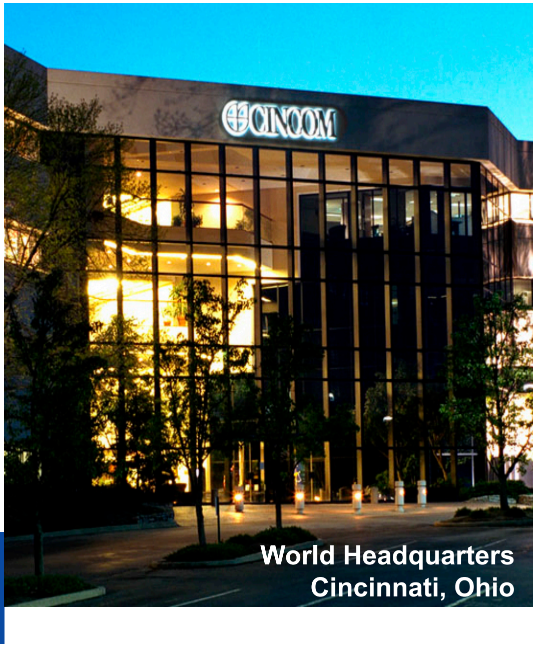
Cincom®

Cincom® ObjectStudio® New Native GUI Implementation Preview:

A Technical Overview


World Headquarters
Cincinnati, Ohio

ObjectStudio®

Cincom®

Overview

- Intention and Goals
- Some Windows™ Definitions
- Architectural Overview
- Announcements
- Sample Code

Intention and Goals

- Modernize the UI Controls / Widgets
- Eliminate Primitives and use DLLCC
- Easy to Maintain and Extend

“A user interface is well-designed when the program behaves exactly how the user thought it would.”

Some Windows™ Definitions

- Window Classes
- Window Procedure
- Window Messages

Window Classes

A window class is a set of attributes that the system uses as a template to create a window. Every window is a member of a window class. All window classes are process specific.

Window Procedure

Every window class has an associated window procedure — a function that processes all messages sent or posted to all windows of the class.

All aspects of a window's appearance and behavior depend on the window procedure's response to these messages.

Window Messages

Each window has a function, called a window procedure, that the system calls whenever it has input for the window.

Windows do not make explicit function calls to obtain input. Instead, they wait for the system to pass input to them.

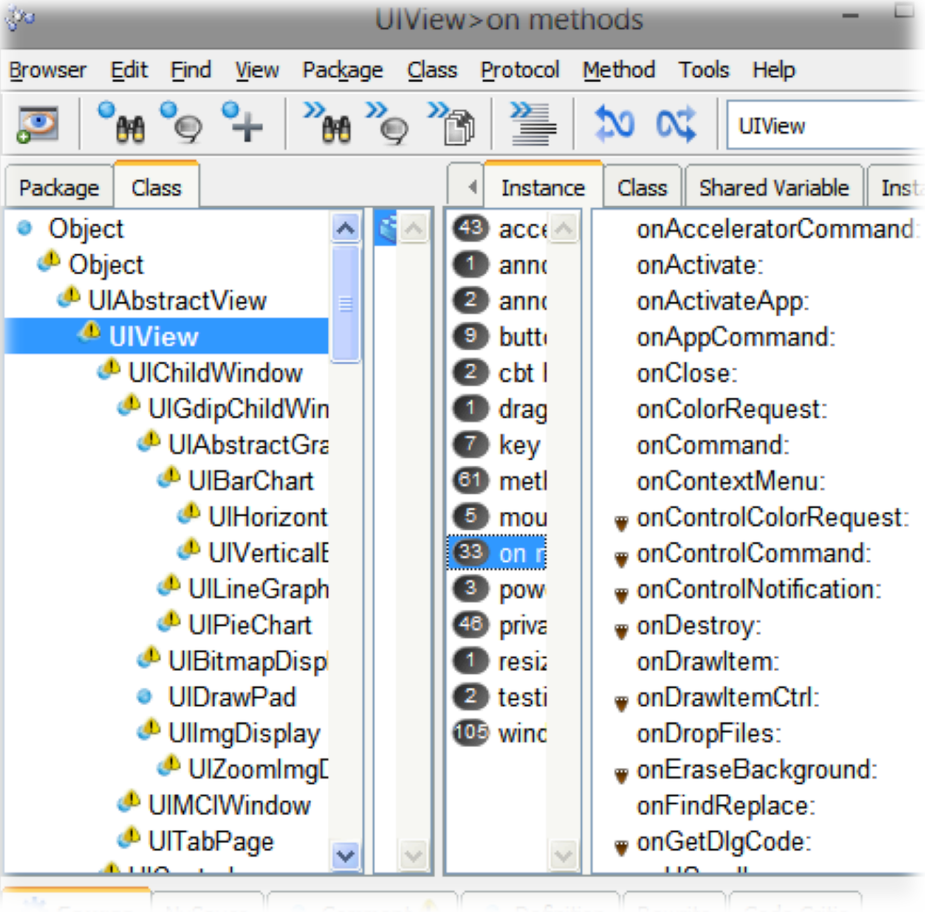
The system passes all input for an application to the various windows in the application.

Architectural Overview

- UIView
  - UITransparentWindow
  - UIChildWindow
  - UIControl
- Windows GDI
- GDI+

UIView

- UIView class
  - registerClass
  - WndProc
  - MessageMap
  - Message Handling
- UIView
  - privateCreate



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UIView
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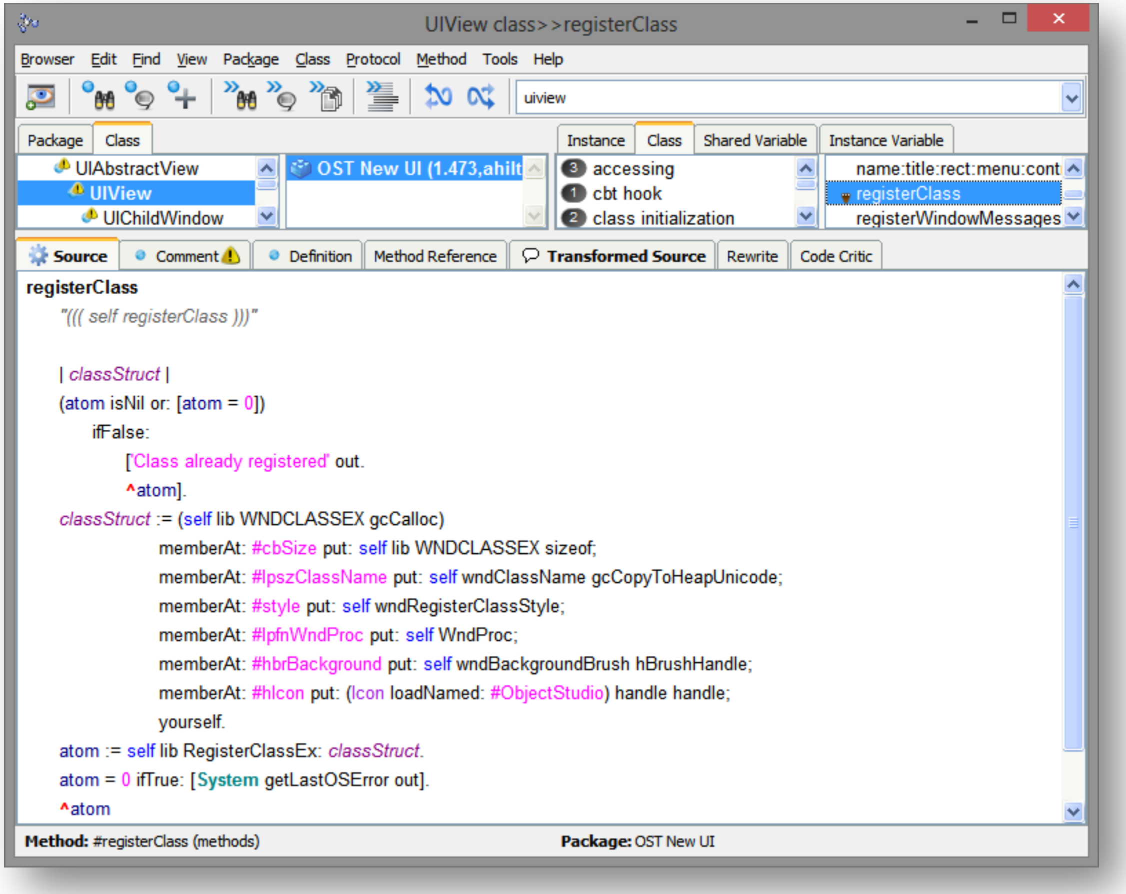
UIGdipChildWin
UIAbstractGra
UIBarChart
UIHorizont
UIVerticalE
UILineGraph
UIPieChart
UIBitmapDispl
UIDrawPad
UIImgDisplay
UIZoomImgD
UIMCIWindow
UITabPage

43 acce
1 annc
2 annc
9 butt
2 cbt l
1 drag
7 key
61 metl
5 mou
33 on r
3 pow
46 priva
1 resiz
2 testi
105 winc

onAcceleratorCommand:
onActivate:
onActivateApp:
onAppCommand:
onClose:
onColorRequest:
onCommand:
onContextMenu:
onControlColorRequest:
onControlCommand:
onControlNotification:
onDestroy:
onDrawItem:
onDrawItemCtrl:
onDropFiles:
onEraseBackground:
onFindReplace:
onGetDlgCode:

UIView class>>registerClass

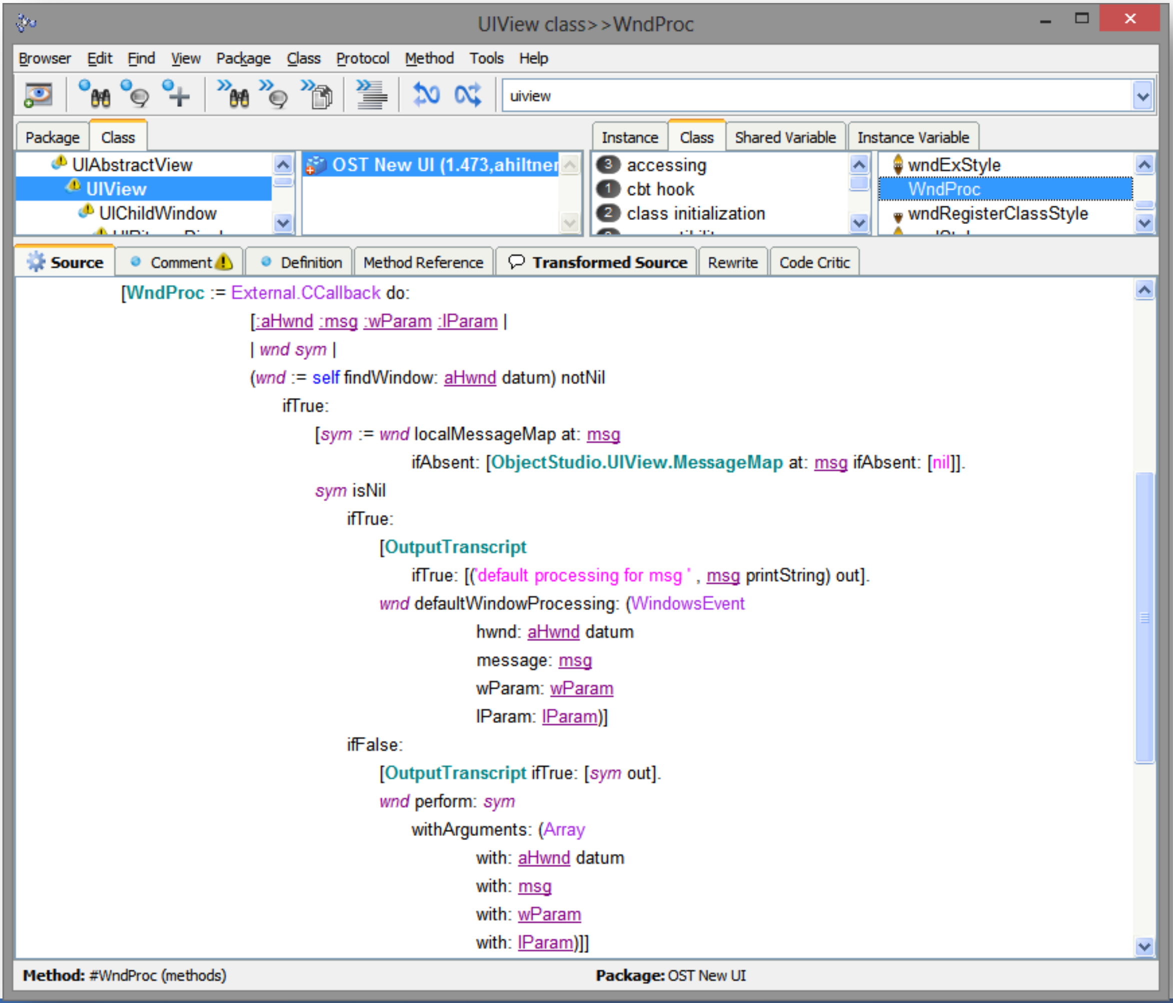

UIView class>>registerClass
Browser Edit Find View Package Class Protocol Method Tools Help
uiview
Package Class
Instance Class Shared Variable Instance Variable
UIAbstractView
UIView
UIChildWindow
OST New UI (1.473,ahilt
3 accessing
1 cbt hook
2 class initialization
name:title:rect:menu:cont
registerClass
registerWindowMessages
Source Comment Definition Method Reference Transformed Source Rewrite Code Critic

```
registerClass
    "((( self registerClass )))"

    | classStruct |
    (atom isNil or: [atom = 0])
        ifFalse:
            ['Class already registered' out.
            ^atom].
    classStruct := (self lib WNDCLASSEX gcCalloc)
                memberAt: #cbSize put: self lib WNDCLASSEX sizeof;
                memberAt: #lpszClassName put: self wndClassName gcCopyToHeapUnicode;
                memberAt: #style put: self wndRegisterClassStyle;
                memberAt: #lpfnWndProc put: self WndProc;
                memberAt: #hbrBackground put: self wndBackgroundBrush hBrushHandle;
                memberAt: #hIcon put: (Icon loadNamed: #ObjectStudio) handle handle;
                yourself.
    atom := self lib RegisterClassEx: classStruct.
    atom = 0 ifTrue: [System getLastOSError out].
    ^atom
```

Method: #registerClass (methods) **Package:** OST New UI

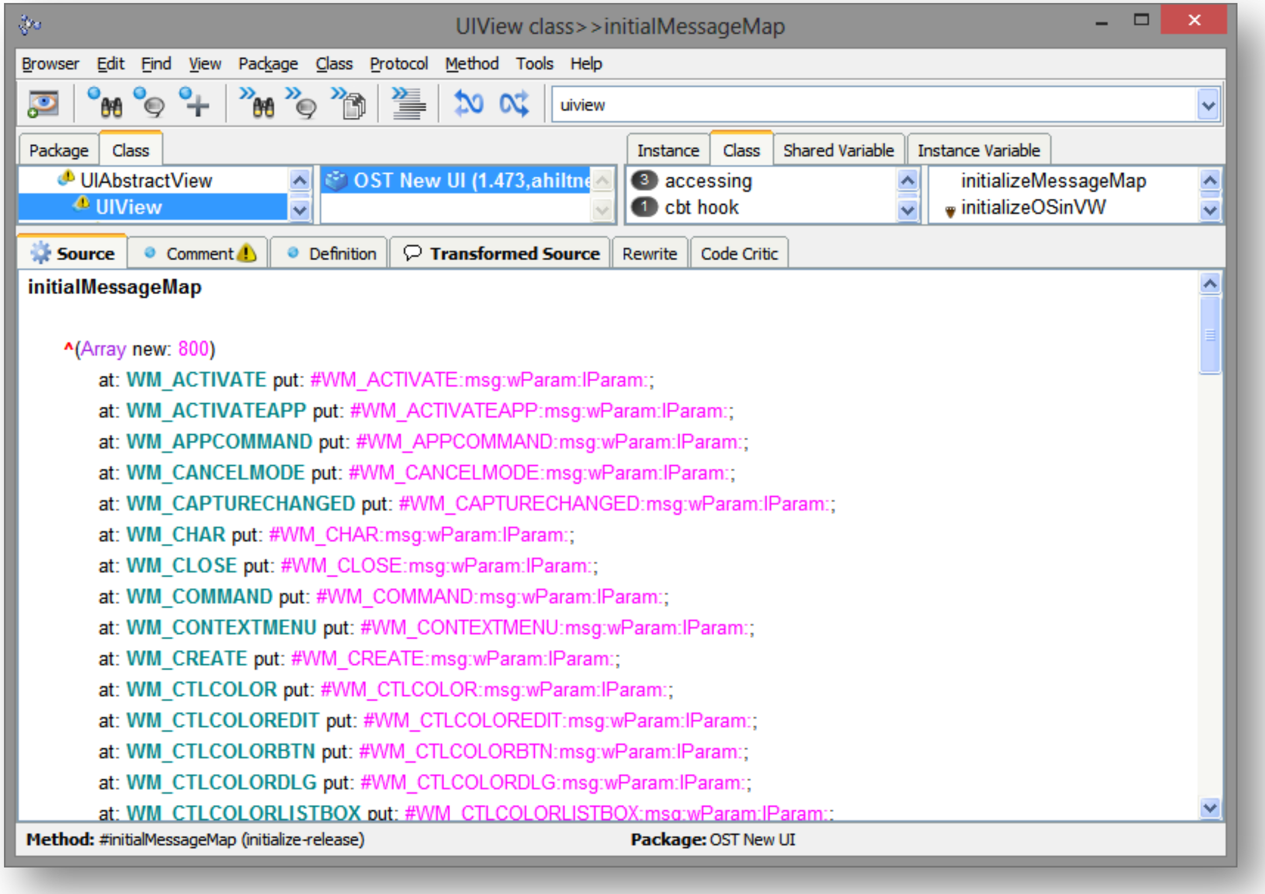
UIView class>>WndProc



```
[WndProc := External.CCallback do:
                [:aHwnd :msg :wParam :lParam |
                | wnd sym |
                (wnd := self findWindow: aHwnd datum) notNil
                    ifTrue:
                        [sym := wnd localMessageMap at: msg
                                    ifAbsent: [ObjectStudio.UIView.MessageMap at: msg ifAbsent: [nil]].
                        sym isNil
                            ifTrue:
                                [OutputTranscript
                                    ifTrue: [('default processing for msg ' , msg printString) out].
                                wnd defaultWindowProcessing: (WindowsEvent
                                            hwnd: aHwnd datum
                                            message: msg
                                            wParam: wParam
                                            lParam: lParam)]
                            ifFalse:
                                [OutputTranscript ifTrue: [sym out].
                                wnd perform: sym
                                    withArguments: (Array
                                            with: aHwnd datum
                                            with: msg
                                            with: wParam
                                            with: lParam)]]
```

Method: #WndProc (methods) **Package:** OST New UI

UIView class>>MessageMap


UIView class>>initialMessageMap
Browser Edit Find View Package Class Protocol Method Tools Help
uiview
Package Class
UIAbstractView
UIView
OST New UI (1.473,ahiltne
Instance Class Shared Variable Instance Variable
3 accessing
1 cbt hook
initializeMessageMap
initializeOSinVW
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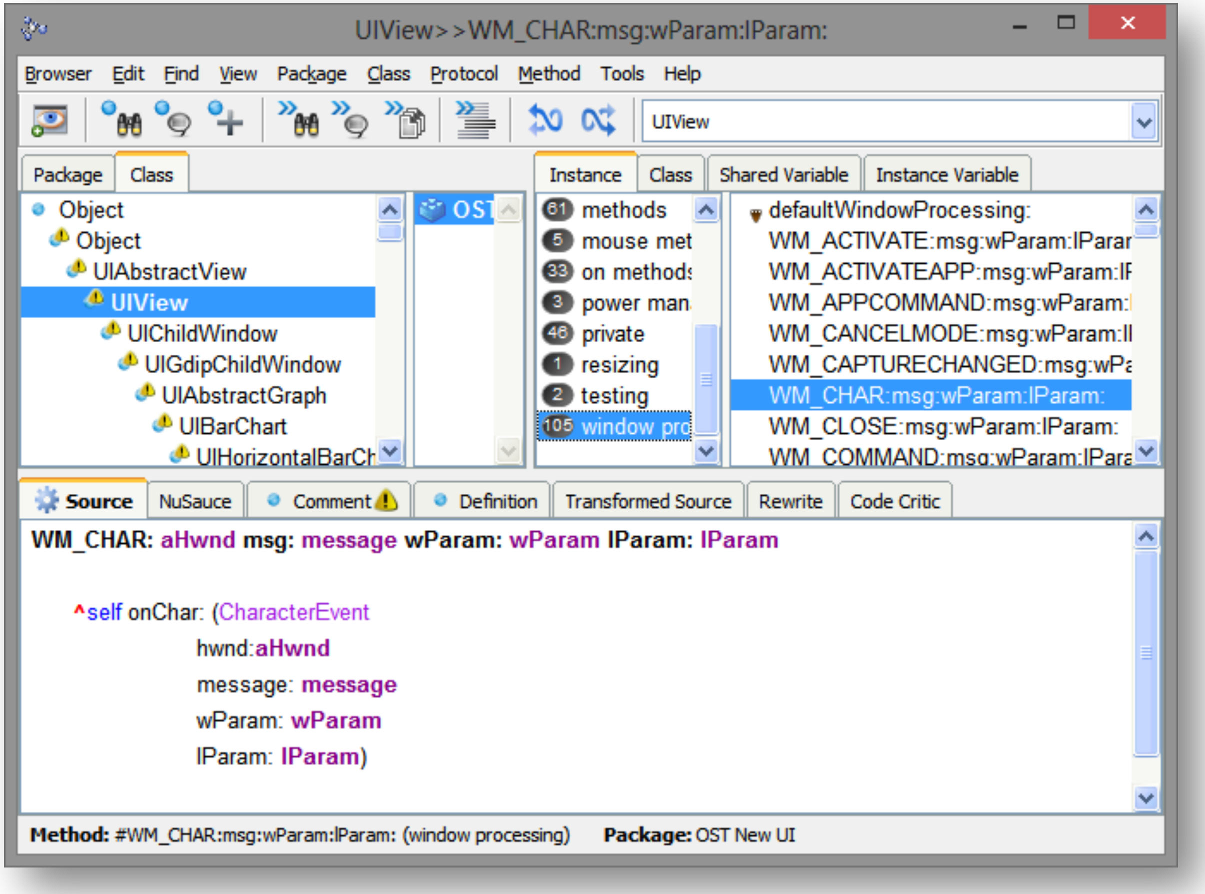
```
initialMessageMap

    ^(Array new: 800)
        at: WM_ACTIVATE put: #WM_ACTIVATE:msg:wParam:lParam:;
        at: WM_ACTIVATEAPP put: #WM_ACTIVATEAPP:msg:wParam:lParam:;
        at: WM_APPCOMMAND put: #WM_APPCOMMAND:msg:wParam:lParam:;
        at: WM_CANCELMODE put: #WM_CANCELMODE:msg:wParam:lParam:;
        at: WM_CAPTURECHANGED put: #WM_CAPTURECHANGED:msg:wParam:lParam:;
        at: WM_CHAR put: #WM_CHAR:msg:wParam:lParam:;
        at: WM_CLOSE put: #WM_CLOSE:msg:wParam:lParam:;
        at: WM_COMMAND put: #WM_COMMAND:msg:wParam:lParam:;
        at: WM_CONTEXTMENU put: #WM_CONTEXTMENU:msg:wParam:lParam:;
        at: WM_CREATE put: #WM_CREATE:msg:wParam:lParam:;
        at: WM_CTLCOLOR put: #WM_CTLCOLOR:msg:wParam:lParam:;
        at: WM_CTLCOLOREDIT put: #WM_CTLCOLOREDIT:msg:wParam:lParam:;
        at: WM_CTLCOLORBTN put: #WM_CTLCOLORBTN:msg:wParam:lParam:;
        at: WM_CTLCOLORDLG put: #WM_CTLCOLORDLG:msg:wParam:lParam:;
        at: WM_CTLCOLORLISTBOX put: #WM_CTLCOLORLISTBOX:msg:wParam:lParam:;
```

Method: #initialMessageMap (initialize-release) **Package:** OST New UI

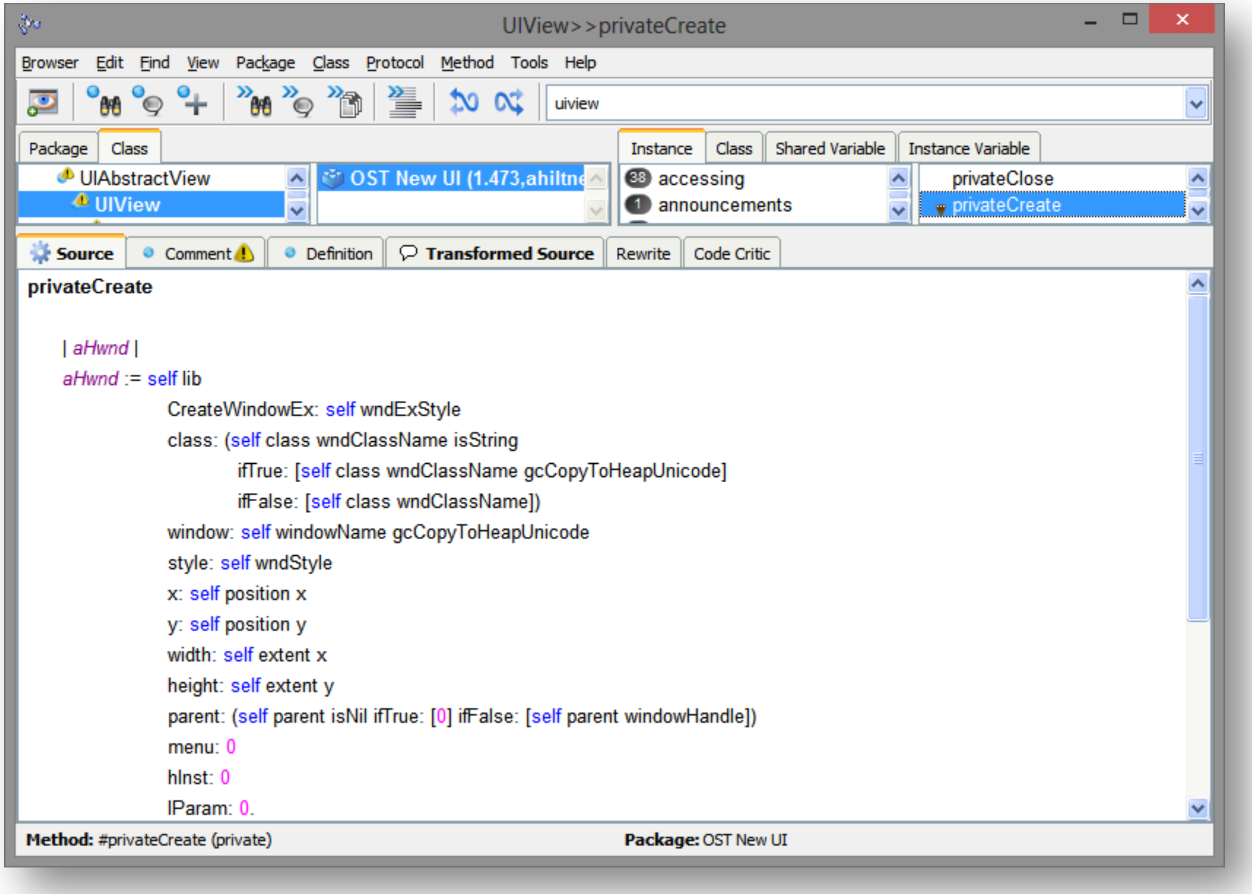
UIView>>WM_CHAR:msg:wParam:lParam


UIView>>WM_CHAR:msg:wParam:lParam:
Browser Edit Find View Package Class Protocol Method Tools Help
UIView
Package Class
Object
Object
UIAbstractView
UIView
UIChildWindow
UIGdipChildWindow
UIAbstractGraph
UIBarChart
UIHorizontalBarCh
OST
Instance Class Shared Variable Instance Variable
61 methods
5 mouse met
33 on methods
3 power man
46 private
1 resizing
2 testing
105 window pro
defaultWindowProcessing:
WM_ACTIVATE:msg:wParam:lParar
WM_ACTIVATEAPP:msg:wParam:lP
WM_APPCOMMAND:msg:wParam:
WM_CANCELMODE:msg:wParam:l
WM_CAPTURECHANGED:msg:wPa
WM_CHAR:msg:wParam:lParam:
WM_CLOSE:msg:wParam:lParam:
WM_COMMAND:msg:wParam:lPara
Source NuSauce Comment Definition Transformed Source Rewrite Code Critic

```
WM_CHAR: aHwnd msg: message wParam: wParam lParam: lParam


    ^self onChar: (CharacterEvent
                hwnd:aHwnd
                message: message
                wParam: wParam
                lParam: lParam)
```

Method: #WM_CHAR:msg:wParam:lParam: (window processing) **Package:** OST New UI

UIView>>privateCreate

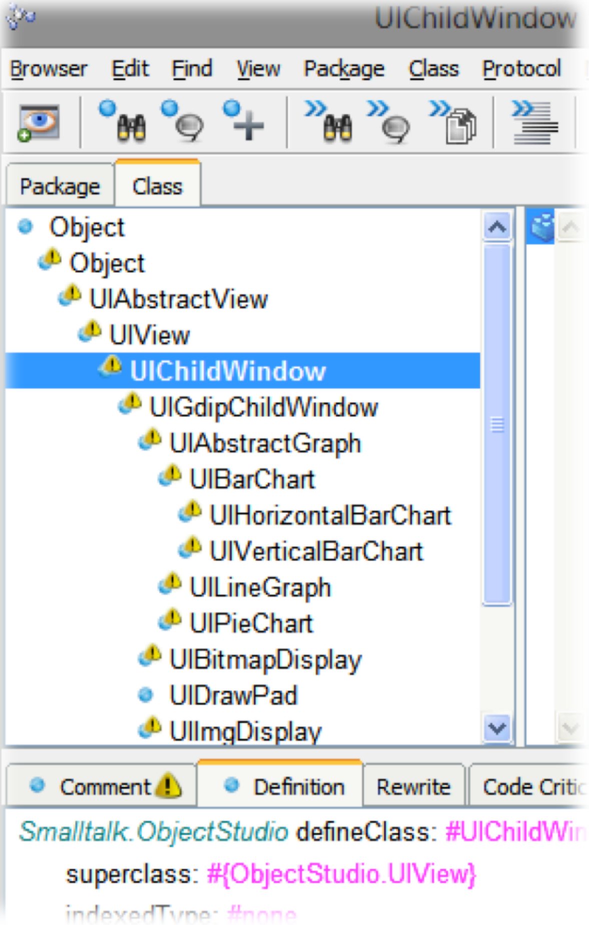


```
privateCreate

    | aHwnd |
    aHwnd := self lib
                CreateWindowEx: self wndExStyle
                class: (self class wndClassName isString
                        ifTrue: [self class wndClassName gcCopyToHeapUnicode]
                        ifFalse: [self class wndClassName])
                window: self windowName gcCopyToHeapUnicode
                style: self wndStyle
                x: self position x
                y: self position y
                width: self extent x
                height: self extent y
                parent: (self parent isNil ifTrue: [0] ifFalse: [self parent windowHandle])
                menu: 0
                hInst: 0
                lParam: 0.
```

Method: #privateCreate (private) **Package:** OST New UI

UIChildWindow

- Superclass for all child windows
- Subclasses are window classes like
  - UITabPage
  - UIDrawPad
  - UIImgDisplay
  - (…)

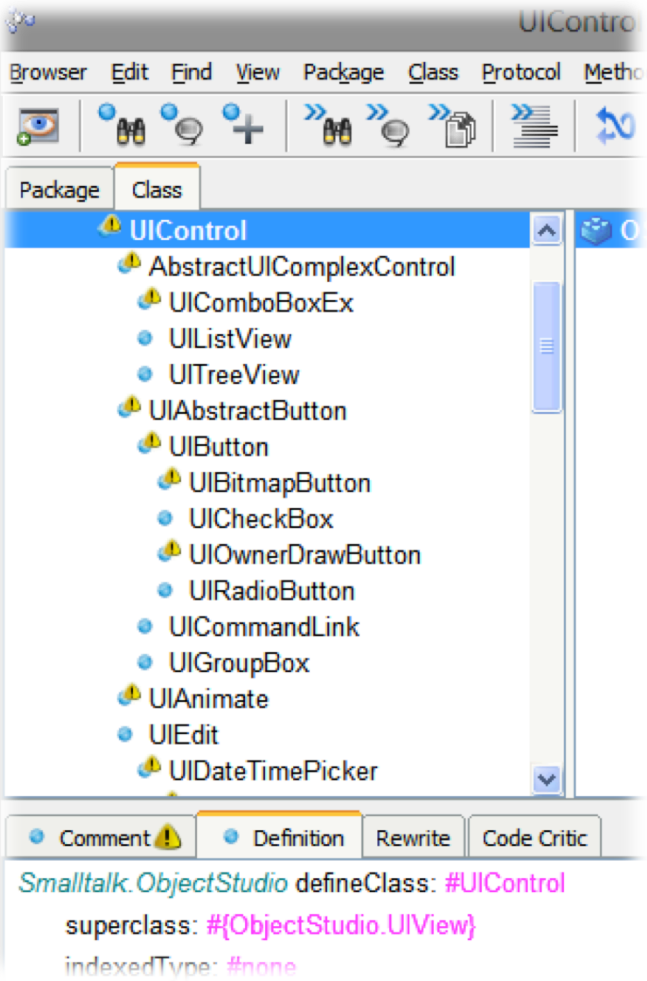


- Object
  - Object
    - UIAbstractView
      - UIView
        - UIChildWindow
          - UIGdipChildWindow
            - UIAbstractGraph
              - UIBarChart
                - UIHorizontalBarChart
                - UIVerticalBarChart
              - UILineGraph
              - UIPieChart
            - UIBitmapDisplay
            - UIDrawPad
            - UIImgDisplay

```
Smalltalk.ObjectStudio defineClass: #UIChildWi
    superclass: #{ObjectStudio.UIView}
    indexedType: #none
```

UIControl

- Superclass for all Controls / Widgets
- Subclasses are Controls / Widgets like
  - UITreeView
  - UIListView
  - UIEdit
    - UIMultilineEdit
    - UIRichEdit
  - (…)



- UIControl
  - AbstractUIComplexControl
    - UIComboBoxEx
    - UIListView
    - UITreeView
  - UIAbstractButton
    - UIButton
      - UIBitmapButton
      - UICheckBox
      - UIOwnerDrawButton
      - UIRadioButton
    - UICommandLink
    - UIGroupBox
  - UIAnimate
  - UIEdit
    - UIDateTimePicker

```
Smalltalk.ObjectStudio defineClass: #UIControl
    superclass: #{ObjectStudio.UIView}
    indexedType: #none
```

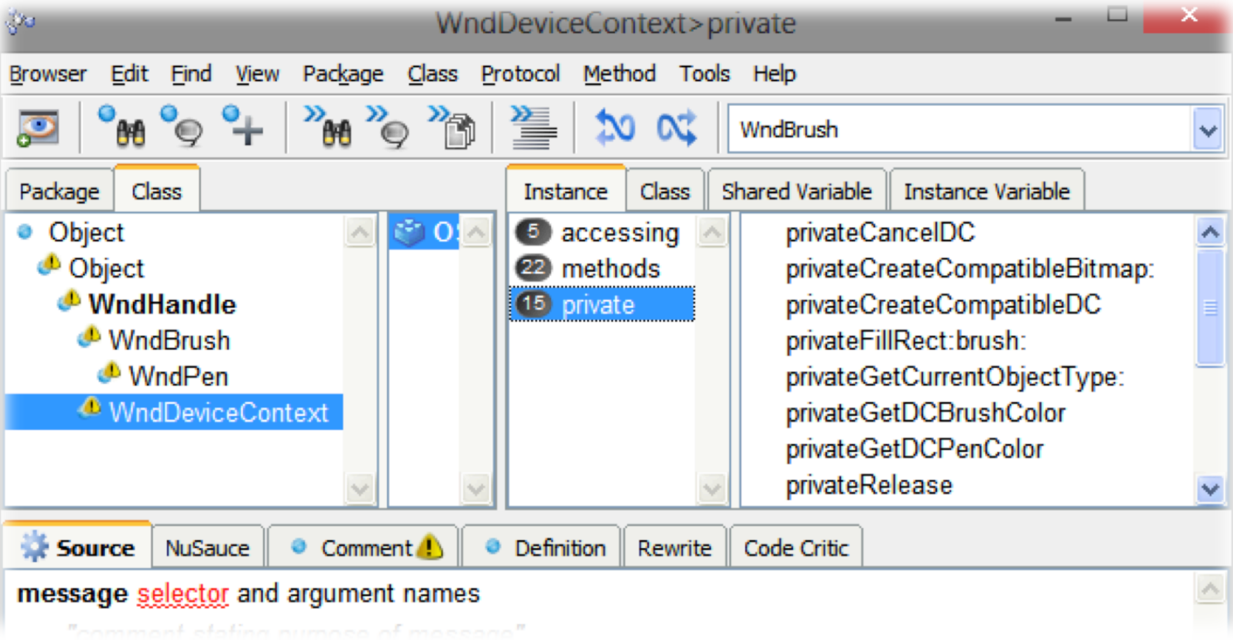
Windows GDI

The Microsoft Windows graphics device interface (GDI) enables applications to use graphics and formatted text on both the video display and the printer.

- Negatives
  - No support for modern image formats (JPG/PNG)
  - No anti-aliasing
- Positive
  - fast

Windows GDI

With the introduction of Windows XP, GDI was deprecated in favor of its successor, the C++ based GDI + subsystem.


WndDeviceContext>private
Browser Edit Find View Package Class Protocol Method Tools Help
WndBrush
Package Class
Instance Class Shared Variable Instance Variable
Source NuSauce Comment Definition Rewrite Code Critic

- Object
  - Object
    - **WndHandle**
      - WndBrush
        - WndPen
      - WndDeviceContext

5 accessing
22 methods
15 private

privateCancelDC
privateCreateCompatibleBitmap:
privateCreateCompatibleDC
privateFillRect:brush:
privateGetCurrentObjectType:
privateGetDCBrushColor
privateGetDCPenColor
privateRelease

message selector and argument names
"comment stating purpose of message"

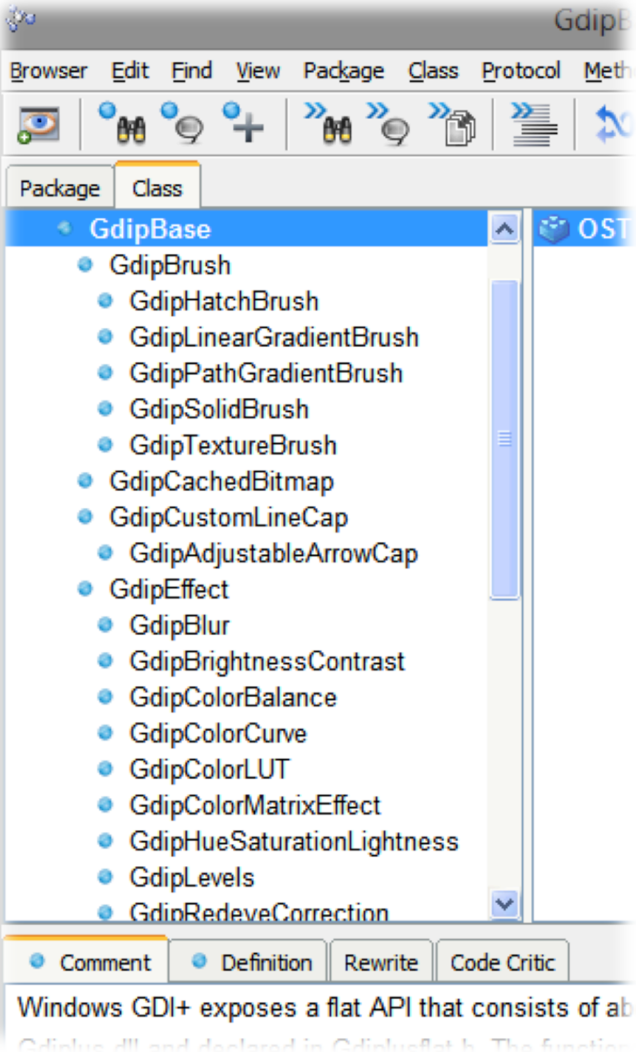
GDI+

“GDI+ adds anti-aliased 2D graphics, floating point coordinates, gradient shading, more complex path management, intrinsic support for modern graphics-file formats like JPEG and PNG, and support for composition of affine transformations in the 2D view pipeline.”

GDI+

Windows GDI+ exposes a flat API that consists of about 600 functions

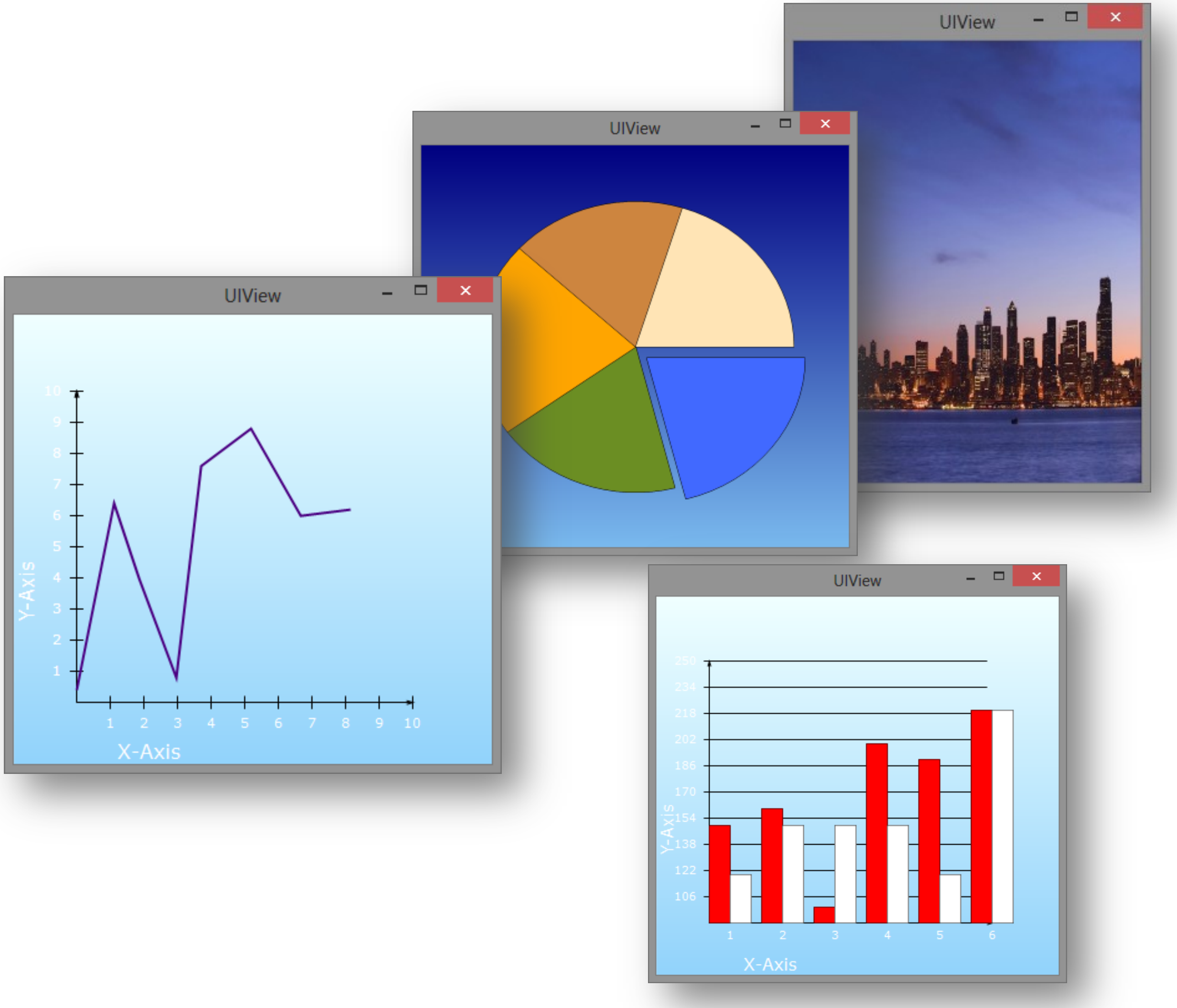
The functions are mapped into Smalltalk classes, that reflect the C++ hierarchy



Windows GDI+ exposes a flat API that consists of ab
Gdiplus.dll and declared in Gdiplusflat.h. The functio

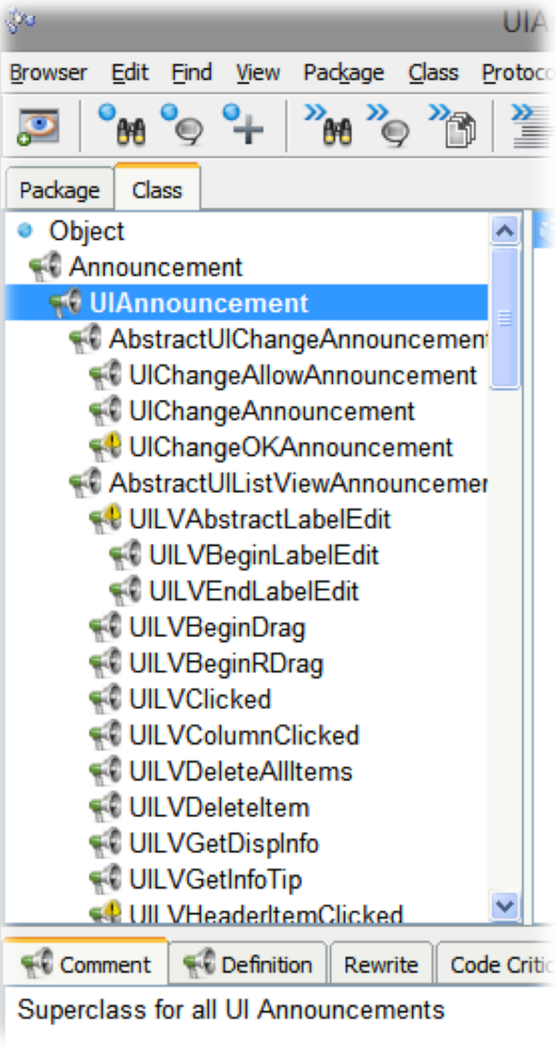
Used In

- UIBitmapDisplay
- UIImgDisplay
- UIDrawPad
- UIChart
  - UILineGraph
  - UIBarChart
  - UIPieChart



Announcements

Announcement is the core of class-based event notification framework superseding the older symbol-based trigger-event framework and the changed/ update mechanism.

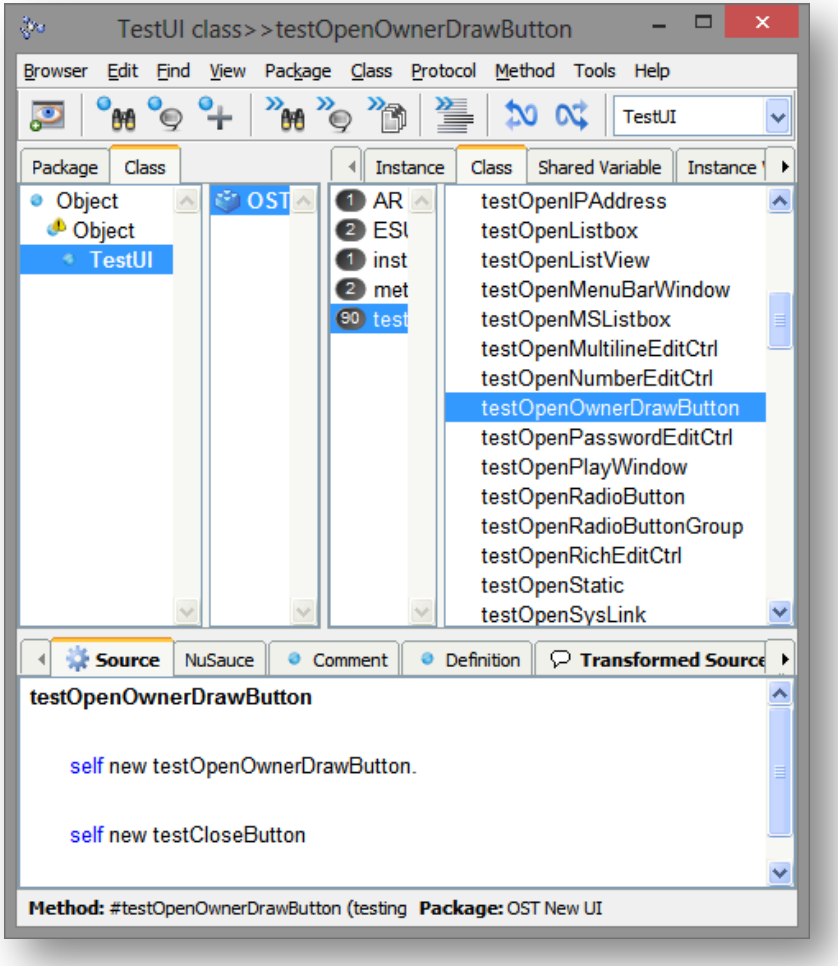


Object
Announcement
UIAnnouncement
AbstractUIChangeAnnouncement
UIChangeAllowAnnouncement
UIChangeAnnouncement
UIChangeOKAnnouncement
AbstractUIListViewAnnouncemer
UILVAbstractLabelEdit
UILVBeginLabelEdit
UILVEndLabelEdit
UILVBeginDrag
UILVBeginRDrag
UILVClicked
UILVColumnClicked
UILVDeleteAllItems
UILVDeleteItem
UILVGetDispInfo
UILVGetInfoTip
UILVHeaderItemClicked

Superclass for all UI Announcements

Class TestUI

- Singleton
- Implements a test for every UI class implemented
- Controlled by class side methods
  - Each line in the class method contain a single operation
  - Execute line by line to see the effect

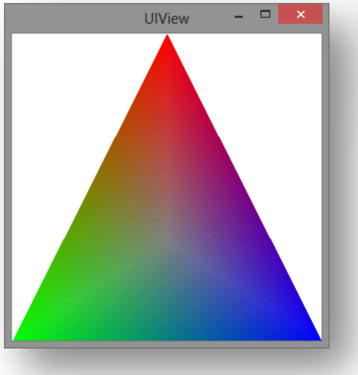


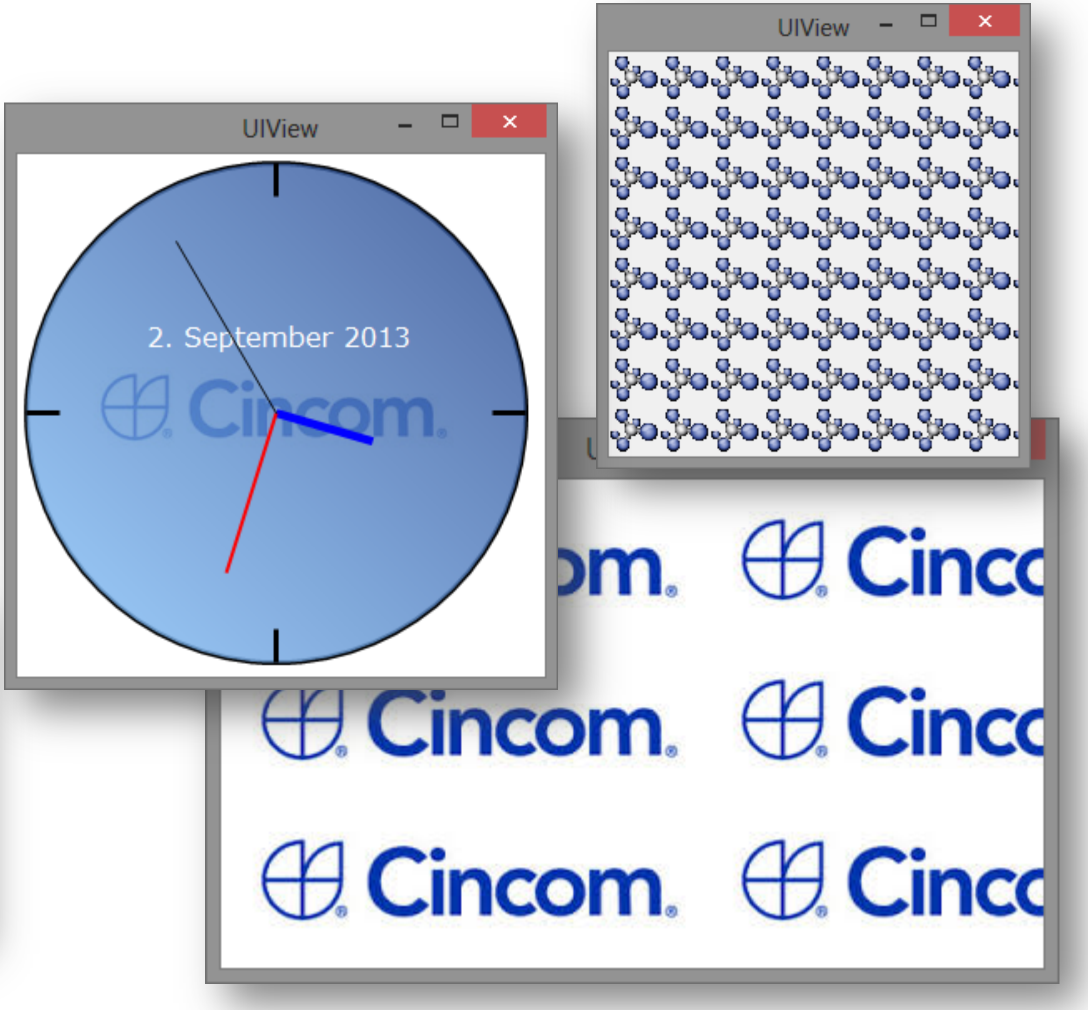
```
testOpenOwnerDrawButton

    self new testOpenOwnerDrawButton.

    self new testCloseButton
```

Method: #testOpenOwnerDrawButton (testing **Package:** OST New UI

Sample Code

- TestUI
- TestGdipClock
- TestPathGradient
- (…)





Some Controls / Widgets

If you want to know more, get your hands on the code and tell us what you think, please register for our OST-DEV program.

See our Product Manager Arden Thomas (athomas@cincom.com) for more information

Contact Information

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  Cincom Smalltalk Product Manager
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  Cincom Smalltalk Marketing Manager

http://www.cincomsmalltalk.com

Thanks for listening