


GemStone/S 64 BitTM **Release Notes**

Version 3.4.3

January 2019



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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

About This Documentation

These release notes describe changes in the GemStone/S 64 Bit™ version 3.4.3 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 3.4.3, or upgrading or converting from previous products or versions, see the Installation Guide for version 3.4.

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.

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gemtalksystems.com

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- ▶ **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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Requests for technical assistance can be submitted online or by email. Telephone support is available but should be limited to urgent requests that require immediate assistance, such as a production system down.

Website: techsupport.gemtalksystems.com

Email: techsupport@gemtalksystems.com

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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.

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GemStone/S 64 Bit

3.4.3 Release Notes

Overview

GemStone/S 64 Bit™ 3.4.3 is a new version of the GemStone/S 64 Bit object server. This release includes a number of new features and bug fixes. We recommend everyone using or planning to use GemStone/S 64 Bit upgrade to this new version.

These release notes describe changes between the previous version of GemStone/S 64 Bit, version 3.4.2, and version 3.4.3. If you are upgrading from a version prior to 3.4.2, review the release notes for each intermediate release to see the full set of changes. Particularly note that there were many changes in v3.4, including the requirement for updated keyfiles and GBS upgrade.

The Installation Guide has not been updated for this release. For installation, upgrade and conversion instructions, use the Installation Guide for version 3.4.

Supported Platforms

Platforms for Version 3.4.3

GemStone/S 64 Bit version 3.4.3 is supported on the following platforms:

- ▶ Red Hat Enterprise Linux Server 6.9 and 7.4, and Ubuntu 14.04 and 16.04, and SUSE Linux Enterprise 12, on x86. Testing has been done on some earlier Red Hat Enterprise Linux Server 6.x and 7.x versions with the latest security patches.
- ▶ Solaris 10 and 11.3 on x86
- ▶ AIX 6.1, 7.1, and 7.2
- ▶ 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)

For more information and detailed requirements for each supported platforms, please refer to the GemStone/S 64 Bit v3.4 Installation Guide for that platform.

GemBuilder for Smalltalk (GBS) Versions

GemStone/S 64 Bit version 3.4.3 requires GBS version 8.3 or later for VisualWorks Smalltalk, or version 5.4.4 or later for VA Smalltalk.

The following versions of GBS are supported with GemStone/S 64 Bit version 3.4.3:

GBS version 8.3

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

GBS version 5.4.4

VA Smalltalk 8.6.3
<ul style="list-style-type: none"> ▶ Windows 10 ▶ Windows 8.1, Professional or above ▶ Windows 2008 R2 ▶ Windows 7, Professional or above

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

VSD Version

The GemStone/S 64 Bit v3.4.3 distribution includes VSD version 5.4. The previous version of GemStone/S, v3.4.2, included VSD v5.3.1.

VSD version 5.4 includes many updates, new features and bug fixes. For details on the changes, see the [Release Notes for VSD v5.4](#).

VSD versions are not tied to GemStone server versions: both older and newer versions of VSD can be used to read statmonitor files generated by both older and newer versions of GemStone/S and GemStone/S 64 Bit.

Changes in this release

Updated library versions

The version of lz4 has been updated to v1.8.3.

The version of OpenSSL has been updated to 1.1.1a.

The version of OpenLDAP has been updated to 2.4.46.

The version of Kerberos has been updated to 1.16.2.

Distribution changes

32-bit executables and libraries no longer included on AIX and Solaris

On AIX and Solaris, 32-bit executables, contained in `$GEMSTONE/bin32`, and libraries contained in `$GEMSTONE/lib32`, are no longer built nor included in the distribution.

These directories remain in the Linux and Mac distributions, to support 32-bit GCI clients.

32-bit VSD no longer included in the distribution

On all platforms, only the 64-bit VSD executables will be provided. 32-bit VSD executables are deprecated and will no longer be included in future VSD distributions.

Reorganization of slow and noop executables

GemStone includes some executables for slow and no-op builds, as well as the normal fast executables, for use when diagnosing problems. The packaging of these into the distribution has changed.

- ▶ The new subdirectories `$GEMSTONE/bin/noop`, `$GEMSTONE/bin/slow`, and `$GEMSTONE/bin32/slow` include the topaz executables corresponding to the build type. No-op builds are not available on Windows.
- ▶ The files `libgcilnk_noop-NN-64.so` and `libgcilnk_slow-NN-64.so` are no longer included in `$GEMSTONE/lib`. Instead, the new subdirectories `$GEMSTONE/lib/noop` and `$GEMSTONE/lib/slow` include the linked and RPC shared libraries, `libgcilnk-3.4.3-64.so` and `libgcirpc-3.4.3-64.so`. No-op builds are not available on Windows.
- ▶ 32-bit slow libraries are now included. The `lib32/slow` directory includes `libgcits-3.4.3-32.so` and `libgcirpc-3.4.3-32.so`
- ▶ The following files have been moved and renamed:
 - `sys/gem.noop` is now `/sys/noop/gem`
 - `sys/gem.slow` is now `/sys/slow/gem`
 - `sys/pgsvrmainl.noop` is now `/sys/noop/pgsvrmainl`
 - `sys/pgsvrmainl.slow` is now `/sys/slow/pgsvrmainl`
 - `sys/stoned.noop` is now `/sys/noop/stoned`
 - `sys/stoned.slow` is now `/sys/slow/stoned`

fullBackupTo: and restoreFromBackup: no longer limited to 16 sessions

The multi-threaded backup and restore are initiated with an upper limit on the number of slave sessions (threads). The actual number of threads may be further limited during the course of execution as the backup or restore respects the configured CPU and thread limits. These limits can be adjusted during runtime to further limit or increased the number of threads, but only up to the upper limit set when the operations initialized.

Previously, backup and restore set that maximum limit of the number of threads based on the number of extents, to a number between 2 and 16. With solid-state drives, however, backup and restore may no longer be I/O bound, and that limit of 16 can result in CPU-bound performance. (#47684)

In this version, the maximum thread limit is still by default set, to two times the number of extents, but without the limit of 16. This upper limit can be further increased, before the backup or restore is started, by executing:

```
SessionTemps current at: #GsOverrideNumThreads put: numThreads
```

where *numThreads* is a value between 1 and 4 * the number of CPUs (inclusive).

Note that you should verify that your operation is CPU bound and not I/O bound before raising the threads maximum. Increasing the number of threads will not improve performance if the operation is limited by the performance of disk reads and writes.

The following private methods have been removed:

```
Repository >> _fullBackupTo:MBytes:compress:
```

```
Repository >> _restoreBackups:scavPercentFree:
```

Ability to configure auto-start for multiple statmonitors

The configuration options `STN_STATMONITOR_ARGS`, `GEM_STATMONITOR_ARGS`, and `GEM_STATMONITOR_MID_CACHE_ARGS` allow you to automatically start statmonitor every time the Stone, remote or mid-level cache, respectively, is started up. These parameters were introduced in v3.4.

Previously, these parameters accepted a single string with statmonitor arguments, or an empty string to not start statmonitor. Now, you may specify a single arguments string or a list of argument strings. Using a list allows you to start multiple simultaneous statmonitor processes with different parameters.

For example, to configure two statmonitor processes on a Stone, one with a 10 second interval and the other with a 60 second, set the configuration parameter something like:

```
STN_STATMONITOR_ARGS = "-i10 -z -F tenSeconds", "-i60 -z -F sixtySeconds";
```

copydbf reports version for backup file generated by any other version

While `copydbf` is intended to be used with dbf files of the same version as the executable, it is useful to use `copydbf -i` on a backup file generated from an unknown version of GemStone. Previously, this was possible only in some cases, in which the backup file header formats were compatible.

Now, `copydbf` knows all backup file header formats. `copydbf` can be used with backups generated from all versions of GemStone (including 2.x, 3.1.x, 3.2.x, 3.3.x, and 3.4.x, as well as 32-bit GemStone/S 6.7.1), and will return the GemStone version number. Other `copydbf` functions are limited to compatible versions only. Note that this applies to backup files only; extents and tranlogs are unaffected by this feature.

Setting environment variables from Smalltalk

You may set environment variables in the process for the Gem or client using the following added methods:

```
System class >> gemEnvironmentVariable: envString put: valString
```

```
System class >> clientEnvironmentVariable: envString put: valString
```

The arguments must be either a String or a Unicode7 not larger than 8000 bytes, and NoGsFileOnClient privilege must not be set.

For example:

```
exec System gemEnvironmentVariable: 'foo' put: 'abc' %
```

Methods to fetch environment variable values, `gemEnvironmentVariable:` and `clientEnvironmentVariable:`, already existed.

Added lock status methods

The following methods have been added:

```
System class >> systemLocksQuick
```

Returns an Array of 2 Arrays; the first Array is readLocks, the second is writeLocks. Unlike `systemLocks`, the details about which sessions hold the locks are not included.

```
System class >> systemLocksReport
```

Returns a String that summarizes all of the locked objects. Details about which session holds the locks are not included. For example:

```
(1 readLocks: 207361(a SymbolDictionary))  
(1 writeLocks: 11079425(a SymbolDictionary))
```

Bugs Fixed

Windows client-side GsFile operations problems with non-ASCII filenames

GsFile is not able to open a Windows client file with a name that contains characters outside the ASCII range, that is, with codePoints over 127. For such filenames, the `open:*` methods return nil. (#47720).

The fix for this is largely transparent to the user; but there are a number of changes involved to support the correct behavior.

New class Utf16

The class `Utf16` has been added. This is parallel to, and similar to, the existing `Utf8` class.

An instance of `Utf16` is a UTF-16 encoded string. For every codePoint `cp` in a `Utf16` the following evaluates to true: `cp >= 0` and: `[cp <= 16r10FFFF]`

`Utf16` uses a variable number of bytes per encoded Character, and thus only certain comparison methods, directly supported by the `libicu` libraries, are implemented. All other

string manipulation must be done on the result of sending `asUnicodeString` to the instance of `Utf16`, and then operating on the equivalent `Unicode7`, `Unicode16` or `Unicode32` string. Methods inherited from `ByteArray` operate on the raw bytes of the UTF-16 encoded string, and have no support for accessing `codePoints`.

Added methods

The following methods have been added:

```
String >> encodeAsUTF16
DoubleByteString >> encodeAsUTF16
QuadByteString >> encodeAsUTF16
Utf8 >> encodeAsUTF16

GsFile >> gciClientIsWindows
    Returns true if GCI client is on a Microsoft Windows operating system.
```

Reclaim configuration parameters revert to speed-optimized values

Values for the `ReclaimGem` parameters:

```
#deadObjsReclaimedCommitThreshold
#objsMovedPerCommitThreshold
#sleepTimeBetweenReclaimMs
#sleepTimeWithCrBacklogMs
#reclaimDeadEnabled
```

Are reset following `reclaimAll`, `MFC`, or `Epoch`, to speed-optimized values, and the previous settings are not automatically restored. (#47797)

As of v3.3.x, the values in the `GcUser's UserGlobals` are used at startup only; runtime changes to these values are done using methods in `System` class.

Killing a remote shared page cache risked bringing the Stone down

If a remote shared page cache was killed using `SIGTERM` (which performs a clean shutdown), there are code paths in which it does not correctly wait for all threads to detach from the Stone's cache. This results in the Stone exit. (#47817)

Stuck session in login cannot be cleaned up

If a `UserProfile` was configured to record login times, and a problem occurred during login such that this session stopped processing (a stuck session), it may have left the `UserSecurityData` for the user of this session locked, and the session unkillable. (#47816)

Error `gsErrSessionShutdown/4059` not sent to remote clients

An error from the Gem that the session is being terminated, `#gsErrSessionShutdown/4059`, correctly passes this message to a GCI client on the same node, but does not pass it to a GCI client on a different node. (#47828)

Problems with `copydbf -i` with files on NFS-mounted disks

With a `.dbf` file on an NFS-mounted disks, `copydbf -i` could return an error or report no results, although the file itself is valid. (#47732)

Extents on CIFS filesystems on Linux do not work

Attempting to create or mount an extent that is on an CIFS file system does not work, and has been disallowed. (#47718)

fullBackupCompressed data file size based on uncompressed size

The `MBytes` : limit argument to multiple file `fullBackupCompressed` was applied to the uncompressed data size. This resulted in smaller files being written for all files except the last, and the large remainder of the backup being written to the single final file. (#47801)

Gem crash with very large `GEM_MAX_SMALLTALK_STACK_DEPTH` on Linux or Solaris/x86

When `GEM_MAX_SMALLTALK_STACK_DEPTH` is very large (over 35000) then an `AlmostOutOfStack` signal may result in a Gem `SEGV`, for Gems running on `x86_64` processors. Now, this configuration is automatically limited to no more than 35000 on these platforms. (#47753)

WriteSet issues with nested transactions

When a nested transaction is started, the `writeSet` could be overstated, including objects that were not modified by the outer transaction. This persisted through the commit of the nested transaction. Also, attempts to modify an invariant object may have put the invariant object in the write set before signalling the `Error` that modification was not allowed. (#47799)

`listInstances:limit`: limit not applied to instances in memory

`Repository>>listInstances:limit`: finds both persistent instances and instances in memory, returning no more results than the limit specified. However, this limit was not being applied to instances in memory, so the results could exceed the limit. (#47806)

Private internal objects can error during commit conflict resolution

During reduced-conflict (RC) resolution after a commit conflict, involved objects are selectively aborted. There were cases in which this was done on instances of private internal classes, such as `NscBagLeaf`, which resulted in a `doesNotUnderstand` error. (#47796)

Object and page audit errors after restore of `NonTranloggedGlobals`

When a repository is using `NotTranloggedGlobals`, and performs a backup and restore from logs, there are some circumstances in which OOPs end up neither allocated nor on the free OOP list. This causes object and page audit to report errors. (#47681)

Stone checkpoint state not updated quickly when checkpoint work done

During a checkpoint, the Stone waits for the AIO page servers to complete the actual work involved in the checkpoint. The Stone was not checking often enough that the checkpoint work is done, resulting in a checkpoint appearing to take a minimum of 10 seconds to complete. (#47769)

Statmonitor subsecond sampling generates incorrect timestamps

In most cases, the timestamps that statmonitor collects from GemStone are rounded to the nearest whole number of seconds before being recorded. This allows them to be easily understood with the VSD display. With sub-second timestamp intervals, however, the seconds field should be truncated, not rounded. This rounding resulted in timestamps that were incorrect by up to 1 second. Since VSD skips out of order timestamps, the charts displayed by VSD did not include all samples. (#47768)

Class Definition issues

Setting class category to nil does not work correctly

GemStone classes have a category instance variable. This can be set to a String or be nil; however, setting it to nil resulted in a category of the string 'nil', rather than nil. (#47788)

Error on versioning a class that with a nil inDictionary: argument

If a class is defined using subclass creation protocol with the inDictionary: argument of nil, and the class creation is as a version of an existing class, it raises an error. (#47413)

Indexing issues

Incorrect results for BtreePlus indexed range query

When using the new indexing infrastructure, the BtreePlus index, and making a range query of the form $a \leq \text{value} \leq b$, the incorrect operator was being applied for one of the two logical comparisons. This resulted in incorrect results. (#47509)

Performance improvement in creating equality index

Setting pathTerm state when creating a new index invoked allSubclasses, which resulted in unnecessary performance overhead. (#47779)

UTC offset in header has incorrect sign

Information in the header on the start time/date of a GemStone process now includes UTC offset information. However, the sign of the value is inverted. (#47712)

Upgrade created new version of TimeZone class

Running the image upgrade causes a new version of the TimeZone class to be unnecessarily created. (#47727)

Using 3.4 shared libraries with 3.4.2 was allowed but could hang

The library compatibility checks were not updated for 3.4.2, so that 3.4 shared libraries could be used to login. Some operations, such as those using GsFile, would hang with this mixed configuration. (#47823)

GsFile user action invocation with invalid name on client

GsFile is implemented internally in user actions (for historical reasons). If the private API for client-side operations is used with an invalid user action name in an RPC sessions, it causes errors and stack overflow. (#47825)

Integer printing broken on Windows client 64-bit topaz

GemStone provides both 64 bit and 32 bit topaz executables with the Windows client. In 64-bit topaz, printing of Integers is incorrect. (#47733)