Telelogic Synergy

Administration Guide for UNIX

Release 7.0

Before using this information, be sure to read the general information under Appendix E, "Notices" on page 193.

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1 *Introduction*

The *Telelogic® Synergy™ Administration Guide for UNIX®* contains complete administrative command descriptions and step-by-step instructions for administering Telelogic Synergy.

For installation and upgrade instructions, see the following documents:

- *Telelogic Synergy Installation Guide for UNIX*

- *Telelogic Synergy Installation Guide for Windows®*

- *Telelogic Synergy Upgrade Instructions for UNIX*

- *Telelogic Synergy Upgrade Instructions for Windows*

You can obtain this guide in PDF format on the Documentation section of the DVD, the Telelogic Synergy Support Web site (located at http:// support.telelogic.com/synergy). Also, see "Obtain additional information" on page 8.

Information in this guide may be superseded by information in the *Readme* files, which are shipped with the product. The latest updates to the *Readme* are available on the IBM Rational Software Support Web site.

Who should use this guide

This guide is intended for change management (CM) administrators. The *CM administrator* should have experience setting up UNIX system files.

The *CM administrator* also must have the *root* password on each machine used by Telelogic Synergy and must be able to set the user to *ccm_root* and *informix*.

Telelogic Synergy administrator's road map

The following items briefly describe the tasks you need to complete to prepare the Telelogic Synergy environment for your team's use. This road map assumes that you have already installed Telelogic Synergy.

- Read the *Readme,* located on the [Telelogic Synergy Support Web site](#), for any last-minute information.

- Install the Telelogic® License Server™ and the license.

  This procedure is described in the *[Telelogic Lifecycle Solutions - Licensing Guide](#)*.

- Unpack a database.

  This procedure is described in "Create a database" on page 80.

- Add users to the database.

  This procedure is described in "Add users or change user roles in a Telelogic Synergy database" on page 12.

- Coordinate the customization of local types with your site's type developer.

- Devise a database backup plan.

  Guidelines for doing this are in "Back up a database" on page 77 and "Schedule and script backups" on page 174.

- Monitor space to plan for growth.

  This procedure is described in "Monitor processes" on page 28.

About Telelogic Synergy

This release supports UNIX clients, engines, and database servers on a variety of UNIX operating systems. UNIX clients can be used only with UNIX servers. However, Windows can run with a UNIX server. For the most current list of supported platforms, see the *Readme.*

When you run Telelogic Synergy, the client, engine, and database all must be at the same release level. Do not mix components from different Telelogic Synergy releases. This means that you must install this release of Telelogic Synergy clients on all Windows client machines that will access a UNIX server. See the *Telelogic Synergy Installation Guide for Windows* and the *Telelogic Synergy Administration Guide for Windows* on the [Telelogic Synergy Support Web site](#) for information about installing and administering Windows clients.

Conventions

The following conventions are used in this guide.

Shell conventions

All command-line instructions and examples are shown for the standard Bourne shell, `/bin/sh`. If you use an alternative shell, such as the C shell, you must make the appropriate changes to execute the commands.

For example, add `/usr/local/ccm70` to the path using the `sh` shell as follows:

```
PATH=/usr/local/ccm70/bin:$PATH; export PATH
```

Add `/usr/local/ccm70` to the path using the `csh` shell as follows:

```
setenv PATH /usr/local/ccm70/bin:$PATH
```

Fonts and symbols

The table below describes the typeface and symbol conventions used in this guide.

Typeface	Description
Italic	Used for book titles and terminology. Also designates names of roles (*developer*), states (*working*), groups (*ccm_root*), and users (*laura*).
Bold	Used for dialog box names and options, items that you can select and menu paths, also used for emphasis.
Courier	Used for commands, filenames, and directory paths. Represents command syntax to be entered verbatim. Signifies computer output that displays on-screen. Also used for the names of attributes (`modify_time`), functions (`remote_type`), and types (`csrc`).
Courier Italic	Represents values in a command string that you supply. For example, (*drive:\username\commands*).

This document also uses the following conventions:

Note Contains information that should not be overlooked.

Caution Contains critical information that must be observed to avoid damaging the database or system.

Command line interface

The command line interface (CLI) is supported on all UNIX platforms. You can execute any Telelogic Synergy command from the command prompt.

Prompt

This guide uses the dollar-sign prompt ($).

Options delimiter

Telelogic Synergy supports the dash (–) option delimiter for all UNIX platforms.

Location of $CCM_HOME

$CCM_HOME is the Telelogic Synergy product installation directory. Many procedures shown in this guide require that you change a file somewhere in the $CCM_HOME directory hierarchy.

Default text editor

The default Telelogic Synergy UNIX text editor is vi. You can change the default text editor (described in "Default Settings" in Telelogic Synergy CLI Help).

New in Telelogic Synergy release 7.0

This section describes the new features of Telelogic Synergy 7.0.

Web mode and traditional mode

Telelogic Synergy 7.0 improves wide area network (WAN) performance by introducing a new architecture where Telelogic Synergy clients communicate to a Web-based Telelogic Synergy server using the HTTP protocol. This architecture reduces the dependency on network latency by using parallel, asynchronous network communication between the client and server.

Rather than replacing the original network communication with this new technique, Telelogic Synergy 7.0 introduces the new technique as Web mode. The previous RFC architecture, which is referred to as traditional mode, is still available for use by some users.

Most developers and build managers will be able to use the Web mode. Users who need administration capabilities or other advanced features can use the traditional mode instead. The traditional mode behaves as it did in Telelogic Synergy 6.5.

Users who work with link based work areas on UNIX must use the traditional mode Telelogic Synergy GUI or the Classic CLI or GUI.

Users will need to use one of the Telelogic Synergy Classic clients (CLI or GUI) for the following reasons:

- Administrative operations
- Data migration
- Save offline and delete

Telelogic Synergy 7.0 Architecture

The following picture shows the Telelogic Synergy 7.0 architecture for the Web mode and the traditional mode.
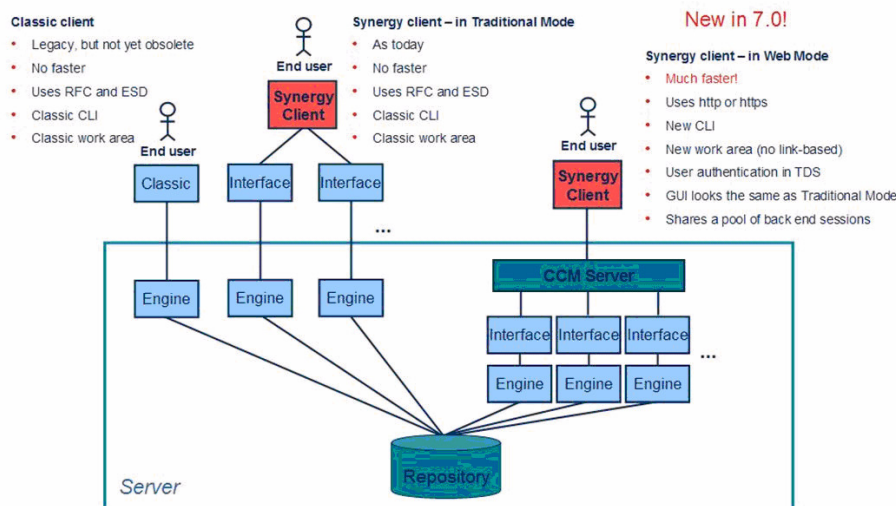
Web mode clients connect to a Telelogic Synergy Web server via HTTP. The Telelogic Synergy server manages a pool of back-end sessions, which all run on the server system.

The Web mode and traditional mode differ in some ways that are important for the *CM administrator* to understand.

- **CCM server**—Web mode introduces a new Web server called the CCM server. This process manages back-end Telelogic Synergy sessions on the server system. This document provides information about configuring and administering the CCM server.

  For more information on administering the CCM server, see "CCM Server Administration" on page 39.

- **Authentication**—Web mode users are authenticated via the Telelogic® Directory Server™ (TDS). Telelogic Synergy can share a single TDS lightweight directory access protocol (LDAP) installation with Telelogic® Change™ and other software tools. TDS is installed and administered

separately from Telelogic Synergy. For more information, see the *Telelogic Directory Server Administration Guide* and the *Telelogic Directory Server Install Guide* on the <u>Lifecycle Solutions Support Web site</u>.

In addition to defining users in TDS, the *CM Administrator* must add user IDs and their associated roles to each Telelogic Synergy databases in which they will work, in order to identify which databases they can access and the privileges they have in each databases.

Traditional mode users are authenticated using OS authentication, as in previous releases. On UNIX operating systems, it is possible to configure PAM to authenticate users via TDS. TDS can also be configured to authenticate users against the operating system.

For more information on authentication, see the *<u>Telelogic Directory Server Administration Guide</u>*.

- **Session start**—To start a Web mode session, users must specify a URL rather than a host name for the server. The *CM administrator* can provide the appropriate startup information for different sets of users.

  Note You will be able to start only a Telelogic Synergy client or Telelogic Synergy CLI in Web mode. Neither the Classic GUI nor the Classic CLI can be started in Web mode.

  - To start a Telelogic Synergy GUI session in Web mode, in the **Start Telelogic Synergy** dialog box, type the CCM server URL in **Server**, rather than typing the hostname.

    Typing the hostname as in previous releases starts a session in traditional mode.

  - To start a Telelogic Synergy CLI session in Web mode, type the CCM server URL, including the `-s` flag.

    For example:

    ```
    $ ccm start -d /vol/vod/ccmdb/mydb -s http://
    vod:8400
    ```

    Typing the `-h` flag with the hostname, as in previous releases, starts a Classic CLI session in traditional mode.

- **Scripting**—Telelogic Synergy 7.0 introduces a new CLI. Starting in release 7.0, the new CLI is referred to as Telelogic Synergy CLI, and the original CLI is referred to as Classic CLI.

  - The new Telelogic Synergy CLI runs only in the Web mode
  - The Classic CLI runs only in the traditional mode.

The new Telelogic Synergy CLI is not as complete compared to the Classic CLI, but it provides equivalent commands for most functions available in the Telelogic Synergy GUI. Most administration commands are not supported in the new Telelogic Synergy CLI yet, including those described in this book.

You may choose to continue running your existing scripts in the Classic CLI, or port them to the new Telelogic Synergy CLI if it includes all of the functionality needed by your scripts. Because the Telelogic Synergy CLI runs in Web mode, it is faster than the Classic CLI, but the Classic CLI continues to run as it has in previous releases.

Obtain additional information

Readme

The Telelogic Synergy *Readme* describes the new features in Telelogic Synergy, provides updates to the documentation, and contains sections on troubleshooting, contacting support, and known errors. See the *Readme* for the latest updates to the installation documentation.

The *Readme* is available in HTML on the documentation DVD and on the IBM Rational Software Support Web site.

The *Readme* can be available to all users by mounting the DVD on a shared drive. The *Readme* is available to Telelogic Synergy GUI users from the **Welcome** page. To display the **Welcome** page, from the main menu, select **Help** > **Welcome**.

Information in the *Readme* takes precedence over information in the documentation or in any of the Telelogic Synergy Help systems.

Contacting IBM Rational Software Support

Support and information for Telelogic products is currently being transitioned from the Telelogic Support site to the IBM Rational Software Support site. During this transition phase, your product support location depends on your customer history.

Product support

- If you are a heritage customer, meaning you were a Telelogic customer prior to November 1, 2008, please visit the [Telelogic Synergy Support Web site](#).

  Telelogic customers will be redirected automatically to the IBM Rational Software Support site after the product information has been migrated.

- If you are a new Rational customer, meaning you did not have Telelogic-licensed products prior to November 1, 2008, please visit the [IBM Rational Software Support site.](#)

Before you contact Support, gather the background information that you will need to describe your problem. When describing a problem to an IBM software support specialist, be as specific as possible and include all relevant background information so that the specialist can help you solve the problem efficiently. To save time, know the answers to these questions:

- What software versions were you running when the problem occurred?

- Do you have logs, traces, or messages that are related to the problem?

- Can you reproduce the problem? If so, what steps do you take to reproduce it?

- Is there a workaround for the problem? If so, be prepared to describe the workaround.

Other information

- For Rational software product news, events, and other information, visit the [IBM Rational Software Web site](#).

2 *General System Administration*

General system administration for Telelogic Synergy includes the following tasks:

- "Add users or change user roles in a Telelogic Synergy database" on page 12
- "Set up the Telelogic Synergy environment" on page 14
- "Set up ccm_root and informix users" on page 16
- "Log security messages" on page 16
- "Access Telelogic Synergy logs" on page 17
- "Telelogic License Server installation" on page 17
- "Manage the Telelogic Synergy daemons" on page 18
- "Broadcast system messages" on page 28
- "Monitor processes" on page 28
- "Check access to automounted file systems" on page 30
- "Set up for remote command execution" on page 32
- "Set up databases for read security" on page 38

Add users or change user roles in a Telelogic Synergy database

Each Telelogic Synergy database has a list of users. After you unpack a database from `base.cpk`, the list contains suggestions of user roles that you might want to give to users of a database. Each user list must contain the team members who can use the database. You need to add user names to the list of users for each Telelogic Synergy database, and give each user at least one role to define his capabilities within a Telelogic Synergy database.

Before you assign user names, consider whether you are going to use automatic email notification. If this is the case, the user's UNIX login name must also be the same as the email address (and must be the same as the Telelogic Synergy user name). However, the UNIX login name can be an alias or a forwarding name.

A user can have multiple roles within a single database. For example, user *sue* could have the role of *writer* and *developer*.

Roles identify which privileges a user has within a database. For example, if user *sue* is only given the *developer* role, she can perform all *developer* operations, but she cannot perform any *build_mgr* operations. The *ccm_admin* role is only used in Telelogic Synergy Classic and CLI.

> **Caution!** Users with the *ccm_admin* role can perform administrative actions on a database, and **have the right to modify any and every object in a database**. You should limit access to this role, and also to the *ccm_root* user, to those who specifically need this level of access.

> Note that *ccm_root* has all roles. However, it might or might not display in the users file list of roles.

1. Set user to *ccm_root*.

```
$ su - ccm_root
Password: *****
```

> **Note** The first time you add users to a database, you need to do so as user *ccm_root*. Once you establish who the administrative user will be (the user with *ccm_admin* role), then he can add users to the user list while logged in as himself.

If `CCM_HOME` and `PATH` were not set up for user *ccm_root* during installation, set these environment variables now.

See "Set up ccm_root and informix users" on page 16.

2. Start a Telelogic Synergy session in the *ccm_admin* role.

```
$ ccm start -nogui -r ccm_admin -d database_path
```

3. Open the `users` file.

```
$ ccm users
```

4. Add the user and the user's roles.

You can add or remove users from this file, or change a user's role. The user roles are predefined according to the Base Model. To add a user, read through the user list, then give users the appropriate role or roles.

Additionally, you can add comments and blank lines.

If you want to use the automatic notification of task assignment feature, the user name must be the same as the email address. The list of users will look similar to the following:

```
user john= build_mgr developer;
user sue= ccm_admin developer;
user bob= writer developer;
user tom= developer;

#testing group
user linda= tester;
user joe= tester;
user ann= tester;
user jane= tester;
user bill= tester;

user user1= developer;
user user2= developer;
```

In the example above, *john*, *sue*, *bob*, and *tom* are the users' login names. *sue* has the roles of *ccm_admin* and *developer*, *john* has *build_mgr* and *developer* roles, *bob* has *writer* and *developer* roles, while *tom* has *developer* role only. Below the first group of users, a second group, including only testers, is defined.

Note Create only one line, with all the user's roles, for each user. Also, end each line with a semicolon.

Additionally, user names in databases on UNIX servers must not be longer than eight characters, must not contain spaces, and must start with an alphabetical character.

5. Stop the Telelogic Synergy session.

```
$ ccm stop
```

6. Log out from user *ccm_root*.

Users who will run Web mode sessions must be added to the TDS and to the Telelogic Synergy databases. For information about adding users to TDS, see the *Telelogic Directory Server Administration Guide*.

Set up the Telelogic Synergy environment

The following sections explain how to set up user environments.

Include Telelogic Synergy in the user's path

If a user wants to use a different installation of Telelogic Synergy, or if a user is new to Telelogic Synergy, set CCM_HOME to the path to the installation directory. (e.g., `/usr/local/ccm70`). Then, set PATH to include `$CCM_HOME/bin`.

CCM_HOME and PATH typically are defined in one of the following files:

- For C shell users, the `.login` or `.cshrc` file

- For Bourne and Korn shell users, the `.profile` file

Set user defaults

Telelogic Synergy Classic users can set their own defaults for engine host, database, browser, and other options.

Initialization files (e.g., users' `.ccm.ini` files) are usually the files used to customize defaults. (The `.ccminit` file contains the Telelogic Synergy Classic commands that are executed at startup.)

- Telelogic Synergy does not use the settings in the `.ccm.ini` file. See the next section, "Set Telelogic Synergy options."

- See Telelogic Synergy CLI Help for information about default Telelogic Synergy options and settings.

Set Telelogic Synergy options

Telelogic Synergy has options that can be configured for the interface and for the server.

- `ccm.user.properties`

  This file provides local workstation settings, such as work area options for the Telelogic Synergy interface. The file is located in the user's home directory. Most user settings can also be configured using the **Options** dialog box.

- `ccm.server.properties`

  This file provides settings for tuning the server for the Telelogic Synergy interface. The file is located in `$CCM_HOME/etc`.

- `ccm.system_info.txt`

  This file provides settings for configuring the Telelogic Synergy installation system information. The file is located in the `$CCM_HOME/etc` directory and includes the following settings:

  - PROBLEM_SUBMIT_EMAIL—Email address to which problem information will be sent from the **Submit Request** dialog box in the Telelogic Synergy GUI. This option should be set to an internal email address so that the Telelogic Synergy experts at your company can review end-user requests to ensure they are valid and do not contain company-confidential information before passing them on to IBM Support.

    For more information, see "Contacting IBM Rational Software Support" on page 9.

  - LICENSE_SERVER—Host and port where the license server is running.

    For possible formats of the license server address, see the *Telelogic License Server* documentation.

  - HELP_SERVER—URL where you wish the ccm server to use to serve help pages.

  - TELELOGIC_DIRECTORY_SERVER—Host and port where the TDS is running.

    For possible formats of the license server address, see the *Telelogic License Server* documentation.

Set up ccm_root and informix users

You can set the environment variables on the command line or in the users' profiles. The following steps show how to set the environment variables in the *ccm_root* or *informix* profiles.

1. Add CCM_HOME to the path for user *ccm_root*.

```
$ su - ccm_root
Password: *****
$ vi .profile
```

If the `.profile` file is not the correct file for your shell, use the correct file (e.g., `.cshrc` or `.login`).

Add the following lines, and then exit from user *ccm_root*:

```
CCM_HOME=$CCM_HOME; export CCM_HOME
PATH=$CCM_HOME/bin
export PATH
$ exit
```

2. Add CCM_HOME to the path for user *informix*.

```
$ su - informix
Password:*****
$ vi .profile
```

If the `.profile` file is not the correct file for your shell, use the correct file.

Add the following lines, and then exit from user *informix*:

```
CCM_HOME=$CCM_HOME; export CCM_HOME
PATH=$CCM_HOME/bin:$CCM_HOME/informix/bin
export PATH
$ exit
```

Log security messages

One audit log is maintained per database and contains security-related messages from all Telelogic Synergy processes accessing the database. The log's default location is *database_path*/`audit_log`. Contact [IBM Rational Software Support](#) if you want to change the location of the audit log.

Access Telelogic Synergy logs

Telelogic Synergy produces a series of log files in one of the following locations:

- **UNIX Server**—`$CCM_HOME/log/`*`synergy_host_port.log`*
- **UNIX client**—`$HOME/ccmlog/synergy.log`
- **Windows Server**—`$CCM_HOME\log\synergy_host_port.log`
- **Windows client**—`<Application Data>\Telelogic\Synergy\synergy.log`

As each log file grows past a configurable limit, the files are rotated, producing log files such as `synergy1.log`, `synergy2.log`, and so forth, for the older versions. The size of each generation and the number of generations kept may be configured in the `$CCM_HOME/etc/logging.properties` file, with the properties `com.telelogic.cm.logging.TLogFileHandler.limit` and `com.telelogic.cm.logging.TLogFileHandler.count`. The default file size limit is 4MB, and the default number of files kept is 4.

On the server side, logs for the back-end sessions supporting Web mode clients are produced in the `$CCM_HOME/log` directory, using names in the format `username_ui.log` and `username_eng.log`, for each client user name.

Telelogic License Server installation

The Telelogic License Server installation is described in the *Telelogic License Server* documentation. See this document for step-by-step instructions.

Manage the Telelogic Synergy daemons

The Telelogic Synergy daemons must be running for you to start a session: `router` (the message router), `objreg` (the object registrar), server (the CCM server that serves Web mode Telelogic Synergy sessions as well as help requests), and, if used, `esd` (the engine startup daemon).

Telelogic Synergy supports all daemon processes (router, object registrar, engine startup service, and CCM server) and engine processes running on machines with more than one IP address.

If the interface process will not start and the router is running on a machine that has multiple IP addresses, you may need to modify the `.router.adr` file. The additional IP addresses need to be appended to the end of the `.router.adr` file. The format for machines with a host name is:

```
hostname:port[:IP]*
```

The format for machines with no known host name is:

```
ip:port[:IP]*
```

> where `[:IP]*` represents zero or more IP addresses separated by colons.

Message router (router)

The message router registers and requests information from other processes so that those processes can communicate with one another.

The router allows the maximum number of file descriptors (i.e., sessions) allowed by the system, with an upper limit of 4096. Your system administrator can change the number of file descriptors in the kernel parameters if an insufficient number is allowed.

You must run one **router** process per network installation, on the router host specified during the installation. Start this process by executing the `ccm_router` or `ccm_start_daemons` command.

The default log file for the router is `$CCM_HOME/log/ccm_router.log`.

Additionally, see "Start or stop the router (router)" on page 24.

Object registrar (objreg)

The object registrar registers all changes made to Telelogic Synergy database objects so that each user's view of the database stays up to date.

You must run one `objreg` process per database host, at all times, on the database server machine. (Determine on which host you should be running a database's object registrar by executing the `ccmdb info database_path -k HOSTNAME` command.)

Start this process by executing the `ccm_objreg` or `ccm_start_daemons` command.

The default log file for the object registrar is `$CCM_HOME/log/ccm_objreg.log`.

Additionally, see "Start or stop the object registrar (objreg)" on page 25.

Engine startup daemon (esd)

Telelogic Synergy clients may be configured to use the engine startup daemon to start sessions. The `esd` allows users to start Telelogic Synergy engines on a remote server without using `rsh` (remote shell) or `rexec` (remote execution) utilities. The `esd` process runs on the server. If you have configured any client to use `esd`, you must run one `esd` process on any machine where you will run Telelogic Synergy engines.

You can start this process by executing the `ccm_esd` or `ccm_start_daemons` command.

Note Telelogic Synergy Web mode sessions do not required ESD.

The default log file for the engine startup daemon is `$CCM_HOME/log/ccm_esd_hostname.log`.

Additionally, see "Start or stop the engine startup daemon (esd)" on page 26. For information about configuring the `esd.adr` port file, see "ccm_esd" on page 112.

Set up esd security

On Solaris™ and Linux® systems, the `esd` uses pluggable authentication modules (PAM) to authenticate users. The PAM service name is `cmsynergy`. To allow the `esd` to authenticate users, the PAM configuration must be updated to specify the authentication methods to use for the `cmsynergy` service, unless a reasonable default already exists.

The following are sample additions to a Solaris `/etc/pam.conf` file:

```
cmsynergy    auth     required     pam_unix_auth.so.1
cmsynergy    account  required     pam_unix_account.so.1
```

The following are sample additions to a Linux `/etc/pam.d/cmsynergy` file:

```
auth      required    /lib/security/pam_stack.so service=system-
auth
auth      required    /lib/security/pam_nologin.so
account   required    /lib/security/pam_stack.so service=system-
auth
```

AIX® has its own configuration scheme instead of using PAM. AIX authentication is through its base operating system.

For additional information about configuring PAM, refer to your system's documentation.

Set up the esd client

You must tell the client to connect to `esd` rather than use the normal engine startup procedure. This is done by editing the `ccm.ini` file in the client Telelogic Synergy installation's `etc` directory to specify how the engine is started.

You must add the following line to the first section of the `ccm.ini` file:

```
engine_daemon = TRUE
```

You can change either the `$CCM_HOME/etc/ccm.ini` file, or your own `.ccm.ini` file, which takes precedence.

Configure for trusted users

Note This section does not apply to Web mode users.

This option allows users to start a client without providing a password. When using this option, sessions on UNIX databases must be started using ESD.

To enable this feature, the administrator needs to create a file named `trusted_clients` on the router machine's `$CCM_HOME/etc` directory. The file must have the following format:

> *hostname1* [user_name1]

> *hostname2* [*user_name2*]

> Where the *hostname* is the client's hostname and the *user_name* is the client's login user name.

Both *hostname* and *user_name* fields accept + (plus sign) for ANY hosts or ANY user.

If the *user_name* field is missing, it has the same meaning as *user_name* set to +.

If the client is trusted, Telelogic Synergy displays the following behavior.

Telelogic Synergy Classic:
On the startup dialog, **User name** and **Password** are disabled, and **User name** displays the OS user name.

If the user name is specified from the command line (-n option), the client is no longer considered trusted and will behave like non-trusted clients.

Telelogic Synergy Command Line Interface (CLI):
The CLI will not prompt for the password if the client is trusted.

If the user name is specified from the command line (-n option), the client is no longer consider trusted and will behave like non-trusted clients.

Telelogic Synergy:
The login pane will not display **UserID** or **Password** (like Telelogic Synergy on UNIX), and the User name displays the OS user name.

If the user name is specified from the command line (-u option), the client is no longer considered trusted and will behave like non-trusted clients.

Set up ccm set_password

Use the `ccm set_password` command to store encrypted password(s) when you use the esd service. Build managers commonly use this command to start Telelogic Synergy sessions from scripts without being prompted for passwords.

The following is the usage form for this command:

```
$ ccm set_password host
```

where *host* is the destination host.

The `ccm set_password` command stores your password(s) in an encrypted file (`.ccmrc`) under your home directory. You can specify different passwords for different destination hosts. If you do not provide a destination host name, the password entered is treated as the default password for all destination machines that do not have an explicit password.

Help server

Telelogic Synergy uses a Web server to serve Telelogic Synergy Web mode sessions and help requests from users' sessions.

See "CCM Server Administration" on page 39 for information about configuring and managing the CCM server.

Start or stop all daemons

Start or **stop** all daemons by performing the following steps.

To kill the ESD process, you must be logged in as *root*.

1. Set user to *ccm_root*.

```
$ su - ccm_root
Password: *****
```

If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Start or stop the daemons.

```
$ ccm_start_daemons
```

    OR

```
$ ccm_stop_daemons
```

Note If all of the daemons do not start when you run `ccm_start_daemons`, you must stop all of the daemons before attempting to start them again using `ccm_start_daemons`. Otherwise, you can start individual daemons at any time without having to shut down all of the daemons first.

3. Exit from user *ccm_root*.

```
$ exit
```

Start or stop the router (router)

Start the message router daemon by performing the following steps.

1. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.)

2. Start the router.

   ```
   $ ccm_router
   ```

3. Exit from user *ccm_root*.

Stop the message router daemon by performing the following steps.

1. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.)

2. Find the `router` process ID.

   ```
   $ ccm monitor -process router
   ```

   You should see output similar to the following:

   ```
   Telelogic Synergy process monitor...1 process(es) located:
   user       process  host      port      pid   database path
   ----       -------  ----      ----      ---   -------------
   ccm_root   router   galaxy    1514      12220 -
   ```

   Note the `router`'s process ID (e.g., 12220).

3. Kill the router process.

   ```
   $ kill process_ID
   ```

4. Exit from user *ccm_root*.

Start or stop the object registrar (objreg)

Start the object registrar by performing the following steps.

1. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Start the object registrar.

   ```
   $ ccm_objreg
   ```

3. Exit from user *ccm_root*.

Stop the object registrar by performing the following steps.

1. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Find the `objreg` process ID.

   ```
   $ ccm monitor -process objreg
   ```

   You should see output similar to the following:

```
Telelogic Synergy process monitor...1 process(es) located:
user       process  host        port        pid   database path
----       -------  ----        ----        ---   -------------
ccm_root   objreg    orbit      34525       7288   -
```

   Note the process ID of the `objreg` (e.g., 7288).

3. Kill the object registrar process.

   ```
   $ kill process_ID
   ```

4. Exit from user *ccm_root*.

Start or stop the engine startup daemon (esd)

Start the engine startup daemon by performing the following steps.

To kill the ESD process, you must be logged in as *root*.

1. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Start the engine startup daemon.

   ```
   $ ccm_esd
   ```

3. Exit from user *ccm_root*.

Stop the engine startup daemon by performing the following steps.

1. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Find the esd process ID.

   ```
   $ ccm monitor -process esd
   ```

   You should see output similar to the following:

   ```
Telelogic Synergy process monitor...1 process(es) located:
user       process  host        port   pid    database path
----       -------  ----        ----   ---    -------------
ccm_root   esd      galaxy      57235  5238   -
   ```

   Note the process ID of the esd (e.g., 5238).

3. Kill the engine startup daemon process.

   ```
   $ kill process_ID
   ```

4. Exit from user *ccm_root*.

Start or stop the CCM server

Start the CCM server by performing the following steps.

1. Set user to *ccm_root*.

```
$ su - ccm_root
Password: *****
```

If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Start the CCM server.

```
$ ccm_server
```

3. Exit from user *ccm_root*.

Stop the CCM server by performing the following steps.

1. Set user to *ccm_root*.

```
$ su - ccm_root
Password: *****
```

If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Stop the CCM server.

```
$ ccm_server -stop
```

3. Exit from user *ccm_root*.

For more information, see "CCM Server Administration" on page 39.

Broadcast system messages

The `ccm message` command enables you to communicate with specific users or groups of users for administrative purposes. For example, you can send a message to a Telelogic Synergy specific user on a specific Telelogic Synergy database, or to all users on a specific Telelogic Synergy host.

For information about all `ccm message` options, see "ccm message" on page 104.

The following are examples of `ccm message`.

• Send a message to all users of all databases.

```
$ ccm message -d "?" "CM Server will be rebooted at noon"
```

• Send a message to user *joe* about his system.

```
$ ccm message -user joe "Your system will be upgraded at 2 pm"
```

• Send a shutdown message to all `project1` database users.

```
$ ccm message -database /vol/hydra/ccmdb/project1 \
"Bringing project1 database down now!"
```

Monitor processes

The following sections show how to monitor Telelogic Synergy processes and their related information.

Monitor processes using ccm monitor

The `ccm monitor` command provides a dynamic, network-wide view of all Telelogic Synergy processes and installation area. The information is displayed in a dynamically updated list, and you can limit the information you are viewing by adding options to the command.

The `ccm monitor` command displays a continuously updated list showing the processes' users, process types (engine, user interface, router, or object registrar), host name, process IDs, port number, and the associated database paths.

To exit from the command, press **CTRL-c**.

For Web mode users, the `ccm monitor` command shows the CCM server as **server**, and the right most column shows the URL that they can use to start sessions.

For more information about `ccm monitor`, see "ccm monitor" on page 106.

Monitor users

The following examples show how to monitor users.

- Display all the processes being run by user *ccm_root*.

```
$ ccm monitor -user ccm_root
```

- Show all users active on a database named `ann_test`.

```
$ ccm monitor -database /vol/hydra/ccmdb/ann_test
```

Monitor engines

The following example shows all interfaces with engines running on host `vod`.

```
$ ccm monitor -host vod -process engine
```

Note that you can use a string or an ACCENT regular expression in the value fields for any of these arguments. (Ensure that the argument starts with ?″ to indicate that it is a regular expression.)

The `ccm ps` command is similar to `ccm monitor,` but it lists more information about each process and does not loop continuously.

Monitor process status using ccm ps

The `ccm ps` command provides network-wide process status information about Telelogic Synergy users and processes. The `ccm ps` command is a maximum verbosity, single-pass version of `ccm monitor`.

For example, show the processes running on `benji`, on any model database, by executing the following command:

```
$ ccm ps -database "?model" -host benji
```

For more information about `ccm ps`, see "ccm ps" on page 109.

Monitor the database server using ccmsrv status

The `ccmsrv status` command shows the status of a database server. This command's information complements the information provided by the `ccm monitor` and `ccm ps` commands.

To use this command, you must be logged onto the UNIX machine that hosts the Informix™ server.

For example, show the status of the `vod` server by executing the following command:

```
$ ccmsrv status -s vod
```

For more information about `ccmsrv status`, see "ccmsrv status" on page 171.

Monitor the Telelogic Synergy daemons log files

The Telelogic Synergy router, object registrar, and engine startup daemons write output to log files in the `$CCM_HOME/log` directory. To monitor the `ccm_router.log`, `ccm_objreg.log`, and `ccm_esd_`*hostname*`.log` daemons' log files, use the following Telelogic Synergy equivalents of the `tail -f` command:

```
$ ccm_router_tail
$ ccm_objreg_tail
```

Check access to automounted file systems

Telelogic Synergy can run with an automounted installation area and automounted databases. The following sections discuss some issues you should consider when using the automounter with Telelogic Synergy.

- "File systems automatically unmounted" on page 30

- "Paths passed to machines not running the automounter" on page 31

- "Automounted databases' paths" on page 31

- "Indirect automounter maps" on page 32

File systems automatically unmounted

Automounted file systems may be automatically unmounted after a specified time. If a program attempts to access a file by the path it previously obtained using the *pwd* command or `getwd` system call and the file system has been unmounted, the file is not found.

To avoid this problem, perform the following steps:

1. Set user to *ccm_root*.

```
$ su - ccm_root
Password: *****
```

If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. View the official path.

The official path (DBPATH) is set when the database is created. Note the path name.

```
$ ccmdb info database_path
```

The information you receive looks similar to the following:

```
sargasso:ccm_root{3}ccmdb info /vol/sargasso1/ccmdb/base70
VERSION=7.0
PLATFORM=solaris
HOSTNAME=sargasso
ORHOST=sargasso
DBPATH=/vol/sargasso1/ccmdb/base70/db
DATABASE=informix
PROTECT=unprotected
ACTIVE=YES (database is active)
CASE=PRESERVE
SIZE=20480 KBYTES
SCHEMA=0111
```

The path is specified by DBPATH. After you have created a database, check the messages from the `create` or `unpack` commands. The messages show the DBPATH set for the database. If the DBPATH is not set to an absolute path that all machines can recognize, use the `ccmdb info` command to change it.

For example, set the `newdb` database's path to `/vol/vod1/ccmdb/newdb/db`.

```
$ ccmdb info -k DBPATH -v /vol/vod1/ccmdb/newdb/db newdb
```

3. Exit from user *ccm_root*.

Paths passed to machines not running the automounter

When a `pwd` or `getwd` command is executed on an automounted file system, the resulting path often is prepended with `/tmp_mnt`. Among programs running on machines with the same file system automounted, the paths are recognized. However, if that same path is passed to a program on a machine on which the file system is not automounted, the program cannot recognize the path.

Telelogic Synergy solves this problem by stripping the `/tmp_mnt` prefix from automounted file systems' paths. Telelogic Synergy also strips any prefix set using the `AUTOMOUNT_FIX` environment variable.

Automounted databases' paths

An automounted database's path must be accessible using the same path on the GUI interface and engine machines.

Verify that a database's path is accessible by changing directories to the official database path on the GUI interface and engine machines.

Indirect automounter maps

If you use an indirect automounter map, you might have to set the environment variable AUTOMOUNT_FIX in the environments of all users.

> **Note** You can use the AUTOMOUNT_FIX environment variable to resolve any potential automounter-related problems. If AUTOMOUNT_FIX is set to a string, Telelogic Synergy strips that string from the beginning of any path. For example, if AUTOMOUNT_FIX is not set, the default is to strip /tmp_mnt.

Setting AUTOMOUNT_FIX is appropriate only if both of the following are true:

- The automounter uses a path other than /tmp_mnt for mounting file systems.
- The same path is used everywhere.

You may need to create symbolic links on some machines to ensure that files on the automounted file system are accessible on all machines by the same path. If you are unsure of how to do this, refer to your automounter documentation.

Set up for remote command execution

The following sections describe how to set up remote execution methods for DCM.

See the *Telelogic® Synergy Distributed™* document for more information.

Set up remote execution methods

For each DCM destination host, add an execution method to the `$CCM_HOME/etc/remexec.cfg` file. Each entry in this file contains the host name and its corresponding remote execution method.

1. Set user to *ccm_root*.

```
$ su - ccm_root
Password: *****
```

If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Edit the remote execution configuration file.

```
$ cd $CCM_HOME/etc
$ vi remexec.cfg
```

3. Add the method for each host.

Specify the source host, destination host, purpose, environment variables, and command using the following syntax:

```
source_host   dest_host   [%purpose envvar]   command
```

where *source_host* is the name of the source host machine.

dest_host is the name of the destination host machine.

purpose is an optional remote execution purpose, normally either DCM or DEFAULT. If specified, the purpose must include a leading percent symbol (%) so that `ccm_remexec` can determine that a purpose was specified.

If the purpose is not specified, it is treated as a DEFAULT purpose. If both DEFAULT purpose and matching purpose exist between two machines, the entry with the matching purpose is used.

envvar is a list of environment variables that starts with an optional leading dash (-), and is separated by commas and no extra spaces. This defines the environment variables that `ccm_rsh` will pass to the process executing the remote command. A list that starts with a dash means that all environment variables except the specified ones will be passed by `ccm_rsh`. A list that does not start with a dash means that only the specified environment variables will be passed by `ccm_rsh`. The keyword value ALL means pass all environment variables.

An environment variable can be in one of the following formats:

- • NONE—None of the environment variables are passed to the remote machine.
- • ALL—All environments variables are passed to the remote machine.
- • Only the listed environment variable is passed to the remote machine, for example, env1, env2, ..., env*n*.
- • All the environment variables except the ones listed (-env1, env2, ... env*n*) are passed to the remote machine.

Note ccm_rsh only performs this environment processing when the remote execution host has a different IP address than the local host. In other words, if you use a ccm_remexec command that ultimately calls ccm_rsh to execute a command on the local host, all environment variables are propagated, regardless of the settings defined in remexec.cfg.

Both *purpose* and *envvar* are optional. However, if *envvar* is specified, then *purpose* must also be specified. If the *purpose* field is not specified, then all environment variables will be passed when ccm_rsh is used as the remote execution method.

The remexec.cfg file is shipped with the following default:

```
DEFAULT DEFAULT %DEFAULT ALL ccm_rsh -n [-s %shell] %hostname
%cmd_line
```

Note If you are using Telelogic® Synergy Distributed™, it only uses ccm_remexec for auto-receives on remote UNIX systems. A Windows to Windows auto-receive is not affected by entries in remexec.cfg.

The following are the search rules for remexec.cfg:

```
source_host    dest_host    matching_purpose  Highest Priority
ALL            dest_host    matching_purpose
source_host    ALL          matching_purpose
DEFAULT        DEFAULT      matching_purpose
source_host    dest_host    DEFAULT
ALL            dest_host    DEFAULT
source_host    ALL          DEFAULT
DEFAULT        DEFAULT      DEFAULT           Lowest Priority
```

See "Sample methods" on page 35 for an example of a shipped remexec.cfg file.

4. Save the file, and then exit.

remexec_method

The `remexec.cfg` file is used for defining remote execution tools on particular machines. The following are predefined keywords in this module:

`%hostname`	Remote hostname on which to run the command.
`%cmdline`	Command to be executed (as one line).
`%cmdargv`	Command to be executed (parsed as `argv`).
`%shell`	Shell that is used to run this command, if required.
`%command`	Overall parsed `argv` of shell + command.

The `remexec_method` string must contain the keywords `%hostname` and `%command_line`, which Telelogic Synergy expands automatically to the name of the remote host and the command to be executed remotely. This enables you to specify a remote execution command containing options in any position.

The `-n` option is required, as well, in any methods using `ccm_rsh` because `rsh` requires the `-n` option for some commands.

Sample methods

The following is a possible `remexec.cfg` file:

```
DEFAULT DEFAULT %DCM -HOME,PWD,TMP ccm_rsh -n
[-s %shell] %hostname %cmd_line
```

If you are using Telelogic® Synergy Distributed™, by default, DCM auto-receives should not pass the `CCM_HOME`, `HOME`, `PWD`, `TMP`, or `TEMP` environment variables because they can cause the remote DCM receive to fail when processing the status attribute.

Note Do not use `rsh(1)` or `remsh(1)` as the `remexec_method`. These methods do not pass the environment to the remote process or return the exit status, both of which are necessary for remote builds.

Telelogic Synergy provides an alternative remote execution method called `ccm_rsh`, which performs the authentication tests required by `rsh` or `remsh`. (`ccm_rsh` invokes either `rsh` or `remsh`, as appropriate, as part of its implementation.) However, `ccm_rsh` overhead is approximately twice that of `rsh`.

Customize remote execution tools

Telelogic Synergy uses `ccm_rsh` as the default tool to execute remote commands. The `ccm_rsh` command uses the `rsh` protocol with few enhancements. If you decide to use your own tool, such as `ssh`, to execute remote commands, you need to change the `remexec.cfg` file.

1. Develop your own tool to have similar functionality as `ccm_rsh`, keeping the following in mind:

   - Preserve the return status of the remote commands.
     This is required.
   - Add the ability to replicate local environment variables to remote machines.
     This is optional. You need it if you use Telelogic® Synergy Distributed™ auto_receive capability.
   - Preserve the current directory for remote commands.
     This is optional.

2. Modify the corresponding fields in the `remexec.cfg` file to use your own tool.

   For example, change DCM to use your tool by changing the following line in the `remexec.cfg` file.

   Change this line:

   ```
   DEFAULT  DEFAULT %DCM  -HOME,PWD,TMP  ccm_rsh -n [-s %shell]
   %hostname
   ```

   Make the following changes:

   ```
   DEFAULT  DEFAULT %DCM  -HOME,PWD,TMP  my_ssh %hostname
   ```

3. If you plan to use your tool for DCM, implement the partial environment variable replication feature.

   The replicated environment variables are controlled by the `CCM_REMOTE_ENV` environment variable passed to your tool. The `CCM_REMOTE_ENV` can be one of the following formats:

   - `ALL`
     Replicate all environment variables to the remote machine.

   - `NONE`
     Do not replicate environment variables to the remote machine.

   - env1<space>env2<space>**...**<space>env*n*
     Only replicate env1, env2, ..., env*n* environment variables to the

remote machine.

- **-**<space>env1<space>env2<space>**…**<space>env*n*

    Replicate all except `env1, env2, ..., env`*n* environment variables to the remote machine.

Restart inetd

If you changed the `inetd.conf` file, you must restart `inetd`.

1. Set user to *root*.

```
$ su root
Password: *****
```

2. Send an HUP signal to `inet`.

```
root# kill -HUP inetd_processID
```

3. Exit from user *root*.

Set up databases for read security

Group security allows restriction of check out and modify permissions to a specified group of users. In addition, read security, which limits visibility of source to designated groups, can be specified.

Read security is implemented by providing access control to an object's source attribute. Users can query for objects and see other attributes regardless of any read restrictions. Read security applies to source objects which can be versioned, and does not apply to directories and projects.

Read security does not have any affect on link-based work areas.

Your database should be set up to deny read access to the database path to all regular users. You can do this by mounting the database on a machine that no one can access, or by changing permissions at the system level so no one has access to the database path. This requires that users run remote clients. The remote clients will only be able to use copy-based work areas.

Three different levels of read access security can be defined as an object:

• That has no read access restrictions to its source. It can be accessed by any user.

• That has one or more groups defined for read access. It will only allow access to the source if the user is a member of at least one of those groups. All other users are denied access to the source contents of that object.

• With the highest level of security (no access to the source). It cannot be viewed, checked out, or modified, but other attributes can be viewed. However, users working in the *ccm_admin* role can always view the source contents of files.

Any object that is checked out inherits the same group security restrictions as its predecessor, including read security restrictions. Use the `ccm groups` command to implement and define security for objects. Group settings on individual objects may be viewed or modified in the Telelogic Synergy GUI.

3   *CCM Server Administration*

About the CCM server

The CCM server is a Web server that is responsible for the following tasks:

- Serves requests from Telelogic Synergy sessions running in Web mode.

- Serves help pages for all Telelogic Synergy GUI sessions, both Web mode and traditional mode.

- Hosts patches for automatic deployment to Telelogic Synergy client installations.

Every Telelogic Synergy server installation needs at least one CCM server. For better scalability, you can start additional CCM servers, for example, if you have multiple Telelogic Synergy databases with many users. A CCM server can manage multiple databases, but one database cannot be managed by more than a single CCM server. One CCM server must be designated to serve help. For more information, see `system_info.txt` in "Set Telelogic Synergy options" on page 15.

A CCM server can run on any system on your network that is running a server platform supported by Telelogic Synergy 7.0.

The CCM server starts back-end command interface sessions to process user requests from Telelogic Synergy Web mode clients. It manages the back-end sessions, starting new ones as needed and shutting down old ones when they are no longer needed.

Start and stop the server

The CCM server is started automatically by the `ccm_start_daemons` command, and stopped by the `ccm_stop_daemons` command on the system where the CCM server is running.

To start the CCM server individually, use the `ccm_server -start` command. To stop the CCM server, use the `ccm_server -stop` command on the system where the server is running.

See "Start or stop the CCM server" on page 27 for more information.

Manage multiple servers

UNIX:

By default, the CCM server runs the help server on port 8400. To change the port, use the `ccm_server -port <port>` command to specify the new port number.

To move the CCM server to run on a different system on the network, stop the CCM server, and then log on to the new system and start the server, optionally specifying a new port number.

After starting the CCM server, start a Telelogic Synergy session in Web mode on the database(s) where that server will serve using the URL of the CCM server as the server parameter. For example:

```
$ ccm start -d /vol/boon/ccmdb/test_ccm -s http://newhost:8400
```

This locks the database to that CCM server. A database can be managed by only one CCM server, although multiple databases can be managed by the same server. To change the CCM server that a database uses, stop the CCM server, start it in the new location, and start a new Telelogic Synergy session in Web mode on the database using the new server URL.

Configure the server

The CCM server is configured using settings in the `ccm.server.properties` file, which is located in the `etc` directory of the Telelogic Synergy server installation. The CCM server settings are in the Web server settings section of the file.

To change the server configuration, first stop the server, and then edit the `ccm.server.properties` file to change the settings. Then restart the server.

The following settings can be configured. They govern the behavior of the back-end sessions managed by the CCM server.

- `cm.webserver.max.sessions`—Maximum number of back-end sessions that will run on your server system to serve Telelogic Synergy Web mode client requests.

- `cm.webserver.persistent.sessions`—Number of back-end sessions that will persist even when the server is not receiving many user requests. This ensures that several back-end sessions are available to handle increased demand. When the CCM server is first started, it will not automatically start this number of back-end sessions unless there is sufficient demand. However, after the number of back-end sessions reaches this value, that number persists.

- `cm.webserver.parallel.startups`—Number of back-end sessions that will be started in parallel when ramping up the number of back-end sessions. For example, if this setting is set to 2, the CCM server starts 2 back-end sessions in parallel. Then, when they are available, if there is still sufficient demand, it starts 2 more. This minimizes resource issues that can occur from too many sessions being started in parallel.

- `cm.webserver.session.min.free.time`—Number of seconds a back-end session remains idle before it is retired. This setting controls how aggressive the server is at retiring sessions when demand slows.

- `cm.webserver.user.authentication.timeout`—Number of seconds between user credential checks. There should be no reason to change this setting unless directed to do so by IBM Support.

Monitor the server

The following commands can be used to monitor CCM server processes:

- `ccm monitor`—Shows a dynamic display of all Telelogic Synergy processes on the network for a given Telelogic Synergy installation. CCM servers are shown with the process name **server**, and the server URL is shown in the `Database` column. Telelogic Synergy Web mode users need to specify the server URL to start a session.

- `ccm ps`—Lists all Telelogic Synergy processes on the network for a given Telelogic Synergy installation. CCM servers are shown with the process name `server`, and the server URL is shown in the `Database` column.

See "Monitor processes" on page 28.

Refresh a database

The `ccmdb refresh` command refreshes all Web mode back-end sessions for the specified database. Use this command after you create or change a model object attribute that affects the behavior of Telelogic Synergy clients, so your changes will take effect for all users.

After you run this command, the Telelogic Synergy server starts new back-end sessions to process all new incoming user requests for that database, and will shut down existing sessions on that database as they finish processing requests.

Because back-end sessions are reused by different Web mode users, restarting Telelogic Synergy GUI Web mode sessions will not cause model changes to take effect. Therefore, it is necessary to refresh the database using this command.

Examples of model changes for which you may want to refresh the database include:

- Changing the `conflict_parameters` or `conflict_exclude_rules` that control which conflicts are shown.

- Changing the `parallel_exclude_rules` that control which parallel conflicts are shown.

- Setting the default work area template for all users.

- Changing the range for keyword expansion in source files.

It is not necessary to use this command after adding, removing, or editing users. Modifying the users attribute causes back-end sessions to be refreshed automatically.

Group changes that require a database refresh so that you do not need to refresh databases more than necessary. Although the refresh should be transparent to end users, their session response time may be somewhat slower during a refresh.

For more information on `ccmdb refresh`, see "ccmdb refresh" on page 147.

Manage log files

The CCM server log is in the `synergy_host_port.log` file, located in the `$CCM_HOME/log` directory of the Telelogic Synergy server installation, for example, `boon.8400.54123`. For more information, see "Access Telelogic Synergy logs" on page 17.

The Telelogic Synergy back-end sessions managed by the CCM server all run on the server host. Their log files (both `ui` and `engine`) are saved in the `$CCM_HOME/log` directory. There will be one pair of log files for each user who runs Telelogic Synergy Web mode sessions. The names of the log files are `<userid>_ui.log` and `<userid>_eng.log`.

Because these back-end session log files tend to grow and end users do not have direct access to them, the administrator should monitor the sizes of the files in the `log` directory and move those approaching a limit, such as 1GB, to a different name. When a `log` file is moved, the Telelogic Synergy logger continues logging to the original file name. Older log files that were moved can be deleted after a period of time. It is a good idea to keep these older files for a certain time period after moving them, should you need to investigate an issue for a user.

The *CM administrator* may want to automate the process of monitoring the directory for large `log` files, moving large `log` files, and deleting very old moved `log` files.

4 *Database Server Administration*

Administering Telelogic Synergy Informix database servers includes the following tasks:

- "About the Informix database server" on page 43
- "Show database server status" on page 46
- "Take a database server offline" on page 46
- "Bring a database server online" on page 47
- "Put a database server in quiescent state" on page 48
- "Change a database server's parameter values" on page 49
- "Create an Informix database server" on page 50
- "Delete a database server" on page 54
- "Increase the database space" on page 55
- "Verify name or address resolution" on page 56
- "Set up remote engine access to the server" on page 57
- "Archive a database server" on page 59
- "Restore a database server" on page 64
- "Back up logical log files" on page 67
- "Restore logical log files" on page 71
- "Obtain detailed Informix messages" on page 72

About the Informix database server

A Telelogic Synergy database consists of a file system data and Informix metadata database spaces (dbspaces). The file system portion uses standard UNIX file systems to store control information and the sources of files under CM control. The Informix portion, which holds metadata such as the owner and status of objects, is stored in databases spaces (dbspaces) on the Informix database server. The following sections describe some of the Informix dbspaces features.

Database spaces

An Informix database server consists of four dbspaces: `rootdbs`, `log`, `tempdbs`, and `ccm`. Each dbspace serves a specific purpose and requires a minimum of one chunk file.

`rootdbs`

> The `rootdbs` dbspace stores system data and physical logs. You specify the `rootdbs` path and size when you create the Informix database server.

`log`

> The `log` dbspace stores logical logs of changes to the database.
>
> You specify the `log` path and size when you create the Informix database server, and you can specify a size larger than the default.

`temp`

> The `temp` dbspace stores temporary tables and sort files. Some queries create and access large temporary files. Therefore, placement of temporary dbspace is a critical performance factor. You specify the `temp` path and size when you create the Informix database server.

`ccm`

> The `ccm  dbspace` stores metadata for Informix databases. Initially, this dbspace uses a single chunk file. You specify the **ccm** path and size when you create the Informix database server.

The default space suggested for the `root`, `temp`, and `log` dbspaces is about 1 MB per user. For the `ccm  dbspace` it is about 2 MB per user. For the default 20 users, the total dbspace is about 100 MB.

See "Create Informix chunk files" on page 179 for more information about chunk files.

Dbspace chunk files

Chunk files are physical disk spaces used by databases spaces (dbspaces) on Informix database servers. Each dbspace must consist of at least one chunk file.

As Telelogic Synergy databases grow, more dbspace is needed for the metadata. Therefore, you must monitor the dbspace usage using the `ccmsrv status` command (see "ccmsrv status" on page 171) and, if necessary, increase the `ccm` dbspace space using the `ccmsrv expand` command (see "ccmsrv expand" on page 163).

You can specify the size of the `ccm dbspace` during server creation. The recommended value is based on the number of users you configure for the database server. This initial value is only a rough estimate and will not meet the needs of all development teams.

Note Do not perform system backups of chunk files. The recommended way to back up Telelogic Synergy databases is discussed in "Back up a database" on page 77 and in Appendix A.

You should archive the database server, as described in "Archive a database server" on page 59, rather than backing up chunk files.

If you must back up chunk files as part of a system backup, you must take the database server offline to avoid serious data corruption.

Keep in mind the following when expanding the `ccm dbspace`:

• Allocate the space generously. It is better to allocate more space than needed than to run out of space.

• **You must not use an existing chunk file.**

The content of a chunk file is reinitialized when you use it for a dbspace, and you will lose the existing metadata if you use an existing chunk file.

• **You must not move a chunk file.**

If you move a chunk file, the database server will no longer function. Consequently, the database server might lose data.

Database server states

As the database server administrator, you will manage the creation, modification, and deletion of your database server(s). These operations require you to change the state of the database server to and from the following states:

*   Online—Database server is available to all users who connect to it.

*   Offline—Database server disconnects users currently connected to the server and prevents users from starting new sessions.

*   Quiescent—Users are disconnected, but the administrator still can run administrative commands.

    The quiescent state is used mainly for database server administration and should not be used for any other purpose.

Show database server status

Show the status of the logical log and the dbspace by executing the `ccmsrv status` command.

For example, show the status of the logical log and dbspace of the `hydra1` server as follows:

```
$ ccmsrv status -log -dbspace -s hydra1
```

Take a database server offline

1. Log on to the database server as user *root*.

2. Set user to *informix*.

    ```
    root# su - informix
    Password: *****
    ```

    If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Take the database server offline (using `-y` to suppress confirmation messages).

    For example, take the `hydra1` server offline as follows:

    ```
    $ ccmsrv offline -y -s hydra1
    ```

4. Exit from user *informix*.

    ```
    $ exit
    ```

Bring a database server online

1. Log on to the database server as user *root*.

2. Set user to *informix*.

   ```
   root# su - informix
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Bring the database server online (using -y to suppress confirmation messages).

   For example, bring the hydra1 server online as follows:

   ```
   $ ccmsrv online -y -s hydra1
   ```

4. Exit from user *informix*.

Put a database server in quiescent state

1. Log on the database server as user *root*.

2. Set user to *informix*.

   ```
   root# su - informix
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Send out a message to all server users, alerting them to the state change.

   For example, send a message to all users on the santo and malta databases (the databases on the hydra1 server), as follows:

   ```
   $ ccm message -database santo "Putting server in
   quiescent state in 15 minutes. Please exit from your
   sessions."
   ```

   ```
   $ ccm message -database ?malta "Putting server in
   quiescent state in 15 minutes. Please exit from your
   sessions."
   ```

4. Shut down all databases.

   ```
   $ ccmdb shutdown /vol/hydra1/ccmdb/santo
   $ ccmdb shutdown /vol/hydra1/ccmdb/malta
   ```

5. Put the database server in a quiescent state.

   For example, put the hydra1 server in the quiescent state so that you can perform administrative tasks, as follows:

   ```
   $ ccmsrv quiescent -s hydra1
   ```

   Note All active Telelogic Synergy sessions lose their connections to the database server when you change its state.

6. Exit from user *informix*.

Change a database server's parameter values

1. Log on the database server as user *root*.

2. Set user to *informix*.

   ```
   root# su - informix
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Change the database parameter values.

   For example, change the maximum number of users allowed in `hydra1` server to 200, as follows:

   ```
   $ ccmsrv modify -user 200 -y -s hydra1
   ```

   Note If you change the maximum number of users, you might have to change your semaphores and shared memory kernel parameters. See "Check shared memory and semaphore kernel parameters" on page 181 for more information.

4. Exit from user *informix*.

Create an Informix database server

You can create a database server on the installation machine or on a remote host. Installers often create a database server on the installation machine. However, you are not required to do so. You can make any host a database server if the machine meets the system requirements and a valid installation directory for that platform is visible (e.g., local or NFS-mounted).

For example, if the installation directory for Solaris is `/usr/local/ccm75` on the `solaris1` machine and you want to create a database server on `solaris2`, you can NFS-mount the installation directory on `solaris2`, and then create a database server on `solaris2`. Creating the database server automatically adds an entry for `solaris2` to the `sqlhosts` file in the Solaris installation directory.

You can allow a database server to run server processes for a different type of platform. For example, if you want an AIX database server, `aix1`, to be available as a database server for Solaris 9 or 10 machines, you can add the `aix1` entry manually to the Solaris 9 or 10 installation directory's `sqlhosts` file.

Note If you create the database server on a different machine than the installation machine, you must ensure that the database server is configured correctly. See "Create an Informix database server" on page 50.

Prepare the database server

See "Database server and engine machine requirement" and "Prepare the database server" in the *Telelogic Synergy Installation Guide for UNIX*.

Create the database server

1. Log on to the database server as user *root*.

   If your database server is the same as your installation machine, you are logged in already as *root*.

2. Create a directory for the Informix dbspace *(chunkfiles)*.

   Replace *informix_chunkfiles* with the path to your Informix chunk files. When you create chunk files, keep the following in mind:

   • Place the chunk files where no one can remove them.
   • Create the chunk file directory (e.g., */data/informix_chunkfiles*) on the machine where the database server will run.
   • For the best performance and reliability, use raw partitions for Informix chunk files. (Note that in the rare event of file system corruption, cooked files are affected but raw files are not.)

- The names of your chunk files paths must contain fewer than 66 characters.
- The maximum chunk files size is 2 GB. If you need more than 2 GB, contact [IBM Rational Software Support](#).

Caution Informix data files should not be backed up as normal UNIX files. Therefore, avoid putting this directory under the installation directory, *$CCM_HOME*, or under the *ccm_root* or *informix* home directory.

See "Create Informix chunk files" on page 179 for more information about creating chunk files.

```
root# mkdir informix_chunkfiles
root# chown informix informix_chunkfiles
root# chgrp informix informix_chunkfiles
root# chmod 770 informix_chunkfiles
```

3. Create a directory for the Telelogic Synergy databases.

Replace *ccmdb* with the database directory (e.g., */data/ccmdb)*.

Caution Avoid putting the database directory under the installation directory. If necessary, you can create the directory under the *ccm_root* home directory, if the *ccm_root* home directory is not under the installation directory.

```
root# mkdir ccmdb
root# chown ccm_root ccmdb
root# chgrp ccm_root ccmdb
root# chmod 755 ccmdb
```

4. Create the database server.

You can create the database server interactively or by using a configuration file.

Use the directory created in step 2 on page 50 (*informix_chunkfiles*) for the primary chunk path for the `root` dbspace. Then, use the defaults for everything else except the number of users, which you should set to the expected number of simultaneous users of all databases on this server, rounded up to the nearest 10.

Your chunk files path names must be fewer than 66 characters. Also, the default space suggested for the `root, temp,` and `log` dbspaces is about 1 MB per user. For the `ccm dbspace` it is about 2 MB per user. Therefore,

for the default 20 users, the total is about 100 MB. See "Create Informix chunk files" on page 179 for more information.

Type valid values for the number of CPUs, number of users, and server number.

Note If you have other Informix installations, either active or inactive, the default server number that `ccmsrv create` attempts to use might be in use already and an error like the following appears in the log file:

```
11:13:05  shmget: [EEXIST][17]: key
52574801: shared
memory already exists
11:13:05  mt_shm_init: can't create resident
segment
```

Correct this problem by using a different server number.

Also, you might see an error like the following in the log file if you need to increase the size of your shared memory kernel parameters:

```
16:53:12  shmat: [EMFILE][24]: out of shared
memory
segments, check system SHMSEG
16:53:12  mt_shm_init: can't create resident
segment
```

See "Check shared memory and semaphore kernel parameters" on page 181 for shared memory kernel parameter values.

Create a database server interactively

```
root# su - informix
Password: *****
$ ccmsrv create [-s servername]
$ exit
```

Create a database server using a configuration file

```
root# su - informix
Password:*****
$ ccmsrv create -file config_filename
```

A configuration file might look like the following:

```
# Database Server Configuration file for vodtest
#
# Server Number
SERVERNUM 10
# Maximum Number of Users
USERS 20
# root dbspace parameters
ROOT_CHUNK_PATH /xfile1/ifmx_chunks/root.dbs
ROOT_CHUNK_SIZE 12560
ROOT_CHUNK_OFFSET 0
TEMP_CHUNK_PATH /xfile1/ifmx_chunks/temp.dbs
TEMP_CHUNK_SIZE 12560
TEMP_CHUNK_OFFSET 0
# log dbspace parameters
LOG_CHUNK_PATH /xfile1/ifmx_chunks/log.dbs
LOG_CHUNK_SIZE 10240
LOG_CHUNK_OFFSET 0
# Archive device
/dev/null
# ccm dbspace parameters
CCM_CHUNK_PATH /xfile1/ifmx_chunks/ccm.dbs
CCM_CHUNK_SIZE 20480
CCM_CHUNK_OFFSET 0
# end of file
```

When the database server creation is completed, the server's configuration is written to a configuration file named *servername* (the HOSTNAME, by default) in the $CCM_HOME/informix/etc directory.

Delete a database server

This procedure removes a database server completely, including its configuration file, the server's entry in the `sqlhosts` file, and any of the server's chunk files that are not raw devices.

Caution   When you delete a database server, the Informix data portion of all Telelogic Synergy databases under this database server are destroyed. However, the file system portion is not destroyed. Therefore, you should back up all the database server's databases (e.g., using `ccmdb backup`), and then in most cases delete the databases (e.g., using `ccmdb delete`) one by one before deleting the database server. Deleting the databases prior to deleting the database server removes all parts (file system and metadata) of each database.

1.   Log on the database server as user *root*.

2.   Set user to *informix*.

   ```
   root# su - informix
   Password: *****
   ```

   If `CCM_HOME` and `PATH` were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3.   Remove all databases from the server.

   You must remove all databases from the server before deleting it. See "Delete a database" on page 83.

4.   Delete the database server.

   For example, delete the `hydra1` database server as follows:

   ```
   $ ccmsrv delete -s hydra1
   ```

5.   Exit from user *informix*.

Increase the database space

1. Log on the database server as user *root*.

2. Set user to *informix*.

   ```
   root# su - informix
   Password: *****
   ```

   If `CCM_HOME` and `PATH` were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Expand the dbspace of the database server.

   Caution Specify a **new** chunk file, not an existing chunk file.

   For example, increase the `ccm` dbspace on the `hydra1` server by 60,000 KB (with a 0 offset), using the `/vol/data/informix_chunkfiles/vod_ccm_2.dbs` chunk path, as follows:

   ```
   $ ccmsrv expand -dbspace ccm -size 60000 -path \
   /vol/data/informix_chunkfiles/vod_ccm_2.dbs -s hydra1
   ```

4. Exit from user *informix*.

See "Create Informix chunk files" on page 179 for more information about creating chunk files with which to expand the dbspace.

Verify name or address resolution

Machines running Telelogic Synergy daemons (router, object registrar, and engine startup daemon) must be reachable by all other Telelogic Synergy processes. Machines running database servers must be reachable from Telelogic Synergy engine processes. Machines running engines, routers, object registrars, and ESDs must be reachable from Telelogic Synergy interface processes.

For machine A to be reachable from machine B, the following must be true:

• Machine A must return a host name that can be resolved by machine B.

OR

• The host name of machine A must map (on machine A) to an IP address that can be used to connect to machine B (possibly by resolving a different name).

   Note

To allow machines to be reachable through consistent names, do the following:

1. Verify that each machine that is used for daemons, database servers, and engines has a single, unique name recognized throughout your network. Also, ensure that either a simple or fully-qualified name is used consistently.

   If the database server machines do not have recognized names, set the servers' names to their IP addresses to make them recognizable, provided this IP address is reachable throughout your network.

   Use the `ccmdb info` command to set a server's name (`HOSTNAME`) to its IP address, for a specific database, using the following syntax:

   ```
   $ ccmdb info -k hostname -v IP_address database_path
   ```

2. Verify that the Informix `sqlhosts` file consistently uses the same host name.

   For example, verify that the server named `horse` has host name `horse.vod.com` and service name `horse_horse.vod.com`.

   ```
   $ cd $CCM_HOME/informix/etc
   $ vi sqlhosts
   horse    onsoctcp    horse.vod.com    horse_horse.vod.com
   ```

Set up remote engine access to the server

If you want to run an engine on one or more remote hosts (instead of, or in addition to, on the database server), you must ensure that the server has trusted access to and from the engine hosts as *ccm_root*.

To test this, log on remotely, as *ccm_root*, to and from each database server host, engine host, and client host machine. If you cannot log on, edit the hosts file. If you cannot log on without being prompted for a password, edit the `hosts.equiv` (or `.rhosts`) file.

See "Routing, Services, Hosts, and Passwords" in the *Telelogic Synergy Installation Guide for UNIX* for a comparison of NIS and non-NIS files used to support remote access. The following files are used to define remote engine hosts.

hosts

The `hosts` file must contain the names of all database servers and the Telelogic Synergy engine hosts, on every engine host or in the `/etc/host` file's equivalent NIS file.

Host entry in the `/etc/hosts` file has the following syntax:

`IP_address official_host_name [aliases]`

The host names and aliases must be consistent among all machines.

hosts.equiv (or .rhosts)

The `/etc/hosts.equiv` or `.rhosts` files, and its NIS equivalent, contain the names of remote hosts that are trusted on or "equivalent" to the local host. Equivalent hosts are allowed access to the local machine using `rcp, remsh,` and `rlogin` commands without a password.

All client machines that perform DCM transfers must be equivalent hosts on the DCM destination machines.

Each host entry in the `/etc/hosts.equiv` file has a syntax similar to the following:

```
hostname
hostname.domain_name.com
hostname.other_domain_name.com
```

If you are running NIS, update the NIS master hosts.equiv map. If you are not running NIS, you must edit the `/etc/hosts.equiv` file on every engine, client, and build machine.

You also must ensure that *ccm_root* is a trusted user on the database server, from each engine machine, so that *ccm_root* can log on remotely without a password in either direction.

For example, you could type *ccm_root* in the database server's `hosts.equiv` file as a trusted user from machines `solaris1` and `aix1`, as follows:

```
aix1 ccm_root
solaris1 ccm_root
```

Use either `/etc/hosts.equiv` or each user's `.rhosts`, whichever is appropriate for your network security requirements.

Archive a database server

The `ccmdb backup` command (page 128) backs up individual databases. You can, however, back up the database server, and all its databases, using the `ccmsrv archive` command.

Use the `ccmsrv archive` command under the following circumstances:

- You prefer to back up all the databases at the same time.

- You want to archive the server regularly in addition to performing database backups.

- An individual database is too large to back up using the `ccmdb backup` command.

Note You cannot restore just one database from a server archive. Because archiving a server archives all databases for that server, restoring the server restores all the server's databases to their archived states. Any individual database backups you may have performed for that database server become invalid.

Before archiving your server, you also must do the following:

- Establish an archiving plan, and update it periodically.

  Create and test a plan for scheduled archiving to ensure that the plan works and does not affect your current production environment.

- Plan to have users exit from their Telelogic Synergy sessions during the archive procedure.

  When the archive is in progress, users might still be editing in the file system while the database activities are suspended. This can cause data inconsistencies.

  Ensuring that users are not making changes in the file system while the server is being archived helps avoid data inconsistencies when the server is restored.

- Coordinate all archive and restore procedures with the local system administrator.

  Ensure that the file system part of the Telelogic Synergy database is backed up properly and synchronized with the database server archive.

- Prepare to restore from both the database server and file system archives when you restore the server.

When you archived the database server, you should have also backed up the file system (separately). If the server archive and file system are not synchronized when you restore the server, data inconsistencies can result.

You must archive the file system using whatever method is appropriate for your environment.

Note You can restore changes made since the last server archive by restoring backed-up logical log files. See "Restore logical log files" on page 71.

See "Database Backup Methods" on page 173 for a comparison of the Telelogic Synergy backup methods.

Archive schedule

You should plan to create some level of archive daily. Under some circumstances, you might want to perform archiving more than once daily. (For example, you might want to archive files three times daily prior to a major release or during a major bug fix phase.)

The three archiving levels are as follows:

- Level 0 is the baseline archive.

- Level 1 includes all changes since the last Level 0 archive.

- Level 2 includes all changes since the last Level 0 or Level 1 archive.

The following is an example of an incremental archiving plan:

- Level 0 archive is created once every nine days.

- Level 1 archive is created once every three days, except when a lower-level archive is performed.

- Level 2 archive is created once daily, except when a lower-level archive is performed.

The following table shows an archive plan. Numbers 1 through 11 denote tape numbers.

Levels	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu
Level 0:	1									10	
Level 1:			4			7					
Level 2:		2	3		5	6		8	9		11

Archive media

You must use tapes to archive the database server. Use your archive plan to determine which tapes you need. For example, if you used the sample plan shown in the previous table, the following table shows the tape requirements for each day in the archive plan.

Day	Tapes Needed
Tue	Tape 1
Wed	Tapes 1 and 2
Thu	Tapes 1 and 3
Fri	Tapes 1 and 4
Sat	Tapes 1, 4, and 5
Sun	Tapes 1, 4, and 6
Mon	Tapes 1 and 7
Tue	Tapes 1, 7, and 8
Wed	Tapes 1, 7, and 9
Thu	Tapes 10
Fri	Tapes 10 and 11

Archive the server

1. Log on the database server as user *root*.

2. Set user to *informix*.

    ```
    root# su - informix
    Password: *****
    ```

    If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Insert the tape.

4. Archive the server.

    For example, create a Level 0 archive of the hydra1 database server using the /dev/rst8 tape device with a 1 GB tape for the database server, as follows:

    ```
    $ ccmsrv archive -level 0 -size 1000000 -device /dev/rst8
    ```

    You also can use a UNIX file for the archive device.

    The size of device you specify should match the capacity of the tape.

5. Label the tape clearly.

    You must perform this step. The success of the restore procedure depends on the accuracy of the labels.

6. Exit from user *informix*.

Restore a database server

When you restore a database server, you go back to the server's and its databases' previous states when the last archive was performed.

Typical reasons for restoring a database server are as follows:

- One or more of your databases is corrupted so badly that you must go back to the last archive.

- The chunk files disk for any of the dbspaces crashed.

- You want to replace one of the database server's chunk file disks.

- A user has accidentally deleted a project.

- The system or application software has failed.

- The server machine has crashed.

If you are unsure whether you should restore your database server, contact <u>IBM Rational Software Support</u>.

Note Restoring a database server causes all changes made after the previous archive to be lost unless your system administrator performed a logical log backup. See "Back up logical log files" on page 67.

If you want to restore backed-up logical logs, `ccmsrv restore` gives you the opportunity to do so.

Before you can restore a database server, ensure that the system configuration, the relevant database server parameter file, and—**most importantly**—the archive source, are correct.

1. Check the system configuration.

   Ensure that the configuration of the current system is the same as the configuration of the system when the server was archived.

   The system configuration includes disk paths, chunk file sizes, shared memory kernel parameters, and so forth. The system configuration settings must be identical to or larger than the settings for the last Level 0 archive. For example, if you are restoring from tape to replace a bad disk, the new disk must use the same path to the chunk files' dbspaces, and the directories must be at least the size they were for the archive.

2. Check the configuration file.

Ensure that the configuration file currently in use is identical to the configuration file used to archive the server.

The configuration file, `$CCM_HOME/informix/etc/`*`servername`*, must be identical to the configuration file used to perform the Level 0 archive. (Note that a copy of this file is always saved when a Level 0 archive is performed.)

You should ensure that Level 0 archives reflect the current configuration file by performing a Level 0 archive immediately after you make any change to the file.

3. Log on the database server as user *root*.

4. Set user to *informix*.

```
root# su - informix
Password: *****
```

If `CCM_HOME` and `PATH` were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

5. Take the database server offline.

```
$ ccmsrv offline
```

6. If you archived to tape, mount the archive tape.

If you archived to tape, insert the most recent tape for the archive level you want to restore. If you are restoring incremental archives, the `ccmsrv restore` command prompts you for the other archive tapes.

7. If you archived to a directory, perform the following steps.

You must perform these steps for each archive file you restore. If you are restoring incremental archives, you must perform these steps when prompted for the next level of "tapes."

a. Change directory to the Informix /etc directory.

```
$ cd $CCM_HOME/informix/etc
```

b. Identify the archive file to restore.

For example, choose to restore the Level 0 archive file called `hydra1,level-0,10_19_99_09_20` from the `/vol/hydra1/archive_data` directory, as follows:

c. Remove the tape device's symbolic link.

```
$ rm hydra1.tapedev
```

    d. Link the tape device to the archive file.

    For example, link `hydra1.tapedev` to the Level 0 archive file,
`hydra1,level-0,10_19_99_09_20`, as follows:

```
$ ln -s /vol/hydra1/archive_data/hydra1,level
-0,10_19_99_09_20 \hydra1.tapedev
```

    Specify the archive device (file) with the `ccmsrv restore` command,
so that the correct archive file is found.

8. Restore the database server.

    For example, restore the database server from the tape on `/dev/rts8`, as
follows:

```
$ ccmsrv restore -device /dev/rst8
```

    Or, restore the database server from the `/vol/hydra1/archive_data`
directory, as follows:

```
$ ccmsrv restore -device $CCM_HOME/etc/informix/hydra1.tapedev
```

    The `ccmsrv restore` command prompts you to mount a tape (or an
archive file) for each archive level. If you are restoring only the Level 0 (full)
archive, type **n** to subsequent prompts for Level 1 and Level 2 (incremental)
archives.

Note You also are prompted to restore logical log backups. To do
so, you must already have backed up the logical log files as
described in "Back up logical log files" on page 67. Type **y** to
this prompt if you want to restore from the logical log file
backup.

9. Bring the database server online.

```
$ ccmsrv online
```

10. Exit from user *informix*.

Back up logical log files

Informix uses logical log files for data recovery and consistency. Backing up the logical log files provides a means of restoring database servers to their last committed transactions in the event of server corruption, performing a fast recovery after an unexpected server shutdown, and freeing space for new logical log records.

Although you can restore a database server to the last server archive, only logical log backups enable you to restore work done between the last archive and the time the database server was shut down or corrupted.

Before backing up logical log files, you also must:

• Establish a backup plan, and update it periodically.

  Create and test a plan for scheduled backups to ensure that the plan works and does not affect your current production environment. The plan should include scheduled database server archives as well as logical log file backups.

• Plan to have users log out of their Telelogic Synergy sessions during backups.

  When the backup is in progress, users might still be editing in the file system while the database activities are suspended. This can cause data inconsistencies.

  Ensuring that users are not making changes in the file system while the logical log files are being backed up helps avoid data inconsistencies when the server is restored.

Note You can restore from logical log backups only while restoring the database server. See the comment at the end of step 8 in "Restore a database server" on page 64.

Backup schedule

Logical log backups must be preceded by a database server archive procedure. If the database server is not archived, the logical log backup is invalid. Therefore, you must include archiving the database server in your plan to back up the logical log files. See the archiving plan in "Archive schedule" on page 61.

You can perform logical log backups in either of the following two ways:

- Continuous backup of logical logs
- Explicit backup of logical logs

To back up the logical logs continuously, you must have a dedicated backup device available for the backups. Whenever the device reaches its capacity, you must swap in new media.

Backup media

The logical log backup device is specified by the LTAPEDEV parameter in the database server parameter file. The device is usually a tape drive, but can be a directory. If you specify a directory, it is treated like a tape device (i.e., the directory must exist and be writable by user *informix*).

The size of the backup media is determined by the LTAPESIZE parameter.

Prepare to back up

Archiving the database server is a prerequisite for backing up the logical log files. Archive the database server before proceeding.

1. Log on the database server as user *root*.

2. Set user to *informix.*

   ```
   root# su - informix
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Take the database server offline.

   ```
   $ ccmsrv offline
   ```

4. Change the tape parameter in the database server parameter file to use a different tape from the regular database server archive device.

   For example, change the tape device to /dev/rst9 and the tape size to 500,000 KB, as follows:

   ```
   $ ccmsrv modify -p LTAPEDEV -v /dev/rst9
   $ ccmsrv modify -p LTAPESIZE -v 500000
   ```

5. Bring the database server online.

   ```
   $ ccmsrv online
   ```

6. Verify that the database server is online.

   ```
   $ ccmsrv status
   ```

7. Perform a Level 0 server archive.

   Because you have changed the parameters, perform a database server Level 0 archive.

   For example, create a Level 0 archive of the **current** database server using the tape device and size defined in the database server parameter file, as follows:

   ```
   $ ccmsrv archive -level 0
   ```

   After you have completed the database server archive, you can put the next archive on the same tape (or file).

Back up the files

1. Log on the database server as user *root*.

2. Set user to *informix*.

    ```
    root# su - informix
    Password: *****
    ```

    If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Set the environment variables for the Informix directory.

    ```
    $ INFORMIXDIR=$CCM_HOME/informix; export INFORMIXDIR
    $ PATH=$CCM_HOME/bin:$INFORMIXDIR/bin:$PATH; export PATH
    $ ONCONFIG=$servername; export ONCONFIG
    $ INFORMIXSERVER=$servername; export INFORMIXSERVER
    ```

4. Mount the tape drive specified in the *LTAPEDEV* parameter, and then insert a blank tape (or use the backup file).

5. Start the backup command.

    Caution   You must ensure that the device to which the logical logs are written is always available and has free space. If the backup cannot write data to the backup device and the logical logs are full, the database server cannot operate normally and hangs until the logical log files are writable again.

    Back up the logical log files continuously by executing the following command:

    ```
    $ ontape -c
    ```

    Back up the logical log files explicitly by executing the following command:

    ```
    $ ontape -a
    ```

6. Swap and label the tape when it is full.

    Label the tapes clearly so that later, when you restore the database server, you can identify the appropriate tapes easily.

    An example of good labeling is as follows:

    ```
    Date: April 20, 2006
    Server: servername
    Type: logical log backup
    Log numbers: 3 - 5
    Tape sequence number: 1
    ```

7. Exit from user *informix*.

Restore logical log files

While restoring a database server from an archive, you may want to recover all the work that has been done since the archive took place. You can do so only if you have performed logical log backups.

Note Server machine crashes normally are recovered by a database server mechanism called Fast Recovery. Fast Recovery can recover database server data when the database server was shut down improperly. This kind of situation does not require the restore procedure because it is performed automatically whenever you bring the database server online.

You can back up the remaining logical log files that were not yet backed up. You can then proceed with your database server restore procedure. Near the end of the database server restore procedure (step 8 in "Restore a database server" on page 64), you can restore logical logs from the backup.

To include logical log file backups in your database server restore procedure, follow the steps shown in "Restore a database server" on page 64.

Briefly, the steps are as follows.

1. Take the database server offline.

2. Restore the database server.

   While restoring the database server, the system prompts you to perform the following additional steps if you are restoring from a logical log backup file:

   • Back up the *current* logical log files (those not backed up already).

      Insert a new tape (or define a new tape device file), respond "y" to the following prompt, and type the ID for the oldest log file to back up.

   ```
   Would you like to back up any of logs 11 - 12? (y/n) y
   Logical logs 11 - 12 may be backed up.
   Enter the id of the oldest log that you would like to back up. 11
   Backing up logical logs 11 - 12 ...
   ```

   • Restore the database server from the latest archive.

      Type **y** to the following prompt, and then press **Enter** to mount the tape (or use the file) for the logical log file.

   ```
   Roll forward should start with log number 12
   ```

```
Is there a logical log tape to restore? (y/n) y
Please mount tape and press Return to continue ...
Processing logical logs, please wait ...
Is there another logical log to restore? (y/n) n
```

3. Bring the database server online.

4. Verify that the data was restored properly.

5. Perform a Level 0 archive.

Obtain detailed Informix messages

Use the `finderr` command to display more descriptive error messages whenever you encounter database server error(s). The command is in the `$CCM_HOME/informix/bin` directory.

Any user can execute this command. Ensure that the Informix `bin` directory is in your path.

The command syntax is as follows:

```
$ finderr message_number
```

For example, the following command displays a description of error 131:

```
$ finderr 131
```

5 *Database Administration*

Administering the Telelogic Synergy databases includes the following tasks:

- "Ensure database integrity" on page 75
- "Create, move, or delete a Telelogic Synergy database" on page 80
- "Manage Telelogic Synergy database space" on page 86
- "Perform database maintenance" on page 93

About Telelogic Synergy databases

The following sections describe the Telelogic Synergy databases so that you can decide when to use them. The supplied database are stored in pack files in the `$CCM_HOME/packfiles` directory.

Caution You must check and back up your database at least once daily to avoid data loss if a system failure occurs. If your database is corrupted, you **must** have a backup of the database or you could lose your data.

Base database

The base model pack file, `base.cpk`, works with the default development model. The `base.cpk` pack file is empty. It contains no data, but has been loaded with the base model. To create a new database, unpack `base.cpk` to the new database.

Training database

The training database, called `training.cpk`, is populated with projects, subprojects, tasks, and change requests. This database is intended to help users learn how to use Telelogic Synergy.

Model database

The model database file, `base.model`, is used for upgrades. The `model.cpk` file is no longer used for upgrades and is no longer shipped with the product. For more information about this database, see the *Telelogic Synergy Upgrade Instructions*.

Database directory structure

Each Telelogic Synergy database directory typically contains the following subdirectories:

bin

> Model scripts and executables not used on the Windows platform.

bitmaps

> Bitmaps used by this database as icons for types.

db

> Information about the database, in particular, the parameters and the RDBMS database name.

dcm

> Information for DCM.

etc

> DCM support files.

guild

> GUI definitions of dialogs for this database, in GUILD syntax.

include

> ACCENT model include files for this database.

lib

> ACCENT model libraries for this database. In addition, initialization files, help files, and migrate rules are stored in the lib directory.

pt

> Contains parameter files used by Telelogic Synergy and Telelogic Change.

st_root

> Telelogic Synergy storage root, used to store source files, product files (such as executables, object files and libraries) and archived sources. The st_root subdirectory may not exist if the database has no source files in it.

Telelogic Synergy database naming conventions

Each Telelogic Synergy database name must conform to the following conventions:

- If two databases use the same database server, they cannot have the same name. The name is the leaf directory in the full database path.

- A database name can contain letters, digits, and underscores only.

- Uppercase and lowercase characters are equivalent.

- A database name cannot be more than 14 characters long.

- The database name must begin with a letter.

Ensure database integrity

You can perform any of the following procedures as part of ensuring database integrity:

- "Check database integrity" on page 76

- "Back up a database" on page 77

- "Repair a database" on page 78

- "Shut down a database" on page 79

Check database integrity

Use the `ccmdb check` command to verify the integrity of your database. The command checks both RDBMS and semantic integrity. Your database might never fail an integrity check, but if a failure does occur, you need to know about it immediately so that you can correct the problem and avoid data loss. You should run the `ccmdb check` program daily, on each database, and after rebooting your system following a hardware or operating system failure.

When you run the `ccmdb backup` command, a `ccmdb check` is performed automatically prior to the backup.

1. Log on to the database server.

2. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If `CCM_HOME` and `PATH` were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Check the database.

   ```
   $ ccmdb check database_path
   ```

   The command reports any problems that are found. If a problem is found, see "Repair a database" on page 78.

4. Exit from user *ccm_root*.

File system verification

Use the `ccm fs_check` command to verify the file system portion of the database. You should run this command weekly on each database.

1. Start Telelogic Synergy as user *admin* from the command prompt.

   ```
   $ ccm start -nogui -r admin -d database_path
   ```

2. Run `ccm fs_check`.

   ```
   $ ccm fs_check
   ```

3. Stop the Telelogic Synergy session.

   ```
   $ ccm stop
   ```

Note In the rare event that a database has been corrupted, contact [IBM Rational Software Support](#).

Back up a database

Use the `ccmdb backup` command to ensure reliable backups of Telelogic Synergy databases. This command was designed to ensure that the database metadata and the storage root (`st_root`) subdirectory in the backup are synchronized. The `ccmdb backup` command also runs the `ccmdb check and ccmdb update_statistics` commands. Doing so improves the speed of database queries.

This synchronization is accomplished by locking the database, dumping the database data, saving the storage root files, then unlocking the database. While users need not exit their sessions during a backup, the changes they make to their files during a backup might not be backed up.

Because the data stored in Telelogic Synergy databases is critical, it is strongly recommended that you perform routine backups. In the event of a major system failure (such as disk crash), your Telelogic Synergy database backup might be your only means of recovering your data.

Information must reside in the database to be successfully backed up, that is, if data is in a user's work area, but not in the database, it is not backed up. The `ccmdb backup` and `ccmdb pack` commands archive information from the metadata and file systems of the database. They do not back up work areas. Users with copy-based work areas must reconcile changes before the administrator runs the backup. If this is not done, changes to work areas must be backed up separately.

Use either the `ccmdb backup` and `ccmdb pack` command to ensure that the backup contains all required information. Do not rely on file system backup utilities to back up the Telelogic Synergy database. Ensure successful recovery by using only Telelogic Synergy backup commands.

You also can use database server archive and restore procedures, or a database dump, but these procedures can require more manual steps. You should use `ccmdb backup` if it is possible and practical for your site. See "Database Backup Methods" on page 173 for a comparison of the backup methods.

1. Log on to the database server.

2. Set user to *ccm_root*.

    ```
    $ su - ccm_root
    Password: *****
    ```

    If `CCM_HOME` and `PATH` were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Broadcast a message to users.

Notify users that you will be backing up the database immediately so that they know the database will be locked.

> **Note** Any changes made to files in a user's work area are not backed up by `ccmdb backup`. Ensure that users reconcile before the backup takes place. See Telelogic Synergy Classic Help for information about reconciling.

For example, notify `tstgonzo` database users that you are backing up the database, as follows:

```
$ ccm message -database /vol/hydra/ccmdb/tstgonzo \
"Backing up database in 5 minutes."
```

4. Check the database and create a compressed backup (`.cpk`) file.

For example, check the `tstgonzo` database and back it up, as follows:.

```
$ ccmdb backup /vol/hydra/ccmdb/tstgonzo -to /vol/sue/backups
```

You should create the backup file in a directory that is backed up regularly through normal file system backup procedures, or at least in a directory on an independent file system.

5. Broadcast a message that the backup is complete.

For example, send a message to all *tstgonzo* database users, as follows:

```
$ ccm message -database /vol/hydra/ccmdb/tstgonzo "Back up
complete."
```

6. Exit from user *ccm_root*.

Repair a database

In the rare event that a database has been corrupted, contact [IBM Rational Software Support](#).

Shut down a database

Shut down a database before backing it up, repairing it, or restoring it from backup.

1. Set user to *ccm_root*.

```
$ su - ccm_root
Password: *****
```

If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Display the database path by executing the `ccm monitor` command.

```
$ ccm monitor
```

3. Broadcast a message to users.

Notify users that you are shutting down the database.

For example, notify `test_ccm` database users that you are shutting down the database, as follows:

```
$ ccm message -database test_ccm "Shutting down
database in 15 minutes. Close sessions!"
```

4. Shut down the `test_ccm` database.

For example, shut down the `/vol/hydra/ccmdb/test_ccm` database, as follows:

```
$ ccmdb shutdown /vol/hydra/ccmdb/test_ccm
```

5. Exit from user *ccm_root*.

Create, move, or delete a Telelogic Synergy database

Telelogic Synergy is shipped with a pack file called `base.cpk`, which contains the standard development model and no user application data. If you are using the standard base model, you can use the `base.cpk` pack file to create a new databases by unpacking it to a new database name.

A database can be stored in two formats: standard database format and a *pack file* format. Pack files usually have the extension `.cpk` and must be unpacked with the `ccmdb unpack` command before they can be used.

Create a database

You can create a new database easily and quickly by unpacking the `base.cpk` file.

Note Create the new database on a file system large enough to accommodate growth. See "Manage Telelogic Synergy database space" on page 86 for more information.

1. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Unpack the `base.cpk` file, which contains the base database.

Note If you are not using the default server name, you must use the `-s servername` option on the `ccm unpack` command.

   ```
   $ ccmdb unpack base.cpk -to /vol/hydra/ccmdb/database_name
   ```

3. If necessary, change the delimiter and add users.

   If you want to change the delimiter for this database, it is strongly recommended that you do so now.

   See Telelogic Synergy CLI Help for more information about the `ccm delimiter` command.

   a. Start a Telelogic Synergy session in the *ccm_admin* role.

   ```
   $ ccm start -d database_path -r ccm_admin -nogui
   ```

    b. Change the delimiter to the new character to be used in this database. For example, set the delimiter to a comma, as follows:

```
$ ccm delim ","
```

    c. Add users.

        If you need to add users to the Telelogic Synergy database, this is a good time to do so. Refer to "Add users or change user roles in a Telelogic Synergy database" on page 12. If you do not need to add users to the Telelogic Synergy database, proceed to the next step.

    d. Exit from the Telelogic Synergy session.

```
$ ccm stop
```

4. Implement a check and backup plan for your database, and execute it daily.

5. Exit from user *ccm_root*.

Caution You must check and back up your database at least once daily in case of a system failure. If your database is corrupted, you **must** have a backup of the database or you could lose all data.

Move (or rename) a database

You might want to move (or rename) a database to use the database on a different machine or a different drive, or to duplicate a database for use elsewhere. The ccmdb copy command enables you to rename or move a database.

Note After moving a database you might need to change some of the database properties, such as the paths to projects' work areas. See Telelogic Synergy CLI Help for the ccm work area command for important information about changing a moved database's properties.

Database moves are restricted as follows:

• If two databases use the same database server, they cannot have the same name.

• A database name can contain letters, digits, and underscores only.

• Uppercase and lowercase characters are equivalent.

• A database name must be 18 characters or fewer.

• The database name must begin with a letter.

• The entire pathname must be unique.

When you move a Telelogic Synergy database, you can pack the database using an older product version, then unpack it using a newer product version. (Unpacking to a newer version requires additional steps. See the *Telelogic Synergy Upgrade Instructions* for more information.)

1. Log on to the database server.

2. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Copy the database it to a new location.

   For example, rename the prod_db database by copying it to a new database named trask, as follows:

   ```
   $ ccmdb copy /vol/hydra/ccmdb/prod_db /vol/hydra/ccmdb/trask
   ```

4. Verify that the new database is usable.

   For example, check the *trask* database as follows:

   ```
   $ ccmdb check /vol/hydra/ccmdb/trask
   ```

   Note Telelogic Synergy protects the database during the check so that users cannot start new sessions, then unprotects it when the check is completed.

5. Pack the new database.

   ```
   $ ccmdb pack database_path -to packfile
   ```

   You should write the pack file to a directory that is backed up regularly through normal file system backup procedures, or at least to a directory on an independent file system.

6. Remove the old database.

   ```
   $ ccmdb delete database_path
   ```

   Exit from user *ccm_root*. Update your backup plan.

Delete a database

Telelogic Synergy databases are a combination of a file system and metadata. Therefore, you must remove databases using the ccmdb delete command so that both the file system and metadata are removed.

Caution Never use the rm command to remove a database. If a Telelogic Synergy database is removed accidently with an rm command, remove the database completely using the *ccmdb drop* command (see page 137).

1. Set user to *ccm_root*.

    ```
    $ su - ccm_root
    Password: *****
    ```

    If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Delete the Telelogic Synergy database.

    For example, delete the tststar database as follows:

    ```
    $ ccmdb delete /vol/sue/ccmdb/tststar
    ```

3. Exit from user *ccm_root*.

Move a database from UNIX to Windows

You can move a database from a UNIX server to a Windows server by packing the database on the UNIX database server, copying the packfile to the Windows server, and then unpacking the database on the Windows server.

1. Log on to the UNIX database server.

2. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Pack the UNIX database.

   If you are moving the database at the same time as you are upgrading from an older to a newer release, use the older release to pack the database.

   ```
   $ ccmdb pack database_path -to packfile_path
   ```

   OR

   ```
   $ ccmdb backup database_path -to packfile_path
   ```

4. Copy the pack file from UNIX to Windows using `rcp -b` from the Windows side.

5. Log on to the Windows database server as user *ccm_root*.

6. Unpack the `packfile_path` file on the Windows database server.

   If you are upgrading from an older to a newer release, use the new release to unpack the database.

7. If you are upgrading from an older to a newer release, run the `ccmdb upgrade` command as described in the *Telelogic Synergy Upgrade Instructions* for the new release.

Move a database from Windows to UNIX

You can move a database from a Windows server to a UNIX server by unpacking the Windows database on a UNIX installation. The resulting database may have Windows-style ASCII data in important files, which should be updated. The command `ccmdb upgrade` has an option, `-w`, which converts the database's files in addition to performing the upgrade. All database configuration files and controlled files of type `ascii` or its subtypes are be examined and converted to UNIX ASCII format. The conversion affects controlled files in the archive and cache only. Work areas are not updated.

Caution This operation changes the contents of static, archived files, and should be used with caution. **Always retain the original packfile in case you encounter any problems later.**

Additionally, you can transfer the contents of a Windows database to UNIX by using Telelogic Synergy Distributed.

For a brief description, see "ccmdb upgrade" on page 156. For a detailed description and usage instructions, see the *Telelogic Synergy Upgrade Instructions*.

Manage Telelogic Synergy database space

Telelogic Synergy attempts to conserve database space (dbspace) to improve performance and ensure database access. However, because many sites use numerous versions of projects and objects (e.g., for various releases, platforms, and test levels), databases can grow quickly and require cleanup.

Note Allocating sufficient space when you create a database server helps to avoid space problems. However, monitoring the file system space (using the appropriate UNIX command) and dbspace (using the `ccmdb info` or `ccmsrv status -d` command) is still necessary.

Remove file system data according to the methods appropriate for your operating system and site requirements. Remove dbspace data by doing one or more of the following:

• Clean the cache

• Delete obsolete projects

• Delete obsolete product files

• Delete obsolete source files

• Delete unwanted data based on the scope you define

Caution Before reclaiming disk space by deleting objects or cleaning cache files, back up your database (e.g., by using the `ccmdb backup` command).

If removing objects is not possible, increase the size of the dbspace. See `ccmsrv expand` on page 163 for information.

Monitor the database space

Informix pre-allocates space for its databases. You can monitor this pre-allocated space to determine whether you need to increase its size or remove unneeded objects.

1. Log on to the database server.

2. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

3. Monitor the database's size.

   For example, show the size of the aeanew database as follows:

   ```
   $ ccmdb info -k size /vol/hydra/ccmdb/aeanew
   ```

4. Monitor the database server's space utilization.

   For example, show the dbspace used by the tonnyx database server, as follows:

   ```
   $ ccmsrv status -dbspace -s tonnyx
   ```

5. Exit from user *ccm_root*.

To increase the Informix dbspace, use the procedure shown in "Increase the database space" on page 55.

Distribute cache files

You can distribute the Telelogic Synergy storage root directories anywhere across local file systems of networks using NFS. The most common and useful method for doing this is to move the cache subdirectory to a separate file system. Do this by moving the cache directory and setting up a symbolic link.

Note You must copy all files under the cache directory to a subdirectory **readable and writable by user *ccm_root*.** Verify that this directory exists, or create it.

Before you perform this task, ensure that there are no users on the database.

1. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

   If CCM_HOME and PATH were not set up for user *ccm_root* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Shut down the database.

   ```
   $ ccmdb shutdown database_path
   ```

3. Pack the database.

   ```
   $ ccmdb pack database_path
   ```

4. Change directory to st_root.

   ```
   $ cd database_path/st_root
   ```

5. Copy all files.

   Copy all files under the cache directory to a subdirectory **readable and writable by user *ccm_root*.** In the following command, this directory is called new_cache. (If a directory readable and writable by user *ccm_root* does not exist, you must create one.)

   ```
   $ find cache -print | cpio -pdma /extra/new_cache
   ```

6. Remove the cache subdirectory.

   ```
   $ rm -rf cache
   ```

7. Create a link to the new cache subdirectory.

   ```
   $ ln -s /extra/new_cache/cache cache
   ```

8. After the files are copied (see step 5), all cache files are owned by *ccm_root*. To make Telelogic Synergy update working files so that they have the correct

ownership, delete the file that lists the users whose ownerships have already been updated.

```
$ rm -f database_path/db/file_acs_update_list
```

9. Exit from user *ccm_root*.

This procedure physically relocates the entire `cache` subdirectory.

Note Alternatively, you can move any or all of the subdirectories under `st_root` (e.g., `workarea, archive`) to separate locations. You also can relocate the cache's individual hashed subdirectories; e.g., each of the `cache/source/#nn` directories can be a link to a different location.

You **must** customize the `ccmdb unpack` and `ccmdb pack` commands to reflect the new directory locations. The tar commands used in the `ccmdb unpack` and `ccmdb pack` command scripts do not follow symbolic links.

If you need assistance, contact [IBM Rational Software Support](#).

Delete cache files

The contents of an object's `source` attributes are stored in files in the `cache` directory, under the database storage root (`st_root`). When an object transitions to the *integrate* state, it triggers the source file to be archived. Objects in the *integrate*, *test, sqa*, *released*, and *rejected* states are archived.

The *CM administrator* can use the `ccm clean_cache` command to remove these archived cache files on demand and to select specific cache files to remove.

Any deleted archived cache file is restored to the cache when needed to perform a Telelogic Synergy operation.

Note Only archived files are eligible to be deleted, regardless of the options you specify.

Also, you must use the command line interface to delete cache files.

For more information, see the `ccm clean_cache` command is described in detail in Telelogic Synergy CLI Help.

1. Set user to *ccm_admin*.

    ```
    $ su - ccm_admin
    Password: *****
    ```

    If `CCM_HOME` and `PATH` were not set up for user *informix* during installation, set these environment variables now. See "Set up ccm_root and informix users" on page 16.

2. Start a session on the database.

    ```
    $ ccm start -nogui -d database_path
    ```

3. Clean up the cache files.

    For example, delete all cache files of archived objects that have not been accessed in the last month, as follows:

    ```
    $ ccm clean_cache -c -30:0:0:0
    ```

    Or, delete the cache files for all `test csrc` objects that have not been accessed since June 1.

    ```
    $ ccm clean_cache -type csrc -status test -cutoff_time
    "June 1"
    ```

4. Exit from the session.

    ```
    $ ccm stop
    ```

5. Exit from user *ccm_admin*.

Delete files

Reclaim disk space used by deleting obsolete products. You can use a query to select the files to delete.

1. Start a Telelogic Synergy session from the command line as user *ccm_admin*.

   For example, start a session on the `testrme` database as follows:

   ```
   $ ccm start -d /vol/hydra/ccmdb/testrme -r ccm_admin
   ```

2. Query for all objects to delete.

   For example, query from the command line for all products not used in any projects, as follows:

   ```
   $ ccm query "is_product=TRUE and not is_bound()"
   ```

3. Collapse the object versions.

   ```
   $ ccm collapse @
   ```

   You could create a script containing these commands so that you can perform the cleanup regularly.

4. Exit from the session.

   ```
   $ ccm stop
   ```

Save Offline and Delete tool

In addition to using a query to delete objects, you can use the Save Offline and Delete (SOAD) tool to remove unwanted data, or to save data offline before deleting it from the database. Objects that are saved offline are saved in a DCM package that can be received at a later time. To save objects offline, the current database must be initialized for DCM, and a DCM license must be available.

This feature uses scopes to define what should be deleted. You can define a new scope, use pre-defined (default) scopes, or modify an existing user-defined or default scope. For information about using the SOAD feature, including the `ccm soad` command, see the Telelogic Synergy CLI Help.

Delete unused databases

Use the `ccmsrv status` command to view all databases. See "Monitor the database server using ccmsrv status" on page 29 for information about listing current databases. To remove unneeded databases, see "Delete a database" on page 83.

Other housekeeping activities

There are several other ways you can reduce the size of your database. These activities do not need to be performed on a regular basis. They can be performed on an as-needed basis. Here are some suggestions:

- Keep your user lists up-to-date.

  When people leave the company, remove their user ID and role definitions, and delete *working* and *checkpoint* objects belonging to those users. The Save Offline and Delete (SOAD) tool provides a scope for this purpose: **All non-static projects and products for a specified user**.

- Keep release information up-to-date.

  When releases are completed or abandoned, mark them as inactive. You can delete old baselines and old prep hierarchies using the following SOAD scopes:

  - **Non-released baselines for specified release older than specified date**
  - **Integration Testing prep projects and products for a specified release**

- Clean up Telelogic License Server log files.

  Check the *Telelogic Synergy Installation Guide for UNIX* for instructions about checking log files.

Perform database maintenance

If you continually delete obsolete data to keep the database clean, you should also perform periodic database maintenance tasks to improve performance, as described here.

Nightly

Back up your databases. Nightly backups help queries run more quickly. This also updates the database statistics.

1. Set user to *ccm_root*.

   ```
   $ su - ccm_root
   Password: *****
   ```

2. Warn users that a backup is about to occur.

   a. Broadcast a backup message to the database users.

   ```
   $ ccm message -database database_path "backup message"
   ```

   b. Show the database usage.

   ```
   $ ccm monitor database_path
   ```

3. Check and back up the database, and then update statistics.

   ```
   $ ccmdb backup database_path -to destination_dir
   ```

Weekly

Repair database indices for all tables to reduce disk fragmentation.

1. Set user to *ccm_root*.

```
$ su - ccm_root
Password: *****
```

2. Shut down database sessions and protect the database.

a. Broadcast a shutdown message to the database users.

```
$ ccm message -database database_path "shutdown
message"
```

b. Show the database usage.

```
$ ccm monitor database_path
```

c. Perform the shutdown.

```
$ ccmdb shutdown database_path
```

3. Back up the database.

```
$ ccmdb backup database_path -to destination_dir
```

4. Repair indices for all tables.

```
$ ccmdb repair database_path -repair_index ""
```

5. Unprotect the database.

```
$ ccmdb unprotect database_path
```

6. Start a session in the *ccm_admin* role.

```
$ ccm start -nogui -r ccm_admin -d database_path
```

7. Protect the database.

```
$ ccmdb protect database_path
```

8. Check the database cache and archive.

```
$ ccm fs_check
```

If the full `ccm fs_check` takes more time than your site can afford on a daily or weekly basis, you can run a reduced check. See "ccm fs_check" on page 100 for information about options and arguments. You should run a full `ccm fs_check` at least once a month.

9. Clean the database cache.

```
$ ccm clean_cache
```

10. End your session.

```
$ ccm stop
```

11. Unprotect the database, if the database is not corrupt.

```
$ ccmdb unprotect database_path
```

Monthly or less often

Rebuild the database by packing and unpacking it. This reduces fragmentation of the databases.

1. Set user to *ccm_root*.

```
$ su - ccm_root
Password: *****
```

2. Shut down database sessions and protect the database.

   a. Broadcast a shutdown message to the database users.

   ```
   $ ccm message -database database_path "shutdown
   message"
   ```

   b. Perform the shutdown.

   ```
   $ ccmdb shutdown database_path
   ```

   c. Show the database usage to ensure everyone is out of the database.

   ```
   $ ccm monitor database_path
   ```

3. Back up the database. First check the database, and then pack it.

```
$ ccmdb check database_path
```

```
$ ccmdb pack database_path -to destination_dir
```

4. Delete the database.

```
$ ccmdb delete database_path
```

5. Unpack the database, using the pack file you created in step 3.

```
$ ccmdb unpack packfile -to database_path
```

6 *Administrative Commands*

This chapter contains detailed descriptions of the Telelogic Synergy administrative commands. Procedures that use these commands are shown in the following chapters:

- "General System Administration" on page 11
- "CCM Server Administration" on page 39
- "Database Server Administration" on page 43
- "Database Administration" on page 73

List of commands

The following table shows all commands available for administering Telelogic Synergy.

Note All commands shown here must be run in the Telelogic Synergy Classic CLI.

See Telelogic Synergy CLI Help for information about commands that developers and build managers use.

Command	Description
ccm fs_check	Checks the consistency of a Telelogic Synergy database's file system. See page 100.
ccm message	Sends messages to users, directly or by broadcast. See page 104.
ccm monitor	Shows status information. See page 106.
ccm ps	Shows process status information. See page 109.
ccm version	Shows the version of Telelogic Synergy. See page 111.
ccm_esd	Starts the Telelogic Synergy engine startup daemon. See page 112.
ccm_install	Installs Telelogic Synergy. See page 115.
ccm_objreg	Starts the Telelogic Synergy object registrar daemon. See page 119.
ccm_objreg_tail	Tails the Telelogic Synergy object registrar log. See page 121.

Command	Description
`ccm_router`	Starts the Telelogic Synergy message router daemon. See page 122.
`ccm_router_tail`	Tails the Telelogic Synergy message router log file. See page 123.
`ccm_server`	Starts the Telelogic Synergy CCM server. See page 124.
`ccm_start_daemons`	Starts all Telelogic Synergy daemons. See page 126.
`ccm_stop_daemons`	Stops all Telelogic Synergy daemons. See page 127.
`ccmdb backup`	Checks, and then backs up a database. This is the only recommended database backup method. See page 128.
`ccmdb check`	Checks the integrity of a database. See page 130.
`ccmdb copy`	Copies a database. See page 132.
`ccmdb create`	Creates a root database. See page 134.
`ccmdb delete`	Deletes a database. See page 136.
`ccmdb drop`	Removes a database from the database server when the database's path, or other database information, has been removed accidentally. See page 137.
`ccmdb dump`	Dumps a database's metadata. See page 138.
`ccmdb info`	Shows the characteristics of a database and allows you to change them. See page 139.
`ccmdb load`	Loads a database's dumped metadata. See page 142.
`ccmdb pack`	Dumps a database's contents to a single, portable file. See page 144.
`ccmdb protect`	Protects a database from new sessions. See page 146.
`ccmdb refresh`	Refreshes the database's Web server for Web mode users. See page 147.
`ccmdb repair`	Repairs database indexes. See page 148.
`ccmdb shutdown`	Shuts down all active sessions on, then protects, a database. See page 150.

Command	Description
`ccmdb unpack`	Restores a database from a `ccmdb pack` file. See page 151.
`ccmdb unprotect`	Unprotects a database. See page 154.
`ccmdb update_statistics`	Updates Informix system tables so that queries execute more quickly. See page 155.
`ccmdb upgrade`	Converts a database from Releases 6.2, 6.3, or 6.4 to Release 7.0. See page 156.
`ccmsrv archive`	Archives a database server. See page 158.
`ccmsrv create`	Creates a database server. See page 160.
`ccmsrv delete`	Deletes a database server. See page 162.
`ccmsrv expand`	Increases the size of the database server space. See page 163.
`ccmsrv modify`	Changes the database server parameters. See page 165.
`ccmsrv offline`	Takes a database server offline. See page 167.
`ccmsrv online`	Brings a database server online. See page 168.
`ccmsrv quiescent`	Places a database server in the quiescent state. See page 169.
`ccmsrv restore`	Restores a database server from archive. See page 170.
`ccmsrv status`	Shows the status of a database server. See page 171

ccm fs_check

Synopsis

```
ccm fs_check    [-d|-dir directory_path] [-f|-fix] [object_spec...]
                [-t|-type type][-v|-verbose]
                [-e|-empty_skip] [-u|-unused_skip]
                [-nd|-no_duplicates] [-w|-windows]
                [-nb|-null_byte][-z|-zero_counts]
```

Description and uses

Use the `ccm fs_check` command to check the consistency of a Telelogic Synergy database's file systems. By default, the `ccm fs_check` command checks that:

- Every static file, project, or directory has an entry in the archive.

- Every non-static file, project, or directory has an entry in the cache.

- Every file in the cache area corresponds to an existing object version.

- Every file in the archive area corresponds to one or more static object versions.

- Every entry in an archive file corresponds to one static object version.

- The source for a project or directory is empty.

Checking all the files in the cache and archive areas takes time and memory resources, and may be suppressed using the `-u|-unused` option.

Execute `ccm fs_check` to check your entire database. This command can be used regularly to reduce the disk space taken up by cache files. However, as the check can take a long time on large databases, you can perform a quicker check by checking only specific types of objects. You can use the `-t` option to check only objects of the specified type, or you can check a list of objects using *object_specs* (for example, using query results). You cannot use both the `-t` option and a list of objects. If you check only objects of the specified type, checking for unused cache and archive entries are suppressed.

You should also direct the output to a file so that you can examine the results.

If unexpected or extra files or archive entries are found, they are reported individually and summarized at the end. However, such cases are not counted as errors and do not cause `ccm fs_check` to fail with a non-zero exit status. The `-fix` option to `ccm fs_check` does not remove these extra entries. Doing so might lead to data loss in cases where you have created such files manually for your own purposes, or where you have restored a file system and metadata

backup taken at slightly different times. Contact [IBM Rational Software Support](#) for assistance in removing unwanted extra cache and archive entries.

All users can perform this operation. However, you must be in the *ccm_admin* role to perform the `-fix` option.

Options and arguments

`-d|-dir` *directory_path*

Specifies the directory into which inconsistent archive entries are written. By default, these files are written to *database_path*/`st_root/tmp/check`.

`-e|-empty_skip`

Suppresses warnings about empty files for static object versions.

This warning may also be suppressed for individual object versions, by creating a boolean attribute `deliberately_empty` with the value `TRUE` on the object versions for which you want to suppress the warnings.

`-f|-fix`

Fixes some simple errors, including the following:

- If you unpack a database from a pack file created on UNIX, it is likely that cache files are in UNIX format. If this newline style is the only difference between the cache and the archive, the `-f|-fix` flag causes the cache file to be deleted.
- If the cache file is zero length, but the archived content is not, the `-f|-fix` flag causes the cache file to be deleted.
- If the cache file has the wrong modify time, but is equal in content to the archive, use the `-f|-fix` option to update the modify time to be equal to the `source_modify_time` attribute.

This option does not remove extra or redundant files. This ensure that you can examine the content of such files to verify that they are not required before deleting them.

`-nd|-noduplicates`

Specifies to skip checks for duplicate archive entries. Use this option to reduce the memory resources used when checking very large databases that might otherwise fail due to lack of memory. Since it reduces the strength of archive checking, it should only be used when necessary.

`-nb|-null_byte`

> Checks in the source attribute for null (0x00) bytes. Generates a warning message when objects of type `ascii` and subtypes of `ascii` contain null bytes.

`-t|-type` *type*

> Specifies the type of objects to check.
>
> You cannot use this option with *object_spec*. Using this option implies the `-u|-unused_skip` option.

`-u|-unused_skip`

> Specifies to skip checks for extra files and entries in the cache and archive files. This option does not remove or delete files or entries.

`-v|-verbose`

> Generates more detailed information about each error. The errors report the following:
>
> • Objects with no `source` attributes, excluding problems and tasks. These objects have no cache or archive entries, and are skipped.
> • Files still archived by the old pre-4.1 archivers (SCCS, compress, and RCS, not `ccm_rcs`). This means that you must perform archive conversion.
> • Objects with no cache files. Such objects were probably affected by an earlier execution of `ccm clean_cache`.
> • Objects with no `source_modify_time` attributes. This is a minor error. Such objects have not been upgraded correctly to current database standards. You can create the `source_modify_time` attribute, of type `time`, and set it to the correct time (the time when the source file was last edited, before it was checked in). This should be the modify time on the cache file.
> • Object cache files with times earlier than their *source_modify_times*. This error, which is not serious, might have been caused by the failure of a call to set the cache file time. Fix this by deleting the cache file **after** you have ensured that the archive entry is correct.

`-w|-windows`

> Suppresses a warning message given when files differ only in carriage return characters.

```
-z|-zero_counts
```

> Causes all counts to be printed, including those with zero values. This can be useful when other programs analyze the output of `fs_check`.

object_spec

> Provides a list of objects to check. You can use query results for this argument.
>
> You cannot use this argument with the `-t` option. Using this option implies the `-u|-unused_skip` option.

Example

Check the file system consistency of the database and provide detailed output information.

```
$ ccm fs_check -v
```

See also

"ccmdb backup" on page 128

"ccmdb check" on page 130

ccm message

Synopsis

```
ccm message [-attr value] [-d|-database database_path]
            [-rfc_address address] [-u|-user username]'message_text'
```

Description and uses

Use the ccm message command to send a message directly to a Telelogic Synergy user, or to broadcast a message to Telelogic Synergy users selected using a keyword criterion.

Messages are prepended with the name of the user who sends the message. If you want to send messages to specific sessions, use the -rfc_address option.

You can execute this command as any user, in any role.

For more information, see "Broadcast system messages" on page 28.

Options and arguments

-attr value

Enables you to send a broadcast message to specific users selected using one of the following keywords: process, display, pid, user, host, database, engine_address, or pwa_path.

-d|-database database_path

Sends a message to all users of the specified database.

You can use a regular expression to specify multiple databases. The regular expression must contain a leading question mark (?) character.

-rfc_address address

Specifies the Remote Function Call (RFC) address of the Telelogic Synergy interface (GUI) process to which to send the message. RFC supports machines with multiple IP addresses.

The RFC address used must be the exact RFC address of the target process. This address can be determined by running the ccm ps command.

The format for machines with a known host name is:

host:port[:ip]*

The format for machines with no known host name is:

ip:port[:ip]*

where `[:ip]*` represents zero or more IP addresses separated by colons.

`-u|-user` *username*

Sends a message to *username*.

Examples

- Use the `-host` attribute to send a message to all users on the `comp1` host.

  ```
  $ ccm message -host comp1 'New compile server is up'
  ```

- Use the `-d` option to send a message to all database users on the current server.

  ```
  $ ccm message -database '?' 'Server going down in 2
  minutes...'
  ```

Caveats

If the specified `-rfc_address` is for an engine, the `ccm message` command fails.

See also

"ccm monitor" on page 106

"ccm ps" on page 109

ccm monitor

Synopsis

```
ccm monitor [-attr value] [-d|-database database_path]
            [-rfc_address address] [-u|-user username]
```

Description and uses

Use the `ccm monitor` command to show a network-wide view of Telelogic Synergy user and process information, including the following:

- user
- process type (engine, user interface, router, or object registrar)
- host
- port
- process ID
- database path

If you specify no options with `ccm monitor`, the command shows information for all users and processes for the current Telelogic Synergy installation (`$CCM_HOME`).

The `ccm monitor` command appends an exclamation point (!) to the status field of a process when that process has not responded to the router for a fixed amount of time. This failure to respond is assumed to indicate a problem; e.g., that the machine that was running the process has gone down or the process has hung.

If a delay in response is due to a busy machine, the exclamation point disappears when the operation that is using the machine is completed.

You can execute this command as any user, in any role.

The process names shown by the `ccm monitor` command indicate the following processes:

Name shown by `ccm monitor`	Process
`engine`	Engine (any kind)
`cmd`	Classic CLI or back end sessions
`gui`	Classic GUI
`dev_clnt`	Telelogic Synergy GUI
`usr_cmd`	Telelogic Synergy CLI
`server`	CCM server
`router`	Message router daemon
`objreg`	Object registrar notification daemon
`ccm_ess`	Engine start service for Windows
`monitor`	Monitor (this command)

For more information, see "Monitor processes using ccm monitor" on page 28.

Options and arguments

`-attr value`

> Specifies the name of the field to be monitored. The possible `-attr` option arguments are: `process`, `display`, `pid`, `user`, `host`, `database`, `engine_address,` or `pwa_path`.

`-d|-database database_path`

> Specifies that all users of `database_path` are monitored.

> You can use a regular expression to monitor multiple databases. The regular expression must contain a leading question mark (`?`) character.

```
-rfc_address address
```

> Specifies the RFC (Remote Function Call) address of the Telelogic Synergy interface (GUI) process to be monitored.
>
> The RFC address used must be the exact RFC address of the target process. This address can be determined by running the `ccm ps` command.
>
> The format for machines with a known host name is:
>
> `host:port[:ip]*`
>
> The format for machines with no known host name is:
>
> `ip:port[:ip]*`
>
> where `[:ip]*` represents zero or more IP addresses separated by colons.

```
-user username
```

> Specifies the user to be monitored.

Examples

- Monitor user ann's engine processes.

```
$ ccm monitor -user ann -process engine
Telelogic Synergy process monitor...2 process(es)
located:
user process  host  portpid   database path
---- -------  ----  ---- ---   ------------
ann  engine  marlin 374525748 /vol/fish/ccmdb/ann_test
ann  engine  marlin 39438645   /vol/fish/ccmdb/ann_eval
```

- Monitor processes with the `guppy.telelogic.com` host address.

```
$ ccm monitor -host guppy.telelogic.com
Telelogic Synergy process monitor...1 process(es)
located:
user  process  host port pid  database path
----  -------  ---- -------   ------------
ann   gui     guppy 194513275 /vol/fish/ccmdb/ann_eval
```

See also

"ccm ps" on page 109

ccm ps

Synopsis

```
ccm ps [-attr value] [-d|-database database_path]
       [-rfc_address address] [-user username]
```

Description and uses

Use the ccm ps command to show network-wide process status information on Telelogic Synergy users and processes. This command is a maximum verbosity version of ccm monitor.

If you specify no options with ccm ps, the command displays information for all processes for the current Telelogic Synergy installation ($CCM_HOME).

You can execute this command as any user, in any role.

The process names shown by the ccm ps command indicate the following processes:

Name shown by ccm ps	Process
engine	Engine (any kind)
cmd_interface	Classic CLI or back end sessions
gui_interface	Classic GUI
dev_clnt_interface	Telelogic Synergy GUI
usr_cmd_interface	Telelogic Synergy CLI
server	CCM server
router	Message router daemon
objreg	Object registrar notification daemon
ccm_ess	Engine start service for Windows
ps	Ps (this command)

For more information, see "Monitor process status using ccm ps" on page 29.

Options and arguments

`-attr value`

> Specifies the name of the field to be monitored. The possible **-attr** option arguments are as follows: `process`, `display`, `pid`, `user`, `host`, `database`, `engine_address,` or `pwa_path`.

`-d|-database database_path`

> Specifies that all users of *database* are monitored.

> You can use a regular expression to specify multiple databases. The regular expression must contain a leading question mark (?) character.

`-rfc_address address`

> Specifies the Remote Function Call (RFC) address for the process status to be displayed. The format for machines with a known host name is:

> `host:port[:ip]*`

> The format for machines with no known host name is:

> `ip:port[:ip]*`

> where `[:ip]*` represents zero or more IP addresses separated by colons.

`-user username`

> Specifies the user whose process status you want to show.

Examples

- Display the process information for the interface with a host address of `horse.cwi.com`.

  `$ ccm ps -host horse.cwi.com`

- Display the process information for all databases that have names containing the string `training`.

  `$ ccm ps -d '?training'`

See also

"ccm monitor" on page 106

ccm version

Synopsis

```
ccm version [-a|-all] [-c|-ccm] [-d|-dbschema|-s|-schema][-i|-
informix]
```

Description and uses

Use the `ccm version` command to show the version of Telelogic Synergy or Informix you are running. If you specify `ccm version` with no options, the system displays the Telelogic Synergy version.

You can execute this command as any user, in any role.

Options and arguments

`-a|-all`

Displays the version of the current database schema, the Informix database server, and the Telelogic Synergy release.

`-c|-ccm`

Displays the version of the Telelogic Synergy release.

If you specify `ccm version` with no options, the system displays the Telelogic Synergy version.

`-d|-dbschema` or `-s|-schema`

Displays the version of the database schema.

`-i|-informix`

Displays the version of the database server.

Example

Show which version of Telelogic Synergy is running.

```
$ ccm version
7.0
```

ccm_esd

Synopsis

```
ccm_esd [port_number]
```

Description and uses

Use the `ccm_esd` command to start the engine startup daemon. Telelogic Synergy clients use the engine startup daemon to start sessions when the server is running inside a firewall and the client is running outside the firewall.

The log file for the Telelogic Synergy engine startup daemon is in `$CCM_HOME/log/ccm_esd_hostname.log`. You must execute this command on the machine where you will run Telelogic Synergy engines, as user *ccm_root*.

Note Web mode users do not need the engine startup daemon to start engines inside the firewall. You need to run ESD only when users outside the firewall will connect using traditional mode sessions, or when you have a Telelogic Change server running outside the firewall.

A Windows client automatically uses an ESD server if one exists on the engine host. However, Telelogic Synergy uses r* protocols to verify that the user name, password, and UNIX installation path are correct. The advantage of the default configuration is that it is possible to use a Windows client for multiple databases where some are using ESD and others are not.

If all UNIX engine servers are using ESD, then the client can rely exclusively on ESD services (r* protocols will not be used). Do this by adding the following option to the `Options` section of the system (not personal) `ccm.ini` file at `$CCM_HOME/etc/ccm.ini`:

```
[Options]
engine_daemon=TRUE
```

If you do not want the Telelogic Synergy Windows client to use ESD even when it is available on the engine host, add the following option to the `Options` section of the system (not personal) `ccm.ini` file at `$CCM_HOME/etc/ccm.ini`:

```
[Options]
engine_daemon=FALSE
```

Note Use of ESD is not automatically detected for UNIX clients. Such clients must specify the `engine_daemon` option to use ESD.

During installation, the installer creates a single entry containing the installation machine name and port number in a port file called `esd.adr`, located in the `$CCM_HOME/etc` directory. The `ccm_esd` command starts the engine startup daemon. The ESD needs to know which port to listen on for requests from clients. This information is in the port file.

If your site will run engines on machines other than the installation machine, you need to add the host (machine) name and port number for each machine. You **must** edit the port file **before** you run the `ccm_esd` command or the command will fail.

The following information will help you determine which machines require an entry in the `esd.adr` port file.

- Which machines will run ESDs?

- Which port will each ESD listen on for requests from clients?

For each machine that will run an ESD, perform the following:

1. Edit the port file, `esd.adr`.

   `$ vi $CCM_HOME/etc/esd.adr`

2. Type the host name and port number in the following form:

   `hostname:port_number`

   For example, type: `john:8828`

3. Save, and then exit the port file.

For more information, see "Start or stop the engine startup daemon (esd)" on page 26.

Options and arguments

port_number

Overrides the port number in the `esd.adr` port file.

Only user *ccm_root* can use this option, which must be run on each machine where an ESD will be run.

Example

Start the engine startup daemon and specify a port.

`$ ccm_esd 5418`

Files

```
$CCM_HOME/etc/esd.adr
$CCM_HOME/etc/ccm.ini
$CCM_HOME/log/ccm_esd_hostname.log
$CCM_HOME/log/ccm_router.log
```

See also

"ccm monitor" on page 106

"ccm_start_daemons" on page 126

"ccm_stop_daemons" on page 127

ccm_install

Synopsis

Install the Software

```
ccm_install [-d|-directory directory][-p|-platform platform_type] -x

ccm_install [-directory directory]-i|-install
            [-p|-platform platform_type]
```

Correct an Installation

```
ccm_install -c|-correct [-p|-platform platform_type]
            [-d|-directory directory]
```

Verify an Installation

```
ccm_install -v|-verify [-p|-platform platform_type]
            [-d|-directory directory]
```

Fix Informix Links

```
ccm_install -l [-d|-directory directory]
```

Description and uses

Use the `ccm_install` command to extract the software, install the software, verify or correct an installation, or fix Informix database links.

If you specify no options, it is assumed that you have extracted the software already and `ccm_install` sets up permissions and links. If you omit the `-p` option, the software is installed onto the current machine. If you omit the `-d` option, the software is installed into the current directory (i.e., it is assumed that you changed directory to the installation directory, `$CCM_HOME`, before executing the `ccm_install` command).

The `-x` or `-i` option installs Telelogic Synergy, performing the following actions:

• Checks that *ccm_root* and *informix* users and groups are present, but does not create them.

- Checks and creates (if necessary) symbolic links from `/usr/lib` to Informix libraries.

    Note This step is not performed if the command is executed on a different platform other then specified with the platform option.

- Checks and creates (if necessary) the `$CCM_HOME/informix/ etc/ sqlhosts` file.
- Creates `$CCM_HOME` subdirectories (e.g., for log files).
- Checks that all required files are present, and sets their ownerships and permissions.
- If the router address (`.router.adr`) file does not exist, prompts for the router host, service name, and port, then creates the file.
- If the help server (`ccm_websrv.adr`) file does not exist, prompts for the help Web server port and creates the file.
- If the port file (`esd.adr`) does not exist, creates it and enters the host name and port number for the installation machine.
- Prompts for license information.

The `-correct` option corrects the installation, and differs from the `-x` or `-i` option in that it does not attempt to create the `sqlhosts` file, the $CCM_HOME subdirectories, the router address file, or prompt for license info.

The `-verify` option verifies the installation by performing the same checks as the install action. The `-verify` option does not change the installation.

You must use the `ccm_install` command to fix library links if the software has been installed already on another server.

You must be user *root* to use the `-x` option, to perform install or correct actions, or to fix database links.

Options and arguments

`-c|-correct`

> Corrects a Telelogic Synergy installation.
>
> No prompts are issued. You can use this option in a non-interactive script.
>
> Only user *root* can use this option.

`-d|-directory` *directory*

>   Specifies the directory to install the software. The `/usr/local/`
>   `ccm70` directory is the default, unless *$CCM_HOME* is set to a different
>   path.

`-i|-install`

>   Installs Telelogic Synergy. This is the default option.
>
>   Only user *root* can use this option.

`-l`

>   Fixes the links on a new database or engine server after installing the
>   software on a different NFS server, and performs no other action. This
>   option is required on any machine where you are setting up an Informix
>   server or running engines, on which you have not installed Telelogic
>   Synergy.
>
>   No prompts are issued; you can use this option in a non-interactive
>   script.
>
>   Only user *root* can use this option.

`-p|-platform` *platform_type*

>   Specifies the remote host on which to install the software, or on which
>   to verify or correct the installation.
>
>   This option enables you to install on a remote host without *root* access to
>   the installation directory. The `-platform` options are:
>
>   `solaris | ibm | linux`

`-s` *servername*

>   Upgrades the named server, which must be local to the current machine.

`-u`

>   Prompts for the previous Telelogic Synergy installation directory, and
>   copies configuration files from it.

`-v|-verify`

>   Verifies a Telelogic Synergy installation.
>
>   No prompts are issued. You can use this option in a non-interactive
>   script.

`-x`

>   Extracts the software from the media. Only user *root* can use this option.

Example

Execute `ccm_install` to extract the AIX software onto a local (Solaris) machine and install the software into the AIX machine's NFS-mounted `/usr/local/ccmvar` directory. (The `/usr/local/ccm70` directory is the default, unless you have set `$CCM_HOME` to a different path.)

ccm_objreg

Synopsis

```
ccm_objreg
```

Description and uses

Use the `ccm_objreg` command to start the object registrar daemon. This daemon keeps each object's data current in all of the user interface processes as modifications are made to the Telelogic Synergy databases.

The object registrar daemon must be running on the host specified in the `ORHOST` parameter of a Telelogic Synergy database before you can start a Telelogic Synergy session on the database. To obtain the object registrar host name for a database, use the following command:
```
ccmdb info database_path -k orhost
```

A single object registrar can service more than one database. A host, therefore, requires only one object registrar to be running for any number of databases.

By default, the object registrar uses a dynamically assigned port. If you want to start Telelogic Synergy sessions where the interface processes run on machines outside a firewall, you must fix the port by creating a file `$CCM_HOME/etc/.objreg.adr`. Each line in this file is of the form `hostname:port.` The object registrar reads this file, and if an entry for this machine is found, the process uses the corresponding port.

Note The other two daemons that are required to run Telelogic Synergy sessions through a firewall are the router and the ESD. Both these daemons always use fixed ports, as configured in the files `$CCM_HOME/etc/.router.adr` and `$CCM_HOME/etc/esd.adr`.

The log file for the Telelogic Synergy object registrar is in `$CCM_HOME/log/ccm_objreg.log`.

You must execute this command on the database server, as user *ccm_root*.

For more information, see "Start or stop the object registrar (objreg)" on page 25.

Options and arguments

This command does not have options and arguments.

Example

Start the object registrar daemon on the current machine.

```
$ ccm_objreg
```

Files

```
$CCM_HOME/log/ccm_objreg.log
```

See also

"ccm_objreg_tail" on page 121

"ccm monitor" on page 106

"ccm_start_daemons" on page 126

"ccm_stop_daemons" on page 127

ccm_objreg_tail

Synopsis

`ccm_objreg_tail`

Description and uses

Use the `ccm_objreg_tail` command to `tail -f` the object registrar log file, `$CCM_HOME/log/ccm_objreg.log`. Press **Control-c** to exit from this command.

You can execute this command as any user, in any role.

For more information, see "Monitor the Telelogic Synergy daemons log files" on page 30.

Options and arguments

This command does not have options and arguments.

Example

Monitor the object registrar log file.

`$ ccm_objreg_tail`

Files

`$CCM_HOME/log/ccm_objreg.log`

See also

"ccm_objreg" on page 119

ccm_router

Synopsis

ccm_router

Description and uses

Use the ccm_router command to start the Telelogic Synergy message router daemon. One message router is required per network installation, and must be run on the machine you specified as the router host when you installed Telelogic Synergy.

The log file for the message router is in $CCM_HOME/log/ccm_router.log.

You must execute this command on the router host, as user *ccm_root*.

For more information, see "Start or stop the router (router)" on page 24.

Options and arguments

This command does not have options and arguments.

Example

Start the message router daemon.

$ ccm_router

Files

$CCM_HOME/log/ccm_router.log

See also

"ccm monitor" on page 106

"ccm_router_tail" on page 123

"ccm_start_daemons" on page 126

"ccm_stop_daemons" on page 127

ccm_router_tail

Synopsis

ccm_router_tail

Description and uses

Use the ccm_router_tail command to tail -f the message router log file, $CCM_HOME/log/ccm_router.log. Press **Control-c** to exit from this command.

You can execute this command as any user, in any role.

For more information, see "Monitor the Telelogic Synergy daemons log files" on page 30.

Options and arguments

This command does not have options and arguments.

Example

Tail the message router log file.

$ ccm_router_tail

Files

$CCM_HOME/log/ccm_router.log

See also

"ccm_router" on page 122

ccm_server

Synopsis

```
ccm_server [-start | -stop] [-debug] [-port <server port>]
```

Description and uses

Use the ccm_server command to start the CCM server, which serves Telelogic Synergy sessions running in Web mode, as well as help.

At least one CCM server is required per installation. For better scalability, you can run multiple CCM servers. By default, the CCM server is started on port 8400, but you can start it on a different port.

The CCM server log is in the `host.port.pid` file in the log directory of the Telelogic Synergy server installation, for example, `boon.8400.54123`.

You must be logged in as *ccm_root* to run this command.

For more information, see "CCM Server Administration" on page 39.

Options and arguments

`-start`

> Starts the server.

`-stop`

> Stops the server.

`-debug`

> Turns on debugging for the server. Debugging messages will be saved in the `server log` file. Turn on debugging if recommended by Support.

`-port <server port>`

> Specifies the server port number to which the command will support.

Examples

Start the server on the current host on the default port number (8400).

```
$ ccm_server -start
```

Stop the server on the current host on the default port number (8400).

```
$ ccm_server -stop
```

Start the server on the current host on port number 8888.

```
$ ccm_server -start -port 8888
```

Stop the server running on the current host on port number 8888.

```
$ ccm_server -stop -port 8888
```

Files

```
$CCM_HOME/log/synergy_host_port.log
```

See also

"ccm monitor" on page 106

"ccm_start_daemons" on page 126

"ccm_stop_daemons" on page 127

ccm_start_daemons

Synopsis

```
ccm_start_daemons
```

Description and uses

Use the `ccm_start_daemons` command to start the Telelogic Synergy daemons, `ccm_router, ccm_objreg`, and `ccm_esd`, and `ccm_server` commands

Start the daemons separately by executing the `ccm_router, ccm_objreg, ccm_esd`, and `ccm_server` commands.

You can use this command only if you are logged onto the router host. You must execute this command as user *ccm_root*.

For more information, see "Start or stop all daemons" on page 23.

Options and arguments

This command does not have options and arguments.

Example

Start the Telelogic Synergy daemons.

```
$ ccm_start_daemons
```

Files

```
$CCM_HOME/log/ccm_esd_hostname.log
$CCM_HOME/log/ccm_objreg.log
$CCM_HOME/log/ccm_router.log
$CCM_HOME/etc/ccm7.0_system_inf.txt
```

See also

"ccm_esd" on page 112

"ccm_objreg" on page 119

"ccm_router" on page 122

"ccm_stop_daemons" on page 127

ccm_stop_daemons

Synopsis

```
ccm_stop_daemons
```

Description and uses

Use the `ccm_stop_daemons` command to stop the Telelogic Synergy daemons.

You must execute this command as user *ccm_root*.

To stop only the ESD process, you need to kill it. To do this, you must be logged in as *root*.

For more information, see "Start or stop all daemons" on page 23.

Options and arguments

This command does not have options and arguments.

Example

Stop the Telelogic Synergy daemons.

```
$ ccm_stop_daemons
```

See also

"ccm_esd" on page 112

"ccm_objreg" on page 119

"ccm_router" on page 122

"ccm_start_daemons" on page 126

ccmdb backup

Synopsis

```
ccmdb backup database_path [-no_check]
        [-z compress_level] -t|-to destination_dir|archive_device|-
```

Description and uses

Use the ccmdb backup command to verify the integrity of a Telelogic Synergy database, and then create a compressed backup (.cpk) file of the database's file systems and metadata. Use the -no_check option to suppress database integrity verification.

To use this command you must be logged onto the UNIX machine that hosts the Informix server.

Note This command performs the same actions as the ccmdb check command, followed by a ccmdb pack command. If the check fails, the database is still packed. The ccmdb check command also runs ccmdb update_statistics, which improves the speed of database queries.

Execute the ccmdb backup command daily to ensure reliable backups of Telelogic Synergy databases.

Note The ccmdb backup and ccmdb pack commands archive information from the metadata and file systems of the database. They do not back up work areas. Users with copy-based work areas must reconcile changes before the administrator runs the backup. If this is not done, changes to work areas must be backed up separately.

The database is locked during backups, which prevents users from changing data in the Telelogic Synergy database while a backup is being performed. Users who attempt to start a new session while a backup is in progress receive a message that the database is protected. Users already in a session being backed up cannot perform any operation until the backup is completed.

The maximum size of a pack file produced by ccmdb backup is limited by the destination file system.

For more information, see "Back up a database" on page 77 and "Pack databases" on page 173.

You must execute this command on the database server, as user *ccm_root*, and the destination directory must be writable by *ccm_root*.

Options and arguments

`database_path`

> Specifies the full path to the database you are backing up.

`-no_check`

> Suppresses the database integrity verification. If you do not specify this option, `ccmdb check` is called, and an update statistics operation is performed automatically.

`-t|-to destination_dir|archive_device|-`

> Specifies the destination of the database backup. You can dump to a pack (.cpk) file, to a directory, to an archive device, or to standard output ("-"). If you dump to a directory, the pack file is named `database_name.cpk`.
>
> Create the backup file in a directory that is backed up regularly through normal file system backup procedures, or at least in a directory on an independent file system.

`-z compress_level`

> Specifies the level of compression of the packed file. Values range from 1 (the least, but fastest compression) to 9 (the most, but slowest compression). The default setting is 6.

Example

Back up a database named `tstbill` to an existing directory called `backups` where you perform regular backups.

```
$ ccmdb backup /data/cw_databases/tstbill -to /vol/
hydra1/backups
```

See also

"ccmdb check" on page 130

"ccmdb pack" on page 144

"ccmdb unpack" on page 151

"ccmdb update_statistics" on page 155

ccmdb check

Synopsis

`ccmdb check` *`database_path`* `[-d|-c]`

Description and uses

Use the `ccmdb check` command to verify the integrity of a database. You can perform checks at the Telelogic Synergy level, the Informix level, or both levels. If no option is specified, both checks are run.

The command reports any problems that are found. If a problem is found, contact IBM Rational Software Support.

Use the `ccmdb check` command to check your database daily. To extend the availability of your database, use the `ccmdb check -c` option during the week, and use the `ccmdb check` command without any options on the weekend to provide full checking on a weekly basis.

Databases rarely fail an integrity check, but if failure does occur, you should detect it quickly so that you can correct the problem immediately. Therefore, execute the `ccmdb check` program daily, on each database, and after rebooting the system following a hardware failure or operating system crash.

The database is locked during checks, which prevents users from changing data in the Telelogic Synergy database while a check is being performed. Users receive a message that the database is locked when they attempt to start a new session while a check is in progress.

You must execute this command on the database server, as user *ccm_root*.

For more information, see "Check database integrity" on page 76.

Options and arguments

`database_path`

Specifies the full or relative path to the database you are checking.

`-c`

Performs checks at the Telelogic Synergy database level, including consistency and index checking.

`-d`

Performs checks at the Informix database level, including consistency and index checking.

Example

Check the `cheops` database in the current directory.

```
$ ccmdb check cheops
```

See also

"ccmdb backup" on page 128

ccmdb copy

Synopsis

```
ccmdb copy src_database_path dest_database_path [-p|-space dbspace]
```

Description and uses

Use the `ccmdb copy` command to copy an existing Telelogic Synergy database. The new database resides on the same database server as the source database, but you can use any *dest_database_path*, as long as that file system is mounted.

The `ccmdb copy` command copies a full Telelogic Synergy database, including its `st_root` directory.

Note After copying a database you might need to change some of the database's properties, such as the paths to projects' work areas. See Telelogic Synergy CLI Help for the `ccm wa` command for important information about changing a copied database's properties.

You must execute this command on the database server, as user *ccm_root*.

Options and arguments

dest_database_path

Specifies the path to the new database.

`-p`|`-space` *dbspace*

Specifies the dbspace to be used by the database server for the new database. By default, the `ccm` dbspace is used.

src_database_path

Specifies the source path to the original database.

Example

Copy the `base` database to `tstgonzo`.

```
$ ccmdb copy /vol/hydra/ccmdb/base /data/ccmdb/tstgonzo
```

Caveats

Databases should not be created in the Telelogic Synergy installation directory.

See also

"ccmdb backup" on page 128

"ccmdb create" on page 134

"ccmdb unpack" on page 151

ccmdb create

Synopsis

```
ccmdb create database_path [-e|-empty] [-p|-space dbspace]
                           [-s|-server servername]
```

Description and uses

Use the `ccmdb create` command to create a Telelogic Synergy root database for a new model installation.

This command creates a database without a model, which means that the database contains no roles, types, users, etc. Such databases are intended for use only by model developers.

Note Use the `ccmdb unpack` command to create a ready-to-use database instead of a database without an installed model. See "ccmdb unpack" on page 151 or "Create a database" on page 80 for more information.

You must execute this command on the database server, as user *ccm_root*.

Options and arguments

database_path

Specifies the path to the new database.

`-e|-empty`

Specifies that the database should be empty. This creates a database **without** a model or contents.

`-p|-space` *dbspace*

Specifies the dbspace to be used by the database server for the new database. By default, the `ccm` dbspace is used. You can specify a different dbspace for the database server on which you are creating the database.

`-s|-server` *servername*

Specifies the database server. If you do not specify the server, the database is created on the current machine if the machine is a database server, and on the main server if it is not.

Examples

Create a root database called `/data/ccmdb/test_ccm`.

`$ ccmdb create /data/ccmdb/test_ccm`

See also

ccmdb delete

Synopsis

```
ccmdb delete database_path [-y]
```

Description and uses

Use the `ccmdb delete` command to remove a database. You must use this command and not the standard `rm` command.

If you removed a database path with the `rm` command, use "ccmdb drop" on page 137 to complete the database's removal.

You must execute this command on the database server, as user *ccm_root*.

Options and arguments

```
database_path
```

Specifies the path to the database you are deleting.

```
-y
```

Executes the command without displaying confirmation messages.

Example

Delete the `test_ccm` database.

```
$ ccmdb delete /vol/hydra/ccmdb/test_ccm
```

Note Do not remove a Telelogic Synergy database using standard UNIX commands. Each Telelogic Synergy database contains data that exists in both the file system and on the database server. Using the UNIX `rm` command removes only the file system data.

See also

"ccmdb create" on page 134
"ccmdb drop" on page 137

ccmdb drop

Synopsis

```
ccmdb drop database_path [-s|-server servername] [-y]
```

Description and uses

Use the `ccmdb drop` command to drop a database from the database server when the database's path, or other database information, has been accidentally removed.

For example, this command completes the removal of a database after a user has attempted to remove a database using a UNIX command.

Note Always use the `ccmdb delete` command to delete a database completely.

You must execute this command on the database server, as user *ccm_root*.

Options and arguments

database_path

Specifies the path to the database you are dropping.

`-s|-server` *servername*

Specifies the database server. If you do not specify the server, the database is dropped from the current machine if the machine is a database server, and from the main server if it is not.

`-y`

Executes the command without displaying confirmation messages.

Example

Drop the web_ccm database from the `argent` server.

```
$ ccmdb drop /vol/argent1/ccmdb/web_ccm -server argent
```

See also

"ccmdb delete" on page 136

ccmdb dump

Synopsis

```
ccmdb dump database_path [-t|-to dumpfile|-]
```

Description and uses

Use the `ccmdb dump` command to dump a database's metadata to a dump file or to standard output.

For more information, see "Dump databases" on page 175.

You must execute this command on the database server, as user *ccm_root*.

Options and arguments

`database_path`

Specifies the path to the database you are dumping.

`-t|-to dumpfile|-`

Specifies the destination of the database dump. You can dump to a dump file or to standard output ("-").

The default pack file path is `database_name.dmp` in the directory above the `database_name` leaf under the `database_path`.

Examples

- Dump the `test_ccm` database to the `test_ccm.dmp` file in the current directory.

  ```
  $ ccmdb dump /vol/hydra/ccmdb/test_ccm
  ```

- Dump the `test_ccm` database to the `/vol/hydra/dumpdb/test_ccm_meta.dmp` file.

  ```
  $ ccmdb dump /vol/hydra/ccmdb/test_ccm -to /vol/hydra/dumpdb/test_ccm_meta.dmp
  ```

See also

"ccmdb backup" on page 128

"ccmdb load" on page 142

ccmdb info

Synopsis

```
ccmdb info database_path [-k|-keyword keyword [-v|-value value]]
```

Description and uses

Use the ccmdb info command to report or change the characteristics of a database.

With no options, the ccmdb info command shows all database information, except size.

Any user can obtain information about the database using the default (*database_path* with no options) or the -keyword option, but you must be user *ccm_root* to execute this command with the -value option.

Note The **-k** size option functions only if you are logged on to the database server.

Options and arguments

database_path

> Specifies the path to the database for which you are showing or changing information.

-k|-keyword *keyword*

> Specifies the type of database information to show or change. Use any one of the following (case-insensitive) keywords to designate the type of information:
>
> ```
> active | all | case | database | dbpath | hostname |
> orhost | platform | protect | schema | size |
> version
> ```
>
> • active shows whether or not users have sessions on the specified database.
> • all shows all keywords and their values.
> • case displays information regarding the case in which a file or directory created in or migrated to Telelogic Synergy is stored.
> • database is the name of the DBMS, which is always Informix.
> • dbpath is the full path to the db directory of the database.
> • hostname is the database server host. .

- `orhost` is the host for the object registrar service. If `orhost` does not exist, `hostname` is used as the object registrar host.
- `platform` is the type of host on which the database resides; for example, AIX.
- `protect` shows whether a database is protected or unprotected.
- `schema` displays the database schema version.
- `size` calculates and reports the size of the Informix database, the storage root, and then the total, all in kilobytes.
- `version` is the version of the database schema.

`-v|-value `*`value`*

Use any one of the following keyword settings to change database information:

`[case | database | hostname | next_cvid ]`

Note For each of these values, you must run as user *ccm_root*.

Note that the value for the `case` keyword has significant impact on your database:

- `case` displays information regarding the case in which a file or directory created in or migrated to Telelogic Synergy will be stored

  Enables you to change a Telelogic Synergy database between two modes: `LOWER` or `PRESERVE`.

  The default mode is `PRESERVE`, which causes Telelogic Synergy to store the file and directory names in the case in which they were created. The `LOWER` mode causes file and directory names to be stored in lower case.

Caution Do **not** change the case from `PRESERVE` to `LOWER` for a database in which upper- or mixed-case objects have been created.

If a database contains objects with upper- or mixed-case names, changing case from PRESERVE to LOWER downcases all user input. Queries, scripts, and so forth containing upper- or mixed-case objects will not work correctly.

- `database` is the name of the DBMS, which is always Informix.

- `hostname` is the database server host.
- `next_cvid` sets the next `cvid` number to the given value. Note that the value passed must be greater than the maximum `cvid` currently in use. You cannot adjust the next `cvid` counter downwards.

Examples

- Show the characteristics of the `/vol/hydra/ccmdb/test_db` database.

```
$ ccmdb info /vol/hydra/ccmdb/test_db
  VERSION=7.0
  PLATFORM=Solaris
  HOSTNAME=flash
  ORHOST=flash
  DBPATH=/vol/hydra/ccmdb/test_db
  DATABASE=informix
  PROTECT=unprotected
  ACTIVE=YES (database is active)
  CASE=PRESERVE
  SIZE=3992 KBYTES
  SCHEMA=0111
```

- In the database called `/vol/tom/ccmdb/alpha`, set `ORHOST` to `bill` so that the database can use an object registrar running on `bill`.

```
$ ccmdb info /vol/tom/ccmdb/alpha -k ORHOST -v bill
```

- In the database called `/vol/tom/ccmdb/alpha`, change the case mode setting to `PRESERVE`.

```
$ ccmdb info /vol/tom/ccmdb/alpha -k case -v preserve
```

- Set the next `cvid` number for the `basek2` database to `10000`.

```
$ ccmdb info -k next_cvid -v 10000 /orbit/ccmdb/basek2
  Setting next cvid to 10000 for database /orbit/
  ccmdb/basek2.
```

ccmdb load

Synopsis

```
ccmdb load dumpfle|- [-n|-overwrite][-p|-space dbspace]
                [-s|-server servername] -t|-to database_path
```

Description and uses

Use the `ccmdb load` command to load a database's dumped metadata into a new or existing database.

By default, the destination database is assumed to be new and empty. Use the `-nocreate` and `-overwrite` option to load into an existing database (e.g., for an upgrade).

You must execute this command on the database server, as user *ccm_root*.

Options and arguments

`-`

Loads the dumped metadata from standard input.

`database_path`

Specifies the path to the database into which you are loading the dumped metadata.

`dumpfile`

Specifies the dump file you are loading.

`-n|-nocreate`

Loads into an existing database at `database_path`.

`-o|-overwrite`

Overwrites the Telelogic Synergy database's file system in the `database_path`, if the database exists already.

`-p|-space dbspace`

Specifies the name of the dbspace. By default, the `ccm` dbspace is used.

`-s|-server servername`

Specifies the database server. If you do not specify the server, the database is loaded onto the current machine if the machine is a database server, and onto the main server if it is not.

```
-t|-to database_path
```

> Specifies the database into which the dumped metadata is loaded
>
> By default, the dumped metadata is loaded to standard output.

Examples

- Load the `test_ccm.dmp` dump file into the new `prod_ccm` database on the `argent` server.

  ```
  $ ccmdb load test_ccm.dmp -to /vol/argent1/ccmdb/prod_ccm
  -server argent
  ```

- Load the `test_ccm.dmp` file into the new `web_ccm` database on the `argent` server and overwrite the existing database path `/vol/argent1/ccmdb/web_ccm`.

  ```
  $ ccmdb load test_ccm.dmp -overwrite -to \
  /vol/argent1/ccmdb/web_ccm -server argent
  ```

See also

"ccmdb dump" on page 138

ccmdb pack

Synopsis

```
ccmdb pack database_path [-t|-to packfile|archive_device|-]
                 [-z compress_level]
```

Description and uses

Use the `ccmdb pack` command to dump a database's contents to a single, portable file, appropriate for moving to another system. Packed files have the extension `.cpk`.

To use this command, you must be logged onto the UNIX machine that hosts the Informix server.

Note The `ccmdb backup` and `ccmdb pack` commands archive information from the metadata and file systems of the database. They do not back up work areas. Users with copy-based work areas must reconcile changes before the administrator runs the backup. If this is not done, changes to work areas must be backed up separately.

You can move a database from a UNIX server to a Windows server by packing the database using the `ccmdb pack` command, and vice versa, but you must run `ccmdb upgrade -w` after moving from Windows to UNIX.

The database is locked while a pack is in progress, which prevents users from changing data in the Telelogic Synergy database during a pack. Users who attempt to start a session while the pack is in progress receive a message that the database is locked.

The maximum size of a pack file produced by `ccmdb pack` is limited by the destination file system.

You must be user *ccm_root* to execute this command.

For more information, see "Back up a database" on page 77 and "Pack databases" on page 173.

Options and arguments

database_path

Specifies the path to the database you are packing.

`-t|-to` *`packfile|archive_device|-`*

> Specifies the destination of the database pack file. The `packfile` argument is the name of the database's packed, portable file. By default, the dump file is written to the *`database_name.`*`cpk` file in the current directory. The `archive_device` argument causes the packfile to be written to the specified archive device, and the `"-"` argument causes the packfile to be written to standard output.

`-z` *`compress_level`*

> Specifies the level of compression of the packed file. Values range from 1 (the least—but fastest—compression) to 9 (the most—but slowest—compression). The default setting is 6.

Example

Generate a pack file called `test_ccm.cpk` in the `/vol/bulldog/ccmdb` directory.

```
$ ccmdb pack /vol/bulldog/ccmdb/test.ccm -to /vol/hydra/
ccmdb/test_ccm.cpk
```

Caveats

Use the `ccmdb backup` command for scheduled backups.

See also

"ccmdb backup" on page 128

"ccmdb unpack" on page 151

ccmdb protect

Synopsis

```
ccmdb protect database_path
```

Description and uses

Use the `ccmdb protect` command to prevent users from starting new sessions on a database while you are solving a database problem or installing a model.

You must be user *ccm_root* to execute this command.

Options and arguments

`database_path`

Specifies the path to the database you are protecting.

Example

Protect the `/vol/boon/ccmdb/test_ccm` database.

```
$ ccmdb protect /vol/boon/ccmdb/test_ccm
```

Caveats

This command prevents new sessions from being started on the specified database but does not protect the database from sessions already running. Stop current sessions by executing the `ccmdb shutdown` command (see page 150).

See also

"ccmdb shutdown" on page 150

"ccmdb unprotect" on page 154

ccmdb refresh

Synopsis

```
ccmdb refresh database_path
```

Description and uses

Use the `ccmdb refresh` command to restart the back end sessions used by Telelogic Synergy Web mode sessions. Use this command when you change model settings that affect the behavior of a database to ensure that those changes take effect for Web mode users.

Because back end sessions are shared for Web mode sessions, restarting a Telelogic Synergy Web mode session will not cause model settings to take effect for that user.

It is not necessary to use this command after adding or modifying users. Telelogic Synergy automatically refreshes back end sessions when the users attribute is modified.

You must be user *ccm_root* to execute this command.

For more information, see "CCM Server Administration" on page 39.

Options and arguments

database_path

Specifies the path to the database that you want to refresh.

Example

Refresh back end sessions for the database `/vol/boon/ccmdb/test_ccm`

```
$ ccmdb refresh /vol/boon/ccmdb/test_ccm.
```

See also

"ccmdb info" on page 139

"ccmdb shutdown" on page 150

ccmdb repair

Synopsis

```
ccmdb repair database_path -i|-repair_index table_name|index_name|''
             [-y]
ccmdb repair database_path -t|-repair_table table_name [-y]
```

Description and uses

Use the ccmdb repair command to repair indexes and tables corrupted at the Informix level.

For more information, see "Repair a database" on page 78.

> **Note** Ensure that all Telelogic Synergy sessions are shut down before executing the ccmdb repair command. If any sessions are running when you execute the command, you will receive an Informix error. (For information on shutting down a database, see "ccmdb shutdown" on page 150.)

You must be user *ccm_root* to execute this command.

Options and arguments

database_path

Specifies the path to the database you are repairing.

-i|-repair_index *table_name*|*index_name*|''

Indicates that you want to re-create an index. If -repair_index is specified with a table name, all of the indexes in the table are repaired. If an index name is specified, only the specified index is repaired. If "" is specified, all indexes in the database are repaired.

The possible tables are as follows: acckeys, attrib, bind, bsite, compver, control, relate, and release.

-t|-repair_table *table_name*

Indicates that you want to repair table data for *table_name*. This is done by renaming the table, creating the new table, copying to the new table, and then deleting the old table.

-y

Executes the command without displaying confirmation messages.

Example

Based on the results of ccmdb check, fix an index corruption in the attrib table in the /vol/tom/ccmdb/primo database.

```
$ ccmdb repair /vol/tom/ccmdb/primo -repair_index attrib
```

ccmdb shutdown

Synopsis

```
ccmdb shutdown database_path
```

Description and uses

Use the `ccmdb shutdown` command to close down a Telelogic Synergy database for maintenance. This command automates several important steps required to bring down all Telelogic Synergy user sessions safely and ensure that the database is protected.

The `ccmdb shutdown` command does the following:

- Prevents new users from starting sessions. See "ccmdb protect" on page 146.

- Notifies active users, with a series of warning messages, that the database will be brought down.

- Issues remote "exit" commands to sessions that have not exited.

- Waits until all users have exited or have successfully shut down.

Once you have started the `ccmdb shutdown` command, only an interrupt keyboard sequence can stop the shutdown.

You must be user *ccm_root* to execute this command.

Options and arguments

database_path

Specifies the path to the database you are shutting down.

Example

Shut down the `/vol/hydra/ccmdb/test_ccm` database.

```
$ ccmdb shutdown /vol/hydra/ccmdb/test_ccm
```

See also

"ccm monitor" on page 106

"ccmdb unprotect" on page 154

ccmdb unpack

Synopsis

```
ccmdb unpack packfile|archive_device|- [-o|-overwrite]
              [-p|-space dbspace] [-s|-server servername]
               -t|-to database_path
```

Description and uses

Use the `ccmdb unpack` command to restore a database from a pack (`.cpk`) file created using `ccmdb pack` or `ccmdb backup`.

After unpacking a database that was created on Windows, you must run `ccmdb upgrade -w` before using it on UNIX.

> **Note** After unpacking a database (particularly from a packed production database), you might need to change some of the database's properties, such as the paths to projects' work areas. See Telelogic Synergy CLI Help for the `ccm wa` command for important information about changing a database's properties.

You must execute this command on the database server, as user *ccm_root*. Also, the destination directory must be writable by *ccm_root*.

For more information, see "Create a database" on page 80.

Options and arguments

`-`

Unpacks from standard input.

archive_device

Unpacks from an archive device.

`-o|-overwrite`

Causes the unpacked database to write the specified database to *database_path*.

Use this option if you want to disperse a large database over many drives under multiple file systems using symbolic links for the subdirectories of the database. Note that you cannot overwrite a database if a database with the same name already exists in Informix. (You can use the `ccmdb drop` command, and then use the `-overwrite` option to write out the database.)

`-p|-space` *dbspace*

> Specifies the name of the dbspace. By default, the ccm dbspace is used.

packfile

> Unpacks from a pack file.

`-s|-server` *servername*

> Specifies the database server. If you do not specify the server, the database is unpacked to the current machine if the machine is a database server, or to the main server if it is not.

`-t|-to` *database_path*

> Specifies the path to the database to which you are unpacking.

Example

Unpack the training database to a new database named `train70`.

```
$ ccmdb unpack packfiles/training.cpk -t /vol/orbit1/
ccmdb/train70
    Unpacking database /vol/orbit1/ccmdb/train70.
    Creating Telelogic Synergy database /vol/orbit1/ccmdb/
    train70.
    Database create succeeded.
    Extracting pack file /vol/pulsar2/ccmred/ccmred.sol/
    ccmred_odd/packfiles/training.cpk.
    Loading database.
    loading Telelogic Synergy dump file version 7.0 platform
    UNIX ...
    loading table attrib...
    ...............................3380 records.
    loading table bind...
    ...343 records.
    loading table bsite...
    ..223 records.
    loading table compver...
    ...368 records.
    loading table control...
    0 records.
    loading table relate...
    ..224 records.
    loading table release...
    10 records.
    loading table acckeys...
```

```
                  22 records.
                  Database unpacked successfully.
```

See also

"ccmdb backup" on page 128

"ccmdb pack" on page 144

ccmdb unprotect

Synopsis

```
ccmdb unprotect database_path
```

Description and uses

Use the `ccmdb unprotect` command to unprotect a database that was protected using the `ccmdb protect` command or `ccmdb shutdown` command.

You must be user *ccm_root* to execute this command.

Options and arguments

```
database_path
```

Specifies the path to the database you are unprotecting.

Example

Unprotect the `/vol/tom/ccmdb/tstgonzo` database.

```
$ ccmdb unprotect /vol/tom/ccmdb/tstgonzo
```

See also

ccmdb update_statistics

Synopsis

ccmdb update_statistics *database_path* [-l|-low]

Description and uses

Use the ccmdb update_statistics regularly to update Informix system tables so that your queries execute more quickly. This command is run for you as part of the ccmdb check, ccmdb load, and ccmdb unpack commands.

You must be user *ccm_root* to execute this command.

The ccmdb update_statistics command uses the UPDATE STATISTICS statement. Contact [IBM Rational Software Support](#) for more information about using this command.

Options and arguments

database_path

Specifies the path to the database for which to update the system tables.

-l|-low

Causes the command to perform a quicker, less comprehensive system catalog table check and update. The default is to perform the most comprehensive table check and update, which executes more slowly.

Example

Perform a quick update of the Informix system tables.

$ ccm update_statistics -low

ccmdb upgrade

The following is a brief description of the `ccmdb upgrade` command. For a detailed description and usage instructions, see the *Telelogic Synergy Upgrade Instructions for UNIX*. The upgrade program converts a database from Releases 6.4 or 6.5 to Release 7.0. You must upgrade a database from a previous release before using it with Release 7.0.

The upgrade program performs the following actions on each database that it upgrades:

1. Updates the target database schema to the Release 7.0 schema.

2. Updates the target database version to 7.0.

3. Saves the previous migrate rules as *database_path*`/lib/Unix/` `migrate.old`.

4. Saves the previous `pt` directory as *database_path*`/oldpt`.

5. Saves the previous `bin` directory as *database_path*`/oldbin`.

6. Saves the previous `notify` directory as *database_path*`/lib/` `oldnotify`.

7. Protects the target database.

8. Exports any types that were modified since a previous model install to the *database_path*`/old_types` directory.

   If the upgrade cannot determine the time of the previous model install, then it exports all standard types and attempts to identify any modified types by using an alternative algorithm.

9. Finds the list of models installed in the target database.

10. Installs the required list of models and model additions from the `model` database to the target database.

11. Unprotects the target database.

12. Restores the original migrate rules file saved in step 3, and performs any required upgrade.

13. Starts a 7.0 session on the target database.

14. Runs the `ccm db_update -update` command to update the data in the target database to 7.0 format.

15. Changes the logging mode of the target database to be unbuffered.

16. Removes obsolete files from the target database.

Description and uses

The database upgrade returns one of three possible outcome codes:

- **0 = Success**—The upgrade was successful, and the user does not need to perform any corrective actions.

- **1 = Failure**—Corrective action is required. The `ccmdb upgrade` command needs to be rerun after the corrections are made.

- **2 = Success with warnings**—The upgrade has successful completed all phases. However, there are warnings that the user needs to review and resolve. These warnings might suggest some post-update corrective actions that the user needs to perform, such as reviewing data to ensure that it is correct for their usage or manually modifying the database data to repair it.

ccmsrv archive

Synopsis

```
ccmsrv archive -d|-device archive_device -l|-level archive_level
               [-size device_size] [-s|-server servername] [-y]
```

Description and uses

Use the `ccmsrv archive` command to archive a database server, as part of a backup plan that includes backing up the files under the Telelogic Synergy database directories.

Caution Verify that you have a blank tape (or new file) for every archive. This command overwrites any previous archives on your tape (or file).

Also, if you use `ccmsrv archive` for metadata and a different tool for the file system, you must ensure that the backups are consistent; i.e., you should ensure that the file system is inactive between the server archive and the file system backup.

For more information about archiving a database server, see "Archive a database server" on page 59 and "Schedule and script backups" on page 174.

You must execute this command on the database server, as user *informix*.

Options and arguments

`-d|-device` *archive_device*

Specifies the archive device. The archive device must be a tape device name. After you specify the archive device with the `-d` option, that device becomes the default for both archive and restore commands. After you specify the default, you need not specify this parameter again unless you want to change the default.

`-l|-level` *archive_level*

Specifies the archive level: 0, 1, or 2.

`-s|-server` *servername*

Specifies the name of the database server. The default is the server on the current machine.

`-size` *device_size*

> Specifies the size of the archive device in Kilobytes. After you specify the size with the `-size` option, that size becomes the default. The device size is typically the size of the tape if you use a tape device.
>
> The default size is 10240 KB.

`-y`

> Executes the command without displaying confirmation messages.

> **Note** The recommended command for database backup is `ccmdb backup`, which is described on page 128. Use `ccmsrv archive` or `ccmdb dump` if `ccmdb backup` is either not possible or not practical, because your database is too large (2 GB on most UNIX operating systems and 4 GB on others).

Example

Create a Level 0 archive for the database server using the `/dev/rst0` device with a 1 GB tape.

```
$ ccmsrv archive -level 0 -size 1000000 -device /dev/rst0
```

The device you specify should be consistent with the type and capacity of tape.

Caveats

When you archive the server, be sure to back up the Informix server configuration file as well. This file is necessary to run or restore the Informix server.

By default, this file is named *servername*, and *servername* is the server's HOSTNAME. The server configuration file is in the `$CCM_HOME/informix/etc` directory.

See also

"ccmsrv restore" on page 170

ccmsrv create

Synopsis

```
ccmsrv create [-f|-file config_file] [-s|-server servername] [-y]
```

Description and uses

Use the `ccmsrv create` command to create a database server.

You must execute this command on the database server, as user *informix*.

Note When you are prompted for a server number, you must type a
server number in the range 1 to 255 that is not used by any
other server on the same machine. If `ccmsrv create` fails,
you might see a message like this one in the log file:

```
shmget: [EEXIST][17]: key 52574801: shared
memory already exists
```

Either a previous attempt to create this server failed, but did
not remove the shared memory, or another Informix server
with the same server number already exists on this machine
(perhaps from an earlier release of Telelogic Synergy, or for
your own use of Informix).

If you are certain there is no other Informix server with the
same number, delete the shared memory with the specific key
using `ipcrm`. If there is another server using the same
number, retry `ccmsrv create` with a different (unique)
server number between 1 and 255.

Also, you might see an error like the following in the log file if you need to
increase the size of your shared memory kernel parameters:

```
16:53:12  shmat: [EMFILE][24]: out of shared memory
segments, check system SHMSEG
16:53:12  mt_shm_init: can't create resident segment
```

See "Check shared memory and semaphore kernel parameters" on
page 181 for shared memory kernel parameter values.

For more information, see "Create an Informix database server" on page 50.

Options and arguments

`-f|-file` *config_file*

> Specifies the path to the configuration file, which is described in "Create a database server using a configuration file" on page 53. If you do not specify a configuration file, you are prompted for the following:
>
> - Maximum number of users
> - Server number
> - `root` dbspace details (location offset size)
> - `log` dbspace details (location offset size)
> - `ccm` dbspace details (location offset size)
> - `temp` dbspace details (location offset size)
> - Number of CPUs
>
> For more information, see "Create an Informix database server" on page 50.

`-s|-server` *servername*

> Specifies the name of the database server. The default is the name of the current machine.
>
> The server name is restricted as follows:
>
> - Is limited to 14 characters.
> - Cannot have `_net` as the last four letters.
> - Must be all lower case.
> - Must have a letter as the first character.
> - Can include any printable character except space, tab, new line, and #.

`-y`

> Executes the command without displaying confirmation messages.

Example

Create a database server named `hydra1`.

```
$ ccmsrv create -s hydra1
```

ccmsrv delete

Synopsis

ccmsrv delete [-s|-server *servername*] [-y]

Description and uses

Use the ccmsrv delete command to delete a database server. This operation removes the configuration file, the record of the database server in the sqlhosts file, and all chunk files.

Caution Avoid data loss by backing up all Telelogic Synergy databases **before** you delete their database server.

For more information, see "Delete a database server" on page 54.

You must execute this command on the database server, as user *informix*.

Options and arguments

-s|-server *servername*

> Specifies the name of the database server. The default is the server on the current machine.

-y

> Executes the command without displaying confirmation messages.

Example

Delete the current machine's database server.

$ ccmsrv delete

ccmsrv expand

Synopsis

```
ccmsrv expand[-d|-dbspace dbspace_name] [-o|-offset chunkpath_offset]
             [-s|-server servername] -size KBytes -p|-path chunkpath [-y]
```

Description and uses

Use the `ccmsrv expand` command to increase the size of database server's dbspace by adding a chunk file. This is useful when you want to increase the size of a server that is running low on dbspace.

Caution Do not use an existing file.

For more information, see "Increase the database space" on page 55.

You must execute this command on the database server, as user *informix*.

Options and arguments

`-d|-dbspace dbspace_name`

Specifies the dbspace. By default, the `ccm` dbspace is used. Possible dbspace names are as follows: `root`, `log`, `ccm`, and `temp`. See "About the Informix database server" on page 43 for more information.

`-o|-offset chunkpath_offset`

Specifies the offset to the chunk path if you are creating a database server using a raw partition. The default offset is zero.

`-p|-path chunkpath`

Specifies the path to the new chunk file.

You can give the full path of the new chunk file, or you can give a directory path. If you specify a directory, the default next name (e.g., `ccm.001, ccm.002, ccm.003`) is the name of the new chunk file.

`-s|-server servername`

Specifies the name of the database server. The default is the server on the current machine.

`-size KBytes`

Specifies the chunk size in Kilobytes.

`-y`

>   Executes the command without displaying confirmation messages.

Example

Expand the `ccm` dbspace by 100 MB by adding the `/vol/data/ informix_chunkfiles2` chunk file directory.

`$ ccmsrv expand -dbspace ccm -size 100000 -path /vol/data/ informix_chunkfiles2`

The new chunk file name is the existing chunk file name, incremented by 1. For example, if the last chunk file created was named `ccm.001`, the new chunk file name is `ccm.002`.

ccmsrv modify

Synopsis

```
ccmsrv modify[-s|-server servername][-u|-user max_users] [-y]

ccmsrv modify[-p|-parameter parameter] [-s servername]
             [-v|-value value] [-y]
```

Description and uses

Use the ccmsrv modify command to change database parameters, such as the maximum number of users allowed on the database server.

You must execute this command on the database server, as user *informix*.

For more information, see "Change a database server's parameter values" on page 49.

Options and arguments

-p|-parameter *parameter*

Specifies parameters to be modified in the Informix server configuration file. Valid parameters are LTAPEDEV or LTAPESIZE.

Use -p for logical log backups. For information on logical log backups, see "Back up logical log files" on page 67.

-s|-server *servername*

Specifies the name of the database server. The default is the server on the current machine.

-u|-users *max_users*

Specifies the maximum number of users allowed in the database.

-v|-value *value*

Specifies the value of *parameter*; for example, the name of the tape device or the size of the tape.

-y

Executes the command without displaying confirmation messages.

Example

Change the maximum number of users allowed in the current server to 55.

```
$ ccmsrv modify -users 55
```

ccmsrv offline

Synopsis

```
ccmsrv offline|off [-s|-server servername][-y]
```

Description and uses

Use the `ccmsrv offline` command to take the database server offline.

Use this command when you want to make a database server unavailable to all users. Send a broadcast message warning users that you are taking the server offline. For instructions on how to send a broadcast message, see "ccm message" on page 104.

Caution This command disconnects all users who are currently connected to the server.

You must execute this command on the database server, as user *informix*.

Options and arguments

`-s|-server servername`

Specifies the name of the database server. The default is the name of the current machine. This option is required when the Informix *servername* does not match the machine name.

`-y`

Executes the command without displaying confirmation messages.

Example

Take the current machine's database server offline.

```
$ ccmsrv offline
```

ccmsrv online

Synopsis

```
ccmsrv online|on [-s|-server servername][-y]
```

Description and uses

Use the `ccmsrv online` command to bring the database server online.

You must execute this command on the database server, as user *informix*.

Options and arguments

`-s|-server servername`

Specifies the name of the database server. The default is the name of the current machine. This option is required when the Informix *servername* does not match the machine name.

`-y`

Executes the command without displaying confirmation messages.

Example

Bring the current machine's database server online.

```
$ ccmsrv online
```

ccmsrv quiescent

Synopsis

```
ccmsrv quiescent|quiet [-s|-server servername][-y]
```

Description and uses

Use the `ccmsrv quiescent` command to put the database server in a quiescent state so that you can perform administrative tasks.

Caution After you execute this command, all active Telelogic Synergy sessions lose their connections to the database server. Execute a `ccmdb shutdown` command first.

You must execute this command on the database server, as user *informix*.

Options and arguments

`-s|-server servername`

> Specifies the name of the database server. The default is the server on the current machine. This option is required when the Informix `servername` does not match the machine name.

`-y`

> Executes the command without displaying confirmation messages.

Example

Put the current machine's database server in the quiescent state.

```
$ ccmsrv quiescent
```

ccmsrv restore

Synopsis

```
ccmsrv restore [-d|-device archive_device] [-s|-server servername][-y]
```

Description and uses

Use the `ccmsrv restore` command to restore a server from an archive device.

You must execute this command on the database server, as user *informix*.

For more information, see "Restore a database server" on page 64.

Options and arguments

`-d|-device archive_device`

Specifies the archive device. The archive device must be a tape device name. After you specify the archive device with the `-d` option, that device becomes the default for both the archive and restore commands. After you specify the default, you need not specify this parameter again, unless you want to change the default.

`-s|-server servername`

Specifies the name of the database server. The default is the server on the current machine.

`-y`

Executes the command without displaying confirmation messages.

Example

Restore the database server from the archive tape on the `/dev/rst8` device.

```
$ ccmsrv restore -device /dev/rst8
```

Caveats

If one or more of the Informix chunk files were deleted, you must re-create each of them. For a raw device, re-create the raw device file; for a cooked file, create a zero-length file in its place. If a chunk file does not exist, `ccmsrv restore` fails.

See also

"ccmsrv archive" on page 158

ccmsrv status

Synopsis

```
ccmsrv status [-a|-all] [-d|-dbspace] [-l|-log] [-s|-server
servername]
```

Description and uses

Use the ccmsrv status command to display the current status of the database server.

You must execute this command on the database server.

Options and arguments

```
-a|-all
```

Displays all information.

```
-d|-dbspace
```

Displays dbspace information.

```
-l|-log
```

Displays logical log information.

```
-s|-server servername
```

Specifies the name of the database server. The default is the server on the current machine.

Example

Request all information on the database server named joe.

```
$ ccmsrv status -all -s joe
```

Appendix A: Database Backup Methods

A Telelogic Synergy database has two parts: Informix metadata and file system data. To protect your data, you must back up both types of data regularly.

The following three methods are used for backing up databases:

- "Pack databases" on page 173
- "Dump databases" on page 175
- "Archive database servers" on page 177

Determine which method is appropriate for your environment. You might back up some databases with one method, and others with another method. However, it is best to choose one method.

After you have chosen a backup method and have developed a backup plan, you should test and automate the plan. Remember to test the backup method's corresponding restore procedures, as well.

The following sections describe the Telelogic Synergy backup methods.

Pack databases

Packing individual databases is the recommended backup method. This method creates a pack (`.cpk`) file that contains a complete backup of both the file system data and metadata.

A pack file is also useful when you upgrade from one release of Telelogic Synergy to the next. You can pack a database under an older release and unpack it under a newer release as part of the upgrade process.

You also can move a pack file to different machines, and usually to different architectures; i.e., you can move a pack file from one UNIX platform to another, or from UNIX to NT. (You cannot move a pack file from NT to UNIX.)

Note Never back up Telelogic Synergy metadata using non-Telelogic Synergy backup tools.

Back up

Create a pack file by executing either the `ccmdb backup` or `ccmdb pack` command. You should use `ccmdb backup`, because `ccmdb backup` also runs the consistency checker, `ccmdb check`. If you use `ccmdb pack`, you can run `ccmdb check` independently.

See "ccmdb backup" on page 128, "ccmdb pack" on page 144, or "ccmdb check" on page 130 for more information about the pack commands.

Database locking and data consistency

Both `ccmdb backup` and `ccmdb pack` lock the database while they are being executed so that the file system data and metadata backups are consistent. Developers can edit checked out files while the backup is running. However, if users are editing during a backup, the backup might not contain those changes. Nonetheless, editing during the backup does not affect the backup consistency.

Schedule and script backups

Develop a backup plan that enables you to back up each active production database daily. Because the file system portion is included in the pack files, you should exclude this data from any other backups.

If you choose database packing as your backup method, you should write a script that includes `ccmdb backup` or `ccmdb pack` for each of your production databases, and you should run this script according to your backup plan.

Recover using a pack file

Recover from system failure by deleting the current database, and then unpacking the packed database using the `ccmdb unpack` command. All work performed in the database since the last backup is lost. In copy-based work areas you can recover the lost changes by reconciling copies of checked-out and recently checked-in files from the work area.

See "ccmdb unpack" on page 151 for more information about the command.

Dump databases

If your database is quite large or takes too long to pack, dumping a database is the recommended backup method. This method creates a dump (`.dmp`) file containing only the database's metadata, instead of producing a pack file that contains the file system data as well as the metadata.

One significant advantage to using the dump method is that you can perform an incremental backup of the file system data without performing a metadata backup. The metadata dump is not incremental, but a metadata dump file is much smaller than a pack file and the dump takes less time to perform than a pack, so you can save both the time and disk space by performing a dump.

A dump file is also useful when you upgrade from one release of Telelogic Synergy to the next. You can dump a database using an older release and load it under a new release as part of the upgrade process.

You also can move a dump file to different machines and different architectures; i.e., you can move a dump file from one UNIX platform to another, or from UNIX to Windows. If you move a dump file from Windows to UNIX, and use standard file system tools to move the file system portion of the database, you must run `ccmdb upgrade -w` on the reconstructed UNIX database before using it. See "Move a database from Windows to UNIX" on page 85.

Note Never back up Telelogic Synergy metadata using a tool that is not from Telelogic Synergy or Informix.

Dump

Create a database dump file by executing the `ccmdb dump` command.

The `ccmdb dump` command does not copy file system data. Therefore, it is your responsibility to back up the file system data using other tools, such as those included with the operating system.

See "ccmdb dump" on page 138 for more information about the dump command.

Database locking and data consistency

To ensure consistency between the metadata and file system data, you must shut down the databases before performing the dump and the file system backup.

Scheduling and scripting backups

You should develop a backup plan that enables you to back up each active production database daily. Because the file system data is excluded from dump files, you should perform the file system backups using separate tools.

If you choose database dumping as your backup method, you should write a script that includes `ccmdb dump` for each of your production databases, and you should run this script according to your backup plan. The script also can include the file system backup commands, or you can perform the file system backups using a separate script. The latter method will not, of course, ensure consistency between metadata and the file system.

Recover using a dump file

Recover from metadata loss or complete system failure by deleting the database, reloading the metadata from the dump file using the `ccmdb load` command, and restoring the file system data from its separate backup.

Although the work that was performed in the file system since the last dump is lost, you can perform dumps more frequently than packs and limit the amount of work lost since the last dump.

Furthermore, if the failure occurred in the file system, you can restore from the file system backup without restoring the metadata.

See "ccmdb load" on page 142 for more information about the load command.

Archive database servers

Archiving and restoring the server is the most complex—and the most difficult—way to back up and restore databases. Do not use the server archive and restore commands unless you are familiar with database logging techniques and neither of the methods discussed previously is practicable in your environment.

Because the administrative complexities of this backup method are considerable, it might be more cost effective for you to invest in hardware solutions for high availability, such as RAID, and to use one of the other backup methods to protect against complete system failure and satisfy other backup requirements.

A server archive creates an archive (9) file containing only the metadata for the server's database's, instead of producing a pack file that contains the file system data as well as the metadata or a dump file that contains metadata for a single database.

The only significant advantage to server archive is that it enables incremental or even continuous online backup of the metadata.

You cannot use a server archive to upgrade to a new release of Telelogic Synergy.

Archive

Create a database server archive file by executing the `ccmsrv archive` command. Note that the entire Informix server is archived. This means that you cannot back up or restore just one database: this method backs up all the server's databases. You can, of course, put each Telelogic Synergy database on its own server.

The `ccmsrv archive` command archives only the databases' metadata. Therefore, it is your responsibility to back up each database's file system data using other tools, such as those included with the server's operating system.

See "ccmsrv archive" on page 158 for more information about the server archive command.

Also, see "Archive database servers" on page 177 for more information.

Database locking and data consistency

To ensure consistency between the metadata and file system data, you must shut down the databases before archiving the server and performing the file system backups.

Scheduling and scripting backups

You can arrange for incremental backups by running `ccmsrv archive` at regular intervals, and you can augment these incremental backups with logical log backups. You can write the logical log backups directly to tape while the system is running.

Restore from archive

Restore a server archive using the `ccmsrv restore` command. You can restore a server archive only to a nearly identical server configuration: the server name, chunk file paths, chunk sizes, and many other configuration parameters must be identical at the time of archive and restore. This significantly restricts your flexibility.

To restore from a server archive, use the `ccmsrv restore` command to restore the metadata archive and all its increments. Then, you can use the logical log backups to roll forward all committed transactions up to the point of failure. If you have also arranged for frequent incremental backups of the file system data, or if you are using file systems with journalling or similar features, you can recover from hardware failure with almost no data loss. See "Back up logical log files" on page 67 for more information.

See "ccmsrv restore" on page 170 for more information about the server restore command.

Appendix B: Informix Setup and Tuning

This appendix discusses two important Informix topics: setup and tuning.

- Setup is discussed in the section, "Prepare UNIX database servers" on page 179.

- Tuning is discussed in the section, "Informix tuning guidelines" on page 184.

Prepare UNIX database servers

The following sections show how to prepare UNIX database servers for Informix Dynamic Server.

- "Create Informix chunk files" on page 179

- "Check shared memory and semaphore kernel parameters" on page 181

- "Add machines and protocols to the sqlhosts files" on page 183

Create Informix chunk files

Informix chunk files can be cooked files or raw partitions. For better performance and reliability on production databases, use raw disk partitions.

Only an experienced system administrator should create chunk files.

Caution Do not create chunk files on an NFS-mounted partition.

The default space suggested for the `root`, `temp`, and `log` dbspaces is about 1 MB per user. For the `ccm` dbspace it is about 2 MB per user. For the default 20 users, the total is about 100 MB. For each chunk file, the limit is 2 GB. This is only a rough estimate for the initial database chunk. In general, you should allocate dbspace generously to allow for future growth.

Cooked Files

No action is necessary on your part to use cooked files (i.e., set up a file system).

Use the estimates shown below to allocate disk space for cooked chunk files.

20 users (default)	100 MB
50 users	250 MB
100 users	500 MB

Raw Partitions

This section summarizes how to set up a raw partition on a new, blank disk that has been formatted already. (New disks typically are formatted by their manufacturers.)

1. Partition the disk into the sizes of your choice.

2. Create a symbolic link to the raw device; i.e., make *chunk_name* a symbolic link to the raw device.

   ```
   root# ln -s raw_device_path chunk_name
   ```

   This step is optional, but you should use a symbolic link to the device. The reasons are as follows.

   If you will be archiving Informix servers using `ccmsrv archive`, and restoring the servers using `ccmsrv restore`, the restored Informix server configuration must be nearly identical to the archived server's configuration. This means that you must restore to the same chunk file path used to archive the server. Using a symbolic link for the chunk file path is a reliable way to ensure that the archive and restore paths are identical.

   Using a symbolic link also facilitates changing the chunk file to a different (but at least same size) partition, or to a larger partition.

   Additionally, using symbolic links means you will not have problems if the raw partition name changes, for example, if you upgrade the operating system.

3. Change the ownership, group, and permission of the raw partition path.

   ```
   root# chown informix chunk_name
   root# chgrp informix chunk_name
   root# chmod 660 chunk_name
   ```

4. When `ccmsrv create` prompts for a raw partition name, type the path to the device file for that partition.

   Ensure that you reference the correct partition.

   chunk_name

5. Repeat steps 2-4 for `root`, `temp`, `log`, and `ccm`.

   For more information about how to partition a raw disk, see the documentation for your operating system.

Check shared memory and semaphore kernel parameters

It is required that the shared memory and semaphore kernel parameters on the database server have at least the minimum values shown, and you might need to increase them if there will be more than 20 users per database server. The values shown are those used by Informix for testing the port to each platform.

Because the optimal values depend on your hardware, network configuration, software, and workload, ask your system administrator for assistance.

Note The `ipcs` command displays the current shared memory
that is in use. This command can help you debug shared
memory problems.

If you are adding many more users to a database or creating a new server, you might need to increase the shared memory and semaphore kernel parameter values.

Caution Before changing the kernel parameters, be sure to
perform a complete backup of the system (e.g., save a
copy of the kernel).

For supported versions of the operating systems listed below, see the *Telelogic Synergy Readme* file.

Solaris

Prior to Solaris 10

The values of the kernel parameters that were used for testing this product on the OS prior to Solaris 10 systems are given below. These values might need to be tuned depending on the application and availability of system resources. These entries are in `/etc/system`.

```
set semsys:seminfo_semmap=64
set semsys:seminfo_semmni=4096
set semsys:seminfo_semmns=4096
set semsys:seminfo_semmnu=4096
set semsys:seminfo_semume=64
set semsys:seminfo_semmsl=100
set shmsys:shminfo_shmmax=268435456
set shmsys:shminfo_shmmin=100
set shmsys:shminfo_shmmni=100
set shmsys:shminfo_shmseg=100
```

The value of the kernel parameter `semmsl` should be set to at least 100. This is the maximum number of semaphores per set. See the section on "Configuring Semaphore Parameters" in *IBM® Informix® Dynamic Server Migration Guide* for details.

Solaris 10

On Solaris 10, all System V IPC facilities are either automatically configured or can be controlled by resource controls. The following kernel parameters are either removed or commented out from `/etc/system`:

```
semsys:seminfo_semmap
semsys:seminfo_semmns
semsys:seminfo_semmnu
semsys:seminfo_semume
shmsys:shminfo_shmmin
shmsys:shminfo_shmseg
```

The following obsolete IPC tunables are replaced by their resource controls with the new default values:

```
semsys:seminfo_semmni
semsys:seminfo_semmsl
shmsys:shminfo_shmmax
shmsys:shminfo_shmmni
```

Please refer to `rctladm(1m)` man page for more information about available resource controls.

RedHat Enterprise Linux

```
SHMMAX: 33554432
SHMMIN: 1
SHMMNI: 128
SHMSEG: 128
SHMALL: 4194304
SEMMNI: 128
SEMMSL: 250
SEMMNS: 32000
SEMOPM: 32
```

The value of the kernel parameter `SEMMSL` should be set to at least 100. This is the maximum number of semaphores per set.

Add machines and protocols to the sqlhosts files

To support both local and remote access to the database server, the ccmsrv create command creates the following two database server entries in the $CCM_HOME/informix/etc/sqlhosts file:

> *dbservername*   *nettype hostname dbservername*
>
> *dbservername_net nettype hostname servicename*

The first type of entry is for a local connection (e.g., a local connection for an engine and a database server in the same machine). The second type of entry is for a remote (*_net*) connection through sockets using TCP/IP (e.g., for a network connection to an engine on a remote machine).

For example, marathon is connected as marathon using a shared memory protocol (onipcshm), and as marathon_net using a Solaris TCP protocol (ontlitcp):

> marathon   onipcshm marathon marathon
>
> marathon_net   ontlitcp marathon marathon_marathon

The fourth column contains the database server name for local connections, and the service name (as defined in the services file) for network connections.

The following table shows the protocols (*nettypes*) for the supported Telelogic Synergy platforms.

Platform	Local	Remote (Sockets)
Solaris	onipcshm	ontlitcp
AIX	onipcshm	onsoctcp
Linux	onipcshm	onsoctcp

For AIX and Linux, the heterogeneous UNIX installations should share a single copy of the $CCM_HOME/informix/etc directory, and, therefore, a single copy of the $CCM_HOME/informix/etc/sqlhosts file. This means that entries added to sqlhosts by ccmsrv create are visible to all UNIX platforms.

If you did not link the $CCM_HOME/informix/etc directories as recommended, after creating a server on one platform you must copy the entries from the sqlhosts file for that platform to the sqlhosts files for your other platforms.

In the case of Solaris, the network protocol supported by Informix is different from the AIX or Linux platforms: the `sqlhosts` file for Solaris must be different, and you must add entries manually to the `sqlhosts` files after creating a server if you want that server to be accessible from other platforms.

For example, after creating a server on an AIX machine `lobo`, you would have two entries such as the following in the `sqlhosts` file on the AIX:

```
lobosrv onipcshm        lobo    lobosrv
lobosrv_net onsoctcp    lobo lobosrv_lobo
```

If you want to access this server from a Solaris platform, which cannot share the `sqlhosts` file, you must add an entry such as the following to the Solaris sqlhosts file:

```
lobosrv_net     ontlitcp     lobo lobosrv_lobo
```

Similarly, after creating a server on a Solaris machine `stellar`, you would have two entries such as the following in the Solaris `sqlhosts` file:

```
stellarsrv       onipcshm     stellar     stellarsrv
stellarsrv_net ontlitcp       stellar     stellarsrv_stellar
```

To access the `stellarsrv` server from AIX or Linux systems, you must copy the following line to the `sqlhosts` file on each of those other platforms:

```
stellarsrv_net onsoctcp     stellar     stellarsrv_stellar
```

Informix tuning guidelines

This section describes proper configuration and maintenance for the Informix database.

Partitions

The following are recommended:

- Always use raw partitions instead of cooked partitions.

- Create four (4) raw partitions on separate physical disk drives for optimal performance from your UNIX server.

- Place each chunk file (`ccm`, `log`, `rootdbs`, `tempdbs`) on a separate drive.

Dedicated Informix server

For better performance, dedicate your CM database server machine to run Telelogic Synergy. If you have a dedicated CM database server machine, make the following change to the RESIDENT parameter in the Informix ONCONFIG file:

```
RESIDENT = 1
```

The default setting is 0. This parameter specifies whether shared memory remains in operating-system physical memory. If the default setting remains, shared memory will be swapped to disk, which might slow CM server performance for large sites and at various usage times.

For more information about the Informix ONCONFIG file, see the appropriate Informix administrator's document.

Appendix C: Scripts

Using scripts

This appendix shows Telelogic Synergy scripts you can change to automatically start and stop the Telelogic Synergy daemons and the Informix daemons.

Note All scripts in this section must run in the Classic CLI.

You can run the scripts on Solaris. The automatic system startup procedures vary for each platform and operating system. If you want to run these scripts on other systems, you must change the scripts and the startup files from which they are called. The examples shown here apply to the Sun SPARC platform running on Solaris.

To start the Telelogic Synergy daemons and the Informix daemons automatically after a system reboot, create the following script in an `/etc/init.d/` `telelogic` file. The script is called by other startup scripts (shown in the next two subsections) that restart these processes.

```
#!/bin/sh
#  Telelogic Synergy Startup/Shutdown Script
#
CCM_HOME=$CCM_HOME
PATH=$CCM_HOME/bin:$PATH
export CCM_HOME PATH

case $1 in
    'start')
# Do on the router system
        su ccm_root -c ccm_start_daemons
# Do on each database server machine
        su informix -c 'ccmsrv online -y -s servername'
        su ccm_root -c ccm_objreg
        su ccm_root -c ccm_server

        ;;

'stop')
# Do on the router system
        su ccm_root -c ccm_stop_daemons
# Do on each database server machine
        su informix -c 'ccmsrv offline -y -s servername'
        ;;

*)
        echo "usage: /etc/init.d/telelogic {start|stop}"
        ;;
esac
```

Start processes automatically

The following example shows how to set up an `/etc/rc2.d` script.

Set up a symbolic link in `/etc/rc2.d`:

```
/etc/rc2.d/S##telelogic --> /etc/init.d/telelogic
```

The pound signs (##) reflect the order in which operations are performed. Replace ## with a 2-digit decimal, such as 98. This value should be high so that everything else (e.g., NFS) is started before the Telelogic Synergy daemons are started. `S##` does not have to be different from `K##.` `rc2.d` represents the run level of the operation. Level 2 startup is the standard.

During startup, the process automatically sends the appropriate argument ("start").

Stop processes automatically

The following example shows how to set up an `/etc/rc0.d` script.

Set up a symbolic link in `/etc/rc0.d`:

```
/etc/rc0.d/K##telelogic --> /etc/init.d/telelogic
```

The pound signs (##) reflect the order in which operations are performed. This value should be low. `K##` does not have to be different from `S##`. `rc0.d` represents the run level of the operation. Level 0 shutdown is the standard.

During shut down, the process automatically sends the appropriate argument ("stop").

Appendix D: Troubleshooting

The following sections describe some problems you might encounter while using Telelogic Synergy and offers solutions for solving the problems. Technical bulletins are available on the [IBM Rational Software Support Web site](#).

- **Daemons Terminated**

  Problem: The router, object registrar, or engine startup daemon terminated abnormally.

  Solution: Any running Telelogic Synergy interfaces will issue a warning message(s) to the user and suspend operation until the daemon(s) are restarted. (Refer to "Manage the Telelogic Synergy daemons" on page 18.) After you restart the daemon(s), the user processes will resume operation. Check the logs in `$CCM_HOME/log/` for more information.

- **ccm monitor Command Fails**
  Cannot locate *daemon_name* **message**

  Problem: After you issue the `ccm monitor` command, you receive a message similar to one of the following:

  ```
  Cannot locate router.
  Please notify your Telelogic Synergy administrator that
  ccm_start_daemons
  must be run.
  ```

      OR

  ```
  Warning: UISSYS engine daemon not registered with router at host
  pacifica
  Warning: Telelogic Synergy startup failed.
  ```

      OR

  ```
  Warning: Cannot locate object registrar on bigtop.
  Warning: Lost connection to engine, exiting
  Warning: Telelogic Synergy startup failed.
  ```

  Solution: The router, engine startup, or object registrar daemon is not running. Start the daemons with the `ccm_start_daemons` command, or with `ccm_router, ccm_esd,` and `ccm_objreg`.

- **Informix error 131**

  Problem: An Informix chunkfile is full.

  ```
  ISAM error 131: no free disk space.
  ```

  Solution: Increase the amount of dbspace. See "Increase the database space" on page 55.

- **Error Received When ccmdb check Attempted**

  Problem: When you attempted to check the database by using the `ccmdb check` command, an error was issued.

  If the command is run when there are active users making modifications to the database, the check program might not be able to lock the database and will report this as an error.

  Solution: Ensure that users are not making modifications to the database, and then try the `ccmdb check` command again. If the problem persists, contact [IBM Rational Software Support](#).

- **Unable to restart router after changing the server IP address.**

  Problem: When you change the server IP address, you need to teach the router about the new address.

  Solution: Change the IP address for the server in the `.router.adr` file, located in the `$CCM_HOME/etc` directory, and then restart the router.

- **Error Received When Trying to Start a Session.**

  Problem: When trying to start a session, you receive the error: `database type not licensed`.

  Solution: Check the following:

  1. Ensure that `LICENSE_SERVER` line in the `$CCM_HOME/etc/server_info.txt` file contains *port@host.*

  2. Run `lmutil lmstat -c license_file` on the license host to ensure that it is running. This command is included with the Telelogic License Server.

  3. Check the license manager log file, `license.log`, located in the installation directory of the Telelogic License Server.

The following are some other messages that you might see in log files. If you need help understanding these messages, see the *Telelogic Synergy Installation Guide for UNIX*.

- `TCP_NODELAY NOT enabled`

- `14:16:17 (telelogic) Multiple dup-groupings in effect for DOORS:`
  `14:16:17 (telelogic) NONE  vs. USER HOST DISPLAY`
  `14:16:17 (telelogic) No further warnings about this.`

- `14:46:39 (telelogic) DENIED: "DOORS" indkach@indkach [telelogic] (Licensed number of users already reached. (-4,342:10054 ""))`
  `14:46:39 (telelogic) DENIED: "DOORS" indkach@indkach [telelogic] (Licensed number of users already reached. (-4,342:10054 ""))`
  `14:46:39 (telelogic) OUT: "TLOG-token" indkach@indkach [DOORS] (3 licenses)`

Appendix E: Notices

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