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*GemStone*®

# **GemStone/S Installation Guide**

for Red Hat Linux on Intel-  
compatible Systems

**Version 6.7**

December 2015



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## PATENTS

GemStone software is covered by U.S. Patent Number 6,256,637 "Transactional virtual machine architecture", Patent Number 6,360,219 "Object queues with concurrent updating", Patent Number 6,567,905 "Generational garbage collector with persistent object cache", and Patent Number 6,681,226 "Selective pessimistic locking for a concurrently updateable database". GemStone software may also be covered by one or more pending United States patent applications.

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# Preface

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## About This Documentation

This document explains how to install GemStone/S™ version 6.7, and how to upgrade from previous GemStone/S versions.

For information regarding new and modified features in GemStone/S v6.7, please refer to the *GemStone/S Release Notes* for version 6.7.

These documents are available on the GemTalk website, as described below.

## Terminology Conventions

The term “GemStone” is used to refer to the server products GemStone/S 64 Bit and GemStone/S, and the GemStone family of products; the GemStone Smalltalk programming language; and may also be used to refer to the company, now GemTalk Systems, previously GemStone Systems, Inc. and a division of VMware, Inc.

## Technical Support

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#### [gemtalksystems.com](http://gemtalksystems.com)

GemTalk’s website provides a variety of resources to help you use GemTalk products:

- ▶ **Documentation** for the current and for previous released versions of all GemTalk products, in PDF form.
- ▶ **Product download** for the current and selected recent versions of GemTalk software.
- ▶ **Bugnotes**, identifying performance issues or error conditions that you may encounter when using a GemTalk product.

- ▶ **TechTips**, providing information and instructions that are not in the documentation.
- ▶ **Compatibility matrices**, listing supported platforms for GemTalk product versions.

This material is updated regularly; we recommend checking this site on a regular basis.

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Requests for technical assistance may be submitted online, 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 down. The support website is the preferred way to contact Technical Support.

**Website:** [techsupport.gemtalksystems.com](http://techsupport.gemtalksystems.com)

**Email:** [techsupport@gemtalksystems.com](mailto:techsupport@gemtalksystems.com)

**Telephone:** (800) 243-4772 or (503) 766-4702

When submitting a request, please include the following information:

- ▶ Your name and company name.
- ▶ The versions of GemStone/S and of all related GemTalk products, and of any other related products, such as client Smalltalk products.
- ▶ The operating system and version you are using.
- ▶ A description of the problem or request.
- ▶ Exact error message(s) received, if any, including log files if appropriate.

Technical Support is available from 8am to 5pm Pacific Time, Monday through Friday, excluding GemTalk holidays.

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# Installing GemStone/S Version 6.7

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This chapter describes the procedure for installing GemStone/S version 6.7 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 running GemStone in a network configuration.

*NOTE*

*If you are upgrading to GemStone/S 6.7 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 19 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.

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## 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, but most configurations will want more RAM in order to take advantage of a larger shared page cache.
- ▶ 3 MB for each Gem session process beyond the first two

### Swap space

- ▶ In addition to other system needs, swap space should be configured to be larger than the intended shared page cache size. In general, the swap space should be at least equal to the RAM installed; it is recommended to have twice as much swap space as RAM.

### 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. 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 v6.5

Kernel: 2.6.32-431.el6.x86\_64  
glibc-2.12-1.132



- ▶ 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. 32-Bit GemStone/S on 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.

The single segment maximum size, `shmmx`, is set in bytes, and the total shared memory limit, `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  $(\text{SHR\_PAGE\_CACHE\_NUM\_PROCS} * 2) + 1$ .

- 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

- ▶ gcc version 4.4.7 20120313 (Red Hat 4.4.7-4)

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 (GDB) Red Hat Enterprise Linux (7.2-60.el6\_4.1)

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
/InstallDir/GemStone6.7.0-x86_64.Linux	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 GemStone6.7.0-x86\_64.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 GemStone6.7.0-x86_64.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/utills/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 `GemStone6.7.0-x86_64.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/GemStone6.7.0-x86_64.Linux
```

Bash, Bourne or Korn shell:

```
$ GEMSTONE=InstallDir/GemStone6.7.0-x86_64.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](mailto: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 6.7 will use `netldi67`. 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 `netldi67` service is already defined:

```
% ypcat services | grep netldi67
```

If it is defined, skip the rest of this procedure and continue with the installation at “Run the Installation Script” on page 15. If it is not defined, continue performing this procedure.

The `netldi67` service must be available on all nodes that communicate with the GemStone server.

- 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.

- Add an entry similar to the following to the network database:

```
netldi67 50383/tcp #GemStone 6.7
```

Choose a port number that is not being used by another service. The port number should be in the range  $49152 \leq \text{port} \leq 65535$ , to conform 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 netldi67.*

- If NIS is running, propagate the change to the network database to the rest of the network.
- 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. 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.

## **Install the default TimeZone**

GemStone/S 64 Bit is shipped with a default time zone of US Pacific. If you are in another Time Zone, edit the file `installtimezone.txt` in the GemStone upgrade directory, then file it in as `SystemUser`.

## **Change System Passwords and Add Users**

After installing GemStone 6.7, 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.

The chapter entitled *User Accounts and Security* in the *System Administration Guide for GemStone/S* tells you how to change the passwords, and how to create new GemStone users accounts for other users on your system. These functions can also be done using

GemBuilder for Smalltalk tools; see the GemBuilder for Smalltalk Users's Guide for more information.

## 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 6.7 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 6.7 directory.

C shell:

```
% setenv GEMSTONE InstallDir/GemStone6.7.0-x86_64.Linux
```

Bash, Bourne or Korn shell:

```
$ GEMSTONE=InstallDir/GemStone6.7.0-x86_64.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 6.7 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*.
- ▶ 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*.

# Upgrading from Previous GemStone/S Versions

---

This chapter describes how to upgrade an existing GemStone/S installation to GemStone/S version 6.7.

GemStone/S version 6.7 supports upgrade from GemStone/S version 6.1.5 and later. If you are upgrading from a version prior to 6.1.5, you must first convert and upgrade to 6.1.5, then proceed to upgrade to 6.7. For instructions, see the Installation Guide for GemStone/S 6.1.5.

**GemStone/S v6.5.4 and later require more semaphores than were required by versions earlier than 6.5.4. If you are upgrading from 6.5.2 or earlier, you may need to adjust your OS configuration. Refer to the section “Operating system” on page 8 for more information.**

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 6.7, and instructions on installing updated client libraries.

For applications using add-on products such as GemConnect or Gembuilder for Java, 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 6.6.5 to represent any of the versions from 6.1.5 through 6.6.5. 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 6.6.5 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 6.7 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.

## 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

### Prepare for the Upgrade

Perform the following steps to prepare for the upgrade.

1. Install GemStone/S 6.7 to a new installation directory, separate from the installation directory for version 6.6.5, using the instructions in Chapter 1.
2. Configure version 6.7 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 6.6.5 extents and transaction logs.
- ▶ Your version 6.7 extents and transaction logs. You should 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 6.6.5 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 6.7. 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**.
6. Shut down the Stone:

```
% stopstone stone665
```

where *stone665* is the name of version 6.6.5 Stone on this machine.

7. Set up the 6.7 environment.

Set the environment variables required for the upgrade.

C shell:

```
% setenv GEMSTONE InstallDir/GemStone6.7.0-x86_64.Linux
% set path = ($GEMSTONE/bin $path)
% setenv upgradeLogDir tempDir
```

Bash, Bourne or Korn shell:

```
$ GEMSTONE=InstallDir/GemStone6.7.0-x86_64.Linux
$ export GEMSTONE
$ PATH=$GEMSTONE/bin:$PATH
$ upgradeLogDir=tempDir
$ export upgradeLogDir
```

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

8. Copy your version 6.6.5 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 InstallDir665/data/extent0.dbf 67location
% cp InstallDir665/data/extent1.dbf 67location
% cp InstallDir665/data/extent2.dbf 67location
```

where *67location* is the location specified by DBF\_EXTENT\_NAMES in the configuration file that will be used in version 6.7. If you are changing platforms, as well as upgrading, use copydbf instead of cp.

## Perform the Upgrade

1. Start the 6.7 Stone. For upgrading from version 6.1.x, 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 example:

For upgrade from 6.1.x:

```
% startstone -C stone67
```

For upgrade from 6.2 or later:

```
% startstone stone67
```

You may omit the stone name, in which case gemserver67 will be used. When this step completes, the results will be:

```
startstone[Info]: GemStone server stone67 has been started.
```

2. To upgrade the image, run the upgrade script:

```
% upgradeImage stone67
```

where *stone67* is the name of the version 6.7 Stone started in the previous step. You will be prompted to continue the upgradeImage step.

This script invokes several subordinate scripts to complete the upgrade. This will take some time to complete; output is sent only to a log file in the \$upgradeLogDir directory. This process should end with this display:

```
Upgrade completed. No errors detected.
```

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 6.7 as DataCurator.

3. Change the password for SystemUser, which you changed to `swordfish` prior to the conversion, back to its version 6.6.5 value. Also, change the password for GcUser, which was reset by the conversion process, back to its version 6.6.5 value:

```
topaz 1> printit
(AllUsers userWithId: 'SystemUser') password: '665Password'.
(AllUsers userWithId: 'GcUser') password: '665Password'.
System commitTransaction
%
```

where *665Password* is the account password used in your initial repository version.

4. If you have modified any kernel class methods in the previous version, compare these changes with version 6.7 kernel methods to see whether your changes are still necessary or appropriate. This should be done before or during the Pilot upgrade, so a filein 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 6.7 client libraries. See Chapter 3, 'Configuring GBS for GemStone/S' for details.



# Configuring GBS for GemStone/S

---

This chapter describes how to configure or update your client Smalltalk application using GemBuilder for Smalltalk (GBS) on Linux to run with GemStone/S version 6.7.

This chapter describes Linux clients only; for instructions for updating GBS clients on other platforms, see the relevant *Installation Guide* for that platform. In addition to using the appropriate version of GBS, you must use GemStone/S 6.7 client libraries with your GBS client application, to be able to log in to the v6.7 server. These libraries are specific to the GemStone/S server version and to the client platform.

For instructions on installing and configuring GBS, see the GemBuilder for Smalltalk Installation Guide for the appropriate version of GBS.

For a table of all supported GBS and client Smalltalk platforms, see the *GemStone/S Release Notes* for v6.7.

## GBS Setup or Upgrade Procedure

### Shared Libraries for GBS Client Node

The GBS client requires a set of shared libraries (.so files) that are provided as part of the GemStone server product distribution. When these are loaded into the client Smalltalk image in which GBS code is installed, the GBS client can log into the GemStone server.

The shared libraries must be the same version as the GemStone server. Since they are loaded into the client smalltalk VM, they must be appropriate for the client platform.

If your GBS client is on a different platform than your GemStone/server, you will need to download the version-specific libraries for the platform that the GBS client is running on.

You can either install the full GemStone/S Server on your GBS client node, or copy just the specific shared libraries you need.

### Install GemStone/S on client node

If your clients run on the same machine as the server, you have no need to do anything further – you can use the libraries in their locations in the existing server installation.

Otherwise, you may find it useful to install the full GemStone/S Server on the client.

If you will run linked sessions on the GBS client, or other configurations in which the gem is on the same node as the GBS client, you will need much of the GemStone/S server installation. The GemStone/S installation also includes tools such as topaz, gslist, and VSD.

Install GemStone/S on the client machine following the instructions in the Installation Guide for the client platform. You do not need to configure an extent or perform similar server tasks.

### Copy only specific client libraries

If you will only be running RPC sessions, and do not require tools such as gslist, vsd, or topaz on the client, you do not need to install the full GemStone/S Server on the client node. You may copy only the small set of library files that GBS requires. If you want to run linked sessions as well as RPC, you will need a full server installation on the client.

The following file needs to be copied to the client node:

```
$GEMSTONE/lib/libgcirpc67.so
```

GBS provides a number of options as to where on the client machine to place the shared libraries. Refer to the *GemBuilder for Smalltalk Installation Guide* for details on these options

## Update GBS to reference v6.7 libraries

Once you have installed the GemStone server on the GBS client machine, or copied the appropriate shared libraries, you need to ensure that the client Smalltalk executable will load the v3.2 libraries.

### Determining library name to specify

Whether or not you have a full server installation on the client or have copied a few libraries, you need to specify the name of the library you wish GBS to load.

RPC logins only:

```
libgcirpc67.so
```

Linked and RPC logins:

```
libgcirlnk67.so
```

### Setup GBS to load the new libraries

- If you have set the GBS configuration parameter `libraryName:`, update this to the new library name, and save your image.
- If you have set the GBS configuration parameter `libraryName:` to an empty string, ensure that no other client libraries of the same name are in the current working directory or the directories that your client Smalltalk product searches.
- For a new GBS application, refer to the *GemBuilder for Smalltalk Installation Guide* for details on the library loading setup options.

### Stop and restart the client VM

GBS loads the client libraries into the client Smalltalk VM the first time a GemStone server call is made after each startup of the VM. GBS is now ready to use.