volume serial number obtained from the TMC volume record.

AIVS tapes are defined to CA 1 either by directly entering the foreign tape information through the Build New TMC Record online command or by executing the TMSMERGE utility to merge another TMC with duplicate volume serial numbers. If an AIVS tape is to be reused, it must be initialized with an actual volume serial number equal to the external volume serial number.

Key Tape Procedure

For tapes which are created on a non-CA 1 system and used as input under CA 1, the Key Tape procedure allows control with minimal manual effort. Tapes that are expired, are not in a vault (no slot number) and are marked out-of-area are eligible for Key Tape Processing.

To implement the Key Tape procedure, you must determine the number of tapes which are needed during a certain period (daily, weekly, and so on). When the TMSCLEAN program is executed, indicate how many scratch tapes are to be logged out-of-area to the individual locations (tapes can be selected based on VOLSER, density or label type).

As the tapes go scratch, they are automatically logged out-of-area. The scratch tapes can then be placed in an area close to the non-CA 1 system. After they are written on, they are filed in the tape library. Protection is maintained because CA 1 does not allow these scratch tapes to be used for output as long as they are marked out-of-area.

When the tape is subsequently used as input under CA 1, the TMC is automatically updated to contain the new data set name and an expiration date. If an EXPDT or RETPD is specified in the JCL, it is used; if not, the value of CA 1 system option KEYTAP is used to protect the tape for the retention period that you specified.

All other pertinent TMC fields are updated, and the out-of-area code is removed. CA 1 then has complete control of the tape for tracking, reporting, and protection purposes.

The Key Tape Procedure is not intended to be used with tapes managed using the Distributed Tape Support feature.

Other Procedures

If tape creation activity on non-CA 1 systems is slight, then a procedure using the CA 1 online inquiry and update feature may suffice. Tapes to be used as output on the non-CA 1 system can be verified as valid scratches. After creation, the appropriate fields can be updated in the TMC.

If these tapes are to be vaulted, VMS requires the following fields to have valid data:

- DSN
- EXPDT
- CDATE
- CTIME
- CJOB
- LDATE
- VOLSEQ

The TMSUPDTE batch utility can also be used.

Chapter 9: Other Features

This section contains the following topics:

External Security

CA 1 has many security options available that enable your external security system to control data set access, use of CA 1 services, online interfaces, use of NL, NSL or BLP label types, and to bypass CA 1 control (LABEL=EXPDT=98000 or ACCODE=xCANORES). This affords your tape data sets the same level of protection as your DASD data sets. An exit is available to allow for customization of security processing.

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

Auxiliary Disposition

The Auxiliary Disposition facility is a communication technique to help eliminate the paper work involved with special tape handling requests and to assure that those requests are fulfilled in a timely manner.

This facility provides direct communication from the person setting up the job to the master console, tape operator, or tape librarian when the tape volumes are closed or reach end of volume. The message appears immediately after the operating system KEEP message.

One of the more common reasons to use Auxiliary Disposition is to notify an operator or librarian that a tape needs to be sent off-site. Such tapes typically require an external label, and Auxiliary Disposition provides an option to generate an external label request at the same time the messages are displayed.

The feature also provides the means to mark tapes out-of-area automatically.

Auxiliary Disposition utilizes a sequential data set which contains all messages required to communicate the special tape handling requests for a particular step. This data set is recognized by CA 1 by a unique ddname (CA 1 system option DSN), and can be a sequential disk data set, a member of a PDS, or included in the job stream following a DD *.

Auxiliary Disposition is invoked at the time a tape is closed or demounted, or it can be invoked as a separate step to give all the disposition messages at one time.

The message format is free-form text. Operator training is minimal because messages can contain all the information needed to perform special tape handling.

Included with this feature is the capability to automatically check tapes out-of-area. The Auxiliary Disposition can display the following requests:

- Routing to microfiche
- Routing to a special printer
- Asking the operator to hold the tape for later use in another job

Note: For more information about the Auxiliary Disposition facility, see the *Administration Guide*.

Accounting Information and User Data

Each Volume record on the TMC contains a 50-byte User Data Field which is available to you for the storage of any desired information. This field can be used to store accounting information, certification information, or any data beneficial to effective tape management in your installation.

The accounting interface allows accounting information to be automatically extracted from the accounting fields located in the JOB card, EXEC statement, or through the operating system, and stored.

If capture of accounting information is not desired, then the entire User Data Field is available for any other purpose. The User Data Field is accessed through a standard CA 1 or site-defined keyword by online inquiry and update or batch functions.

Note: For more information about accounting exits and the User Data Field, see the *Programming Guide*.

External Label Processing

External labels are not required in the CA 1 environment. A legitimate need for them exists, however, if tapes are to be sent off-site for subsequent processing.

CA 1 has a feature that facilitates the printing of external tape labels on a dedicated printer, console, or WTO route code. External label requests from all sources in CA 1 are routed to the Online Label Interface for printing. This can be done from a single CPU or from multiple CPUs.

There are five methods for tape label generation:

TMSLBLPR

A stand-alone program that runs as a started task or batch job and produces labels. An exit is available that allows labels to be selectively generated based on the data set name, job name, and so forth.

Note: For more information about the TMSLBLPR utility, see the *Utilities and Reports Reference Guide*.

CA 1 system option

CA 1 system option LAB allows labels to be produced at OPEN for all output tapes.

Auxiliary Disposition

Two different uses of Auxiliary Disposition that can either generate a label at volume CLOSE or EOV, or, when executed as a separate step, generate labels for system cataloged data sets and optionally uncatalog them.

Online Interfaces

Labels can be generated on demand through the CA 1 online interfaces (ISPF and TIQ.)

Online Label Interface

Labels can be generated on demand by sending a direct request to the Online Label Interface (LAB) subtask of CTS using the appropriate commands.

The format of the external label requests can be tailored to site specifications. An example of a suitable device for printing labels would be an IBM 3287 or equivalent device.

Prestage Input and Output Tapes

Input tape handling procedures are greatly improved by giving the tape librarian or production control the facility to pre-stage or set up jobs ahead of time. The CA 1 pre-staging program is designed to aid in this task.

The TMSPULL utility allows reporting to facilitate pre-staging tape volumes for production processing. TMSPULL generates listings of all required input and output volumes for a normal production job.

- One report is produced to allow the tapes to be retrieved and organized for the other report to reference.
- The Pull List is in shift, cart ID, and volume serial number sequence. Other report information includes job name, data set name, and volume sequence number.
- The Setup List is in shift, job name and volume serial number sequence. Other report information includes cart slot number, volume sequence number, data set name, out-of-area code, and slot number.
- The pre-staging facility is driven by a PDS that contains the information necessary to produce the list of tapes to be pulled.
- Each PDS member contains information relative to one job with the member name being the job name. The PDS member contains the following:
  - The shift designation number (36 are available)
  - The cart on which the tapes are to be placed
  - The input data sets to be selected
- Scratch tapes can be requested for output data sets.
- The list can be generated from the information in the MVS Catalog or the Tape Management Catalog (TMC).
- Provision is made to indicate other than a current generation for GDGs.
- Appropriate scheduling of the TMSPULL program and proper setup of the TMSPULL PDS can assure the operators that all input and output volumes required for a job or groups of jobs are available before the job is submitted for execution.

Note: For more information about the TMSPULL utility, see the *Utilities and Reports Reference Guide*.

Optional Features

The following optional features in CA 1 provide other management and control techniques:

- Paperwork does not have to accompany jobs that have special processing needs or post-processing requirements. The Auxiliary Disposition feature communicates these special processing requirements directly to your system consoles.
- By using the CA 1 pre-staging facility, input tapes required by scheduled jobs can be pulled in advance to reduce delays in mounting tapes and increase overall throughput.
- CA 1 interfaces with a wide variety of other software packages, such as security, DASD management, and media analysis.

Real-time Alert Notification

CA 1 enables you to monitor scratch availability and tape usage and to send an email or issue a WTO when specific conditions are met. This functionality is delivered in the Volume Pool Monitor (VPM) feature. The VPM feature allows you to define volume pools and alerts. Volume pools are ranges of tapes that you define. Alerts are the rules that you define to monitor the status and use of tapes in the pools. You can also create alerts to monitor the processing that selected CA 1 daily utilities perform.

The VPM feature is implemented as a subtask of the CTS started task that you use for many different CA 1 functions. The CTS VPM subtask runs in real time to monitor alert conditions for volume pools. As the VPM subtask monitors tape activity, it categorizes tapes as being in Active, Scratch, or Out of Service status. A total volume count for the volume pool is maintained with a separate count of volumes in Never Used status. You can display these totals on the z/OS console or through the CTS ISPF interface or CA GMI.

The VPM feature uses a VSAM Database (VDB) to save volume pool and alert definitions. The feature uses also current and history counters for the volume pools. The VDB is updated through ISPF and also by the VPM subtask.

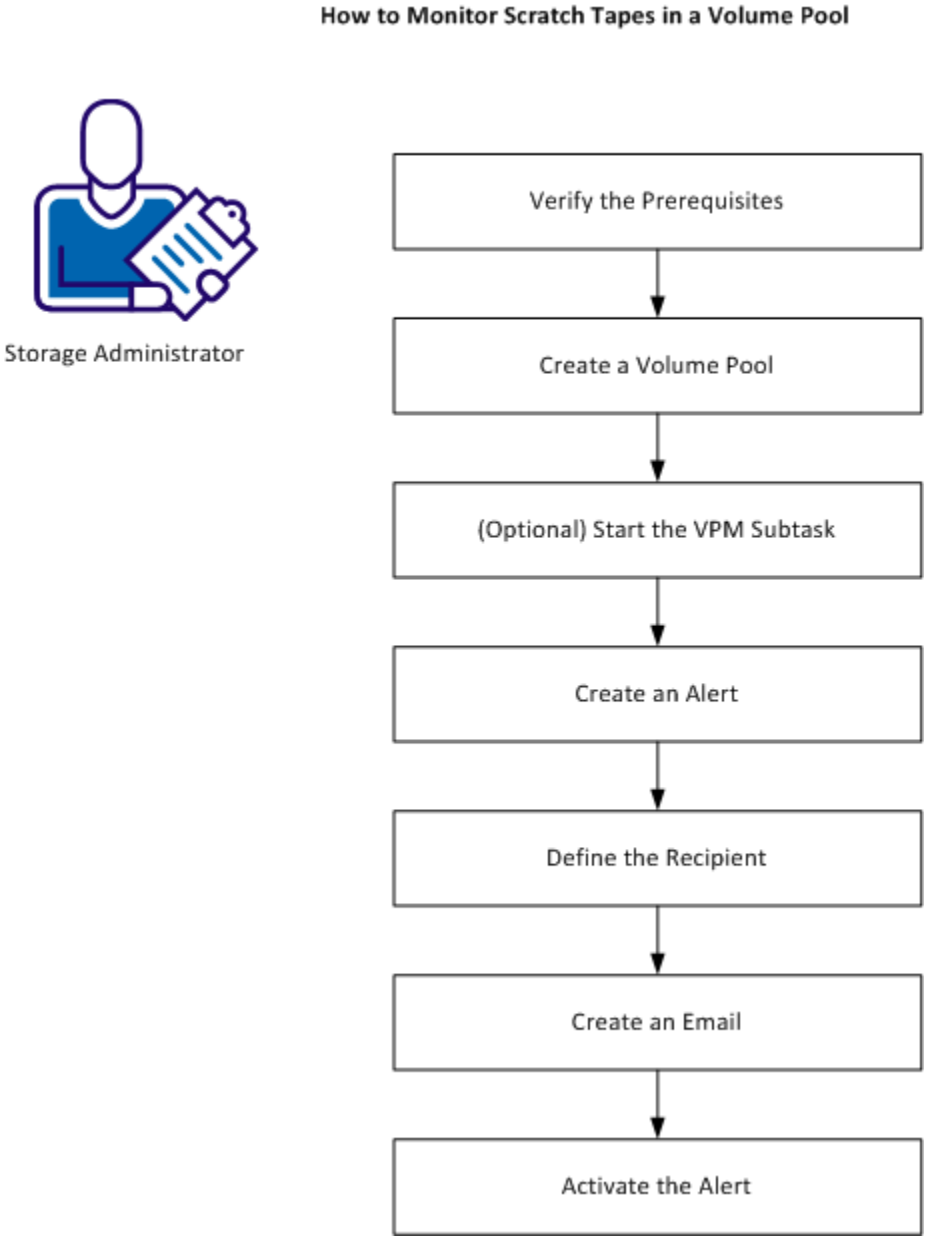
The following two scenarios demonstrate the real-time alert notification capabilities of CA 1.

Note: These scenarios assume that the one-time steps to create emails and configure the Volume Pool Monitor feature have been completed. For more information, see the *Installation Guide*.

How to Monitor Scratch Tapes in a Volume Pool

As a storage administrator, you are responsible for monitoring scratch tapes availability to ensure that you have enough space for data that needs to be stored. To monitor scratch availability for a set of volumes that is defined in the tape management catalog (TMC), use the Volume Pool Monitor feature (VPM). In this example scenario, the daily batch cycle typically uses 200 scratch tapes. The users want to be notified if the number of available scratch volumes falls below 500.

The following illustration shows how to monitor scratch tapes in a volume pool:



To monitor scratch tapes in a volume pool, do the following:

1. Verify the prerequisites (see page 65).
2. Create a volume pool (see page 65).
3. (Optional) Start the VPM subtask (see page 66). The VPM subtask can be already started.
4. Create an alert (see page 66).
5. Define the recipient (see page 67).
6. Create an email (see page 68).
7. Activate the alert (see page 68).

Verify the Prerequisites

To be able to define volume pools and monitor the number of scratch tapes available in a volume pool, verify the following prerequisites:

- Verify that the VSAM Database is allocated and initialized.
- Verify that ISPF Panels are installed.
- Verify that SEND data set exists.
- Verify that some variables are set to define the email environment and Volume Pool Monitor (VPM) subtask parameters.

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

Create a Volume Pool

To define a range of tapes that you can monitor and perform actions on, create a volume pool.

Follow these steps:

1. Open the CTS Primary Menu, and enter **2**.

   The Volume Pool List panel opens.

2. Enter **ADD** in the Command field.

   Note: If you have already defined at least one volume pool, you can enter **A** in the CMD line for any row in the displayed list of volume pools.

   The VPM Range Add Panel opens.

3. Specify the volume pool parameters for this example:
   - Type **Production_Range_1** in the Pool ID field.
   - To set the volume serial number (VSN) range, type **010000** in the LO VSN field and type **019999** in the HI VSN field.
4. Press Enter to save the settings.

   The volume pool named Production_Range_1 is created. The volume pool includes volumes with serial numbers from 010000 through 019999.

(Optional) Start the VPM Subtask

To send alerts, the VPM subtask must be started. If you added the VPM subtask to the CTS started task and you started the Common Tape System (CTS) started task, the VPM subtask is already running.

Follow these steps:

1. If the CTS started task is not running, start the CTS started task. Specify the following command in the ENFCMDS member of CA Common Services *hlq*.PPOPTION:

   ```
   S CTS
   ```

2. If the CTS started task is running and you have not set the VPM subtask to start automatically, use the modify command:

   ```
   F CTS,SET TASK(VPM) PGM(CTSVPM)
   F CTS,START VPM
   ```

   The CTS started task and the VPM subtask is running.

Note: To start the VPM subtask each time CTS is started, add the following commands to the CTSSTART member in *hlq*.CTAPOPTN:

```
SET TASK(VPM) PGM(CTSVPM)
START VPM
```

Create an Alert

To monitor scratch availability in the Production_Range_1 volume pool so that you know if you are reaching the critical threshold, define an alert with the name Scratches_Running_Low.

Follow these steps:

1. Open the CTS ISPF primary menu, and enter **3**.

   The VPM Alert List Panel opens.

2. Enter **ADD** in the command line on the VPM Alert List Panel.

   The VPM Alert Add Panel opens.

3. Specify the alert parameters:
   - Type **Scratches_Running_Low** in the Alert ID field.
   - Type **Production_Range_1** in the Pool ID field.
   - Type **Scratch_Count** in the Variable field to have the alert trigger when the number of scratch tapes in the volume pool falls below 500.
   - Type **LT** in the Oper field.
   - Type **500** in the Value field.
   - Type **SCRLOW** in the Send field.
   - Type **ONCE** in the Interval field.
4. Press Enter to save the settings.

Note: The Alert ID can be any name. The Pool ID must be the name of the volume pool that you want to monitor. For complete information about the options for this panel, see the *Administration Guide*.

Define the Recipient

To define a recipient of an email notification that is sent by the alert, create a variable to use in the email. Using a variable also enables you to change the recipient of the email easily.

Follow these steps:

1. Open the CTS ISPF primary menu, and enter **1**.

   The CTS Variable Type menu opens.
2. Enter **1** on the CTS Variable Type menu.
3. Enter the **ADD** command on the CTS User Variable List menu.
4. Type **Lead_tape_librarian** in the Name field on the CTS Variable Add Panel. On this panel, do not specify the ampersand (&) character that you normally include with variables.
5. Type the email address of the recipient in the Value field.
6. Press Enter to save the settings.

Create an Email

You can enable automatic sending of an email when the alert condition is met. The person responsible gets email notifications in a timely manner.

Follow these steps:

1. Open the SCRLOW member of the SEND data set for editing.
2. Edit the member as follows:
   - Type **EMAIL** in the first line of data.
   - Type **x-TO: &Lead_tape_librarian&** in the second line.
   - Type **x-TITLE: Scratch tapes are low!** in the third line.
   - Type the body of the email in the following lines.

```
EDIT       SYS3.CA1.SEND(SCRLOW) - 01.00         Columns 00001 00072
Command ===>                                        Scroll ===> CSR

****** ************************ Top of Data ************************
000001 EMAIL
000002 x-TO: &Lead_tape_librarian&
000003 x-TITLE: Scratch tapes are low!
000004 Warning! There are only &CTS_Alert_Variable_Value& tapes
000005 left in volume pool
000006 &CTS_Alert_Pool_ID&.
000007 Please take action now to insure we have sufficient tapes for
000008 daily processing. Note - do not
000009 reply to this email.
****** ********************** Bottom of Data **********************
```

3. Press PF3 or enter **END** in the command line to save the settings.

Note: You can extensively customize the emails. For more information, see the *Administration Guide*.

Activate the Alert

To have the email sent when the condition that you defined in the alert is met, activate the alert.

To have the VPM subtask activate the alert, issue the following command:

```
F CTS,MSG,VPM,UPDATE
```

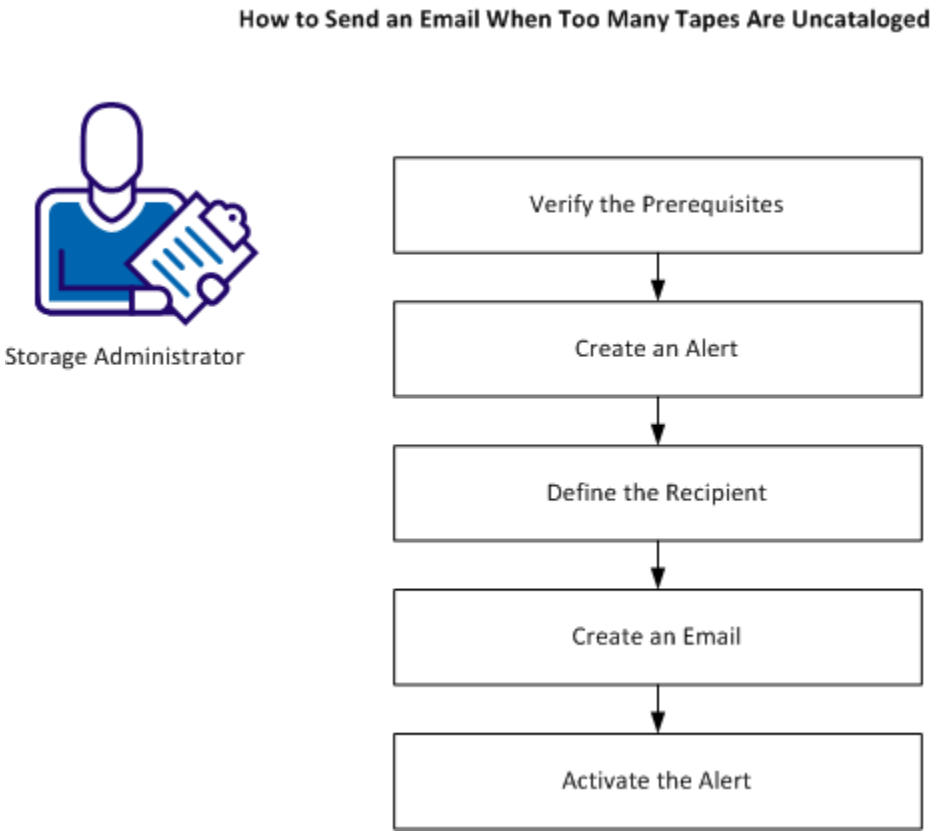
The VPM subtask reads the CA 1 Audit file and updates the counters that are associated with the Production_Range_1 volume pool.

The VPM subtask reads the CA 1 Audit file in user-specified intervals. You can set this interval in the option variable OPT_VPM_TIMER. As tapes change status, the accumulators for the Production_Range_1 are updated. The VPM subtask also tests the alert condition in this interval. If the condition is met, the email that is defined in SCRLOW is sent.

How to Send an Email When Too Many Tapes Are Uncataloged

As a storage administrator, you are responsible for keeping the tape catalog up-to-date and monitoring the processing of the CA 1 daily utilities. This scenario describes how to create an alert and send an email when too many tape files are uncataloged in one run of TMSCLEAN. In this scenario, the storage administrator has specified 1,000 data sets being uncataloged as an uncommonly high number and indicative of a possible problem.

The following illustration shows how to send an email when too many tapes are uncataloged:



To send an email when too many tapes are uncataloged, do the following:

1. Verify the prerequisites (see page 70).
2. Create an alert (see page 70).
3. Define the recipient (see page 67).
4. Create an email (see page 71).
5. Activate the alert (see page 72).

Verify the Prerequisites

To be able to monitor the number of uncataloged tapes and send an email notification when the number exceeds certain threshold, verify the following prerequisites:

- Verify that the VSAM Database is allocated and initialized.
- Verify that ISPF Panels are installed.
- Verify that SEND data set exists.
- Verify that some variables are set to define the email environment and Volume Pool Monitor (VPM) subtask parameters.

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

Create an Alert

To be notified when TMSCLEAN uncatalogs a high number of tape files in one run, define the alert named High_Uncatalog_Activity.

Follow these steps:

1. Open the CTS ISPF primary menu, and enter **3**.

   The VPM Alert List Panel opens.

2. Enter **ADD** in the command line on the VPM Alert List Panel.

   The VPM Alert Add Panel opens.

3. Specify the alert parameters:
   - Type **High_Uncatalog_Acitivity** in the Alert ID field.
   - Leave the Pool ID field blank.
   - Type in **TMSCLEAN_FILES_UNCATALOGED t**o have the alert monitor the number of files that TMSCLEAN uncatalogs every time that the utility runs.
   - Type **GT** in the Oper field.
   - Type **1,000** in the Value field.

- Type **UNCAT2HI** in the Send field to identify the member of the SEND data set that you want to send.

  The member name must match the member name that you specify when creating the email (see page 71).

- Type **12** in the Interval field to have the email sent once in every 12 hours while the condition is still true.

4. Press Enter to save the settings.

Note: For complete information about the options for this panel, see the *Administration Guide*.

Define the Recipient

To define a recipient of an email notification that is sent by the alert, create a variable to use in the email. Using a variable also enables you to change the recipient of the email easily.

Follow these steps:

1. Open the CTS ISPF primary menu, and enter **1**.

   The CTS Variable Type menu opens.

2. Enter **1** on the CTS Variable Type menu.
3. Enter the **ADD** command on the CTS User Variable List menu.
4. Type **Lead_tape_librarian** in the Name field on the CTS Variable Add Panel. On this panel, do not specify the ampersand (&) character that you normally include with variables.
5. Type the email address of the recipient in the Value field.
6. Press Enter to save the settings.

Create an Email

Create the contents of the email to send when the alert condition has been met.

Follow these steps:

1. Open the UNCAT2HI member of the SEND data set for editing.
2. Edit the member as follows:

   - Type **EMAIL** in the first line of data.
   - Type **x-TO: &Lead_tape_librarian&** in the second line.

- Type **x-TITLE: Investigate TMSCLEAN Uncatalog Activity** in the third line.
- Type the body of the email in the following lines.

```
EDIT       SYS3.CA1.SEND(UNCAT2HI) - 01.00                Columns 00001 00072
Command ===>                                               Scroll ===> CSR

****** ***************************** Top of Data ******************************
000001 EMAIL
000002 x-TO: &Lead_tape_librarian&
000003 x-TITLE: Investigate TMSCLEAN Uncatalog Activity
000004 In the most recent run of TMSCLEAN on
000005 &TMSCLEAN_JOB_COMPLETION_DATE& run on System &SYSID& there
000006 were &CTS_Alert_Variable_Value&
000007 files UNCATALOGED in that run. TMSCLEAN does not normally
000008 uncatalog that many files in a daily run.
000009 &BL&
000010 This condition should be investigated to insure that we don't have
000011 a problem.
000012 &BL&
000013 Note – do not reply to this email.
****** ***************************** Bottom of Data ***************************
```

3. Press PF3 or enter **END** in the command line to save the settings.

Note: You can extensively customize the emails. For more information, see the *Administration Guide*.

Activate the Alert

To add the new alert to the list of alerts that the VPM subtask monitors, activate the alert.

Follow these steps:

1. (Optional) If the Common Tape System (CTS) started task is not running, add the VPM subtask to the CTSSTART member in *hlq*.CTAPOPTN.
2. (Optional) Start CTS started task using the following command in the ENFCMDS member of CA Common Services *hlq*.PPOPTION:

   ```
   S CTS
   ```

3. (Optional) If the CTS started task is running but the VPM subtask is not running, start the VPM subtask using the modify command:

   ```
   F CTS,SET TASK(VPM) PGM(CTSVPM)
   F CTS,START VPM
   ```

4. Update the list of alerts by issuing the following command:

   ```
   F CTS,MSG,VPM,UPDATE
   ```

   The VPM reads the VDB and adds the new alert to the list of the alerts that the VPM monitors.

You have successfully set the notification threshold for uncataloged data sets. When the VPM subtask discovers that TMSCLEAN has uncataloged more than 1,000 tape files in one run, the lead tape librarian receives an email notification. The email is sent once every 12 hours while the condition is still true.

Note: The interval that the VPM subtask uses to check for activity in the CA 1 Audit file is controlled by the option variable OPT_VPM_TIMER. Review the default 30-minute setting for OPT_VPM_TIMER and insure that it is appropriate for your site.

If the interval is set to 30 minutes and TMSCLEAN completes after the last time that the interval expired, there can be up to a 30-minute delay until the interval expires again and the updated value for TMSCLEAN_JOB_FILES_UNCATALOGED is read from the CA 1 Audit file.

Appendix A: Evaluating a Tape Management System

This section contains the following topics:

Introduction to Tape Management System Evaluation

Evaluating a tape management system involves determining not only how a data center currently operates but how it should ideally operate, both now and in the future.

It is important for the tape management system to provide adequate protection of your tape data sets and effective management and control of your tape library. The following areas should be addressed when evaluating a tape system for a particular environment:

- Data Protection—Is it as close to 100 percent as possible?
- System Efficiency—Is there minimal overhead and maximum efficiency, while still providing that important protection?
- Installation and Implementation—How difficult and time-consuming a task is this?
- Flexibility—Are sufficient user options available to effectively tailor the system to any environment? Will operations, tape librarians, and applications programmers find the system easy to use?
- Management and Control—Can it manage all aspects of tape handling? Are the required capabilities provided?
- System Integrity—What preventive measures are available to prevent people from making critical mistakes?

Data Protection

CA 1 has the following data protection features:

- For multi-data set tapes, each file is recorded and protected. Output is not allowed for any file other than n + 1 (where n is the number of existing files). The volume is retained based on the highest expiration date among all files on the volume.
- For multivolume data sets, all volumes are chained, and updates affecting the data set (as opposed to the volume) can only be made to the first volume of the data set.
- For multivolume data sets, an output volume cannot be remounted accidentally during multivolume data set creation.
- On input, data set names are verified to help ensure that the data recorded in the TMC is correct for the volume. This also controls duplicate volume serial numbers.
- On output, a tape cannot be written on unless it has been identified as a scratch by TMSCLEAN. Data set recreation on the same volume is permitted.
- A permanent hold tape can never be written over. (DISP=MOD is allowed.)
- The TMC is updated immediately at data set OPEN, CLOSE and EOV. There is no queuing of TMC updates.
- MOD tapes are controlled so that:
  - What is intended is allowed. Modifications are added to the data set.
  - What is not intended is prevented. Modifications do not write over the current data set.
- Nonlabel (NL) and Bypass Label Processing (BLP) tapes are controlled and protected.
- The TMC is not updated if the tapes are not under CA 1 control that is, if they are non-CA 1 tapes.

System Efficiency

CA 1 has the following system efficiency features:

- CA 1 operates in a true, real-time processing mode, as an extension of your operating system. Resource requirements are nominal for these functions.
- The TMC and Audit data sets are accessed by Execute Channel Program (EXCP) processing. Records are always read directly based on a one-to-one correspondence of relative record to volume serial number (or in the case of the Audit, an internal counter). No extraneous reads to find the proper records are required. No storage is required for BDAM or other operating system access method modules.
- The TMC is read a full track or cylinder at a time to expedite processing for reports and utilities.
- The Audit data set is a wraparound data set and, as a result, the TMC backup process does not require that tape mounts or TMC and Audit recording stop while the backup is running.
- The Audit threshold notifies operations when the Audit data set is approaching capacity. There is never a need to stop operations because the Audit data set is full, nor is a TMC record update ever lost because the Audit is full.
- The real-time processing programs used by CA 1 are modular and function-oriented to provide the capabilities necessary with a minimum number of instructions executed and a minimum number of modules loaded into storage.

Installation and Implementation

CA 1 has the following installation and implementation features:

- The installation of CA 1 is performed with SMP/E for MVS systems or SMP Version 10 for Fujitsu systems.
- System options generally require simple editing of the appropriate parameter library members, and can be changed without an IPL of the operating system.
- Utilities, reports, and the CA 1 online inquiry and update facility can all be tested without installing CA 1 operating system intercepts.
- Several methods are available to generate data for the TMC.

Flexibility

CA 1 has the following flexibility features:

- Options are available, both when implementing the system and later, in the variety of extended features which you can use as needed. User exits provide a means to completely customize the system if necessary.
- The TMC can be extended for both Volume records and for DSNB records, or reduced by deleting a range of serial numbers no longer required.
- CA 1 provides the facilities to combine two TMCs or to migrate data from an existing TMC to another TMC.
- Tape retention can be user-controlled through the JCL or centralized with the Retention Data Set.
- Available interfaces with other products allow for extended CA 1 facilities.
- CA 1 provides special expiration date keywords that enhance tape retention.

Management and Control

CA 1 has the following management and control features:

- CA 1 programs produce standard reports which satisfy the reporting requirements of most installations.
- The CA Earl interface provides reports on any combination of data fields within the TMC or Audit data set. You define the report format, which can contain totals, headings, and so forth.
- The VMS is used to efficiently cycle tapes through one or more critical off-site vaults. Criteria for holding tapes in the vaults may be different for each data set and for each vault.
- Extensive internal and external security is available to protect the TMC from invalid access and real-time access to sensitive files.
- Auxiliary Disposition communicates post-processing requests directly to the console operator or tape librarian and provides selective external label printing.
- External labels can be printed automatically or on demand.
- The pre-staging facility provides input and output tapes for advance preparation of production jobs.
- Tape utilities provide the ability to verify tape header labels and initialize tapes.
- Scratch Pool Management allows you to restrict nonspecific output access to tape pools of CA 1 controlled volume ranges.
- The accounting interface provides for the automatic recording of job or step accounting information.

System Integrity

CA 1 has the following system integrity features:

- At initialization, CA 1 verifies the integrity of the operating system interface.
- An accurate system date and time is critical for managing tapes. CA 1 performs checking during initialization and normal processing to help ensure they are correct.
- When the TMC is backed up, the volume serial number (VOLSER) of the backup tape is automatically recorded. If a restore is necessary, this VOLSER is checked against the tape mounted for the restore. This assures that the most current backup tape is used.
- The Audit data set provides complete TMC integrity. No record can be modified in the TMC without a corresponding record being written to the Audit data set.
- Approximately every 30 minutes, CA 1 verifies that the databases have not been moved or re-cataloged since the previous CA 1 initialization.
- CA 1 notifies operations when the number of used DSNBs exceeds a site-defined level.
- CA 1 notifies operations when the number of Audit records written exceeds a site-defined level.

Glossary

Alternate Internal Volume Substitution (AIVS)
A facility that allows volumes created on another CA 1 system or a foreign volume to retain their original internal volume serial number, while assigning a new external volume serial number.

Auxillary Disposition
A facility that provides direct communication from the person setting up the job to the master console, tape operator, or tape librarian when the tape volumes are closed or reach end of volume.

Chain Pointer
The part of the tape control block that gives the address of the next data block.

Data Set Name Block (DSNB)
A data set used by file control to hold information relevant to the data set.

Execute Channel Program (EXCP)
A low-level file access system. The programmer provides a list of device-specific channel commands to be executed by I/O channels, control units, and devices.

External Data Manager (EDM)
A facility that allows systems such as the IBM Hierarchical Storage Manager (DFSMShsm) to own a CA 1 controlled volume and indicate when it should be returned to scratch status.

iGateway and iSponsor
Free CA facilities that allow distributed systems products to provide data to CA 1.

Interactive System Productivity Facility (ISPF)
A set of panels used to interface with the CA 1 system.

Retention Data Set (RDS)
A facility that supplies the tape's expiration criteria.

Scratch Pool Management
A feature that restricts nonspecific output access to tape pools of CA 1 controlled volume ranges. If a tape is mounted from outside a requested scratch pool range, the tape is demounted and the request is reissued. If a tape from a defined pool is mounted for a non-pool request, the volume is demounted and the mount request reissued.

SMS Management Class
The class supplies data set migration, backup, and retention values, backup requirements, and class transition criteria.

Tape Management Catalog (TMC)

A facility used to store all necessary information associated with the tape volume.

User Data Field

A 50-byte field which stores any desired information about each volume record on the TMC.

Vault Management System

In an installation that has multiple tape storage locations, use this facility to control the movement of tape volumes from one location to another.

Vault Pattern Description (VPD)

A data set used to define movement criteria, location IDs, and data set names. Data sets can be identified by a high-level qualifier, be fully qualified or identified by pattern masking specification. Vaults and movement information can be added, changed, or deleted by editing and redefining the VPD.

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