GemTalk Systems

GemStone/S 64 Update (with jokes!)

Norm Green
Senior VP & CTO

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Agenda

- So what is this *GemStone* thing you speak of?
- GemStone/S 64 v 3.3
- GemStone/S 64 v 3.4
- Licensing Options

Q: How can you tell an extroverted programmer from an introverted programmer?

A: An extroverted programmer looks at *your* shoes when he talks to you.

XP Implemented….

How Many Have A Good Feel For What GemStone Is?

How Many Have Actually Used GemStone ?

So What Is This GemStone Thing You Speak Of?

- 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 Magical 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
    - Traditional User-id / Password
    - Single-Sign-On (GSSAP/Kerberos) (coming soon)
    - LDAP
    - PAM
  - Administrative Privileges
    - #GarbageCollection
    - #OtherPassword
    - #SystemControl

Key Features Of GemStone

- 100% Smalltalk
  - All objects, all the time.
  - Classes, methods, blocks.
  - ANSI Smalltalk compliant (mostly)

Key Features Of GemStone

- Very Large Collection Support
  - Collections of millions of objects.
  - Optimized searches using b-tree Indexes:
    - Equality Indexes (a = b)
    - Identity Indexes (a == b)

Key Features Of GemStone

- Interfaces to Other Smalltalks
  - VisualWorks® - GemBuilder for VisualWorks®
  - VA Smalltalk® - GemBuilder for VA Smalltalk®
  - Pharo – tODE (open source)
- 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)

Agile or Fragile?

GemStone/S 64 Versions

- Latest Release: 3.3.1 (June, 2016)
- Next Major Release: 3.4 (Spring, 2017)

GemStone/S 64 3.3

- Smalltalk Virtual Machine Performance
  - Improved native code generation.
  - Optimize native code for branch prediction.
  - Improved math performance, especially integer math.
  - Average overall improvement:
    - 25% faster vs. GS/64 3.2

GemStone/S 3.3

- Faster Tranlog Restore
  - Optimize object table generation during restore.
  - ~30% improvement
  - Affects:
    - #restoreFromLogs
    - Hot Standby Systems

GemStone/S 64 3.3

- SmallFraction
  - New immediate (special) class.
    - Value encoded in the object.
    - Guaranteed canonical.
  - Numerator Range:
    - -268435456 to 268435455
  - Denominator Range:
    - 1 to 134217727

GemStone/S 64 3.3

- GsFile Improvements
  - Native UTF8 Support
  - Methods Now Implemented as Primitives:
    - `next`
    - `nextPut:`
    - `_peek:`
    - `_seekTo: opcode:`
    - `isCompressed`
    - `position`

GemStone/S 64 3.3

- Support LZ4 Data Compression
  - *"LZ4 is lossless compression algorithm, providing compression speed at 400 MB/s per core (0.16 Bytes/cycle). It also features an extremely fast decoder, with speed in multiple GB/s per core (0.71 Bytes/cycle)."* -http://cyan4973.github.io/lz4/
  - Up to 10X faster than zlib (aka gzip).
  - Compression ratio slightly worse than zlib.

GemStone/S 64 3.3

- 3.3 LZ4 Support:
  - Remote Gem to Page Server
  - Remote GCI (ST Image) to Gem
  - Stone to Remote Shared Page Cache(s)
  - Stone to hot standby server(s).

GemStone/S 64 3.3

- Remote Gem to Page Server Encryption
  - Remote Gem to Page Server connection may now use SSL/TLS.
  - Enabled with new `GEM_PGSVR_USE_SSL` option.
  - Remote client to Gem connection already uses SSL/TLS.

GemStone/S 64 3.3

- Start statmonitor automatically
- Supports various wildcard args from strftime(3)
- New Configuration parameters:
  - `STN_STATMONITOR_ARGS`
    - At stone startup
  - `GEM_STATMONITOR_ARGS`
    - At remote cache startup
  - `STN_STATMONITOR_MID_CACHE_ARGS`
    - At mid-level cache startup

GemStone/S 64 3.3

- Make `pageaudit` Command Multi-threaded
  - Used to audit the repository for page-level consistency.
  - Up to 20 X faster than 3.2

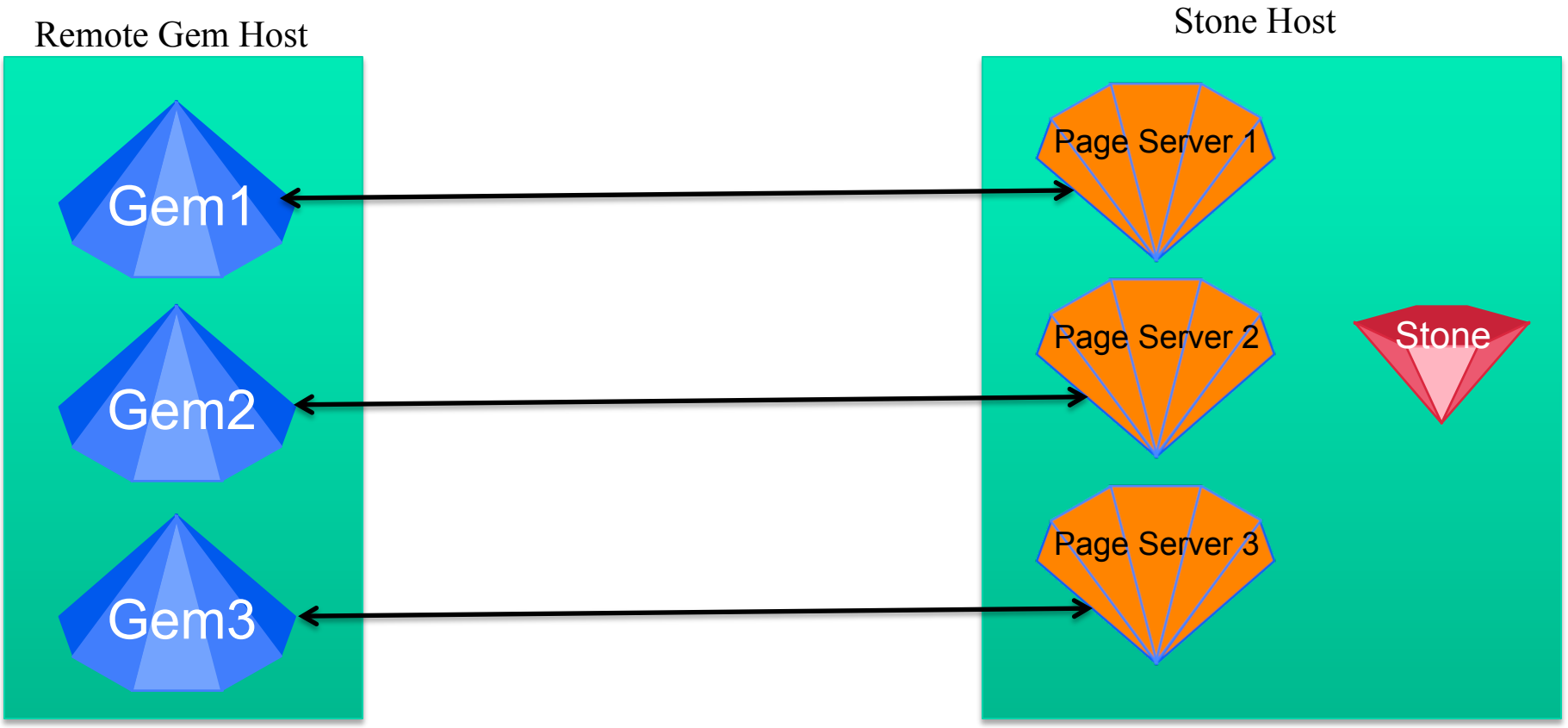
GemStone/S 64 3.3

- Object Canonicalization Framework
  - A framework of classes that may be used to canonicalize instances of domain classes.
    - AbstractReferencingObjectPolicy
    - ReferencingObjectPolicy
    - CanonicalObjectManager
    - CanonicalObjectPolicy
    - CanonicalObjectRegistry
- Developed by a GemTalk – Customer partnership.

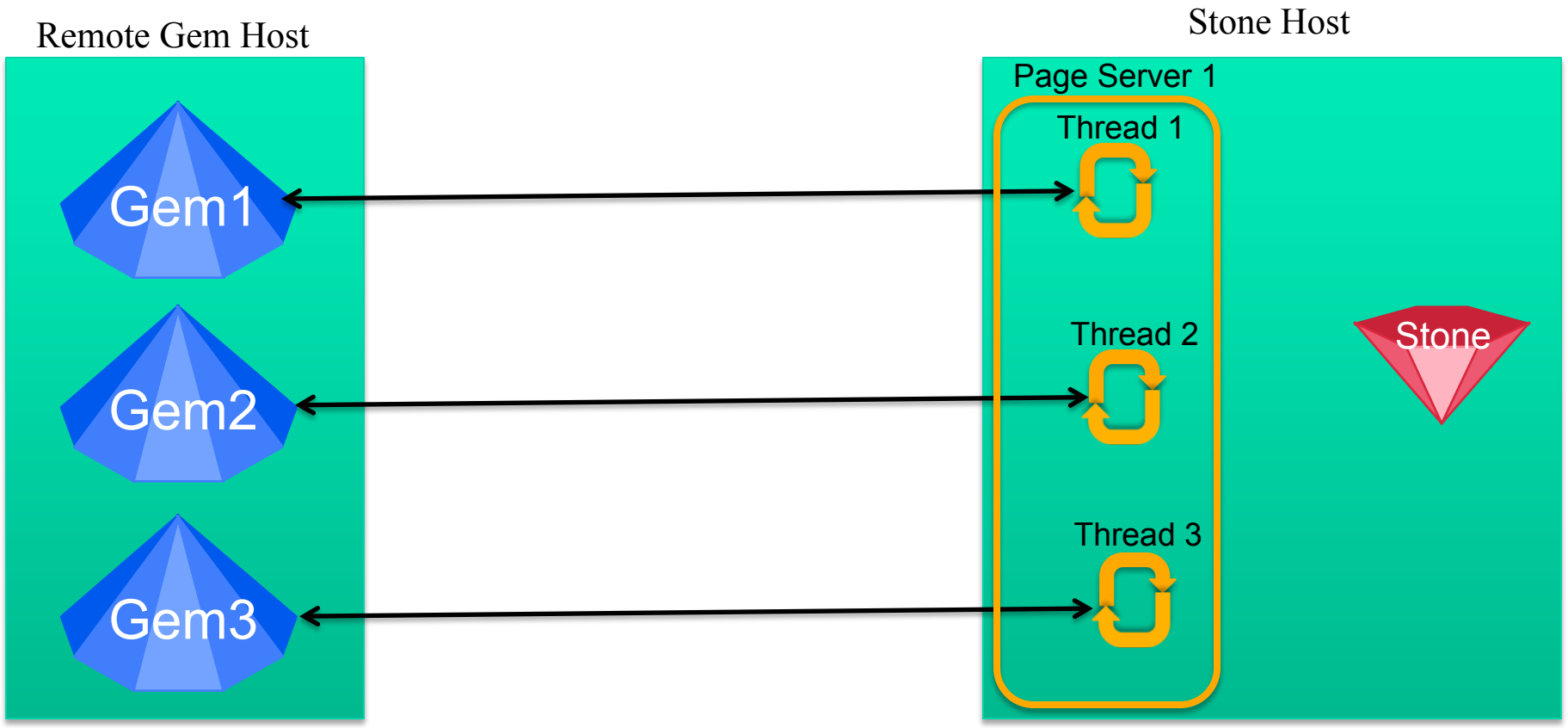
GemStone/S 64 3.3

- Page Server Changes
  - Previously (before 3.3)
    - 1 process (page server) is started for 1 remote gem.
    - 3000 sessions == 3000 page servers!
    - Page Table Memory Problems (especially Linux)
  - Now (3.3 and later)
    - 1 page server process is started for *all* gems on a remote host.
    - 1 thread is started for 1 remote gem.
    - Each remote gem uses 1 native thread in the page server.

3.2 Architecture



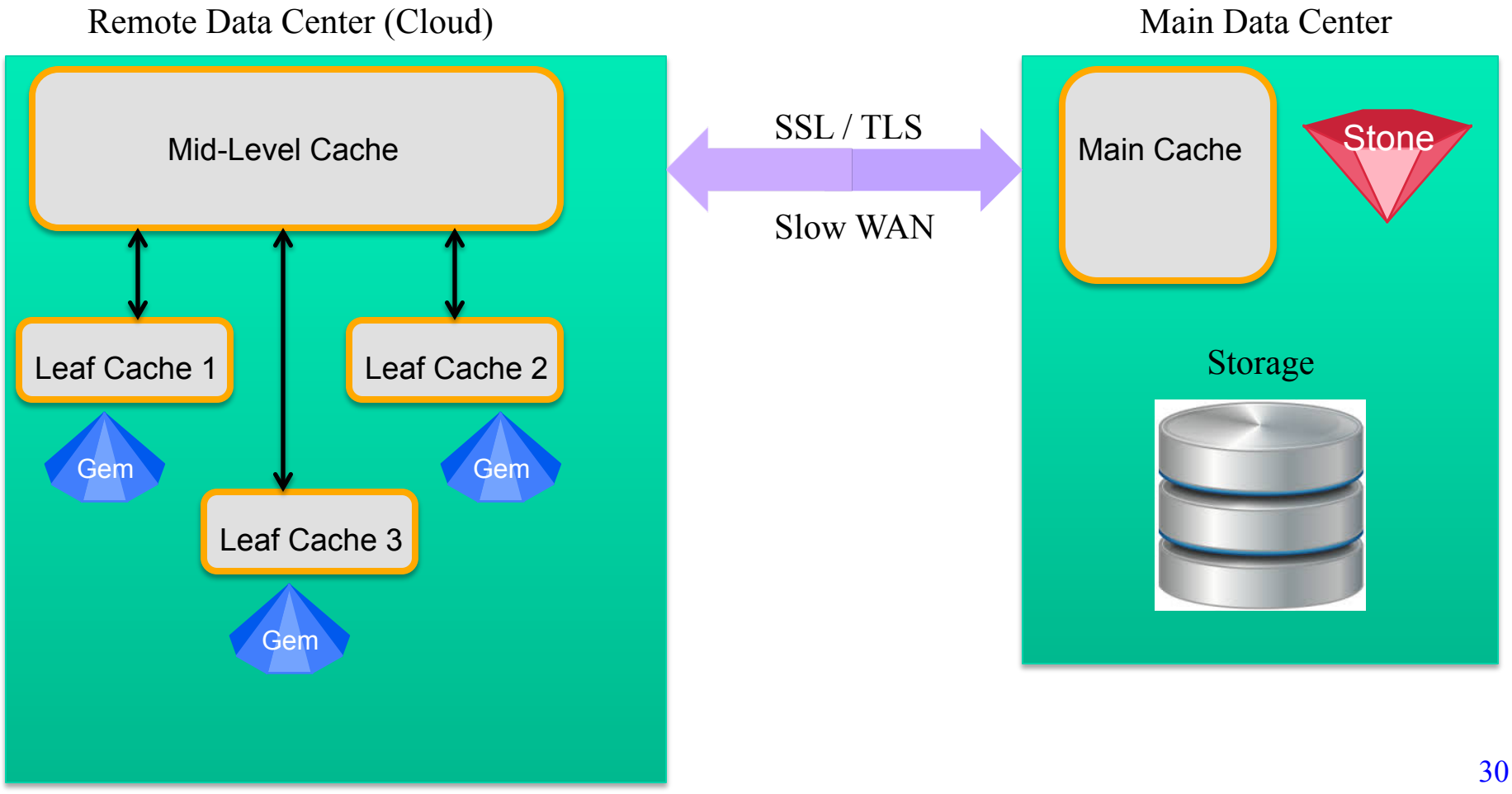
3.3 Architecture



GemStone/S 64 3.3

- Cache Warming With Mid Caches
  - Leaf Caches may now use mid caches during cache warming.
  - Advantageous for highly distributed, cloud based architectures.

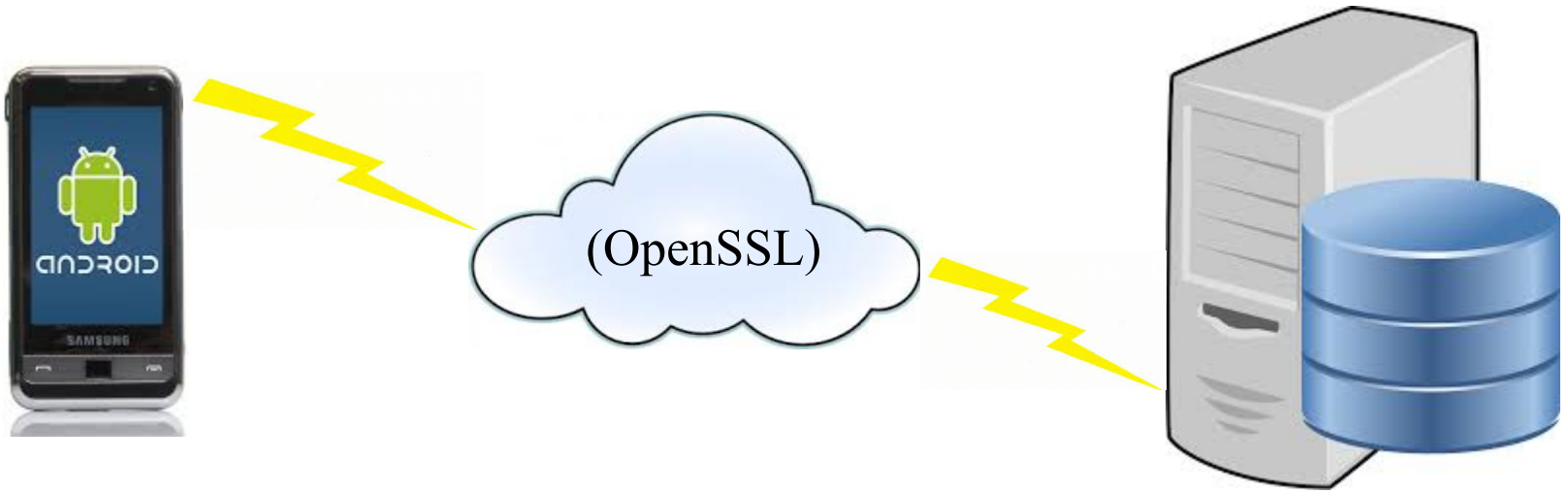
GemStone Cloud Architecture



O-O Programming

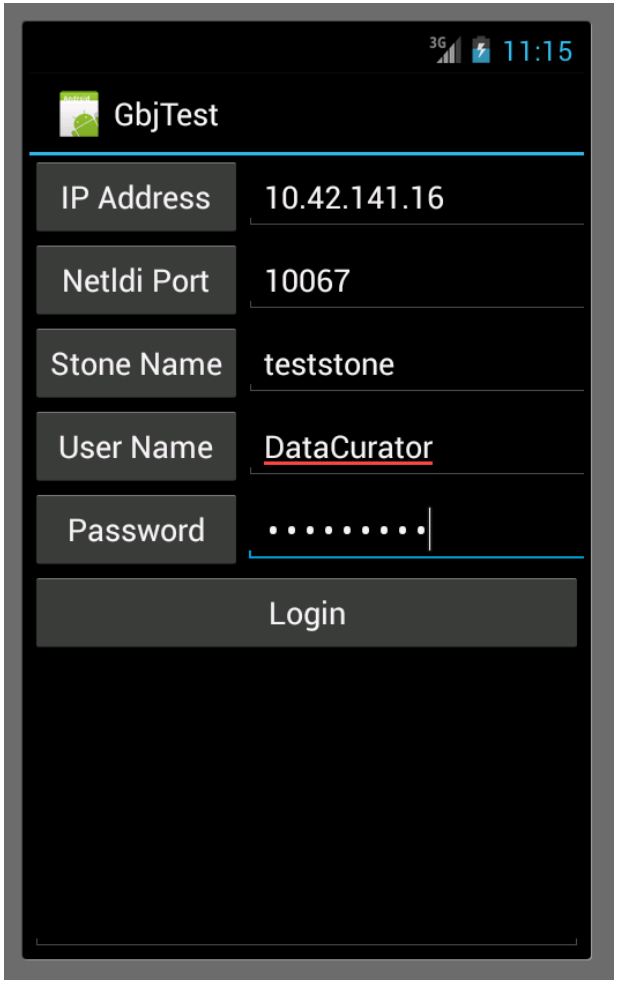
GemBuilder for……..Android?!?

- Experimental Project to Access GemStone from Android Devices
- Uses GemBuilder for Java (GBJ)

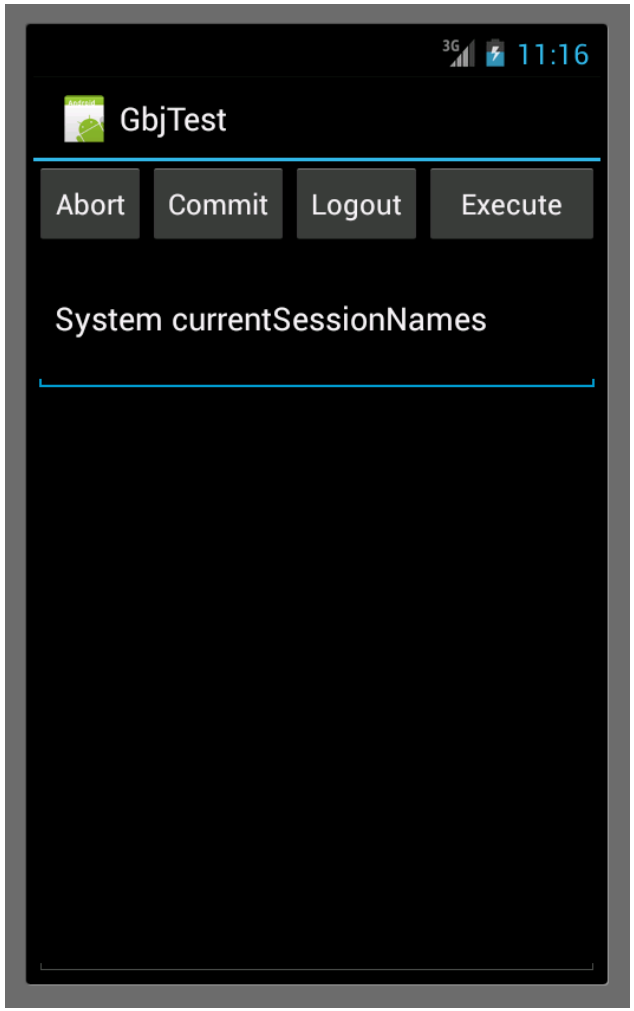


GbjTest App on Android

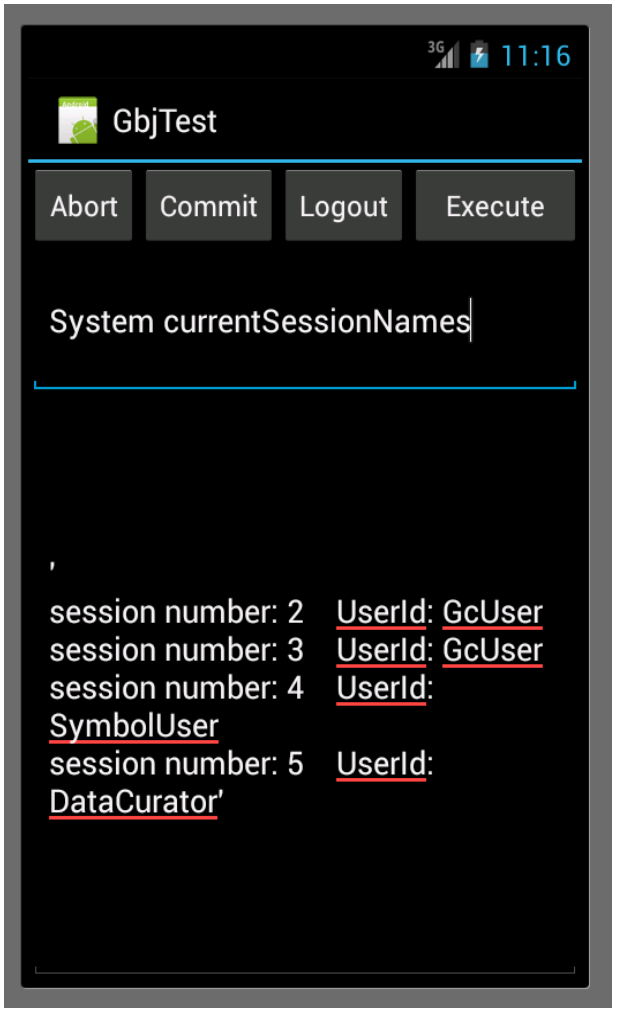
Login Screen



GbjTest App on Android



Command Execution

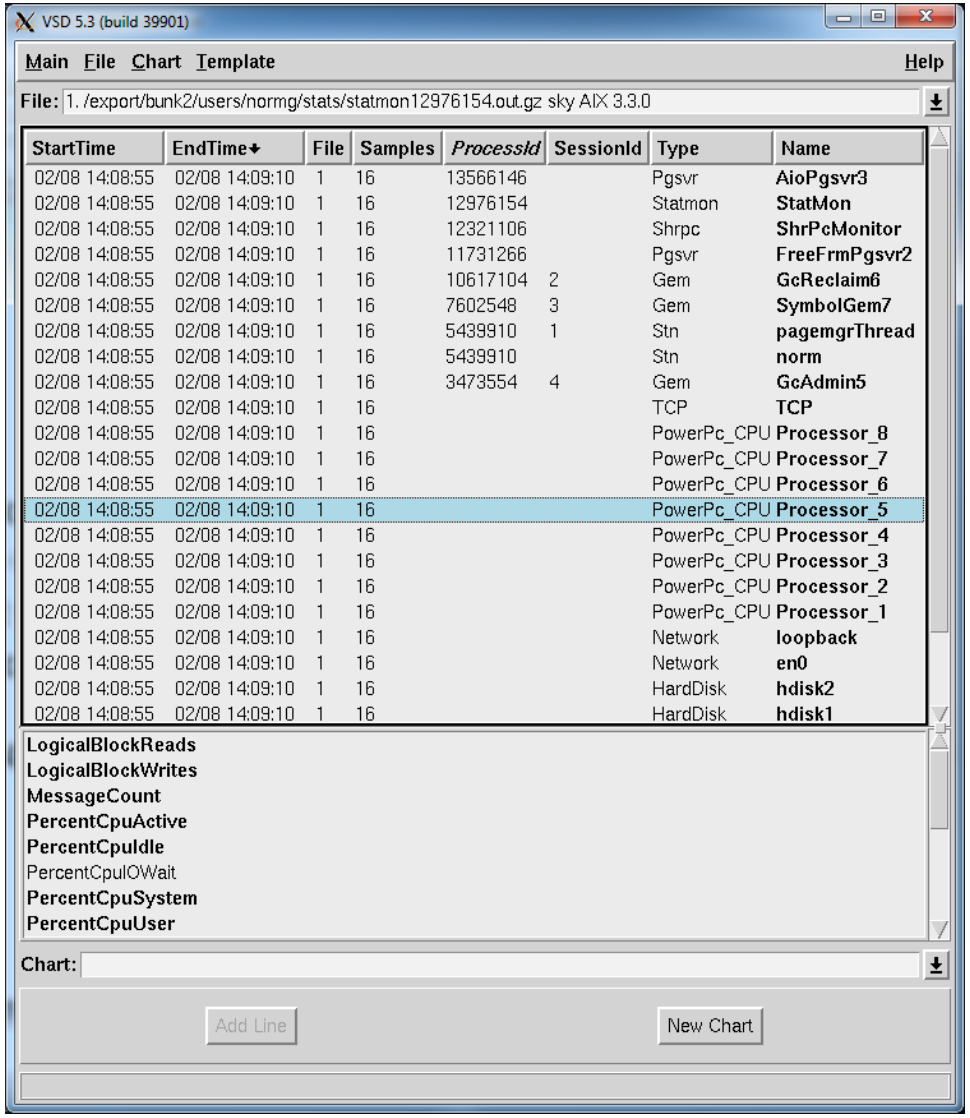


Android Test App Source Code

- Application Code:
  - ftp://ftp.gemtalksystems.com/pub/GBJ/GbjTest.zip
- Contact:
  - bill.erickson@gemtalksystems.com

VSD 5.2

- Faster load times on Windows
- New *End Time* Column
- Column Sort Arrows
- Secondary Sort Column
- Support for LZ4 compressed files.



GemStone/S 64 Platforms

- Object Server (Database)
  - Linux x86_64
  - Apple Darwin 64 bit
  - Oracle Solaris amd64
  - Oracle Solaris SPARC 64 bit
  - IBM AIX PowerPC 64 bit

GBS Platforms

- Cincom® VisualWorks® 7.10.1 / 8.1.1
  - MS Windows 7/8 32 bit
  - MS Windows 7/8/10 64 bit
  - Linux 32/64 bit
  - Solaris SPARC 32/64 bit
- Instantiations VA Smalltalk™ 8.6.2
  - MS Windows 7/8 32 bit

GemStone/S 64 3.4

- More lz4 Support:
  - Statmonitor
  - VSD
  - Copydbf
  - Backup/Restore
  - Smalltalk Access (GsFile ? FileSystem ?)

GemStone/S 64 3.4

- Encrypted Backups and Tranlogs
  - AES 128, 192 or 256 bit encryption
  - Public / private key pair
  - Passphrase
  - Secure Signing (MAC)

GemStone/S 64 3.4

- OpenSSL 1.1.x
  - Still in beta
  - Will be supported once 1.1 is final

GemStone/S 64 3.4

- Improved findReferencePath methods
  - GemStone uses “persistence by reachability”
  - Finds all references paths for a list of objects.
  - Now multi-threaded

GemStone/S 64 3.4

- GIT Support in Base Image
  - Cypress Project
  - https://github.com/CampSmalltalk/Cypress

GemStone/S 64 3.4

- Single Sign On (SSO) Support
  - GSSAPI / Kerberos (UNIX)
  - SSPI (Windows)
  - Service Name: “GEMSTONE64”
- Database Login
  - Enable UserProfile For SSO
- Process Creation
  - Enable NetLDI for SSO

GemStone/S 64 3.4

- SSO Database Login Setup
  1. Create UserProfile and KerberosPrincipal objects

```
run
|profile kp|
profile := AllUsers addNewUserWithId: 'normg' password:
swordfish' .
kp := KerberosPrincipal newPrincipalWithName:
'normg@GEMTALKSYSTEMS.COM'
    loginUserProfile: profile .
profile enableSingleSignOnAuthenticationWithPrincipal: kp .
%
commit
```

GemStone/S 64 3.4

- SSO Database Login Setup
  2. Add the Kerberos keytab file to the GemStone configuration file.

```
echo "GEM_KERBEROS_KEYTAB_FILE = /common/gemtalk.keytab;"
>> $GEMSTONE/data/system.conf
```

GemStone/S 64 3.4

- SSO Database Login Setup
  3. If UNIX login does not use Kerberos, get a ticket using kinit.

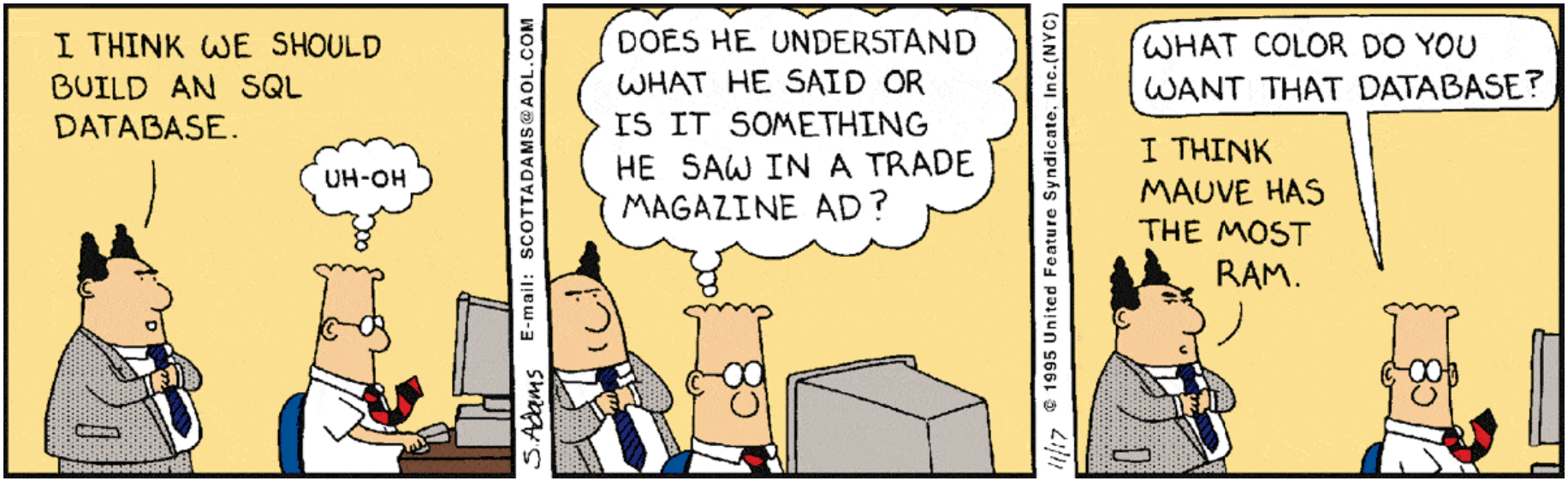
```
normg@bunk>kinit
Password for normg@GEMTALKSYSTEMS.COM: xxxxxxxx
normg@bunk>klist
Ticket cache: FILE:/tmp/krb5cc_300
Default principal: normg@GEMTALKSYSTEMS.COM
Valid starting     Expires            Service principal
08/01/16 12:32:49  08/01/16 22:32:49  krbtgt/
GEMTALKSYSTEMS.COM@GEMTALKSYSTEMS.COM
        renew until 08/02/16 12:34:09
```

GemStone/S 64 3.4

- SSO Database Login Setup
  4. Login to GemStone with no password!

```
normg@bunk>topaz -r

_____________________________________________________________________________
|             GemStone/S64 Object-Oriented Data Management System             |
|                   Copyright (C) GemTalk Systems 1986-2016                   |
|                            All rights reserved.                             |
+-----------------------------------------------------------------------------+
|    PROGRAM: topaz, Linear GemStone Interface (Remote Session)               |
|    VERSION: 3.4.0, Wed May 18 13:11:30 2016 normg private build             |
|      BUILD: 64bit-39535-PRIVATE                                             |
|  BUILT FOR: x86-64 (Linux)                                                  |
|       MODE: 64 bit                                                          |
| RUNNING ON: 4-CPU bunk x86_64 (Linux 3.2.0-90-generic #128-Ubuntu SMP Fri Aug
| 14 21:43:58 UTC 2015) 11903MB                                               |
| PROCESS ID: 29215     DATE: 08/02/16 09:42:14 PDT                           |
|   USER IDS: REAL=normg (300) EFFECTIVE=normg (300) LOGIN=normg (300)        |
+-----------------------------------------------------------------------------+
|   GEMSTONE_NRS_ALL = #netldi:ldinormg#dir:/home/normg/local/gs64-3xb3/slow50/gs/product/data
|_____________________________________________________________________________|
topaz> set u normg
Warning: clearing the previous GemStone password.
topaz> login
[Info]: libssl-3.4.0-64.so: loaded
[08/02/16 09:42:18.559 PDT]
  gci login: currSession 1  rpc gem processId 29234 socket 6
successful login
topaz 1>
```


I THINK WE SHOULD BUILD AN SQL DATABASE.
UH-OH
DOES HE UNDERSTAND WHAT HE SAID OR IS IT SOMETHING HE SAW IN A TRADE MAGAZINE AD?
WHAT COLOR DO YOU WANT THAT DATABASE?
I THINK MAUVE HAS THE MOST RAM.
S. Adams
E-mail: SCOTTADAMS@AOL.COM
© 1995 United Feature Syndicate, Inc.(NYC)

GemStone/S Licensing Models

- 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

Source: http://gemtalksystems.com/index.php/lc-licensing/

Smalltalk Advocacy

- STIC
- ESUG
- FAST
- Pharo Consortium
- Open Source Projects
  - Metacello
  - tODE
  - Tugrik

Questions?

Norman R. Green
Senior VP & Chief Technical Officer

GemTalk Systems LLC
15220 NW Greenbrier Pkwy., Suite 240
Beaverton, Oregon, 97006
Mobile: (503) 804-2041
norm.green@gemtalksystems.com

www.gemtalksystems.com