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# **GemStone/S 64 Bit<sup>TM</sup>** **Release Notes**

**Version 3.3.7**

July 2018



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## PATENTS

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

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# Preface

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## About This Documentation

These release notes describe changes in the GemStone/S 64 Bit™ version 3.3.7 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 3.3.7, or upgrading or converting from previous products or versions, see the Installation Guide for version 3.3.5.

For questions or to submit feedback on this manual, join the documentation mailing list: <http://lists.gemtalksystems.com/mailman/listinfo/documentation>.

## 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 LLC, previously GemStone Systems, Inc. and a division of VMware, Inc.

## Technical Support

### Support Website

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

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

- ▶ **Documentation** for the current and for previous released versions of all GemTalk products, in PDF form.

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

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

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

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

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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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# GemStone/S 64 Bit

## 3.3.7 Release Notes

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### Overview

GemStone/S 64 Bit™ 3.3.7 is a new version of the GemStone/S 64 Bit object server. This release adds several new features and fixes a number of bugs.

These release notes describe changes between the previous version of GemStone/S 64 Bit, version 3.3.6, and version 3.3.7. If you are upgrading from a version prior to 3.3.6, review the release notes for each intermediate release to see the full set of changes.

The Installation Guide has not been updated for this release. For installation, upgrade and conversion instructions, use the Installation Guide for version 3.3.5.

### Supported Platforms

#### Platforms for Version 3.3.7

GemStone/S 64 Bit version 3.3.7 is supported on the following platforms:

- ▶ Solaris 10 and 11.3 on x86
- ▶ AIX 6.1 on POWER6 and POWER7 and AIX 7.1 on POWER8
- ▶ Red Hat Enterprise Linux Server 6.4, 6.9, 7.1, and 7.4; Ubuntu 14.04 and 16.04; and SUSE Linux Enterprise 12, all on x86
- ▶ OS X 10.11.2 (El Capitan) with Darwin 15.2.0 kernel, and OS X 10.13.2 (High Sierra) with Darwin 17.3.0 kernel, on x86 (Mac is supported for development only)

Supported Windows client platforms are

- ▶ Windows 7, Windows 2008 R2, Windows 8, and Windows 10

Note that (deprecated) Solaris/SPARC distributions are available for development and debugging only. Solaris on x86 continues to be fully supported.

For more information and detailed requirements for each supported platforms, please refer to the GemStone/S 64 Bit v3.3.5 Installation Guide for that platform.

## GemBuilder for Smalltalk (GBS) Versions

The following versions of GBS are certified with GemStone/S 64 Bit version 3.3.7:

### GBS version 8.3

VisualWorks 8.2.1 32-bit	VisualWorks 8.2.1 64-bit	VisualWorks 7.10.1 32-bit	VisualWorks 7.10.1 64-bit
<ul style="list-style-type: none"> <li>▶ Windows 10 and Windows 7</li> <li>▶ RedHat ES 6.9 and 7.4, Ubuntu 14.04 and 16.04</li> </ul>	<ul style="list-style-type: none"> <li>▶ Windows 10</li> <li>▶ RedHat ES 6.9 and 7.4, Ubuntu 14.04 and 16.04</li> </ul>	<ul style="list-style-type: none"> <li>▶ Windows 10 and Windows 7</li> <li>▶ RedHat ES 6.9 and 7.4, Ubuntu 14.04 and 16.04</li> </ul>	<ul style="list-style-type: none"> <li>▶ Windows 10</li> <li>▶ RedHat ES 6.9 and 7.4</li> </ul>

### GBS version 8.2

VisualWorks 8.1.1 32-bit and 64-bit	VisualWorks 7.10.1 32-bit	VisualWorks 7.10.1 64-bit
<ul style="list-style-type: none"> <li>▶ Windows 10 and Windows 7</li> <li>▶ RedHat ES 6.9 and 7.4</li> </ul>	<ul style="list-style-type: none"> <li>▶ Windows 7</li> <li>▶ RedHat ES 6.4, 6.9 and 7.4, Ubuntu 14.04 and 16.04</li> </ul>	<ul style="list-style-type: none"> <li>▶ Windows 7</li> <li>▶ RedHat ES 6.9 and 7.4</li> </ul>

### GBS version 5.4.4

VA Smalltalk 8.6.3
<ul style="list-style-type: none"> <li>▶ Windows 10, Windows 8.1, Windows 2008 R2 and Windows 7</li> </ul>

For more details on supported GBS and client Smalltalk platforms and requirements, see the *GemBuilder for Smalltalk Installation Guide* for that version of GBS. Consult the matrices on the website, [gemtalksystems.com/products/gbs-vw](http://gemtalksystems.com/products/gbs-vw) or [gemtalksystems.com/products/gbs-va](http://gemtalksystems.com/products/gbs-va), for the latest updates.



## Changes in this release

### Updated SSL library version

The version of OpenSSL has been updated to 1.0.2o.

### Support for Mac/High Sierra file system

The new Apple File System, apfs, is now recognized and handled by GemStone, allowing support for the High Sierra Mac version.

### Support for Opportunistic TLS Sockets

New methods have been added that can promote an existing GsSocket to a GsSecureSocket without losing an existing socket connection. The socket connection is transferred from the GsSocket to the GsSecureSocket, which enables STARTTLS behavior.

The following methods have been added to support this functionality:

`GsSecureSocket class >> newServerFromGsSocket: aGsSocket`  
Creates a new instance and initializes it to act as an SSL server socket. Any existing (non-SSL) connection owned by *aGsSocket* is transferred to the new instance and *aGsSocket* is effectively closed. No SSL connection is made.

`GsSecureSocket class >> newClientFromGsSocket: aGsSocket`  
Creates a new instance and initializes it to act as an SSL client socket. Any existing (non-SSL) connection owned by *aGsSocket* is transferred to the new instance and *aGsSocket* is effectively closed. No SSL connection is made.

### Hot standby related changes

#### Replay of hot standby could lag with high rate of small tranlogs

When a hot standby system has a master repository that produces small tranlogs at a rapid rate, the replay into the slave system could fall behind. (#47566)

The transfer rate in this situation has been improved in several ways:

- ▶ Reduced sleep time on socket EWOULDBLOCK.
- ▶ Larger data socket send/receive buffer sizes.
- ▶ Configurable flush interval in the logreceiver (described in more detail below).

#### logreceiver flush interval now configurable

The startlogreceiver utility now accepts the `-f <seconds>` argument, configuring the flush interval for the logreceiver to flush. The default is 10 seconds.

Previously, the flushing interval was always 2 seconds, which could reduce performance depending on the underlying disk performance, number and size of files.

- `-f <seconds>` Interval in seconds at which the logreceiver flushes the tranlog file.
  - 0 means flush as often as possible (caution: this may be very slow).
  - 1 disables flushing (file is flushed only when closed).
  - default: 10 seconds

## Reduced printouts in logsender and logreceiver logs

Some log messages are now only printed to the logsender and logreceiver logs when the `-d` option is used, to reduce noise in the logs under normal operation.

## Configuration Parameter changes

### STN\_GEM\_PGSRV\_CONNECT\_TIMEOUT

The time in seconds that a remote gem will wait for a connection to a pgsrv on stone's machine to complete.

Runtime equivalent: `#StnGemPgsrvConnectTimeout` (may only be set by System-User)

Default: 20 Min: 5 Max: 3600

### STN\_GEM\_PRIVATE\_PGSRV\_ENABLED

If TRUE, a remote gem will start a private pgsrv process if the attempt to connect to a multithreaded pgsrv on stone's machine fails.

Runtime equivalent: `#StnGemPrivatePgsrvEnabled` (may only be set by SystemUser)

Default: FALSE

### GEM\_PGSRV\_USE\_SSL is disabled

There are code paths that are broken when the configuration parameter `GEM_PGSRV_USE_SSL` is set to TRUE. There are thread safety issues in the socket code, making the multi-threaded pgsrv end of the ssl connection unreliable. This parameter has been disabled in this release (fixed in v3.4.1 and later). (#47275)

## Restore from backup with missing or corrupted objects

If a backup file has corruption which prevents certain objects from being restored, the restore would terminate with a non-fatal error depending on the specific problem, and the backup file could not be restored. (#47401)

Rather than allowing the backup to be completely unusable, the restore now tolerates some corrupted records and continues to complete the restore. On completion, the restore reports a new fatal error, `BKUP_ERR_RESTORE_FAILURE/4152`.

If you encounter this error, it is recommended that you find a non-corrupt backup file to restore. However, if you do not have another backup, you can continue to restore the tranlogs.

### Added method `commitRestoreWithLostData`

To commit the restored backup, instead of `commitRestore`, you must invoke the new method `Repository >> commitRestoreWithLostData`. After executing `commitRestoreWithLostData`, you should log in and perform an object audit to determine the extent of the problems, and if possible, attempt to repair the issues.

### **Automatic commitRestore change**

Backups taken from repositories with transaction logs written to /dev/null, or in partial logging mode, normally automatically perform the commitRestore when the backup is completed (since it is not possible to restore tranlogs). If corruption is detected, however, the restore will return BKUP\_ERR\_RESTORE\_FAILURE/4152. The restore is not automatically committed, and you must execute commitRestoreWithLostData in order to commit the restore.

### **CByteArray pointerAt:resultClass: allows CPointer**

This method previously only allowed the resultClass: argument to be a CByteArray or a subclass of CByteArray. Now, CPointer may be specified and this method will create an instance of CPointer.

## Bugs Fixed

The following bugs in v3.3.6 are fixed in v3.3.7.

### Suspended checkpoints resumed after an Epoch GC

When checkpoints have been suspended, if an Epoch GC happened to run during this time window, the suspension was cancelled and checkpoints resumed, without any warning messages in the stone log. If extent copy backups were taking place, which is the usual reason for suspending checkpoints, this could result in the backups being corrupt. (#47133)

### Abort may not advance view if not in transaction and many CRs behind

If a session performs an `System >> abortTransaction`, when the session is outside of transaction, and many `commitRecords` behind the current, it will not advance it's view. (#47344)

### Extra ShrPcMon processes on heavily loaded system

On a heavily loaded system, in which swapping is taking place, there a race condition in acquiring an exclusive lock on the `.LCK` file. This can allow multiple `ShrPcMonitor` processes to be started; the Stone assumes that the earlier one(s) have timed out, and starts another one. Once the Stone connects to one of these `ShrPcMon` processes, it runs correctly, but the extra `ShrPcMon` processes remain and use resources. (#46928)

### Gems may crash or hang under very low memory conditions

When a machine is almost out of swap space, such that an `mmap` from reserved memory fails, there are cases where the Gem may crash. (#46848)

### Exclusive lock failure can cause tranlog space full error

Creating a new tranlog involves multiple steps; the tranlog is first created, closed, and reopened, then an exclusive lock is requested. If this lock request fails with the error `EBADF`, the error is incorrectly reported as tranlog space is full. (#47565)

### findReferences found references from a large NSC that did not directly contain the object

If a large `UnorderedCollection` (NSC) contained an object that referenced a search object, but did not contain the search object directly, the results of a `findReferences:` or `fastFindReferences:` could still have included the NSC, in addition to the correct referencing object. (#47187)

### listInstancesInPageOrder:toFile: reports out of memory

When running `listInstancesInPageOrder:toFile:`, and there are no instances of the given class, it signalled an `AlmostOutOfMemory` error. (#47583)

### Debugger single-stepping could get stuck

When single stepping through code in a debugger, it was possible for stepping to get stuck and be unable to advance. (#47314)

## Remote cache issues

### Remote cache connection behavior

The first gem on a remote node triggers the creation of a remote shared cache, and the creation of a page server on the stone's node. The page server on the stone's node is multithreaded and shared between all gems on that remote node.

If a subsequent gem on that remote node fails to connect to the shared page server on the Stone's node within the timeout of 20 seconds, previously it would create a private pageserver. This could result in excessive page servers on the stone's node. (#46946)

Two new configuration parameters have been added to address this behavior:

STN\_GEM\_PGSRV\_CONNECT\_TIMEOUT (page 58) provides control over the timeout specifically for the connection between the remote gem and the page server on the stone's node.

STN\_GEM\_PRIVATE\_PGSRV\_ENABLED (page 58), if false, prevents the remote gem from starting a private page server if the connection to the shared page server fails or times out. In this case, the remote gem's login would fail.

### GEM\_PGSRV\_UPDATE\_CACHE\_ON\_READ can cause errors for remote logins

When the remote gem configuration parameter GEM\_PGSRV\_UPDATE\_CACHE\_ON\_READ is set to true, logins from remote gems may encounter the error 'Repository root page is corrupted or contains a disk media defect'. This is related to the requested root page having been flushed from the Stone's cache. (#47291)

### Multithreaded pageserver not shut down after remote cache death

When a remote cache died, the multithreaded page server for that host on the stone's node was not entirely cleaned up. Entries for the page servers continues to use a slot in the shared page cache monitor client table, although they did not have a process table entry. (#47117)

### Failed mid-level cache startup caused Gem crash

When a mid-level cache could not be started, it caused a fatal error in the gem. (#47305)

### Log file name for remote cache page server used customization

When a remote gem's log file name is defined using NRS directives, and a remote cache was started, the composition of the log file name for the remote cache pageserver incorrectly prepended the remote gem log file name. (#47031)

## Cannot change objectSecurityPolicy of a DbTransient object

Instances of Classes that are defined as DbTransient can be persisted, but their instance variable data is not written to disk. When setting the objectSecurityPolicy of a committed DbTransient object, the change to the security policy was not visible outside of the session that made the change. (#46655)

## GsHostProcess file descriptor leak

GsHostProcess finalization of in-memory instances did not properly close its three pipes. (#47630)

## Accessing large ByteArray with out of range argument errored

Using an out-of-range argument for `at :` with a `ByteArray` of size larger than 16273 triggers a corrupt object error, which also prevents further commits in that transaction. (#47131)

## topaz truncated byte output

With the setting `limit bytes 0`, there should be no byte limit on the output. Topaz was incorrectly truncating at 32500 bytes. (#47521)

## contentsAndTypesOfDirectory:onClient: incorrect in Unicode Mode

When the repository is in Unicode Comparison Mode (i.e., `StringConfiguration` is `Unicode16`), `GsFile` methods that return file names outside the ASCII range should decode the file names from UTF8 into Unicode strings. The method `GsFile >> contentsAndTypesOfDirectory:onClient:` did not do this correctly when `onClient:` was `false`. (#46894)

## GsExternalSession>>lastResult may be incorrect with multiple sessions

`GsExternalSession >> lastResult` is used to fetch the results of execution. `lastResult` previously fetched the result from the session that had the most recent previous access, which in an environment with multiple instance of `GsExternalSession` performing work, could be a different session than the receiver. (#47021)

## GsExternalSession resolveResult:toLevel: broken

This method incorrectly used a 1-based offset for a 0-based C array. (#46919)

## Security error when browsing implementors

If session methods have been enabled for a user that does not have `CodeModification` privilege, attempting to browse implementors of any method will trigger a `SecurityError`. (#47364)

## GsSecureSocket did not correctly apply client certificates

There was a bug in the internal code such that when configuring mutual authentication, the method to set CA certificates did not work correctly for client contexts. This did not cause any observed problems, although `openssl` documentation indicated this was required. (#47256)

## GsFile >> isTerminal incorrect

The code for `isTerminal` checked against an incorrect constant and did not return correct results. (#47283)