



GEMTALK
SYSTEMS

GemStone/S 64 Update

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ESUG 2019
Cologne, Germany



GEMTALK
SYSTEMS

Part 1

GemTalk the Company

GemTalk History

- 37 Years of Continuous Operation!
 - Founded: 1982 (as Servio Logic Corporation)
 - First Version of GemStone Shipped: 1986
 - Name Changed from Servio to GemStone: 1995
 - Acquired by Brokat: July 2000
 - Management buyout: June 2001
 - Acquired by VMware: May 2010
 - Acquired by GemTalk Systems: May 2013

GemStone/S Powered Business

Container Shipping Vertical



- since 2016



- since 2000

20% of the world's container shipments are managed by GemStone/S.

13,000,000,000 objects / 2,500 GB

GemStone/S Powered Business

Financial and Trading Vertical

JPMorganChase 

Kapital is the world's leading derivatives trading and management system – since 1993



DBO is a very large precious metals trading and settlement system.
- since 1990



ICE is the world's fastest growing electronic trading exchange
– since 1994

momentum

MAS – Investor call management workflow system. – since 1995

GemStone/S Powered Business

Manufacturing Vertical



Works application for semiconductor manufacturing
– since 1991



Semiconductor manufacturing software – since 1998



Manufacturing software – since 2012



Adhesives Manufacturing – since 1997

GemStone/S Powered Business

Utilities Vertical



TCMS II- Trouble Call Management System V2

Power Billing – Customer Billing Application – since 1992

GemTalk provides remote administration and emergency on-call support to augment FPL staff

GemStone/S Powered Business

Telecommunications Vertical



CONDIS – Inventory and cable management – since 1993



Telecom Service Provisioning – since 2004

GemStone/S Powered Business

Government Vertical



Canada Border Services Agency
Agence des services frontaliers du Canada

Border Security – since 1996



Norwegian Directorate
of Immigration

Visa Processing – since 2004



Dutch Agricultural Institute – agriculture data collection
– since 1998

GemTalk Partners



SIEMENS



CCK. Financial Solutions.



sophisticated simplicity



GemTalk In the Community...

■ Conferences and Groups

- Pharo Consortium (Industrial Member)



- ESUG (Platinum Sponsor)



- FAST (Platinum Sponsor)



- Camp Smalltalk

- Charlotte, NC (March, 2019)
- Portland OR (October, 2019)



ESUG 2019

- Martin – Threads, Critical Sections, Tuesday, 5 pm
- Norm – Roadmap, Wednesday 9 am
- James – Pharo on GS, Wednesday, 9:30 am
- Dale – Turning a Tonal Class File into a Shell Script, Wednesday, 4 pm

- BOF – Wednesday, 16:45, rear courtyard area.

GemTalk – The Next Generation

- Welcome Kurt Kilpela!
- Joined GemTalk on May 6, 2019
- Best Cover Letter Ever:

Early in my education, I was introduced to Smalltalk. Prior to this, my training was in Java, C, and C++. Initially, Smalltalk felt bizarre. In just a few days, I fell in love.





GEMTALK
SYSTEMS

Part 2

GemStone Software: A Lightning Tutorial

**How Many Have A Good
Feel For What
GemStone Is?**

**How Many Have Actually
Used GemStone ?**

So What Is This GemStone Thing?

- A solution to the limitations of traditional Smalltalk:
 1. Object space limited to one VM.
 2. Object space limited to one host.
 3. Object space limited to available RAM.
 4. Object changes (since last image save) lost when VM exits.
- A solution to Object-Relational Mapping
 - Objects are stored as objects in an object repository.
 - No rows, columns, tables, foreign keys, or joins.
 - GemStone is the original NoSQL database.

Welcome To The World Of GemStone!

- Object space visible to thousands of VMs on thousands of machines.
- Object space limited by disk, not RAM.
- Object changes managed by ACID transactions
 - Atomic
 - Consistent
 - Isolated
 - Durable
- Object changes guaranteed persistent once committed.

Key Features Of GemStone

- Scalability
 - Billions of objects
 - Thousands of users.
 - Thousands of machines.
 - Thousands of transactions per second.
 - Terabytes of data.

Key Features Of GemStone

- Concurrency
 - Multiple user sessions.
 - Built-in database transactions.
 - Commit
 - Abort
 - Continue
 - Optimistic Concurrency
 - Reduced Conflict Collections
 - Pessimistic Concurrency
 - Object-level read/write locks.
 - Namespaces
 - Shared and private.

Key Features Of GemStone

- Security
 - Object-level security.
 - User, group, world permissions.
 - Login Security
 - User-id / Password
 - Single-Sign-On (GSSAPI / Kerberos)
 - LDAP
 - PAM
 - X509 Certificate
 - Administrative Privileges
 - #GarbageCollection
 - #OtherPassword
 - #SystemControl

Key Features Of GemStone

- 100% Smalltalk (*"It's turtles, all the way down"*)
 - All objects, all the time.
 - Classes, methods, blocks, exceptions.
 - ANSI Smalltalk compliant

Key Features Of GemStone

- Very Large Collection Support
 - Collections of millions of objects.
 - Optimized searches using b-tree Indexes:
 - Equality Indexes ($a = b$)
 - *AllEmployees detect:{:each| each.lastName = 'Ducasse' }*
 - Identity Indexes ($a == b$)
 - *AllEmployees select:{:each| each.countryOfOrigin == #France }*

Key Features Of GemStone

- Interfaces to Other Smalltalks
 - VisualWorks® - GemBuilder for VisualWorks®
 - VA Smalltalk® - GemBuilder for VA Smalltalk®
 - Pharo – tODE (open source)
 - Jade / Jadeite (Dolphin, open source)
 - gt4Gemstone
- Interfaces To Other Languages
 - C/C++ - GemBuilder for C
 - Java – GemBuilder for Java
- Interfaces to Relational Databases
 - Oracle – GemConnect for Oracle
 - Sybase – GemConnect for Sybase (open source)

GemStone/S 64 Platforms

- Server (Database)
 - Linux x86_64
 - Apple Darwin 64 bit
 - Oracle Solaris amd64
 - Oracle Solaris SPARC 64 bit
 - IBM AIX PowerPC 64 bit
- Client
 - All of the above, and:
 - Microsoft Windows 7, 8, 10
 - Raspberry Pi (experimental)

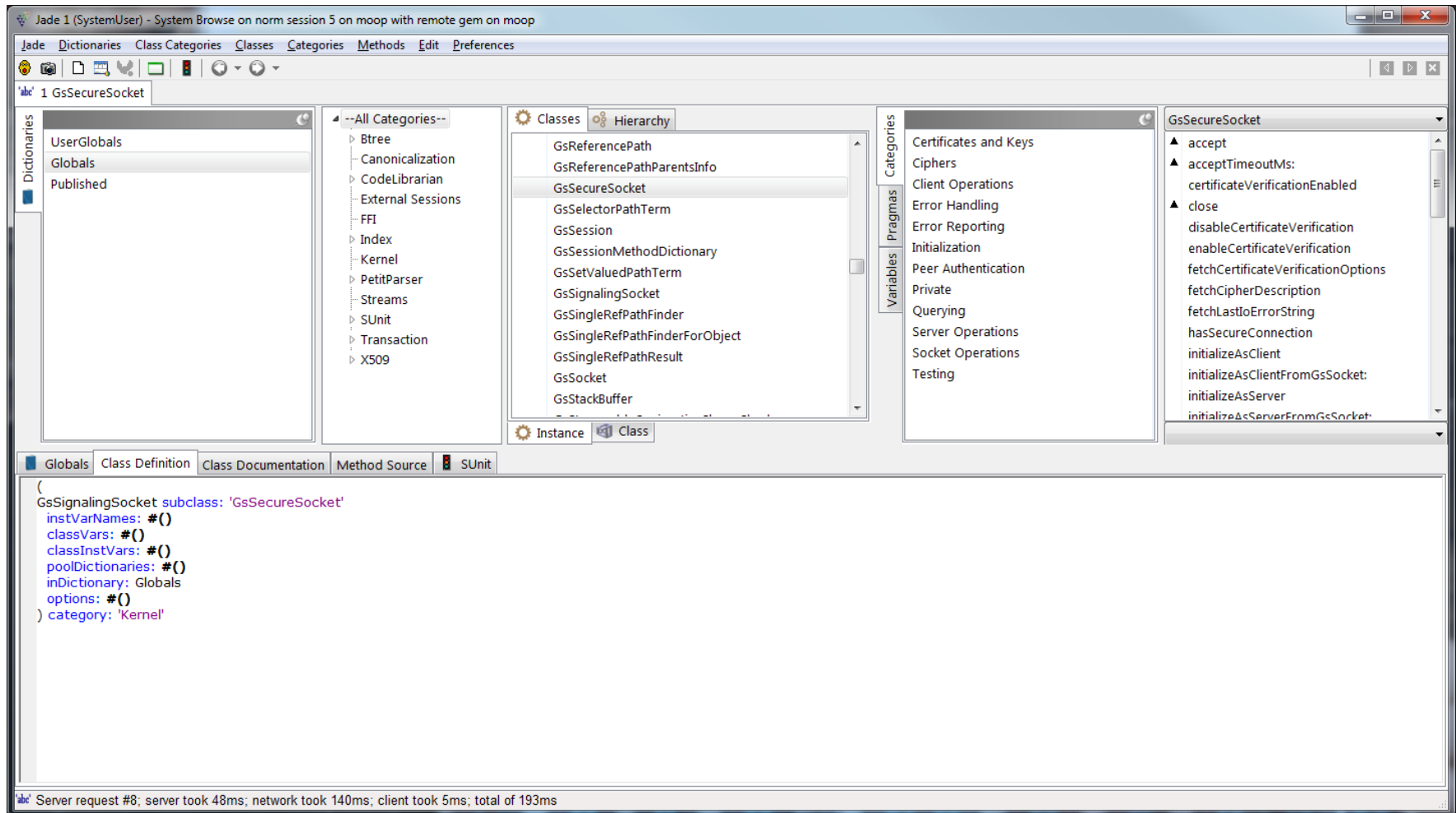
GemBuilder for Smalltalk (GBS) Platforms

- Cincom[®] VisualWorks[®] 8.3.2, 7.10.1
 - MS Windows 7/8 32 bit
 - MS Windows 7/8/10 64 bit
 - Linux 32/64 bit
- Instantiations VA Smalltalk[™] 9.1, 8.6.3
 - MS Windows 7/8

Jade IDE

- Open source IDE for all versions of GemStone
- Written in Dolphin Smalltalk by James Foster
- MS Windows only
- Supports all versions of GemStone
- Free of charge
- Rich set of tools
 - Browsers
 - Inspectors
 - Debuggers
- <https://github.com/jgfoster/Jade>

Jade System Browser



The screenshot displays the Jade System Browser interface. The main window title is "Jade 1 (SystemUser) - System Browse on norm session 5 on moop with remote gem on moop". The interface includes a menu bar (Jade, Dictionaries, Class Categories, Classes, Categories, Methods, Edit, Preferences) and a toolbar. The left sidebar shows "Dictionaries" with "UserGlobals", "Globals", and "Published". The central area is divided into "Classes" and "Hierarchy" views, with "GsSecureSocket" selected. The right sidebar shows "Categories" and "Pragmas" for "GsSecureSocket". The bottom pane shows the class definition code:

```
(
GsSignalingSocket subclass: 'GsSecureSocket'
instVarNames: #()
classVars: #()
classInstVars: #()
poolDictionaries: #()
inDictionary: Globals
options: #()
) category: 'Kernel'
```

At the bottom of the window, a status bar displays: "Server request #8; server took 48ms; network took 140ms; client took 5ms; total of 193ms".

Jadeite IDE

- Fork of the Jade project
- Currently in development at GemTalk for a customer in Europe
- Support for source code control with Rowan and Git
- Support for Tonal file format
- Migration tools from other SCM systems

GemStone/S Licensing Models

- Community Editions
 - Free (as in beer) for any use (including commercial)
 - Now includes GemBuilder for Smalltalk !
- Perpetual
 - Buy once, own it forever
- Annual Subscription
 - Pay annually, cancel any time.
- Value Added Reseller (VAR)
 - Percentage of royalties

GemStone Community Edition

	Starter	Limited	Full	Extended SPC	Extended CPU	Extended Full
License Kind	Perpetual	Subscription	Subscription	Subscription	Subscription	Subscription
Cores	2	2	2	2	4	4
SPC	1 G	2 G	2G	4G	2G	4G
Gems	10	20	Unlimited	Unlimited	Unlimited	Unlimited
Disk	10G	50G	Unlimited	Unlimited	Unlimited	Unlimited
Development DB	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Production DB	1	2	Unlimited	Unlimited	Unlimited	Unlimited
Tech Support	Community	Community	5 tickets	10 tickets	10 tickets	20 tickets
Price	Free	Free	\$1500/yr	\$3000/yr	\$3000/yr	\$6000/yr
Distribution	With Product	Email addr	Sales	Sales	Sales	Sales

Support Models

- Web Support (24 x 7)
 - <https://techsupport.gemtalksystems.com>
 - Help requests processed 8 am – 5 pm Pacific Time
- Emergency 24 x 7 Support
 - Available for a premium
 - GemTalk provides an emergency phone number
 - Call back to the customer within 15 minutes
- Mailing Lists
 - GLASS – Open source projects: Seaside / GLASS / tODE
 - GemStone Smalltalk – GemStone-specific
 - Sign up at:
 - <https://lists.gemtalksystems.com/mailman/listinfo/>



GEMTALK
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Part 3

Roadmap

GS/64 Server Releases

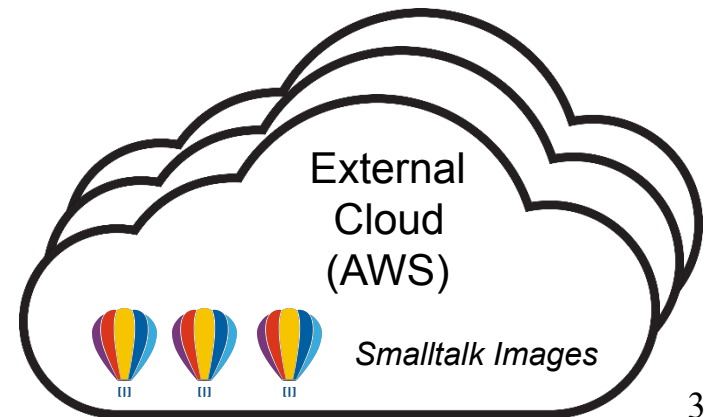
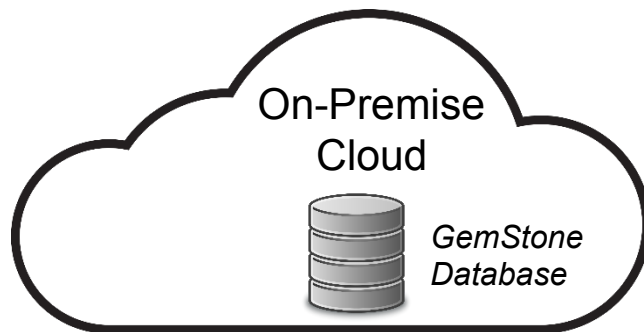
- Version 3.6
 - Summer, 2020
- Version 3.5
 - 3.5.0: June, 2019
 - 3.5.1: Q4-2019
- Version 3.4
 - 3.4.4: July 2019
 - 3.4.5: TBD

GBS for VisualWorks® Release Pipeline

- Version 8.4
 - 8.4.0: June 2019
 - 8.4.1: TBD
- Version 8.5
 - Summer 2020

New In Version 3.5

- GemStone/64 in the Hybrid Cloud
 - X509 Certificate security for all connections
 - Login with certificate, CA cert and private key
 - Cloud / Firewall-friendly network connections
 - Tolerance for high latency networks (aka the Internet)
 - Object Filtering
 - Restrict which objects may/may not go to the cloud



New In Version 3.5

- Solo Smalltalk Execution
 - No running database required!
 - Execute Smalltalk code from the command line

```
topaz> set solologin on
topaz> login
[Info]: LNK client/gem GCI levels = 35001/35001
[Info]: Read-Only Repository: /export/koop2/users/normg/product/bin/extent0.dbf
successful Solo login
send GsSecureSocket httpsClientExampleForHost: 'www.google.com' certificateDirectory: '/etc/ssl/certs'
Secure connection established
Current cipher in use is: ECDHE-RSA-CHACHA20-POLY1305 TLSv1.2 Kx=ECDH Au=RSA Enc=CHACHA20/POLY1305(256) Mac=AEAD
Sending a 40 byte request to client: GET / HTTP/1.1 Host: www.google.com
Waiting for response from server...finished reading 1397 bytes from server.
HTTP/1.1 200 OK
Date: Fri, 31 Aug 2018 19:00:46 GMT
Expires: -1
Cache-Control: private, max-age=0
Content-Type: text/html; charset=ISO-8859-1
...
```

Solo Mode Script Example

```
#!/usr/bin/env topaz
set solologin on
set u DataCurator p swordfish
login
run
| c |
"Get dir contents"
c := GsFile contentsOfDirectory: '/home/normg/local/gartst' onClient: false .
"select files larger than 64K"
^ c select:[:e| |stat|
    stat := GsFile stat: e isLstat: false.
    stat _isSmallInteger not and:[stat isDirectory not and:[stat size > 65536 ]]
].
%
quit
```

```
normg@moop>solo.tpz |grep \# |egrep -v "\|"
#1 /export/moop3/users/normg/gartst/gem_29147.code_log
#2 /export/moop3/users/normg/gartst/gem_29125.code_log
#3 /export/moop3/users/normg/gartst/gem_17645.code_log
#4 /export/moop3/users/normg/gartst/gem_29106.code_log
#5 /export/moop3/users/normg/gartst/gem_29119.code_log
#6 /export/moop3/users/normg/gartst/gem_16461.code_log
#7 /export/moop3/users/normg/gartst/gem_29140.code_log
#8 /export/moop3/users/normg/gartst/gem_15972.code_log
```

New In Version 3.5

- New Public Key Infrastructure (PKI) Classes
 - Object
 - GsTlsCredential
 - GsTlsPublicKey
 - GsTlsPrivateKey
 - GsX509Certificate
 - Array
 - GsX509CertificateChain

New In Version 3.5

- Support for Latest Crypto Algorithms
 - Message Digests
 - SHA3 (224, 256, 384, 512 bits)
 - HMAC
 - Authenticated Encryption Modes
 - OCB, GCM, ChaCha20
- Support for Digital Signatures
 - Sign with private key, verify with public key

New In Version 3.5

- Support for Digital Envelopes
 - Securely exchange messages or objects over insecure link
 - Requires 2 key pairs for both sender and receiver
 - Encryption keys (public/private)
 - Signing keys (public/private)
 - Class Hierarchy:
 - Object
 - GsDigitalEnvelope
 - Sender:
 - Encrypt message with recipient's public key
 - Sign message with sender's private key
 - Recipient:
 - Decrypt message with recipient's private key
 - Verify message signature with sender's public key

New In Version 3.5

- Remove 2 Spin Locks From Shared Memory
 - Free Fame Lock
 - Free Page Cache Entry Lock
- Replace with Atomic Bit Arrays
 - Bits set/cleared using atomic assembler instructions
 - Avoids spinning (aka waiting) for a lock.

Upcoming In Version 3.6

- Support for DARE (Data At Rest Encryption)
 - Optional encryption of database extents and tranlogs
 - Encryption done at the database page level
 - Each page is encrypted individually
 - Salt: hashed page ID
 - Uses XTS-AES Encryption
 - XTS == *XEX-based tweaked-codebook mode with ciphertext stealing*
 - Support for 128 and 256 bit XTS keys
 - XTS is supported by: *BestCrypt, TrueCrypt, VeraCrypt, DiskCryptor, MS Bitlocker, wolfCrypt.*
 - Private key (and passphrase) required to start the an encrypted GemStone database.

Upcoming In Version 3.6

- Support for DARE (Data At Rest Encryption)

- Creating an encrypted database extent:

```
$GEMSTONE/bin/copydbf -e dbCert.pem -s 128 \  
-K /home/normg/certs \  
$GEMSTONE/data/extent0.dbf $GEMSTONE/data/extent0.sdbf
```

- Starting an encrypted database:

```
$GEMSTONE/bin/startstone -D dbPrivateKey.pem \  
-J ~/secrets/passphrase.txt -K /home/normg/keys \  
-z $GEMSTONE/data/system.conf normstone
```

Upcoming In Version 3.6

- Substring Indexed Queries (maybe)
 - Search an indexed collection for a substring
- Regex Indexed Queries (maybe)
 - Search an indexed collection for keys that match a regex expression.
- Native Support for Pharo Clients (maybe)
- Native Support for the Rowan Package Manager
 - Support for FileTree and Tonal formats
 - No Monticello / Metacello required

Upcoming In Version 3.6

- Better Instance Migration (maybe)
- Vision (no code yet):
 - User Provides:
 - List of old classes
 - List of new classes
 - Blocks to migrate old instances to new
 - GemStone Will:
 - Start multiple C threads to scan the database and migrate the instances.
 - Commit all migrations at the end in one logical transaction.

Upcoming In Version 3.6

- <Your Suggestions Here>
- Send us your suggestions, feedback and feature requests.
- How ?
 - Email
 - Mailing Lists
 - Sign up at: <https://lists.gemtalksystems.com/mailman/listinfo/>
 - Twitter: @GemTalkSystems

Questions?

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