GemStone®

GemStone/S 64 Bit™ Release Notes

Limited Distribution
Special Release

Version 3.2.5

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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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GemTalk Systems
15220 NW Greenbrier Parkway
Suite 240
Beaverton, OR 97006

Preface

About This Documentation

These release notes describe changes in the GemStone/S 64 Bit™ version 3.2.5 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 3.2.5, or upgrading or converting from previous products or versions, see the Installation Guide for version 3.2.5.

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.

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Support Website

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.

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

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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.

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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Chapter

1 GemStone/S 64 Bit 3.2.5 Release Notes (Limited Distribution Special Release)

Overview

GemStone/S 64 Bit 3.2.5 is a new limited distribution special release version of the GemStone/S 64 Bit object server. This release adds new features, new cache statistics, and fixes a number of bugs in v3.2.4.3.

These release notes provide changes between the previous version of GemStone/S 64 Bit, version 3.2.4.3, and version 3.2.5. If you are upgrading from a version prior to 3.2.4.3, 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 3.2.5.

Supported Platforms

Platforms for Version 3.2.5

GemStone/S 64 Bit version 3.2.5 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 6.5; Ubuntu 12.04; and SUSE Linux Enterprise 11 Service Pack 3, on x86
- Mac OSX 10.6.8 (Snow Leopard), with Darwin 10.8.0 kernel, on x86

Note that on Linux, GemStone/S v3.2.5 has been compiled on a later kernel; Red Hat 6.1 and 6.4 are not supported with this version.

For more information and detailed requirements for each supported platforms, please refer to the GemStone/S 64 Bit v3.2.5 Installation Guide for that platform.

Changes and New Features

Updated SSL libraries

The version of OpenSSL used by GemStone/S 64 Bit v3.2.5 has been updated to 1.0.2.

Hang in SSL code during login

Version 1.0.2 of OpenSSL has better retry logic handling than that in 1.0.1x. In addition, the retry logic in GemStone's SSL login (GciLogin) did not correctly handle retries in all cases. (#44927)

startcachewarmer for remote cache may now use mid-level cache

When the startcachewarmer script is used to warm a remote cache, it can now be configured to use or create a mid-level cache. With this configured, the cachewarmer will either load pages into the remote cache using the mid-level cache, or warm the mid-level cache as it loads pages in the remote cache.

The following options have been added to startcachewarmer:

-M host name or IP address where the mid-level cache is running or will be created. The -H option (specifying the host name or IP of the Stone's host) must also be specified with this option.

-C size of the mid-level cache in KB. If omitted, a value of 75000 is used. Only applies if the -M option is also specified and the mid-level cache does not exist.

-N The maximum number of processes that can use the mid-level cache. If omitted, a value of 50 is used. Only applies if the -M option is also specified and mid-level cache does not exist.

If a mid-level cache host name or IP address is specified (via -M), the mid-level cache will be created if it does not already exist. The -C and -N options will be used to specify the size and number of processes that can attach the mid-cache respectively. If the mid-cache already exists, the -C and -N options are ignored.

Change in handling of Linux out of memory kill protection

When a Linux system runs low in memory, each process's oom_score_adj settings is used to determine which processes are killed first. Applications can adjust this value; if the Unix user has the CAP_SYS_RESOURCE capacity, the oom_score_adj can be set to a lower value, otherwise it can only be increased.

The previous behavior had shortcomings:

- For users without CAP_SYS_RESOURCE, the oom_score_adj was increased to +250 for Gem and Topaz; however, it did not adjust page servers. Page servers for remote sessions and Free Frame Page servers are now treated the same as Gem and Topaz sessions.
- For users with CAP_SYS_RESOURCE, the oom_score_adj was decreased to -500 for most processes, including user Gems and Topaz. This is inappropriate, since killing Gem sessions would be preferably to killing critical non-GemStone processes. Now, Gems, Topaz, and remote and Free Frame Page servers are set to +250.

Change in handling of read authorization errors

In GemStone/S 64 Bit, read authorization checks occur when the object is faulted into the VM, rather than when the actual read occurs. This changes the timing of the error relative to 32-bit GemStone/S, and creates conditions under which you could get a SecurityError even when the operations you were performing should not trigger that error. (#45040)

A variation occurred under some conditions of updating an RcKeyValueDictionary. (#45054).

This release includes changes and a new configuration parameter to change the way unauthorized objects are handled. By default, there is no change in behavior. A new configuration parameter, GEM_READ_AUTH_ERR_STUBS, has been added. This defaults to FALSE; when this is set to TRUE, instead of triggering a SecurityError, when a read authorization error is encountered, an instance of the new class UnauthorizedObjectStub is created.

These changes require corresponding changes in GBS, and should not be used for GBS sessions, unless directed otherwise by GBS Engineering when running with certain versions of GBS.

Added configuration parameter

The following configuration parameter has been added:

GEM_READ_AUTH_ERR_STUBS
If TRUE, an in-memory instance of UnauthorizedObjectStub is constructed for an object fault instead of signalling a SecurityError for read authorization denied.

Runtime equivalent: #GemReadAuthErrStubs
Default: FALSE

This should remain FALSE for GBS sessions, unless directed otherwise by GBS Engineering when running with certain versions of GBS.

Duplicate cache names now allowed

The name of a gem in cache statistics can be set using the method `cacheName:`, and this name is visible in VSD and when using the programmatic interface to cache statistics. In version 3.0, it was disallowed to assign a name to a Gem when that name was already in use, and attempting to do so would raise an error.

While it is more unambiguous to avoid duplicate cache names, this error was inconvenient in practice, and duplicate names are now allowed.

Note that accessing statistics via `System >> cacheStatsForGemWithName:` will return statistics for the first gem with a given name. If your cache naming does not create unique names, use other cache statistics lookup methods that rely on PID or sessionId, to ensure that you get predictable results.

Reflection now includes tagSizeOf:

The method Reflection>>tagSizeOf: has been added.

Added method physicalSizeOnDisk

When determining the amount of physical space required to hold objects on disk, the method `physicalSize`, which returns the space required for the in-memory representation, may overstate the requirement for the object on disk. For more accurate calculation, the following method has been added:

`Object >> physicalSizeOnDisk`
Returns the number of bytes required to represent the receiver on disk. If the receiver is in special format (which implies that its representation is the same as its OOP), returns zero.

Added Gci Function

The following GCI function has been added:

```
(int64) GciFetchTagSize(
    OopType obj,
    );

Returns the number of oops of dynamic instVars that are
allocated in the object. Returns 0 if obj is a special object.
```

Bugs Fixed

The following bugs in v3.2.4.3 have been fixed in v3.2.5:

Mid-level cache related issues

A number of fixes and changes have been made in v3.2.5 in handling of problems in mid-level caches. Systems using mid-level caches are now more tolerant of the loss of connection to a mid-level cache host, and of problems with individual processes supporting a mid-level cache.

Death of mid-cache caused gems to terminate

If a mid-level cache terminated or the mid-level cache machine became unavailable, all remote sessions using that mid-level cache would encounter a fatal error. Now, these sessions will continue running without the mid-level cache; a message is printed to the Gem's stdout. (#44993)

Shared Page Cache Monitor death not handled properly

Under some conditions, the death of the Shared page cache Monitor on a mid-level cache host may not be handled properly, resulting in errors attempting to connect to the mid-level cache. (#45005).

Page server's death not handled properly

When a session's page server on the mid-level cache dies, the session may encounter an error as the remove session attempts to recover the connection. (#44992).

GsSocket getHostNameByAddress: risk of hang

If the DNS server cannot resolve an address, the execution of `GsSocket class >> getHostNameByAddress:` may hang, depending on your configuration. Now, it will try five times before reporting an error (#45077)

Unresolved symbol in non-upgrade recompile of GemStone kernel methods

Some obsolete classes, such as ObsoleteSymbol, were moved to the "ObsoleteClasses" dictionary within Globals as part of the 3.0 upgrade; by leaving the class, existing references would continue to be functional. However, recompile of GemStone kernel classes (other than by upgrade) resulted in unresolved symbols. While this is not generally needed or recommended, tools such as STORE may have caused recompile. (#44990)

sigAborts may be lost to GBS or GCI applications

Changes in handling of asynchronous events to avoid recursive handling were made in 3.2. There was a case in which this code would suppress a second sigAbort to a GCI or GBS applications performing certain GCI executions. (#45067)

Risk of SEGV from thread-unsafe code

It was possible for internal repository I/O Time tracking code to execute thread-unsafe, with a risk of a null pointer and SEGV. (#44511)

Gem error when commit on tranlog full

When the transaction logs are full, the stone performs special handling of commits and other operations, pausing until space becomes available. If a Gem was performing a commit, some state was cleared by the code that handled the tranlog full condition. In this case, the Gem would terminate with a invalid stone command error. (#44894)

GCI Client Socket not closed on Gem abnormal shutdown

When the Gem terminated due to loss of its page server, the error was not handled correctly. The timing of the close of the socket to the client was incorrect, which for some cases in GBS logins, could cause the GBS client image to hang. (#45065)

Unnecessary atomic operations

Some atomic operations in threads were being performing while holding a mutex which precluded other threads from modifying the data structure. This has been cleaned up to improve performance. (#45037)

Changes in FFI interface code

Some adjustments have been made in header parsing code that will allow support for later versions of Mac OS. (#45034)

Statmonitor and Cache Statistics Changes

This release includes several bug fixes related to cache statistics, and a number of new statistics.

Inaccuracies in page read cache statistics

The following cache statistics were not updated for reads done by a mid-level cache on behalf of a remote gem:

BitmapPageReads
DataPageReads
ObjectTablePageReads
OtherPageReads
PageIoCount
PageIoTimeOverallAvg
PageIoTime10SampleAvg
PageIoTime100SampleAvg
PageReads

The stone, logsender, and logreceiver processes incremented these statistics by the number of read operations, rather than by the number of pages read. (#45006)

SPC Monitor total stats were sums

Previously, some SPC Monitor statistics were calculated as the sum of the corresponding processes for all active processes in the cache. When a session logged out, the SPC Monitor statistics value could drop, counter-intuitively.

Now, the following SPC Monitor statistics are cumulative for the life of the cache, and will not decrease:

TotalLocalPageCacheHits
TotalLocalPageCacheMisses
TotalWaitsForOtherReader
TotalPageReadsTotalPageWrites
TotalFramesFromFreeList
TotalFramesFromFindFree
TotalFramesAddedToFreeList
TotalOtPageReads
TotalDataPageReads
TotalBmPageReads
TotalMiscPageReads
TotalPcesRemovedFromFreeList
TotalPcesAddedToFreeList

statmonitor -J flag did not collect PageManager statistics

The -J flag to statmonitor specifies to collect statistics for the Stone, Shared page cache, and Page Manager only. However, the Page Manager statistics were not being collected. (#45081)

Incorrect values for network stats on Linux hosts

The statistics related to network performance were incorrect for Linux hosts; some values were unreasonably high, others were zero. (#45051)

Memory page cache statistics incorrect on AIX

The following cache statistics were expressed on AIX as the number of 4KB pages, rather than KB, and so were understated 4x in the statmonitor data. This has been corrected, and these statistics are now in correctly in KB. (#45058)

DataRSS
TextRSS
DataVmSize

Change in GemStone process statistics on Linux

On Linux, cache statistics are collected from `/proc/`*pid*`/status` rather than from `/proc/`*pid*`/statm`. This provides some additional statistics, which are available for all GemStone processes.

MaxImageSize (All on Linux)
The maximum (high water) size of the process's image in kilobytes.

MaxRSS (All on Linux)
The high water mark of the processes resident set size. Note that this counter is always 0 on Solaris.

RSSStack (All on Linux)
The stack resident set size.

PageTablesMemoryKB (All on Linux)
The amount of memory dedicated to low-level page tables.

ThreadCount (All on Linux)
Number of threads currently active in this process. An instruction is the basic unit of execution in a processor, and a thread is the object that executes instructions. Every running process has at least one thread.

VolCSW (All on Linux)
The number of voluntary context switches done by the process. Note that this counter is always 0 on HP-UX.

IVolCSW (All on Linux)
The number of times the process was forced to do a context switch. Note that this counter is always 0 on HP-UX.

As a result of this change, **SharedKBytes** and **RSSDirty** are no longer collected on Linux.

Added GemStone process cache statistics

The following GemStone process cache statistics have been added:

CommitRecordPageReads (All)
The number of commit record pages read by the process since it was started.

PagesAddedToCacheFromDisk (All)
Number of pages added to the shared cache by this process which were read from disk.

PagesAddedToCacheFromMidCache (All)
Number of pages added to the shared cache by this process which were copied from a mid-level shared page cache.

PagesAddedToCacheFromPrimaryCache (All)
Number of pages added to the shared cache by this process which were copied from the primary shared page cache.

PagesAddedToCacheNewlyCreated (All)
Number of pages added to the shared cache by this process which were newly created. For gems and the stone, the pages were created by the process. For page servers, the pages were created by gem connected to the page server.

PagesInCacheCreatedInLeafCache (ShrPcMonitor)
Number of pages present in the shared cache which were created in a remote shared page cache.

PagesInCacheCreatedInPrimaryCache (ShrPcMonitor)
Number of pages present in the shared cache which were created in the primary shared page cache.

PagesInCacheFromDisk (ShrPcMonitor)
Number of pages present in the shared cache which were read from disk.

PagesInCacheFromMidCache (ShrPcMonitor)
Number of pages present in the shared cache which were copied from a mid-level shared page cache.

PagesInCacheFromPrimaryCache (ShrPcMonitor)
Number of pages present in the shared cache which were copied from the primary shared page cache.

TotalCommitRecordPageReads (ShrPcMonitor)
Total number of commit record pages read into the shared page cache by all processes since the cache was created.

TotalPagesAddedToCacheFromDisk (ShrPcMonitor)
Total number of pages which were read from disk and added to the shared page cache by all processes since the cache was created.

TotalPagesAddedToCacheFromMidCache (ShrPcMonitor)
Total number of pages which were copied from a mid-level shared cache and added to the shared page cache by all processes since the cache was created.

TotalPagesAddedToCacheFromPrimaryCache (ShrPcMonitor)
Total number of pages which were copied from the primary shared cache and added to the shared page cache by all processes since the cache was created.

TotalPagesAddedToCacheNewlyCreated (ShrPcMonitor)
Total number of pages which were newly created and added to the shared page cache by all processes since the cache was created.

Removed cache statistics

The following statistic has been removed:

MilliSecPerIoSample

Also note **SharedKBytes** and **RSSDirty** are no longer collected on Linux; see "Change in GemStone process statistics on Linux" on page 13