
GemStone®

GemStone/S Installation Guide

for Red Hat Linux on Intel-compatible Systems

Version 6.5.4

October 2009

GEMSTONE ™

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PATENTS

GemStone is covered by U.S. Patent Number 6,256,637 "Transactional virtual machine architecture", Patent Number 6,360,219 "Object queues with concurrent updating", and Patent Number 6,567,905 "Generational Garbage Collector". GemStone may also be covered by one or more pending United States patent applications.

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GemStone Systems, Inc.

1260 NW Waterhouse Avenue, Suite 200
Beaverton, OR 97006

Preface

This document explains how to install GemStone/S version 6.5.4, and how to upgrade from previous GemStone releases. This Installation Guide is also available on the GemStone customer website.

For information regarding new and modified features in this release of GemStone/S, please refer to the *GemStone/S Release Notes*.

Terminology Conventions

This document uses the following terminology:

The term “GemStone” is used to refer both to the product, GemStone/S, or previous GemStone/S server products; and to the company, GemStone Systems, Inc.

Typographical Conventions

This document uses the following typographical conventions:

- ▶ Operating system and Topaz commands are shown in **bold** typeface. For example:

copydbf

- ▶ Smalltalk methods, GemStone environment variables, operating system file names and paths, listings, and prompts are shown in `monospace` typeface. For example:

`markForCollection`

- ▶ Place holders that are meant to be replaced with real values are shown in *italic* typeface. For example:

StoneName.conf

- ▶ The symbols `%GEMSTONE%` and `$GEMSTONE` refer to the directory where the GemStone software is installed.

Technical Support

GemStone provides several sources for product information and support. The product-specific manuals provide extensive documentation, and should be your first source of information.

GemStone Web Site: <http://support.gemstone.com>

GemStone's Technical Support website provides a variety of resources to help you use GemStone products. Use of this site requires an account, but registration is free of charge. To get an account, just complete the Registration Form, found in the same location. You'll be able to access the site as soon as you submit the web form.

The following types of information are provided at this web site:

Documentation for GemStone/S is provided in PDF format. This is the same documentation that is included with your GemStone/S product.

Release Notes and **Install Guides** for your product software are provided in PDF format in the Documentation section.

Downloads and **Patches** provide code fixes and enhancements that have been developed after product release, and past and current versions of GemBuilder for Smalltalk.

Bugnotes, in the Learning Center section, identify performance issues or error conditions that you may encounter when using a GemStone product. A bugnote describes the cause of the condition, and, when possible, provides an alternative means of accomplishing the task. In addition, bugnotes identify whether or not a fix is available, either by upgrading to another version of the product, or by applying a patch. Bugnotes are updated regularly.

TechTips, also in the Learning Center section, provide information and instructions for topics that usually relate to more effective or efficient use of GemStone products.

Community Links provide customer forums for discussion of GemStone product issues.

Technical information on the GemStone Web site is reviewed and updated regularly. We recommend that you check this site on a regular basis to obtain the latest technical information for GemStone products.

Help Requests

You may need to contact Technical Support directly for the following reasons:

- ▶ Your technical question is not answered in the documentation.
- ▶ You receive an error message that directs you to contact GemStone Technical Support.
- ▶ You want to report a bug.
- ▶ You want to submit a feature request.

Questions concerning product availability, pricing, keyfiles, or future features should be directed to your GemStone account manager.

When contacting GemStone Technical Support, please be prepared to provide the following information:

- ▶ Your name, company name, and GemStone/S license number

- ▶ The GemStone product and version you are using
- ▶ The hardware platform and operating system you are using
- ▶ A description of the problem or request
- ▶ Exact error message(s) received, if any

Your GemStone support agreement may identify specific individuals who are responsible for submitting all support requests to GemStone. If so, please submit your information through those individuals. All responses will be sent to authorized contacts only.

For non-emergency requests, the support website is the preferred way to contact Technical Support. Only designated support contacts may submit help requests via the support website. If you are a designated support contact for your company, or the designated contacts have changed, please contact us to update the appropriate user accounts.

Website: <http://techsupport.gemstone.com>

Email: support@gemstone.com

Telephone: (800) 243-4772 or (503) 533-3503

Requests for technical assistance may be submitted online, or by email or by telephone. We recommend you use telephone contact only for more serious requests that require immediate evaluation, such as a production system that is non-operational. In these cases, please also submit your request via the web or email, including pertinent details such as error messages and relevant log files.

If you are reporting an emergency by telephone, select the option to transfer your call to the technical support administrator, who will take down your customer information and immediately contact an engineer.

Non-emergency requests received by telephone will be placed in the normal support queue for evaluation and response.

24x7 Emergency Technical Support

GemStone offers, at an additional charge, 24x7 emergency technical support. This support entitles customers to contact us 24 hours a day, 7 days a week, 365 days a year, if they encounter problems that cause their production application to go down, or that have the potential to bring their production application down.

For more details, contact your GemStone account manager.

Training and Consulting

Consulting and training for all GemStone products are available through GemStone's Professional Services organization.

- ▶ Training courses are offered periodically at GemStone's offices in Beaverton, Oregon, or you can arrange for onsite training at your desired location.
- ▶ Customized consulting services can help you make the best use of GemStone products in your business environment.

Contact your GemStone account representative for more details or to obtain consulting services.

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Installing GemStone/S Version 6.5.4

This chapter describes the procedure for installing GemStone/S version 6.5.4 on a single machine. If you have enough disk space on a single machine, we recommend that you set up GemStone this way initially to ensure that all the pieces work together. At the end of this chapter, we suggest refinements you might want to make, such as relocating the repository files or running GemStone in a network configuration.

NOTE

If you are upgrading to GemStone/S 6.5.4 from an earlier release, follow the instructions in Chapter 2 of this installation guide.

Adjust the installation to meet your specific needs. The topic “What Next?” on page 1-14 provides references to procedures and related information in the *System Administration Guide for GemStone/S*.

Review the Installation Procedure

The following list summarizes the steps to install GemStone.

- ▶ Check the System Requirements 1-2
- ▶ Prepare for Installation 1-4
- ▶ Set the Environment 1-6
- ▶ Create the GemStone Key File 1-7
- ▶ Verify TCP/IP 1-7
- ▶ Define the NetLDI Service 1-7
- ▶ Run the Installation Script 1-8
- ▶ Change System Passwords and Add Users 1-11
- ▶ Have Users Execute gemsetup 1-13

Check the System Requirements

Before you install GemStone, ensure that the following system requirements are satisfied. Systems meeting these requirements are suitable for installing GemStone and beginning development, but additional system resources may be necessary to support large applications.

Platform

- ▶ An Intel-compatible Pentium-class system, clock speed 200Mhz or faster

RAM

- ▶ At least 128 MB (256 MB recommended)
- ▶ 3 MB for each Gem session process beyond the first two

Swap space

- ▶ At least 128 MB of swap space beyond other system needs (512 MB recommended). In general, your total swap space should be at least twice the RAM installed.

Disk space

- ▶ Space for the installed distribution files—you need approximately 45 MB for GemStone, and additional space for each product listed on the label of your distribution media.
- ▶ Additional disk space as required for your repository.
- ▶ The repository files should be located on a disk drive that does not contain swap space. Use of multiple disk drives is advisable for servers.

NOTE

You should also allow space in your filesystem for at least one core file. In most situations, it's preferable to allow space for two core files.

*For each core file, ensure that enough disk space is available for the size of the shared page cache **plus** the size of private page cache **plus** an additional 10-50 MB.*

Operating system

- ▶ Linux Red Hat Enterprise Linux AS release 3 (Taroon Update 6)
Kernel: 2.6.9-34.EL.rootstmp #1 SMP Tue Apr 11 13:21:07 PDT 2006
glibc 2.3.2-95.37
- ▶ Linux Red Hat Enterprise Linux ES release 4 (Nahant Update 5)
Kernel 2.6.9-55.ELhugemem #1 SMP Fri Apr 20 17:20:11 EDT 2007
glibc 2.3.4-2.36

- ▶ The kernel must be configured to support shared memory and semaphores. See your operating system documentation for further information. These requirements apply both to server nodes and to client nodes with linked sessions.

- a. Red Hat Linux supports shared memory up to 4GB. The maximum shared memory segment should be set to a value larger than your desired Shared Page Cache size, and not more than 75% of your real memory size.

`shmall` is configured in pages, with a base page size of 4KB. Note that the results of `ipcs` may be reported in kbytes.

For example, if you have 2048 MB of real memory:

```
2048 MB * .75 = 1536 MB
1536 MB * 2**20 = 1610612736 bytes
1610612736 / 4K = 393216 pages
```

To set shared memory, you would append the following text to the `/etc/sysctl.conf` file. The setting of the shared memory size is read from this file during the boot process.

```
# Shared Memory setting for GemStone
kernel.shmall = 393216
kernel.shmmax = 1610612736
```

Note that even when you set 4GB of shared memory in the `/etc/sysctl.conf` file, only 2GB of shared memory is available for your application. The other 2GB is reserved for the system.

For more details, consult your Linux operating system documentation.

- b. You may need to increase the settings for semaphores. `semmsl` sets the maximum number of semaphores per id (per semaphore set). This parameter limits the number of GemStone sessions that can log in to a particular Stone and connect to its shared page cache. (Note that `semmsl` ends with a lowercase L, not a digit.)

On the Stone's node this parameter must provide **two** semaphores for each user who will log in to that Stone from any node plus an overhead of **four**. In distributed systems, nodes that have only user sessions (Gems, but no Stone) must provide **two** semaphores for each user session on that node plus an overhead of **one**.

The number of semaphores actually requested for a particular shared page cache depends on the GemStone configuration file read by the process that starts the cache and is $(SHR_PAGE_CACHE_NUM_PROCS * 2) + 1$.

- c. `semms` sets the total number of semaphores in the system. This parameter limits the total number of GemStone sessions on a node. Keep this setting \geq `semmsl` (above).
- d. A file descriptor limit of 1024 is adequate for up to about 500 GemStone users. Each user session requires two file descriptors, and others are needed for extents, transaction logs, and overhead. Consequently, you may need to set the `nfile` parameter to a larger value, such as 2048. *Use caution and increase the default setting only when necessary because doing so can have system side effects.*

- ▶ The configuration option `SHR_PAGE_CACHE_SIZE_KB` defines the size (in KBytes) of extent page space in the shared page cache. The maximum acceptable value for this

configuration option is limited by system memory, kernel configurations, and cache space allocated by `SHR_PAGE_CACHE_NUM_PROCS`. As a general guideline, the maximum limit for `SHR_PAGE_CACHE_SIZE_KB` is approximately 1.8 GB.

For more general information about these and other configuration options, see Appendix A of the *System Administration Guide for GemStone/S*.

System clock

- ▶ The system clock must be set to the correct time. When GemStone opens the repository at startup, it compares the current system time with the recorded checkpoint times as part of a consistency check. A system time earlier than the time at which the last checkpoint was written may be taken as an indication of corrupted data and prevent GemStone from starting. The time comparisons use GMT.

TCP keepalive option

- ▶ GemStone processes ordinarily use the TCP *keepalive* option to determine how long they will wait after communications activity ceases unexpectedly. This setting can be useful for reaping stale RPC Gems, but the operating system default may not be appropriate for this purpose. For further information, refer to your operating system documentation.

C/C++ Compiler

- ▶ `g++ (GCC) 3.2.3 20030502`

GemStone requires a C/C++ compiler only if you are developing C or C++ code for user actions or for a C or C++ application. This compiler is required only for development work, not for execution.

Debugger

- ▶ `gdb 6.3.0.0-1.62rh`

A C debugger can be useful to allow problem analysis by GemStone consulting or Technical Support. It also may allow you to debug your C user actions. It is not required for GemStone execution.

Prepare for Installation

Perform the following steps to prepare the machine to receive the GemStone software. Although most steps require root login, we recommend that you perform the initial step as the GemStone administrator.

NOTE

For the rest of this document, the installation directory is referred to as `InstallDir`, which is the parent directory of `$GEMSTONE`.

Table 1.1 shows the portions of the system that are affected by the installation of GemStone.

Table 1.1 Parts of System Affected by GemStone Installation

Location	Use
/dev/rdisk/	Optional raw partitions for repository extents and transaction logs
/etc/services	Internet services database
<i>/InstallDir/GemStone6.5.4-i686.Linux</i>	Location of the object server software
/opt/gemstone	Default location for server lock files and log files for GemStone network servers (NetLDIs)
/usr/gemstone	Alternative location for lock and log files, for compatibility with previous releases; /opt/gemstone is created unless /usr/gemstone already exists

1. As the GemStone administrator log in to a machine with adequate resources to run GemStone and that owns the disk on which you are going to install the GemStone files.

NOTE

Do not copy the files as root, because the ownerships that were in effect when the distribution media was created are maintained, which might result in file permission errors for users at your site.

2. Determine that adequate swap space is available:


```
% cat /proc/swaps
```
3. Check the free disk space and determine the disk drive and partition on which you will install the GemStone software.

To list all disk partitions, along with the amount of free space in each partition:

```
% df
```

We recommend that you avoid choosing either an NFS-mounted partition or one containing UNIX swap space for the initial installation. NFS-mounted partitions can result in executables running on the wrong machine and in file permission problems. Existence of swap space on the same drive can dramatically slow GemStone disk accesses.

4. Select an installation directory, *InstallDir*, and make this directory the current working directory. For example,


```
% mkdir InstallDir
```

```
% cd InstallDir
```
5. GemStone/S is provided as a zipped archive file with a name similar to *GemStone6.5.4-i686.Linux*. Move this distribution file to the directory location

in which GemStone will be installed, *InstallDir*, then unzip the distribution file using unzip. For example:

```
% unzip GemStone6.5.4-i686.Linux.zip
```

If you are installing from CD-ROM, insert the CD-ROM into the drive and mount it, then unzip the files. For example,

```
% /mount_pt/Utils/linux/unzip /mount_pt/gemstone/linux.zip
```

where *mount_pt* is the mount point for the CD-ROM drive.

6. The *InstallDir* now contains a GemStone directory with a name similar to GemStone6.5.4-i686.Linux.

In addition to several subdirectories, this directory also contains two text files: PACKING, which lists all of the GemStone files, and version.txt, which identifies this particular product and release of GemStone.

7. Log in as root.

NOTE

Although you can complete the installation as a non-root user, we do not recommend this. During installation, GemStone system security is established through file permissions and process attributes. To ensure that the installation is successful, you must install as root. If you later decide to change the security of your GemStone system, see Chapter 1 of the System Administration Guide for GemStone/S, which explains the concept of GemStone server file permissions and how to change them.

Set the Environment

Perform the following steps to properly configure the operating environment.

1. Add GemStone environment variables from previous installations:

- a. Check for existing GemStone environment variables:

```
% env | grep GEM
```

All GemStone environment variables are displayed.

- b. If any environment variables exist, you must specifically unset each one.

C shell:

```
% unsetenv GEMSTONE GEMSTONE_SYS_CONF \
GEMSTONE_EXE_CONF GEMSTONE_LOG GEMSTONE_LANG
```

Bash, Bourne or Korn shell:

```
$ unset GEMSTONE GEMSTONE_SYS_CONF GEMSTONE_EXE_CONF \
GEMSTONE_LOG GEMSTONE_LANG
```

2. Set the environment variable GEMSTONE to the *full pathname* (starting with a slash) of your new GemStone installation directory

C shell:

```
% setenv GEMSTONE InstallDir/GemStone6.5.4-i686.Linux
```

Bash, Bourne or Korn shell:

```
$ GEMSTONE=InstallDir/GemStone6.5.4-i686.Linux
```

```
$ export GEMSTONE
```

Create the GemStone Key File

To run GemStone, you must have a key file. The keyfile contents are provided by your GemStone sales representative, or contact keyfiles@gemstone.com.

1. Change the permissions on the directory `$GEMSTONE/sys` so that you can create the file. This is a default location for the GemStone key; another location may be specified in the GemStone configuration file.

```
% cd $GEMSTONE/sys
```

```
% chmod 755 .
```

2. Using a text editor, create the key file `$GEMSTONE/sys/gemstone.key`.
3. GemStone keys are provided in text email. Paste the contents of this email into the keyfile and save.
4. Change the file and directory permissions so that they are no longer writable:

```
% chmod 555 gemstone.key
```

```
% chmod 555 .
```

Verify TCP/IP

To run GemStone, TCP/IP must be functioning, even if your machine is not connected to a network.

1. Verify that TCP/IP networking software is functioning (1 is the number one):

```
% /bin/ping -c1 hostname
```

where *hostname* is the name of your machine. If ping responds with statistics, TCP/IP is functioning.

Define the NetLDI Service

The appropriate NetLDI service must be defined in your TCP/IP network database. By default, GemStone/S 6.5.4 will use `netldi65`. You may use another name, although this may require further configuration to allow remote caches to connect.

NOTE

You might need the help of your UNIX system administrator to complete this procedure.

1. Determine whether the `netldi65` service is already defined:

```
% ypcat services | grep netldi65
```

If it is defined, skip the rest of this procedure and continue with the installation at “Run the Installation Script” on page 1-8. If it is not defined, continue performing this procedure.

The `netldi65` service must be available on all nodes that communicate with the GemStone server.

2. Determine which TCP/IP network database (local or NIS) is in use:

```
% ypwhich
```

If the program is missing or you see an error message when you run it, you can assume that your machine is using a local copy of the TCP/IP network database instead of a copy provided by NIS. Perform the following step on your local copy of the network database (the file `/etc/services`).

If NIS is running, have your UNIX system administrator perform the following steps.

3. Add an entry similar to the following to the network database:

```
netldi65 50383/tcp #GemStone 6.5.4
```

Choose a port number that is not being used by another service. The port number should be in the range `49152 <= port <= 65535`, to confirm to IANA standards (<http://www.iana.org/assignments/port-numbers>).

NOTE

If you are upgrading from a previous version, you might need to keep the NetLDI for that version running. You may need to define a new `netldi` service name with a different port number, or assign a different port number to `netldi65`.

4. If NIS is running, propagate the change to the network database to the rest of the network.
5. If NIS is not running, but several machines will be running GemStone, have the UNIX system administrator update the network database for each machine. The port number must be the same on every machine.

Run the Installation Script

Invoke the installation script from the `install` subdirectory:

```
% cd $GEMSTONE/install  
% ./installgs
```

`installgs` is an interactive script that analyzes your system configuration and makes suggestions to guide you through installing GemStone on your machine.

NOTE

You can usually terminate execution of the installation script with `Ctrl-C` without

risk to your files. When it is not safe to do so, the message Please do not interrupt appears on the screen. If this happens, wait for the message now it is OK to interrupt before you interrupt the script. You can run the script again from the beginning as many times as necessary.

Decisions to Make During Installation

During installation, you are asked several questions. The entire installation dialog is not reproduced here, but the main points are addressed. Some questions may not be asked, depending on answers to previous questions.

Whenever you are asked to answer “yes” or “no,” answer with **y** or **n**. If the script offers a default answer in square brackets (such as “[y]”), you may press Enter to accept the default.

Verify the Release Tree?

Do you want the installation script to verify your GemStone release tree?

This process takes a few minutes, but it’s a good idea to ensure that the files were transferred from your distribution media without error.

Default: Verify the installation tree.

The GemStone installer will attempt to verify some system requirements on your system. Some of the verifications may issue warnings of the form:

```
./installgs[52]: test: Specify a parameter with this command.  
./installgs[52]: -q: not found.  
./installgs[260]: test: Specify a parameter with this command.
```

Unless an explicit installation failure is returned, the installation will complete successfully, and the above warnings may be ignored.

Do you want the installation script to set up directories for server lock files and NetLDI logs?

The default location for server lock files and NetLDI log files is `/opt/gemstone`, although for compatibility with earlier releases `/usr/gemstone` is used if it exists. If neither directory exists, the installation script offers to create `/opt/gemstone` and the subdirectories `locks` and `log`. Then, the script offers to grant world access (777) to these directories.

If you answer **no** to creating the directories, you must create them (or provide a symbolic link) before starting the server.

Do you want the installation script to set the owner and group for all the files in the GemStone distribution?

If you answer **yes**, the script will prompt you for the owner and group you want to use. Refer to Chapter 1 of the *System Administration Guide for GemStone/S* for more information about setting owner and group permissions.

If you answer **no**, the permissions will remain the same as when the files were extracted from the distribution media.

Do you want the installation script to protect the repository file?

The default, which we recommend, gives only the owner read and write access (600) through ordinary UNIX commands. Other users can read and write the repository through a GemStone session. If you choose not to protect the repository, the `setuid` bit is cleared from all executables, which causes them to run under ownership of the user who invokes them.

Default: Set the repository permission to 600, and leave the `setuid` bit applied.

Allow NetLDI to Run as Root?

Do you want the installation script to allow non-root users to start a NetLDI that runs as root?

The NetLDI is a network server that permits remote processes to interact with the repository. There are two ways to set up a NetLDI so that it can provide services to all GemStone users: it can run as root, or it can run in guest mode with a captive account.

- ▶ To run NetLDIs as root, accept the default “yes” response. Ownership of the NetLDI executable is changed to root, and the `setuid` bit is set. Any GemStone user will be able to start a NetLDI process that is accessible to all GemStone users because it will always run as root. For certain services, users will need to authenticate themselves by supplying a password or Kerberos ticket. Alternatively, answer “no” but log in as root before starting the NetLDI.

If the NetLDI uses a port number less than 1024, it must run as root.

- ▶ To run NetLDIs in guest mode with a captive account, answer “no” to the prompt, because those modes are not permitted if the NetLDI runs as root. “Guest mode” means that GemStone users do not have to supply a UNIX password to use NetLDI services. The “captive account” is an account that owns all processes the NetLDI starts; typically, it is the GemStone administrative account that owns the files. You must start the NetLDI while logged in as that account.

Default: Change ownership of the `netldi` executable to root, and set its `setuid` bit.

Set up an Extent?

Do you want the installation script to set up an extent now?

GemStone is distributed with a read-only copy of the initial repository in `$(GEMSTONE)/bin/extent0.dbf`. Before you can start GemStone, this file must be copied to a suitable location and made writable. The script offers to copy the file to its default location of `$(GEMSTONE)/data`.

If you are a new GemStone user, we recommend that you answer **y**. If you are an existing GemStone user, you might prefer to answer **n**, then copy the extent to a different location yourself. (If you choose a location other than the default, you must edit your configuration file before starting GemStone. For information, see the *System Administration Guide for GemStone/S*.)

Default: Place a writable copy of `extent0.dbf` in `$(GEMSTONE)/data`.

Start a NetLDI?

Do you want the installation script to start a NetLDI?

If you prefer, you can start these processes manually at any time.

Almost every host needs a NetLDI. You must start a NetLDI when the Stone repository monitor or Gem session processes will run on this machine.

You can start a NetLDI that runs as root by answering **yes** to this prompt and the confirmation that follows. However, if you want to start the NetLDI in guest mode with a captive account, you must do that after completing the installation. For more information about guest mode with captive account, see Chapter 3 of the *System Administration Guide for GemStone/S*.

Default: Do not start a NetLDI at this time.

Start an Object Server?

As root, you cannot start an object server, but the script offers to start one as another user. You will start the server later in the installation, so answer **no**.

Default: Do not start an object server at this time.

Log out as root

When the installation script has completed, log out as root.

Change System Passwords and Add Users

After installing GemStone 6.5.4, you must change the passwords for the three administrative users: DataCurator, SystemUser, and GcUser (The initial password for each is `swordfish`). The DataCurator account is used to perform system administration tasks. The SystemUser account ordinarily is used only for performing GemStone system upgrades. The GcUser account is used by the garbage collection task, which runs automatically as a separate login. Access to each of these accounts should be restricted.

Chapter 6 of the *System Administration Guide for GemStone/S* tells you how to change the passwords and set up accounts for other GemStone users.

You must then establish GemStone accounts for each of your system's users.

The script `makeusers` in the `$GEMSTONE/install` directory helps you change the system passwords and add users. Note that the `makeusers` script assumes that the system passwords are as yet unmodified from their initial values of `swordfish`. Because `makeusers` modifies the system passwords, you can run the script only once on a given repository. To change system passwords or add more users at a later time, refer to the procedures in the *System Administration Guide for GemStone/S*.

NOTE

The actions described in this procedure affect only the repository whose name you enter while running the script `makeusers`.

1. Ensure that the GemStone environment variables are set for version 6.5.4:

```
% env | grep GEM
```

If necessary, set the environment variables as detailed in “Set the Environment” on page 1-6.

2. Invoke the script `gemsetup`.

C shell:

```
% source $GEMSTONE/bin/gemsetup.csh
```

Bash, Bourne or Korn shell:

```
$ . $GEMSTONE/bin/gemsetup.sh
```

The script defines the GemStone environment for users by modifying the `PATH` and `MANPATH` variables to include `$GEMSTONE/bin` and `$GEMSTONE/doc`, respectively.

3. Start the repository monitor (Stone). You must do this from a working directory for which you have write privilege. For instance:

```
% cd $HOME
```

```
% startstone
```

4. Invoke the script `makeusers`:

```
% cd $GEMSTONE/install
```

```
% ./makeusers
```

The script prompts you for the name of your Stone (the default is `gemserver65`), new administrative passwords, and names of the users you want to create. The password for new users will be set to `gemstone`.

The script writes the information you supply to a file that can be read by Topaz, an interactive GemStone interface that you can use for system administration. Topaz deletes the file when it finishes with it. By default, this file is `newusers.topaz`, created in your `$HOME` directory. If you specify another file, be sure to give a full path-name. (You cannot create a file in the `install` directory unless you made the directory writable during installation.)

5. When the script `makeusers` has finished, run the linked version of Topaz and read in the file that the script created.

- a. Invoke linked Topaz:

```
% topaz -l
```

- b. Read in the file containing the new users:

```
topaz> input $HOME/newusers.topaz
```

Topaz reads in the file, displays GemStone's new settings, deletes `$HOME/newusers.topaz`, and logs you out of GemStone.

- c. Exit Topaz:

```
topaz> exit
```

Have Users Execute gemsetup

The directory `$GEMSTONE/bin` contains two files, `gemsetup.sh` and `gemsetup.csh`, to help set a user's environment. These files define the GemStone environment for users by modifying the `PATH` and `MANPATH` variables to include `$GEMSTONE/bin` and `$GEMSTONE/doc`, respectively.

After GemStone 6.5.4 has been installed, you should notify each GemStone user of the installation and explain how to use the `gemsetup` files.

NOTE

This procedure applies only to users, and each user must perform this procedure before running GemStone. However, users who will only access GemStone using GBS do not need to run `gemsetup`.

1. Set the environment variable `GEMSTONE` to the *full pathname* (starting with a slash) of the GemStone 6.5.4 directory.

C shell:

```
% setenv GEMSTONE InstallDir/GemStone6.5.4-i686.Linux
```

Bash, Bourne or Korn shell:

```
$ GEMSTONE=InstallDir/GemStone6.5.4-i686.Linux
$ export GEMSTONE
```

2. Invoke the script `gemsetup`.

C shell:

```
% source $GEMSTONE/bin/gemsetup.csh
```

Bash, Bourne or Korn shell:

```
$ . $GEMSTONE/bin/gemsetup.sh
```

3. If you will use GemStone frequently, consider adding to your login shell's initialization file (`.bashrc`, `.cshrc` or `.profile`) the environment variable `GEMSTONE` and the command **`gemsetup`**. This way, the GemStone environment is automatically configured every time you log in or create a login shell. It overrides any other GemStone path settings.

NOTE

If you use the Korn shell or other shell that extends POSIX, and your `.profile` contains commands that are not POSIX-compliant, you might encounter errors when a shell is initialized. To remedy this situation, place the non-compliant commands within a conditional, such as the following:

```
hash -r 2>/dev/null
status=$?
if [ $status -ne 0 ]; then
    # Place Korn-shell-specific initialization here
fi
```

What Next?

This chapter has guided you through installation of GemStone 6.5.4 in an initial configuration that is sufficient to create a basic repository and begin setting up user accounts. The objective was to get a simple, default configuration up and running.

You might consider performing the following tasks:

- ▶ If you will be using a related GemStone product, such as GemConnect, install it by referring to the product's installation guide.
- ▶ To modify the initial object server configuration to one that is more efficient for your particular needs, refer to Chapter 1 of the *System Administration Guide for GemStone/S*. This chapter contains sample configurations, from small to very large, and also contains detailed information about how to tailor these configurations to your own system.
- ▶ To modify the configuration of Gem session processes and to ensure that users have the necessary permissions to access the shared page cache and the extents, refer to Chapter 2 of the *System Administration Guide for GemStone/S*.
- ▶ If you are going to operate in a network environment, Chapter 3 of the *System Administration Guide for GemStone/S* has additional information about the GemStone network object server (NetLDI), how to handle user authentication, how to share software over the network, and how to set up some common configurations.
- ▶ To start and stop the GemStone object server, refer to instructions in Chapter 4 of the *System Administration Guide for GemStone/S*.
- ▶ GemStone/S is shipped with a default time zone of US Pacific. To modify this setting, edit the file `installtimezone.txt` in the GemStone upgrade directory, then execute it as SystemUser.

Upgrading from Previous GemStone/S Versions

This chapter describes how to upgrade an existing GemStone/S installation to GemStone/S version 6.5.4.

GemStone/S version 6.5.4 supports upgrade from GemStone/S version 6.1 and later. If you are upgrading from a version prior to 6.1, you must first convert and upgrade to a GemStone/S 6.1.x version, preferably 6.1.5. For instructions, see the Installation Guide for GemStone/S 6.1.5.

GemStone/S v6.5.4 requires additional semaphores; you may need to adjust your OS configuration. Refer to the section “Operating system” on page 1-2 for more information, and to the Release Notes.

If you are using GemBuilder for Smalltalk (GBS), you should also upgrade the client libraries that are used by GBS. See Chapter 3 for supported versions of GBS for use with GemStone/S 6.5.4, and instructions on installing updated client libraries.

For applications using GemConnect, Gembuilder for Java, or GemEnterprise, these products will need to be reinstalled following the upgrade process. For details, see the Installation Guide for that product.

NOTE

The following instructions use the version number 6.1.5 to represent any of the versions 6.1.5, 6.1.6, 6.2, 6.2.x, 6.3, 6.3.1, 6.5.1, or 6.5.2. The procedure is the same regardless which of these versions you have; exceptions are noted in the instructions.

Overview of the Upgrade Strategy

We recommend that you perform the upgrade twice: first a pilot upgrade and then the production upgrade. With this strategy, you can keep your version 6.1.5 production system running while you familiarize yourself with the upgrade process.

Pilot Upgrade

The purpose of the Pilot upgrade is to familiarize yourself with the upgrade process and to help ease the upgrade of your production system. To help you gain the most information and experience from the Pilot upgrade, you must create a small repository that contains objects that are representative of your production system.

Using the representative repository, complete the upgrade and file out all changes so you can minimize down time when you upgrade your production system. During the Pilot upgrade, you:

- ▶ Modify classes and methods that run in GemStone so they work properly with the version 6.5.4 classes and methods.
- ▶ Modify your application's client code as necessary. This code may be in C, C++, or client Smalltalk.
- ▶ File out the changes so they can be loaded quickly when you perform the Production upgrade.
- ▶ Recompile and relink any C or C++ programs.
- ▶ Reload client Smalltalk images.

Once you complete the Pilot upgrade, you will be able to schedule down time of your production system based on what you learned during the Pilot upgrade.

NOTE

Most upgrade procedures apply to both the Pilot upgrade and the Production upgrade. Differences are noted in the procedures.

Production Upgrade

The purpose of the Production upgrade is to upgrade your production system using the information you gathered during the Pilot upgrade.

Perform the Upgrade

Review the Upgrade Procedure

The following list summarizes the steps to upgrade to GemStone version 6.5.4.

- ▶ Prepare for the Upgrade2-3
- ▶ Perform the Upgrade.....2-4
- ▶ Restore Your Site-Specific Settings and Back Up the Repository2-5

Prepare for the Upgrade

Perform the following steps to prepare for the upgrade.

1. Install GemStone/S 6.5.4 to a new installation directory, separate from the installation directory for version 6.1.5, using the instructions in Chapter 1.
2. Configure version 6.5.4 the way you expect to use it — that is, with the appropriate extent locations and sizes.

Ensure that adequate space is available for extents, transaction logs, and a backup during the upgrade:

```
% df
```

Space is needed for the following:

- ▶ Your version 6.1.5 extents and transaction logs.
- ▶ Your version 6.5.4 extents and transaction logs — allow for some growth of the extents during the upgrade (you can reclaim much of the physical space later by performing a full backup and restoration of the converted repository).

3. Log in to the 6.1.5 GemStone system and reset the SystemUser password to 'swordfish':

```
topaz 1> printit
(AllUsers userWithId: #SystemUser) password: 'swordfish' .
System commitTransaction .
```

```
%
```

The upgrade scripts log in to GemStone with the SystemUser account and the default password.

4. Halt all user activity on the repository you are going to upgrade:
 - a. Log in to Topaz as DataCurator.
 - b. Force all other users off the system:

```
topaz 1> printit
System stopOtherSessions.
%
```

CAUTION

You MUST file out any changes you have made to the GemStone kernel classes in order to preserve these changes in version 6.5.4. Also, consider saving important modified files, such as configuration files, that will be overwritten during the upgrade.

5. If this is the Pilot upgrade, file out any modifications or additions you made to GemStone kernel class methods by using Topaz command **fileout**. (For information about **fileout**, see the *GemStone Topaz Programming Environment*.)
6. Shut down the Stone:

```
% stopstone stone615
```

where *stone615* is the name of version 6.1.5 Stone on this machine.

7. Set up the 6.5.4 environment.

Set the environment variables required for the upgrade.

C shell:

```
% setenv GEMSTONE InstallDir/GemStone6.5.4-i686.Linux
% set path = ($GEMSTONE/bin $path)
% setenv upgradeLogDir tempDir
```

Bash, Bourne or Korn shell:

```
$ GEMSTONE=InstallDir/GemStone6.5.4-i686.Linux
$ export GEMSTONE
$ PATH=$GEMSTONE/bin:$PATH
$ upgradeLogDir=tempDir
$ export upgradeLogDir
```

where *tempDir* is a temporary directory for which you have write permission.

NOTE

Use a separate log directory for each repository you upgrade. A repository may contain multiple extents.

8. Copy your version 6.1.5 extent files into the location specified by the GemStone configuration option `DBF_EXTENT_NAMES`:
 - a. Using a text editor, open the file `$GEMSTONE/data/system.conf`, or whichever configuration file your system uses.
 - b. Locate the last occurrence of the option `DBF_EXTENT_NAMES`, and note its value.
 - c. Copy each `.dbf` file to the noted location. For example:

```
% cp InstallDir615/data/extent0.dbf 654location
% cp InstallDir615/data/extent1.dbf 654location
% cp InstallDir615/data/extent2.dbf 654location
```

where *654location* is the location specified by `DBF_EXTENT_NAMES` in the configuration file that will be used in version 6.5.4. If you are changing platforms, as well as upgrading, use `copydbf` instead of `cp`.

Perform the Upgrade

1. Start the 6.5.4 Stone. For upgrading from version 6.1.6 or earlier, you must start the stone using the `-C` flag, which performs the conversion. If you are upgrading from version 6.2 or later, this flag should not be used.

For upgrade from 6.1.6 or earlier:

```
% startstone -C stone654
```

For upgrade from 6.2 or later:

```
% startstone stone654
```

You may omit the stone name, in which case `gemserver654` will be used. When this step completes, the results will be:

```
startstone[Info]: GemStone server stone654 has been started.
```

2. Run the upgrade script:

```
% upgradeImage stone654
```

where *stone654* is the name of the version 6.5.4 Stone started in the previous step.

This script invokes several subordinate scripts to complete the upgrade. It is normal for the display to stop scrolling occasionally while output is sent only to a log file and while methods are recompiled. Each step should end with this display:

```
No errors detected in this step.
```

If errors were reported during the upgrade, please preserve the contents of `$upgradeLogDir`. Contact your internal GemStone support person or GemStone Technical Support.

Restore Your Site-Specific Settings and Back Up the Repository

1. Reinstall any other GemStone products that modify kernel classes.

If you use GemConnect, GemBuilder for Java, or GemEnterprise, you must install them again at this time. Use the procedure in the installation guide for each product. If you have an upgraded product version you may install it at this time. Otherwise, install the same version that was previously installed.

2. Log in to GemStone version 6.5.4 as DataCurator.
3. Change the password for SystemUser, which you changed to `swordfish` prior to the conversion, back to its version 6.1.5 value. Also, change the password for GcUser, which was reset by the conversion process, back to its version 6.1.5 value:

```
topaz 1> printit
(AllUsers userWithId: 'SystemUser') password: '615Password'.
(AllUsers userWithId: 'GcUser') password: '615Password'.
System commitTransaction
%
```

where *615Password* is the account password used in version 6.1.5.

4. If you have modified any kernel class methods in the previous version, carefully compare these changes with version 6.5.4 kernel methods to see whether your changes are still necessary or appropriate. This should be done before or during the Pilot upgrade, so a file can be created containing only the required changes.

File in the application-specific kernel modifications and commit. You may need to log in as SystemUser to do this.
5. If you are upgrading from a version earlier than 6.2, and your application includes indexes on values that may contain Characters greater than 128, you need to rebuild these indexes. This is due to changes in Character collation in version 6.2.
6. If this is the Production upgrade, create a full backup of the upgraded repository now.

The upgraded repository is now usable.
7. If you are using GBS clients, configure these to use the version 6.5.4 client libraries. See Chapter 3, 'Configuring GBS for the v6.5.4 Server' for details.

Configuring GBS for the v6.5.4 Server

This chapter describes how to configure your GemBuilder for Smalltalk (GBS) application to run with GemStone/S version 6.5.4. You will need to install the client shared libraries for GemStone/S 6.5.4 to your GBS location, and modify GBS settings to use the new client libraries.

We recommend upgrading to GBS version 7.1.2patch2 or later for VisualWorks Smalltalk, or 5.2.5 or later for VisualAge or VA Smalltalk, if you have not already done so. Previous versions of GBS (5.2.2 or later for VisualAge or VA Smalltalk and 6.0 or later with VisualWorks) are expected to work with GemStone/S version 6.5.4 but have not been tested.

Supported Versions and Platforms

The following tables list supported versions of GemBuilder for Smalltalk with the compatible versions of client Smalltalk and Operating System.

GBS version 7.1.2patch2

GemBuilder for Smalltalk version 7.1.2patch2 is supported with GemStone/S version 6.5.4, on the following VisualWorks and OS platforms:

VisualWorks 7.5 with 7.5 OE	VisualWorks 7.4.1 with 7.4d OE	VisualWorks 7.4 with 7.4 OE	VisualWorks 5i.1 Envy with 5i.4c OE
Windows XP, SP1 or later, and Win- dows 2003 Server	Windows XP, SP1 or later, and Win- dows 2003 Server	Windows XP, SP1 or later, and Win- dows 2003 Server	Windows 2000, SP1 or later, Win- dows XP, SP1 or later, and Win- dows 2003 Server
Solaris 8, 9 and 10 on SPARC	Solaris 8, 9 and 10 on SPARC	Solaris 8, 9 and 10 on SPARC	
Red Hat Linux AS 3.0	Red Hat Linux AS 3.0	Red Hat Linux AS 3.0	

GBS version 5.2.5

GemBuilder for Smalltalk version 5.2.5 is supported with GemStone/S version 6.5.4, on the following VA Smalltalk and OS platforms:

VA Smalltalk 7.5.2	VA Smalltalk 7.0
Windows 2000, SP1 or later, Windows XP, SP1 or later, and Windows 2003 Server	Windows 2000, SP1 or later, Windows XP, SP1 or later, and Windows 2003 Server

Installing the GemStone/S 6.5.4 Libraries onto Windows Clients

This section describes the procedure for installing client libraries on Windows and getting GBS to recognize them.

1. Install the GemStone/S 6.5.4 object server if you have not already done so.
2. Copy the file `clientFiles.zip`, distributed with your platform installation, to a location on the Windows client machine, `<InstallDir>`.
3. Unzip `clientFiles.zip`. This file unzips into a directory tree:
`<InstallDir>\clientFiles\<clientPlatform>\<shared library files>`
4. Quit any running client Smalltalk VM that is using GBS.
5. Your client libraries may be placed in the directory in which the client Smalltalk executable resides, or in any directory that is on the path, `%PATH%`.

NOTE

In step 6., <GBS> refers to the directory in which the client Smalltalk executable resides, or any directory that is on the path that will be used by the GBS application, and <SRC> refers to the `clientFiles` subdirectory for the GBS platform; for example, `<InstallDir>\clientFiles\x86.Windows_NT`.

6. To copy the files from the `clientFiles` directory <SRC> to the GemBuilder installation directory, or another directory on the Windows path, <GBS>, execute the following:


```
C:\> copy <SRC>\gcilw65.dll <GBS>
C:\> copy <SRC>\gcirw65.dll <GBS>
C:\> copy <SRC>\gsw65.dll <GBS>
C:\> copy <SRC>\englis65.err <GBS>
```
7. No other files from `clientFiles.zip` are needed. You may delete `<InstallDir>\clientFiles` if you wish.
8. Ensure that there are no other copies of these libraries on the search path.
9. Start up the client Smalltalk VM.
10. Determine the appropriate library name to use. The library `gcilw65.dll` permits both linked and RPC logins. `gcirw65.dll` permits only rpc logins.
11. Set the library name in GBS. There are several ways to do this. Using the GBS settings dialog, select the tab titled "Server Communication", and edit the field `libraryName`. You may also execute:


```
GbsConfiguration current libraryName: 'libraryName'
```

 for example:


```
GbsConfiguration current libraryName: 'gcilw65.dll'
```
12. Save your image, exit, and restart, to allow the correct libraries to be loaded.

Installing the GemStone/S 6.5.4 Libraries onto Unix Clients

This section describes the procedure for installing client libraries on UNIX or Linux clients, and getting GBS to recognize them.

If you are installing onto the same client platform as the server platform, you may copy the library files from the GemStone/S 6.5.4 object server installation, instead of extracting from `clientFiles.zip`. The libraries are the same ones found in `$GEMSTONE/bin`

1. Install the GemStone/S 6.5.4 object server if you have not already done so.
2. Unzip the file `clientFiles.zip`, distributed with your platform installation. This file unzips into a directory tree:


```
clientFiles/<clientPlatform>/<shared library files>
```
3. Log in to your GBS client machine as the user who is the owner of the GBS installation files.
4. Your client libraries may be placed in any directory that is on the machine search path `$LD_LIBRARY_PATH`, or you may add the directory containing the client libraries to

the `$LD_LIBRARY_PATH`. Ensure that there are no other copies of the client libraries on the search path. (In the following instructions, the term “path” means the path specified by `$LD_LIBRARY_PATH`.)

Alternatively, you can place the shared libraries in any location, and in the GBS configuration parameter *libraryName*, specify the absolute path to the client library file.

NOTE

In step 5., <GBS> refers to your GemBuilder installation directory, or any directory that is on the path that will be used by the GBS application, and <SRC> refers to the `clientFiles` subdirectory of the GemStone/S installation for your GBS platform (For example, `$GEMSTONE/clientFiles/sparc.Solaris`).

5. To copy the files from the GemStone/S server source directory `<SRC>` to the GemBuilder installation directory, or another directory, `<GBS>`, execute the following:

```
% cp <SRC>/libgcilnk65.so <GBS>
% cp <SRC>/libgcirpc65.so <GBS>
% cp <SRC>/english65.err <GBS>
```

6. Start up the client Smalltalk VM.
7. Determine the appropriate library name to use. The library `libgcilnk65.so` permits both linked and RPC logins. `libgcirpc65.so` permits only rpc logins.
8. Set the library name. There are several ways to do this. Using the GBS settings tool, select the tab titled “Server Communication”, and edit the field `libraryName`. You may also execute:

```
GbsConfiguration current libraryName: 'libraryName'
```

for example:

```
GbsConfiguration current libraryName: 'libgcilnk65.so'
```

If the client libraries are not in a directory on the path, *libraryName* must be set to the absolute path and name of the client library.

9. Save your image, exit, and restart, to allow the correct libraries to be loaded.