



# Sun™ Mainframe Transaction Processing Software High Availability Data Service for Sun Cluster

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Release 1.0

Sun Microsystems, Inc.  
[www.sun.com](http://www.sun.com)

Part No. 817-3504-10  
August 2003, Revision A

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# Preface

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This document describes how to install and configure the Sun™ Mainframe Transaction Processing (Sun MTP) software HA data service for Sun Cluster.

This document is intended for system administrators with extensive knowledge of Sun hardware and software. Do not use this document as a planning or presales guide. Before reading this document, you should have already determined your system requirements and purchased the appropriate equipment and software.

Knowledge of Sun Cluster architecture, data services, Sun MTP software, and the Solaris™ operating environment is required. Expertise with the volume manager software used with Sun Cluster is also required. Refer to the Sun Cluster documentation for detailed information.

---

## Using UNIX Commands

This document contains information on commands specific to installing and configuring Sun Cluster data services. It might not contain information about basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See the following for this information:

- Software documentation that you received with your system
- Solaris™ operating environment documentation, which is at <http://docs.sun.com>

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# Typographic Conventions

Typeface*	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
<b>AaBbCc123</b>	What you type, when contrasted with on-screen computer output	% <b>su</b> Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this. To delete a file, type <code>rm filename</code> .

\* The settings on your browser might differ from these settings.

---

## Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

---

## Related Documentation

Application	Title	Part Number
Sun MTP software	<i>Sun Mainframe Transaction Processing Software Administrator's Guide</i>	816-5327-10
	<i>Sun Mainframe Transaction Processing Software Configuration Guide</i>	816-5328-10
	<i>Sun Mainframe Transaction Processing Software Developer's Guide</i>	816-5329-10
	<i>Sun Mainframe Transaction Processing Software Installation Guide</i>	816-5330-10
	<i>Sun Mainframe Transaction Processing Software Message Guide</i>	816-5331-10
	<i>Sun Mainframe Transaction Processing Software Reference Guide</i>	816-5334-10
	<i>Sun Mainframe Transaction Processing Software Release Notes</i>	816-5335-11
	<i>Sun Mainframe Transaction Processing Software Troubleshooting and Tuning Guide</i>	816-5333-10
Sun Cluster	<i>Sun Cluster 3.1 Concepts Guide</i>	816-3383
	<i>Sun Cluster 3.1 Data Service Planning and Administration Guide</i>	817-1526
	<i>Sun Cluster 3.1 Error Messages Guide</i>	816-3382
	<i>Sun Cluster 3.1 Reference Manual</i>	816-5251
	<i>Sun Cluster 3.1 Release Notes</i>	816-5317
	<i>Sun Cluster 3.1 Release Notes Supplement</i>	816-3381
	<i>Sun Cluster 3.1 Software Installation Guide</i>	816-3388
	<i>Sun Cluster 3.1 System Administration Guide</i>	816-3384

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# Help

If you have problems installing or using Sun cluster, contact your your authorized service provider and provide the following information:

- You name and email address (if available)
- Your company name, address, and phone number
- The model and serial numbers of your systems
- The release number of the operating system (for example, Solaris 9)
- The release number of Sun Cluster (for example, Sun Cluster 3.1)

Use the following commands to gather information about each node on your system for your service provider.

Command	Function
<code>prtconf -v</code>	Displays the size of the system memory and reports information about peripheral devices.
<code>psrinfo -v</code>	Displays information about processors.
<code>showrev -p</code>	Reports which patches are installed.
<code>prtdiag -v</code>	Displays system diagnostic information.
<code>scinstall -pv</code>	Displays Sun Cluster release and package version information.

Also have available the contents of the `/var/adm/messages` file.

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*Sun Mainframe Transaction Processing Software High Availability Data Service for Sun Cluster*, part number 817-3504-10

# Installing and Configuring the Sun MTP HA Data Service

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This document provides instructions for setting up and administering the Sun MTP high availability (HA) *data service* on your Sun Cluster nodes. It contains the following topics:

- [“Sun MTP HA Data Service Overview” on page 2](#)
- [“Task Map: Installing and Configuring the Sun MTP HA Data Service” on page 3](#)
- [“Planning the Sun MTP HA Data Service Installation and Configuration” on page 4](#)
- [“Upgrading the Sun MTP HA Data Service” on page 7](#)
- [“Preparing to Install the Sun MTP HA Data Service” on page 8](#)
- [“Installing Sun MTP” on page 11](#)
- [“Installing the Sun MTP HA Data Service” on page 11](#)
- [“Registering and Configuring the Sun MTP HA Data Service” on page 12](#)
- [“Configuration Example” on page 15](#)
- [“Verifying the Installation and Configuration” on page 16](#)
- [“Understanding the Sun MTP HA Data Service Fault Monitor” on page 17](#)
- [“Configuring the Sun MTP HA Data Service Extension Properties” on page 19](#)
- [“Using Sun MTP as a Sun Cluster Resource” on page 22](#)
- [“Configuring the COBOL Animator” on page 23](#)
- [“Troubleshooting” on page 24](#)

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# Sun MTP HA Data Service Overview

The Sun MTP HA data service works with the Sun Cluster hardware and software to make one or more Sun MTP regions highly available.

A Sun Cluster system can host multiple Sun MTP HA data service instances distributed across the entire cluster. Even when the same node hosts several instances, each instance uses only the resources available on that node.

The Sun MTP data service starts, stops, restarts, and fails over the Sun MTP application among the nodes of the cluster in response to cluster events, such as administrative actions, application failures, or cluster node failure.

The Sun MTP application restart is managed by the Sun Cluster *resource group manager (RGM)*.

If the Sun MTP application deaths exceed the failure count within the failure time window, the *resource group* containing the Sun MTP application is automatically failed over to another cluster node.

The fault monitor is provided using the probe method.

The Sun MTP data service provides:

- The Sun MTP *resource type registration (RTR) file* that defines the static standard and extended properties.
- The start callback method invoked by the RGM to start the Sun MTP application when the resource group containing the Sun MTP application is brought online, or the resource is enabled.
- The stop callback method invoked by the RGM to stop the Sun MTP application when the resource group containing the Sun MTP application goes offline, or the resource is disabled.
- The fault monitor to check the reliability of the data service by verifying that the Sun MTP application is running properly.
- The validate callback method invoked by the RGM to validate that the Sun MTP base directory is accessible to the Sun MTP data service.
- The update callback method invoked by the RGM to restart the fault monitor when the system changes the values of the resource property.

For general information about data services, resource groups, resources, and other related topics, refer to the *Sun Cluster 3.1 Concepts* document.

# Task Map: Installing and Configuring the Sun MTP HA Data Service

**TABLE 1** lists the tasks for installing and configuring Sun MTP HA data service. Perform these tasks in the order that they are listed.

**TABLE 1** Task Map: Installing and Configuring Sun MTP HA Data Service

Task	For Instructions, Go To
Plan the installation	Chapter 1 of <i>Sun Cluster 3.1 Data Service Planning and Administration Guide</i>  <a href="#">“Planning the Sun MTP HA Data Service Installation and Configuration” on page 4</a>
Upgrade Sun MTP HA data service	<a href="#">“Upgrading the Sun MTP HA Data Service” on page 7</a>
Prepare to install the Sun MTP HA data service	<a href="#">“Preparing to Install the Sun MTP HA Data Service” on page 8</a>
Install Sun MTP	<a href="#">“Installing Sun MTP” on page 11</a>
Install Sun MTP HA data service package	<a href="#">“Installing the Sun MTP HA Data Service” on page 11</a>
Register and configure Sun MTP HA data service as a failover data service	<a href="#">“Registering and Configuring the Sun MTP HA Data Service” on page 12</a>
Verify Sun MTP HA data service Installation and configuration	<a href="#">“Verifying the Installation and Configuration” on page 16</a>
Understand Sun MTP HA data service fault monitor	<a href="#">“Understanding the Sun MTP HA Data Service Fault Monitor” on page 17</a>

---

# Planning the Sun MTP HA Data Service Installation and Configuration

This section contains the information you need to plan your Sun MTP HA data service installation and configuration.

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**Note** – Check the SunSolve<sup>SM</sup> web site at <http://sunsolve.sun.com> on a regular basis for any patches that are available, and apply the recommended patches.

---

## Configuration Requirements

To use this version of the Sun MTP HA data service, your environment must have the following:

- A hardware configuration that can support high availability
- The Solaris operating system, release 9. The same release level must be installed on the primary and failover nodes.
- Sun Cluster, minimum release of 3.1
- Sun MTP, minimum release of 8.0.0 patch level of 5. The same release level must be installed on the primary and failover nodes.
- Sun MTP HA data service, release 1.0 patch level of 1. The same release level must be installed on the primary and failover nodes.
- `SUNW.HAStoragePlus` file service

## Configuration Considerations

This section describes the configuration components that have been qualified with this release. It also lists components and packages that will be qualified in a future release, and components or functionality that are not supported.



## Currently Qualified

The Sun MTP HA data service has been qualified with the following components and functionality:

- Sun MTP VSAM
- COBOL runtime environment with Server Express 2.1 or later
- Standard Sun MTP file recovery method
- TN3270 client connections using the `unikixtnemux` server
- Socket client connections
- The Sun MTP HA data service is independent of any volume manager. This release of the data service has been qualified with VERITAS Volume Manager (version 3.5) with VERITAS file system (version 3.5)

## Not Yet Qualified

The following components and functionality have not yet been qualified:

- Relational database management systems (RDBMS)
- Intersystem communications (ISC) over TCP/IP
- PL/I, C/C++, and Java application environments
- ECI/EPI clients over TCP/IP
- Secure socket layer (SSL) client connections
- WebSphere MQ clients

The following Sun mainframe rehosting software components will be qualified when there are highly available versions:

- Sun Mainframe Batch Manager (Sun MBM)
- Sun Mainframe Security Facility (Sun MSF)
- Sun Mainframe Administration Tool (Sun MAT)

## Not Supported

The following functionality is not supported:

- SNA connections, both ISC and client
- Raw file systems (Native Recovery File System)
- TN3270 client connections using the deprecated `unikixtne` server

# Usage Considerations

Your data service configuration might not be supported if you do not observe these guidelines.

- The Sun MTP HA data service can only be configured as a failover service. It cannot operate as a scalable service.
- Configure the HASToragePlus file service to protect data from being inadvertently used by other nodes.
- All nodes in the cluster must be configured with the same national language support (NLS).
- Install the Sun MTP binaries (\$UNIXIX) on the local file system of each node, as currently qualified.
- All Sun MTP resources (data files, configuration files, programs, and so on), including those that are accessed by Sun MTP customized user exit routines, must be located on the HASToragePlus file service. This includes the following directories: \$KIXSYS, \$KIXPROGS, \$KIXMAPS, and \$KIXDATA or its equivalent.
- The region setup file can be located on the HASToragePlus file service or on a local node. See [“Updating the Sun MTP Setup File” on page 9](#) for information about the advantages and disadvantages of each option.
- The Sun MTP regions must be configured with recovery, otherwise failover operations will have unpredictable results.
- If your environment uses COBOL, you must install and license it on each local node. Contact your COBOL vendor for licensing requirements.
- Install all third-party software on each node of the cluster in the same directory structure. Make sure the software version is the same on each node.
- Sun MTP contains utilities and scripts that specifically support the HA environment. Do not modify any of these scripts or utilities, or those shipped with the HA data service, unless you are specifically instructed to do so by your authorized service provider. Otherwise, the changed scripts will not be supported.
- If Sun MTP fails over during a session where you have dynamically defined or modified resources (using the CEDA or CEMT transactions), the dynamic changes will be lost. When the system starts on the failover node, it uses the original resource configuration.
- If you are using the Micro Focus COBOL Animator, see [“Configuring the COBOL Animator” on page 23](#) for configuration information.

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**Note** – For restrictions that apply to all data services, refer to the *Sun Cluster Release Notes*.

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# Upgrading the Sun MTP HA Data Service

## ▼ To Install an Update of the Sun MTP Data Service

1. Log in to the system as the superuser.
2. Disable and remove all Sun MTP resources on the entire cluster.

Type the following commands for each resource, using the names you gave to your resources when you originally configured them:

```
# scswitch -n -j MTP-resource-name  
# scrgadm -r -j MTP-resource-name
```

3. Remove the Sun MTP HA data service.

```
# scrgadm -r -t SUNW.scmtp
```

4. Remove the SUNWscmtp package from each node of the cluster.

```
# pkgrm SUNWscmtp
```

5. Install the new SUNWscmtp package.

See [“Installing the Sun MTP HA Data Service” on page 11](#).

---

# Preparing to Install the Sun MTP HA Data Service

This section describes the tasks you must perform before you install and configure the Sun MTP HA data service.

- Install the Solaris operating system and the Sun Cluster software.
- Set up *IPMP* and the *network adapter failover (NAFO)* groups.
- Install Sun MTP on each node of the cluster.
- Validate the operation of Sun MTP on each node of the cluster. For example, manually start the region, execute a variety of transactions, and shut down the region.

## Setting Up the Sun MTP Administrator

Contact your system administrator to create the Sun MTP administrator (using the `useradd` command), if one does not already exist. This user is specified in the `EMP_ADMIN` property when the data service is registered. See [“Registering and Configuring the Sun MTP HA Data Service” on page 12](#).

## Updating NIS/NIS+ Configuration File

Because the Sun MTP HA data service uses the `su EMP_ADMIN` command when starting and stopping the Sun MTP system, the `su(1M)` command must not refer to the network information name service (NIS/NIS+). This is because NIS/NIS+ might not be available because of a failure of the public network on the cluster node, and it is, therefore, a potential single point of failure for a Sun Cluster system.

The following entries in the `/etc/nsswitch.conf` configuration file removes the dependency for contacting an NIS/NIS+ master server over public network adapters. However, the functionality these fields provide will not be available from the NIS server. Adding the entries ensures that the `su` command does not refer to the NIS/NIS+ name services if the network information name service is unavailable.

```
passwd: files [NOTFOUND=return] nis
group: files [NOTFOUND=return] nis
publickey: files [NOTFOUND=return] nis
project: files [NOTFOUND=return] nis
```

# Updating the Sun MTP Setup File

This section describes how to update the region setup file to include the appropriate startup options. It also provides information about where to maintain the region setup file in the Sun Cluster environment.

## Setting the Startup Options

To ensure that the Sun MTP region is restarted with the appropriate `unikixmain` (`kixstart`) options, add the `HA_MTP_START_OPTS` environment variable to your region's setup file. This setup file is specified in the `EMP_SETUP` property when the data service is registered. See [“Registering and Configuring the Sun MTP HA Data Service” on page 12](#).

The following example setup file shows the `HA_MTP_START_OPTS` environment variable as the last line in the file. The value of this variable is a list of `unikixmain` options you would normally use to start the region. The value must be enclosed in double quotes.

```
UNIKIX=/pkgs/mtp/MTP8.0.0;export UNIKIX
COBDIR=/opt/cobol/2.10;export COBDIR
COBCPY=$COBDIR/cpylib:$UNIKIX/copy;export COBCPY
LD_LIBRARY_PATH=$COBDIR/lib:$UNIKIX/lib;export LD_LIBRARY_PATH
PATH=$UNIKIX/local/bin:$UNIKIX/bin:$COBDIR/bin:$PATH:/usr/openwin/bin;export
PATH
KIXSYS=/mtp_data/appl2/sys;export KIXSYS
SPOOLER=$KIXSYS/SPOOLER;export SPOOLER
KIXPROGS=/mtp_data/appl2/cobol/online;export KIXPROGS
KIXMAPS=/mtp_data/appl2/maps;export KIXMAPS
KIXDATA=/mtp_data/appl2/data/vsam;export KIXDATA
KIXLICDIR=/licenses/8.0;export KIXLICDIR
ulimit -n 512
HA_MTP_START_OPTS="-S 4m -j 300 -N 20 -p 8001";export HA_MTP_START_OPTS
```



---

**Caution** – Make sure to include `$PATH` in the `PATH` statement so that the inherited Sun Cluster environment is not overridden.

---

## Selecting a Location for the Setup File

The setup file is dynamically loaded at execution time by the Sun MTP probe process. Changes to the setup file while the Sun MTP resource is enabled can result in unpredictable behavior. Therefore, if the setup file is located on the HAStoragePlus file service, you must disable the Sun MTP resource before changing any information in the setup file.

1. Log in to the system as superuser.
2. Disable the resource by typing the following command:

```
# scswitch -n -j MTP-resource-name
```

3. Edit the setup file and save it.
4. Enable the resource by typing the following command:

```
# scswitch -e -j MTP-resource-name
```

---

**Note** – If you maintain the region setup file on the HAStoragePlus file service, it is a good idea to locate it in the `$KIXSYS` directory.

---

A less preferable alternative is to have a copy of the setup file on each local node. This alternative requires the contents of the setup files to be consistent. The advantage of maintaining separate setup files is that you can modify the setup file on the secondary node without disabling the resource on the primary node. If you want to keep separate setup files, use the following procedure to maintain them:

1. On the secondary node, modify the setup file.
2. As superuser, move the Sun MTP resource to the secondary node.

```
# scswitch -z -g resource-group -h cluster-node-host-name
```

3. Check that Sun MTP is up and running with the new setup file.
  - If so, on the original primary node, modify the setup file so that its contents match the contents of the setup file on the secondary node.
  - If not, a failover may occur back to original primary node. Review the setup file on the secondary node for errors. Correct the errors and retry.
4. Move the Sun MTP resource back to the primary node.

---

# Installing Sun MTP

The installation procedure for Sun MTP in a Sun Cluster environment is the same as the normal installation procedure. Refer to the *Sun Mainframe Transaction Processing Software Installation Guide* for detailed information.

Also, refer to [“Usage Considerations” on page 6](#), which contains information about where to locate the Sun MTP binaries (\$UNIX), configuration directory (\$KIXSYS), and the region setup file. The \$UNIX directory is specified in the EMP\_BASEDIR property when the data service is registered. See [“Registering and Configuring the Sun MTP HA Data Service” on page 12](#).

---

**Note** – Make sure to upgrade Sun MTP on each node of the cluster.

---

Make sure to verify your installation on each node as described in the *Sun Mainframe Transaction Processing Software Installation Guide*.

---

## Installing the Sun MTP HA Data Service

You must be superuser to perform this procedure.

### ▼ To Install the Sun MTP HA Data Service

1. Load the distribution CD into the CD-ROM, or download the `SUNWscmtp` package from SunSolve.
2. Run the `pkgadd` command on each cluster node on which the data service will be configured to run.

Refer to the `pkgadd(1M)` man page for information on how to install a package using this administrative command.

The installation creates the `SUNWscmtp` directory, which contains the following:

- `bin` subdirectory, which contains the binaries for various methods used by the RGM to drive various events in the evolution of the resources of the `scmtp` resource type.
- `etc` subdirectory, which contains the RTR file for the `scmtp` resource type. See `rt_reg(4)` for more info.

- `util` subdirectory, which contains Sun Cluster utilities.
- `README.scmtmp` file.

---

## Registering and Configuring the Sun MTP HA Data Service

The Sun MTP HA data service must be registered and configured as a failover data service. To ensure optimal performance and data integrity, you must associate the data service with the `HAStoragePlus` file service (`SUNW.HAStoragePlus`).

You must be superuser to perform the procedures in this section.

### ▼ To Register and Configure the Sun MTP HA Data Service

#### 1. Register the `SUNW.scmtmp` resource type:

```
# scrgadm -a -t SUNW.scmtmp
```

where:

- |                             |  |
|-----------------------------|--|
| <code>-a</code>             | Adds the data service resource type.                               |
| <code>-t SUNW.scmtmp</code> | Specifies the predefined resource type name for your data service. |

#### 2. Create the `SUNW.HAStoragePlus` resource type:

```
# scrgadm -a -t SUNW.HAStoragePlus
```



### 3. Create a resource group:

```
# scrgadm -a -g resource-group-name [-h nodelist]
```

where:

- |                                     |  |
|-------------------------------------|--|
| <code>-g resource-group-name</code> | Specifies the name of the resource group. This name must be unique for resource groups within the cluster.   |
| <code>-h nodelist</code>            | Specifies an optional comma-separated list of physical node names. The order of the name determines the order in which nodes are considered primary during failover. |

### 4. Define the logical host name.

a. Make sure that the logical host name is defined in the cluster's `/etc/hosts` file.

b. Set up the logical host name on the client system.

- If the client is a UNIX client, make sure the logical host name is defined in the client system's `/etc/hosts` file.
- If the client is a non-UNIX system, define the logical host name in the appropriate location.

### 5. Add the logical host name to the failover resource group:

```
# scrgadm -a -L -j logical-host-resource-name -g resource-group-name -l logical-hostname
```

where:

- |  |   |
|--|---|
| <code>-L</code>                            | Specifies logical host name resources.  |
| <code>-j logical-host-resource-name</code> | An optional name for the logical host name resource.  |
| <code>-l logical-hostname</code>           | Specifies a host name that can apply to any node in the cluster, and which is assigned dynamically. |

## 6. Create a disk device group resource:

```
# scrgadm -a -j disk-device-group-name -g resource-group-name \  
-t SUNW.HAStoragePlus -x FileSystemMountPoints=ha-filesystem \  
-x AffinityOn=True
```

The `-x` options used in this command are extension properties for `SUNW.HAStoragePlus`.

## 7. Turn the resource group online:

```
# scswitch -Z -g resource-group-name
```

## 8. Create the Sun MTP application resource in the failover resource group:

```
# scrgadm -a -j MTP-resource-name -g resource-group-name \  
-t SUNW.scmtmp \  
-y Resource_Dependencies=disk-device-group-name \  
-x EMP_BASEDIR=MTP-directory \  
-x EMP_ADMIN=MTP-administrator-name \  
-x EMP_SETUP=fully-qualified-setup-pathname \  
-x Monitor=monitor-level
```

where the `-x` values are the following extension properties:

<i>MTP-directory</i>	Identifies the fully-qualified directory path name where the Sun MTP product is installed (usually referred as <code>\$UNIKIX</code> ).
<i>MTP-administrator-name</i>	Identifies the user ID that will be used to start and stop the Sun MTP system.
<i>fully-qualified-setup-pathname</i>	Points to a setup file in Korn shell format that contains the environment variables of the Sun MTP region. Examples of variables contained in this file are: <code>KIXSYS</code> , <code>KIXPROGS</code> , <code>KIXLICDIR</code> , and so on.

*monitor-level*

Specifies the monitor level to be performed. Options are:

- APPL\_DEFS: Monitors for the availability of the application definitions, which is the information related to the Sun MTP resources that are contained in the Sun MTP shared memory.
- SYS\_PROCS: Monitors for the existence of the Sun MTP main process (unikixmain).
- NONE: Does not perform any monitoring on the Sun MTP data resource.

You must use the colon-separated combination of APPL\_DEFS and SYS\_PROCS to have full monitoring capability.

## 9. Turn the Sun MTP resource online:

```
# scswitch -e -j MTP-resource-name
```

See “[Configuring the Sun MTP HA Data Service Extension Properties](#)” on page 19 for a complete list of the extension and standard properties and their valid values.

---

# Configuration Example

The following example shows the commands needed to register and configure the mtp-rg-1 resource group and associate it with a SUNW.HAStoragePlus resource type.

```
# scrgadm -a -t SUNW.scmtmp
# scrgadm -a -t SUNW.HAStoragePlus
# scrgadm -a -g mtp-rg-1
# scrgadm -a -L -j mtp-lh-1 -g mtp-rg-1 -l mtp-logical
# scrgadm -a -j mtp-dg-1 -g mtp-rg-1 \
-t SUNW.HAStoragePlus -x FileSystemMountPoints=/mtp_data \
-x AffinityOn=True
# scswitch -Z -g mtp-rg-1
# scrgadm -a -j mtp-rs-1 -g mtp-rg-1 -t SUNW.scmtmp \
-y ResourceDependencies=mtp-dg-1 \
-x EMP_BASEDIR=/pkgs/mtp/MTP8.0.0 \
-x EMP_ADMIN=mtpadmin \
-x EMP_SETUP=/mtp_data/appl2/sys/Setup.ksh \
-x Monitor=SYS_PROCS:APPL_DEFS
# scswitch -e -j mtp-rs-1
```

---

# Verifying the Installation and Configuration

## ▼ To Verify the Installation and Configuration

1. Log in as the Sun MTP administrator.
2. Type the following command to bring online the resource group where the Sun MTP application resource is defined:

```
# scswitch -Z -g resource-group
```

where the **-Z** option enables all resources of the resource group and their monitors, and moves the resource group into the managed state.

3. Shut down the Sun MTP application by killing one of the Sun MTP system processes, such as the `unikixstrt` process.
4. Verify that Sun Cluster restarts the region.  
See [“To Verify the Failover” on page 17](#).

## ▼ To Switch to Another Node

- Execute the following command to move the Sun MTP application to another node:

```
# scswitch -z -g resource-group -h cluster-node-host-name
```

where:

- |  |   |
|--|---|
| <code>-z</code>                        | Specifies a change in master of the resource group.   |
| <code>-h cluster-node-host-name</code> | Identifies the Sun Cluster node you are switching to. |

## ▼ To Verify the Failover

1. Execute the following command to determine if the Sun MTP application is online on the selected cluster node:

```
# scstat -g
```

2. Confirm that the resource group is now online on the new primary node.

---

# Understanding the Sun MTP HA Data Service Fault Monitor

The Sun MTP data service contains a built-in fault monitor (or fault probe). The fault monitor is a process that probes the health of the Sun MTP data service.

## Monitor Start Method

The fault monitor is invoked by the RGM when you bring the resource group and its associated resources online. This invocation causes the RGM to internally call the `Monitor_Start` method for the Sun MTP data service.

## Monitor Stop Method

The fault monitor is stopped by RGM when you bring the resource group and its associated resources offline. This invocation causes the RGM to internally call the `Monitor_Stop` method for the Sun MTP data service.

## Extension Properties

The fault monitor uses the following Sun MTP extension properties:

- `Debug`
- `Probe_timeout`
- `Probe_start_interval`
- `Monitor`

You might be able to tune these properties. Refer to [“Configuring the Sun MTP HA Data Service Extension Properties” on page 19](#) to review or set extension properties.

## Resource Properties

The fault monitor uses the following resource properties:

- `Thorough_probe_interval`
- `Retry_count`
- `Retry_interval`
- `Stop_timeout`
- `Start_timeout`

Refer to the Sun Cluster documentation to review or set resource properties.

## Probing Algorithm and Functionality

The monitor functionality of the Sun MTP HA data service consists of two components: the [Process Monitor Facility \(PMF\)](#) and the fault monitor.

---

**Note** – These components are not activated if the `Monitor` extended property is set to `None`.

---

### PMF

PMF monitors the abnormal exit of all Sun MTP system processes. On any abnormal exit, the PMF tries to restart the data service up to `Retry_count` times in a period of `Retry_interval`. If Sun MTP crashes more often than the retry interval period, the PMF stops trying to restart it.

This feature relies on the Sun MTP main server process (`unikixmain`) monitoring capabilities. If any Sun MTP system process dies, `unikixmain` evaluates whether the failure is critical, and decides whether to restart the dead process or shut down Sun MTP.

### Fault Monitor

The fault monitor performs health checks on the data service. The logic followed by the fault monitor is as follows:

1. Sleep `Probe_start_interval` number of seconds before going into an infinite loop.
2. Sleep `Thorough_probe_interval` number of seconds.

3. Perform health check under the time out property `Probe_timeout` using the Sun MTP entry point `mtp_probe`.
  - If the result of step 3 is a success, that is, the service is healthy, the fault monitor returns to step 2.
  - If Step 3 resulted in a failure, the fault monitor computes the total number of times the health check failed. If the number of failures in `Retry_interval` exceeds `Retry_count`, the fault monitor attempts a failover of the data service. Otherwise, it attempts to restart locally using the Sun MTP HA data service start and stop methods. These two methods are executed under the time-out data service properties `Start_timeout` and `Stop_timeout`.

The `mtp_probe` command checks the health of the Sun MTP system by performing the following checks according to the options set in the `Monitor` extended property:

- `APPL_DEFS`: Checks that the application specific system resources and definition are available.
- `SYS_PROCS`: Monitors for the existence of the Sun MTP main server process (`unikixmain`).

---

## Configuring the Sun MTP HA Data Service Extension Properties

Typically, you configure extension properties using the command `scrgadm -x parameter=value` at the time you create the Sun MTP resource. The following table describes the standard tunable properties that you can configure for the Sun MTP HA data service. Standard properties are default resource properties. To set or modify this property the `-x` option must be used.

**TABLE 2** Tunable Standard Properties for Sun MTP

Property Name	Description
<code>Retry_interval</code>	The number of seconds over which to count attempts to restart a failed Sun MTP resource. The monitor uses this properties in conjunction with <code>Retry_count</code> . <b>Default:</b> 300 <b>Tunable:</b> Any time <b>Category:</b> Optional

**TABLE 2** Tunable Standard Properties for Sun MTP (*Continued*)

Property Name	Description
Retry_count	The number of times the monitor attempts to restart the Sun MTP resource if it fails on the primary node. <b>Default:</b> 2 <b>Tunable:</b> Any time <b>Category:</b> Optional
Thorough_probe_interval	The number of seconds between invocations of an high-overhead fault probe of the Sun MTP resource. <b>Default:</b> 60 <b>Tunable:</b> Any time <b>Category:</b> Optional
Start_timeout	Timeout value for the start method in seconds. <b>Default:</b> 300 <b>Tunable:</b> Any time <b>Category:</b> Optional
Stop_timeout	Timeout value for the stop method in seconds. <b>Default:</b> 300 <b>Tunable:</b> Any time <b>Category:</b> Optional
Failover_mode	Controls whether the RGM relocates a resource group or aborts a node in response to a failure of the start or stop method. <i>None</i> indicates that the RGM should just set the resource state on method failure and wait for operator intervention. <i>Soft</i> indicates failure of the start method should cause the RGM to relocate the resource's group to a different node, while failure of the stop method should cause the RGM to set the resource state and wait for operator intervention. <i>Hard</i> indicates that failure of the start method should cause the relocation of the group and failure of the stop method should cause the forcible stop of the resource by aborting the cluster node. <b>Default:</b> Soft <b>Tunable:</b> Any time <b>Category:</b> Optional



The following table describes the tunable extension properties that you can configure for the Sun MTP HA data service. Extension properties are additional properties specific to the Sun MTP resource. To set or modify this property the `-y` option must be used.

**TABLE 3** Tunable Extension Properties for Sun MTP

Property Name	Description
Probe_timeout	Timeout value for the probe in seconds. <b>Default:</b> 30 <b>Tunable:</b> Any time <b>Category:</b> Optional
Child_mon_level	Child process monitoring level for the Process Management Facility (the <code>-C</code> option of <code>pmfadm</code> ). Default=-1 means monitor all Sun MTP processes, a value >0 indicates the level of child process monitoring that is desired. Do not change this parameter unless you are directed to do so by your authorized service provider. <b>Default:</b> -1 <b>Tunable:</b> When disabled <b>Category:</b> Optional
Probe_start_interval	Probe startup waiting time before starting monitoring Sun MTP in seconds. <b>Default:</b> 60 <b>Tunable:</b> When disabled <b>Category:</b> Optional
Debug	Debug option to enable/disable the internal debugging messages. Valid values are ON and OFF. <b>Default:</b> OFF <b>Tunable:</b> Any time <b>Category:</b> Optional
EMP_BASEDIR	The directory where the Sun MTP product resides. Usually <code>\$UNIXIX</code> . <b>Default:</b> None <b>Tunable:</b> When disabled <b>Category:</b> Required
EMP_ADMIN	The Sun MTP administrator ID. <b>Default:</b> None <b>Tunable:</b> When disabled <b>Category:</b> Required

**TABLE 3** Tunable Extension Properties for Sun MTP (*Continued*)

Property Name	Description
EMP_SETUP	The Sun MTP setup file. <b>Default:</b> None <b>Tunable:</b> When disabled <b>Category:</b> Required
Monitor	Monitor level; can be NONE or a colon-separated combination of SYS_PROCS and APPL_DEFS, which is the recommended setting. <b>Default:</b> None <b>Tunable:</b> When disabled <b>Category:</b> Required

The terms used in the tables are defined as follows:

*Property:* Name of the resource property.

*Description:* A brief description of the property.

*Default:* The default value for the property.

*Tunable:* Indicates when the cluster administrator can set or modify the value of this property for the Sun MTP resource. Values that allow administrator tuning are: Anytime (at any time), At creation (only when the resource is created), or When disabled (when the resource is offline).

*Optional:* These properties are set to the default values at creation time. They can be changed after the resource is created.

*Required:* The property must be specified when creating the resource.



# Using Sun MTP as a Sun Cluster Resource

When managing Sun MTP as a Sun Cluster resource, Sun Cluster management facilities must be used to start and stop the region. Do not use the standard Sun MTP commands, such as kixstart, unikixmain, kixclean, and kixstop. Using these commands will conflict with the Sun Cluster management facilities, and might fail to provide a highly available operational environment.

---

# Configuring the COBOL Animator

This procedure enables you to run the Micro Focus COBOL Animator on a node in a Sun Cluster environment. However, due to the Sun Cluster restriction on animating processes while they are being monitored by PMF, using Animator to debug COBOL programs on a production Sun Cluster region is strongly discouraged.



---

**Caution** – Failure to observe this guideline could result in data corruption.

---

## ▼ To Set Up the Data Service to Allow Animation

1. Log in to the system as superuser.
2. Change directory to `$UNIX/sbin`.
3. Change the owner of the `kxchg_dbg` module to root:

```
# chown root kxchg_dbg
```

4. Change permissions on the `kxchg_dbg` module:

```
# chmod 4755 kxchg_dbg
```

5. Log out as superuser.

---

**Note** – This procedure must be performed on each node where you are using Sun MTP and Animator.

---

---

# Troubleshooting

If you encounter problems that cannot be resolved by means of the Sun Cluster or Sun MTP troubleshooting facilities, run the Sun Explorer facility (`SUNWexplo`). You can download the `SUNWexplo` package, including information on installing and using it, from the SunSolve web site:

<http://sunsolve.sun.com>

Also run the `kixsnap` utility on the node where Sun MTP is running.

Both utilities generate zip files.

Collect all the output and send the files, along with the information noted in “[Help](#)” on [page xii](#), to your authorized service provider.

# Glossary

---

The source for many of these Glossary entries is the *Sun Cluster 3.1 Concepts Guide*.

<b>cluster</b>	Two or more interconnected nodes or domains that share a cluster file system and are configured together to run failover, parallel, or scalable resources.
<b>cluster file system</b>	A file system that is accessible from all cluster members.
<b>cluster member</b>	An active member of the current cluster incarnation. This member is capable of sharing resources with other cluster members and providing services both to other cluster members and to clients of the cluster.
<b>cluster node</b>	A node that is configured to be a cluster member. A cluster node might or might not be a current member.
<b>data service</b>	The term data service is used to describe an application, such as Sun MTP, that has been configured to run on a cluster rather than on a single server. A data service includes the application software and Sun Cluster software that starts, stops, and monitors the application.
<b>failover</b>	The automatic relocation of a resource group or a device group from a current primary node to a new primary node after a failure has occurred.
<b>failover resource type</b>	A resource type, each of whose resources can correctly be mastered by one node at time.
<b>global resource</b>	A highly available resource provided at the kernel level of the Sun Cluster software. Global resources can include disks, cluster file system, and global networking.
<b>HASStoragePlus file system</b>	SUNW.HASStoragePlus is a resource type that can be used to make locally mounted file systems highly available within a Sun Cluster environment. Any file system resident on a Sun Cluster global device group can be used with HASStoragePlus. Unlike a globally mounted file system, it is available only on one cluster node at any given point of time. Moreover, such a file system

cannot be used from cluster nodes that are not physically connected to the underlying storage device. File systems under HAStoragePlus control can only be used in failover mode and in failover resource groups.

When used this way, the file system becomes a part of the resource group and is mounted locally on the node where the resource group is. When the resource group switches or fails over to another node, the file system is unmounted from the original node and mounted on the new node.

**high availability**

**(HA)** A term used to describe a system that provides near continuous access to data and applications.

**IPMP** IP network multipathing software, which is implemented in the Solaris operating system, provides failure detection, repair detection, and outbound load pathing. Refer to the Solaris documentation for more information.

**local disk** A disk that is physically private to a given cluster node.

**logical network  
interface**

In the Internet architecture, a host can have one or more IP addresses. Sun Cluster configures additional logical network interfaces to establish a mapping between several logical network interfaces and a single physical network interface. Each logical network interface has a single IP address. This mapping enables a single physical network interface to respond to multiple IP addresses. This mapping also enables the IP address to move from one cluster member to the other in the event of a failover without requiring additional hardware interfaces.

**network adapter  
failover (NAFO)**

A set of one or more network adapters on the same node and on the same subnet configured to back up each other in the event of an adapter failure.

**NIS** Network information service. NIS is a distributed naming service. It is a mechanism for identifying and locating network objects and resources. It provides a uniform storage and retrieval method for network-wide information in a transport-protocol and media-independent fashion.<sup>1</sup>

**NIS+** NIS+ is a network name service similar to NIS but with more features. NIS+ is not an extension of NIS. NIS+ enables you to store information about machine addresses, security information, mail information, Ethernet interfaces, and network services in central locations where all machines on a network can have access to it. This configuration of network information is referred to as the NIS+ namespace.<sup>2</sup>

---

1. System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP). Santa Clara, CA: Sun Microsystems, Inc., 2002.

2. System Administration Guide: Naming and Directory Services (FNS and NIS+). Santa Clara, CA: Sun Microsystems, Inc., 2002.

<b>Process Monitor Facility (PMF)</b>	The Process Monitor Facility (PMF), provides a means of monitoring processes and their descendants, and restarting them if they die.
<b>resource</b>	An instance of a resource type. Many resources of the same type might exist, each resource having its own name and set of property values, so that many instances of the underlying application might run on the cluster.
<b>resource group</b>	A collection of resources that are managed by the RGM as a unit. Each resource that is to be managed by the RGM must be configured in a resource group. Typically, related and interdependent resources are grouped.
<b>resource group manager (RGM)</b>	A software facility used to make cluster resources highly available. And scalable by automatically starting and stopping these resources on selected cluster nodes. The RGM acts according to pre-configured policies, in the event of hardware or software failures or reboots.
<b>resource type</b>	The unique name given to a data service. Data service resource type can be either failover types or scalable types.
<b>resource type property</b>	A key-value pair, stored by the RGM as part of the resource type, that is used to describe and manage resources of the given type.
<b>resource type registration (RTR) file</b>	Resource type configuration file that defines the static standard and extended properties.
<b>Solaris Volume Manager</b>	A volume manager used by Sun Cluster. See volume manager.
<b>Sun Mainframe Transaction Processing software (Sun MTP)</b>	A user application that uses facilities, such as interprocess communications services, sockets and COBOL, C, and PL/I for application execution. All components of Sun MTP, except for clients, are started by the main server process, unikixmain.
<b>UNIX file system (UFS)</b>	A type of hierarchical file system for UNIX operating systems.
<b>volume manager</b>	A software product that provides data reliability through disk striping, concatenation, mirroring, and dynamic growth of metadevices or volumes.





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