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Georg Heeg

Integration of Cincom Smalltalk Systems
-
e.g. ObjectStudio inside VisualWorks

Prague, September 7th, 2006

About Georg Heeg eK

- Founded 1987, headquarter in Dortmund, since 1996 in Zurich, since 1999 in Koethen/Anhalt
- Consulting- and training company in Smalltalk
- Hotline support, maintenance, bug-fixes for ObjectStudio, VisualWorks and Visual Smalltalk
- VM-laboratory for VisualWorks and ObjectStudio
- Porting service of old VisualWorks applications to 5i/7
- Technology-partner of CINCOM

Corporate Mission: Make Sophisticated Projects a Success for the Customer!

Some Background

- 1994/96 Cincom bought ObjectStudio
- 1999 Cincom bought VisualWorks
- ObjectStudio customers keep asking for VisualWorks features

- ObjectStudio 8 integrates VisualWorks and ObjectStudio

ObjectStudio and VisualWorks

- Both ObjectStudio and VisualWorks
  - are Smalltalk systems.
- Both
  - are owned by the same company Cincom
- VisualWorks
  - like Squeak goes back to the original Smalltalk-76/-78/-80 developments at Xerox PARC.
  - Originally called Smalltalk-80, ObjectWorks later
- ObjectStudio
  - was developed as "Enterprise Object-Oriented Development Environment"
  - Originally called Enfin.

Key Features

- Enfin/ObjectStudio
  - Ease of Use
  - Enterprise Integration
- Smalltalk-80/ObjectWorks/VisualWorks
  - Execution speed
  - Sophisticated meta-modelling features
- Customers want both
  - Speed: always
  - Ease of use: to get started
  - Enterprise integration: mostly
  - meta-modeling: seldom
    - but if they need it, they outperform having it.

From Forbes.COM

- "A press conference is called.
- "The media is alerted.
- "The top executives gather for much backslapping and multisyllabic descriptions of the synergistic opportunities abounding in this, a fresh new partnership.
- "There's a champagne toast
- "and then the most extraordinary thing happens
  - "...nothing! Nothing at all."
    - http://www.forbes.com/2002/07/01/0701alliances.html

Synergy doesn't Work

- VisualWorks VM for ObjectStudio
  - "HPOS"
  - Was started and
  - ... was not completed
- Ideas to integrate ObjectStudio into .NET
  - ... didn't make it

Theory: Smalltalk is Different

- In Smalltalk programming is modeling.
- Thus every theory can be modeled well.
- Thus every computer technology can be modeled well
- Thus every other Smalltalk system can be modeled well.

ObjectStudio 8

- Model ObjectStudio by VisualWorks in Smalltalk
- Use Meta-Modeling
- Use all reflection capabilities
  - Compiler
  - Debugger
  - Namespaces

The Goal

- Both ObjectStudio and VisualWorks live in the same image the same time
- Both Environments share the same Smalltalk kernel and base classes to provide identical functionality
- Mixing and matching is seamlessly possible
- Both ObjectStudio and VisualWorks application Smalltalk code works unchanged
  - There will always be exceptions to this rule

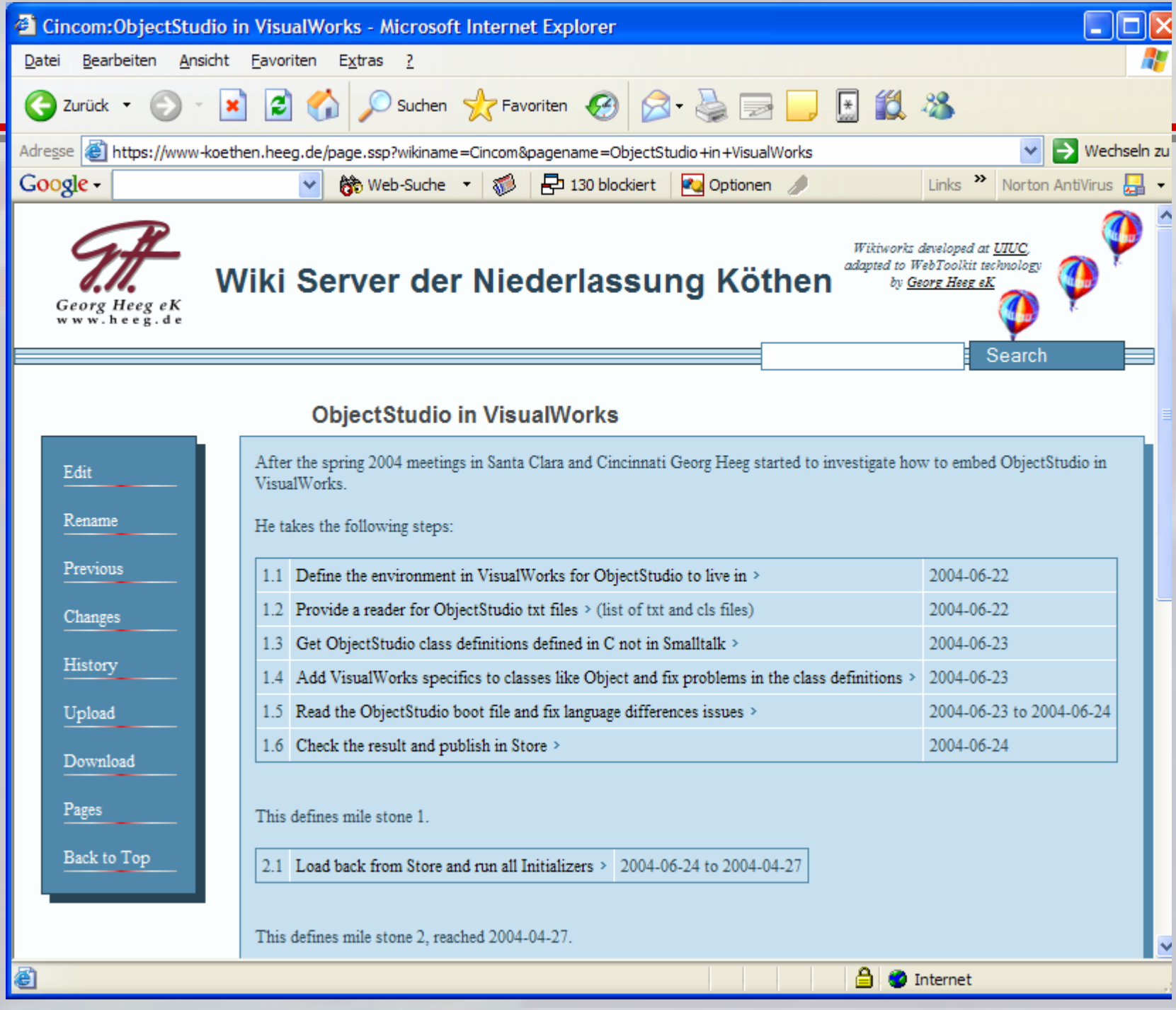
The Team

- Suzanne Fortman (Program Director, Cincom Smalltalk)
- Andreas Hiltner (ObjectStudio 8 Lead Engineer)
- Mark Grinnell (ObjectStudio Lead Engineer)
- Eduard Maydanik (GUI Engineer)
- Kim Thomas (Testing, Packaging, Support)
- Eliot Miranda (VisualWorks Lead Engineer)
- Alan Knight (Store Consultant)
- Jörg Belger (VisualWorks Wrapper)
- James Robertson (Product Manager)
- Georg Heeg (Idea)

- Helge Nowak (Sales Engineer)
- Monika Laurent (Marketing)

The First Step

- Vocal chords surgery in June 2004
- No permission to speak for a week


Cincom:ObjectStudio in VisualWorks - Microsoft Internet Explorer
Datei Bearbeiten Ansicht Favoriten Extras ?
Zurück Suchen Favoriten
Adresse https://www-koethen.heeg.de/page.ssp?wikiname=Cincom&pagename=ObjectStudio+in+VisualWorks
Wechseln zu
Google Web-Suche 130 blockiert Optionen Links Norton AntiVirus
Georg Heeg eK
www.heeg.de
Wiki Server der Niederlassung Köthen
Wikiworks developed at UIUC,
adapted to WebToolkit technology
by Georg Heeg eK
Search
ObjectStudio in VisualWorks
Edit
Rename
Previous
Changes
History
Upload
Download
Pages
Back to Top
After the spring 2004 meetings in Santa Clara and Cincinnati Georg Heeg started to investigate how to embed ObjectStudio in VisualWorks.
He takes the following steps:
1.1 Define the environment in VisualWorks for ObjectStudio to live in › 2004-06-22
1.2 Provide a reader for ObjectStudio txt files › (list of txt and cls files) 2004-06-22
1.3 Get ObjectStudio class definitions defined in C not in Smalltalk › 2004-06-23
1.4 Add VisualWorks specifics to classes like Object and fix problems in the class definitions › 2004-06-23
1.5 Read the ObjectStudio boot file and fix language differences issues › 2004-06-23 to 2004-06-24
1.6 Check the result and publish in Store › 2004-06-24
This defines mile stone 1.
2.1 Load back from Store and run all Initializers › 2004-06-24 to 2004-04-27
This defines mile stone 2, reached 2004-04-27.
Internet

End of First Step

- Smalltalk works
- UI does not work
- Primitives don’t work

The Second Step: Primitives

- Jörg Belger starts working at Georg Heeg eK Köthen October 1, 2004
  - Coauthor of the original Ce VM as intern (100 days)
  - Coauthor of computer games
  - Background in C++
- ObjectStudio MFC DLL functions are implemented
  - One per one at a time

The First Window Opens

- User Conference in Frankfurt
  - December 2004
- First customers see it and are impressed

Second Step: Proof of Concept

- One primitive at a time
  - One day per primitive
- But ...
  - There are alone 450 MFC primitives
- Second step is stopped in January 2005

Third Step: Do it Completely

- Take the entire ObjectStudio C/C++-Code
- Make it a VisualWorks callable DLL

- Started in February 2005

June 2005

- Alpha1 Version made
- First time complete
  - But not tested or bug-free

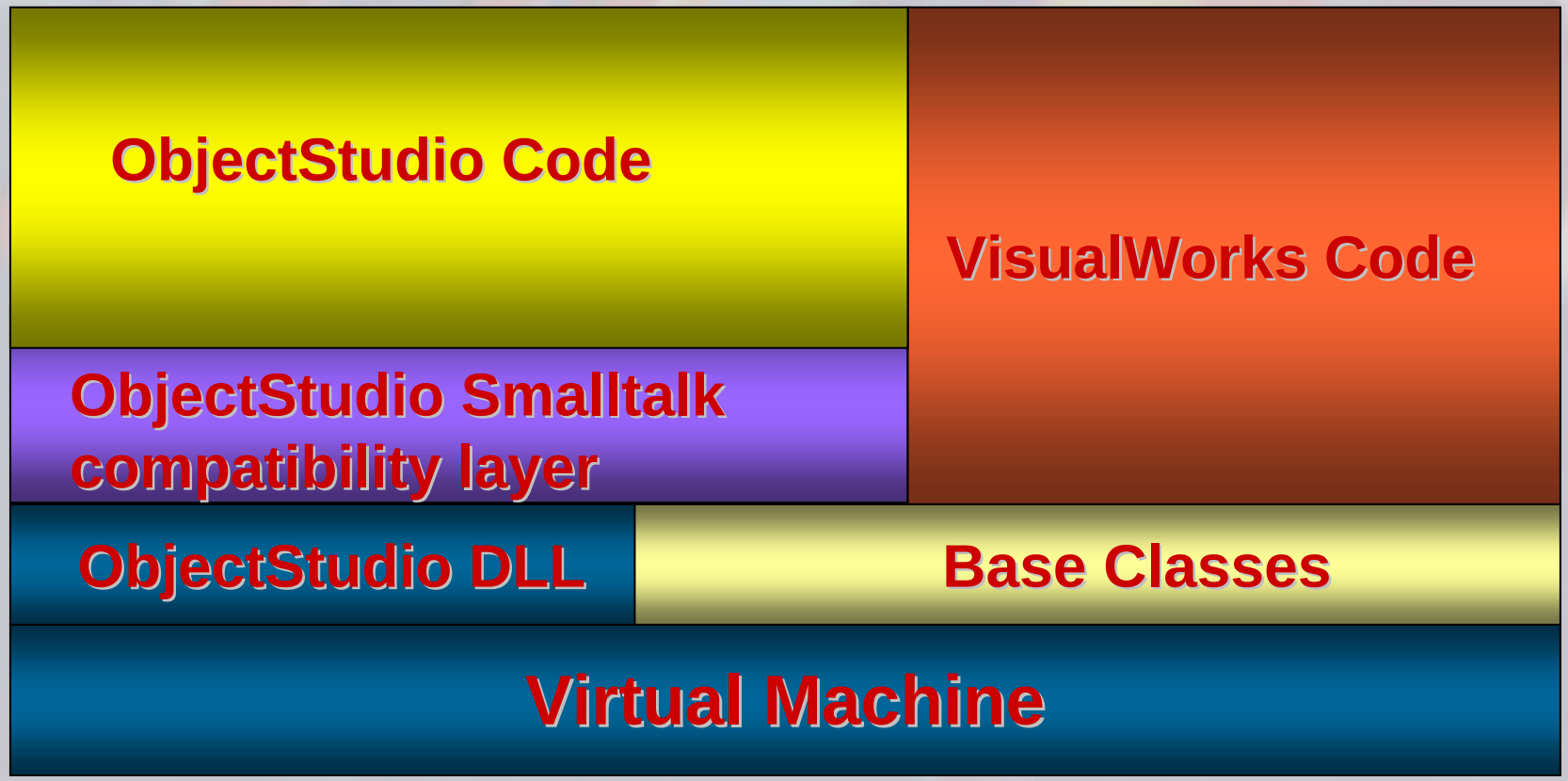
Forth step: Check for Compatibility

- Run all components of the system
  - If they work differently
    - Add compatibility
    - Decide for incompatibility
      - seldom and easy to understand
      - E.g.: BOSS instead of BinaryObjectStreams
- Run real Customer Applications
  - Details: see later

September 2006

- Ready for Beta1 at the end of the month

Architecture overview



Implementation Strategy

- KISS
  - Keep modifications of ObjectStudio source code to a minimum
    - In Smalltalk and C/C++
  - Do not modify VisualWorks VM unnecessarily
    - Fix bugs
    - Additional features in VW 7.4.1/7.5
      - Use LoadLibraryEx() instead of LoadLibrary()
      - Event handling in the image

General Concepts

- Model ObjectStudio by VisualWorks Smalltalk
  - Preserve syntax and semantics
- ObjectStudioCompiler
- Embed in a NameSpace
- Share code
  - Collections
  - Magnitude
  - Semaphore
  - Boolean
  - Undefined Object
  - ...

VisualWorks Namespaces

- Goal
  - (In-)visibility of global names
- Successor to
  - GlobalDictionary
  - PoolDictionary
  - ClassPools

System, the GlobalDictionary

- In Classic ObjectStudio all global names live in the Globaldictionary called System
- In ObjectStudio 8
  - Classes live in Namespace **ObjectStudio**
  - Globals live in Namespace **ObjectStudio.Globals**
  - Non Identifier entries are Stored in an IdentityDictionary

PoolDictionaries

- In Classic ObjectStudio
  - PoolDictionaries are globals which are IdentityDictionaries

```
OLEConstants := IdentyDictionary new.
OLEConstants at: # ADVF_DATAONSTOP put: 64.
```

- In ObjectStudio 8
  - Extra declaration is needed (manually)

```
ObjectStudio.Globals defineNameSpace: #OLEConstants
```

  - Entries in these Dictionaries become SharedVariables with initializers (automatically)

```
ObjectStudio.Globals.OLEConstants
   defineSharedVariable: #ADVF_DATAONSTOP
   private: false
   constant: false
   category: 'As yet unclassified'
   initializer: '64'
```

Shared Classes

ActionSequence, Array, Association, Bag, Behavior, BlockClosure, Boolean, ByteArray, Character, Class, Collection, CompiledBlock, CompiledMethod, Compiler, Date, Dictionary, EncodedStream, False, Fraction, IdentityDictionary, IdentitySet, Integer, InternalStream, Magnitude, Metaclass, MethodContext, Number, OrderedCollection, PeekableStream, Point, PositionableStream, Random, ReadStream, ReadWriteStream, Rectangle, Semaphore, Set, SmallInteger, SortedCollection, Stream, String, Symbol, Time, Timestamp, True, UndefinedObject, UserPrimitiveMethod, WeakDictionary, WriteStream, Exception, Error, MessageNotUnderstood, Notification, StreamError, PositionOutOfBoundsError, IncompleteNextCountError, EndOfStreamNotification, SocketAccessor, SocketAddress

Special Renaming

```
ObjectStudio defineSharedVariable: #Float
    private: false
    constant: true
    category: 'ObjectStudio Compatibility 2'
    initializer: `Core.Double'
```

Source Differences

- ObjectStudio cls files
  - One class per file
    - With class definition: primary files
    - Class extension: secondary file
  - Different chunk file format
- Method syntax differences
- Semantic differences

Parsing ObjectStudio Source Code

- ObjectStudioCompiler
  - Calls ObjectStudioParser
- ObjectStudioParser
  - Accepts ObjectStudio Syntax
  - Creates ObjectStudio Syntax compliant Syntax tree
- Specifying to use ObjectStudio Syntax
  - classCompilerClass
  - compilerClass
  - Automatic source transformation of methods of VisualWorks classes in cls files

Syntax differences: Arrays and cond

```
f: n
    ^{{[n <= 1] [1]}
        {[true] [(self f: n - 1) * n]}} cond
```

```
f: n
    ^ n < 1
        ifTrue: [1]
        ifFalse: [true
                    ifTrue: [(self f: n - 1) * n]
                    ifFalse: [ObjectStudio.Message
    newValue: 'No condition satisfied']]
```

Syntax differences: parameters

```
inc: n
   n isNil ifTrue: [n := 0].
   ^ n + 1
```

```
inc: __n
   | n |
   n := __n.
   n isNil ifTrue: [n := 0].
   ^ n + 1
```

Some Semantic Differences

	VisualWorks	ObjectStudio
1 = 0 ifTrue: [1]	nil	False
[:n |] value: 1	1	nil
Array new add: 1	<Error>	#(1)
(Array new: 1) at: 1 put: 7	7	#(7)

Modifying ObjectStudio Parse Tree

- ProgramNodeEnumerator subclass OStudioTreeTransformer modifies parse tree
  - <osprim ...>
  - Blocks in literal arrays
  - Assignments to arguments
  - Enabling inner returns
  - Condition results
  - Substitutions
- All this allows for VisualWorks Code generation

Messages with different Semantics

```
Kernel.OStudioTreeTransformer defineSharedVariable:
    #Substitutions
    private: false
    constant: false
    category: 'constants'
    initializer: '(Dictionary new)
        at:    #basicAt:put:      put:   #os_basicAt:put;
        ...;
        yourself'
```

Substituted Selectors

,	os_comma:
//	quo:
<	os_LessThan:
<=	os_LessEqualThan:
=	os_Equal:
>	os_GreaterThan:
>=	os_GreaterEqualThan:
add:	os_add:
add:after:	os_add:after:
add:before:	os_add:before:
add:beforeIndex:	os_add:beforeIndex:
add:withOccurrences:	os_add:withOccurrences:
addAll:	os_addAll:
addAllFirst:	os_addAllFirst:
addAllLast:	os_addAllLast:
addDependent:	os_addDependent:
addFirst:	os_addFirst:
addLast:	os_addLast:
addTime:	os_addTime:
allInstVarNames	os_allInstVarNames
allSubclasses	os_allSubclasses
asByteArray	os_asByteArray
asFilename	os_asFilename
asFloat	os_asFloat
asInteger	os_asInteger
asNumber	os_asNumber
asSet	os_asSet
associationAt:	os_associationAt:
associationsDo:	os_associationsDo:
asString	os_asString

asText	os_asText
asTime	os_asTime
asTimestamp	os_asTimestamp
asValue	os_asValue
at:	os_at:
at:put:	os_at:put:
basicAt:put:	os_basicAt:put:
between:and:	os_between:and:
changeSizeTo:	os_changeSizeTo:
coerce:	os_coerce:
collect:	os_collect:
copyFrom:to:	os_copyFrom:to:
copyReplaceFrom:to:with:	os_copyReplaceFrom:to:with:
copyWithout:	os_copyWithout:
dependents	os_dependents
detect:	os_detect:
fileName	os_fileName
first	os_first
firstDayOfMonth	os_firstDayOfMonth
flush	os_flush
fromDays:	os_fromDays:
ifFalse:	os_ifFalse:
ifTrue:	os_ifTrue:
includesKey:	os_includesKey:
indexOf:	os_indexOf:
inheritsFrom:	os_inheritsFrom:
inspect	os_inspect
isAlphaNumeric	os_isAlphaNumeric
last	os_last
leapYear:	isLeapYear:

methods	os_methods
nameOfDay:	os_nameOfDay:
new	os_new
new:	os_new:
nextString	os_nextString
origin:corner:	os_origin:corner:
origin:extent:	os_origin:extent:
perform:	os_perform:
perform:with:	os_perform:with:
perform:with:with:	os_perform:with:with:
perform:with:with:with:	os_perform:with:with:with:
perform:withArguments:	os_perform:withArguments:
printOn:	os_printOn:
printOn:base:	os_printOn:base:
printString	os_printString
readFrom:	os_readFrom:
remove:	os_remove:
remove:ifAbsent:	os_remove:ifAbsent:
removeAll:	os_removeAll:
removeDependent:	os_removeDependent:
removeKey:	os_removeKey:
signal	os_signal
size	os_size
storeOn:	os_storeOn:
storeString	os_storeString
subclass:instanceVariablNames:classVariableNames:poolDictionaries:	os_subclass:instanceVariablNames:classVariableNames:poolDictionaries:

subclass:instanceVariableNames:classVariableNames:poolDictionaries:category:	os_subclass:instanceVariableNames:classVariableNames:poolDictionaries:category:
subclasses	os_subclasses
subtractTime:	os_subtractTime:
to:by:do:	os_to:by:do:
to:do:	os_to:do:
totalSeconds	os_totalSeconds
trimBlanks	os_trimBlanks
value	os_value
wait	os_wait
whileFalse	os_whileFalse
whileFalse:	os_whileFalse:
whileTrue	os_whileTrue
whileTrue:	os_whileTrue:
with:do:	os_with:do:
withAllSubclasses	os_withAllSubclasses
\\	rem:
~=	os_NotEqual:

Different file structure, first version

- Reader for .txt and .cls files to get ObjectStudio code into VisualWorks
  - ClassReader
    - Reads txt files and calls ObjectStudioChangeScanner
  - ObjectStudioChangeScanner
    - Reads cls files

Second Version: Source Code Integration

- ObjectStudio.ApplicationDefintionStream
  - Original Classic ObjectStudio class
  - Reads .txt files
- OStudioChunkSourceFileFormat
  - Lives in VisualWorks SourceFileFormat class hierarchy
  - Reads and writes .cls files
  - Controls that .cls files

ObjectStudio Smalltalk and C

- Strong interconnection between C and Smalltalk
  - They call each other all the time
- There are five ways to call C
  - Direct primitives
    - PrimSpecRec
  - Numbered Primitives
    - <primitive: 123>
  - Named Primitives
    - < osprim: MFC openWindow>
    - < osprim: #myDll myfunc>
  - Module/ENFINModule
    - Programmatic creation of interface methods using osprim
  - ExternalProcedures
    - Programmatic creation of interface methods with C datatypes

ObjectStudioWrapperDLL

- Regular VisualWorks DLL
- Uses _oop as parameter and return type
- Calls ObjectStudio primitives using a simulated ObjectStudio stack

OPTR and _oop

- In ObjectStudio object pointers OPTR never move
- In VisualWorks object pointer _oop are moved by the garbage collector
- ObjectStudio C code relies on not non moving OPTR

- Solution:
  - Define class OPTR with wraps VisualWorks Oops for ObjectStudio including C++ reference counting
  - The real object pointers _oop are stored in a Smalltalk array
    - which is registered in the Visualworks registry
    - the index to this array is stored in class OPTR as variable
  - Reference counts are stored in a normal C array.

OPTR class (extract)

```
class __declspec(dllexport) OPTR;
typedef OPTR*  POPTR;

class OPTR
    {
    public:
        static OPTR&    cpp_S2O(LONG value);
[...]
    private:
[...]
        enum   Types { TYPE_NIL = 0, TYPE_NORMALOBJECT,
    TYPE_NOTNORMALOBJECT, TYPE_UNKNOWN} ;
        INT     m_IndexOrOop;           // index in objecttable or not normal
    object
        INT     m_Type;                 // type of object
    static      INT     s_NumObjects; // number of registered objects
    static      INT     s_NextFreeObject;       // index of next free object
    in objecttable
    static      INT     s_ObjectTable;  // index of objecttable array in
    visualworks registry
    static      INT*    s_LinkTable;    // array with linked registry slots
```

Direct Primitives

- Look at definition
- Re-implement
  - mostly in Smalltalk using existing VisualWorks functionality
  - In rare cases replace by osprim

Numbered Primitives

- <Primitive: 45>
- Some are replaced by
  - VisualWorks Primitive
    - E.g. Object>>==
    - <vwprimitive: 110>
  - VisualWorks implementation
- For most
  - Auto-generate calling code

Auto-Generated Primitive

```
disable
    <primitive: 7>
    ^ self primitiveFailed.
```

```
disable
    <osprimitive: 7>
    | argumentArray |
    argumentArray := Core.Array os_new: 0.
    ^ ObjectStudioCallInterface os_new
            callPrim: 7
            self: self
            arguments: argumentArray
            ifFail: [^self primitiveFailed]
```

Primitive Calling Method

Class ObjectStudioCallInterface

callPrim: primitiveNumber self: oSelf arguments: args ifFail: failBlock

```
self init.
^[self callPrim: primitiveNumber self: oSelf arguments: args]
        on: PrimitiveFailException
        do: [:ex| ^failBlock value]
```

callPrim: primitiveNumber self: oSelf arguments: args

```
<C: _oop callPrim(int primitiveNumber, _oop oSelf, _oop args)>
_errorCode = 0 ifTrue: [PrimitiveFailException raise].
self externalAccessFailedWith: _errorCode
```

The C++ side

```
_oop callPrim(int primitiveNumber, _oop oSelf, _oop args)
   {
   AFX_MANAGE_STATE(AfxGetStaticModuleState());
   [...]
   primReturnCode =
   CallUserPrimitiveFunc(primMethodOPTR);
   oSelf = PPop().getObject();
   [...]
   if (primReturnCode == FALSE)
         UPfail(0);
   return oSelf;
   }
```

Autogenerated osprim

```
activateExcludeChild: fExclude
    <osprim: MFC ActivateForm>
    ^ self primitiveFailed.

activateExcludeChild: fExclude
    <osprim: MFC ActivateForm>
    <methodClass: ExternalAnnotatedMethod>
    | argumentArray |
    (argumentArray := Array new: 1) os_at: 1 put: fExclude.
    ^ ObjectStudio.External.ObjectStudioCallInterface new
        callOSPrim: thisContext method functionSpecification
        self: self
        arguments: argumentArray
        ifFail: [^self primitiveFailed]
```

Manually created osprim (Class Point)

```
translateFromForm: aFormOrFormItem to: anOther
    "<osprim: TRACK POINTTRANSLATEFROMFORM>"

    | args functionSpecification |
    args := Array new: 2.
    args at: 1 put: aFormOrFormItem.
    args at: 2 put: anOther.
    functionSpecification := OSPrimSpecifier new.
    functionSpecification
        module: Root.ObjectStudio.ENFINModule versionTag , 'TRACK'.
    functionSpecification function: 'POINTTRANSLATEFROMFORM'.
    functionSpecification numArgs: 2.
    ^ Root.ObjectStudio.ObjectStudioCallInterface new
        callOSPrim: functionSpecification
        self: self
        arguments: args
        ifFail: [^self primitiveFailed]
```

OSPrimSpecifier

```
Smalltalk.Kernel defineClass: #OSPrimSpecifier
    superclass: #{Object}
    indexedType: #none
    private: false
    instanceVariableNames: 'numArgs numTemps
        handle function module '
    classInstanceVariableNames: ''
    imports: ''
    category: 'ObjectStudio Tools,
```

ExternalAnnotatedMethod

```
Smalltalk.Kernel defineClass: #ExternalAnnotatedMethod
    superclass: #{Kernel.AnnotatedMethod}
    indexedType: #objects
    private: false
    instanceVariableNames: 'functionSpecification '
    classInstanceVariableNames: ''
    imports: ''
    category: 'ExternalAnnotatedMethod`
```

- Variable functionSpecification stores instances of OSPrimSpecifier

Module/ EnfinModule

- Autogenerate osprim

privateQueryVolumeName: aSmallInteger
< osprim: FILES PRIVATEQUERYDRIVENAME>

":Section Reference
privateQueryVolumeName: aSmallInteger

Description: Returns the name of a drive.
Assumptions: The drive number passed in is a small integer starting with 1 for drive A:. This function returns allways an empty strings on operating systems, which do not support a drive concept.
[...]

External Procedures

- Just work unchanged

ObjectStudio Unicode

- In ObjectStudio 7
  - Two installations
  - Two Virtual Machines
  - Incompatible Images
  - Compatible Source Code
- In ObjectStudio 8
  - One installation
  - One Virtual Machine
  - Two sets of DLLs
  - One image
  - Decision at start-up

Native Widgets

- Use MFC
- Callbacks to VisualWorks

Calling Smalltalk from C

- PSend is implemented using
  - OESendMessageMany()
- ASend is implemented using
  - OESendMessageMany()

```
whenIdleSend: aSelector to: aReceiver withArguments: anArray
                "inserts the asend into the queue "
        ASendSemaphore critical:
                        [ASendQueue addLast: (Core.MessageSend
                                                receiver: aReceiver
                                                selector: aSelector
                                                arguments: (anArrayOrObject isAr
```

The Process Model

- VisualWorks process model
  - Many Smalltalk processes are running in different priority.
  - Windows events are handled (almost) any time
  - Shared queues move the events to target processes
  - This is emplemented in C
- ObjectStudio process model
  - The caller of all execution is the Windows Event Loop
  - All Message Sends in the ASendQueue are executed when the Windows Event is empty
  - This is implemented in C++

Decision of July 2006

- Move EventLoop to Smalltalk
  - Available in vw-dev since August 29, 2006

- Initialzing in class EventProcessingManager:

```
primCallbackEventInstall: aMethodSelector
    "Inform the VM of the callback class (the receiver) and the callback
    invocation
    method selector for event processing."

    | regNames |
    regNames := ObjectMemory registrationNames.
    ((regNames includes: 'callbackEventClass')
      and: [regNames includes: 'callbackEventSelector'])
            ifTrue:
                    [ObjectMemory registerObject: self
                            withEngineFor: 'callbackEventClass'.
                    ObjectMemory registerObject: aMethodSelector
                            withEngineFor: 'callbackEventSelector']
```

Eventloop in Smalltalk

- Class EventProcessingManager
  - runs the loop
  - delegates all actions to the handler
    - Implemented in EventHandler class hierarchy

```
processEvents
    | eventRecord |
    handler canHandleMultipleEvents
      ifFalse: [self blockEvents ifTrue: [^self]].

    [eventRecord := handler eventRecord.
    [handler nextEvent: eventRecord]
      whileTrue: [handler handleEvent: eventRecord].
    handler postHandleEvents]
                ensure: [self allowEvents]
```

Subclasses of EventHandler

- Example methods in Win32EventHandler

```
eventRecord
    ^ self MSG gcMalloc
```

```
nextEvent: anEventRecord
    ^(self
      peekMessageA: anEventRecord
      window: 0
      filterMin: 0
      filterMax: 0
      flags: (self PM_REMOVE bitOr: self PM_NOYIELD)) ~= self
    FALSE
```

```
postHandleEvents
    ^ self
```

OStudioEventHandler

- Example methods in OStudioEventHandler

```
preTranslateMessage: msg
    <C: BOOL PreTranslateMessage(LPMSG msg)>
    ^ self externalAccessFailedWith: _errorCode

postHandleEvents
    System wantsBusyCursor
      ifTrue:  [UI.Cursor wait
                    showWhile: [System drainASendQueue]]
      ifFalse: [System drainASendQueue].
    self onIdleApp

onIdleApp
    <C: void OnIdleApp(void)>
    ^ self externalAccessFailedWith: _errorCode
```

Handling an event

- In Win32EventHandler

```
handleEvent: anEventRecord
    self translateMessage: anEventRecord.
    self dispatchMessageA: anEventRecord
```

- In OStudioEventHandler

```
handleEvent: anEventRecord
    (self preTranslateMessage: anEventRecord) = self FALSE
      ifTrue:
                [self translateMessage: anEventRecord.
                self dispatchMessageA: anEventRecord]
```

User Interrupts

- <ctrl> Y and <ctrl> <shift> Y work as in VisualWorks
- Implemented as Accelerator Keys
- <ctrl> Y interrupts the running process by sending self halt: in a callBack from C

Class Proxies

- Class Proxies work
- They are shared variables in Root.ObjectStudio.Global
- Loading puts class in Root.ObjectStudio

Application Loading

- Application loading works

Performance Issues

- In Classic ObjectStudio
  - Smalltalk execution is slow
  - Calling C primitives cost nothing
- In VisualWorks
  - Smalltalk execution is fast
  - Calling C is expensive
- In Classic ObjectStudio
  - Performance critical methods are moved to C
- In ObjectStudio 8
  - Performance critical primitives are moved back to Smalltalk

VisualWorks .st file-in is slow

- Of 1000 seconds
  - 900 are RB refresh
  - Of 100 seconds
    - 90 are repeatedly relinking the system
    - Of 10 Seconds
      - 9 are disk flush (Changes file)
      - 1 second compiling
- At the end of the optimizations:
  - Loading as alternative to file-in
  - Loading a .st is similar speed as parcel loading
    - Small .st/.cls files load faster than parcels
    - Large parcel files load faster than .st/.cls files

New Concepts for ObjectStudio

- Source Code Management
  - Store
    - Versioning system
    - Database based
  - Smalltalk Archives
    - File based
    - One file per application
- Code purity
  - Undeclared
  - Code Critic
  - Overrides

Time Line

- June 2005
  - Internal Alpha
- October 2005
  - Internal Alpha2
- March 2006
  - Cincom internal testing
- April 2006
  - First Customer
- August 2006
  - First independent Service Partner
- May-September 2006
  - Solve incompatabilities, Refactoring, Performance issues
- October 2006
  - Next few customers
- December 2006
  - Preview

Porting Process Theory

- Theory
  - Load application
  - Start it

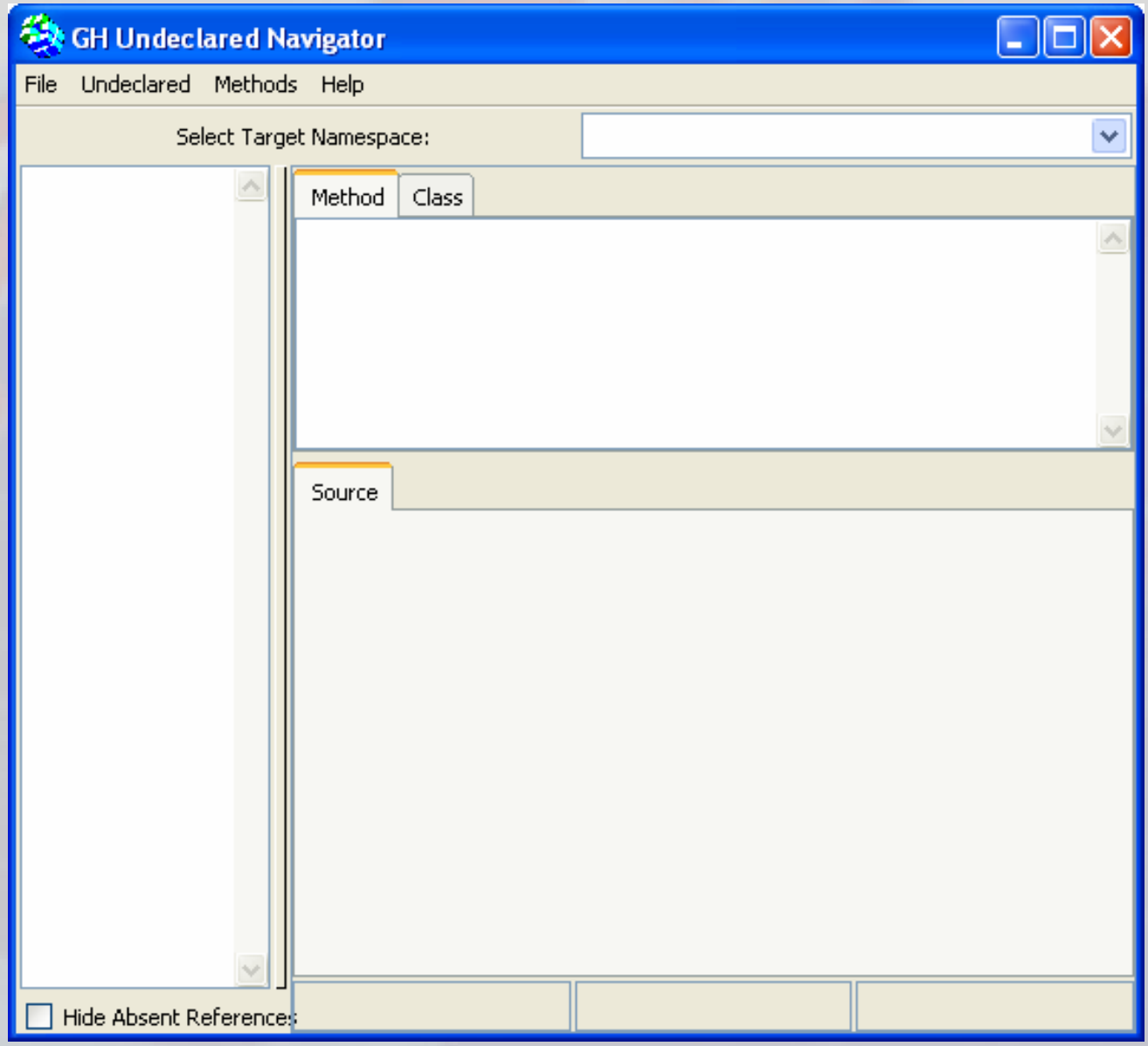
Porting Process Practice

- Look at base system modifications
  - Like any other porting this is a source of many problems
- Known incompatibilities
  - Immutability
  - Declare Pool Dictionaries
  - Export Modeling Tool definitions in ASCII
    - Binary format is incompatible

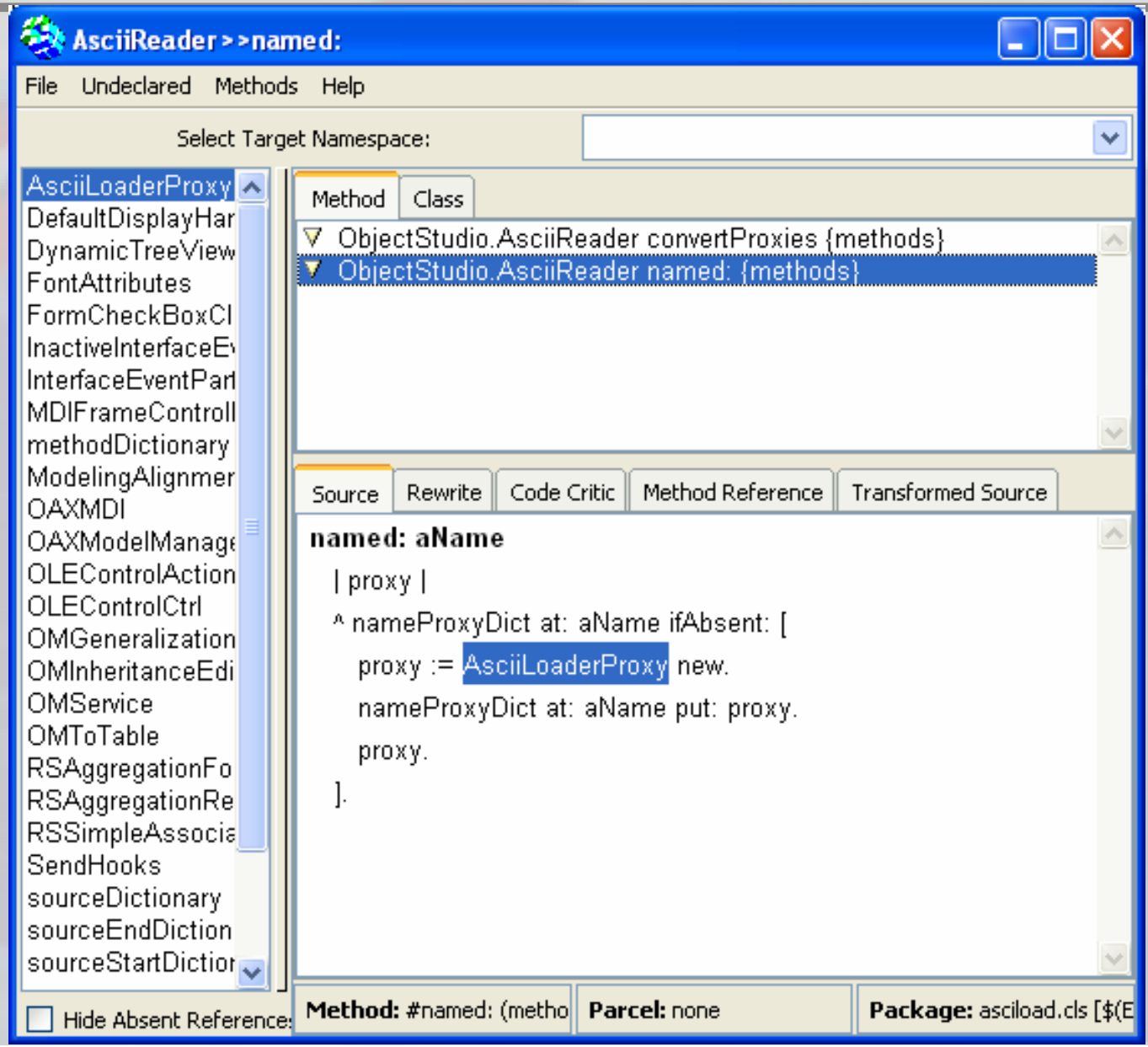
Undeclareds

- In Classic ObjectStudio
  - Each undeclared variable is always considered a global
- In VisualWorks and ObjectStudio 8
  - Each undeclared variable is considered undeclared
- GHUndeclaredBrowser
  - Shows all Undeclareds and their references
  - It uncovered some very old ObjectStudio problems due to typoes.

Target Look


GH Undeclared Navigator
File
Undeclared
Methods
Help
Select Target Namespace:
Method
Class
Source
Hide Absent References

After loading Modeling Tool



What can ESUG Audience learn?

- Integration of Smalltalk systems is possible
- Which systems deserve to be integrated?
  - VW and Squeak
    - Very common systems
  - VSE
  - VA
  - Smalltalk-X
  - Dolphin
  - Ruby
  - Java
    - Frost
  - GemStone