GemStone®

GemStone/S 64 Bit Release Notes

Version 2.4.3

April 2010

GemStone S 64™

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PATENTS

GemStone is covered by U.S. Patent Number 6,256,637 “Transactional virtual machine architecture”, Patent Number 6,360,219 “Object queues with concurrent updating”, and Patent Number 6,567,905 “Generational Garbage Collector”. GemStone 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 2.4.3 release. We recommend that everyone migrating to this version read these release notes before beginning installation, testing or development.

No separate Installation Guide is provided with this release. For instructions on installing GemStone/S 64 Bit version 2.4.3, or upgrading or converting from previous products or versions, see the Installation Guide for version 2.4.

These documents are also available on the GemStone customer website, as described below.

Terminology Conventions

This document uses the following terminology:

The term "GemStone" is used to refer both to the product, GemStone/S 64 Bit, or previous GemStone/S server products; and to the company, GemStone Systems, Inc.

Technical Support

GemStone provides several sources for product information and support. The product-specific manuals provide extensive documentation, and should be your first source of information.

GemStone Web Site: http://support.gemstone.com

GemStone's Technical Support website provides a variety of resources to help you use GemStone products. Use of this site requires an account, but registration is free of charge. To get an account, just complete the Registration Form, found in the same location. You'll be able to access the site as soon as you submit the web form.

The following types of information are provided at this web site:

Documentation for GemStone/S 64 Bit is provided in PDF format. This is the same documentation that is included with your GemStone/S 64 Bit product.

Release Notes and **Install Guides** for your product software are provided in PDF format in the Documentation section.

Downloads and **Patches** provide code fixes and enhancements that have been developed after product release, and past and current versions of GemBuilder for Smalltalk.

Bugnotes, in the Learning Center section, identify performance issues or error conditions that you may encounter when using a GemStone product. A bugnote describes the cause of the condition, and, when possible, provides an alternative means of accomplishing the task. In addition, bugnotes identify whether or not a fix is available, either by upgrading to another version of the product, or by applying a patch. Bugnotes are updated regularly.

TechTips, also in the Learning Center section, provide information and instructions for topics that usually relate to more effective or efficient use of GemStone products.

Community Links provide customer forums for discussion of GemStone product issues.

Technical information on the GemStone Web site is reviewed and updated regularly. We recommend that you check this site on a regular basis to obtain the latest technical information for GemStone products.

Help Requests

You may need to contact Technical Support directly for the following reasons:

- Your technical question is not answered in the documentation.
- You receive an error message that directs you to contact GemStone Technical Support.
- You want to report a bug.
- You want to submit a feature request.

Questions concerning product availability, pricing, keyfiles, or future features should be directed to your GemStone account manager.

When contacting GemStone Technical Support, please be prepared to provide the following information:

- Your name, company name, and GemStone/S license number
- The GemStone product and version you are using
- The hardware platform and operating system you are using
- A description of the problem or request
- Exact error message(s) received, if any

Your GemStone support agreement may identify specific individuals who are responsible for submitting all support requests to GemStone. If so, please submit your information through those individuals. All responses will be sent to authorized contacts only.

For non-emergency requests, the support website is the preferred way to contact Technical Support. Only designated support contacts may submit help requests via the support website. If you are a designated support contact for your company, or the

designated contacts have changed, please contact us to update the appropriate user accounts.

Website: http://techsupport.gemstone.com

Email: support@gemstone.com

Telephone: (800) 243-4772 or (503) 533-3503

Requests for technical assistance may be submitted online, or 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 that is non-operational. In these cases, please also submit your request via the web or email, including pertinent details such error messages and relevant log files.

If you are reporting an emergency by telephone, select the option to transfer your call to the technical support administrator, who will take down your customer information and immediately contact an engineer.

Non-emergency requests received by telephone will be placed in the normal support queue for evaluation and response.

24x7 Emergency Technical Support

GemStone 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, if they encounter problems that cause their production application to go down, or that have the potential to bring their production application down. For more details, contact your GemStone account manager.

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- Customized consulting services can help you make the best use of GemStone products in your business environment.

Contact your GemStone account representative for more details or to obtain consulting services.

Contents

Chapter 1. GemStone/S 64 Bit 2.4.3 Release Notes

Overview 9
Supported Platforms and GBS Versions 9
Platforms 9
GBS versions 10
Changes and new features 10
Improved performance for tranlogs on file system 10
New feature to refresh transient symbol list. 11
New features to handle problems with Dependency Map. 11
Improved performance for _hiddenSetAsArray 12
Additional Socket functionality. 12
Programmatic access to host CPU usage. 12
GCI login message now includes timestamp 12
Change in the way Object >> become: errors are reported 12
IndexManager new features. 13
Added all indexes analysis methods 13
Override IndexManager autoCommit for the current session. 13
Added cache statistics 13
Bugs Fixed 14
Slow commit performance due to aio_suspend() 14
DependencyMap issues 14
Recovery could cause problem with Dependency Map 14
Object audit did not catch corruption in Dependency Map 14
Upgrade related issues. 14
Mutex error during conversion on HP-UX. 14
Secondary extents not converted 14
Conversion related issues 14
postconv crashed on corrupted object/s 14

Handling of Tranlog space full 15
Tranlog full condition could have corrupted tranlogs. 15
Gem error when tranlog becomes full in middle of commit 15
Administrative accounts cannot log in during tranlog full 15
Session may hang after resolution of tranlog full 15
Fast FDC with cache warmers could error 15
Simultaneous logins by the same userId could result in disabled account . . . 15
Blocked session may have received lostOT or been logged off. 15
Inappropriate timeouts due to STN_GEM_TIMEOUT 16
"gci login" messages not flushed correctly 16
Code path existed that resulted in corrupted RcEqualityIndex 16
Terminating during replay of MFC tranlogs could cause corruption 16
copyReplaceFrom:to:with: incorrect results for empty with: argument. 16
Class comment not preserved when versioning Class 16
Migrating instances of subclasses failed 16
Super reference in do-it causes SIGBUS 17
Misleading startup of PA-RISC executables on Itanium 17
startstone -N could still hang 17
Improved reporting for mutex error 17
Missing and non-current man pages 17
Default name for pageaudit 17

Chapter 1

GemStone/S 64 Bit 2.4.3 Release Notes

Overview

GemStone/S 64 Bit 2.4.3 is a new version of the GemStone/S 64 Bit object server. This release provides fixes for a number of serious bugs; we recommend everyone using GemStone/S 64 Bit upgrade to this new version. The details of these changes are provided in this document.

These release notes provide changes between the previous version of GemStone/S 64 Bit, version 2.4.2.1, and version 2.4.3 (version 2.4.2.1 was a re-release of 2.4.2; there were no code changes between these releases). If you are upgrading from a version prior to 2.4.2 or 2.4.2.1, please also review the release notes for each intermediate release to see the full set of changes.

No separate Installation Guide is provided with this release. For installation instructions, use the Installation Guide for version 2.4.

Supported Platforms and GBS Versions

Platforms

GemStone/S 64 Bit version 2.4.3 is supported on the following platforms:

- Solaris 9 and 10 on SPARC
- Solaris 10 on x86
- HP-UX 11.11 and 11.31 on PA-RISC
- HP-UX 11.23 and 11.31 on Itanium/
- AIX 5.3, TL5, SP3 and AIX 6.1, TL1, SP1.
- SuSE Linux ES 10 SP1 and Red Hat Linux ES 5.0

For more information and detailed requirements for each supported platforms, please refer to the GemStone/S 64 Bit v2.4 Installation Guide for that platform.

GBS versions

The following versions of GBS are supported with GemStone/S 64 Bit version 2.4.3, with the following client Smalltalk and platforms versions.

GBS version 7.3

VW 7.7 32-bit with 32-bit 7.7 OE	**VW 7.7 64-bit** with 64-bit 7.7 OE	**VW 7.6 32-bit** with 32-bit 7.6c OE
▸ Windows XP, Windows 2003 Server, Windows Vista, and Windows 7 ▸ Solaris 9 and 10 on SPARC ▸ HP-UX 11.11 on PA-RISC ▸ SuSE Linux ES 10 and RedHat Linux ES 5.0	▸ Solaris 10 on SPARC ▸ SuSE Linux ES 10 and Red Hat Linux ES 5.0	▸ Windows XP and Windows 2003 Server ▸ Solaris 9 and 10 on SPARC ▸ HP-UX 11.11 on PA-RISC ▸ SUSE Linux ES 10 and Red Hat Linux ES 5.0

GBS version 7.1.2patch2

VW 7.5 with 7.5 OE	**VW 7.4.1** with 7.4d OE	**VW 5i.1 Envy** with 5i.4c OE
▸ Windows XP and Windows 2003 Server ▸ Solaris 9 and 10 on SPARC ▸ HP-UX 11.11 on PA-RISC ▸ SuSE Linux ES 10	▸ Windows XP ▸ Solaris 9 and 10 on SPARC ▸ HP-UX 11.11 on PA-RISC ▸ SuSE Linux ES 10	▸ Windows XP

GBS version 5.3

VA Smalltalk version 7.5.2 is supported on Windows XP, SP1 or later, Windows 2003 Server, and Windows Vista.

For more information on supported platforms and requirements, see the release notes for that version of GBS.

Changes and new features

Improved performance for tranlogs on file system

Commits require a write to the tranlog, which is sent fsync() to ensure the write is completed. Now, these fsync() calls are batched, so when multiple commit tranlog writes are pending, a single fsync() call is made. Testing has show increases of up to 40% in commit performance, for systems using tranlogs on file system, in which the commit performance was limited by tranlog writes.

This change has no impact when tranlogs are on raw partitions.

Two cache statistics have been added, **StnAioFsyncCount** and **StnAioTimeInFsyncMs**. See page 13 for a description of these statistics.

New feature to refresh transient symbol list

The following method has been added:

`System class >> refreshTransientSymbolList`
Rebuild the session's transient symbol list from the one in the UserProfile.

Updating a session's transient Symbol List requires the CodeModification privilege. Sessions that did not have this privilege and were logged in while their persistent symbol list was updated by another session (one which had the appropriate privilege), were unable to see these changes until they logged in again. This method allows such session to refresh their transient symbol list from their persistent symbol list while logged in.

New features to handle problems with Dependency Map

A bug in the handling of DependencyMaps has been fixed (see "Recovery could cause problem with Dependency Map" on page 14. Object audit did not detect this type of corruption, as documented under "Object audit did not catch corruption in Dependency Map" on page 14. In addition to fixing this, objectAudit code has been overhauled and improved in this release.

All repository audit methods (objectAudit, auditWithLimit:, quickAuditLevel1 and quickAuditLevel2) now also audit the DependencyMap, near the beginning. If problems are found a re-scan is not done, since no further reliable information can be extracted.

In addition, methods have been added to audit and optionally repair the Dependency Map.

`Repository >> auditDependencyMap`
Audit the shared dependency map and report errors and statistics to stdout. This method should be executed from topaz -l (the linked version of Topaz).

This method raises the error 3022 if audit detects problems, otherwise it returns true.

`Repository >> repairDependencyMap`
Audit the shared dependency map and repair any errors detected. This method should be executed from topaz -l (the linked version of Topaz).

This method raises fatal error 4033 if repairs were performed and terminates the session. Otherwise the method returns true which indicates no errors were detected and no repairs were performed.

Note that while repairWithLimit: will now also repair dependency map corruption, this method has performance issues, and is not recommended.

The GemStoneError dictionary in the image now includes an error string for error 4033 / #errFinishedObjAuditRepair.

The following private changes have also been made:

- The hidden set RemovedDepMapEntries is now available via the image code to access hidden sets. Update is restricted to SystemUser.
- Private debugging methods have been added:

```
Repository >> _pageForOopIsTagged:
Repository >> _sharedDepMapLookupForOop:
```

Improved performance for _hiddenSetAsArray

System _hiddenSetAsArray and _hiddenSetEnumerate: now do object lookups in bulk rather than one at a time, improving performance.

Additional Socket functionality

The following methods have been added:

`GsSocket >> shutdownReading`
Partially shutdown the socket such that further reads are disallowed. The socket is not closed.

`GsSocket >> shutdownWriting`
Partially shutdown the socket such that further writes are disallowed. The socket is not closed.

`GsSocket >> shutdownReadingAndWriting`
Shutdown the socket such that further reads and writes are disallowed. The socket is not closed.

Programmatic access to host CPU usage

The following method has been added:

`System class >> hostCpuUsage`
Returns an Array of 5 SmallIntegers with values between 0 and 100 which have the following meanings:

1 - Percent CPU active (user + system)
2 - Percent CPU idle
3 - Percent CPU user
4 - Percent CPU system (kernel)
5 - Percent CPU I/O wait

On hosts with multiple CPUs, these figure represent the average across all processors.

The results of the first call to this method are invalid and should be discarded.

GCI login message now includes timestamp

On login, a message of the form

gci login: currSession *N* rpc gem processId *NNN*

is written to stdout. This method now includes a timestamp.

Change in the way Object >> become: errors are reported

Most limitations on become: are checked for and reported from Object >> _become:fullChecks:, prior to invoking the primitive. The C code invoked via _primitiveBecome: did not report details of problems. Now, failures at the C level returns an error that includes a specific error message.

The text of the error for 2426 / #rtErrCantBecomeGeneric has been modified, and now includes two arguments.

IndexManager new features

Added all indexes analysis methods

The following methods have been added to the IndexManager.

`IndexManager >> nscsWithBadIndexes`
This method performs and auditIndexes on all UnorderedCollections, and returns the indexed collections that failed the audit.

`IndexManager >> nscsWithIncompleteIndexes`
This method returns the UnorderedCollections that have incomplete indexes.

`IndexManager >> usageReport`
return a string describing all indexes: path terms, the collection sizes, and the (visible) methods that could create the indexes.

Override IndexManager autoCommit for the current session.

It is now possible to override the current setting for IndexManager autoCommit for a specific session. The methods sessionAutoCommit: and sessionAutoCommit will set and retrieve a value for the current session. If set to a boolean, this value is used instead of the IndexManager autoCommit during indexing operations.

```
IndexManager class >> sessionAutoCommit
IndexManager class >> sessionAutoCommit: aBool
IndexManager >> sessionAutoCommit
IndexManager >> sessionAutoCommit: aBoolOrNil
```

Added cache statistics

The following cache statistics have been added:

CodeGenFullCount (Gem)
The number of times the code gen space was found to be full.

LastMarkSweepReasonCode (Gem)
An internal code which indicates the reason for the last Mark/Sweep operation.

LastScavengeReasonCode (Gem)
An internal code which indicates the reason for the last scavenge operation.

OldGenFullCount (Gem)
The number of times the old gen space was found to be full.

PermGenFullCount (Gem)
The number of times the perm gen space was found to be full.

ScavsPromToMkSwCount (Gem)
The number of times a scavenge operation was promoted to a Mark/Sweep operation.

StnAioFsyncCount (Stone) - number of fsync() calls done to flush commit records to the tranlog. Will always be zero if the tranlog resides on a raw partition.

StnAioTimeInFsyncMs (Stone) - approximate cumulative amount of real time spent performing the fsync() call on transaction logs measured in milliseconds.

VoteOnDeadCount (Gem)
The number of times the session has voted on dead objects.

Bugs Fixed

The following bugs in GemStone/S 64 Bit 2.4.2/2.4.2.1 have been fixed in GemStone/S 64 Bit 2.4.3.

Slow commit performance due to aio_suspend()

In recent releases, GemStone has fixed a number of issues related to aio_suspend() on Solaris with raw partitions, with mixed success. In this release, calls to aio_suspend() have ben removed, and replaced with calls to aio_error() and controlled sleeps. This results in a 8x or more increase in the maximum commit rate for this configuration. (#40484).

DependencyMap issues

Recovery could cause problem with Dependency Map

Recent changes in recovery code introduced a condition where there could be inconsistencies between the Dependency Map and internal settings for the objects in the map. This caused unexpected failures; observed as unexplained failures in become:. (#40512)

Object audit did not catch corruption in Dependency Map

The methods in Repository to audit the repository did not audit the dependencyMap structure. (#40572)

For details on the changes to audit, see “New features to handle problems with Dependency Map” on page 11.

Upgrade related issues

Upgrading from versions earlier than 2.2 requires conversion, which is done automatically during startstone. Changes in startstone processing in version 2.4, related to the improved tranlog replay code, introduced bugs in this automatic conversion.

Mutex error during conversion on HP-UX

HP-UX only

Conversions on HP-UX encountered the error "HostMutexError" (#40543)

Secondary extents not converted

On upgrade from a version earlier than 2.2 to version 2.4 or above, on systems with more than one extent, the startstone exited with an error in starting the PageManager, after the conversion successfully completed. (#40565).

Conversion related issues

postconv crashed on corrupted object/s

When a repository that being upgraded from 32-bit GemStone/S contained large objects that were corrupted within their internal leaf structure, the postconv operation would encounter a SEGV error and crash. postconv now skips such corrupted objects. (#40641)

Handling of Tranlog space full

When all the disk space for transaction logs is full, or all transaction log raw partitions are full, the GemStone repository must wait for tranlog space to become available before continuing. This release fixes a number of different bugs related to GemStone operation under these conditions. Although GemStone should now handle tranlog full conditions properly, we still strongly recommend avoiding this situation.

Note that this applies only when in full logging mode. In partial logging mode, the stone will shut down immediately when tranlog space becomes full.

Tranlog full condition could have corrupted tranlogs

A sequence of timing events in a tranlog full condition could cause writes to be done to tranlogs out of order. This corrupts the tranlogs. (#40502)

Gem error when tranlog becomes full in middle of commit

When the tranlog space becomes full when a gem is in the process of writing a commit record, an error is returned to the gem. The correct behavior is to pause and wait for space to become available to complete the operations. Exiting with an error partway through commit handling may have serious consequences. (#40516)

Administrative accounts cannot log in during tranlog full

SystemUser and DataCurator should have been able to login when tranlog space is full, but logins for these accounts were also paused. (#40521)

Session may hang after resolution of tranlog full

After a tranlog full event, it was possible for sessions that were paused during tranlog full to not have been reactivated, effectively hanging them. (#40518)

Fast FDC with cache warmers could error

Running Repository >> findDisconnectedObjectsAndWriteToFile:pageBufferSize: saveToRepository:numCacheWarmers could result in an error that too many pages were pinned. (#40542)

Note that if fast FDC crashes, the cache may be filled with pinned pages. This is acceptable since FDC is normally run offline from production.

Simultaneous logins by the same userId could result in disabled account

If two logins for the same userId arrived within the same clock second, a logic error could result in the account being disabled due to “StaleAccount”. (#40473)

Blocked session may have received lostOT or been logged off

Sessions that were blocked waiting for some resource (such as in tranlog full conditions), may have timed out and been sent a lostOTRoot signal, or in the case of GcGems, been logged out. Now, these sessions will not be terminated while waiting for the resource. (#40523)

Inappropriate timeouts due to STN_GEM_TIMEOUT

Gems that are blocked on a queue, such as the symbol queue, are now exempt from STN_GEM_TIMEOUT while blocked. This avoids, for example, a gem being terminated by timeout while performing a long clusterAllSymbols operation.

In addition, the internal timestamp indicating an interaction with the stone is now updated when the stone sends a response to the gem. Previously, it was only updated when the stone received the request. (#40596)

"gci login" messages not flushed correctly

On login, a message of the form

gci login: currSession *N* rpc gem processId *NNN*

is written to stdout. When stdout was redirected to a file from a GCI application (such as GBS), these messages were not flushed until the application exited. (#40476)

This message now includes a timestamp (see “GCI login message now includes timestamp” on page 12).

Code path existed that resulted in corrupted RcEqualityIndex

Under certain cases, where during an index update, btree nodes were split and a commit conflict triggered RC replay, the selective abort of the nodes may have been incorrect, corrupting the index. (#40577)

Terminating during replay of MFC tranlogs could cause corruption

If the Stone is terminated during the replay of tranlogs that record a markForCollection in the original repository, there is a risk that the replay could write checkpoints incorrectly. This corrupted the repository, resulting in a UTL_GUARANTEE error and requiring re-restore from backup. (#40578)

copyReplaceFrom:to:with: incorrect results for empty with: argument

The method SequenceableCollection >> copyReplaceFrom:to:with: incorrectly returns a copy of the receiver if the argument provided to the with: keyword is empty. (#40550)

Class comment not preserved when versioning Class

When a new version of a Class is created, the class description was not copied to the new version of the class. The description is an instance of GsClassDocumentation returned by <Class> description, and is as displayed in the GBS System Browser as the comment. (#40536)

Migrating instances of subclasses failed

Migrating instances of subclasses of ByteArray failed with the error "No method was found for the selector #'asciiValue'". (#40510)

Migrating instances of subclass of Dictionary failed with the error "No method was found for the selector #'_generality'". (#40511)

Super reference in do-it causes SIGBUS

Message sends to super outside of a class context, such as GS-Do it execution from GBS, caused a SIGBUS error in the gem. (#40564)

Misleading startup of PA-RISC executables on Itanium

HP-UX only

It was possible to start up on Itanium, GemStone executables that were built for HP-UX on PA-RISC. While these would start up, they would not run correctly. Now, attempting to do this reports an error and terminates. (#40579)

startstone -N could still hang

If the startstone script was executed with the -N flag, with no transaction logs available, it would not receive the signal from the stone and would wait, appearing to hang. (#40582)

Improved reporting for mutex error

The error reporting for an internal mutex error (as encountered in bug 40543, “Mutex error during conversion on HP-UX“) had unclear and difficult to diagnose error messages. This has been improved. (#40541)

Missing and non-current man pages

GemStone man pages have been cleaned up to update incorrect older default names, and man pages for startcachewarmer, printlogs.sh, and searchlogs.sh have been added.

Default name for pageaudit

If no stone name is explicitly specified for the pageaudit, it will now perform the audit using the default name **`gs64stone-audit`**, rather than **`gs64stone`**. (#40508)