
GemStone®

GemStone/S 64 Bit Release Notes

Version 2.2.4

January 2008

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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 2.2.4 release. We recommend that everyone migrating to this version read these release notes before beginning installation, testing or development.

For information on installing or upgrading to this version of GemStone/S 64 Bit, please refer to the *GemStone/S 64 Bit Installation Guide*.

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 and online help provide extensive documentation, and should always be your first source of information. GemStone Technical Support engineers will refer you to these documents when applicable.

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:

Help Request allows designated support contacts to submit new requests for technical assistance and to review or update previous requests.

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. Most code fixes and enhancements listed on the GemStone Web site are available for direct downloading.

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. Some Tips may contain code that can be downloaded for use at your site.

Community provides 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. We also welcome suggestions and ideas for improving and expanding our site to better serve you.

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.

Email: support@gemstone.com

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

Requests for technical assistance may also be submitted 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 as 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.

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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.

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GemStone/S 64 Bit 2.2.4 Release Notes

Overview

GemStone/S 64 Bit 2.2.4 is a new version of the GemStone/S 64 Bit object server. This release provides several new features and fixes a number of bugs; we recommend everyone using or intending to upgrade to GemStone/S 64 Bit 2.x, 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 2.2.3, and version 2.2.4. If you are upgrading from a version prior to 2.2.3, please also review the release notes for each intermediate release to see the full set of changes.

For details about installing GemStone/S 64 Bit 2.2.4 or upgrading from earlier versions of GemStone/S 64 Bit or other GemStone server products, see the *GemStone/S 64 Bit Installation Guide* for version 2.2.4.

Changes and New Features

New methods added

The following methods have been added:

Methods to get commit record page information

System class >> commitRecordPageForSessionId:

Return the page ID of the commit record referenced by the given session ID. The result will usually be a `SmallInteger` but could also be a `LargePositiveInteger`.

Returns -1 if the session does not exist or if it does not currently reference a commit record (such as after a Lost OT root error).

To execute this method for any session other than your current session, you must have the `SessionAccess` privilege.

System class >> latestCommitRecordPageId

Return the page ID of the most recent (newest) commit record on the system.

Methods to get sessions holding oldest commit record

System class >> sessionsReferencingOldestCrInTransaction

Returns the sessions that are in transaction that are referencing the oldest commit record.

System class >> sessionsReferencingOldestCrNotInTransaction

Returns the sessions that are in transaction that are referencing the oldest commit record.

Method to get performance information in microseconds

System class >> microsecondsToRun:

Returns the real-time microseconds which elapsed while evaluating a block of code. The argument must be a zero-argument block.

Checksum methods

ByteArray >> md5sum

String >> md5sum

These methods return the 128 bit MD5 checksum of the receiver as a `LargePositiveInteger`. Computation is per RFC 1321, <http://www.ietf.org/rfc/rfc1321.txt>, using L. Peter Deutsch's C implementation from <http://sourceforge.net/projects/libmd5-rfc/>.

GcUser parameter `sleepTimeBetweenReclaim` now has millisecond resolution

For more precise control over the impact of reclaim, the GcGem now supports millisecond control over the sleep between reclaims. A new parameter named `sleepTimeBetweenReclaimMs` has been added, which is automatically set to 1000x the value of `sleepTimeBetweenReclaim`. The old parameter has been removed.

GemBuilder for C added `Gci_doubleToSmallDouble`

An additional C function has been made available:

```
(OopType) Gci_doubleToSmallDouble(  
    double aFloat  
)
```

If the argument is representable as a `SmallDouble`, return the OOP representing that value, otherwise return `OOP_ILLEGAL`.

Directory permission changes

Formerly, the `installgs` script modified the operating system directory permissions for `$GEMSTONE/data` and `$GEMSTONE/ualib`, to include world write. This has been restricted, to group write. If you use `installgs`, verify the resulting directory permissions are as required for your application usage and security requirements.

In addition, the `/opt/gemstone`, `/opt/gemstone/lock` and `/opt/gemstone/logs` files are now restricted to 770, rather than 777, by the `installgs` script. These directories have ownership and groups changed to match the rest of the GemStone installation.

Ability to control location of locks directory

The environment variable `GEMSTONE_GLOBAL_DIR` can now be specified to indicate where the global GemStone directory for logs and locks is located. Previously, this was always `/opt/gemstone` (except for some older legacy systems that may still use `/usr/gemstone`).

The directory specified in `GEMSTONE_GLOBAL_DIR` must already exist, or the default directory (`/opt/gemstone`) is used. If it does exist, the installation process attempts to create the subdirectories 'log' and 'locks', ignoring any errors in doing so.

For a given repository, all processes that will connect to the stone or shared cache must use the same setting of `GEMSTONE_GLOBAL_DIR`. This includes the gems, topaz, statmonitor, netldi, and so on.

CharacterCollection >> isKeyword semantic change

Previously, `CharacterCollection >> isKeyword` only returned true for `CharacterCollections` representing single-keyword method names, such as `#select`. `CharacterCollections` representing multi-keyword method names, such as `#detect:ifNone:`, would return false. This has been changed; now, `CharacterCollections` with embedded colons (`$:`) will not prevent this method from returning true.

This change was required to fix bug 37969 - see "Symbol >> precedence incorrect for multi-keyword method names" on page 7.

Object notification behavior change

The semantics for object change notification on the addition of new elements to ordered collections has changed. Previously, the method `#inserting:into:at:insertSize:` method was triggered with an index that included any named instance variables in the count. The new logic going forward does not; the index reflects only the indexable elements in the collection.

Voting Change

When doing VM markSweep for voting on possible dead, only do aggressive stubbing if it is configured; that is, if `GEM_TEMPOBJ_AGGRESSIVE_STUBBING` is set to true.

Seaside related features

Pragmas

Pragmas are method components that act as compiler directives, used to annotate or specify metadata about the method. These are provided for Seaside; while the compiler will return encoded pragma information, this information is not stored outside of the Seaside framework.

Pragmas are indicated by angle brackets; for example

```
<keyword1:value1...keywordN:valueN>.
```

When the new method:

```
Behavior >> compileMethod:dictionaries:category:intoMethodDict:  
intoCategories:intoPragmas:
```

is used to compile method source that includes pragma directives, and an Array is passed into the argument for `intoPragmas:`, the compiler will add pragma information to that Array. The information is in the form of tuples of keyword, Array of values. In other words, for the pragma directive `<aa:5 bb: 3>`, the pragma Array would contain:

```
anArray( #'aa:bb:', anArray( 5, 3)).
```

GemStone tools do not retain this information, and the methods

`GsCompiledMethod >> pragmas` and `Behavior >> pragmasForMethod:` will return empty Arrays. GemStone's Seaside support modules include code that store the pragma information for later use.

Improved tools and many bug fixes

Seaside user interface tools have been created and enhanced. In particular, the OmniBrowser-based Monticello tools are now available. For updates on the changes occurring with GLASS, see the GemStone seaside blog at <http://gemstonesoup.wordpress.com>.

In addition, many fixes and enhancements have been made to the GemStone server code that supports GemStone Seaside.

Curly brace Array constructors

For compatibility with Squeak, GemStone syntax has been expanded to allow curly braces `{}` as Array constructors, similar to the way GemStone uses square brackets, with some exceptions:

- ▶ Elements are separated by periods, rather than by commas
- ▶ No initial `#` is required

For example, the following lines will each create similar Arrays:

```
#[ $a, 2, String new ]
{ $a . 2 . String new }
```

Note that curly braces are also used to indicate SelectBlocks for indexed queries. The compiler could previously catch incorrect use of curly braces by checking for the existence of arguments in the SelectBlock. Since curly braces without arguments are now legal, incorrect use of curly braces that previously would have been detected by the compiler may now not show up until runtime.

Updated BNF describing GemStone Smalltalk syntax

The GemStone BNF has been updated to include the modifications for both Pragmas and curly braces.

Also, the complete BNF is now included with the product distribution, in a new file `$GEMSTONE/doc/bnf.txt`.

The following are the updated BNF expressions:

```
CurlyArrayBuilder = '{' [ AExpression { '.' AExpression } ] '}'
MethodBody = [ Pragmas ] [ Temporaries ] [ Statements ]
```

```

Primary = ArrayBuilder | CurlyArrayBuilder | Literal | Path |
        Block | SelectionBlock |
Pragmas = Pragma [ Pragma ]
Pragma = '< PragmaBody '>'
PragmaBody = UnaryPragma | KeywordPragma
UnaryPragma = SpecialLiteral | UnaryPragmaIdentifier
KeywordPragma = PragmaPair [ PragmaPair ]
PragmaPair = [ KeywordNotPrimitive | BinarySelector ] PragmaLiteral
KeywordNotPrimitive is any Keyword other than 'primitive:'
UnaryPragmaIdentifier is any Identifier except 'protected', 'unprotected',
        'requiresVc'
PragmaLiteral = Number | NegNumber | StringLiteral |
        CharacterLiteral | SymbolLiteral | SpecialLiteral
Statements = { [ Pragmas ] { Statement '.' } } [ Pragmas ] [ ['^']
        Statement ['.' [ Pragmas ] ] ]

```

New errors

The following errors have been added:

Error	Error Number	Description
STDB_ERR_PRIMITIVE_IN_PRAGMA	1064	primitive:, protected, unprotected, requiresVc not allowed in pragma.
STDB_ERR_PRAGMA_IN_PRIM	1065	pragma not allowed in a primitive:, protected, unprotected, requiresVc method
RT_ERR_CANNOT_BECOME_GENERIC	2426	Become not allowed. Args: 1) reason, a String.

Bugs Fixed

The following bugs in GemStone/S 64 Bit 2.2.3 have been fixed in GemStone/S 64 Bit 2.2.4.

raisedTo: coredumps when sent to 0

Executing 0 raisedTo: <some integer> caused a SIGFPE, floating point exceptions, which resulted in the session crashing. (#37863)

Floats created from subnormal Large Integers were incorrect

If a subnormal Large Integer was converted into a Float, the mantissa portion was incorrectly calculated and incorrect. This also affected converting Fractions containing subnormal Large Integers. Subnormal Large Integers are LargePositiveIntegers or

LargeNegativeIntegers that are in the current range of SmallInteger; these normally exist only when a pre-2.0 repository containing Large Integers is converted. (#38083)

Float >> raisedToInteger: fails for Large Integer arguments

If the argument to raisedToInteger: was a LargePositiveInteger or LargeNegativeInteger, this method would return a primitive failed error. (#38083)

Float >> roundTo: returns wrong type

When a Float is rounded such that the result is zero, it was incorrectly returning the Integer 0 rather than the Float 0.0. (#37996)

vxfs file system treated as remote

Under some circumstances, GemStone would treat vxfs (Veritas) file system as remote, rather than local. Since GemStone extents are required to be local, this prevented GemStone from starting. (#37865)

'fetch past end' error on return from Block under certain circumstances

Under some circumstances, the method compiler generated incorrect code for a return from a block. The bad code resulted in a corrupt object error, with the given reason 'fetch past end'.

Since the bad bytecodes are generated during recompilation, affected methods must be recompiled for the fix to take effect. (#38184)

become: swapped variance incorrectly

In GemStone/S 64 Bit, using become: to swap a variant object and an invariant object left the variance/invariance with the identity, rather than swapping them along with other object state. (#38058)

GciStoreClassMismatch error during StoreTraversal from a C client

Implementation of StoreTraversal was incorrectly faulting in dead lifetimes of objects when determining whether an object report in the buffer represented store into an already existing object or represented an object creation request. This would produce intermittent error 2246, GciStoreClassMismatch. This only occurred from GCI applications under heavy use that were reclaiming dead objects (#38182)

System>>sessionsReferencingOldestCr only returned sessions in transaction

This method failed to return sessions that were referencing the oldest commit record but which were not in transaction. (#38063)

In addition to fixing the bug in this method, new methods were added to return sessions referencing the oldest commit record that were in transaction and not in transaction:

```
System class >> sessionsReferencingOldestCrInTransaction  
System class >> sessionsReferencingOldestCrNotInTransaction
```

Problems in System class >>fixReferencesAfterConversionFromDirectory:

This method failed for conversions from previous (pre-2.0) versions that did not support the -F conversion option to collect Floats. It also included a typo in handling of the trailing / character. (#38056)

Symbol >> precedence incorrect for multi-keyword method names

Multi-keyword method names, such as #detect:ifNone:, incorrectly returned the precedence number indicating it was a unary selector. (#37969)

Locate>>setCategory:locale: failures on some platforms

On AIX and HP-UX, incorrect C level category codes were being used, causing failures. The internal code now compares against the symbolic category names, to avoid risk of problems on future platform/category changes; performance is not significant in this method. (#37871)

_oopNumberHighWaterMark incorrect after restore

After a restore from backup, System class >> _oopNumberHighWaterMark may have reported incorrect results. (#37829)

Incorrect number of CPUs displayed on AIX

GemStone reported the number of CPUs in the physical box on AIX, while logical partitioning may mean that the number of CPUs actually available to a process is fewer. Now, the available CPUs is reported. (#37958).

Nested exceptions returned with value from wrong level

Nested exceptions may have resumed with the value from the wrong handler. (#38061)

Pass returned from wrong block when nested exceptions

Nested exceptions that returned to a handler that did a pass, returned from the incorrect block. (#37928)

Solaris system level 4 cache stats may be zero

The Solaris level 4 system cache statistics ComplexNetwork and SystemPages were always zero. (#37987)

Race condition between SigAborts and System beginTransaction

If a gem has enabled receipt of sigAborts (via System enableSignaledAbortError), and the stone sent a sigAbort to that session at the same time the gem began a transaction, there was a window which put the gem at risk of seeing the sigAbort while in transaction. (#37839)

Conversion may have failed to set up Segments correctly

Under some circumstances, Segment 20 is required to exist to avoid problems with objects created in versions of GemStone/S 64 Bit that did not support Segments. The conversion code did not always correct set up Segment 20. (#38084)

System primitive failure variable checking error in _reloginAsUser:...

The method System class >> _reloginAsUser:password:encrypted: has a typo in referencing the argument name; it references userId, rather than the correct argument name aUserId. (#38120)