*GemStone*®

# *GemStone/S Installation Guide*

for HP-UX on HP 9000 Systems

January 2006

GEMSTONE®

Version 6.1.5

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### Patents

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

# *Preface*

This document explains how to install GemStone/S version 6.1.5, 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*.

## 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.

In formal syntax listings, these additional conventions are used:

- Literals are shown in **bold** typeface. For example:

  **tcp**

- Optional arguments and terms are enclosed in square brackets. For example:

  [*dbfName*]

- Braces { } mean 0 or more modifiers. For example:

{*modifier*}

In this example you may list as many modifiers as you wish, but they are not required.

- Alternative arguments and terms are separated by a vertical bar (pipe). For example:

  *gemStoneName* | *netLdiName*

  In this example you must specify one name, but not both.

## Technical Support

GemStone provides several sources for product information and support. The product-specific manuals and online help provide extensive documentation, and should always be your first source of information. GemStone Technical Support engineers will refer you to these documents when applicable.

### 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:

**Help Request** allows designated support contacts to submit new requests for technical assistance and to review or update previous requests.

**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. Most code fixes and enhancements listed on the GemStone Web site are available for direct downloading.

**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. Some Tips may contain code that can be downloaded for use at your site.

**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. We also welcome suggestions and ideas for improving and expanding our site to better serve you.

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.

**Email: support@gemstone.com**

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

Requests for technical assistance may also be submitted 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 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.

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## 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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Chapter 1

# Installing GemStone/S Version 6.1.5

This chapter describes the procedure for installing GemStone/S version 6.1.5 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 6.1.5 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 *GemStone/S System Administration Guide.*

Installation instructions and system requirements for other system components, such as GemBuilder for Smalltalk, are provided separately with their respective products.

## Review the Installation Procedure

The following list summarizes the steps to install GemStone.

# 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

- HP 9000 workstation, series 800 or higher, with PA RISC 2.0

## 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.*

## Media drive

- CD-ROM drive

## Operating system

- HP-UX version 11i (11.11).

- For running GemStone, the following HP patches were installed:

  BUNDLE_11.11.depot Aug 16 2001
  GOLDQPK11i_11.11.depot Aug 16 2001
  PHCO_23772
  PHCO_23846
  PHCO_24400
  PHCO_24402
  PHKL_24032
  PHKL_25362
  PHKL_25506
  PHKL_25602

- Configure the operating system kernel.

  a. Invoke SAM.

  b. Ensure that asynchronous I/O is enabled. From the Drivers menu of Kernel Configuration, select `asyncdsk`, then press Return.

     If its status is "out," go to the Actions menu and choose Add to Kernel. Have SAM rebuild the kernel and reboot.

  c. Set the following kernel parameters from the Configurable Parameters menu:

  - Set the parameter `fs_async` to 1.
  - Set `max_mem_window` parameter to some non-zero value, such as 10. This enables the memory windows feature, which is required for a shared page cache larger than 1 GB. Each such GemStone system uses one memory window and must be started by using the `setmemwindow` command as described in Chapter 4, "Using the setmemwindow Command".
  - 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 parameter `nflocks` sets the possible number of file/record locks in the system. Like `nfiles` (above), this parameter limits the number of extents and user sessions that GemStone can support at one time. We recommend the same setting for `nflocks` as for `nfiles`.
  - Set the `maxusers` parameter to 512. Several other parameters are automatically scaled from this one.
  - The parameter `semmni` sets the number of semaphore identifiers in the system. This parameter limits the number of GemStone shared page caches on the node because each shared page cache uses one identifier. There will be one shared page cache on the node for each local Stone repository monitor. There will also be one for each remote Stone (that is, each Stone on another node) if users log in to that Stone through a Gem session process on the local node. A setting of 2048 should be adequate for most installations.
  - The parameter `semmns` sets the total number of semaphores in the system. This parameter limits the total number of GemStone sessions on a node. The default may not be adequate for some GemStone installations, especially if other software

uses semaphores or if more than one shared page cache will be present. A suggested value is 4096.

- The parameter `shmmax` sets the maximum shared memory segment size. We recommend that the maximum shared memory segment be set to 2147483647, unless that would be more than 75% of your real memory size. (In that case, use 75% of your real memory size.) For example, if you have 256 of real memory:

  256 MB * .75 = 192 MB
  192 MB * 2**20 = 201326592 bytes

- The parameter `shmmni` sets the number of shared memory identifiers in the system. We suggest that you set `shmmni` the same as `semmni`, above.

d. Exit SAM.

e. Find the character device major number for `asyncdsk`:

```
# lsdev
```

f. Create a device special file:

```
# mknod async c majorNumber 0x000000
```

where *majorNumber* is the number returned by **`lsdev`**.

*NOTE*

*If you see a message similar to `HostAioInit failure: cannot open /dev/async` during installation, asynchronous I/O is not enabled.*

g. Give the user running GemStone (or all users) the MLOCK privilege by running one of the following commands as root:

```
# setprivgrp userId CHOWN MLOCK
or
#setprivgrp -g CHOWN MLOCK
```

To have these privileges assigned to a user group when the system boots, put the following lines in the file `/etc/privgroup`:

```
groupname CHOWN
groupname MLOCK
```

- To use extents in the file system larger than 2 GB, the file system must be designated as a Large Files file system. When creating a new file system with SAM, enable the Large File System Allow parameter. To convert an existing HFS file system from a “nolargefiles” file system to a “largefiles” file system, see the documentation for `fsadm`. We recommend that you pregrow such extents to a size greater than 2 GB so any configuration difficulty is detected when the server is first started.
- 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 1.9 GB.

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

### 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 Compiler

- HP C compiler in the ANSI C Developer's Bundle.

  For HP-UX 11.0: D11.01.20 and patches

  For HP-UX 11i: B.11.11.02S and patches

  GemStone requires a C compiler only if you are developing C code for user actions or for a C application. The C compiler is required only for development work, not for 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 shows the portions of the system that are affected by the installation of GemStone.

**Table 1 Parts of System Affected by GemStone Installation**

| Location | Use |
|---|---|
| /dev/rdsk/ | Optional raw partitions for repository extents and transaction logs |
| /etc/services | Internet services database |
| /*InstallDir*/GemStone6.1.5-hppa.hpux | 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:

3. % **/etc/swapinfo**
   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:

   % **bdf**
   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. To extract the GemStone files, first insert the GemStone CD-ROM into the drive and mount it. (See your system administrator for details on how to do this.) Then unzip the files. For example:

   % /*mount_pt*/utils/hpux/unzip /*mount_pt*/gemstone/hpux.zip
   where *mount_pt* is the mount point for the CD-ROM drive.

The *InstallDir* now contains a GemStone directory with a name similar to **GemStone6.1.5-hppa.hpux**.

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

*NOTE*

*The GemStone man pages in the `doc` directory cannot be accessed by using **man -f** or **man -k** unless `/usr/share/lib/whatis` is re-created to include them. The installation script does not perform this action.*

6. 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* GemStone/S System Administration Guide, *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. Set the environment variable GEMSTONE.
   a. If more than one version of GemStone resides on this machine, 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**

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

      C shell:

      % **setenv GEMSTONE** *InstallDir*/**GemStone6.1.5-hppa.hpux**

      Bash, Bourne or Korn shell:

      $ **GEMSTONE=***InstallDir*/**GemStone6.1.5-hppa.hpux**$ **export GEMSTONE**

## Create the GemStone Key File

To run GemStone, you must create a key file. Instructions and information to create this file were shipped with the distribution media. If either of these materials is missing, call GemStone Contract Administration.

1. Change the permissions on the directory `$GEMSTONE/sys` so that you can create the file:

   ```
   % cd $GEMSTONE/sys
   % chmod 755 .
   ```

2. Using a text editor and the information provided, create the key file `$GEMSTONE/sys/gemstone.key`.

3. 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):

   % **/etc/ping** *hostname* **8 1**
   where *hostname* is the name of your machine. If **ping** responds with statistics, TCP/IP is functioning.

## Define the NetLDI Service

The `netldi61` service must be defined in your TCP/IP network database.

*NOTE*

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

1. Determine whether the `netldi61` service is already defined:

   ```
   % ypcat services | grep netldi
   ```

   If it is defined, skip the rest of this procedure and continue with the installation at “Run the Installation Script” on page 1-9.

   If it is not defined, continue performing this procedure.

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:

   ```
   netldi61 10377/tcp #GemStone 6.1.5
   ```

   Choose a port number that is not being used by another service. The port number must be either less than 1024 (in which case `netldi` must be owned by root) or greater than 5000.

   *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* `netldi61`.

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.

## Check the /etc/nsswitch.conf system file

Make sure there is a services entry in the `/etc/nsswitch.conf` system file. This addition allows the netldi service name to resolve to the appropriate port number.

The following line in `/etc/nsswitch.conf` is for use when services can be resolved via a local `/etc/service` file:

```
services: files
```

The next example in `/etc/nsswitch.conf` is for use when services can be resolved via the local `/etc/services` file and then via the NIS server:

```
services: files [NOTFOUND=continue UNAVAIL=continue] nis
```

## 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 *GemStone/S System Administration Guide* 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 *GemStone/S System Administration Guide*.)

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 *GemStone/S System Administration Guide.*

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.

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

## Change System Passwords and Add Users

After installing GemStone 6.1.5, 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 *GemStone/S System Administration Guide* 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 *GemStone/S System Administration Guide.*

*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 6.1.5:

   ```
   % env | grep GEM
   ```

   If necessary, set the environment variables as detailed in "Set the Environment" on page 1-7.

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 gemserver61), 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 pathname. (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 6.1.5 has been installed, you should notify each GemStone user of the installation and explain how to use the gemsetup files.

*NOTE*
*This procedure applies to users ONLY, 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 6.1.5 directory.

   C shell:

   % **setenv GEMSTONE** *InstallDir*/**GemStone6.1.5-hppa.hpux**

   Bash, Bourne or Korn shell:

   $ **GEMSTONE=***InstallDir*/**GemStone6.1.5-hppa.hpux**
   $ **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 (`.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 6.1.5 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 ordered a related GemStone product, 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 *GemStone/S System Administration Guide*. 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 *GemStone/S System Administration Guide.*
- If you are going to operate in a network environment, Chapter 3 of the *GemStone/S System Administration Guide* 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 *GemStone/S System Administration Guide.*
- GemStone/S is shipped with a default time zone of US Pacific. To modify this setting, edit the file `timezone.txt` in the GemStone `install` directory, then file it in as DataCurator.

Chapter 2

# Upgrading from Previous GemStone/S Versions

The procedure for upgrading to GemStone/S 6.1.5 differs depending on which version you are currently using. The following table describes the possible upgrade scenarios for the GemStone/S server. For corresponding GemBuilder upgrade procedures, see Chapter 3.

| Current Version | Overview of Upgrade Procedure | Detailed Upgrade Instructions |
|---|---|---|
| 6.0.1 through 6.1.4 | 6.0.1, 6.1, 6.1.1, 6.1.2, 6.1.3, and 6.1.4 extents, tranlogs, and backups are compatible with version 6.1.5 | See "Upgrading to Version 6.1.5" on page 2-1 |
| 5.1.5 through 6.0 | 5.1.5, 5.1.5.1, and 6.0 repositories must be converted to be compatible with version 6.1.5. | See "Upgrading to Version 6.1.5" on page 2-1 |
| 5.1.3 or 5.1.4 | You must first upgrade to version 6.0. | Installation Guide for GemStone/S 6.0 |
| prior to 5.1.3 | You must first upgrade to version 5.1.3, then upgrade to 6.0. | Installation Guide for GemStone/S 5.1.3 |

*NOTE*
*Multiple steps are required to upgrade from older releases.*

## Upgrading to Version 6.1.5

*NOTE*
*If you are upgrading from GemStone/S 5.x, before upgrading you may want to install GemBuilder for Smalltalk (GBS) 5.2.2 or later to take advantage of its new features with your existing GemStone server. Later, you can configure GBS to work with GemStone 6.1.5 by following the steps in Chapter 3.*

This upgrade procedure is divided into two parts:

- An overview of the recommended strategy for carrying out the upgrade (see page 2-2).
- Instructions for upgrading the GemStone Object Server (see page 2-3).

*NOTE*

*The following instructions use the version number 6.1.4 to represent any of the versions 5.1.5, 5.1.5.1, 6.0, 6.0.1, 6.1, 6.1.1, 6.1.2, 6.1.3, or 6.1.4. The procedure is the same regardless which of these versions you have.*

# 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 6.1.4 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 6.1.5 classes and methods.
- Modify your application's client code as necessary. This code may be in C, C++, or client Smalltalk.

*NOTE*

*In order to use GemBuilder for Smalltalk (GBS) with the v6.1.5 server, you should install GBS 5.2.2 or later if you have not done so, and then follow the configuration instructions in Chapter 3 of this document.*

- 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 6.1.5.



### Prepare for the Upgrade

Perform the following steps to prepare for the upgrade.

1. Install GemStone / S 6.1.5 to a new installation directory, separate from the installation directory for version 6.1.4, using the instructions in Chapter 1.
2. Configure version 6.1.5 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:

   ```
   % bdf
   ```

   Space is needed for the following:

   - Your version 6.1.4 extents and transaction logs.
   - Your version 6.1.5 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 6.1.4 GemStone system and reset the SystemUser password to ‘`sword-fish`’:

   ```
   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 6.1.5. 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`** *stone614*

   where *stone614* is the name of version 6.1.4 Stone on this machine.

7. Set up the 6.1.5 environment.

   Set the environment variables required for the upgrade.

   C shell:

   % **`setenv GEMSTONE`** *InstallDir*/**`GemStone6.1.5-hppa.hpux`**
   % **`set path = ($GEMSTONE/bin $path)`**
   % **`setenv upgradeLogDir`** *tempDir*

   Bash, Bourne or Korn shell:

   $ **`GEMSTONE=`***InstallDir*`/GemStone6.1.5-hppa.hpux`$ **`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 6.1.4 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:

% **copydbf** *InstallDir614***/data/extent0.dbf** *615location*

% **copydbf** *InstallDir614***/data/extent1.dbf** *615location*

% **copydbf** *InstallDir614***/data/extent2.dbf** *615location*

where *615location* is the location specified by `DBF_EXTENT_NAMES`.

## Perform the Upgrade

*NOTE*

*If you are upgrading from version 6.0.1, 6.1, 6.1.1, 6.1.2, 6.1.3, or 6.1.4 you do* ***not*** *need to perform step 1.*

1. For each extent file you copied from your 6.1.4 location, invoke the script `convDbf` with the extent name as an argument:

   % **convDbf** *615location* / extent0.dbf

2. Start the 6.1.5 Stone:

   % **startstone** *stone615*

3. Run the upgrade script:

   % **upgradeTo615** *stone615*

   where *stone615* is the name of the version 6.1.5 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 a new product version you may install it at this time. Otherwise, install the same version that was previously installed.

2. Log in to GemStone version 6.1.5 as DataCurator.

3. Change the password for SystemUser, which you changed to `swordfish` prior to the conversion, back to its version 6.1.4 value. Also, change the password for GcUser, which was reset by the conversion process, back to its version 6.1.4 value:

   ```
   topaz 1> printit
   (AllUsers userWithId: 'SystemUser') password: '614Password'.
   (AllUsers userWithId: 'GcUser') password: '614Password'.
   System commitTransaction
   %
   ```

   where *614Password* is the account password used in version 6.1.4.

4. If this is the Production upgrade, create a full backup of the upgraded repository now. For details, see Chapter 9 of the *GemStone/S System Administration Guide*.

   The upgraded repository is now usable.

If you have modified any kernel class methods of the previous GemStone/S version, perform steps 5 and 6 for the Pilot upgrade.

5. Carefully compare your changes with version 6.1.5 kernel methods to see whether your changes are still necessary or appropriate.

   In some cases, an appropriate method may have been added to version 6.1.5. You may find it useful to examine the ASCII text files in the GemStone upgrade directory.

6. File out the changes that you plan to carry forward into version 6.1.5, for use when you perform the Production upgrade.

If this is the Production upgrade, perform steps 7 and 8.

7. File in the kernel class changes that you filed out as part the Pilot upgrade, and have determined are still required.

8. Commit the changes.

Chapter 3

# Configuring GBS for the v6.1.5 Server

This chapter describes how to configure your application using 5.2.2 (or later) GemBuilder for Smalltalk (GBS) on VisualWorks 5.x or VisualAge, or 6.0 (or later) GemBuilder for Smalltalk with VisualWorks 7.x, to run with GemStone 6.1.5.

*NOTE*

*Applications based on an earlier version must first upgrade to GBS v*5.2.2 *or later for VisualWorks 5.x, or GBS v6.0 or later for VisualWorks 7.x. For installation instructions, refer to the GemBuilder for Smalltalk Installation Guide.*

To use *linked* logins to a 6.1.5 server, you must use 6.1.5 client libraries.

To use *RPC* logins to a 6.1.5 server, we recommend that you use 6.1.5 client libraries. However, 6.0.1 and later client libraries are compatible with the 6.1.5 server.

The following section, "Copying the GemStone 6.1.5 Libraries," describes the procedure for updating your libraries and getting GBS to recognize them.

## Copying the GemStone 6.1.5 Libraries

1. Install the GemStone 6.1.5 object server if you have not already done so.
2. Unzip the file `clientFiles.zip`, located at the top level of the distribution medium. This file unzips into a directory tree:

   `clientFiles/`*<clientPlatform>/<shared library files>*
3. Quit any running client Smalltalk VM that is using GBS.
4. Log in to your GBS platform as the user who is the owner of the GBS installation files.

*NOTE*

*In the following steps, <GBS> refers to your GemBuilder installation directory, and <SRC> refers to the* `clientFiles` *subdirectory for your GemBuilder platform (for example,* `$GEMSTONE/clientFiles/sparc.Solaris`*). Under UNIX, it may help to define two environment variables.*

5. Copy the files from the GemStone source directory <*SRC*> to the GemBuilder installation directory <*GBS*>.

   On Solaris or Linux:

   ```
   % cp <SRC>/libgcilnk61.so  <GBS>
   % cp <SRC>/libgcirpc61.so  <GBS>
   % cp <SRC>/english61.err   <GBS>
   ```

   On HPUX:

   ```
   % cp <SRC>/libgcilnk61.sl <GBS>
   % cp <SRC>/libgcirpc61.sl <GBS>
   % cp <SRC>/english61.err  <GBS>
   ```

   On Windows:

   ```
   C:\> copy <SRC>\gcilw61.dll  <GBS>
   C:\> copy <SRC>\gcirw61.dll  <GBS>
   C:\> copy <SRC>\gsw61.dll    <GBS>
   C:\> copy <SRC>\englis61.err <GBS>
   ```

6. Set up GBS to use the correct client libraries. The technique will vary according to the version of GBS used. This is discussed in the following section.

## Setting up GBS to recognize the client libraries

The process that GBS uses to locate the correct clientLibraries differs depending on the version of GBS that is used.

### GBS version 6.1 or later and 5.2.3

Before logging into GemStone, set the new GBS configuration parameter 'libraryName' to the appropriate client library name. Client library names containing "lnk" or "lw" permit both linked and rpc logins. Names containing "rpc" or "rw" permit only rpc logins. For more information, see the release notes for the version of GBS you are using.

### GBS versions prior to 6.1 and 5.2.3

If it exists, delete the file <*GBS*>`/gbsSharedLibraryVersion.cfg`. The next time GBS needs to know the shared library version number, a prompt asks which version of the shared libraries to use. Enter the two digits from the file name, "61" in this example.

GemBuilder uses shared libraries on Solaris, HPUX, Linux, and Windows. The copy procedure you have just completed is sufficient to allow an existing GBS v5.2.2 (or later) application on Solaris, HPUX, or Windows to run with GemStone 6.1.5.

Chapter 4

# Using the setmemwindow Command

## Using a 1GB or Larger Shared Page Cache Under HP-UX

Because of unique details in the HP-UX memory architecture, GemStone applications that require a shared page cache size of 1GB and larger must be executed within a designated memory window, using the HP-UX `setmemwindow` command. The `setmemwindow` command is an HP-UX 11.0 patch to allow 2 GB contiguous shared memory access.

Failure to use `setmemwindow` will result in the inability to start or login to the Stone, usually with warning messages regarding the inability to create or attach to shared memory.

- For general information about the `setmemwindow` command, refer to the HP-UX man page.

To use this feature:

1. Confirm that your HP-UX kernel has been configured to use memory windows, as described in step c on page 1-3.
2. You must select a unique window ID for a given GemStone repository and Stone process. The particular value chosen is not important, but must be used consistently for all GemStone processes to be used with this particular repository / stone. GemStone site administrators may wish to use the HP-UX `getmemwindow` command and `/etc/services.window` file as one way to manage this.

## The setmemwindow Command

For all GemStone applications, the `setmemwindow` command must be run using the following syntax:

```
setmemwindow -i <window_id> -b <program_args>
```

For details about `setmemwindow` command usage, see page 4-4.

Here are several examples of how you might invoke the setmemwindow command (in all examples, the unique window ID is *13*)

```
unix> setmemwindow -i 13 -b startnetldi -a gssadmin -g

unix> setmemwindow -i 13 -b startstone gemserver61 ...   unix>
setmemwindow -i 13 -b topaz -l

...

unix> setmemwindow -i 13 -b stopnetldi

unix> setmemwindow -i 13 -b stopstone gemserver61 ...
```

The one exception to this rule is in running Topaz / GBS using *only* RPC sessions. Since the memory window for the spawned Gem process is determined by the NetLDI process, you do not need to execute Topaz / GBS under setmemwindow in this case. However, if you intend to use a *linked* session from this process, then you must use setmemwindow.

For convenience you can also spawn a UNIX shell (sh, csh, and so forth) from setmemwindow, which will then automatically use the designated memory window for all subsequent commands. For example:

```
unix> setmemwindow -i 13 -b csh

csh> startnetldi -a gssadmin -g

csh> startstone gemserver61 -e system.conf ...

...
```

Failure to include the -b switch with setmemwindow may result in a Segmentation Violation error when starting the Stone.

Failure to use setmemwindow when starting NetLDI (for an RPC session) or when running topaz / GBS (for a linked session) will result in an error as shown in Example 4.1.

**Example 4.1 Typical Error Without setmemwindow**

```
unix> topaz -l
topaz> set gemstone mystone user DataCurator pass swordfish
topaz> login
------------------------------------------------------      GemStone:
Error         Fatal     The session was unable to start a cache page
server on host 'myhost'.
Reason:   GemStone could not attach to the shared memory segment with
id XXXXXXX.
            (First attach attempt at arbitrary address.)
            shmat() error = errno=13, EACCES, Authorization failure
            (permission denied)
Help:
            Operating system kernel not configured for shared memory?
            SHR_PAGE_CACHE_SIZE_KB too large for kernel configuration.
Error Category: [GemStone] Number: 4139 Arg Count: 0
topaz>
```

GemStone site administrators may wish to develop shell scripts for frequently used GemStone activities that incorporate the `setmemwindow` command with the appropriate window ID.

## Running Multiple Stones

If multiple Stone processes are to run on a single HP node, you must use a different window ID for each Stone. In addition, since each RPC Gem process acquires its window ID from the NetLDI process that spawns it, each Stone must have its own NetLDI process. Requests to login an RPC Gem must specify the appropriate NetLDI process as part of the `gemnetid` (`gemservice` in GBS) using an appropriate NRS string.

The following example starts two Stones, *stone1* and *stone2*, running under the window IDs *13* and *14*.

**Example 4.2 Running Two Stones**

```
unix> setmemwindow -i 13 -b startstone stone1 <other args>
unix> setmemwindow -i 13 -b startnetldi stone1netldi <other args>
unix> topaz
topaz> set gemstone stone1
topaz> set gemnetid !#netldi:stone1netldi!gemnetobject
topaz> login
successful login
topaz 1>
...
unix> setmemwindow -i 14 -b startstone stone2 <other args>
unix> setmemwindow -i 14 -b startnetldi stone2netldi <other args>
unix> topaz
topaz> set gemstone stone2
topaz> set gemnetid !#netldi:stone2netldi!gemnetobject
topaz> login
successful login
```

```
topaz 1>
```

Refer to the *GemStone/S System Administration Guide* for further details on naming NetLDI processes and using NRS strings to define which NetLDI process to use.

## Usage

```
setmemwindow [-cjnvf][-i window_id][-p pid] || program [arg1]...
```

**Table 1 setmemwindow Command-Line Options and Arguments**

| Argument | Description |
|---|---|
| -c | Create window, fail if exists |
| -j | Join window, fail if not present |
| -n | Do not waitpid() for program. |
| -v | Verbose mode(debug). |
| -f | Exec program if setting window fails. |
| -i | Set window ID to *window_id* |
| -p | Set window ID of the specified process |
| -b | Combine window partitions |
| program | Execute the named program in the specified window ID. |