
GemStone®

GemStone/S 64 Bit™

Release Notes

Version 3.2.2

August 2014



GEMTALK™
SYSTEMS

GEMSTONE S™ 64
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PATENTS

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

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About This Documentation

These release notes describe changes in the GemStone/S 64 Bit™ version 3.2.2 release. Read these release notes carefully before you begin installation, conversion testing, or development with this release.

No separate Installation Guide is provided with this release. For instructions on installing GemStone/S 64 Bit version 3.2.2, or upgrading or converting from previous products or versions, see the Installation Guide for version 3.2.

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

Terminology Conventions

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

Technical Support

Support Website

<http://gemtalksystems.com/techsupport>

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

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

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

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

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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: <http://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 versions of GemStone/S 64 Bit and of all related GemTalk products, and of any other related products, such as client Smalltalk products.
- ▶ The operating system and version you are using.
- ▶ A description of the problem or request.
- ▶ Exact error message(s) received, if any, including log files if appropriate.

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GemStone/S 64 Bit 3.2.2 Release Notes

Overview

GemStone/S 64 Bit 3.2.2 is a new version of the GemStone/S 64 Bit object server. This release fixes a number of bugs in v3.2.1, and adds some new features. We recommend everyone using or planning to use GemStone/S 64 Bit v3.2.x upgrade to this new version.

These release notes provide changes between the previous version of GemStone/S 64 Bit, version 3.2.1, and version 3.2.2. If you are upgrading from a version prior to 3.2.1, review the release notes for each intermediate release to see the full set of changes. In particular, if you are upgrading from version 2.4.x, note that there were substantial changes in v3.0 that impact your application.

No separate Installation Guide is provided with this release. For installation instructions, use the Installation Guide for version 3.2.

Note that the Linux Installation Guide does not mention SUSE. SUSE 11, service pack 3, is now supported for v3.2 and later. Configuration information is the same as for the other Linux platforms. Support for Red Hat ES Linux v6.4 has also been added in this release.

Supported Platforms

Platforms for Version 3.2.2

GemStone/S 64 Bit version 3.2.2 is supported on the following platforms:

- ▶ Solaris 10 and 11 on SPARC
- ▶ Solaris 10 on x86
- ▶ AIX 6.1, TL1, SP1, and AIX 7.1
- ▶ Red Hat Linux ES 6.1 and 6.4, Ubuntu 10.04 and 12.04, and SuSE 11 SP3, on x86
- ▶ Mac OSX 10.6.8 (Snow Leopard), with Darwin 10.8.0 kernel, on x86

For more information and detailed requirements for each supported platforms, please refer to the GemStone/S 64 Bit v3.2 Installation Guide for that platform.

GBS Versions

The following version of GBS is supported with GemStone/S 64 Bit version 3.2.2. You must use GBS version 7.6.1 or later for VisualWorks, or 5.4.2 or later for VA Smalltalk, with GemStone/S 64 Bit v3.2.2.

GBS version 7.6.1

VisualWorks 7.10.1 32-bit	VisualWorks 7.10.1 64-bit	VisualWorks 7.9.1 32-bit
<ul style="list-style-type: none"> ▶ Windows 8, Windows 2008 R2 and Windows 7 ▶ Solaris 10 on SPARC ▶ Ubuntu 10.04, RedHat Linux ES 6.1 and 6.4, and SUSE Linux ES 11 SP3 	<ul style="list-style-type: none"> ▶ Windows 8, Windows 2008 R2 and Windows 7 ▶ Solaris 10 on SPARC ▶ Ubuntu 10.04, RedHat Linux ES 6.1 and 6.4, and SUSE Linux ES 11 SP3 	<ul style="list-style-type: none"> ▶ Windows 2008 R2 and Windows 7 ▶ Solaris 10 on SPARC ▶ Ubuntu 10.04, RedHat Linux ES 6.1, and SUSE Linux ES 11 SP3

GBS version 5.4.2

VA Smalltalk 8.6	VA Smalltalk 8.5.2
<ul style="list-style-type: none"> ▶ Windows 8, Professional or above ▶ Windows 2008 R2 ▶ Windows 7, Professional or above 	<ul style="list-style-type: none"> ▶ Windows 2008 R2 ▶ Windows 7

For more details on supported GBS and client Smalltalk platforms and requirements, see the *GemBuilder for Smalltalk Installation Guide* for that version of GBS.

Web/Community Edition license distribution on non-GLASS platforms

The GLASS/Seaside open source project and the Web Edition/Community Edition licenses are only supported for Linux and Macintosh. The free license distributed under the \$GEMSTONE/seaside directory is no longer included with the AIX and Solaris distributions.

Changes in this Release

Updated SSL libraries

OpenSSL has released a security advisory, and the version of OpenSSL used by GemStone/S 64 Bit v3.2.2 has accordingly been updated to 1.0.1i.

Faster Gem to Stone communications

To improve performance on heavily loaded systems, there is a new design for Gem to Stone communication, using a spin lock in addition to the semaphore.

The configuration parameter `STN_SMC_SPIN_LOCK_COUNT` has been added to support this feature. Using this with a value of 0 results in behavior similar to previous releases.

STN_SMC_SPIN_LOCK_COUNT

Specifies the number of times a process (gem or page server) waiting for a response from the stone will check a variable in shared memory before sleeping on a semaphore. Higher values can lead to higher throughput on performance-intensive systems at the expense of higher CPU consumption.

Setting this value to 0 disables this feature, which causes the client process to always wait on the semaphore without checking the variable in shared memory.

Runtime equivalent: `#StnSmcSpinLockCount`

Cache Statistic: `StnSmcSpinLockCount`

Min: 0

Max: 10000000

Default: 5000

New statistics have been added to monitor this feature:

ResponsesSentEarly (Stone)

Number of times the stone was able to send a response to the client gem or page server without using the semaphore.

ResponsesSentNormal (Stone)

Number of times the stone sent a response to the client gem or page server using the semaphore.

StnSmcSpinLockCount (Stone)

Current value of the `STN_SMC_SPIN_LOCK_COUNT` stone configuration parameter.

StnMessagesNoWakeUpCount (Stone)

Number of requests sent to the stone when the stone was already awake.

StnMessagesNeedWakeUpCount (Stone)

Number of requests sent to the stone when the stone was sleeping and was awoken.

Login User Id

In previous releases, the gem log headers and other tracking reported the Real User Id and the Effective User Id. These distinguish between the Gem process user when the gem was spawned by a netldi running as root.

For audit purposes, it is also useful to track the login user id, which is the original id of the user that logged in. This allows the original user to be determined even when sudo or su are used.

If the system is unable to determine a login user id, then -1 is reported; on Windows, 0 is always reported.

To get the login user id, on linux, /proc/pid/loginuid is checked, then getlogin_r(). The login process also now sets an environment variable GS_LOGIN_NAME, which is used if the above options fail.

Process log headers

The login user id is now included in the log file headers. For example:

```
| USER IDS: REAL=gsadmin (300) EFFECTIVE=gsadmin (300) LOGIN=gsadmin (300)
```

Login Log file

The login user name is now also included in the login log, as the last space-delimited field on each line.

Programmatic access to all User Ids

The following methods have been added to get the real, effective, and login user id for the currently gem process.

System >> realUserId

Returns a SmallInteger indicating the real user ID of the gem process.

System >> realUserIdName

Returns a String indicating the real user ID of the gem process.

System class >> effectiveUserId

Returns a SmallInteger indicating the effective user ID of the gem process.

System class >> effectiveUserIdName

Returns a String indicating the effective user ID of the gem process.

System class >> loginUserId

Returns a SmallInteger indicating the login user ID of the gem process. The login user ID is the user ID the owner of the session used to log in to the host system.

Returns -1 if the login user ID could not be determined or if the host system does not support this feature.

System class >> loginUserIdName

Returns a String indicating the login user ID of the gem process. The login user ID is the user ID the owner of the session used to log in to the host system. Returns 'unknown user' if the login user ID could not be determined or if the host system does not support this feature.

System class >> hostname

Return a String which is the name of the host on which the session is running.

Ability to search tranlogs by UNIX user name

searchlogs.sh and printlogs.sh now accept additional arguments:

```
luid      <integer> - filter by gem's login user ID
luidstr   <string>  - filter by gem's login user name
```

Enhancements to login log feature

The ability to log logins and logouts to a separate text file was introduced in v6.6.4. There are a number of enhancements to this feature in version 3.2.2.

Login log now includes user information

As noted under “Login User Id”, the login log now includes an additional entry for the login user id.

Login log file now has limited permissions

The permission for the login log file are now 600, to reflect its nature as a security audit feature. (#44392)

New feature to specify directory for login log file.

The directory for the login log file, by default, is placed in the same directory as the stone log. Now another location can be specified using a new configuration parameter.

STN_LOGIN_LOG_DIR

Specifies a directory where the login log is located when the STN_LOGIN_LOG_ENABLED option is set to TRUE. Otherwise this option is ignored. If STN_LOGIN_LOG_DIR is not specified and STN_LOGIN_LOG_ENABLED is set to TRUE, then the login log will be placed in the same directory as the stone log.

It is a fatal Stone error if the directory specified is not writable by the Stone process.

Min: 0 entries

Max: 1 entry

Default: NONE

Increase in maximum number of sessions

The hard upper limit on the number of sessions has been increased from 10000 to 32767. Larger values are permitted for the configuration parameter STN_MAX_SESSIONS, provided your keyfile limits do not restrict the number of users.

Note that this is an internal hard limit; the ability to log in a very large number of sessions to a stone depends on your configuration and available system resources.

Cleanup of zombie sessions

Zombie sessions are sessions in which an OS process does not exist, but resources within GemStone are still held, such that the system is impacted. While the occurrence of session in this state is a bug, there still may exist unknown pathways to enter this state; the following methods have been added to allow systems to clean up such zombie sessions without restarting the stone.

System class >> allZombieSessions

Returns a list of session IDs that are partially logged out and are in the process of being disposed by the stone. These zombie sessions may or may not reference a commit record.

System class >> allZombieSessionsRefOldestCr

Returns a list of session IDs that are partially logged out and are in the process of being disposed by the stone, which also reference the oldest commit record.

System class >> stopZombieSession: aSessionId

Forces the stone to finish logout processing for the given session ID. Takes no action if the given session has not begun the logout process or if the session no longer exists. When logout processing is completed, references to a commit record by that session are released and resources consumed by the session are recycled.

Returns true if the action was successful and the stone acted on the specified session. A message will be written to the stone log in this case. Returns false if no action was taken. No message is added to the stone log when false is returned.

WARNING: This method bypasses certain internal mechanisms which prevent the immediate termination of active sessions, and therefore should only be used if the oldest CR session(s) could not be stopped by any other mechanisms.

Added methods to manage commit record backlog

The following methods have been added to help diagnose and manage commit record backlogs:

System class >> terminateAllSessionsReferencingOldestCr

Causes the stone to take the following actions:

- 1 - send a stopSession: to all sessions referencing the oldest commit record.
- 2 - forces all sessions referencing the oldest commit record to logout.
- 3 - forces all references to the oldest commit record to be released.
- 4 - disposes all commit records eligible for disposal.

Does not terminate the current session, even if it references the oldest commit record. Has no effect if there is only one commit record present.

WARNING: This method bypasses certain internal mechanisms which prevent the immediate termination of active sessions, and therefore should only be used if the oldest CR session(s) could not be stopped by any other mechanisms. The method System class >> stopAllSessionsReferencingOldestCr should be attempted before this one. Usage of this method when one or more session referencing the oldest CR is active may cause cache coherency errors.

Returns a SmallInteger indicating the number of commit records disposed.

System class >> stopAllSessionsReferencingOldestCr

Causes the stone to take the following actions:

- 1 - send a stopSession: to all sessions referencing the oldest commit record.
- 2 - forces all sessions referencing the oldest commit record to logout.
- 3 - disposes all commit records eligible for disposal.

Does not stop the current session, even if it references the oldest commit record. Has no effect if there is only one commit record present. Does not force the immediate disposal of the oldest commit record. Returns a SmallInteger indicating the number of commit records disposed.

System class >> oldestCommitRecordAge

Return a SmallInteger representing the age of the oldest commit record in seconds. This value represents the elapsed time since the commit that created the oldest commit record occurred.

Added cache statistics related to commit record backlog

CommitRecordReleases (Stone)

The number of times stone has released a session's reference to a commit record due to an abnormal event. Routine events that cause commit records to be released such as commit, abort, and logout are not included in this statistic. See the `LastCommitRecordReleaseReasonCode` statistic to determine the cause of the last commit record release.

LastCommitRecordReleaseReasonCode (Stone)

A code indicating the reason of the last commit record release by stone as follows:

- 1 - Lost OT root
- 2 - Logout processing when the logout was not requested.
- 3 - System terminateAllSessionsReferencingOldestCr method.
- 4 - System stopZombieSession method.

LastCommitRecordReleaseSessionId (Stone)

The session ID of the last session for which the stone released the sessions commit record reference due to an abnormal event.

Added cache statistics to track SIGTERMs

The following cache statistics have been added:

LastSigTermGemSessionId (Stone)

The session ID of the last local session for which the stone sent a SIGTERM signal to the gem process.

LastSigTermGemPid (Stone)

The process ID of the last local session to which the stone sent a SIGTERM signal to the gem process.

LastSigTermPageServerSessionId (Stone)

The session ID of the last remote session for which the stone sent a SIGTERM signal to the page server process.

LastSigTermPgsvrPid (Stone)

The process ID of the last remote session to which the stone sent a SIGTERM signal to the page server process.

TotalSigTermsSentToGems (Stone)

Total number of times a SIGTERM signal was sent to a gem process.

TotalSigTermsSentToPageServers (Stone)

Total number of times the stone has sent a SIGTERM signal to a page server process.

Bugs Fixed

The following bugs have been fixed in this release.

Possible corruption with tranlogs configured to /dev/null

When tranlogs are configured to write to /dev/null, there is a race condition that can cause repository corruption. (#44504)

Reclaim Gem threads may hang

It is possible for threads within the Reclaim Gem to hang during commit processing. Since the commit does not complete, it leads to a commit record backlog. (#44454)

Process handling issues

ProcessScheduler problems with committed instances of GsSocket, Delay, and GsProcess

Instances of GsSocket, Delay and GsProcess can be committed. If a committed instance is used by the ProcessScheduler, and changes were committed in other sessions, an abort may have resulted in changes in instance variable values which could cause problems with the ProcessScheduler. (#44358)

Now, when a session aborts, committed instances of GsSocket, Delay and GsProcess do not update instance variables with changes from other sessions, nor are any changes in the variables rolled back. Objects referenced by instance variables, however, follow normal transaction semantics.

GsProcess printString errors after termination

A terminated GsProcess signalled a does not understand error from printString. (#44440)

GsFile operation in ensure: block may hang

When the code in an ensure: block includes GsFile operations, sending terminate to the GsProcess may cause the process to hang. (#44349)

Timeout on a socket read leaves GsProcess in a non-debuggable state

If there is no data on a socket such that a wait to read times out, further stepping or debugging will encounter an improper operation, the GsProcess is not in a debuggable state. (#44336)

Session terminate issues

stopSession: ignored when target waiting on a Delay

A session waiting on a delay was unresponsive to stopSession:. (#44346)

System gems were not forcibly terminated

When a session logged in as SystemUser or DataCurator was sent a stopSession: or terminateSession:timeout: message, the stop signal was sent. However, no further action to forcibly logout or send SIGTERM was taken. (#44337)

On SIGTERM, processes returned exit code 0

When topaz or another GemStone process was terminated with SIGTERM, it previously returned exit code 0. Now, SIGTERM causes process to return exit code 5 (HOST_EXIT_SIGTERM). (#44486)

This does not apply to logsender and receiver, which use SIGTERM for some normal terminations.

QuadByteString and QuadByteSymbol encoded incorrectly in indexes

The encoding for QuadByteString and QuadByteSymbol in indexes was incorrect for indexes created in v3.2 or upgraded to 3.2. (#44383)

If you have any collections in a version 3.2 or 3.2.1 repository that have indexes that may include QuadByteStrings or QuadByteSymbols, these indexes are incorrect. You should drop and rebuild these indexes.

Issues with Unicode indexes in GLASS/seaside environment

An error in session initialization in the GLASS environment resulted in errors adding to Unicode indexes. (#44439)

Changes in log messages

Missing timestamps in some log files

Some entries in the NetLDI, GcGem, and Stone logs did not have timestamps. (#44328)

Excessive logging of SIGTERMs

When a stopSession goes to a gem that is blocked (for example, in a user action), a SIGTERM is sent to the gem each second until timeout; each SIGTERM results in a message in the log. Now, SIGTERM logging is limited to once in 60 seconds. (#44338)

Excessive Linked login warnings removed

The stone log previously logged a warning after each 200 linked GBS logins. This warning is now printed for the first linked GBS login since stone startup, and thereafter once during each stone startup. (#44404)

Incorrect warning message in postconv for SortedCollections

After 2.x to 3.x conversion, the postconv script updates existing SortedCollections. If any SortedCollections could not be converted, the script provides instructions on reading in this data; these instructions referenced an incorrect method. (#44482)

Multithreaded operations may error on programmatic add of new extent file

When a new extent was added dynamically, slave threads of multithreaded repository operations may not have had their list of extents updated, resulting in errors. (#44378)

FFI primitives may SEGV with invalid argument

The Foreign Function Interface (FFI) did not check for special OOPs in some places; this could result in a SEGV. (#44457)

GsSocket >> isConnected signalling error

The methods GsSocket >> isConnected, peerAddress, and peerPort signalled a SocketError if an error occurred, rather than returning nil as documented.

In addition, rather than signalling or returning nil, GsSocket >> isConnected now returns false on error. (#44411)

StnLoopsSinceSleep cache statistic always zero

This cache statistic was not incremented and was always zero. (#44189)

Linux disk statistic WaitMs incorrect

The statistic WaitMs for Linux disks was computed incorrectly by statmonitor code. (#44505)

copydbf of compressed tranlogs may error/produce incorrect copies

Using copydbf to copy a tranlog that was compressed using gzip or produced by copydbf -C may error, or produce a truncated result file. (#44153)

Mid-level cache related issues

Session starting a mid-level cache may hang on cache startup error

In certain configurations, if the netldi fails to create a mid-level cache, the gem that is attempting to use that mid-level cache may hang, rather than timeout and error. (#44413)

Mid-level cache timeout hardcoded at 30 seconds

When starting up a mid-level cache, the timeout is fixed at 30 seconds. On heavily loaded networks, or with very large mid-level caches, this may not be sufficient time for the startup to complete. Now, this is controlled by the configuration parameter STN_REMOTE_CACHE_PGSRV_TIMEOUT; the timeout is set at 30 seconds, or the value of this setting in the stone's configuration, whichever is larger. (#44414)

LostOT not handled correctly for gems using mid-level cache

Due to changes in the architecture of systems using mid-level caches, lostOTs were not propagated correctly for gems using mid-level caches; the page server's process table slot should be, but was not, being "poisoned" to prevent it from accessing the cache. This potentially allowed cache access, which could result in page cache faults. (#44468)

Hot standby issues

A number of issues have been fixed in hot standby.

After a slave stone was shutdown, the logsender would stop transmitting records to the logreceiver. (#44320)

If the logsender was not connected to the master stone, there was a window when the master stone switched to a new log. Tranlog records written at the end of the previous log could be missed. (#44320)

The logsender could encounter problems in determining the correct position to perform reads, and transmit incorrect data to the logreceiver. (#444960)

LargeIntegers may not be invariant

It was possible to create LargeIntegers that were not invariant. (#44396)

Object audit could report false positives during reclaim dead

While dead were being reclaimed, it was possible for a race condition between the reclaim and objectAudit scans to miss valid objects that were shadowed, and report references to objects that do not exist. (#43745)

Object audit errors on failed backup

A failed backup attempt while objectAudit is running may report audit errors, even though the repository is correct. (#43644)

Reclaim Gem crash on sudden increase in oopNumHighWaterMark

A very large increase in the oopNumHighWaterMark between commits by the Reclaim Gem could cause the Reclaim Gem to crash. (#44351)

Race condition after restore from backup could cause tranlog restore to fail

After restoreFromBackup, the Reclaim Gem is restarted to handle dead reclaim in restore of transaction logs. There was a race condition in which the Reclaim Gem failed to start; restore would have failed with the error "Waited too long to reclaim dead". (#44417)