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# VA Smalltalk Update

**\*\*including\*\***

**Exploring the Dark Underside of 64-bit Support**

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# Agenda

- 2017 Release Content
- 64-bit Support
- Next Release
- Q&A

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# 2017 Release

V9.0 available now for Windows

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# V9.0 Content

- Windows only
  - New 32/64-bit VMs
    - Fully backward compatible
  - Image adaptation for 64-bits
  - Dual, but shared, Environments
  - Dual Installers

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# V9.0 Contents

## Minor Enhancements

- Grease and Seaside
  - Currency
- Cryptography
  - Elliptic Curve support added
- SUnit Browser
  - Performance improvement for large test sets
- Scintilla
  - Full Code Assist support in Workspaces for 25+ languages
- HTTP multipart forms
  - Optimized memory usage and speed

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# What Made 64-bit Difficult?

## Beyond writing new VMs

- Bootstrap
- Serialize for everyone
- Expose the magic
- Say what you mean
- Managing elastic OSStructures
- I don't have my source

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# What Made 64-bit Difficult?

## Bootstrap

- **Problem:** All I have is a 32-bit image
- **Solution:**
  - Mark image file as 32- or 64-bit
  - Provide multiple image file loaders
    - 32-bit image loader for 32-bit VM
    - 32-bit image loader for 64-bit VM (dynamic conversion)
    - 64-bit image loader for 64-bit VM
  - Depend on #preStartUp/#startUp for fixup of converted image
  - Offline 32-to-64 bit conversion tool available

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# What Made 64-bit Difficult?

## Serialization for everyone

- **Problem:** Serialized data (files and library objects) must be sharable between 32- and 64-bit images
- **Solution:**
  - All serialization is 32-bit by default (compatibility mode)
  - If 64-bit serialized object is required; temporarily turn off compatible mode
    - 64-bit serialized object cannot be read by 32-bit image



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# What Made 64-bit Difficult?

## Expose the magic

- **Problem:** Images are littered with magic numbers conforming to 32-bit representations
- **Example:**
  - 4 (size of pointer)
  - 12 (size of object header)
  - 20 (size of Association)
  - Etc.
- **Solution:**
  - Find and fix (parameterize)
    - 4 (size of pointer) → System vmPointerSize
    - 12 (size of object header) → Object objectHeaderSize
    - 20 (size of Association) → self associationSize

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# What Made 64-bit Difficult?

Say what you mean

- **Problem:** PlatformFunction parameter and returnValue definition semantics are too loose
- **Example:** #uint8, #uint16 and #uint32 widened to 32-bits
- **Solution:**
  - Examine ALL PlatformFunction definitions and make parameter and returnValue types explicitly correct

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# What Made 64-bit Difficult?

## Managing elastic OSStructures

- **Problem:** Static OSStructure definitions (mapping C structs) need to be dynamic
  - Field sizes may change for 64-bit
  - Field order may change for 64-bit
  - Number of fields may change for 64-bit
  - Field alignment may change for 64-bit
- **Solution:**
  - Explicitly identify field sizes, order, and occurrence
  - Change field references from offset based to field name based
  - Compute offsets for field names when starting image
  - Completely backward compatible

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# What Made 64-bit Difficult?

I don't have my source

- **Problem:** Method source code is hidden (3<sup>rd</sup> party add-ons) or lost
- **Solution:**
  - Obtain source code from 3<sup>rd</sup> party providers
  - Dynamic 32-to-64 bit conversion may work at runtime
    - Immediate access to additional memory
    - Doesn't handle access to 64-bit DLLs
  - Run only 32-bit images

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# What Helped with 64-bit?

- Early Customer Access Program
  - Invitation only to limit overhead
  - Small number of high-impact customers
- Beta Releases
  - 3 public betas with significant number of participants
  - Exposed problems that in-house testing didn't find

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# Looking to the Future

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# Next Release (9.1)

- UNIX 32/64 bit VMs
  - Short development cycle
  - Beta program expected to start soon
- Unicode
  - Initial infrastructure layer (prims and classes)

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# How Do You Get VA Smalltalk?

- Download evaluation copy
  - <http://www.instantiations.com/products/vasmalltalk/download.html>
- Buy development licenses
  - <http://www.instantiations.com/products/purchase.html>
- Download development build/beta
  - Announced in VA Smalltalk Google Group or by email
- Be a committer on an Open Source project
  - <http://www.instantiations.com/company/open-source.html>
- Work for an educational institution
  - <http://www.instantiations.com/products/academic-license-program.html>



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**Thank you for your attention**

Questions?