
GemStone®

GemBuilder® for Java Installation Guide

Version 3.2

December 2024



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PATENTS

GemStone software has been covered by U.S. Patent Number 6,256,637 “Transactional virtual machine architecture”, Patent Number 6,360,219 “Object queues with concurrent updating”, Patent Number 6,567,905 “Generational garbage collector with persistent object cache”, and Patent Number 6,681,226 “Selective pessimistic locking for a concurrently updateable database”.

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Preface

About This Documentation

This document provides instructions for installing GemBuilder® for Java™ version 3.2. You should read through this document before beginning installation or upgrade.

Please also read through the changes in this release, which are described in the *GemBuilder for Java Release Notes* for version 3.2.

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

Other Useful Documents

- ▶ The *Javadocs* that are provided with the GemBuilder for Java product distribution are a key source of up-to-date information on GemBuilder for Java functionality.
- ▶ *GemBuilder for Java Tools Guide* describes the independent set of tools that let you explore and modify Smalltalk code in the server.
- ▶ *GemBuilder for Java Programming Guide* describes how to develop java based applications that interface with a GemStone server.
- ▶ The *Programming Guide* for the GemStone server describes GemStone and the GemStone Smalltalk language.

If you will be acting as a system administrator, or developing software for someone else who must play this role, you should read the *System Administration Guide* for the GemStone server.

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 form.
- ▶ **Product download** for the current and selected recent versions of GemTalk software.
- ▶ **Bugnotes**, identifying performance issues or error conditions that you may encounter when using a GemTalk product.
- ▶ **TechTips**, providing information and instructions that are not in the documentation.
- ▶ **Compatibility matrices**, listing supported platforms for GemTalk product versions.

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

Help Requests

You may need to contact Technical Support directly, if your questions are not answered in the documentation or by other material on the Technical Support site. Technical Support is available to customers with current support contracts.

Requests for technical assistance may be submitted online, by email, or by telephone. We recommend you use telephone contact only for more serious requests that require immediate evaluation, such as a production system down. The support website is the preferred way to contact Technical Support.

Website: **techsupport.gemtalksystems.com**

Email: **techsupport@gemtalksystems.com**

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

When submitting a request, please include the following information:

- ▶ Your name and company name.
- ▶ The version of GemBuilder for Java, and all related GemTalk products, as well as the operating system and version you are using.
- ▶ A description of the problem or request.
- ▶ Exact error message(s) received, if any, including log files if appropriate.

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

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.



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Installing GemBuilder for Java

This Installation Guide describes how to install GemBuilder for Java (GBJ) into a GemStone Repository, or upgrade GBJ in a GemStone repository, and how to configure Java clients to log in to GemStone using GBJ.

This version of GemBuilder for Java supports only GemStone/S 64 Bit 3.7.2 and later, with server and clients on Linux only. 32-bit GemStone/S is not supported by GBJ 3.2.

For details on the changes in this version of GBJ, see the *GemBuilder for Java Release Notes* for version 3.2.

The GemBuilder for Java installation process includes installing the GBJ interface files into the GemStone repository, and configuring your system to allow a GBJ Java application to log into GemStone. You need only install the GBJ interface files into the server once for each release of GBJ or new GemStone repository, but each Java client must be configured for login.

This version of GBJ is provided with two environments:

- ▶ The standard GBJ environment uses the thread-safe GCI, and is RPC only. The thread-safe GCI provides robust multi-process support. Note that in the thread-safe GCI, linked logins, UserActions and client-side GsFile operations are not supported.
- ▶ To support linked logins, a single-session linked environment is available, which uses the classic GCI. Only a single linked session is supported. This provides a performance-optimized environment for specific use cases.

There are differences between the low level packages `com.gemstone.gbjgci` between the RPC and linked interfaces. However, using the `com.gemstone.gbj` package (which is recommended), and provided the application does not use unavailable features, the resulting java application will run correctly in both environments, provided that the correct login parameters are used.

System Requirements

GemBuilder for Java includes components that are part of both the GemStone server and the Java client. A supported GemStone server product and version, and a supported client platform, are required

GemStone Server

Product and Platform

GemBuilder for Java version 3.2 is compatible with GemStone/S 64 Bit versions 3.7.2 only, on 64-bit Linux only.

Server keyfile

Authorization for using GemBuilder for Java is provided by the GS/64 keyfile. You will need to have a keyfile that provides authorization for use with GemBuilder for Java in order to use GemBuilder for Java. If you require a keyfile, write to keyfiles@gemtalksystems.com, or contact GemTalk Technical Support.

GemBuilder for Java Client

Supported Platforms

GemBuilder for Java v3.2 clients are supported on 64-bit Linux only.

Server Shared Libraries

GBJ clients must have access to shared libraries that are linked for a specific version of GBJ and a specific version of the GemStone server. These shared libraries are distributed with the GemStone/S 64 Bit server.

Java JDK

A Java 8 development environment. This release was built and tested with Java Development Kit (JDK) version 1.8.0_102. Later versions of the JDK are expected to work.

Installing the GemBuilder for Java distribution

The following instructions describe installing GemBuilder for Java v3.2 server and java components onto your system.

1. Select an installation directory, *installdir*, and make this directory the current working directory.

We recommend installing GBJ at the same level as the GemStone server installation directory. You will need about 9 MB of free disk space.

2. GemBuilder for Java is provided as a zipped archive file, `GemBuilderJava3.2.0.zip`. Move this distribution file to the directory location in which GemBuilder for Java will be installed.

3. Unzip the distribution file using unzip.

InstallDir now contains a GemStone directory with a name similar to GemBuilderJava3.2.0. In the instructions that follow, we refer to this directory as *gbj_directory*.

gbj_directory includes the following:

version.txt

README.txt

gbj320.jar - the Java class library for the RPC/thread-safe environment.

gbjopensrc320.jar - class library with open source libraries used by the RPC/thread-safe GBJ tools.

gbjsource320.jar - additional class library to support debugging, used by the RPC/thread-safe environment.

gbjLnk320.jar - the Java class library for the linked environment.

gbjLnksource320.jar - additional class library to support debugging, for use with the linked environment.

doc - directory containing documentation for the RPC/thread-safe GBJ environment

index.html - the entry point for the online javadocs documentation

api - directory containing support files for the online javadocs documentation.

copyinfo.html - intellectual property ownership information

open_source_licenses.txt - licenses for open-source components.

sources.html - Further information and GemStone Technical Support

docLnk - directory containing documentation for the linked GBJ environment:

api - directory containing support files for the online javadocs documentation for the linked environment.

server - directory containing:

GbjFileinReader.gs

GbjGciInterface.gs

GbjHypericServerTemplate.xml

GbjHypericServiceTemplate.xml

GbjInstant.gs

GbjJmxCommandsTemplate.dat

GbjJmxSystemStatsTemplate.dat

GbjLocalDateTime.gs

GbjSupport.gs

GbjToolsInterface.gs

GbjUtilDate.gs

GbjZonedDateTime.gs

install.gs

Installing GBJ into your Repository

GemBuilder for Java has server components that must be installed into your GemStone repository. This process is the same if you are installing into a new repository, or upgrading from a repository containing a previous version of GBJ.

Environment Setup

GemBuilder for Java version 3.2 requires several environment variables to be set prior to installation to a server repository.

1. The \$GEMSTONE environment variable should be set to the GemStone server installation directory. This is described in the GemStone server documentation. For example:

```
os$ export GEMSTONE=GS64InstallDir/GemStone64Bit3.7.2-x86_64.Linux
```

2. Your path should include the path for the Gemstone Server executables, \$GEMSTONE/bin

```
os$ export PATH=$GEMSTONE/bin:$PATH
```

3. \$GBJ should be set to the GemBuilder for Java installation directory.

```
os$ export GBJ=gbj_directory
```

Prepare for installation

Before installing GBJ into the server repository for the first time, or upgrading an existing GBJ installation, verify the installation in a pilot environment. The server installation commits automatically. If the installation fails, you should correct the problem and re-run the installation.

GBJ 3.2 installation will report an error if the TimeZone configured in the server repository does not match the TimeZone configured in the OS, in `/etc/timezone`.

Install GBJ into server repository

1. Installation writes a log file to the current working directory. You must `cd` to a working directory in which you have write permission.
2. Start topaz using the `-l -i` options, which starts a linked topaz that does not read a topaz initialization file.
3. Log in to the GemStone server as SystemUser.
4. Input the installation script, `$GBJ/server/install.gs`, which files in the server components. For example:

```
topaz 1> input $GBJ/server/install.gs
```

During the filein operation, output is directed to the file `installGbj.out` in the current directory.

The filein operation should end with a message that the errorcount is 0. If errorcount is not 0, errors have occurred. Contact GemStone Technical Support, providing the file `installGbj.out` as well as details about the installation process.

The installation script performs the commit, so you do not need to commit.

5. Exit Topaz:

```
topaz 1> quit
```

Your GemStone server is now ready for use by GemBuilder for Java clients.

Client setup for RPC environment

Preliminaries

Ensure that your GemStone server has successfully installed GBJ, and that the Stone and NetLDI are running.

Required Files

1. JDK environment

You must have a java environment on the client.

2. Server shared libraries

If you are running the GBJ client on the same machine as the GemStone server, or if you install the GemStone server distribution on the client node, you may use this environment for the required server shared libraries.

Otherwise, you must have an directory accessible from the client, containing the required server shared libraries listed in Table 1.

Table 1 Client Shared Libraries for GemStone/S 64 Bit v3.7.2

	Linux
GBJ v3.2, RPC	libgbjts320-3.7.2-64.so libgcits3.7.2-64.so libkrb5-3.7.2-64.so libssl-3.7.2-64.so

3. GBJ jar files

If you are running the GBJ client on the same machine as the server, use the existing location configured in the *gbjInstallDir*.

If the GBJ client is on a different machine, copy the following files to the client node:

```
gbj320.jar
gbjopensrc320.jar. (if you are using GbjTools)
```

You should also copy *gbjInstallDir/docs/* to the client node. The javadocs provide important documentation for GBJ functions.

The directory containing the GBJ jar files accessible to the client will be referred to as *gbj_jar_dir*.

4. Third-party jar file

To support the java BigFraction class, the Apache Commons Math 3.6.1 library jar file `commons-math-3.6.1.jar` must be accessible.

This library can be downloaded from the Apache Commons site at:

https://commons.apache.org/proper/commons-math/download_math.cgi

Environment Setup

\$PATH

The Java executable directory should be on your path.

\$GEMSTONE

GemBuilder for Java version 3.2 does not require that `$GEMSTONE` be defined, provided that the server shared libraries are available and the server version can be determined.

If `$GEMSTONE` is defined, it must include the file `version.txt`, and the required shared libraries must be in `$GEMSTONE/lib`.

If `$GEMSTONE` is not defined, you must include `-Dgemstone.version=3.7.2` on the java command line, and either define `LD_LIBRARY_PATH` or the java command line `-Djava.library.path=` argument, to include a directory containing the required server shared libraries as listed in Table 1.

\$LD_LIBRARY_PATH

GemBuilder for Java version 3.2 does not require that `$LD_LIBRARY_PATH` be defined.

If `$GEMSTONE` is defined, `$LD_LIBRARY_PATH` and `-Djava.library.path=` are ignored.

Otherwise, if `$LD_LIBRARY_PATH` is defined, it must include a directory containing the required server shared libraries as listed in Table 1.

If neither `$GEMSTONE` nor `$LD_LIBRARY_PATH` are defined, you must include `-Djava.library.path=` on the java command line as well as `-Dgemstone.version=3.7.2`.

\$CLASSPATH

You may specify the java CLASSPATH either by defining the environment variable `$CLASSPATH`, or using the java command line argument `-cp`.

The CLASSPATH must include the GBJ class library, `gbj320.jar`, and the third-party (Apache) jar file `commons-math3-3.6.1.jar`. This contains Apache's BigFraction class is used to support GemStone server Fractions.

If you are using the GbjTools, you will also need to include the open source library `gbjopensrc320.jar`, which contains the Kunststoff graphic support.

For example:

```
os$ export CLASSPATH=
  gbj_jar_dir/gbj320.jar:gbj_jar_dir/gbjopensrc320.jar:apacheInstallDir/3.6
  .1/commons-math3-3.6.1/commons-math3-3.6.1.jar
```

Testing RPC login using Test.java

The GBJ distribution includes a simple java application that allows you to test your GBJ configuration.

1. Copy Test.java to a writable directory.

Find or create a directory to hold your source and class files. These instructions will call this *gbj_dev*.

```
os$ cp $GBJ/doc/Test.java gbj_dev
os$ chmod 755 gbj_dev/Test.java
```

2. Edit Test.java to specify the login parameters

Edit *gbj_dev/Test.java* to specify the appropriate Stone name and other login parameters.

To login to a remote Stone, add a line specifying the gem service:

```
p.gemnetName = "!@hostname!netldiName!gemnetobject";
```

3. Compile and execute

Ensure your `$CLASSPATH` includes the *gbj_dev* directory as well as the correct .jar files, and that `$GEMSTONE` is defined, as described in previous sections.

```
os$ javac Test.java
os$ java Test
```

Client setup for Linked environment

Preliminaries

Ensure that your GemStone server has successfully installed GBJ, and that the Stone and NetLDI (for remote configurations) are running.

Required Files

1. JDK environment

You must have java environment on the client.

2. Server shared libraries

If you are running the GBJ client on the same machine as the GemStone server, or if you install the GemStone server distribution on the client node, you may use this environment for the required server shared libraries.

If you are running on a machine remote from the Stone, you must have a full GemStone installation on the client node, since it will need to start a remote cache and page server; you must have a NetLDI running on the client as well as on the server.

3. GBJ jar files

If you are running the GBJ client on the same machine as the server, use the existing location configured in the *gbjInstallDir*.

If the GBJ client is on a different machine, copy the following file to the client node:

```
gbjLnk320.jar
```

You should also copy *gbjInstallDir/docsLnk/* to the client node. The javadocs provide important documentation for GBJ functions.

The directory containing the GBJ jar files accessible to the client will be referred to as *gbj_jar_dir*.

4. Third-party jar file

To support the java BigFraction class, the Apache Commons Math 3.6.1 library jar file *commons-math-3.6.1.jar* must be accessible.

This library can be downloaded from the Apache Commons site at:

https://commons.apache.org/proper/commons-math/download_math.cgi

Environment Setup

\$PATH

The Java executable directory should be on your path.

\$GEMSTONE

In the linked environment, you must have \$GEMSTONE defined to point to a full GemStone distribution installation.

\$LD_LIBRARY_PATH

Since \$GEMSTONE is defined, \$LD_LIBRARY_PATH and **-Djava.library.path=** are ignored.

\$CLASSPATH

You may specify the java CLASSPATH either by defining the environment variable \$CLASSPATH, or using the java command line argument **-cp**.

The CLASSPATH must include the GBJ class library, *gbjLnk320.jar*, and the third-party (Apache) jar file *commons-math3-3.6.1.jar*. This contains Apache's BigFraction class is used to support GemStone server Fractions.

Additional Requirement

When using the linked environment, the default java stack size is insufficient. You should include the java argument to increase this value, e.g. **-Xss2048k**.

Testing linked login using Test.java

The GBJ distribution includes a simple java application that allows you to test your GBJ configuration.

1. Copy Test.java to a writable directory.

Find or create a directory to hold your source and class files. These instructions will call this *gbj_dev*.

```
os$ cp $GBJ/doc/Test.java gbj_dev
os$ chmod 755 gbj_dev/Test.java
```

2. Edit Test.java to specify the login parameters

Edit *gbj_dev/Test.java* to specify the appropriate Stone name and other login parameters.

To login using the linked environment, you must add the line:

```
p.gemnetName = "gcilnkobj";
```

3. Compile and execute

Ensure your `$CLASSPATH` includes the *gbj_dev* directory as well as the correct `.jar` files, and that `$GEMSTONE` is defined, as described in the previous section.

```
os$ javac Test.java
os$ java Test
```

Logging into GemStone using the GBJ Launcher

The GBJ Launcher provides a simple GUI tool that allows you to specify the name and location of the GemStone server and the other parameters that control an RPC login.

You cannot login using the linked environment to the GbjLauncher.

To log in to GemStone, you must have the GemStone server and a NetLDI running on the GemStone server machine, and be otherwise configured to allow login.

4. Invoke the GBJ Tools Launcher.

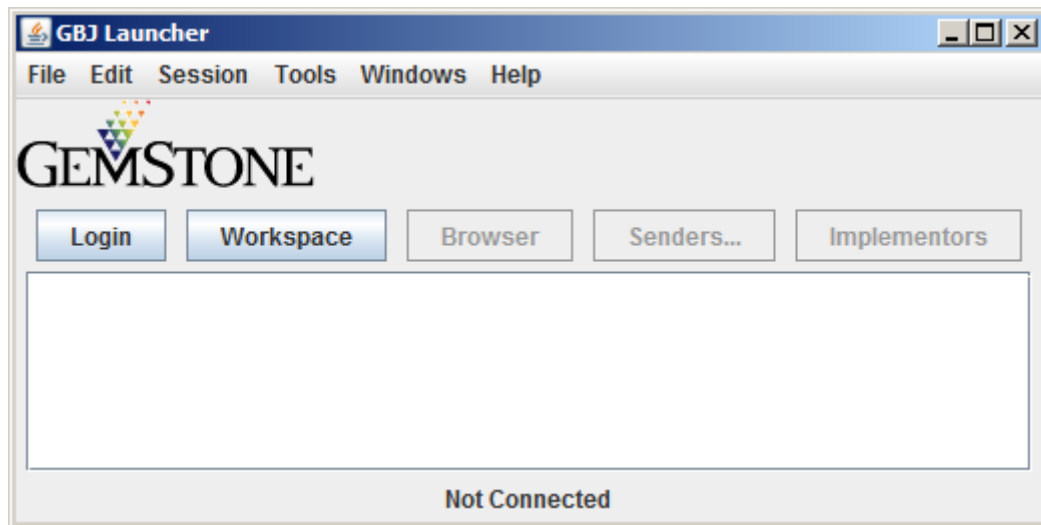
If you have defined `$GEMSTONE` and `$CLASSPATH`, you may open the Launcher simply using:

```
os$ java com.gemstone.tools.GbjLauncher
```

`com.gemstone.tools.GbjLauncher` contains the GBJ Launcher; this tool supports the following options on the command line:

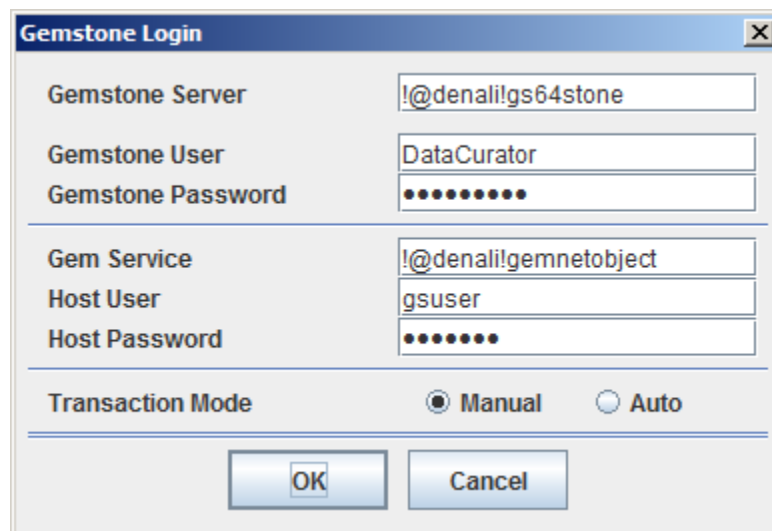
- ▶ `help` – print a help message (to standard output)
- ▶ `version` – print GBJ version information
- ▶ `UseLogFile filename` – write log output to the specified file
- ▶ `NoFileLogger` – send log output to standard output rather than to a file
- ▶ `UsePrefFile filename` – use the specified file for the preferences file
- ▶ `NoPrefFile` – do not load or save a preferences file

This GBJ Tools Launcher window:



5. Enter Login Parameters

In the Tools Launcher, click **Login** to begin a session. A Session Parameters Dialog appears, prompting you for the session parameters.



Gemstone Server	!@denali!gs64stone
Gemstone User	DataCurator
Gemstone Password	••••••••
Gem Service	!@denali!gemnetobject
Host User	gsuser
Host Password	••••••
Transaction Mode	<input checked="" type="radio"/> Manual <input type="radio"/> Auto

OK Cancel

Fill in the session parameters, as described in Table 2. More detail on the specific details for configuring login parameters can be found in the *GemStone/S System Administration Guide*.

Table 2 Session Parameters

Parameter	Description
GemStone Server	(Required.) The name of the Stone process. For a Stone running on a remote server, this may include the Network Resource String (NRS), although this is only needed if the gem service is not on the same machine as the stone. For more information on NRS and distributed configurations, see the <i>System Administration Guide</i> for your GemStone server.
GemStone User	(Required) Your GemStone username, such as DataCurator.
GemStone Password	(Required) Your GemStone password.
Gem Service	The default is gemnetobject , which is not shown; if you are running with the default NetLDI on the same machine as the Stone, you may leave this unchanged. Otherwise, include the appropriate information in NRS format. For example, with the Stone example above, you would specify this NRS string for the Gem Service: ! @denali!gemnetobject
Host User	The username for your account on this machine. Host authentication may be omitted if you are using another method of network authentication, such as running the NetLDI in guest mode. See the <i>System Administration Guide</i> for your GemStone server for more information on the options.
Host Password	The password for your unix account, if host authentication is required.
Transaction Mode	One of the following: Auto – Places your session in a GemStone transaction and starts a new one each time you commit or abort. Manual – You must explicitly begin transactions before making changes that you want to commit.

6. Click Ok to log in

When the session parameters are correct, click **Ok**.

A successful login results in the event being recorded in the Launcher's Text Pane, which serves as a transcript. Additional buttons are activated, and the **Login** button becomes **Logout**.

After you have successfully logged in to the GemStone server, you have verified that your GemBuilder installation is correct.

If the login attempt did not complete or if login fails, the console will contain log messages with java error details.

If this is not sufficient to determine the problem, you can configure more complete error messages by setting full logging. To do this, execute:

```
os$ java com.gemstone.gbjgci.GbjGciPreferences set  
    GBJ.LogLevel ALL
```

For more information on login parameters and on using the GBJ tools available from the GBJ Launcher, see the *GemBuilder for Java Programming Guide* and the *GemBuilder for Java Tools Guide*.