GemStone/S 64 Bit™ Installation Guide

for AIX on IBM RS/6000

Version 3.7

September 2023

GEMTALK™
S Y S T E M S

Preface

About This Documentation

This document explains how to install GemStone/S 64 Bit version 3.7 on a workstation running AIX on IBM RS/6000; and how to upgrade from previous GemStone/S 64 Bit versions.

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.

Technical Support

Support Website

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 and HTML.

▶ **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.

▶ **Supplemental Documentation** and **TechTips**, providing information and instructions that are not in the regular documentation.

▶ **Compatibility matrices**, listing supported platforms for GemTalk product versions.

We recommend checking this site on a regular basis for the latest updates.

Help Requests

GemTalk Technical Support is limited to customers with current support contracts. Requests for technical assistance may be submitted online (including by email), or by telephone. We recommend you use telephone contact only for urgent 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

Email: techsupport@gemtalksystems.com

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

Please include the following, in addition to a description of the issue:

▸ The versions of GemStone/S 64 Bit and of all related GemTalk products, and of any other related products, such as client Smalltalk products, and the operating system and version you are using.

▸ Exact error message received, if any, including log files and statmonitor data if appropriate.

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

24x7 Emergency Technical Support

GemTalk 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, for issues impacting a production system. For more details, contact GemTalk Support Renewals.

Training and Consulting

GemTalk Professional Services provide consulting to help you succeed with GemStone products. Training for GemStone/S is available at your location, and training courses are offered periodically at our offices in Beaverton, Oregon. Contact GemTalk Professional Services for more details or to obtain consulting services.

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Chapter

1

Installing GemStone/S 64 Bit Version 3.7

This chapter describes the procedure for installing GemStone/S 64 Bit™ version 3.7.

For new users, we recommend that you set up GemStone initially on a single machine, to ensure that all the pieces work together. Further setup to run a distributed system are described in the *System Administration Guide*. You will need to adjust the installation process to meet your specific needs.

If you are upgrading to this release from a previous version of GemStone/S 64 Bit, follow the instructions in the appropriate later chapter of this Installation Guide. These upgrade instructions will provide details on steps that need to be taken before and after the installation described here.

Review the Installation Procedure

The following list summarizes the steps to install GemStone/S 64 Bit.

Check the System Requirements

Before you install GemStone/S 64 Bit, ensure that the following system requirements are satisfied. Additional system resources may be necessary to support large applications.

Platform

▸ IBM RS/6000 workstation running a POWER7, POWER8, or POWER9 processor.

RAM and Page space

▸ While small installations can run on systems with only a few GB of physical RAM, increasing RAM, and so allowing a larger Shared page cache, is important for GemStone performance.

▸ Total page space should be at least equal to the amount of RAM. We recommend installing twice as much page space as RAM.

Disk space

▸ Space for the installed distribution files—you need approximately 700MB for GemStone/S 64 Bit, and additional space for other products.

▸ Additional space as required for your repository.

▸ The repository files should be located on a disk drive that does not contain page space.

Operating system

▸ AIX version 7.1, TL3 SP5, on POWER8

▸ AIX version 7.2, TL2 SP2, on POWER7 and POWER9

Debugger

A C debugger allows C-level stack traces when a GemStone error occurs, or when using the **pstack** command. While not required for GemStone execution, it is strongly recommended that a debugger be installed, so diagnostic error stacks will be available.

▸ dbx

C/C++ Compiler

GemStone requires a C/C++ compiler if you are developing C or C++ code for user actions or a C or C++ application; as described in the *GemBuilder for C* manual. It is not needed for the runtime application.

▸ IBM XL C/C++ for AIX, V11.1

X Windows

An X Windows server allows you to use GemStone's graphical VSD application on AIX. Alternatively, GemStone statistical data may be viewed on Windows, by transferring the data files, or by mounting the file system on Windows. X Windows is not required for GemStone execution.

Configure the Operating System

1. **File size and file descriptors**

    To use extents in the file system larger than 2 GB or to increase the number of file descriptors available, make these changes in `/etc/security/limits`:

    ```
    Fsize = -1
    nofiles = 2000
    ```

    You must also have the Large File System enabled when creating a jfs file system using SMIT.

    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 default 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. *Use caution and increase the default setting only when necessary because doing so can have system side effects.*

2. **PAM**

    If you are using UNIX authentication for GemStone logins, or if you run NetLDI as root with setuid (i.e. not in guest mode), you must have PAM (Pluggable Authentication Module) configured on the server. You may include a specific GemStone authorization service name, or allow the default "other" authentication definitions to be used.

    PAM authentication definitions are in `/etc/pam.conf`.

    The specific GemStone service names are `gemstone.gem` for user authentication, and `gemstone.netldi` for a NetLDI running with authentication. The libraries that are specified in the stack depend on how you are configuring PAM to perform the authentication. AIX does not provide an LDAP module as part of the core.

    For example, to allow GemStone UNIX authentication, which uses PAM, to authenticate via a custom LDAP module:

    ```
    gemstone.gem    auth    required    /usr/lib/security/pam_ldap
    ```

    For NetLDI running as root, to authenticate directly to the AIX security subsystem, use the following. This only applies for process running as root.

    ```
    gemstone.netldi  auth    required    /usr/lib/security/pam_aix
    ```

    If the following "other" stack is available in `/etc/pam.conf`, GemStone can use this to authenticate, via a custom LDAP module:

    ```
    OTHER    auth    required        /usr/lib/security/pam_ldap
    ```

    Consult your System Administrators for more information on how authentication is handled on your system.

3. **Large Memory Pages**

    The default size for memory pages is 4K (small), and AIX also transparently supports 64K (medium) pages; AIX automatically adjusts between these two page sizes.

    Current releases of AIX also support larger pages sizes, including 16MB (large) pages. If you have a large repository, using large pages may improve performance. To use large pages, you must configure AIX to allocate large pages, and configure GemStone to request large pages.

    To configure GemStone to use Large Pages:

a. Determine the number of huge pages that will be needed, based on your GemStone configuration. This is calculated by the utility **largememorypages**. This utility needs several details to compute the number of required pages: the shared page cache size, the maximum number of GemStone processes, and the number of shared counters. These can be provided by arguments or read from an existing configuration file. When using a configuration file, the file must have large memory pages enabled (SHR_PAGE_CACHE_LARGE_MEMORY_PAGE_POLICY).

```
largememorypages [-e path ][-z path][-F cacheFrames | -M cacheKB]
    [ -P maxProcesses] [-C maxSharedCounters][ -p 16MB ]
```

You may specify the required values using a valid configuration file. This is parsed as a Stone configuration file and the necessary values extracted.

-e *path*
    specifies an executable config file (same as startstone -e).

-z *path*
    specifies a system config file (same as startstone -z).

If a config file is not specified, then -M or -F and -P and -C are required. These arguments can be used in addition to the configuration file, in which case they override values set or computed in the configuration file:

-F *cacheFrames*
    shared cache size expressed in 16 KB frames

-M *cacheKB*
    shared cache size in bytes, with a optional units suffix.

-p **16MB**
    Only 16MB memory pages are supported on AIX.

-P *maxProcesses*
    setting for SHR_PAGE_CACHE_NUM_PROCS

-C *maxSharedCounters*
    setting for SHR_PAGE_CACHE_NUM_SHARED_COUNTERS.

The following example is for an (approximately) 20GB shared page cache, 200 processes, and 1900 shared counters:

```
os$ largememorypages -P 200 -M 20GB -C 1900 -p 16MB
Cache config is 1310720 pages = 20480 MB,  total is 22064 MB,
overhead 7% of configured size
Large page size requested is: 16 MB.
Large page overhead: 4.80 MB
For 1310720 pages, 200 processes and 1900 shared counters, 10
pusherThreads
  required cache size is 23135780864 bytes.
Number of 16 MB large pages required: 1379
```
<with further update commands>

b. Configure AIX to use large pages using the following commands, which are also output by **largememorypages**.

```
os$ vmo -r -o lgpg_regions=numPages -o lgpg_size=16777216
os$ vmo -p -o v_pinshm=1
```

After this has been executed, the bosboot command must be run to build a new kernel image, and the system must be rebooted

You can confirm large memory pages are available for use using vmstat -l.

    c.   The UNIX user running the shared cache monitor must be given permission to use large memory pages.

```
os$ chuser capabilities=CAP_BYPASS_RAC_VMM,CAP_PROPAGATE
     userId
```

Alternatively, you can run the SPC monitor process with an effective user ID of root:

```
os$ chown root $GEMSTONE/sys/shrpcmonitor
os$ chmod u+s $GEMSTONE/sys/shrpcmonitor
```

    d.   Configure GemStone to request large pages by setting the configuration option SHR_PAGE_CACHE_LARGE_MEMORY_PAGE_POLICY = 2.

4. 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; a system time earlier than the last checkpoint time may be taken as an indication of corrupted data and prevent GemStone from starting. The time comparisons use GMT.

5. 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 OS default may not be appropriate for your system. For further information, refer to your operating system documentation.

Install the GemStone Server

Installing GemStone can be done as a regular user, but to setup a multi-user repository with appropriate security, some portions of the installation should be done when logged in as the root user. Other steps of the installation are done as the unix user who will be the GemStone administrative account.

1. Log in as the GemStone administrator to the machine on which you are installing GemStone. This part of the installation should **not** be done as root, to ensure all the files are not owned by root.

2. Determine that adequate page space is available.:

   We recommend that you allow at least 10 LPs of page for running GemStone and an additional 10 LPs if you will be developing GemStone applications.

   To determine the current size of the paging device(s), which is usually found on the root volume group, rootvg:

   ```
   os$ /etc/lsvg rootvg -l
   ```

   Paging devices are of TYPE paging, and the LPs column shows the size of each device. An LP is 4 MB.

   Page space can be expanded dynamically (without rebooting) using SMIT.

3. Select the drive on which you will install the GemStone software, and the installation directory on this drive, *InstallDir*. Make this directory the current working directory.

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

4. GemStone/S 64 Bit is provided as a compressed file with a name similar to `GemStone64Bit3.7.0-RISC6000.AIX.zip`. Move this distribution file to the directory location in which GemStone will be installed, *InstallDir*.

5. Unzip the distribution file using `unzip`.

6. The *InstallDir* now contains a GemStone directory with a name similar to `GemStone64Bit3.7.0-RISC6000.AIX`.

   In addition to subdirectories, this directory also contains the text files `version.txt`, which identifies this particular product and release of GemStone, and `externals.sha.txt`, which lists shas for external projects included in this version.

   The GemStone server is now installed.

Set the Environment

Perform the following steps to properly configure the operating environment.

1. Set the environment variable GEMSTONE.

   a. If more than one installation of any GemStone/S product resides on this machine, check for existing GemStone environment variables:

      os$ **env | grep GEM**

      All GemStone environment variables are displayed.

   b. If any environment variables exist and are not appropriate for the new installation, you must specifically unset each one. For example:

      os$ **unset GEMSTONE GEMSTONE_SYS_CONF**

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

      os$ **export GEMSTONE=***InstallDir***/GemStone64Bit3.7.0-RISC6000.AIX**

Set the GemStone Key File

To run GemStone, you must have a key file for the correct version of GemStone/S 64 Bit and for the appropriate platform. The keyfile must be located where GemStone can find it on startup:

▸ A file specified by the KEYFILE configuration parameter in the configuration file used by the stone. This is not set by default, but may be defined to read a keyfile with any name in any location.

▸ `$GEMSTONE/sys/gemstone.key`

Licensed Customer key file

Keyfiles for GemStone version 3.6.x and earlier are not valid with v3.7. Licenced customers can email keyfiles@gemtalksystems.com or contact GemTalk Technical Support to request a keyfile for version 3.7 for their platform or platforms.

Installing a keyfile

To specify the location and name of the keyfile using the KEYFILE configuration parameter, edit the configuration file that will be used by the v3.7 stone to include the location and name of the keyfile.

You may also put the keyfile in the default location, `$GEMSTONE/sys/gemstone.key`. This requires modifying the write permissions of the `$GEMSTONE/sys` directory; ensure you change this back to not writable, after this update.

Verify TCP/IP

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

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

```
os$ /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 NetLDI service, by default `gs64ldi`, can be defined in your system services database to return the NetLDI listening port. A NetLDI is required for some local and all remote sessions to log into GemStone, and it can be resolved by name or directly by port number. If you are defining NetLDI services by name, the same NetLDI service name and port number must be defined on the remote machines as on the Stone's node.

The following steps can be skipped if you will be using the NetLDI port rather than name. Using the port number requires that this same port be specified when the NetLDI is started up, and when sessions login. The details are described in the *System Administration Guide*.

If you are upgrading from a previous version, you may need to keep the NetLDI for that version running. In this case, select a distinct name and/or port for the NetLDI for GemStone/S 64 Bit 3.7.

1. Determine whether the `gs64ldi` service is already defined. How to do this will depend on how your system is set up. The GemStone distribution includes an executable that will allow you to do this:

    ```
    os$ $GEMSTONE/install/getservbyname gs64ldi
    s_name=gs64ldi s_port = 50377 s_proto = tcp
    ```

    If `gs64ldi` is defined, skip the rest of this procedure and continue with the installation at "Run the Installation Script" on page 14.

    If it is not defined, continue performing this procedure.

2. Add an entry similar to the following to the system services database:

    ```
    gs64ldi 50377/tcp #GemStone/S 64 Bit 3.7
    ```

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

3. If several machines will be running GemStone, have the UNIX system administrator update the system services database for each machine. This includes Windows client machines as well as UNIX nodes. Note that the port number must be the same for every machine.

Run the Installation Script

The installation script verifies your environment, creates lock file directories, sets up the extent files, and can be used to configure certain types of security for multi-user systems. It is not required to run the installation script; however, if you are new to GemStone, or installing GemStone on a new server, running the install script is recommended.

For development systems without strict security requirements, it is recommended to run GemStone with the NetLDI in guest mode with captive account, which simplifies debugging. In this case, do **not** accept the default answers to the installation script questions regarding protecting the extent and running NetLDI as root.

1. Log in as root.

    You can run the installation script as a non-root user, however, some options are not available as a non-root user. To ensure that the installation is successful, you must install as root. See the *System Administration Guide* for details on setting up GemStone server file security.

2. Invoke the installation script from the `install` subdirectory:

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

installgs is an interactive script that analyzes your system configuration and makes suggestions to guide you through installing GemStone on your machine. You can run the script multiple times; it will skip completed tasks.

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.*

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. When the script offers a default answer in square brackets (such as "[y]"), press Enter to accept the default.

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 /usr/gemstone may be used in legacy installations. A different location can be specified using the environment variable GEMSTONE_GLOBAL_DIR; however, all Gemstone processes that will interact on this machine must have this environment variable set to the same directory.

If the directory does not exist, the installation script offers to create /opt/gemstone and the subdirectories locks and log, and to set access (770) to these directories.

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

Set the owner and group for all the files in the 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 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.

Protect the repository file?

The default 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.

If you are running a development system without strict security requirements, we recommend **not** selecting the default.

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

Allow NetLDI to Run as Root?

The NetLDI 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.

▶ 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.

If you are running a development system without strict security requirements, we recommend **not** selecting the default.

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

Set up an Extent?

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, and edit the configuration file to reference this location. For more information, see the *System Administration Guide*.

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

Start a NetLDI?

You can start a NetLDI that runs as root by answering yes to this prompt and the confirmation that follows.

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 the *System Administration Guide.*

Default: Do not start a NetLDI at this time.

Start an Object Server?

As root, you cannot start an object server (Stone), but the script offers to start one as another user.

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

3.   Log out as root

     After running **installgs**, log out as user root. Further work is done as the GemStone administrative user.

Complete GemStone Configuration

The following should be done by an administrative user, not as root.

Change Passwords for Administrative Accounts

GemStone comes with a number of built-in System user accounts, which are needed to perform administrative operations (such as adding application user accounts).

▸ 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.

The initial password for these administrative accounts is `swordfish`.

Access to each of these accounts should be restricted; you should always change the passwords for these accounts, to provide basic security for your application.

The chapter entitled "User Accounts and Security" in the *System Administration Guide* tells you how to change the passwords.

Add GemStone User Accounts

For each of the users in your system, you should establish GemStone accounts, which involves creating an individual UserProfile in GemStone.

The chapter entitled "User Accounts and Security" in the *System Administration Guide* provides information on how create accounts for GemStone users, and the options for authentication. This task can be done by executing Smalltalk code, or using GemBuilder for Smalltalk tools. See the *GemBuilder for Smalltalk Users's Guide* for information on the GUI tools in GemBuilder.

Users must set environment

After GemStone/S 64 Bit 3.7 has been installed, you should notify each person who will be using GemStone about the installation, and explain how to setup their environment.

Each user must:

▸ Set the environment variable `GEMSTONE` to the *full pathname* (starting with a slash) of the GemStone/S 64 Bit 3.7 directory.

▸ update their path to include the `$GEMSTONE/bin` directory.

▸ Optionally, update the man path (MANPATH variable) to include the `$GEMSTONE/doc` directory. GemStone provides man pages for utility functions.

These last two steps can be done using scripts that are part of the GemStone distribution. The directory `$GEMSTONE/bin` contains the files `gemsetup.sh` and `gemsetup.csh`,

which define the GemStone environment for users by modifying the PATH and MANPATH variables to include $GEMSTONE/bin and $GEMSTONE/doc, respectively.

For example:

```
os$ export GEMSTONE=installdir
os$ export PATH=$GEMSTONE/bin:$PATH
os$ export MANPATH=$MANPATH:$GEMSTONE/doc
```

If the user will use GemStone frequently, consider adding these steps to the login shell initialization file.

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.

Further Configuration and Administration

This chapter has guided you through installation of GemStone/S 64 Bit 3.7, with the objective of getting a simple, default configuration up and running.

The next chapters explain the process of upgrading a previous version of GemStone/S 64 Bit to version 3.7; and Chapter 3 provides information on GemBuilder for Smalltalk.

For more detailed information on server setup, details on customizing your GemStone environment, Gem client processes, and setting up distributed configurations, see the *System Administration Guide*.

2 Upgrading from GemStone/S 64 Bit 3.4.x or later

This chapter describes how to upgrade an existing GemStone/S 64 Bit 3.4.x, 3.5.x, or 3.6.x installation to GemStone/S 64 Bit version 3.7.

To upgrade from GemStone/S 64 Bit version 3.2.x and earlier, you must first upgrade to a more recent version, and then upgrade to v3.7. Upgrade from 3.3.x to 3.7 is not disallowed, but is not tested or supported.

If you are using GemBuilder for Smalltalk (GBS), you also need to upgrade the client libraries that are used by GBS. You may also need to upgrade your version of GBS; versions of GBS earlier than 8.7 and 5.4.7 may be usable, but are not fully supported with v3.7. See Chapter 3 for details.

Keyfiles

Keyfiles for GemStone/S 64 Bit 3.6.x or earlier will not work with v3.7.

To acquire a keyfile for version 3.7, email keyfiles@gemtalksystems.com, or contact GemStone Technical Support, preferably providing your existing keyfile.

Keyfiles also manage access to GemConnect, GemBuilder for Java, and the X509-Secured GemStone feature. If you are using these add-on products, you must use a keyfile with the appropriate permissions.

Upgrade Procedure

The following list summarizes the steps necessary to perform the upgrade to GemStone/S 64 Bit v3.7.

NOTE
*The following instructions use the version number **3.6.6** to refer to the version you are upgrading from, and version number **3.7** indicate the target version you are upgrading to.*

Prior to Upgrade in existing application

1. Check for use of deprecated methods

Verify that your application does not invoke any methods that were deprecated in previous releases, by enabling error or logging on deprecation in your existing repository. Deprecated methods are subject to removal in major releases; finding them before upgrading allows the deprecation messages to provide replacement instructions.

For details on finding deprecated methods, refer to the *Programming Guide for GemStone/S 64 Bit*.

2. File out modifications to GemStone classes

File out any modifications or additions you made to GemStone/S 64 Bit kernel class methods. For more information about fileout, see the *GemStone/S 64 Bit Topaz Programming Environment*.

You will need to carefully compare these changes with GemStone/S 64 Bit 3.7 kernel methods, and refer to the *Release Notes* for version 3.7 to determine whether your changes are still necessary or appropriate.

CAUTION
Any changes that you have made to the GemStone/S 64 Bit kernel classes will be lost during upgrade; you MUST file these out in order to preserve the changes in version 3.7.

Prepare for Upgrade

1. Install and configure GemStone/S 64 Bit 3.7

Install GemStone/S 64 Bit 3.7 to a new installation directory, separate from the installation directory for version 3.6.6, as described in Chapter 1, starting on page 7.

Configure GemStone/S 64 Bit 3.7 the way you expect to use it — that is, with the appropriate extent locations and sizes.

If you copy the configuration files from your previous version to the version 3.7, be sure to review any changes in configuration parameters to determine if changes are needed.

You should ensure that adequate space is available for extents, transaction logs, and a backup during the upgrade. You must provide space for the extents and transaction logs for both repositories, the old and the new.

2. Reset SystemUser password

Log in to the version 3.6.6 system as a user with OtherPassword privilege, such as DataCurator, and reset the SystemUser password to 'swordfish':

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

The upgrade script logs in with the SystemUser account and the default password, and resets the password for DataCurator and GcUser.

3. Stop user activity

Log in to the version 3.6.6 system as a user with SessionAccess and SystemControl privileges, such as DataCurator, and halt all user activity on the repository.

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

4. Shut down the repository

You may now shut down the Stone. At the UNIX command line:

```
stopstone stone366
```

where *stone366* is the name of the version 3.6.6 stone on this machine. The repository must be cleanly shut down to avoid needing recovery when it is restarted with the new version's executables.

5. Set up the version 3.7 environment.

Set the environment variables required for the upgrade. For example:

```
export GEMSTONE=InstallDir37
export PATH=$GEMSTONE/bin:$PATH
export upgradeLogDir=tempDir
```

where *InstallDir37* is the GemStone/S 64 Bit version 3.7 installation and *tempDir* is a temporary directory for which you have write permission.

6. Copy extent files

Copy your version 3.6.6 extent files into the location specified by the v3.7 configuration file option DBF_EXTENT_NAMES:

a. Identify the complete set of extent files that are used by your 3.6.6 stone. This can be found by examining the configuration file for the version 3.6.6 repository, looking for the last entry for DBF_EXTENT_NAMES.

b.   The target location is the setting for DBF_EXTENT_NAMES in the version 3.7
     installation. Copy each of these extent files to the target location.

     For example:

> **cp** *dataDirFor366***/extent0.dbf** *dataDirFor37*
> **cp** *dataDirFor366***/extent1.dbf** *dataDirFor37*
> **cp** *dataDirFor366***/extent2.dbf** *dataDirFor37***/**

Before upgrading, ensure that there are no transaction logs from a previous version of
GemStone/S 64 Bit in any of the transaction log locations specified in the configuration
file that will be used by version 3.7.

Perform the Upgrade

1. Start the Stone

Start the 3.7 Stone on the 3.6.6 extents you just copied:

> **startstone** *stoneName37*

2. Upgrade image

Ensure you are in a directory to which you have write permission, and run the upgrade
script.

The upgrade is performed by the script upgradeImage. This script has optional
switches to specify the stone name and to set to size of the
GEM_TEMPOBJ_CACHE_SIZE used for the upgrade process.

upgradeImage [-h] [-c *cacheSize*] [-s *stoneName*]

-h prints this usage information.

-c *cacheSize* sets the size of the GEM_TEMPOBJ_CACHE_SIZE; if this is not used, the
     script will default to use a value of 100000.

-s *stoneName* sets the name of the running stone to upgrade; if this option is not used,
     the script will default to **gs64stone.**

For example,

> **upgradeImage** -s *stoneName37*

The script will prompt you to press the return key to begin.

The script invokes subordinate scripts to complete the upgrade. The upgrade process
will take some time. You can examine the progress, if desired, by examining the file
$upgradeLogDir/upgradeImage*.out.

The script should complete with the message:

Upgrade completed. No errors detected.

If not, please preserve the Stone log file and the contents of $upgradeLogDir.
Contact your internal GemStone support person or GemStone Technical Support.

3. Restore System Account passwords

Log in to GemStone/S 64 Bit version 3.7 as DataCurator or SystemUser, and change the password for SystemUser, DataCurator, and GcUser to a secure password, such as the passwords used for these accounts in v3.6.6. For example:

```
topaz 1> run
(AllUsers userWithId: 'SystemUser') password: '366Password'.
(AllUsers userWithId: 'GcUser') password: '366Password'.
(AllUsers userWithId: 'DataCurator') password: '366Password'.
System commitTransaction
%
```

where *366Password* is the account password used in version 3.6.6.

4. Recompile methods referencing instance of reimplemented class definitions

GsHostProcess and JsonParser have new implemenations in v3.7 that affect some applications.

GsHostProcess

If you have methods that encode a reference to the GsHostProcess class (and you have not recompiled these methods after a previous upgrade to 3.6.4 or later), these methods must be recompiled. After upgrade, the compiled method will refer to the class ObsoleteGsHostProcess, which does not support new GsHostProcess primitives.

Affected instances can be found using an expression such as:

```
(ClassOrganizer newExcludingGlobals) referencesToObject:
        (ObsoleteClasses at: #ObsoleteGsHostProcess)
```

This returns instances of GsNMethod. Once these have been examined, recompile can be done using an expression of the form:

```
aGsNMethod recompileFromSource
```

Note that this recompiles using the SymbolList of the current session, which may affect other class references in the method.

If you refer to the GsHostProcess class by name or symbol, the correct class will be found in the SymbolList, and no further action is needed.

JsonParser

The JsonParser class has been replaced in v3.7 with a non-PetitParser based implementation, which is smaller and faster. The basic `parse:` API is the same, but PetitParser-specific methods are not present in the new implementation.

If you are using JsonParser to simply parse JSON, you do not need to do anything. The methods reference the older class (now JsonPetitParser); if you want faster JSON parsing, you can recompile methods with class references. Affected instances can be found using an expression such as:

```
(ClassOrganizer newExcludingGlobals) referencesToObject:
      (Globals at: #JsonPetitParser)
```

If you are using JsonParser as part of a PetitParser customization, references to the class by name must be updated to refer to 'JsonPetitParser' instead of 'JsonParser'.

References from compiled methods to the class will continue to work, but it is recommended to edit the source code, so that a future recompile does not

inadvertently introduce a reference to the new implementation, or fail due to a reference to an inherited instance variable.

Post-upgrade Application Code Modifications

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

If you use GemConnect or GemBuilder for Java, you must reinstall the appropriate version of these products into your repository at this time.

To install, use the procedure in the *Installation Guide* for that product.

2. File in Kernel class changes

If you have modified any kernel class methods of the previous version or if you have added methods to kernel classes, carefully compare your changes with the changes in version 3.7 to see whether your changes are still necessary or appropriate. Carefully review the *Release Notes* for each intervening version, as well as examining code in the image. If the kernel class changes are still applicable, file in the changes, verify that errorcount is 0, and commit.

Make Backup

1. Make backup

At this point, you should create a full backup of the upgraded repository.

Configure GCI clients and GBS

1. Recompile User Actions

It is recommended to recompile and relink User Action libraries.

2. Configure GBS

If you are using GBS clients, ensure you are running a supported version of GBS and client Smalltalk. Versions of GBS earlier than 8.7 for VW and GBS 5.4.7 for VA may be usable but are not fully supported with GemStone/S 64 Bit v3.7.

Configure GBS to use the version 3.7 client libraries. Depending on the GBS version you are upgrading from, the required libraries, library naming conventions, and the process GBS uses to identify the correct library to load may have changed.

See Chapter 3, 'Configuring GBS for GemStone/S 64 Bit' for details. If your GBS clients run on a different platform than your GemStone server, refer to the *Installation Guide* for that platform.

3 Configuring GBS for GemStone/S 64 Bit

The GemStone/S 64 Bit v3.7 server requires a compatible version of GBS; versions of GBS earlier than 8.7 are not supported with GemStone/S 64 Bit v3.7 or later.

Versions of GemBuilder for Smalltalk (GBS) that are compatible with GemStone/S 64 Bit v3.7 do not support Smalltalk client applications running on AIX or Macintosh.

GemStone/S 64 Bit v3.7 supports client Smalltalk/GBS applications running with VisualWorks on Linux and Windows, and with VAST (VA Smalltalk) running on Windows. For a table of all supported GBS and client Smalltalk platforms, see the *GemStone/S 64 Bit Release Notes* for v3.7.

For instructions for updating GBS clients that are running on Linux, see the *GemStone/S 64 Bit Installation Guide* for that platform; for GBS clients running on Windows, see the *GemStone/S 64 Bit Windows Client Installation Guide*.