CA XOsoft™ Replication for UNIX and Linux

Operation Guide

r12.5

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Chapter 1: Introduction

This document is intended for experienced UNIX and Linux system administrators interested in implementing and deploying the CA XOsoft Replication solution in their environment. The document provides all the details necessary to install and uninstall CA XOsoft, create a simple Replication and Data Recovery (DR) scenario, manage a scenario, and recover lost data.

This section contains the following topics:

Related Documentation (see page 7)
Supported Server Types (see page 7)

Related Documentation

Use this Guide along with the *CA XOsoft Installation Guide,* the *CA XOsoft User Guide, and the CA XOsoft PowerShell Guide*.

Supported Server Types

The UNIX/Linux version of CA XOsoft provides a disaster recovery solution for:

- File Servers
- Oracle 9i, 10g and 11g databases

The following platforms are supported:

- AIX
  - 5.2 - 32/64 bit kernels
  - 5.3 - 32/64 bit kernels, minimum ML 04 required
- Linux
  - RHEL 4 32/64 bit kernels
  - RHEL 5 32/64 bit kernels
  - SLES 9 (SP1, SP2, SP3, SP4) 32/64 bit
  - SLES10 (SP1, SP2) 32/64 bit
- Solaris
  - Solaris 9 SPARC, 32/64 bit
  - Solaris 10 SPARC, 32/64 bit
  - Solaris 10 x86_64

Chapter 2: Installing and Uninstalling CA XOsoft

This chapter explains how to install and uninstall the CA XOsoft Engine and CA XOsoft Manager.

This section contains the following topics:

Install the CA XOsoft Engine (see page 10)
Managing the CA XOsoft Engine (see page 11)
How to Install CA XOsoft Manager (see page 11)
Upgrade CA XOsoft (see page 12)
Uninstall CA XOsoft (see page 13)

Install the CA XOsoft Engine

The CA XOsoft installation bundle consists of packages for all supported platforms and a common installation script.

To install the CA XOsoft Engine

1. Become "superuser" (root).
2. Change the working directory to the directory that contains installation files
3. Run install.sh script.
4. Follow the instructions until the end of the installation. You will be prompted to accept the license agreement and asked if you wish to create CA XOsoft group and enable Oracle support. If you decide to enable Oracle support, you must provide the Oracle home path If your Oracle server is installed without the 32-bit Oracle client library, then you must also provide the Oracle Instant Client path.
5. If the CA XOsoft package has been installed, you will be prompted to reinstall it.
6. If the CA XOsoft group has been created, use the command, usermod, or edit /etc/passwd file to add users who want to access CA XOsoft (create/manage a scenario) to the CA XOsoft group.

For non-global zones on Solaris, you need to run the configure.sh in each non-global zone.

To install the CA XOsoft Engine into non-global Solaris zones.

1. Run install.sh script in global zones as the upper process.
2. After installation, run configure.sh in each non-global zone.

Managing the CA XOsoft Engine

After the installation, the CA XOsoft Engine is automatically managed by the operating system: it is started during operating system boot sequence, and stopped during operating system shutdown process. These procedures are done automatically through **.rc** scripts.

However, if you need to manually stop the engine and then start it again, do the following:

Linux

To start an Engine:

/etc/init.d/CAXOsoft start

To stop an Engine

/etc/init.d/CAXOsoft stop

Solaris

To start an Engine

/etc/init.d/CAXOsoft start

To stop an Engine

/etc/init.d/CAXOsoft stop

AIX

To start an Engine:

/opt/CA XOsoft/bin/CAXOsoft.rc start

To stop an Engine:

/opt/CA XOsoft/bin/CAXOsoft.rc stop

How to Install CA XOsoft Manager

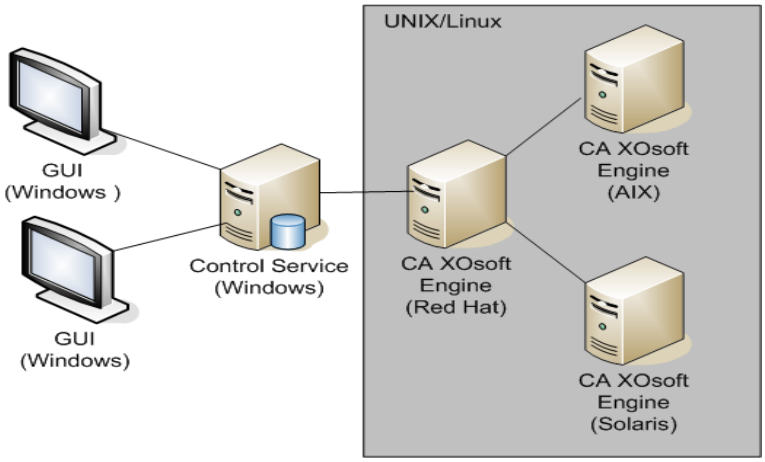
The CA XOsoft Manager is installed only on Windows platforms. Installing CA XOsoft components on a Windows platform is very straightforward. The installation package contains a file called Setup.exe that runs a standard MSI wizard.

- This (soft) installation does not require reboot or application shutdown.
- The required level of instmsi.exe is 2.0.2600.2 or higher. If you do not meet this minimum requirement, CA XOsoft installation automatically upgrades the Windows installer for you. However, upgrading the installer requires a reboot.

Standard prompts facilitate the installation. Your only major decision is on which server(s) to install the applications (CA XOsoft Manager and CA XOsoft PowerShell are installed together):

- Install CA XOsoft Manager and the Control Service on any Win2000, Win2003, or XP computers that have network access to the machines that you intend to manage, as the following diagram shows.
- The default installation directory (INSTALLDIR) is: \Program Files\XOsoft\CAXOsoft. All executables, DLLs and configuration files are located in INSTALLDIR.
- A Windows user running the CA XOsoft Manager requires Read-Write permission to the installation directory.

For more information on how to install the CA XOsoft Manager, see the *CA XOsoft Installation Guide*.



Upgrade CA XOsoft

Before upgrading to this release, please consider the following:

- Stop any running scenarios.
- You do not need to manually uninstall the previous version. The Installation process removes the prior version automatically.
- Copy old scenarios to the machine running this version of the CA XOsoft Management GUI. Once copied, you can import them into this version of CA XOsoft using the Scenario, Import menu selection. Scenarios may be located at:
  - UNIX: /opt/WANSync/bin/ws_scenarios
  - Windows: Program Files/XOsoft/bin/ws_scenarios

Uninstall CA XOsoft

The uninstall procedure is different for each operating system. Before uninstalling CA XOsoft you should stop all running scenarios and verify that there are no directories mounted by xofs.

To verify there are no directories mounted by xofs, make sure that the /etc/xofs_mnttab file is empty. If it is not empty, see *Unload xofs Drivers*.

Note: You may skip the verification process by simply rebooting your computer at the end of uninstall procedure.

Uninstall CA XOsoft from Red Hat and Novel SuSE Enterprise Linux

To uninstall CA XOsoft from Red Hat or SuSE

1. Become "superuser".
2. Make sure that all the replication scenarios have been stopped.
3. Issue the following command as root user: #rpm -e CAXOsoft

   CA XOsoft will be stopped; xofs driver will be unloaded from the memory.

Uninstall CA XOsoft from IBM AIX and SUN Solaris

To uninstall CA XOsoft from AIX and Solaris

1. Become "superuser".
2. Make sure that all the replication scenarios have been stopped.
3. Run the uninstall script: /opt/CAXOsoft/bin/uninstall.sh.

   You are prompted to confirm the uninstall procedure. For example: Uninstall CA XOsoft (y/n)
4. Type **y** and press **Enter**.
5. [Optional] Reboot.

Chapter 3: Managing a Scenario

This section describes how to create, start, and stop scenarios using the CA XOsoft Manager. You can also use CA XOsoft PowerShell to manage your scenarios. For more information on using CA XOsoft PowerShell to create a scenario, see the *CA XOsoft PowerShell Guide*.

Important! CA XOsoft is best suited for replicating data files. It is not recommended to replicate executable files and libraries using CA XOsoft since doing so can impact application performance. During scenario creation, you may exclude such files from replication. For more information, refer to the topic, Create a Scenario.

This section contains the following topics:

Create a Scenario (see page 16)
Start a Scenario (see page 24)
Stop a Scenario (see page 26)
UNIX/Linux Scenario Considerations (see page 26)

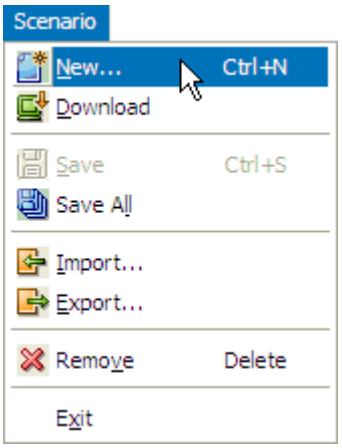
Create a Scenario

Protecting UNIX and Linux machines using CA XOsoft requires replication scenarios that identify the Master and Replica servers, as well as properties that controls scenario behavior. You can create File Server or Oracle scenarios, as needed. Auto-discovery is used to protect only one Oracle instance in one scenario. If more than one Oracle instance is to be protected in one scenario, use the File Server scenario type. Scenario creation is a wizard-based process and the steps for creating File Server and Oracle scenarios are quite similar. Where differences exist, they are clearly noted. For more detailed instructions, please reference the appropriate Operation Guide.

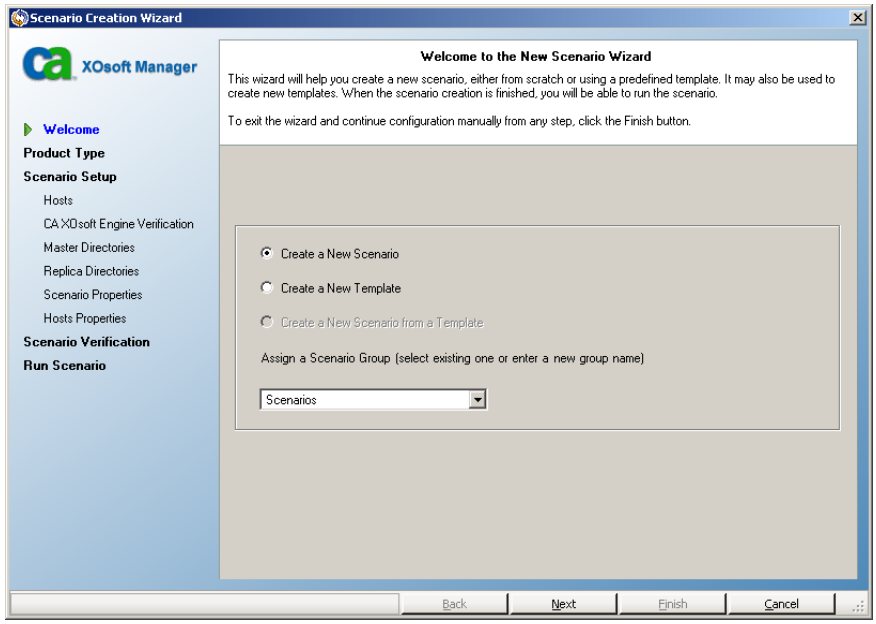
Use your web browser to connect to CA XOsoft using the Control Service, log onto the portal page and then run the Management GUI. If this is the first time you have run the GUI, it is installed automatically using ClickOnce™ technology. The following is the URL of the portal page:

http://<ControlServiceHost>:8088/entry_point.aspx

1. From the CA XOsoft Manager and select Scenario, New, or click the New Scenario button from the toolbar:

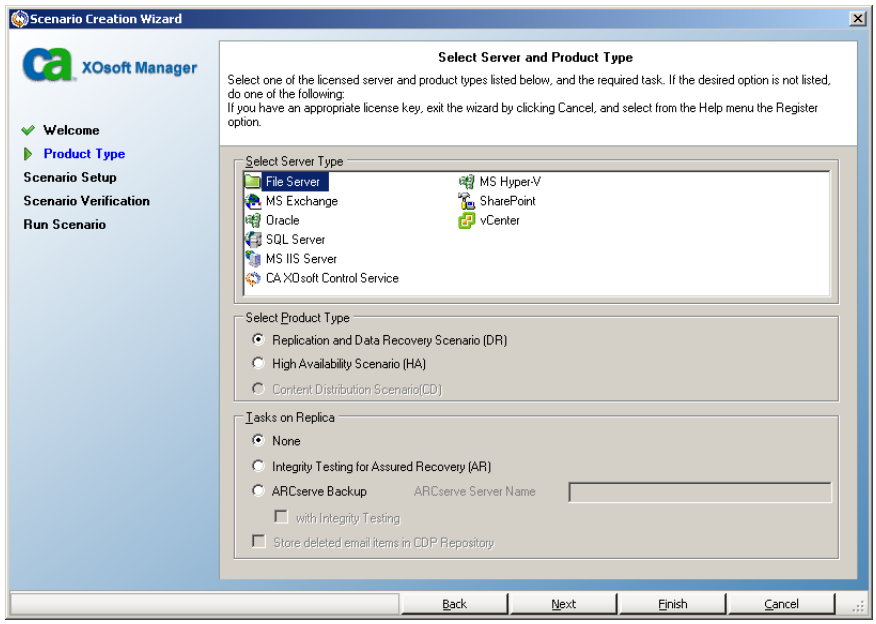


The New Scenario Wizard opens:



2. Select Create New Scenario, and click Next.

The Select Server and Product Type dialog opens:



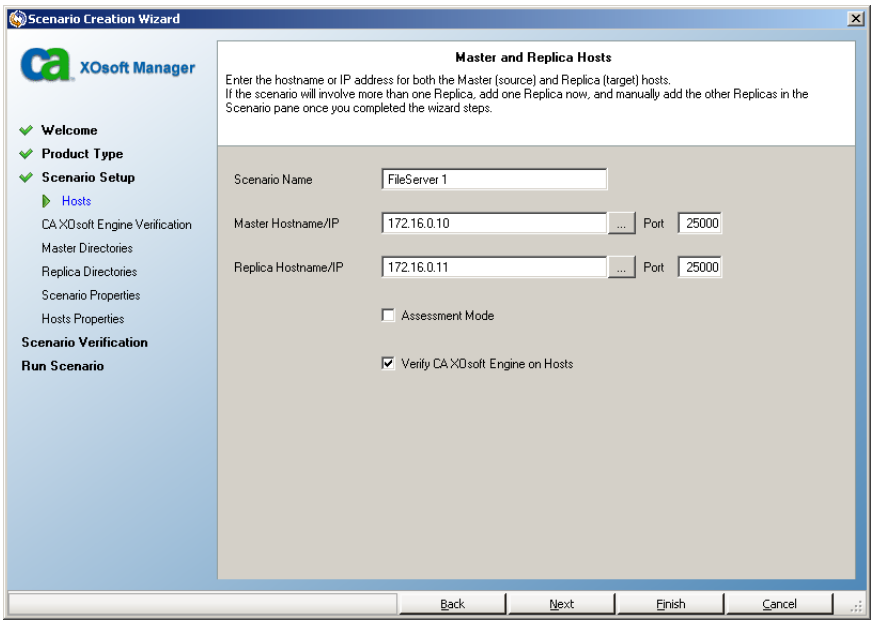
3. Select the required scenario options, as follows:

   a. From the Select Server Type list, select the type of scenario you want to create. For UNIX/Linux replication, only File Server and Oracle scenarios are supported.

   b. From the Select Product Type options, select Replication and Data Recovery Scenario (DR).

4. Click Next.

   The Master and Replica Hosts dialog opens:



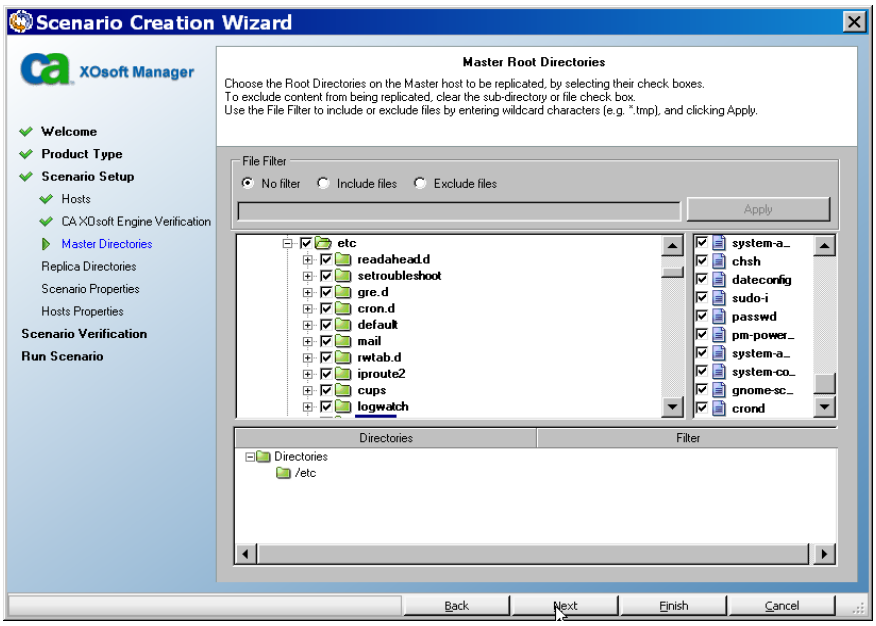
5. Enter the names or IPs of the Master and Replica servers you wish to protect, and click Next.

   The Engine Verification dialog opens. Wait while the Engine version status is verified. If the current version is outdated, CA XOsoft asks if you wish to update it now. You may install the latest version or continue. When verification is complete, click Next.

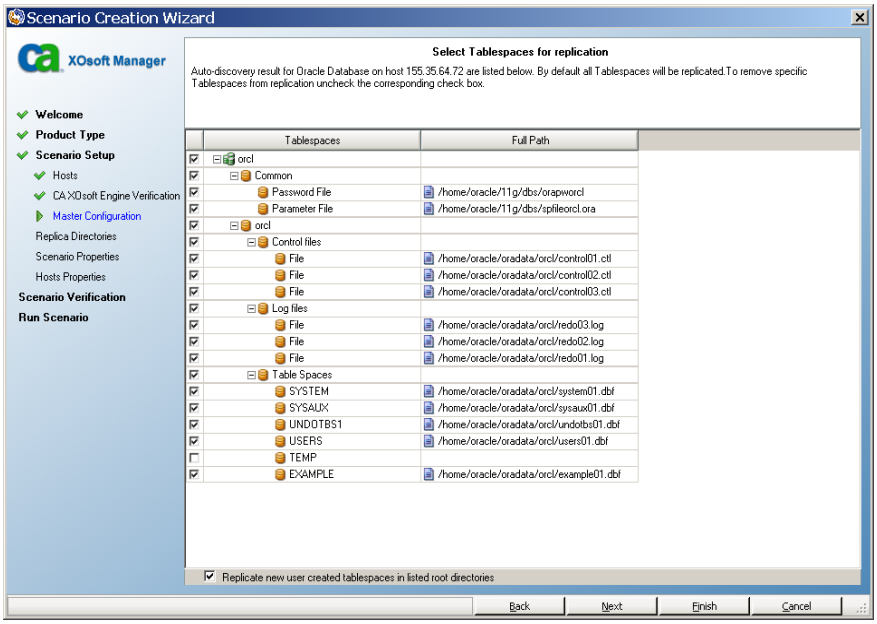
   Note: If the scenario type is Oracle, you are prompted for user credentials. You should enter credentials for an account with administrative privileges in the database so that CA XOsoft can query the Oracle configuration on the Master server.

6. Enter the Oracle instance name, Oracle DBA and user name/password now and click OK.

   – In **File Server** scenarios, the Master Root Directories dialog opens. Select the files and/or directories to be replicated from the Master, and click Next to continue to the Replica Root Directories screen.



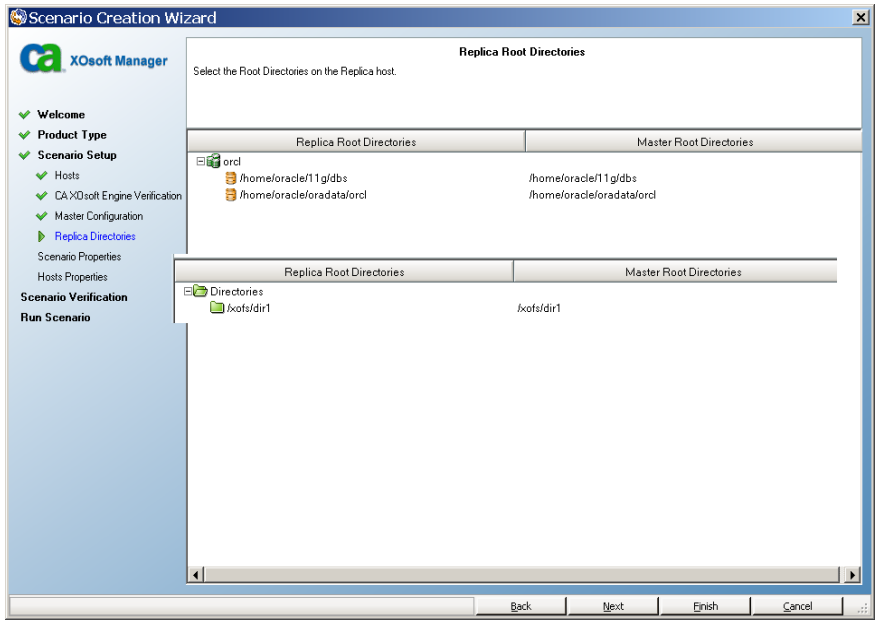
– In **Oracle** scenarios, the Select Tablespaces for Replication dialog opens in place of the Master Root Directories dialog. CA XOsoft provides a list of results auto-discovered on the Master server. Select or clear databases for replication, as desired and enable the option, Replicate new user-created files in listed root directories. Click Next to continue to the Replica Root Directories screen.



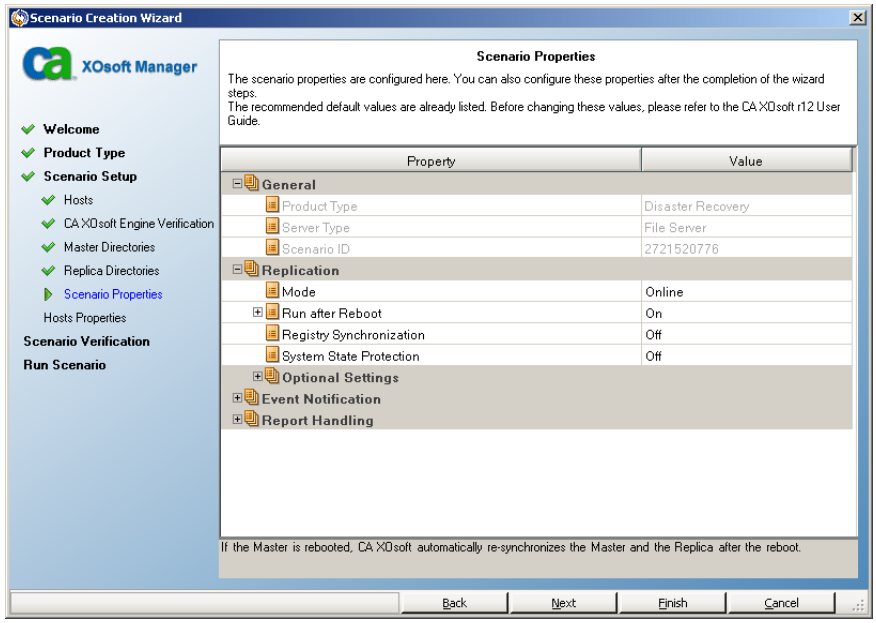
7. The Replica Root Directories dialog opens.

   Depending on the type of scenario you are creating, the Replica Root Directories dialog shows a list of directories for the Oracle database or File Server. Select the files and/or directories on the Replica in which the data to be replicated will be stored, and click Next.

   Note: If the same directory structure exists on the Replica server, the wizard automatically selects it as the directory to which to replicate.



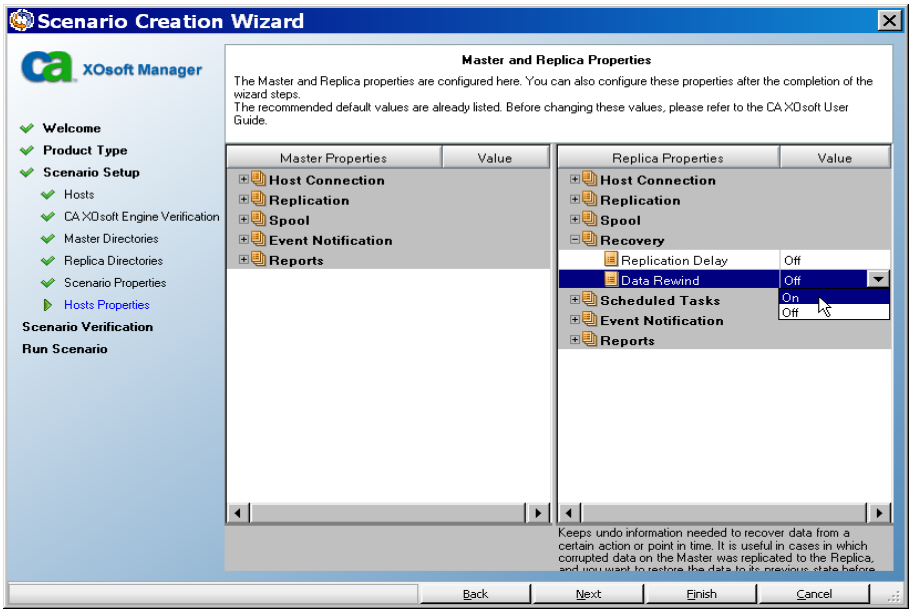
8. The Scenario Properties dialog opens:



The Scenario Properties dialog enables you to configure the Master and Replica properties. Typically, the default values are sufficient.

You can modify all the settings in this pane after the scenario is created. However, before changing any Spool properties (which are configured here), see the following *Spool Settings* information for configuration details.

9. The Master and Replica Properties dialog opens.



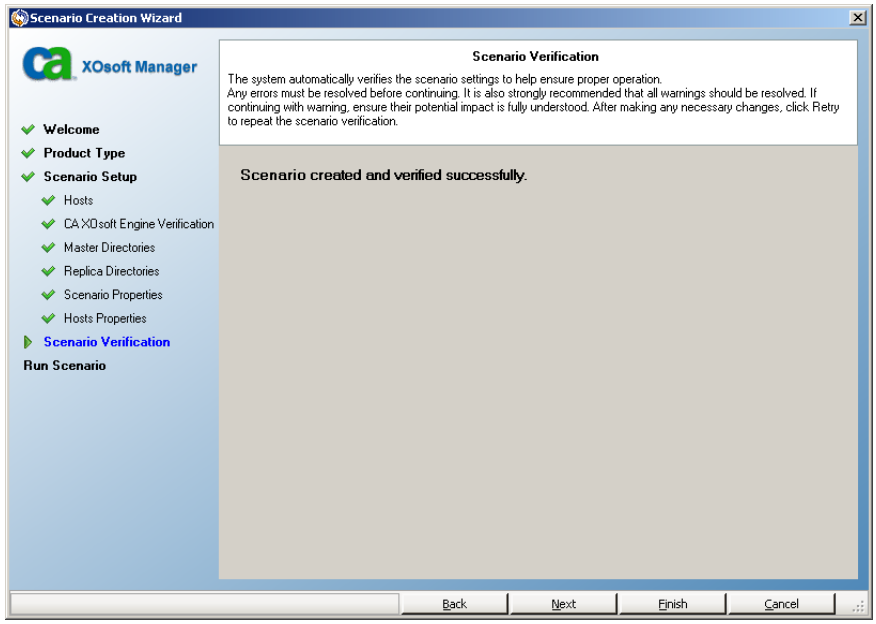
If you want to activate the Data rewind option, so you can later recover lost data from the Replica by using rewind points on the Replica Properties pane, set the Data rewind option to On. For more information on how to use Data Rewind, see the topic, Data Rewind.

Spool Settings

The CA XOsoft spool is a folder on disk where data to be replicated is temporarily stored (that is, spooled). The spool parameters, located in the properties tab (on both Master and Replica) or set with the New Scenario Wizard, determines how much disk space is available for the spool. In most cases the default values are sufficient. However, if you choose to change this value, it should be at least 10% of the total dataset size. See the CA XOsoft User Guide for more information.

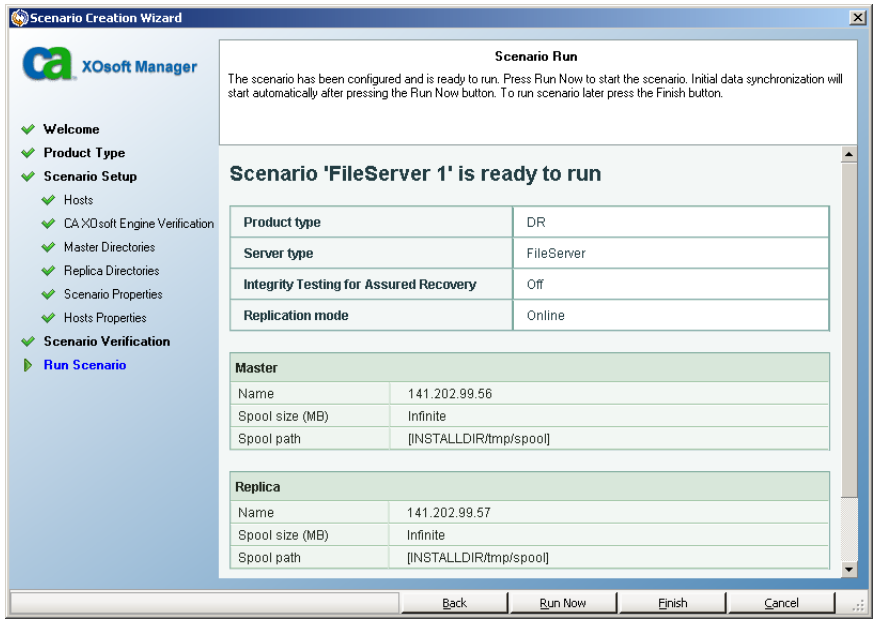
Once you are satisfied with the Master and Replica properties, click Next.

The Scenario Verification dialog opens:



10. After setting the properties, the wizard verifies the scenario configuration:
    - If errors appear, it's recommended to click Back, and correct the scenario settings.
    - If the scenario is verified successfully, click Next.

    The Scenario Run page is displayed:



11. After the scenario is verified, you are prompted to run it. Running the scenario starts the data synchronization process.
    - To finish the scenario creation and run it later, select Finish.
    - To run the scenario, click Run Now.

    The synchronization process starts.

Start a Scenario

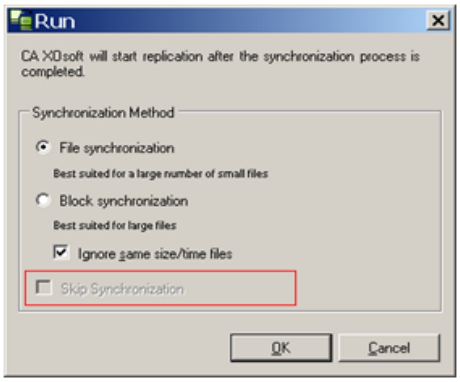
You can start a scenario using the CA XOsoft Manager.

To start a scenario

1. From the Scenario pane, select the scenario you want to run.
2. Click Run on the toolbar.

   A confirmation message appears prompting you to approve running the scenario.
3. Click OK.

   The Run dialog appears.

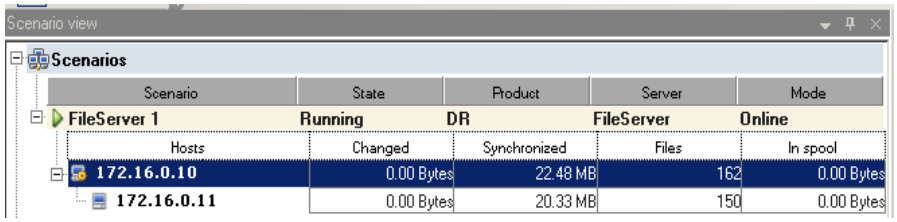


When you start UNIX-based scenarios, you cannot skip file synchronization.

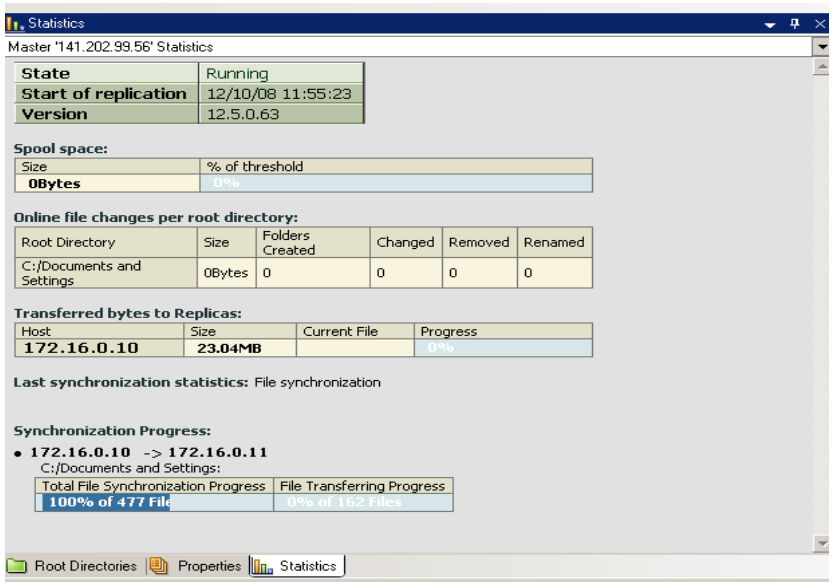
4. Choose File synchronization and click the OK.

   Note: If you are running a scenario for Oracle server, remove the check from the Ignore same size/time files check box and select Block Synchronization.

   The Manager now indicates that the scenario is running via the green play symbol to the left of the scenario:



   Once a scenario is running, a statistics tab appears (on the bottom of the far right pane):



   In addition, by default once synchronization occurs, a Report is generated.

Stop a Scenario

You can stop a scenario using the CA XOsoft Manager

To stop a scenario

1. To stop the scenario using the CA XOsoft Manager, click the Stop button on the tool bar.

   A confirmation message appears prompting you to approve stopping the scenario.

2. Click Yes.

   The scenario stops.

   Note: After stopping the scenario, you'll see that the Manager no longer shows the green play symbol to the left of the scenario and the statistics tab is no longer available.

UNIX/Linux Scenario Considerations

Consider the following when creating UNIX/Linux scenarios:

- A directory can be present in only one scenario
- For Network File Sharing (NFS), V4 is not supported. You should install the CA XOsoft Engine on the NFS server and make sure the exported directory resides the root directory.
- For Windows-to-UNIX replication, Windows ACLs are lost.
- For UNIX-to-Windows replication, UID, GUID and symbolic links are lost.
- File names on Windows are not case-sensitive, so conflicts are possible.

Chapter 4: Recovering Data

This chapter describes how to use the CA XOsoft Manager to recover data from a Replica to the Master, to set rewind bookmarks and to restore data to a previous valid state by rewinding it back in time.

When an event causes loss of Master data, the data can be restored from any Replica. The recovery process is in fact a synchronization process in the reverse direction - from a Replica to the Master.

CA XOsoft enables you to either recover all lost data from the Replica to the Master, or to recover data only from a certain action or point in time. The other option, called Rewind Data, is similar to an undo action. It is useful in cases in which corrupted data on the Master was replicated to the Replica, and you want to restore the data to its previous state before the corruption occurred. The rewind process is done using time-stamped check-points and user-defined bookmarks.

Note: This section demonstrates recovering data of a File Server. For more detailed instructions involving other applications, please reference the appropriate operations guide.

This section contains the following topics:

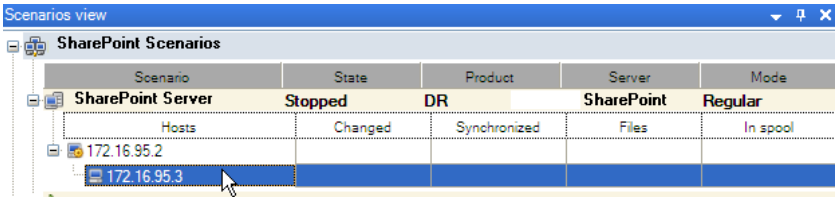
Recover Lost Data from Replica (see page 28)
Setting Bookmarks (see page 31)
Data Rewind (see page 32)

Recover Lost Data from Replica

Recover all lost data from a Replica

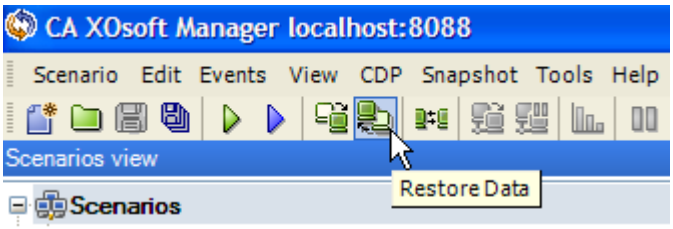
1. On the Manager, from the Scenario pane select the desired scenario and stop it.
2. [For database applications only] stop the database services on the Master host.
3. On the Manager, from the scenario folder select the Replica host:

   Note: If multiple Replica servers participate in the required scenario, select the Replica from which you want to recover data.

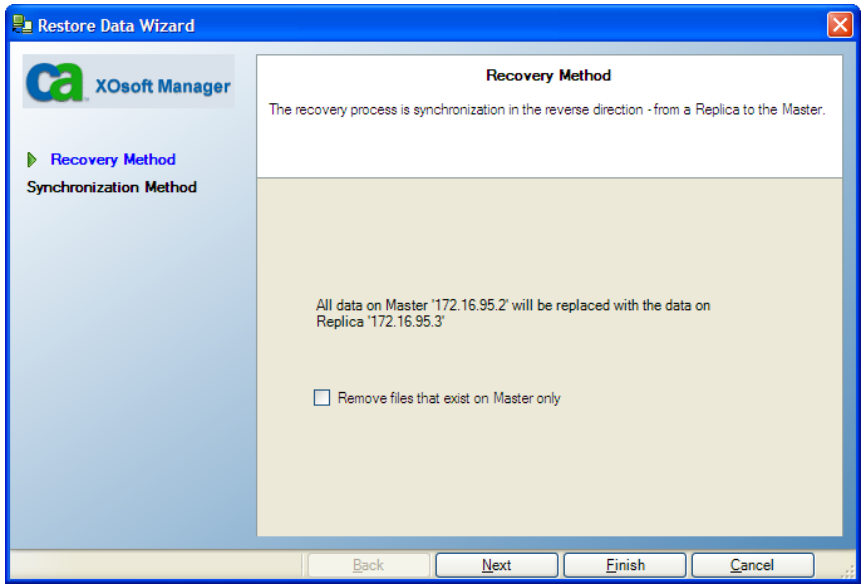


4. From the **Tools** menu, select **Restore Data**, or click the **Restore data** button on the Standard toolbar:

   Note: If the user credentials you used to log in to the Manager are different than the ones required for working with the Engine on the Replica, a **User credentials** dialog appears, asking you to enter log on account details for the selected Replica.

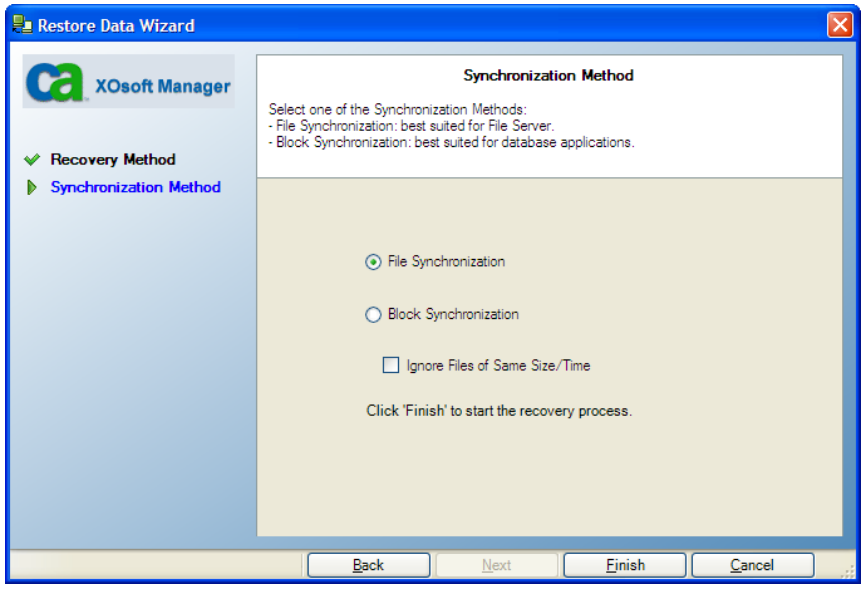


The **Recovery Method** page of the Restore Data wizard appears:



Note: If the Data Rewind property is set to On, another Restore Data dialog will appear. In this case, select the first option - **Replace all data on Master with the data on Replica**.

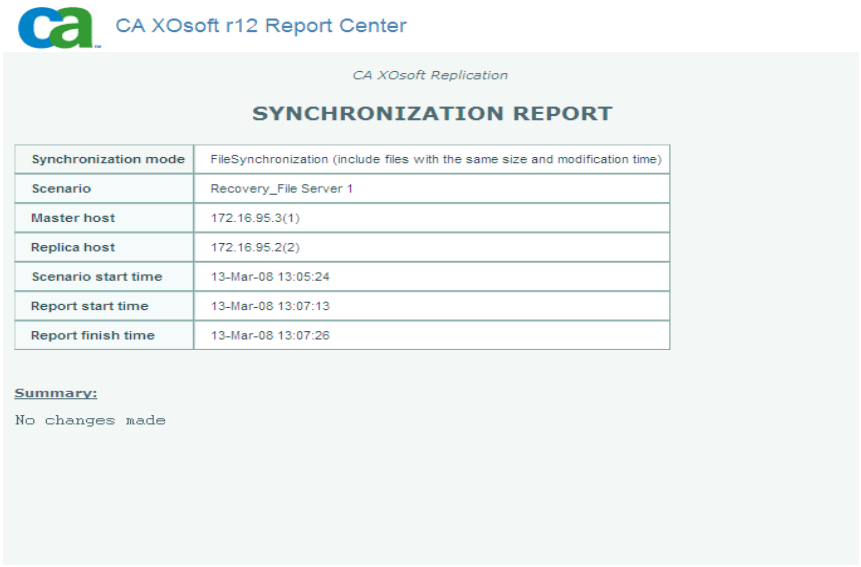
5. Click **Next**. The **Synchronization Method** page appears:



6. Make sure that the **File Synchronization** method is selected, and click **Finish.**

   Once you finished initiating the recovery process, CA XOsoft builds a temporary reverse tree using the selected Replica as the root, and the Master as the terminating node. After the Master recovery process ends, the temporary scenario is deleted, and you receive the following message in the Event pane: **Synchronization finished**.

7. By default, once a data recovery occurs a Synchronization Report is generated:



CA XOsoft r12 Report Center

CA XOsoft Replication

SYNCHRONIZATION REPORT

Synchronization mode	FileSynchronization (include files with the same size and modification time)
Scenario	Recovery_File Server 1
Master host	172.16.95.3(1)
Replica host	172.16.95.2(2)
Scenario start time	13-Mar-08 13:05:24
Report start time	13-Mar-08 13:07:13
Report finish time	13-Mar-08 13:07:26

Summary:

No changes made

   Now, the replication process can restart following the original scenario.

Setting Bookmarks

A *bookmark* is a checkpoint that is manually set to mark a state that you may want to rewind back to. We recommend setting a bookmark just before any activity that may cause data to become unstable. Bookmarks are set in real-time, and not for past events.

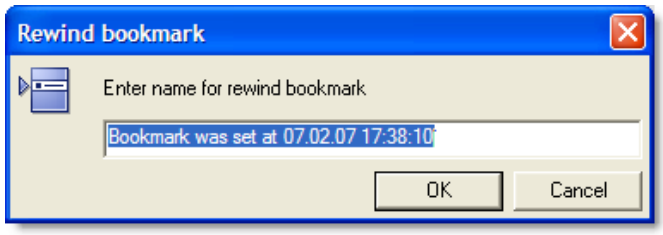
Notes:

- You can use this option only if you set in the Replica Properties list the **Recovery - Data Rewind** option to **On**.
- You cannot set bookmarks during the synchronization process.

To set a bookmark

1. When the required scenario is running, on the Scenario pane select the Replica host from which you want to rewind data.
2. From the **Tools** menu, select the **Set Rewind Bookmark** option.

   The **Rewind bookmark** dialog opens.

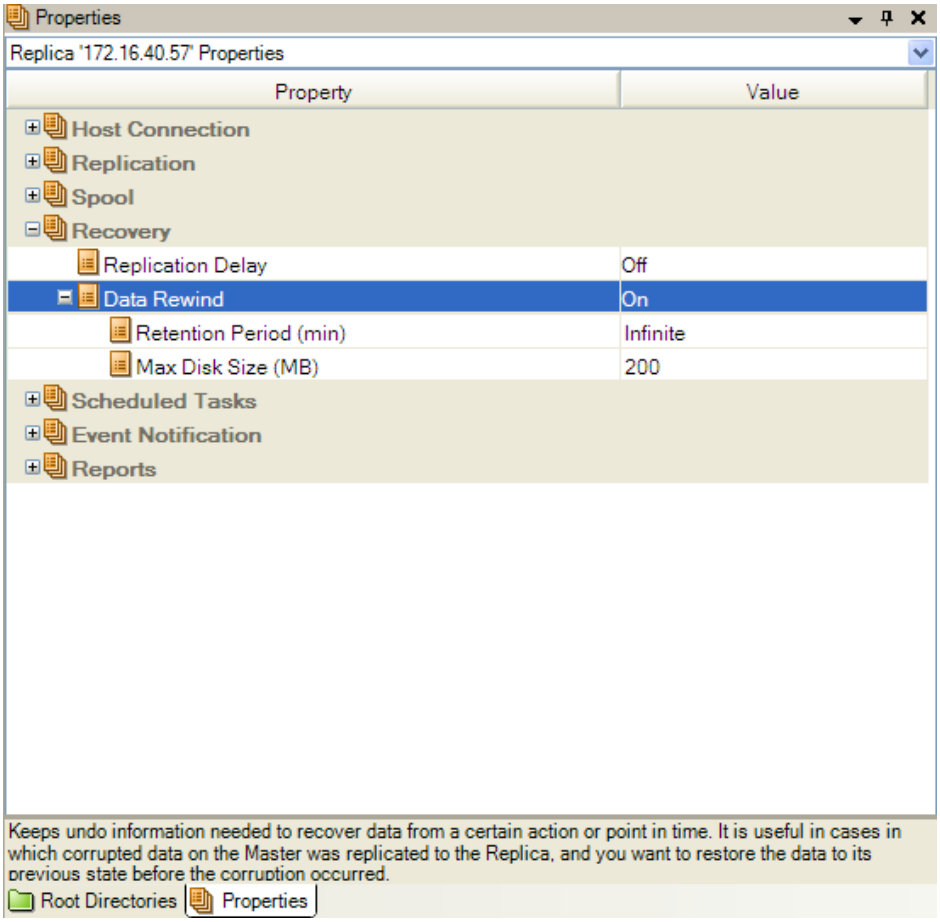
   The text that appears in the **Rewind bookmark** dialog will appear in the **Rewind Points Selection** dialog as the bookmark's name. The default name includes date and time.
3. Accept the default name, or enter a new name for the bookmark. It is recommended to give a meaningful name that will later help you recognize the required bookmark. Then, click **OK**.

   The bookmark is set.

Data Rewind

The Data Rewind recovery method allows you to rewind data to a point in time before it was corrupted. The rewind process takes place on the Replica server before the reverse synchronization process starts. The Data Rewind method uses rewind points or bookmarks that enable you to reset the current data back to a previous state.

You can use this option only if you set the **Recovery - Data Rewind** option to **On.**



If this option is set to Off, the system will not register data rewind points. For more information about Data Rewind parameters (Retention Period, Max Disk Size), see the *CA XOsoft User Guide*.

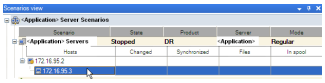
Important! The data rewind process operates in one way only - there is no replay forward. After rewind, all data subsequent to the rewind point will be lost, since data after the rewind point will be overwritten with new data.

Note: The automatic registration of the rewind points starts only after the synchronization process is completed, and the message **All modifications during synchronization period are replicated** appears on the Event pane. Similarly, you cannot manually set bookmarks during synchronization. In the following example, a File Server scenario is used, but the steps are the same for all scenario types.

To recover lost data using rewind points

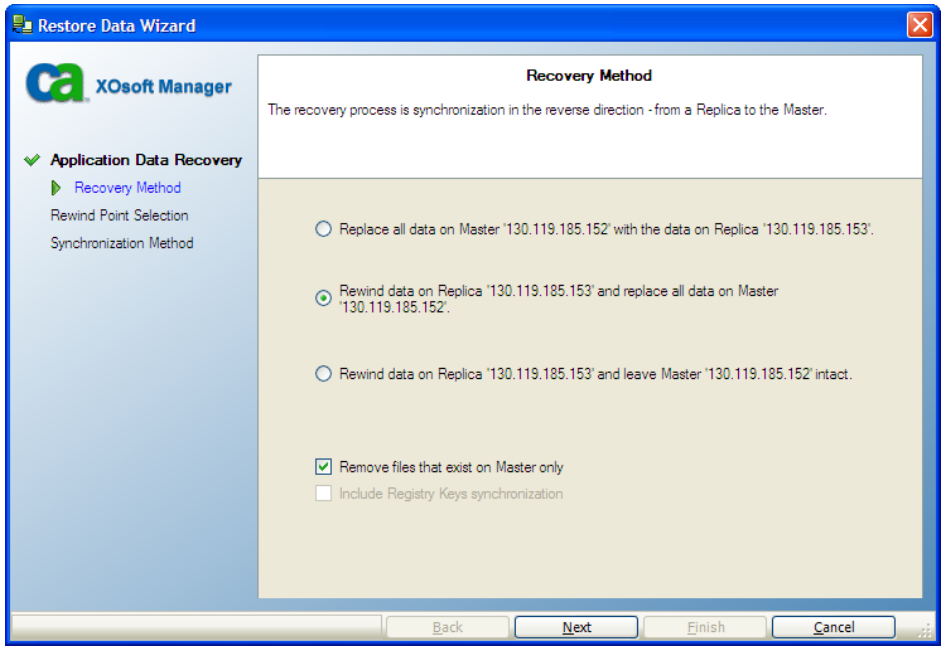
1. On the Manager, from the Scenario pane select the desired scenario and stop it.
2. [For database applications only] stop the database services on the Master host.
3. On the Manager, from the scenario folder select the Replica host:

   Note: If multiple Replica servers participate in the required scenario, select the Replica from which you want to recover data.



4. From the **Tools** menu, select **Restore Data**, or click the **Restore Data** button. If you are prompted for user credentials, enter the appropriate information and click OK.

   The **Recovery Method** page of the Restore Data Wizard opens.



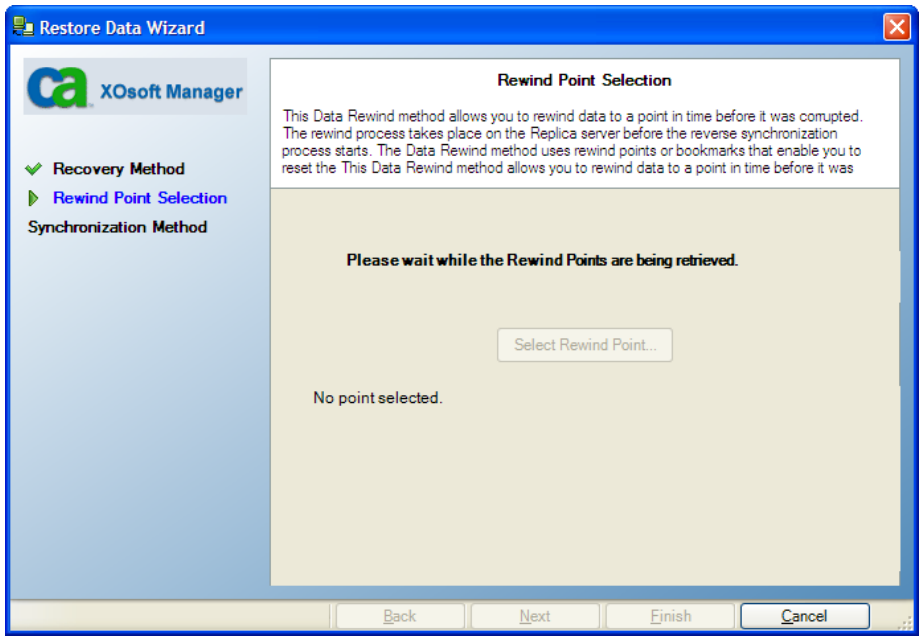
5. Select one of the Rewind data options, depending on whether you want the rewind data synchronized back to the Master (option 2) or left on the Replica only (option 3).

   Notes:

   - If the user credentials you used to log in to the Manager are different than the ones required for working with the Engine on the Replica, a **User credentials** dialog appears, asking you to enter log on account details for the selected Replica.
   - The **Include Registry Keys synchronization** checkbox is enabled, only if you activated this option before starting the scenario. If the checkbox is enabled, you can select it to include the synchronized Registry Keys in the recovery process.

   After you select a Rewind data option, a Recovery scenario is automatically created. This Recovery scenario will run until the end of the rewind process.

6. Click **Next**. The **Rewind Point Selection** page is displayed.



7. Wait until the **Select Rewind Point** button is enabled, and click it to view the existing rewind points.

The **Select Rewind Point** dialog opens.

The **Select Rewind Point** dialog displays a list of all rewind points appropriate to the application you are protecting. These include modifications of folders and files that were automatically registered by the system and user-defined bookmarks.

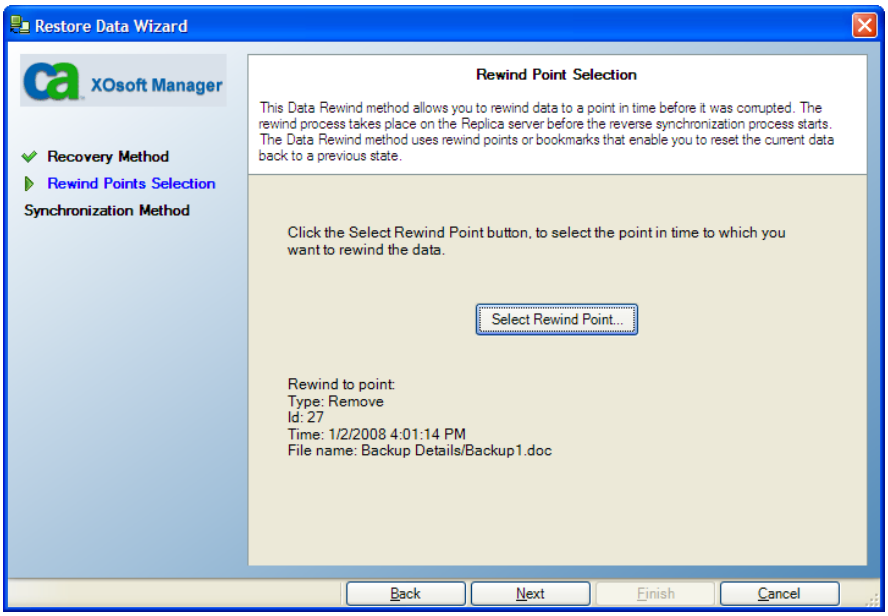
The list can be filtered according to the rewind point type or other criteria, using the **Filter Rewind Points** pane on the left.

Note: If the **Select Rewind Points** dialog is empty, make sure that the **Data Rewind** property is enabled.

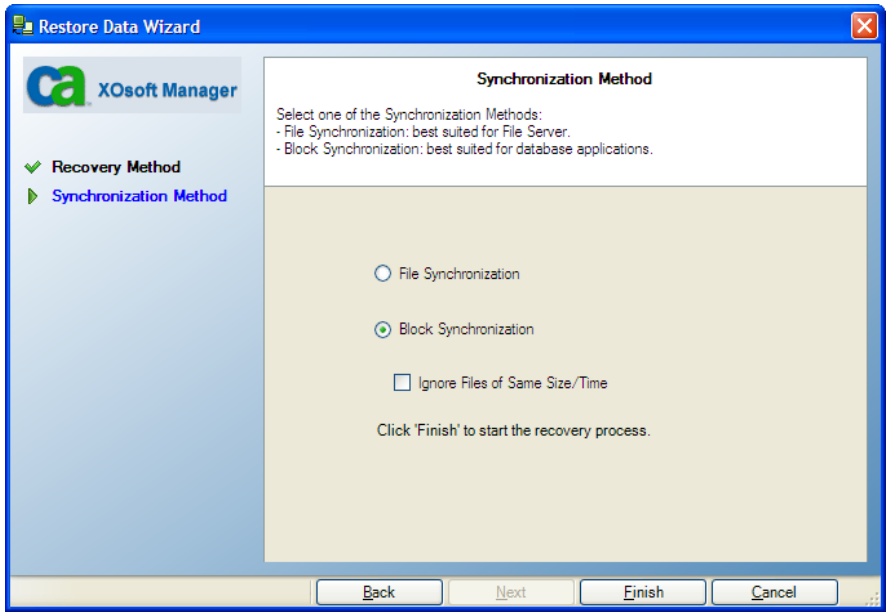
8. Select the required rewind point, and click **OK.**

Note: If you want to use a Bookmark as the rewind point, it is best practice to select the closest rewind point that indicates an actual event.

You return to the **Rewind Point Selection** page, now displaying information about the rewind point you selected.



9. Click **Next**. The **Synchronization Method** page is displayed.



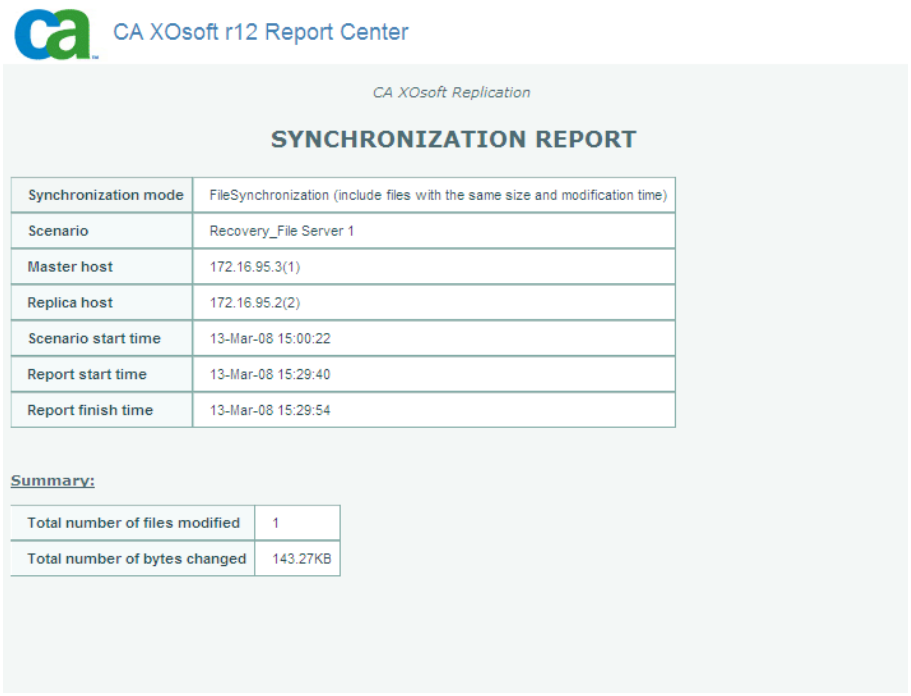
10. Select the **Block Synchronization** method and click **Finish**.

    Note: If the user credentials you used to log in to the Manager are different than the ones required for working with the Engine on the Replica, a **User credentials** dialog appears, asking you to enter log on account details for the selected Replica.

    CA XOsoft rewinds the data to the point you selected. After the rewind process ends, you receive the following message in the Event pane: **Rewind process is completed successfully**.

    If you chose to replace the data on the Master with the data on the Replica, CA XOsoft starts a synchronization process from the Replica to the Master. Once the process ends, the temporary Recovery scenario is stopped and then deleted.

11. By default, once a data recovery occurs a Synchronization Report is generated.



CA XOsoft r12 Report Center

CA XOsoft Replication

SYNCHRONIZATION REPORT

Synchronization mode	FileSynchronization (include files with the same size and modification time)
Scenario	Recovery_File Server 1
Master host	172.16.95.3(1)
Replica host	172.16.95.2(2)
Scenario start time	13-Mar-08 15:00:22
Report start time	13-Mar-08 15:29:40
Report finish time	13-Mar-08 15:29:54

Summary:

Total number of files modified	1
Total number of bytes changed	143.27KB

Now, the Replication process can restart on the original scenario.

Appendix A: Installed CA XOsoft Files

During the CA XOsoft installation, different files are installed for different operating systems, as described in the following sections.

This section contains the following topics:

Files Installed on Red Hat and Novell SuSE Enterprise Linux (see page 39)
Files Installed on IBM AIX (see page 40)
Files Installed on Solaris (see page 41)

Files Installed on Red Hat and Novell SuSE Enterprise Linux

On Linux platforms, the following files are installed:

Installed File	Description
/opt/CAXOsoft/bin/ws_rep	CA XOsoft Engine operates in user mode as a daemon. Its primary responsibility is to collaborate with the xofs kernel module (filtering file system), in order to track file system changes and to propagate these changes according to the replication scenario.
/opt/CAXOsoft/kernel/fs/xofs.*	A proprietary file system - xofs. Implemented in the form of a loadable kernel module. The primary purpose of xofs is to track file system changes and to notify the Engine of these changes. Loaded during system start up (through /etc/init.d/CA XOsoft). Note: .up is for uniprocessor while smp is for symmetric multiprocessor.
/etc/init.d/CAXOsoft	Startup script used to start up and shut down CA XOsoft Engine.
/etc/pam.d/ws_rep	Needed by CA XOsoft in order to authenticate management connections from the GUI.

Installed File	Description
/opt/CAXOsoft/README	Release notes for the product.

/opt/CAXOsoft/bin/ws_rep.cfg	CA XOsoft configuration file.

RHEL3 is not supported in this release of CA XOsoft.

Files Installed on IBM AIX

On AIX platforms, the following files are installed:

Installed File	Description
/opt/CAXOsoft/bin/ws_rep	CA XOsoft Engine operates in user mode as a daemon. Its primary responsibility is to collaborate with the xofs kernel module (filtering file system) in order to track file system changes and to propagate these changes according to the replication scenario.
/opt/CAXOsoft/bin/xofs.ext	A proprietary file system - xofs. Implemented in the form of a loadable kernel extension. The primary purpose of xofs is to track file system changes and to notify the Engine of these changes. Loaded during system start up (through /opt/CAXOsoft/bin/CAXOsoft.rc).
/opt/CAXOsoft/bin/xoctl	CA XOsoft's auxiliary utility (file system helper). Preloads xofs during system start-up.
/opt/CAXOsoft/bin/xoumount	CA XOsoft's auxiliary utility (umounts xofs). Analog of standard umount command line utility. (In current release standard umount command will not work for xofs.)
/opt/CAXOsoft/bin/CAXOsoft.rc	Startup script used to start and shut down CA XOsoft Engine.
/opt/CAXOsoft/bin/uninstall.sh	Uninstalls CA XOsoft software.

Files Installed on Solaris

On Solaris platforms, the following files are installed:

Installed File	Description
/opt/CAXOsoft/bin/ws_rep	CA XOsoft Engine operates in user mode as a daemon. Its primary responsibility is to collaborate with the xofs kernel module (filtering file system) in order to track file system changes and to propagate these changes according to the replication scenario.
/usr/kernel/fs/xofs and /usr/kernel/fs/sparcv9/xofs	A proprietary file system - xofs. Implemented in the form of a loadable kernel module. The primary purpose of xofs is to track file system changes and to notify the Engine of these changes. Loaded on demand during replication scenario start up.
/opt/CAXOsoft/bin/uninstall.sh	Uninstalls CA XOsoft software.
/opt/CAXOsoft/bin/configure.sh (zones)	Configures ws_rep in non-global zones

Appendix B: Troubleshooting

The following information is provided to help you troubleshoot CA XOsoft scenarios for UNIX/Linux:

- This version of CA XOsoft provides an "uninject" feature that allows xofs to unload automatically, even when there are some open files during a scenario stop operation.

This section contains the following topics:

Unload xofs Drivers (see page 43)

Unload xofs Drivers

If during the uninstall procedure some of the directories were inadvertently left under xofs control (for example, the scenario was running and the directory was mounted by xofs), the uninstall procedure will not be able to unload the xofs driver from your system.

In this case, you may simply reboot the computer or unload xofs driver manually

To unload xofs drivers

1. Check if there are any xofs mount points:
   #cat /etc/xofs_mnttab
2. Stop all the processes that hold your directory. Use fuser command to discover processes that have open files in your directory.
   For example:
   - #fuser -c <dir_from_xofs_mnttab> (AIX & Solaris)
   - #fuser -u <dir_from_xofs_mnttab> (Linux)

3. Use umount command for the directory discovered in step 1.
   For example:

   #umount <dir_from_xofs_mnttab>

4. Check that no process is using xofs driver and manually unload it.
   On each platform follow the appropriate instructions:

   On Linux:

   – Use /sbin/lsmod to verify that the reference counter of xofs driver is 0.

     Run the following command:
     /sbin/lsmod|grep xofs

   – Use /sbin/rmmod to manually unload xofs driver.

   – Run the following command:
     /sbin/rmmod xofs.

   On Solaris:

   – Use *modinfo* to check whether the driver is loaded into memory.

     Run the following command:
     modinfo|grep xofs

   – Use *modunload* to manually unload xofs driver.

     Run the following command:
     modunload -i <xofs ID>

   On AIX:

   – To check whether xofs is loaded into kernel, Run as root the following command:
     echo lke | kdb| grep xofs

   – To unload xofs driver run as root the following command:
     /opt/CAXOsoft/bin/xoctl u /opt/CAXOsoft/bin/xofs.ext

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