


GemStone/S 64 BitTM

Release Notes

Limited Distribution
Special Release

Version 3.7.1.1

July 2024



INTELLECTUAL PROPERTY OWNERSHIP

This documentation is furnished for informational use only and is subject to change without notice. GemTalk Systems LLC assumes no responsibility or liability for any errors or inaccuracies that may appear in this documentation.

Warning: This computer program and its documentation are protected by copyright law and international treaties. Any unauthorized copying or distribution of this program, its documentation, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted under the maximum extent possible under the law.

The software installed in accordance with this documentation is copyrighted and licensed by GemTalk Systems under separate license agreement. This software may only be used pursuant to the terms and conditions of such license agreement. Any other use may be a violation of law.

Use, duplication, or disclosure by the Government is subject to restrictions set forth in the Commercial Software - Restricted Rights clause at 52.227-19 of the Federal Acquisitions Regulations (48 CFR 52.227-19) except that the government agency shall not have the right to disclose this software to support service contractors or their subcontractors without the prior written consent of GemTalk Systems.

This software is provided by GemTalk Systems LLC and contributors "as is" and any expressed or implied warranties, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose are disclaimed. In no event shall GemTalk Systems LLC or any contributors be liable for any direct, indirect, incidental, special, exemplary, or consequential damages (including, but not limited to, procurement of substitute goods or services; loss of use, data, or profits; or business interruption) however caused and on any theory of liability, whether in contract, strict liability, or tort (including negligence or otherwise) arising in any way out of the use of this software, even if advised of the possibility of such damage.

COPYRIGHTS

This software product, its documentation, and its user interface © 1986-2024 GemTalk Systems LLC. All rights reserved by GemTalk Systems.

PATENTS

GemStone software is or has been covered by U.S. Patent Number 6,256,637 "Transactional virtual machine architecture" (1998-2018), Patent Number 6,360,219 "Object queues with concurrent updating" (1998-2018), Patent Number 6,567,905 "Generational garbage collector with persistent object cache" (2001-2021), and Patent Number 6,681,226 "Selective pessimistic locking for a concurrently updateable database" (2001-2021).

TRADEMARKS

GemTalk, **GemStone**, **GemBuilder**, **GemConnect**, and the GemStone and GemTalk logos are trademarks or registered trademarks of GemTalk Systems LLC, or of VMware, Inc., previously of GemStone Systems, Inc.

UNIX is a registered trademark of The Open Group.

Intel is a registered trademarks of Intel Corporation.

Microsoft, **Windows**, **Windows Server**, and **Azure** are registered trademarks of Microsoft Corporation.

Linux is a registered trademark of Linus Torvalds and others.

Red Hat, **Red Hat Enterprise Linux**, **RHEL**, and **CentOS** are trademarks or registered trademarks of Red Hat, Inc.

Rocky Linux is a trademark or registered trademark of Rocky Enterprise Software Foundation.

Ubuntu is a registered trademark of Canonical Ltd., Inc.

AIX, **Power**, **POWER**, **Power8**, **Power9**, and **VisualAge** are trademarks or registered trademarks of International Business Machines Corporation.

Apple, **Mac**, **macOS**, and **Macintosh** are trademarks of Apple Inc.

Instantiations is a registered trademarks of Instantiations, Inc.

CINCOM, **Cincom Smalltalk**, and **VisualWorks** are trademarks or registered trademarks of Cincom Systems, Inc.

Other company or product names mentioned herein may be trademarks or registered trademarks of their respective owners. Trademark specifications are subject to change without notice. GemTalk Systems cannot attest to the accuracy of all trademark information. Use of a term in this documentation should not be regarded as affecting the validity of any trademark or service mark.

GemTalk Systems LLC

15220 NW Greenbrier Parkway
Suite 240
Beaverton, OR 97006



Table of Contents

Chapter 1. Release Notes for 3.7.1.1

Supported Platforms	5
Changes in this Release	5
Array >> fillFrom:resizeTo:with: removed	5
Array added method	5
RcIdentityBag changes	6
Results of RcIdentityBag >> maxSessionId changed	6
RcIdentityBag added methods	6
GemCommitConflictDetails now accepts 0...3	6
Validating an SNI name against the target host name	6
GsSecureSocket added methods	7
Other added methods to for managing certificates	7
System class added methods	8
Optimizations in TreeDictionary/TreeSet	8
Bugs Fixed	9
Memory issues	9
Memory issues from fillFrom:resizeTo:with:	9
Out of Memory after demanding String>>evaluate	9
Issues with Reduced-conflict collections	9
Failure to detect write conflict after reduced-conflict replay.	9
RcIdentityBag conflicts with unexpected larger sessionIds	9
RcKeyValueDictionary rebuildTable likely to cause commit conflicts	9
After commitRestore, ReclaimGem may not be restarted	9
Memory corruption from hostEasyStatistics*	10

Release Notes for 3.7.1.1

GemStone/S 64 Bit™ 3.7.1.1 is a limited-distribution special release version of the GemStone/S 64 Bit object server, fixing a number of significant bugs and providing a new feature to validate remote SNI names, and included other minor fixes.

These Release Notes include changes between the previous version of GemStone/S 64 Bit, v3.7.1, and v3.7.1.1.

Supported Platforms

GemStone/S 64 Bit version 3.7.1.1 is supported on Linux only, with clients running on Windows and Linux.

Changes in this Release

Array >> fillFrom:resizeTo:with: removed

The primitive that supported `Array >> fillFrom:resizeTo:with:` and `KeyValueDictionary >> fillFrom:resizeTo:with:` did not handle out of memory conditions correctly. This method has been removed.

Array added method

The following method can be used to fill an Array.

Note that code that previously used `fillFrom:resizeTo:with:` will need modification, the Array sizing must be done separately.

```
Array >> fillFrom: startIdx to: endIdx with: anObject
```

Store anObject into instVars startIdx .. endIdx of the receiver. The receiver will be grown if necessary. Attempts to grow the receiver beyond 2034 total instance variables (named and unnamed) signals an error.

RcIdentityBag changes

Results of RcIdentityBag >> maxSessionId changed

The method `RcIdentityBag >> maxSessionId` previously returned the size of the internal components structure. Since there are two entries per `sessionId`, this was incorrect; this method now returns the highest `sessionId` represented in the internal structure. This return value may have further adjustments in future versions.

RcIdentityBag added methods

The following methods have been added to `RcIdentityBag`:

`RcIdentityBag >> maxSessionId: aSessionId`

Force the receiver to include component bags for Ids up to *aSessionId*. This method is not reduced conflict and should not be used while other sessions are modifying the collection.

`RcIdentityBag >> removeOneObject`

Remove and return one object from the receiver. An object that was added by the current session is returned, if possible, otherwise an object added by another session, otherwise nil if the receiver is empty.

GemCommitConflictDetails now accepts 0...3

The gem configuration parameter `GemCommitConflictDetails` previously accepted true or false as an argument. Now, it is a numeric value between 0 and 3 inclusive. 1 and true are equivalent and 0 and false are equivalent. Values of 2 and 3 provide additional tracing of replay operations.

Validating an SNI name against the target host name

`GsSecureSocket` now supports validating that a client connection's SNI name matches a host name in the peer certificate.

By default, this additional validation is not done; the same validation is done as in previous releases.

To enable validation, add the expected host name to the `GsSecureSocket` before making the secure connection, using `GsSecureSocket >> addExpectedHost:` or `GsSecureSocket >> setExpectedHost:.` Multiple hosts can be added to a `Socket`'s expected hosts.

During the connection TLS handshake, if the certificate's names don't match the expected host name, the connection is not completed. This validation is done automatically during the connection, if the expected hosts is set.

To disable validation, set the expected hosts to nil using `GsSecureSocket >> setExpectedHosts: nil.`

The matching can be made more strict by setting additional flags using `GsSecureSocket >> setExpectedHostFlags:.`

GsSecureSocket added methods

GsSecureSocket >> addExpectedHost: *aString*

Adds *aString* to the list of expected host names the receiver will connect to. This method must be executed before the #secureConnect method and only with client sockets. Raises an exception if the receiver is not a client socket, #secureConnect has already been executed, or if *aString* is not a non-empty instance of String.

GsSecureSocket >> setExpectedHost: *aString*

Sets the expected host name that the receiver will connect to. If *aString* is nil, all previously set host names will be cleared and no host name matching will be performed. This method must be executed before the #secureConnect method and only with client sockets. Raises an exception if the receiver is not a client socket, #secureConnect has already been executed, or if *aString* is not a non-empty instance of String or nil.

GsSecureSocket >> setExpectedHostFlags: *anArray*

Sets the flags which control host name matching during TLS session negotiation. By default no flags are set. *anArray* must contain zero or more symbols of the following symbols:

```
#X509_CHECK_FLAG_ALWAYS_CHECK_SUBJECT  
#X509_CHECK_FLAG_NO_WILDCARDS  
#X509_CHECK_FLAG_NO_PARTIAL_WILDCARDS  
#X509_CHECK_FLAG_MULTI_LABEL_WILDCARDS  
#X509_CHECK_FLAG_SINGLE_LABEL_SUBDOMAINS  
#X509_CHECK_FLAG_NEVER_CHECK_SUBJECT
```

An empty array causes all previously set flags to be cleared.

A detailed description of these flags may be found in the OpenSSL documentation at: https://www.openssl.org/docs/man3.0/man3/X509_check_host.html

Other added methods to for managing certificates

The following methods on GsSecureSocket and GsX509Certificate allow you to query for more details about the peer certificate.

GsSecureSocket >> matchedPeerName

Returns a String representing the DNS hostname or subject CommonName from the peer certificate that matched one of the hosts set by the #setExpectedHost: or #addExpectedHost: methods. Returns nil if no host matching was performed. Raises an exception if the receiver is not a client socket or if the secure connection has not been established.

GsSecureSocket >> peerCertificate

Answer an instance of GsX509Certificate representing the peer's certificate. Raises an exception if the receiver has not completed the TLS handshake with its peer. Returns nil if no certificate was sent by the peer. This will always happen if anonymous TLS is used and can happen when certificate verification is disabled.

`GsSecureSocket >> peerCertificateChain`
Answer an instance of `GsX509CertificateChain` containing the peer's certificate chain. Raises an exception if the receiver has not completed the TLS handshake with its peer. Returns nil if no certificate was sent by the peer. This will always happen if anonymous TLS is used and may happen when certificate verification is disabled.

`GsX509Certificate >> isSelfSigned`
Answer a Boolean indicating if the receiver is a self-signed certificate.

`GsX509Certificate >> issuerName`
Returns a string representing the issuer common name of the receiver.

`GsX509Certificate >> isValidNow`
Answer a Boolean indicating if the receiver is valid at this point in time, that is the current time falls within the window between the receiver's 'not before' and 'not after' times.

`GsX509Certificate >> notAfterTime`
Returns a `SmallDateAndTime` representing the 'not after' time of the receiver in GMT.

`GsX509Certificate >> notAfterTimeGmtSeconds`
Returns a `SmallInteger` representing 'not after' time of the receiver expressed as the number of seconds since 00:00:00UTC January 1, 1970.

`GsX509Certificate >> notBeforeTime`
Returns a `SmallDateAndTime` representing the 'not before' time of the receiver in GMT. `GsX509Certificate >> notBeforeTimeGmtSeconds`. Returns a `SmallInteger` representing 'not before' time of the receiver expressed as the number of seconds since 00:00:00UTC January 1, 1970.

`GsX509Certificate >> subjectAlternateNames`
Returns an Array of Strings representing the contents of the subject alternate extension contained in the receiver, or an empty array if the receiver does not contain the extension.

`GsX509Certificate >> subjectName`
Returns a string representing the subject common name of the receiver.

System class added methods

Methods have been added to provide the configuration values for the Gem and Stone in a string format.

`System class >> gemConfigurationReportString`
Returns a String representation of `gemConfigurationReport`.

`System class >> stoneConfigurationReportString`
Returns a String representation of `stoneConfigurationReport`.

Optimizations in `TreeDictionary/TreeSet`

`TreeDictionary/TreeSet` are kinds of `Dictionary/Set` optimized to avoid performance variability in adding elements, added in v3.7.1. There have been a number of optimizations in the supporting code in v3.7.1.1.

Bugs Fixed

Memory issues

Memory issues from fillFrom:resizeTo:with:

The primitive invoked by `Array >> fillFrom:resizeTo:with:` and `KeyValueDictionary >> fillFrom:resizeTo:with:` was subject to out of memory errors. These methods have been removed from the image; see “Array >> fillFrom:resizeTo:with: removed” on page 5.

The use of this method in `KeyValueDictionary` table resize was unnecessary; resetting the collection is just as efficient. (#50990)

Out of Memory after demanding String>>evaluate

Performing a `String >> evaluate` on a `String` with large source strings or containing large method literals may result in an `OutOfMemory Error`. The in-memory GC of `code_gen` is not aggressive enough under these conditions. (#51019)

Issues with Reduced-conflict collections

Failure to detect write conflict after reduced-conflict replay

When two sessions make changes to the same object in an reduced-conflict collection, the second session to commit sees a write-write conflict during commit, selectively aborts, and replays the change. If there was another non-RC commit meanwhile to this same object, such that it should result in a second write-write conflict, it was not detected by the replay. This caused a later Stone crash with errors such as "page NNN already shadowed". (#50235)

RcIdentityBag conflicts with unexpected larger sessionIds

When a new session, that has a `sessionId` greater than any `sessionId` that has previously made changes to an `RcIdentityBag`, adds or removes an element, an internal structure may need to be enlarged. If another session was also making potentially conflicting changes to the `RcIdentityBag`, the replay did not handle this correctly and could trigger a concurrency conflict. (#51033)

RcKeyValueDictionary rebuildTable likely to cause commit conflicts

When multiple sessions are modifying an `RcKeyValueDictionary` and adding keys that were not previously present, the internal structure supporting the dictionary may require rebuilding to a larger size, to accommodate the additional keys. If a commit conflict occurs, the rebuild table is replayed, but it was likely to encounter further commit conflicts. (#51032)

After commitRestore, ReclaimGem may not be restarted

Under rare conditions, after a `commitRestore`, the automatic restart of the `ReclaimGem` may not be performed. (#51001).

Memory corruption from hostEasyStatistics*

The System class methods `hostEasyStatisticsForProcess:` and `hostEasyStatisticsForMyProcess` were added in 3.7.1, for a more performant partial set of statistics. The C code supporting this function had a risk of corrupting static C memory. (#50998)