



## **GemStone Update**

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**GEMTALK**  
SYSTEMS

## **Part 1**

# **GemTalk the Company**

# Our History

- 40 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 Powered Business

## Financial and Trading Vertical

 JPMorganChase

**Kapital** is the world 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



**MMI Holdings** – Financial portfolio management system. – since 1995



**Lifeware** – Cloud-based insurance management solutions – since 2000



**Guava** – Financial & treasury Software – since 1998

# GemStone 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 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

The logo for Atos, consisting of the word "Atos" in a bold, blue, sans-serif font.

*CONDIS* – Inventory and cable management – since 1993

The logo for Telecom, featuring the word "TELECOM" in a bold, black, sans-serif font above a blue, curved, wave-like graphic.

Telecom Service Provisioning for Argentina – since 2004

The logo for SPL TELE, featuring the letters "SPL" in a large, blue, sans-serif font, followed by "TELE" in a smaller font, and three small colored squares (blue, green, and red) to the right.

Telecom Workflow Management – since 2013

# GemStone 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

**HOKUS**



# GemTalk In the Community...

- **Conferences and Groups**

- Pharo Consortium (Industrial Member)



- ESUG (Platinum Sponsor)



- FAST (Platinum Sponsor)

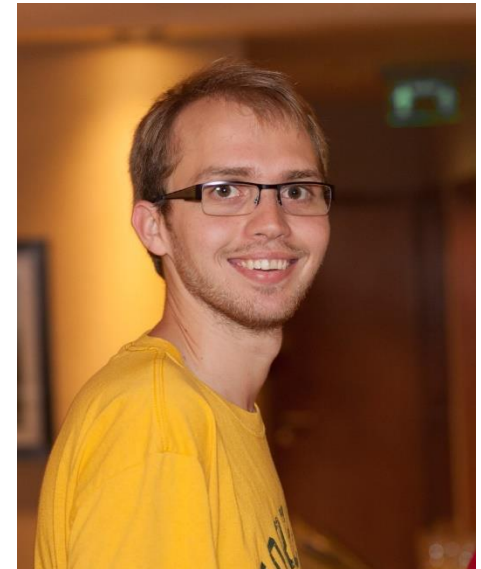


- Camp Smalltalk Supreme (Gold Sponsor)

# GemTalk – The Next Generation

- Welcome Kurt Kilpela!
- Joined GemTalk on May, 2019
- From Kurt's Cover Letter:

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



# GemTalk – The Next Generation

- Welcome Andres Valloud!
- Joined GemTalk on June, 2022
- Part-time while he finishes his PhD.



# GemTalk Is Hiring!

- Want to write Smalltalk and get paid \$\$ for it?
- Advanced Quality Assurance Engineers
- SUnit Test Development
  - [resumes@gemtalksystems.com](mailto:resumes@gemtalksystems.com)



**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.



# 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, GsDevKit, Sparkle, gt4Gemstone
  - Jade / Jadeite (Dolphin, open source)
- Interfaces To Other Languages
  - C/C++ - GemBuilder for C
  - Java – GemBuilder for Java
- Interfaces to Relational Databases
  - Oracle – GemConnect for Oracle
  - Postgres – GemConnect for Postgres
  - Sybase – GemConnect for Sybase (open source)

# GemStone/S 64 Platforms

- Object Server (Database)
  - Linux: x86\_64, arm64
  - Apple MacOS: x86\_64, Apple Silicone (M1 & M2)
  - Oracle Solaris: x86\_64
  - IBM: AIX PowerPC 64 bit
  - Raspberry Pi ARM64
- Object Clients
  - All of the above, and:
    - Microsoft Windows 7, 8, 10,11



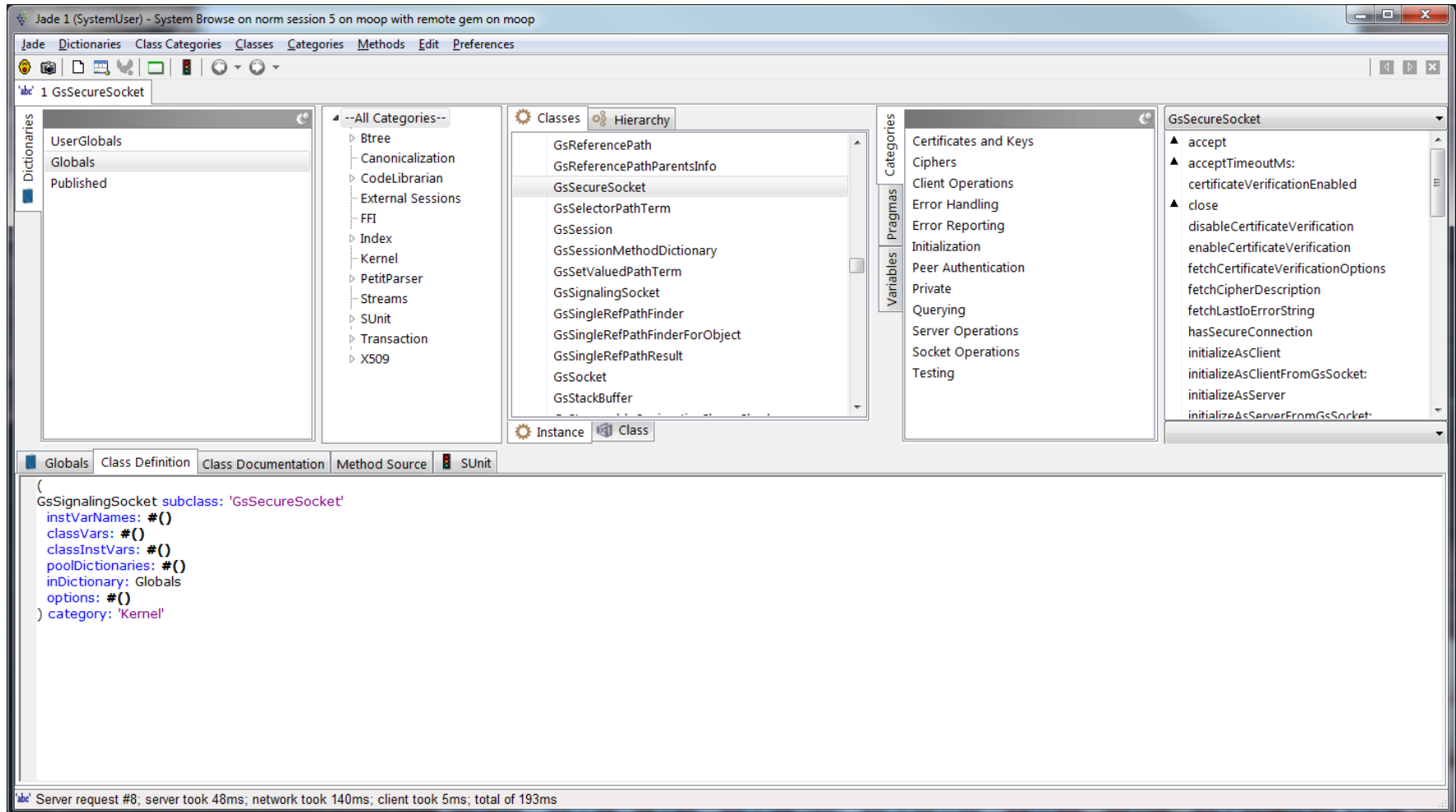
# GemBuilder for Smalltalk (GBS) Platforms

- Cincom<sup>®</sup> VisualWorks<sup>®</sup> 9.1
  - MS Windows 7/8/10 64 bit
  - Linux 32/64 bit
- Instantiations VA Smalltalk<sup>™</sup> 9.1, 8.6.3
  - MS Windows 7/8/10

# 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 shows the Jade System Browser interface. The main window displays the class hierarchy for `GsSecureSocket`. The left pane shows a list of dictionaries, and the middle pane shows a tree view of categories. The right pane shows the class hierarchy, with `GsSecureSocket` selected. The bottom pane shows the class definition for `GsSecureSocket`.

```

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

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)
- 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
<b>License Kind</b>	Perpetual	Subscription	Subscription	Subscription	Subscription	Subscription
<b>Cores</b>	2	2	2	2	4	4
<b>SPC</b>	1 G	2 G	2G	4G	2G	4G
<b>Gems</b>	10	20	Unlimited	Unlimited	Unlimited	Unlimited
<b>Disk</b>	10G	50G	Unlimited	Unlimited	Unlimited	Unlimited
<b>Development DB</b>	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
<b>Production DB</b>	1	2	Unlimited	Unlimited	Unlimited	Unlimited
<b>Tech Support</b>	Community	Community	5 tickets	10 tickets	10 tickets	20 tickets
<b>Price</b>	Free	Free	\$1500/yr	\$3000/yr	\$3000/yr	\$6000/yr
<b>Distribution</b>	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**  
SYSTEMS

**Part 3**  
**Roadmap**



# GS/64 Server Releases

- Version 3.7
  - Late 2022 / early 2023
- Version 3.6.x
  - 3.6.5: July 2022
- Version 3.5.x
  - 3.5.8: February 2022
  - 3.5.9: October 2022
- Version 3.4.x
  - 3.4.6: February 2021

# New 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
  - Encryption Mode: XTS-AES
    - 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 encrypted GemStone database.

# New In Version 3.6

- Support for DARE (Data At Rest Encryption)

- Encrypt / decrypt via copydbf utility

- 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
```

# New In Version 3.6

- Restricted *System >>performOnServer*:
  - If enabled, each UserProfile has a whitelist of permitted *performOnServer*: commands.
  - Only commands on the whitelist may be executed.
  - Default whitelist is empty.
  - Example of adding a permitted command (git)

```
|up|  
up := AllUsers userWithId: 'normg' .  
up addPrivilege: 'NoPerformOnServer' ;  
    addPerformOnServerCommands: (Array with: '/usr/bin/git') .
```

# New In Version 3.6

- 4 New Special Classes
  - Also known as *immediate objects*
  - Value encoded in the object ID
  - Never occupy disk space
    - SmallDate
    - SmallDateAndTime
    - SmallScaledDecimal
    - SmallTime

# New In Version 3.6

- **gslist output as JSON:**

```
normg@moop>gslist -j
{"GemStoneServers":[
  {
    "Name":"norm",
    "Host":"moop",
    "HostId":"b6f9ea8dee7eca73",
    "Ip":"10.94.141.31",
    "Status":"Exists",
    "Type":"Stone",
    "Version":"3.6.0",
    "Creator":"normg",
    "Started":"2020-09-21T12:44:59.000-07:00",
    "Pid": 7733,
    "Port": 38423, ...
```

# New in Version 3.6

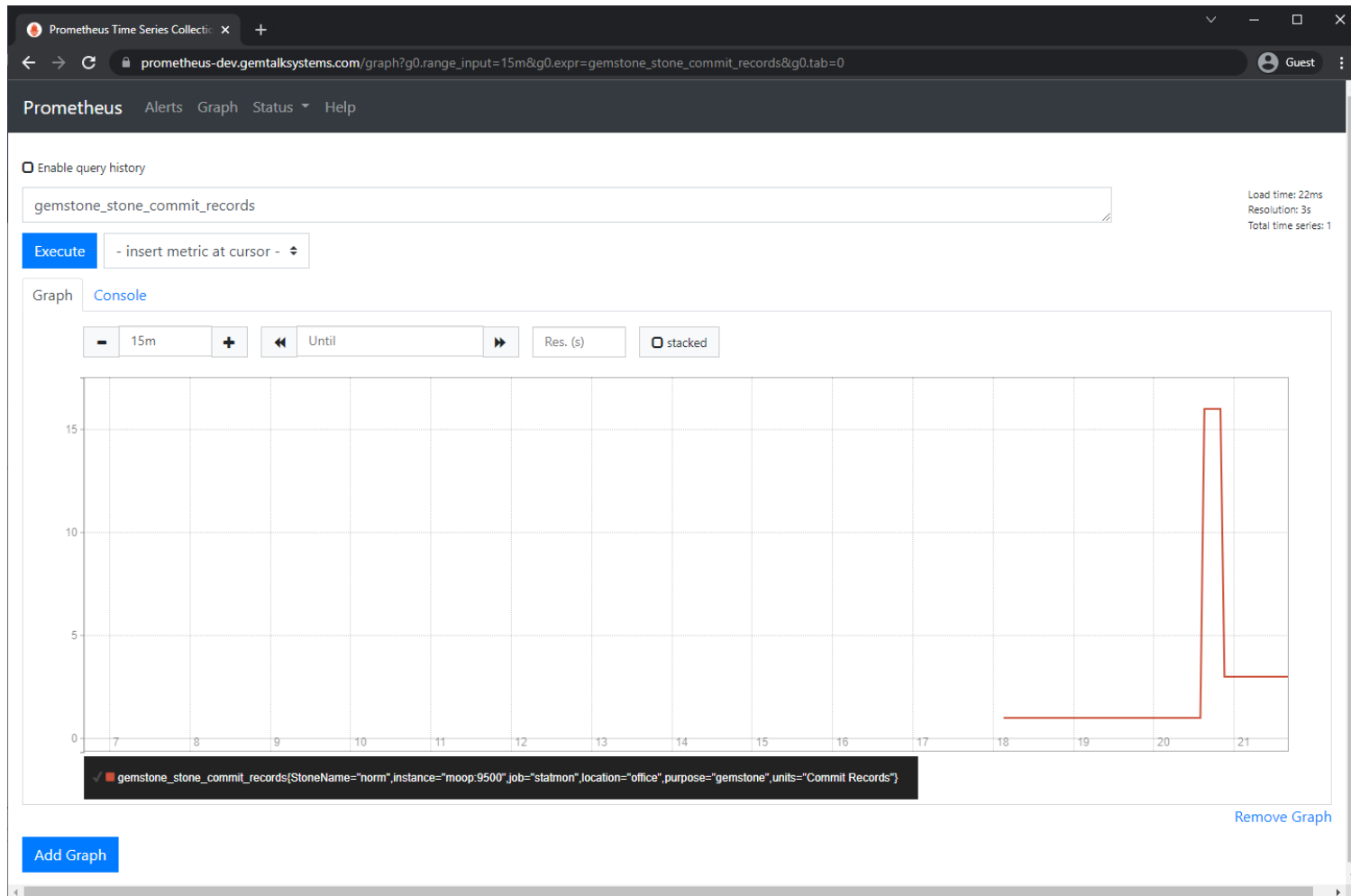
- Amazon AWS Customer Master Key (CMK) Support
  - Encrypted data stored in GemStone.
  - Encryption keys managed by AWS.
  - Cloud user controls if/when data is unlocked and accessed.

# Coming in Version 3.7

- Support Monitoring GemStone by Prometheus
  - *“Prometheus is an open-source systems monitoring and alerting toolkit originally built at SoundCloud. Since its inception in 2012, many companies and organizations have adopted Prometheus, and the project has a very active developer and user community. It is now a standalone open source project and maintained independently of any company.”*  
- <https://prometheus.io>



# Prometheus Monitoring Sample



# Coming in Version 3.7

- Faster Smalltalk VM on x86\_64
  - Native code generator optimized by Andres Valloud
  - Reduce number of instructions and number of branches
  - Better branch prediction
  - Average ~35% improvement

# Coming in Version 3.7

- MS Azure Customer Master Key (CMK) Support
  - Encrypted data stored in GemStone.
  - Encryption keys managed by Azure.

# Coming in Version 3.7

- Fast Instance Migration
  - Migrate and commit all instances of up to 2000 classes in a single operation.
  - Multi-threaded: uses multiple C threads for speed.
  - Typical Use Case: Add a new instance variable.

# Coming in Version 3.7

- ssh Support
  - New Class: GsSshSocket
  - Execute remote commands via ssh
- sftp Support
  - New Classes: GsSftpSocket, GsSftpRemoteFile
  - Upload and download files via sftp

# Coming in Version 3.7

- Faster Read Streams on Strings
  - New Class: ReadByteStream
  - Optimized for reading String and byte objects.

# Version 3.7 and Beyond...

- Native ROWAN support
  - ROWAN is a new package manager that supports FileTree and Tonel repositories.
  - <https://github.com/GemTalk/Rowan>
- Pharo Support (Sparkle)
  - *Not* GBS for Pharo
  - Inspectors and debuggers
  - Work In progress.
  - <https://github.com/GemTalk/Sparkle>
  - No GA date yet.
  - Martin's UK Smalltalk talk: <https://vimeo.com/676889959>
  - ~~More in Martin McClure's talk Thursday @ 9 am~~

# New Open-Source Projects

- GemConnect for Postgres
  - 100% Smalltalk code via FFI
  - Requires GemStone/64 v3.6.2 or later
  - Available as open source on github:
    - <https://github.com/GemTalk/GemConnect-for-Postgres>
- GemConnect for RabbitMQ
  - 100% Smalltalk code via FFI
  - Requires GemStone/64 v3.6.4 or later
  - Available as open source on github:
    - <https://github.com/GemTalk/GemConnectForRabbitMQ>



# Questions?

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