



# Sun™ Mainframe Batch Manager Software High Availability Data Service for Sun Cluster

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# Preface

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This document describes how to install, configure, and use the Sun™ Mainframe Batch Manager (Sun MBM) software high availability (HA) data service for Sun Cluster.

This document is intended for system administrators with extensive knowledge of Sun hardware and software. Knowledge of Sun Cluster architecture, data services, Sun MBM, 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.

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## Using UNIX Commands

This document does 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.<br>Use <code>ls -a</code> to list all files.<br>% You have mail.   |
| <b>AaBbCc123</b> | What you type, when contrasted with on-screen computer output  | % <b>su</b><br>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> .<br>These are called <i>class</i> options.<br>You <i>must</i> be superuser to do this.<br>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

| <b>Application</b>                                      | <b>Title</b>  | <b>Part Number</b> |
|---|---|--------------------|
| Sun MBM software  | <i>Sun Mainframe Batch Manager Software Configuration Guide</i>                                     | 816-5342-10        |
|   | <i>Sun Mainframe Batch Manager Software Installation Guide</i>                                      | 816-5343-10        |
|   | <i>Sun Mainframe Batch Manager Software Message Guide</i>   | 816-5345-10        |
|   | <i>Sun Mainframe Batch Manager Software Migration Guide</i>   | 816-5346-10        |
|   | <i>Sun Mainframe Batch Manager Software Reference Guide</i>   | 816-5347-10        |
|   | <i>Sun Mainframe Batch Manager Software Release Notes</i>   | 816-5348-11        |
|   | <i>Sun Mainframe Batch Manager Software User's Guide</i>  | 816-5349-10        |
| Sun Mainframe Transaction Processing software (Sun MTP) | <i>Sun Mainframe Transaction Processing Software High Availability Data Service for Sun Cluster</i> | 817-3504-11        |
|   |   |                    |
| 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 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.                            |

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

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Please include the title and part number of your document with your feedback:

*Sun Mainframe Batch Manager Software High Availability Data Service for Sun Cluster, part number 817-3505-10*

# Installing and Configuring the Sun MBM HA Data Service

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This document contains the procedures for installing and configuring the Sun MBM high availability (HA) *data service* on your Sun Cluster nodes.

This chapter contains the following procedures:

- [“Sun MBM HA Data Service Overview” on page 2](#)
- [“Task Map: Installing and Configuring the Sun MBM HA Data Service” on page 3](#)
- [“Planning the Sun MBM HA Data Service Installation and Configuration” on page 4](#)
- [“Preparing to Install the Sun MBM HA Data Service” on page 6](#)
- [“Installing Sun MBM” on page 8](#)
- [“Installing the Sun MBM HA Data Service” on page 9](#)
- [“Registering and Configuring the Sun MBM HA Data Service” on page 9](#)
- [“Configuration Example” on page 12](#)
- [“Verifying the Installation and Configuration” on page 12](#)
- [“Understanding the Sun MBM HA Data Service Fault Monitor” on page 13](#)
- [“Configuring the Sun MBM HA Data Service Properties” on page 15](#)
- [“Using Sun MBM as a Sun Cluster Resource” on page 18](#)
- [“Upgrading the Sun MBM HA Data Service” on page 19](#)
- [“Configuring the COBOL Animator” on page 20](#)
- [“Troubleshooting” on page 20](#)
- [“Sun MBM Error Messages” on page 21](#)

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# Sun MBM HA Data Service Overview

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

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

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

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

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

The fault monitor is provided using the probe method.

The Sun MBM data service provides:

- The Sun MBM *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 MBM node when the resource group containing the Sun MBM node is brought online, or the resource is enabled.
- The stop callback method invoked by the RGM to stop the Sun MBM node when the resource group containing the Sun MBM node goes offline, or the resource is disabled.
- The fault monitor to check the reliability of the data service by verifying that the Sun MBM node is running properly.
- The validate callback method invoked by the RGM to validate that the Sun MBM base directory is accessible to the Sun MBM HA 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 MBM HA Data Service

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

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

| <b>Task</b>   | <b>For Instructions, Go To</b>  |
|---|---|
| Plan the installation   | Chapter 1 of <i>Sun Cluster Data Service Planning and Administration Guide</i><br><br><a href="#">“Planning the Sun MBM HA Data Service Installation and Configuration” on page 4</a> |
| Prepare to install the Sun MBM HA data service                            | <a href="#">“Preparing to Install the Sun MBM HA Data Service” on page 6</a>  |
| Install Sun MBM   | <a href="#">“Installing Sun MBM” on page 8</a>  |
| Install Sun MBM HA data service package                                   | <a href="#">“Installing the Sun MBM HA Data Service” on page 9</a>  |
| Register and Configure Sun MBM HA data service as a failover data service | <a href="#">“Registering and Configuring the Sun MBM HA Data Service” on page 9</a>   |
| Verify Sun MBM HA data service installation and configuration             | <a href="#">“Verifying the Installation and Configuration” on page 12</a>   |
| Understand Sun MBM HA data service fault monitor                          | <a href="#">“Understanding the Sun MBM HA Data Service Fault Monitor” on page 13</a>  |

To upgrade a previous version of the Sun MBM HA data service, see [“Upgrading the Sun MBM HA Data Service” on page 19](#).

---

# Planning the Sun MBM HA Data Service Installation and Configuration

This section contains the information you need to plan your Sun MBM 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 MBM 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 MBM, minimum release of 10.0.0 patch level of 7, which must be installed on the *cluster failover file system*.
- Sun MBM 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, which provides the cluster failover file system.

If you are also using Sun MTP and the Sun MTP HA data service, you must use Sun MTP 8.0.0, minimum patch level of 6, and the Sun MTP HA data service, release 1.0, minimum patch level of 2. Make sure to configure the Sun MTP HA data service as described in the *Sun Mainframe Transaction Processing Software High Availability Data Service for Sun Cluster* document (part number 817-3504-11).

# Configuration Considerations

This section describes the configuration components that have been qualified with this release.

## Currently Qualified

The Sun MBM 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
- The Sun MBM 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)
- PL/I, C/C++, and Java application environments

## Usage Considerations

There are many options for configuring your Sun Cluster environment with Sun MBM and Sun MTP. If you choose to configure your environment in a way that is not described in this document, you are responsible for the validation of your configuration.

Your data service configuration might not be supported if you do not observe the following guidelines:

- The Sun MBM HA data service can only be configured as a failover service. It cannot operate as a scalable service.
- Configure the HAStoragePlus file service (cluster failover file system) to protect data from being inadvertently used by other cluster nodes.
- All nodes in the cluster must be configured with the same national language support (NLS).
- Install the Sun MBM node (`$EBMHOME`) on the cluster failover file system.

- All Sun MBM resources (data files, configuration files, programs, and so on), including those that are accessed by Sun MBM customized user exit routines, must be located on the cluster failover file system.
- If your environment uses COBOL, you must install and license it on each local cluster 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 MBM 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.
- Sun Cluster management facilities must be used to start and stop the Sun MBM node. Do not use the Sun MBM Batch Administration Manager (or `bam` commands) or the Sun MBM GUI to start and stop the Sun MBM node. Using these facilities will conflict with the Sun Cluster management facilities, and might fail to provide a highly available operational environment.

---

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

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## Preparing to Install the Sun MBM HA Data Service

This section describes the tasks you must perform before you install the Sun MBM HA data service.

- Install the Solaris operating system and the Sun Cluster software.
- Set up *IPMP* groups.
- Update the NIS/NIS+ configuration file, if necessary.
- Set up the Sun MBM administrator. See [“Setting Up the Sun MBM Administrator” on page 7](#).
- Install Sun MBM as described in [“Installing Sun MBM” on page 8](#).

# Updating NIS/NIS+ Configuration File

Because the Sun MBM HA data service uses the `su EMP_ADMIN` command when starting and stopping the Sun MBM node, 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
```

## Setting Up the Sun MBM Administrator

Contact your system administrator to create the Sun MBM 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 MBM HA Data Service”](#) on page 9.

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**Note** – The Sun MBM administrator’s login shell must be Korn shell (`/bin/ksh`).

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# Installing Sun MBM

The installation procedure for Sun MBM in a Sun Cluster environment is the same as the normal installation procedure. For example, unzip the Sun MBM package into the unload directory on one of the cluster nodes. Then, run the `INSTEEM` utility to install each Sun MBM node on the cluster failover file system.

---

**Note** – The `$EBMHOME` (node installation) directory is specified in the `EMP_BASEDIR` property when the data service is registered. See [“Registering and Configuring the Sun MBM HA Data Service” on page 9](#).

---

Build your Sun MBM configuration in a non-HA environment and validate the operation of Sun MBM on each node of the cluster to ensure that it works correctly. For example, manually start the Sun MBM node, execute a variety of jobs, and shut down the Sun MBM node.

Refer to the *Sun Mainframe Batch Manager Software Installation Guide* for more information about installing and verifying Sun MBM.

## Sun MBM Installation Location

You must install the Sun MBM product on the cluster failover file system. By putting the application binaries on the cluster file system there will be only one copy to maintain and manage.

After installing the Sun MBM node, you must configure the license file for each cluster node. Refer to the *Sun Mainframe Batch Manager Software Installation Guide* for information about the license file.

## Upgrading Sun MBM

When upgrading Sun MBM in the Sun Cluster environment, you must disable the Sun MBM resource before performing the normal upgrade process. Make sure to verify that the upgrade was successful outside of the Sun Cluster environment, and then reenble the resource. Refer to the *Sun Mainframe Batch Manager Software Installation Guide* for information about upgrading the software.

---

# Installing the Sun MBM HA Data Service

You must be superuser to perform this procedure.

## ▼ To Install the Sun MBM HA Data Service

1. **Load the distribution CD into the CD-ROM, or download the `SUNWscmbm` 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 `/opt/SUNWscmbm` 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 `scmbm` resource type.
- `etc` subdirectory, which contains the RTR file for the `scmbm` resource type. See `rt_reg(4)` for more info.
- `util` subdirectory, which contains utilities used by the `pkgadd` and `pkgrm` system commands during installation and deinstallation of the product.
- `README.scmbm` file.

---

## Registering and Configuring the Sun MBM HA Data Service

The Sun MBM HA data service is registered and configured as a failover data service.

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

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

### 1. Register the resource type:

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

where:

- a Adds the data service resource type.
- t `SUNW.scmbm` 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:

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

### 4. Create a disk device group resource:

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

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

---

**Note** – The `-x FileSystemMountPoints` option identifies the cluster failover file system.

---

**5. Turn the resource group online:**

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

**6. Create the Sun MBM resource in the failover resource group:**

```
# scrgadm -a -j MBM-resource-name -g resource-group-name \  
-t SUNW.scmbm \  
-y Resource_Dependencies=disk-device-group-name \  
-x EMP_BASEDIR=MBM-node-directory \  
-x EMP_ADMIN=MBM-administrator-name
```

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

|                               |   |
|-------------------------------|---|
| <i>MBM-node-directory</i>     | Identifies the fully-qualified directory path name on the cluster failover file system where the Sun MBM node is installed (usually referred as <code>\$EBMHOME</code> ). |
| <i>MBM-administrator-name</i> | Identifies the user ID of the Sun MBM node administrator.   |

**7. Turn the Sun MBM resource online:**

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

See [“Configuring the Sun MBM HA Data Service Properties” on page 15](#) 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 `mbm-rg-1` resource group and associate it with a `SUNW.HAStorage` resource type.

```
# scrgadm -a -t SUNW.scmbm
# scrgadm -a -t SUNW.HAStoragePlus
# scrgadm -a -g mbm-rg-1
# scrgadm -a -j mbm-dg-1 -g mbm-rg-1 \
-t SUNW.HAStoragePlus -x FileSystemMountPoints=/mbm_data \
-x AffinityOn=True
# scswitch -Z -g mbm-rg-1
# scrgadm -a -j mbm-rs-1 -g mbm-rg-1 -t SUNW.scmbm \
-y Resource_Dependencies=mbm-dg-1 \
-x EMP_BASEDIR=/mbm_data/MBMnode1 \
-x EMP_ADMIN=mbmadmin
# scswitch -e -j mbm-rs-1
```

---

## Verifying the Installation and Configuration

### ▼ To Verify the Installation and Configuration

1. Log in as the Sun MBM administrator.
2. Create a failure condition in the Sun MBM node by killing one or more of its system processes.

Use the `ebminfo` command to retrieve the process identifiers of the main Sun MBM system processes.

3. Verify that Sun Cluster restarts the Sun MBM node.

See [“To Verify the Fail-Over”](#) on page 13.

## ▼ To Switch to Another Node

- Execute the following command to move the Sun MBM resource group to another node:

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

where:

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

## ▼ To Verify the Fail-Over

1. Execute the following command to determine if the Sun MBM resource 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 MBM HA Data Service Fault Monitor

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

## Standard Properties

The fault monitor uses the following standard properties:

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

You might be able to tune these properties. Refer to the Sun Cluster documentation to review or set resource properties. Also see [“Configuring the Sun MBM HA Data Service Properties” on page 15](#) to review or set resource properties.

## Extension Properties

The fault monitor uses the following Sun MBM extension properties:

- `Debug`
- `PMF_Retry_Count`
- `Probe_timeout`
- `Probe_start_interval`

You might be able to tune these properties. Refer to [“Configuring the Sun MBM HA Data Service Properties” on page 15](#) to review or set extension properties.

## Probing Algorithm and Functionality

The monitor functionality of the Sun MBM HA data service consists of two components: the *Process Monitor Facility (PMF)* and the fault monitor.

### PMF

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

## 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 MBM entry point `mbm_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 MBM HA data service start and stop methods. These two methods are executed under the time-out data service properties `Start_timeout` and `Stop_timeout`.

---

# Configuring the Sun MBM HA Data Service Properties

Typically, you configure properties using the options on the `scrgadm` command at the time you create the Sun MBM resource.

The following table describes the standard tunable properties that you can configure for the Sun MBM HA data service. Standard properties are default resource properties. To set or modify this property, use the `-y parameter=value` option.

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

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

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

| Property Name           | Description  |
|-------------------------|--|
| Retry_count             | The number of times the monitor attempts to restart the Sun MBM resource if it fails on the primary node.<br><b>Default:</b> 2<br><b>Tunable:</b> Any time<br><b>Category:</b> Optional  |
| Thorough_probe_interval | The number of seconds between invocations of an high-overhead fault probe of the Sun MBM resource.<br><b>Default:</b> 60<br><b>Tunable:</b> Any time<br><b>Category:</b> Optional  |
| Start_timeout           | Timeout value for the start method in seconds.<br><b>Default:</b> 300<br><b>Tunable:</b> Any time<br><b>Category:</b> Optional   |
| Stop_timeout            | Timeout value for the stop method in seconds.<br><b>Default:</b> 300<br><b>Tunable:</b> Any time<br><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.<br><b>Default:</b> Soft<br><b>Tunable:</b> Any time<br><b>Category:</b> Optional |

The following table describes the tunable extension properties that you can configure for the Sun MBM HA data service. Extension properties are additional properties specific to the Sun MBM resource. To set or modify this property, use the `-x parameter=value` option.

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

| Property Name        | Description  |
|----------------------|--|
| Probe_timeout        | Timeout value for the probe in seconds.<br><b>Default:</b> 30<br><b>Tunable:</b> Any time<br><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 MBM processes, a value >0 indicates the level of child process monitoring that is desired.<br>Do not change this parameter unless you are directed to do so by your authorized service provider.<br><b>Default:</b> -1<br><b>Tunable:</b> When disabled<br><b>Category:</b> Optional |
| Probe_start_interval | Probe startup waiting time before starting monitoring Sun MBM in seconds.<br><b>Default:</b> 60<br><b>Tunable:</b> When disabled<br><b>Category:</b> Optional  |
| Debug                | Debug option to enable/disable the internal debugging messages. Valid values are ON and OFF.<br><b>Default:</b> OFF<br><b>Tunable:</b> Any time<br><b>Category:</b> Optional   |
| PMF_Retry_Count      | Number of retries used by PMF to restart Sun MBM if it fails.<br><b>Default:</b> 2<br><b>Tunable:</b> When disabled<br><b>Category:</b> Optional   |
| EMP_BASEDIR          | The directory where the Sun MBM product resides. Usually <code>\$EBMHOME</code> .<br><b>Default:</b> None<br><b>Tunable:</b> When disabled<br><b>Category:</b> Required  |
| EMP_ADMIN            | The Sun MBM administrator ID.<br><b>Default:</b> None<br><b>Tunable:</b> When disabled<br><b>Category:</b> Required  |

The terms used in [TABLE 3](#) are defined as follows:

*Property:* Name of the Sun MBM HA 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 MBM resource. Values that allow administrator tuning are: Any time (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 MBM as a Sun Cluster Resource

When managing Sun MBM as a Sun Cluster resource, Sun Cluster management facilities must be used to start and stop the Sun MBM node. Do not use the Sun MBM Batch Administration Manager (or bam commands) or the Sun MBM GUI to start and stop the Sun MBM node. Using these facilities will conflict with the Sun Cluster management facilities, and might fail to provide a highly available operational environment.

---

## Other Operational Information

The operation of Sun MBM is the same in a cluster environment as it is in a non-clustered environment. Therefore, jobs that are aborted as a result of a failover will not be automatically restarted.

---

# Upgrading the Sun MBM HA Data Service

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

1. Log in to the system as the superuser.

2. Disable and remove all Sun MBM 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 MBM-resource-name
# scrgadm -r -j MBM-resource-name
```

3. Remove the Sun MBM HA data service.

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

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

```
# pkgrm SUNWscmbm
```

5. Verify that the package removal was successful for each node of the cluster by executing the following command:

```
$ cd /opt/SUNWscmbm
```

An error message indicating that the directory does not exist should be displayed.

6. Install the new SUNWscmbm package.

See [“Installing the Sun MBM HA Data Service”](#) on page 9.

---

# 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 node is strongly discouraged.

## ▼ To Set Up a Subsystem to Allow Animation

1. **Log in as the Sun MBM node administrator.**
2. **Add the following environment variable to the target subsystem's user setup (\$USER\_SETUP) file:**

```
setenv ANIM_WITH_PMF 1
```

Refer to the *Sun Mainframe Batch Manager Software Configuration Guide* for the procedure to update the \$USER\_SETUP file.

---

## Troubleshooting

If you encounter problems that cannot be resolved by means of the Sun Cluster or Sun MBM troubleshooting facilities, run the Sun Explorer facility (SUNWexpl0). You can download the SUNWexpl0 package, including information on installing and using it, from the SunSolve web site:

<http://sunsolve.sun.com>

Also, capture a system snap shot on the node where Sun MBM is running. Refer to the section "To Create a System Snap Shot" in the *Sun Mainframe Batch Manager Software Configuration Guide*.

Collect all the output and send the files, along with the information noted in "Help" on page x, to your authorized service provider.

---

# Sun MBM Error Messages

The following Sun MBM error messages are documented here for ease of use. They will be added to the next major release of the *Sun Mainframe Batch Manager Software Message Guide*.

## BAM Series Messages

The following are new BAM series messages:

BAM0099(W) Warning !!! %s exceeds %d % disk space.

**Description:** The specified directory exceeds the batch node suggested limit.

**Solution:** An additional message is displayed to suggest the action to take.

BAM0100(W) Warning !!! %s exceeds %d bytes.

**Description:** The specified file exceeds the batch node suggested size limit.

**Solution:** An additional message is displayed to suggest the action to take.

BAM0723(W) No batch job classes are defined

**Description:** The batch node is active, but no batch job classes are defined. The batch node can accept jobs, but cannot execute any of them.

**Solution:** Create one or more batch job classes. Refer to the *Sun Mainframe Batch Manager Software Configuration Guide* for information about creating job classes.

BAM0724(I) Batch job class activities: %d

**Description:** The batch node is active and it is configured with the specified number of job class activities allocated.

**Solution:** Informational message; no user action is needed.

The following message has been updated:

BAM0712(I) To erase the Job Log file use the bam ClearJobLog option.

**Description:** The message indicates to use the bam ClearJobLog command to erase the job log file.

**Solution:** Informational message; no user action is needed unless you want to use the specified command to erase the job log file.

# BS Series Messages

The following are new BS series messages:

BS0270(I) Batch autosub daemon is not active

**Description:** The batch node's job auto submission daemon is not active.

**Solution:** If the Sun MBM node is configured as a Sun MBM HA data service, the node should restart automatically. If it does not, contact your authorized service provider.

BS0271(I) Batch autosub daemon is hanging

**Description:** The batch node's job auto submission daemon is not working properly.

**Solution:** If the Sun MBM node is configured as a Sun MBM HA data service, the node should restart automatically. If it does not, contact your authorized service provider.

BS0272(W) Batch psg daemon returns unexpected message type=%d

**Description:** Internal error.

**Solution:** Contact your authorized service provider.

BS0584(I) Batch node %s is not active. Reason: error connecting ebmmd process

**Description:** The specified batch node is not active.

**Solution:** Informational message; no user action is needed.

BS0585(I) Batch node %s is not active. Reason: error communicating with ebmmd process

**Description:** The specified batch node is not active.

**Solution:** Informational message; no user action is needed.

BS0586(I) Batch node %s is not active. Reason: ebmmd process is not active

**Description:** The specified batch node is not active.

**Solution:** Informational message; no user action is needed.

BS0587(I) Batch node %s is warming up

**Description:** The specified batch node is going to start up.

**Solution:** Informational message; no user action is needed.

BS0588(I) Batch node %s is starting up

**Description:** The specified batch node is starting up.

**Solution:** Informational message; no user action is needed.

BS0589(I) Batch node %s is shutting down

**Description:** The specified batch node is shutting down.

**Solution:** Informational message; no user action is needed.

BS0590(I) Batch node %s is active

**Description:** The specified batch node is active.

**Solution:** Informational message; no user action is needed.

BS0591(I) Batch node %s is not active. Reason: one or more batch system processes are not available

**Description:** The specified batch node is down.

**Solution:** Informational message; no user action is needed.

BS0592(I) Batch node %s is hanging

**Description:** One or more of the specified batch node's system processes or resources are not available or are not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS0593(S) ERROR. Unknown batch node status, received message %d from ebmmd

**Description:** Internal error.

**Solution:** Contact your authorized service provider.

BS0594(I) Batch vcf daemon is not active

**Description:** The batch node's virtual console facility daemon is not active or is not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS0595(I) Batch psg daemon is not active

**Description:** The batch node's process group daemon is not active or is not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS0596(I) Batch psg daemon is not active

**Description:** The batch node's process group daemon is not active or is not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS0597(I) Batch node %s is hanging

**Description:** One or more of the specified batch node's system processes or resources are not available or are not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS0619(I) VCF semaphore is not available, errno=%d

**Description:** The specified batch resource is not available or is not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS0620(I) PSG level 1 shared memory semaphore is not available, errno=%d

**Description:** The specified batch resource is not available or is not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS0621(I) PSG level 2 shared memory semaphore is not available, errno=%d

**Description:** The specified batch resource is not available or is not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS0622(I) PSG level 3 shared memory semaphore is not available, errno=%d

**Description:** The specified batch resource is not available or is not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS0623(I) Shared memory buffer pool semaphore is not available, errno=%d

**Description:** The specified batch resource is not available or is not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS0624(I) Shared memory buffer pool is not available, errno=%d

**Description:** The specified batch resource is not available or is not functioning properly.

**Solution:** If the Sun MBM HA data service is configured, the node should restart automatically. If it does not, contact your authorized service provider.

BS2015(I) Batch node is not active

**Description:** The batch node is down.

**Solution:** Informational message; no user action is needed.

BS2016(I) Batch node is not active. Reason: error connecting batch message daemon

**Description:** The batch node is down.

**Solution:** Informational message; no user action is needed.

BS2017(I) Batch node is not active. Reason: error communicating with batch message daemon

**Description:** The batch node is down.

**Solution:** Informational message; no user action is needed.

BS2018(I) Batch node is not active. Reason: batch message daemon is not available

**Description:** The batch node is down.

**Solution:** Informational message; no user action is needed.

BS2019(S) Batch environment is not set. Command aborted

**Description:** Internal error.

**Solution:** Contact your authorized service provider.

BS2020(W) No batch subsystems are defined. Reason: batch subsystem table is empty.

**Description:** The batch node is active, but no subsystems have been defined. The batch node is not able to accept any job for execution.

**Solution:** Create one or more batch subsystems.

BS2021(W) No batch subsystems are defined

**Description:** The batch node is active, but no subsystems have been defined. The batch node is not able to accept any job for execution.

**Solution:** Create one or more batch subsystems.

BS2022(S) The batch subsystem table is corrupted

**Description:** Internal error.

**Solution:** Contact your authorized service provider.

BS2023(I) Active batch subsystems: %d

**Description:** The message indicates the number of active subsystems, including those connected to Sun MTP regions.

**Solution:** Informational message; no user action is needed.

BS2024(S) Unexpected message type %d from BQM

**Description:** Internal error.

**Solution:** Contact your authorized service provider.

BS2025(W) Batch subsystems: defined %d, active %d

**Description:** The message indicates the number of defined subsystems and the number of active ones. This message is displayed when there is a discrepancy between defined and active subsystems, and indicates that one or more of the configured Sun MTP regions are not active or are not connecting to the batch node.

**Cause:** There are many reasons why this error message might be displayed. For example, the region is down or is in the process of connecting to another node.

**Solution:** Check the status to determine if the problem has resolved itself. If not, check the subsystem configuration and the configuration of the associated regions to verify that they are correct.

BS2026(S) Error deleting VCF semaphore %d, errno=%d

**Description:** Internal error.

**Solution:** Check the error table for information. Contact your authorized service provider.

BS2027(S) Error deleting PSG level 1 semaphore %d, errno=%d

**Description:** Internal error.

**Solution:** Check the error table for information. Contact your authorized service provider.

BS2028(S) Error deleting PSG level 2 semaphore %d, errno=%d

**Description:** Internal error.

**Solution:** Check the error table for information. Contact your authorized service provider.

BS2029(S) Error deleting PSG level 3 semaphore %d, errno=%d

**Description:** Internal error.

**Solution:** Check the error table for information. Contact your authorized service provider.

BS2030(S) Error deleting MBM shared memory semaphore %d, errno=%d

**Description:** Internal error.

**Solution:** Check the error table for information. Contact your authorized service provider.

BS2031(S) Error deleting MBM shared memory pool %d, errno=%d

**Description:** Internal error.

**Solution:** Check the error table for information. Contact your authorized service provider.

BS2032(I) VCF semaphore %d deleted

**Description:** The specified batch node resource has been deleted while the batch node was shutting down.

**Solution:** Informational message; no user action is needed.

BS2033(I) PSG level 1 semaphore %d deleted

**Description:** The specified batch node resource has been deleted while the batch node was shutting down.

**Solution:** Informational message; no user action is needed.

BS2034(I) PSG level 2 semaphore %d deleted

**Description:** The specified batch node resource has been deleted while the batch node was shutting down.

**Solution:** Informational message; no user action is needed.

BS2035(I) PSG level 3 semaphore %d deleted

**Description:** The specified batch node resource has been deleted while the batch node was shutting down.

**Solution:** Informational message; no user action is needed.

BS2036(I) MBM shared memory semaphore %d deleted

**Description:** The specified batch node resource has been deleted while the batch node was shutting down.

**Solution:** Informational message; no user action is needed.

BS2037(I) MBM shared memory %d deleted

**Description:** The specified batch node resource has been deleted while the batch node was shutting down.

**Solution:** Informational message; no user action is needed.

## TP Series Messages

TP2086(S) ERROR: function setuid() failed, errno=%d

**Description:** The COBOL program executing in Animator mode is not able to change user ID as required to suspend the PMF monitoring.

**Cause:** This error can be caused if the Sun MBM node was improperly installed. For example, if the `tar` command was used, instead of the `INSTEEM` utility.

**Solution:** If you used the `tar` command rather than the `INSTEEM` utility to install the Sun MBM node, reinstall the node using `INSTEEM`. If the node was properly installed, verify that the file `$(EBMHOME)/pack/scbin/mbmchg_dbg` has `setuid` on execution and that it is owned by `root`.

TP2087(S) ERROR: Unable to suspend PMF monitoring for process %d, status=%d, errno=%d

**Description:** The COBOL program executing in Animator mode is not able to suspend the PMF monitoring. Therefore, the COBOL Animator fails to attach the running process.

**Solution:** Use the UNIX error number (`errno`) to determine the kind of error that occurred, and the appropriate corrective action. After performing the corrective action, try animating the program again.

TP2088(S) ERROR: Unable to suspend PMF monitoring for process %d, exited with status=%d

**Description:** The utility invoked to suspend PMF monitoring failed with the reported exit status. Therefore, the COBOL Animator fails to attach the running process.

**Solution:** An additional message is displayed to specify the reason for the failure.

TP2089(S) ERROR: Unable to suspend PMF monitoring for process %d, exited with signal %d

**Description:** The utility invoked to suspend PMF monitoring failed with the reported signal. Therefore, the COBOL Animator fails to attach the running process.

**Solution:** Contact your authorized service provider.



# Glossary

---

The source for many of these Glossary entries is the *Sun Cluster Concepts Guide* document and the *Sun Cluster Data Service Planning and Administration Guide*.

- cluster** Two or more interconnected nodes or domains that share a cluster file system and are configured together to run failover, parallel, or scalable resources.
- cluster failover file system** A file system that is accessible from all cluster members.
- cluster member** 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.
- cluster node** A node that is configured to be a cluster member. A cluster node might or might not be a current member.
- data service** The term data service is used to describe software that starts, stops, and monitors an application, such as Sun MBM, that has been configured to run in the Sun Cluster environment, rather than on a single server.
- failover** 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.
- failover resource type** A resource type, each of whose resources can correctly be mastered by one node at time.
- global resource** 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.
- HASStoragePlus file service** 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, a cluster failover file system 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 fail-over without requiring additional hardware interfaces.

**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>

**Process Monitor Facility**

**(PMF)** The Process Monitor Facility (PMF), provides a means of monitoring processes and their descendants, and restarting them if they die.

---

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>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 Batch Manager software (Sun MBM)</b> | A batch manager product that provides a facility for executing batch jobs in a controlled environment. Sun MBM processes the batch production workload, scheduling jobs by the parameters assigned, such as start time, maximum number of batch processes and job priority.      |
| <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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