VA Smalltalk Update

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Agenda

• Company Update
• Current Release Content
• Next Release Candidates
• Q&A
Company Updates
VAST remains strong - new technology and users

• Intense new technology development
  • Upcoming product release
  • New 32/64-bit VM

• Community Outreach
  • Conference/workshop sponsors and participants
    • ESUG, FAST Smalltalks

• Sponsoring Marquette Camp Smalltalk
  • September 15 – 18, 2016

• Hosting North Carolina Camp Smalltalk
  • Spring 2017
2015-2016 Engineering Focus

- Enhanced Cryptography Support
- TCP IPv6 Support
- Fast Reliable Headless Installation
- Build System Re-engineering
- New 32/64-bit VM
New Release

V8.6.3 available Q4 2016!
V8.6.3 Content
Base Class Libraries

- Zip/Unzip support
  - Inflate/deflate convenience APIs added
- OSLong class added
  - Simplifies handing of 64-bit data and pointers
    - Transparent resizing on 32/64 bit systems
    - Transparent platform adaptation
V8.6.3 Contents
Communications Enhancements

- IPv6 support
  - All layers enabled
    - SocketCommunicationsInterface
    - Server Smalltalk (SST)
    - Parts
  - UI handles IPv4 and IPv6 addressing syntax
  - .INI file preference controls addressing behavior
    - IPv4 is default
V8.6.3 Contents
Seaside and Grease

- Small currency updates
- Adapted to IPv6
Cryptography

- OpenSSL 1.1 Compatibility
  - *Lots of new algorithms available*
- Continue to support/enhance 1.0.x
- Compatibility layer to handle API breakage
  - OpenSSL 1.1 is a significant overhaul
  - Good amount of API breakage from 1.0.x
  - We have handled that internally
  - No code changes required for the user to move up
V8.6.3 Contents
Cryptography Cont...

- Secure Memory Support
  - Windows
    - User can request bytes that are encrypted in-memory
    - Auto-decrypt-encrypt during OpenSSL native calls
    - Uses Microsoft Crypto API
  - UNIX/Linux
    - Secure Arena
    - Page-guarded on either side
    - Pinned to RAM (won’t swap to disk)
    - Won’t show up in a core-dump
V8.6.3 Contents
SQLite

• Update SQLite to 3.14.0
  • Transparent performance improvements
New popup menu on Environments list pane provides new actions:

- Open a file explorer on the VA Smalltalk installation folder associated with the selected Environment
- Open a command (terminal) window on the selected Environment’s folder
- Open a command (terminal) window on the VA Smalltalk installation folder associated with the selected Environment
- Duplicate the selected Environment
  - Setup and use standardized images
  - Take checkpoint of development activity
V8.6.3 Contents
Installers

• All UNIX installers are headless
  • .RPM (Fedora RedHat derivatives)
  • .DEB (Debian derivatives)
  • .PKG (Solaris)

• Windows installer can be scripted
  • Supports standard installation across multiple machines
V8.6.3 Content
New Supported Platforms

- Ubuntu 16.04
- Fedora 24
- RedHat Enterprise Linux 6
Reengineered Build System

- Old Image Build and Installation Build
  - All custom Smalltalk code
    - Dates to mid-90’s with relatively small changes since
    - Not the best code quality
  - Builds were slow with significant manual intervention
  - Windows and UNIX builds were sequential
  - Difficult to restart if problem occurred
  - Installation artifacts were unmanaged
Reengineered Build System

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• New Image Build and Installation Build
  • Cmake-based system used to script build
    • Can restart at any job step
    • Duplicate and redundant processing removed
  • Still uses Smalltalk function where appropriate
    • Driven using abt.cnf scripting
  • Fully-automated nightly builds (if changes occurred)
  • Installable artifacts will be managed in Git repository
Reengineered Build System (cont)

• Old Installation
  • Smalltalk packaged image
    • Difficult to maintain
  • Slow install
    • File-by-file copying
    • File attributes in separate shadow file

• New Installation
  • ‘Standard’ installers
    • Windows MSI
    • UNIX RPM/DEB/PKG
  • Documentation in separate packages
  • Smaller download packages
  • FAST install
Reengineered Build System (cont)

• **Old Build Testing**
  • Only VM Build testing was automated

• **New Build Testing**
  • Automated build testing using CMake/CTest
    • Install Verification Tests
    • VM Tests
    • Image Tests
  • All platforms can be tested in parallel
  • Currently over 10,000 mainline testcases (and growing)
    • Additional non-automated testcases for features
Looking to the Future
Future Releases

• Release schedule is about once a year
  • Depends on volume of content
  • Current content information in Product Roadmap

• Content based on requirements from:
  • Surveys
  • Direct customer interactions
  • Forums
  • Support cases
  • Internals
Next Release
Candidate Items

- Web interface
  - Seaside 3.x
  - Continuation support
- Middleware
  - Postgres
  - NOSql (Voyage/MongoDB or ???)
Next Release
Candidate Items

- GUI Look-and-Feel
  - Common Widgets Application Window framework
    - Useful for SUnit, Seaside, etc.
  - Windows Common Controls
    - TreeView improvements
  - GTK to replace Motif on UNIX platforms
- Communications
  - HTTP/2
  - 0MQ
- Server
  - Easy to use server farm support
Next Release
Candidate Items

• Development Tools
  • Improved code library access over WAN
  • Revamped Changes Browser
  • New Code Merge Engine

• Performance and Scalability
  • Incremental garbage collection
  • 64-bit Smalltalk
Dino2 32/64 Bit VM Project
Overview

• Project Goals
  • 64-bit VMs for x86, PowerPC and SPARC
  • 32-bit VMs with performance at least as good as production
  • Improve build systems and testing infrastructure

• Production VM Review
  • Proprietary Smalltalk Model (generates assembly)
  • VM Interpreter/JIT/Primitives is generated assembly
  • Supporting Modules written in C
  • @135,000 lines of ASM
  • @50,000 lines of C
Dino2 32/64 Bit VM Project
Current Status

• Build/Compiler Infrastructure
  • CMake-Based Build System
  • GCC, MinGW and MSVC compilers

• 32/64-bit Virtual Machine
  • Running on Windows and Linux
  • Current Focus: Interpreter Performance

• 32/64-bit Smalltalk Image
  • 32-bit -> 64-bit Image Translation Complete
  • Core Smalltalk Image and many libraries are 64-bit prepped
  • Current Focus: Continued 64-bit library prep
Dino2 32/64 Bit VM Project
The Journey Forward

- **Raptor**
  - 1st Generation C-Interpreter
  - Slow but 64-bit Clean
  - 80% bytecode speed (32-bit)
  - 50% message send speed (32-bit)
  - Primitive call machinery slow
  - Smalltalk process switching slow
  - Primitive implementation often faster than production
  - Allowed us to move forward with Image work
  - @90,000 lines of C code
Dino2 32/64 Bit VM Project
The Journey Forward

• Indominus-Rex
  • 2nd Generation C-Interpreter
  • Faster C-Implementation
  • 85% bytecode speed (32-bit)
  • 75% message send speed (32-bit)
  • Primitive implementation often faster than production
  • Stable - good reference implementation for new platforms
  • Small changes to large interpreter loop resulted in unpredictable behavior
    • Register allocator having a difficult time
    • Constant fight with the compiler
  • @85,000 lines of C Code
Dino2 32/64 Bit VM Project
The Journey Forward

• Coelo
  • LLVM Code-Generated Interpreter
    • Compiler toolkit
    • SSA Abstract Assembly Representation
  • Still down one register on X86 compared to production VM
    • Can’t use hardware-stack register (ESP)
    • Superior Code-Gen makes up for it
  • 100% bytecode speed (32-bit)
  • 110% message send speed (32-bit)
  • At least 20% performance jump in primitives
  • For many prims (Floats) the production VM used call-outs to C
    • These are described directly in LLVM
    • Speedups are more like 4-6x
  • @19,000 of C++ Code (Interpreter Code-Gen)
  • @75,000 of C Code
Dino2 32/64 Bit VM Project

Customer Involvement

- Early Customer Access Program (ECAP)
  - Kicked off our ECAP program in July, 2016
  - Select customer involvement
  - Opportunity for feedback and collaboration
How Do You Get VA Smalltalk?

• Download evaluation copy

• Buy development licenses

• Download development build
  • Announced in VA Smalltalk Google Group

• Be a committer on an Open Source project
  • [http://www.instantiations.com/company/open-source.html](http://www.instantiations.com/company/open-source.html)

• Work for an educational institution
  • [http://www.instantiations.com/products/academic-license-program.html](http://www.instantiations.com/products/academic-license-program.html)
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Questions?