

# Effective Debugging with Xcode 4

Session 319

**Ken Orr**

Xcode Debugger UI Engineer

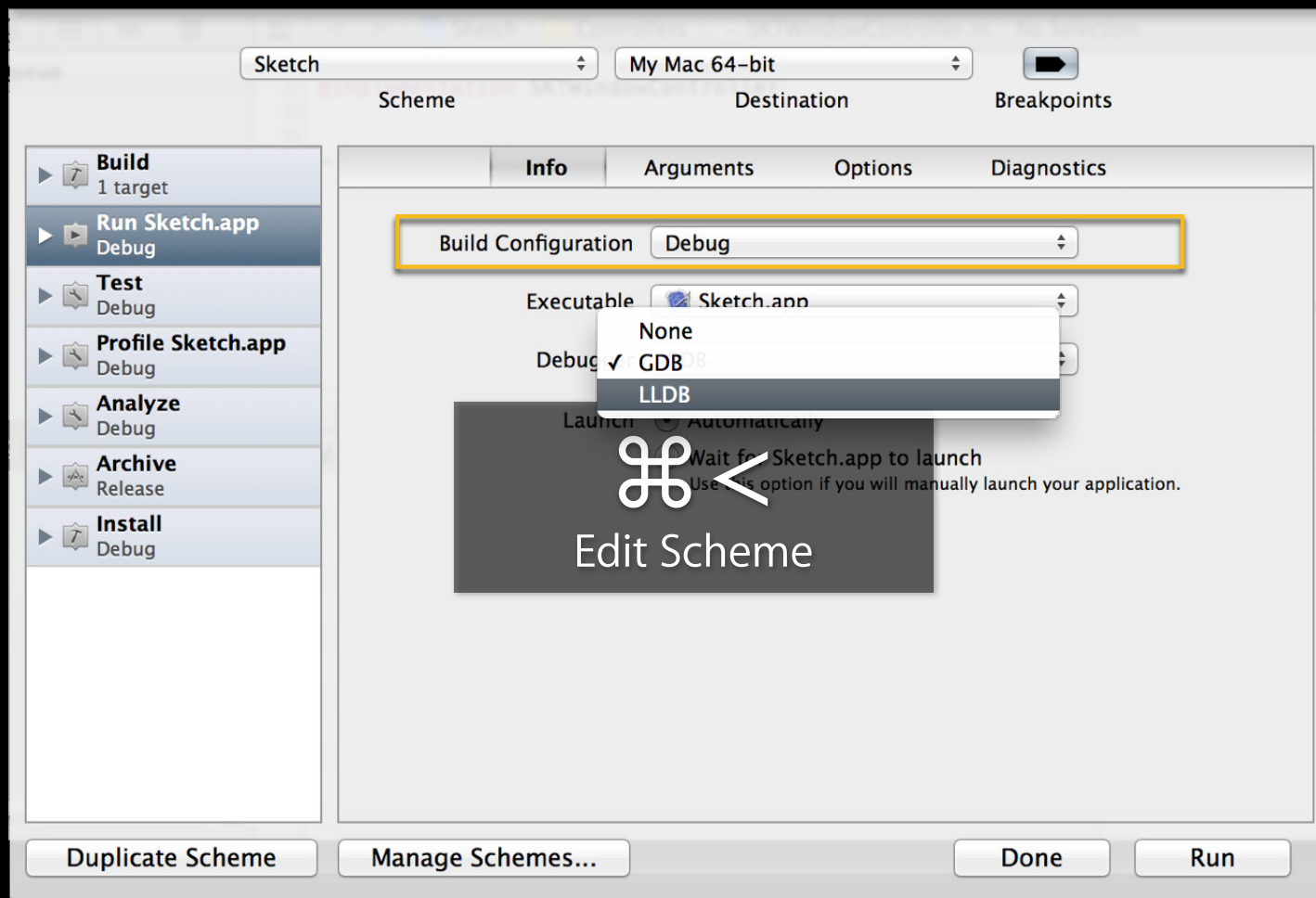
These are confidential sessions—please refrain from streaming, blogging, or taking pictures

# Flexible Workflows

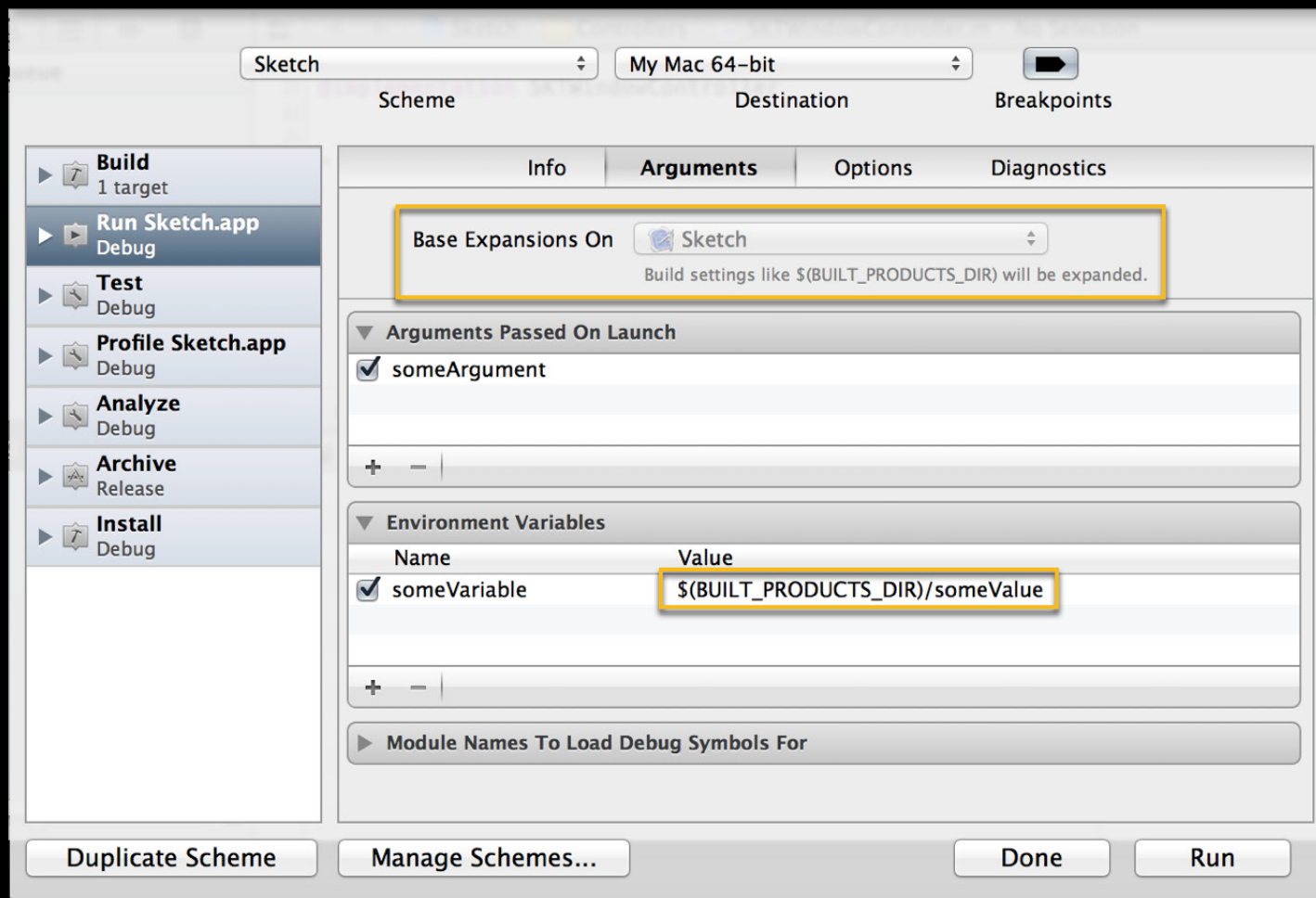
**More Effective**

**More Productive**

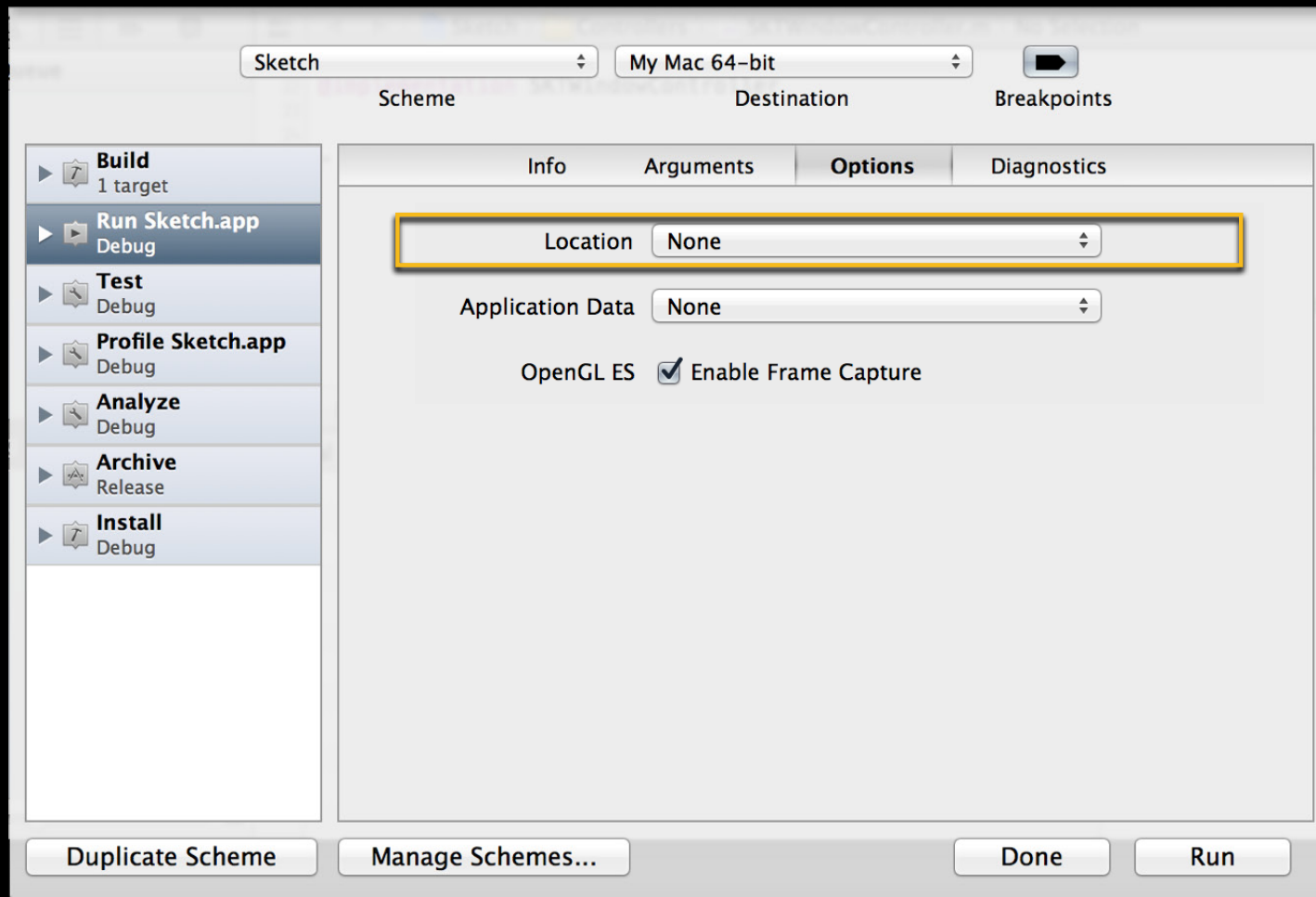
# Debugging with Xcode 4



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# Debugging with Xcode 4



# Debugging with Xcode 4

```
Sketch - SKTWindowController.m
Sketch - My Mac 64-bit
Build Sketch: Canceled | Today at 12:35 PM
Workspace 5
Editor View Organizer

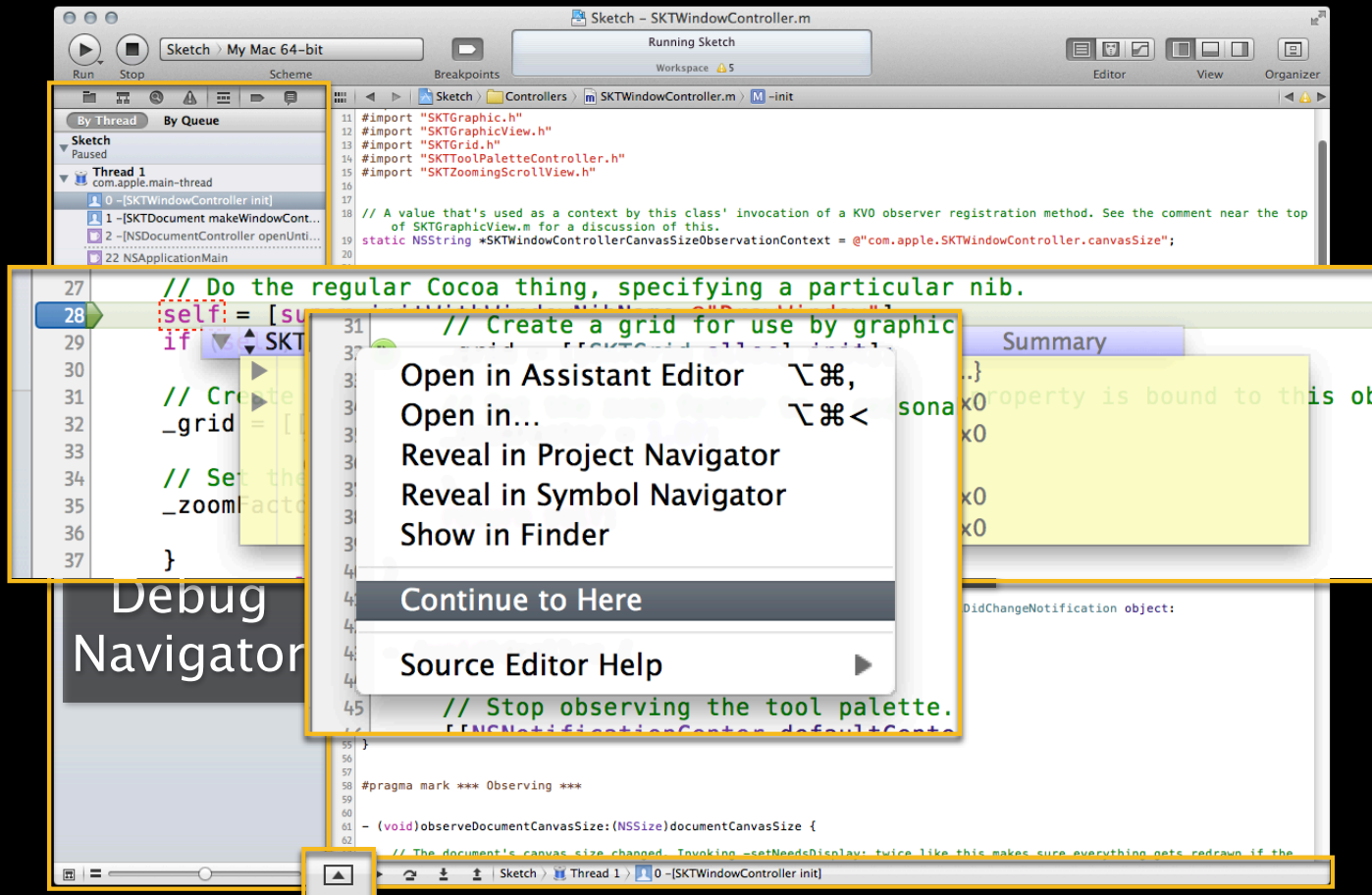
Sketch > Controllers > SKTWindowController.m > M -init

By Thread By Queue
No Debug Session

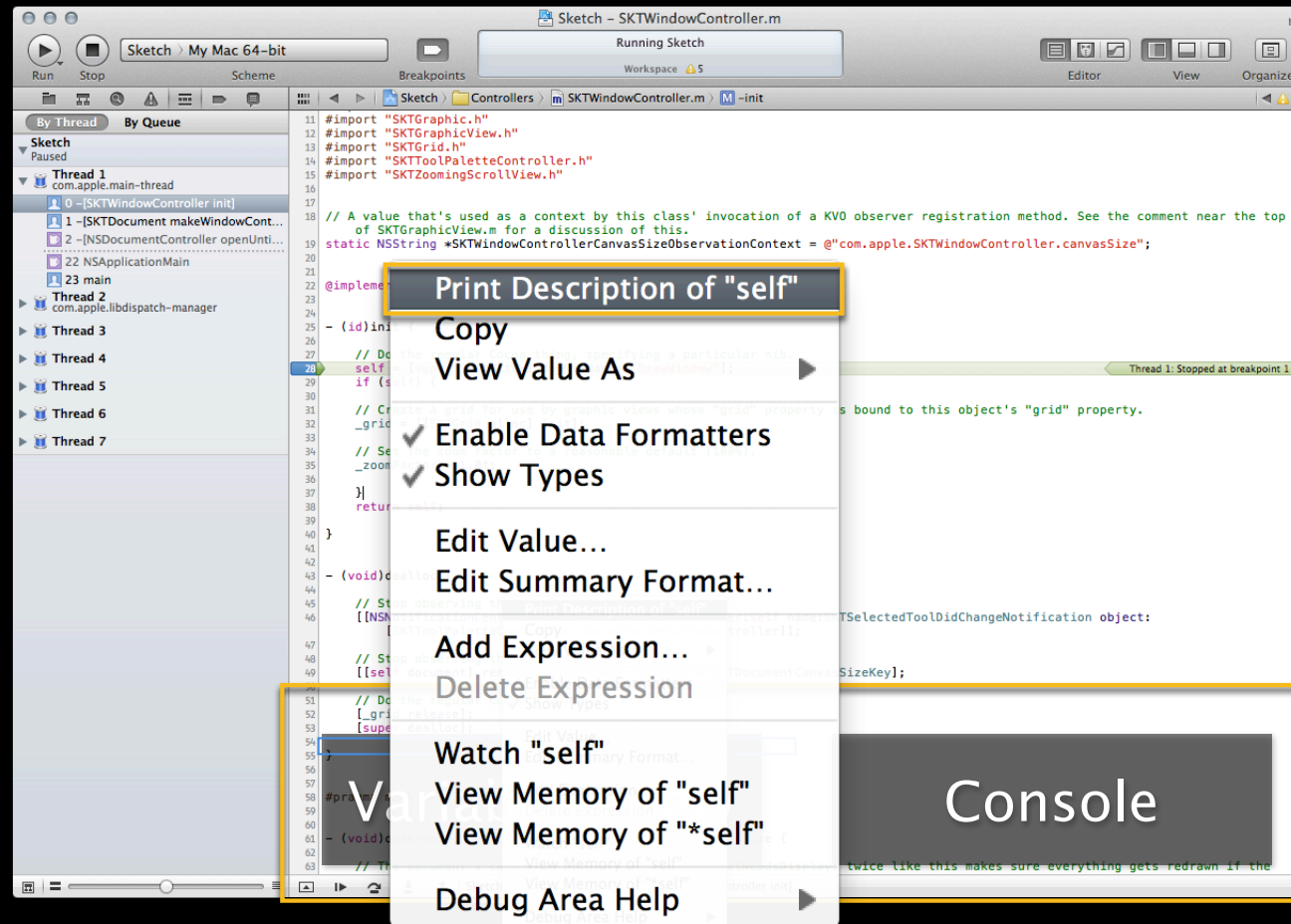
2 SKTWindowController.m
3 Part of the Sketch Sample Code
4 */
5
6
7
8
9 #import "SKTWindowController.h"
10 #import "SKTDocument.h"
11 #import "SKTGraphic.h"
12 #import "SKTGraphicView.h"
13 #import "SKTGrid.h"
14 #import "SKTToolPaletteController.h"
15 #import "SKTZoomingScrollView.h"
16
17
18 // A value that's used as a context by this class' invocation of a KVO observer registration method. See the comment near the top
19 // of SKTGraphicView.m for a discussion of this.
20 static NSString *SKTWindowControllerCanvasSizeObservationContext = @"com.apple.SKTWindowController.canvasSize";
21
22 @implementation SKTWindowController
23
24 - (id)init {
25
26
27 // Do the regular Cocoa thing, specifying a particular nib.
28 self = [super initWithWindowNibName:@"DrawWindow"];
29 if (self) {
30
31 // Create a grid for use by graphic views whose "grid" property is bound to this object's "grid" property.
32 _grid = [[SKTGrid alloc] init];
33
34 // Set the zoom factor to a reasonable default (100%).
35 _zoomFactor = 1.0f;
36
37 }
38 return self;
39
40 }
41
42 - (void)dealloc {
43
44 // Stop observing the tool palette.
45 [[NSNotificationCenter defaultCenter] removeObserver:self name:SKTSelectedToolDidChangeNotification object:
46 [SKTToolPaletteController sharedToolPaletteController]];
47
48 // Stop observing the document's canvas size.
49 [[self document] removeObserver:self forKeyPath:SKTDocumentCanvasSizeKey];
50
51 // Do the regular Cocoa thing.
52 [_grid release];
53 [super dealloc];
54
55 }
56
```



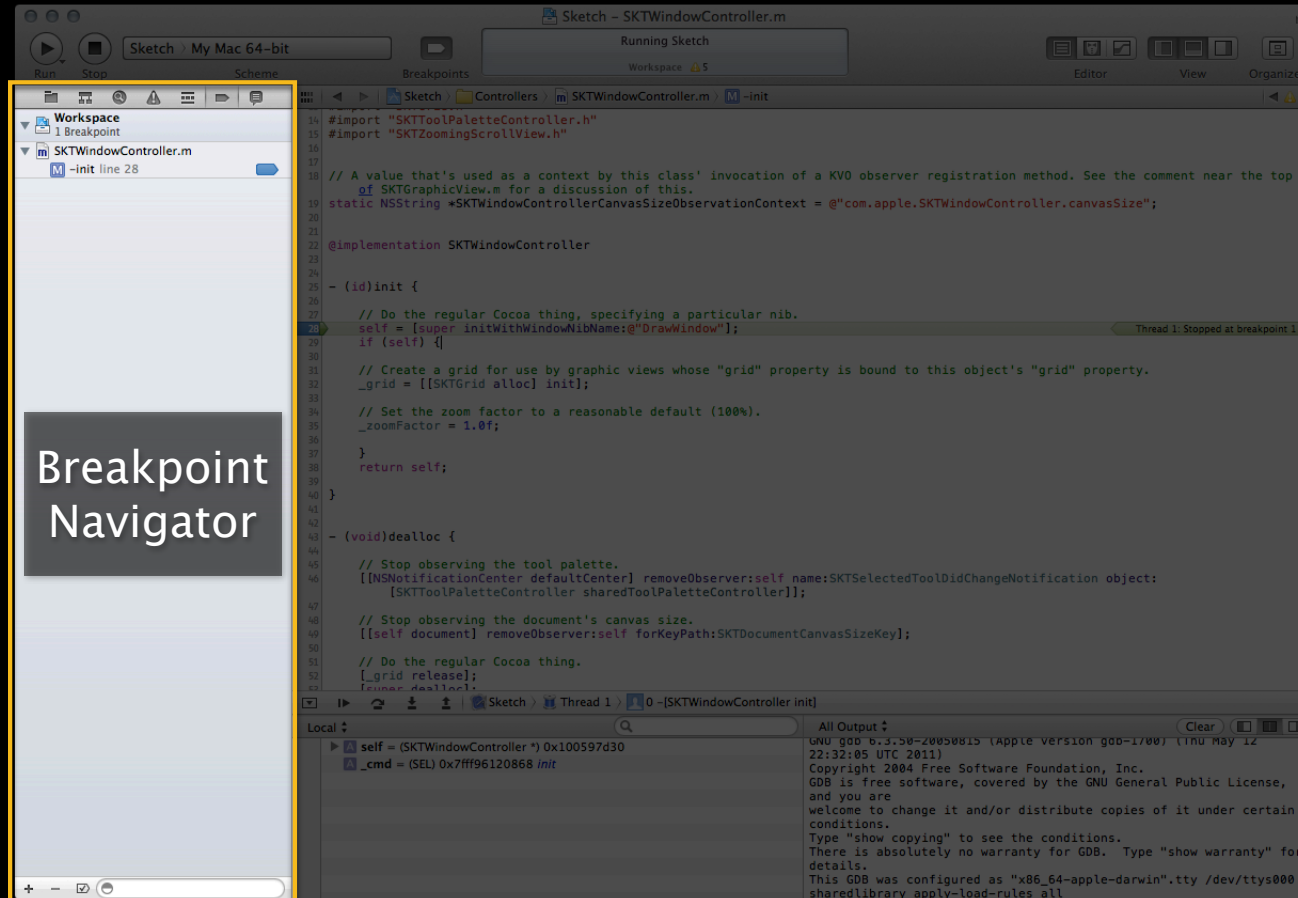
# Debugging with Xcode 4



# Debugging with Xcode 4



# Debugging with Xcode 4



# Debugging with Xcode 4

SKTWindowController.m:28

Condition

Ignore  times before stopping

Action Click to add an action

Options  Automatically continue after evaluating actions

Done

```
29 if (self) {
30
31 // Create a grid for use by graphic views whose "grid" property is bound to this object's "grid" property.
32 _grid = [[SKTGrid alloc] init];
33
34 // Set the zoom factor to a reasonable default (100%).
35 _zoomFactor = 1.0f;
36
37 }
38 return self;
39
40 }
41
42
43 - (void)dealloc {
44
45 // Stop observing the tool palette.
46 [[NSNotificationCenter defaultCenter] removeObserver:self name:SKTSelectedToolDidChangeNotification object:
47 [SKTToolPaletteController sharedToolPaletteController]];
48
49 // Stop observing the document's canvas size.
50 [[self document] removeObserver:self forKeyPath:SKTDocumentCanvasSizeKey];
51
52 // Do the regular Cocoa thing.
53 [_grid release];
54 [super dealloc];
55 }
```

Thread 1: Stopped at breakpoint 1

Local

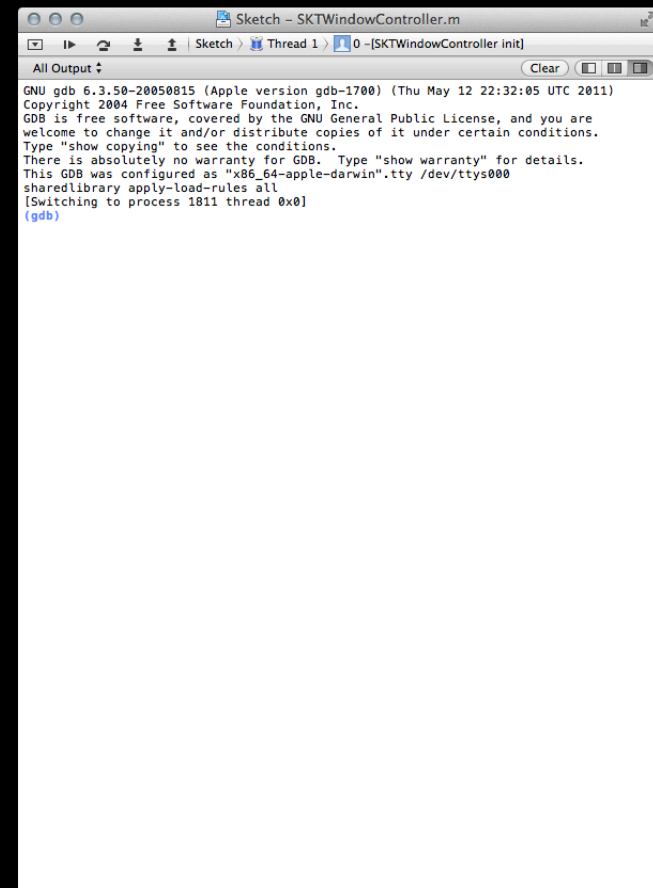
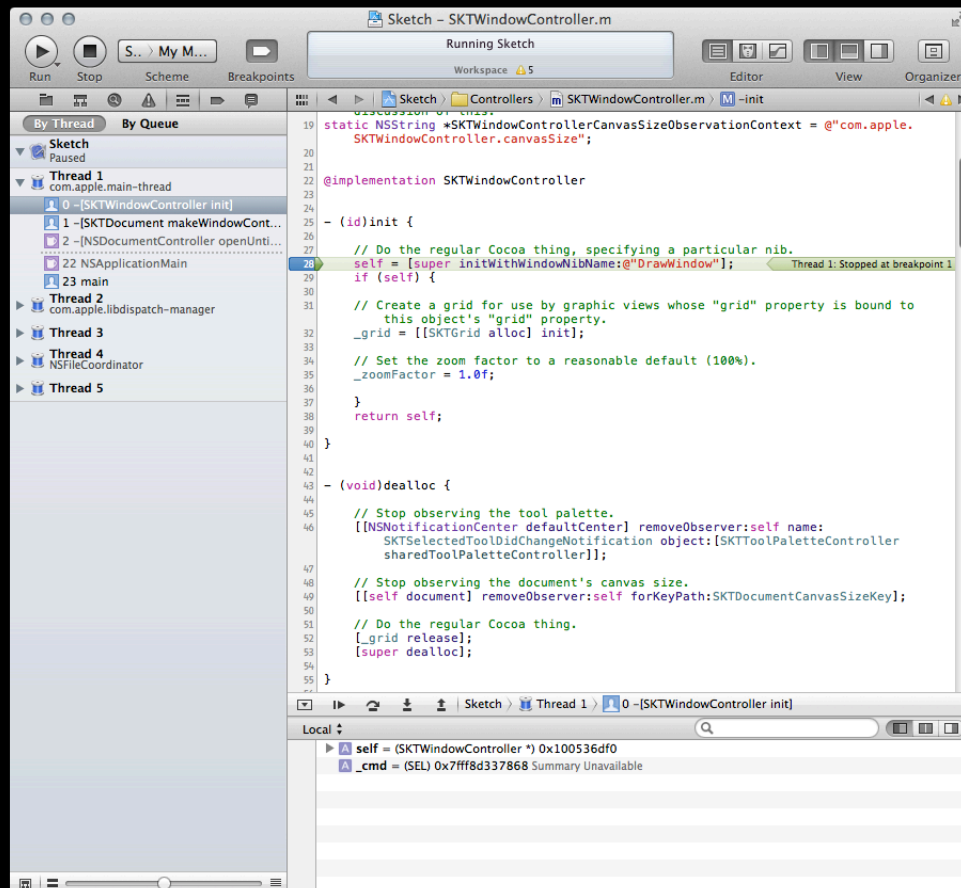
- self = (SKTWindowController \*) 0x100597d30
- \_cmd = (SEL) 0x7fff96120868 *init*

All Output

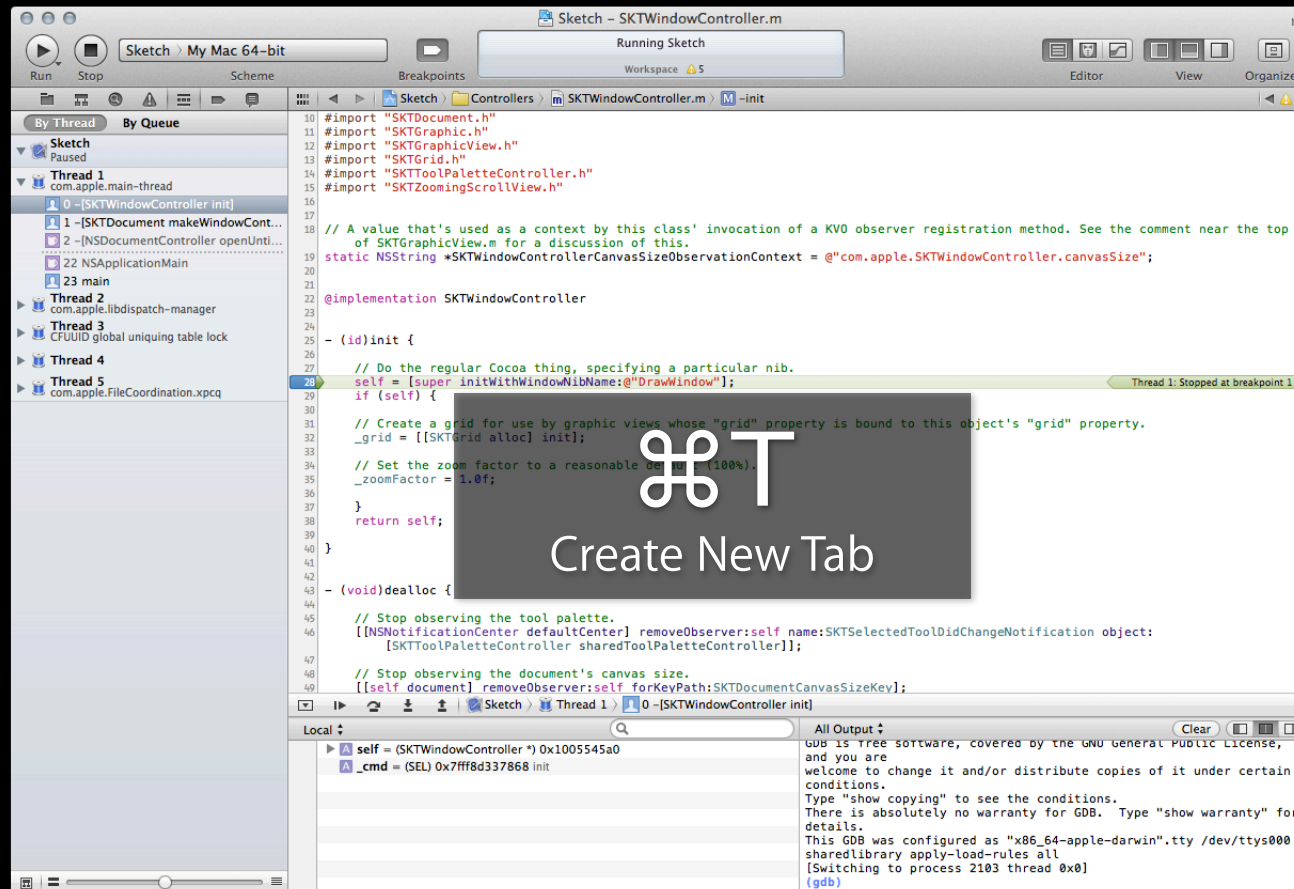
```
GNU gdb 6.3.58-20050815 (Apple version gdb-1700) (Thu May 12
22:32:05 UTC 2011)
Copyright 2004 Free Software Foundation, Inc.
GDB is free software, covered by the GNU General Public License,
and you are
welcome to change it and/or distribute copies of it under certain
conditions.
Type "show copying" to see the conditions.
There is absolutely no warranty for GDB. Type "show warranty" for
details.
This GDB was configured as "x86_64-apple-darwin".tty /dev/ttys000
sharedlibrary apply-load-rules all
```

# Match Xcode to Your Workflow

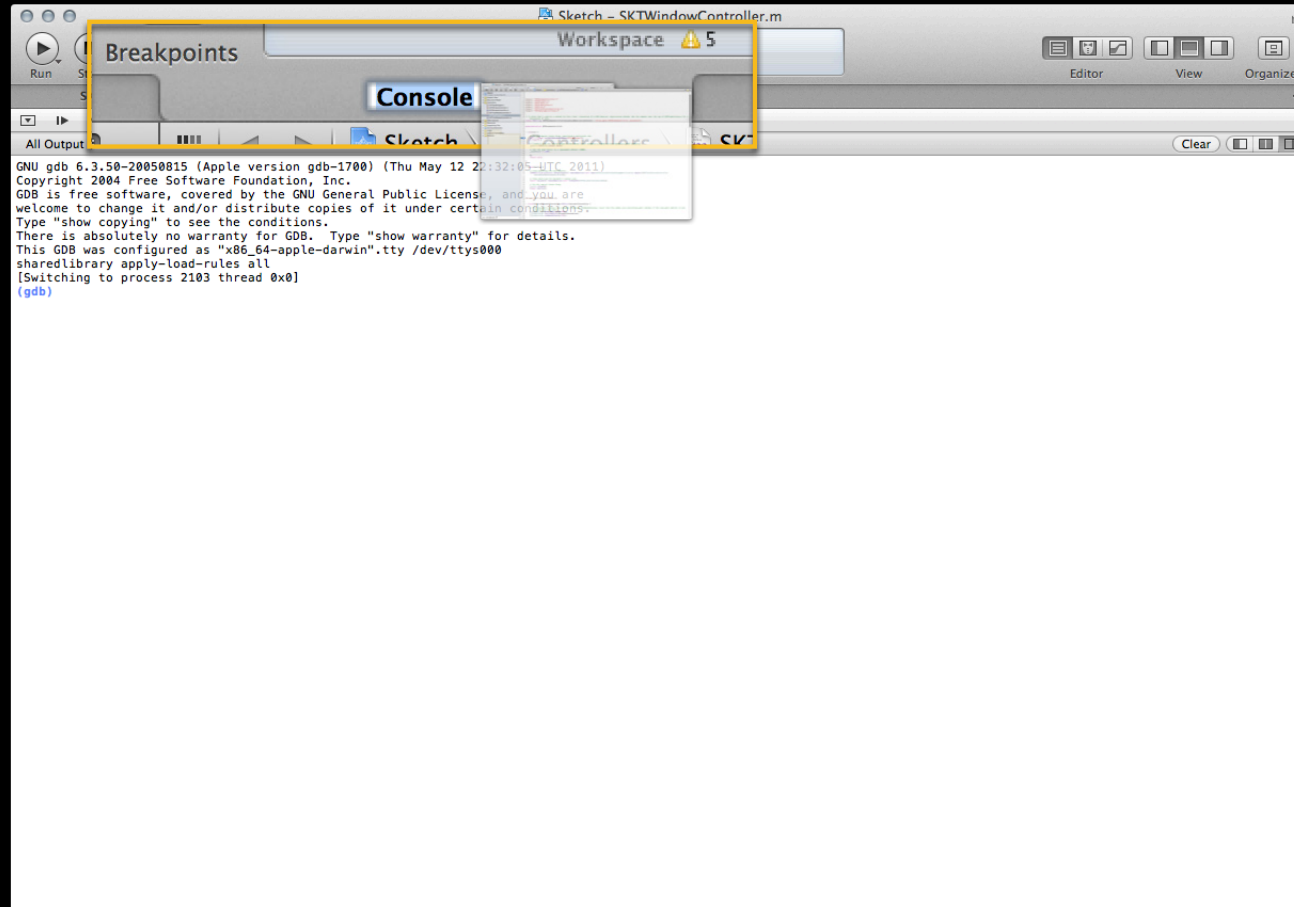
# Match Xcode to Your Workflow



# Match Xcode to Your Workflow

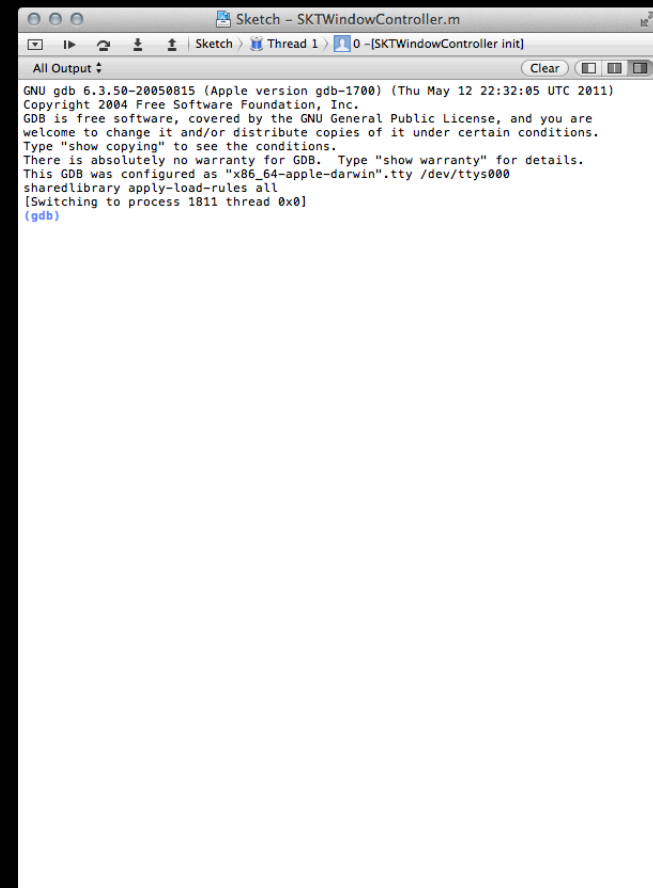
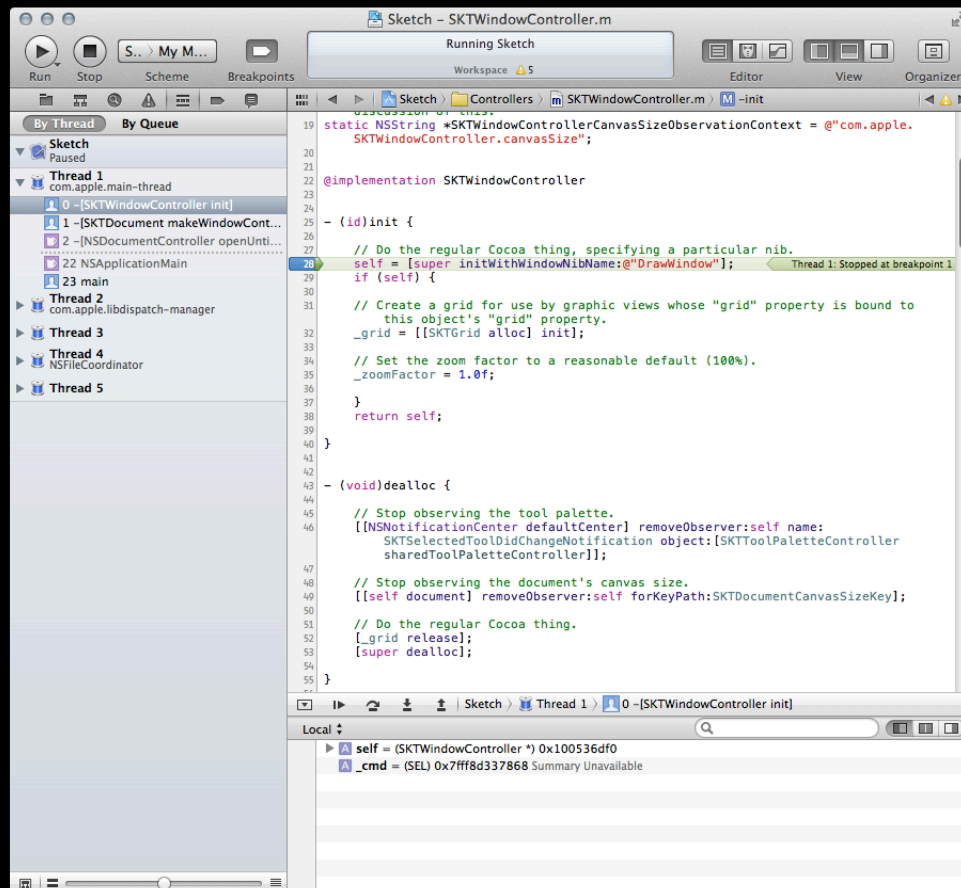


# Match Xcode to Your Workflow

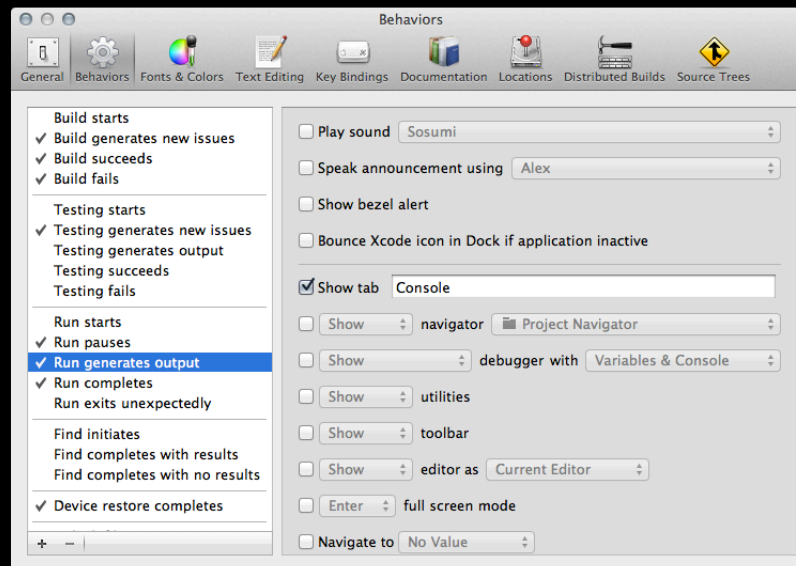




# Match Xcode to Your Workflow



# Use Behaviors to Control Xcode



# Demo

**Blake Chaffin**  
Xcode Engineer

# Typing Less at the Console

```
[myVariable superMethod:foo  
reallyLongButDescriptiveVariableName  
thirdArgument:baz  
lastArgument:bing]
```

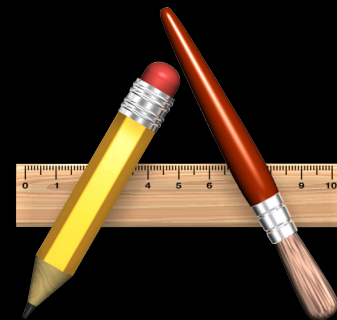
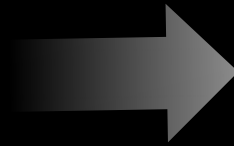
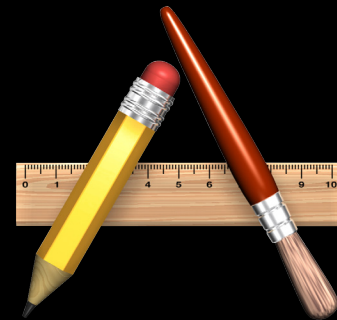
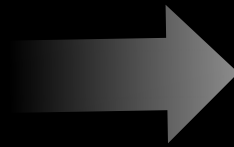
# Type Less with Console Completions

```
(gdb) po _
```

```
✓ CGFloat _zoomFactor  
✓ SKTZoomingScrollView * _zoomingScrollView
```

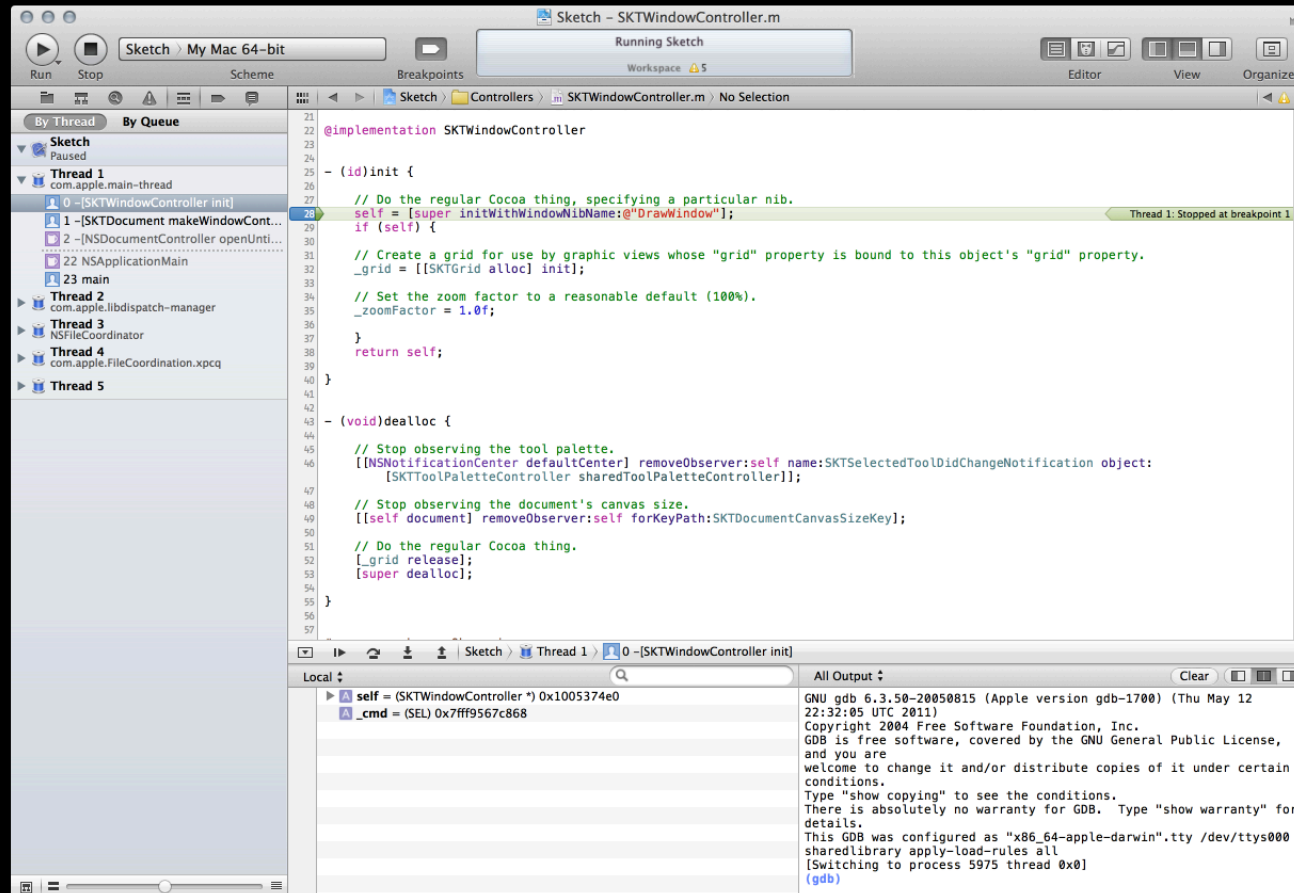
```
(gdb) p (int) [self application: (NSApplication *)  
delegateHandlesKey: (NSString *)
```

# Multi-Process Debugging

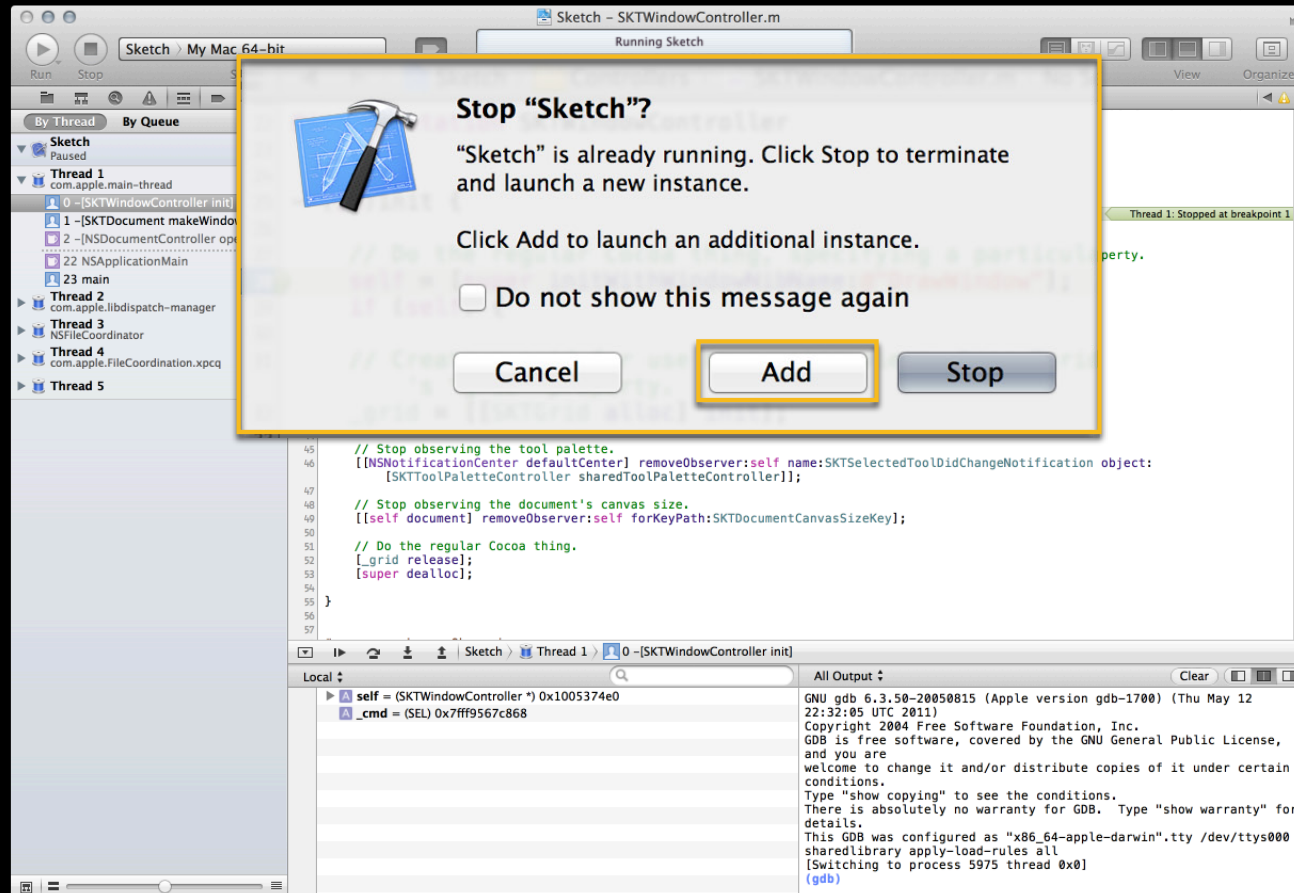




# Multi-Process Debugging



# Multi-Process Debugging



**Stop "Sketch"?**

"Sketch" is already running. Click Stop to terminate and launch a new instance.

Click Add to launch an additional instance.

Do not show this message again

Cancel Add Stop

```
45 // Stop observing the tool palette.
46 [[NSNotificationCenter defaultCenter] removeObserver:self name:SKTSelectedToolDidChangeNotification object:
47 [SKTToolPaletteController sharedToolPaletteController]];
48
49 // Stop observing the document's canvas size.
50 [[self document] removeObserver:self forKeyPath:SKTDocumentCanvasSizeKey];
51
52 // Do the regular Cocoa thing.
53 [_grid release];
54 [super dealloc];
55
56 }
57
```

Local :

- self = (SKTWindowController \*) 0x1005374e0
- \_cmd = (SEL) 0x7fff9567c868

All Output :

```
GNU gdb 6.3.50-20050815 (Apple version gdb-1700) (Thu May 12
22:32:05 UTC 2011)
Copyright 2004 Free Software Foundation, Inc.
GDB is free software, covered by the GNU General Public License,
and you are
welcome to change it and/or distribute copies of it under certain
conditions.
Type "show copying" to see the conditions.
There is absolutely no warranty for GDB. Type "show warranty" for
details.
This GDB was configured as "x86_64-apple-darwin".tty /dev/ttys000
sharedLibrary apply-load-rules all
[Switching to process 5975 thread 0x0]
(gdb)
```

# Multi-Process Debugging

The screenshot displays the Xcode interface for multi-process debugging. On the left, the 'Process Navigator' shows two processes: 'Sketch - 5843' (Paused) and 'Sketch - 5866' (Paused). Under 'Sketch - 5843', 'Thread 1' (com.apple.main-thread) is expanded, showing a list of threads: 0 -[SKTWindowController init], 1 -[SKTDocument makeWindowCont..., 2 -[NSDocumentController openUnti..., 22 NSApplicationMain, and 23 main. Under 'Sketch - 5866', 'Thread 1' (com.apple.main-thread) is also expanded, showing threads: 0 -[SKTWindowController init], 1 -[SKTDocument makeWindowCont..., 2 -[NSDocumentController openUnti..., 22 NSApplicationMain, and 23 main. The right pane shows the code editor for 'Sketch - SKTWindowController.m' with a breakpoint at line 1. The code includes comments and Objective-C code for window controller initialization. The bottom pane shows the GDB console output, which includes the GNU gdb version and configuration details.

```
Sketch - 5843
Paused
Thread 1
com.apple.main-thread
0 -[SKTWindowController init]
1 -[SKTDocument makeWindowCont...
2 -[NSDocumentController openUnti...
22 NSApplicationMain
23 main
Thread 2
com.apple.libdispatch-manager
Thread 3
Thread 4
Thread 5
com.apple.FileCoordination.xpcq
Thread 6

Sketch - 5866
Paused
Thread 1
com.apple.main-thread
0 -[SKTWindowController init]
1 -[SKTDocument makeWindowCont...
2 -[NSDocumentController openUnti...
22 NSApplicationMain
23 main
Thread 2
com.apple.libdispatch-manager
Thread 3
CFUUID global uniquing table lock
Thread 4
com.apple.FileCoordination.xpcq
Thread 5
Thread 6

Sketch - SKTWindowController.m
Running Sketch
Workspace 5
Editor View Organizer
Controllers > SKTWindowController.m > No Selection
WindowController

r Cocoa thing, specifying a particular nib.
initWithWindowNibName:@"DrawWindow"];

for use by graphic views whose "grid" property is bound to this object's "grid" property.
d alloc] init];

factor to a reasonable default (100%).
0f;

g the tool palette.
Center defaultCenter] removeObserver:self name:SKTSelectedToolDidChangeNotification object:
tteController sharedToolPaletteController]];

g the document's canvas size.
removeObserver:self forKeyPath:SKTDocumentCanvasSizeKey];

r Cocoa thing.

Sketch - 5995 > Thread 1 > 0 -[SKTWindowController init]
All Output :
GNU gdb 6.3.50-20050815 (Apple version gdb-1700) (Thu May 12
22:32:05 UTC 2011)
Copyright 2004 Free Software Foundation, Inc.
GDB is free software, covered by the GNU General Public License,
and you are
welcome to change it and/or distribute copies of it under certain
conditions.
Type "show copying" to see the conditions.
There is absolutely no warranty for GDB. Type "show warranty" for
details.
This GDB was configured as "x86_64-apple-darwin".tty /dev/ttys001
sharedLibrary apply-load-rules all
[Switching to process 5995 thread 0x0]
(gdb)
```

# Demo

**Anders Bertelrud**  
Xcode Architect



+



# OpenGL ES Debugging

Only on  
iOS

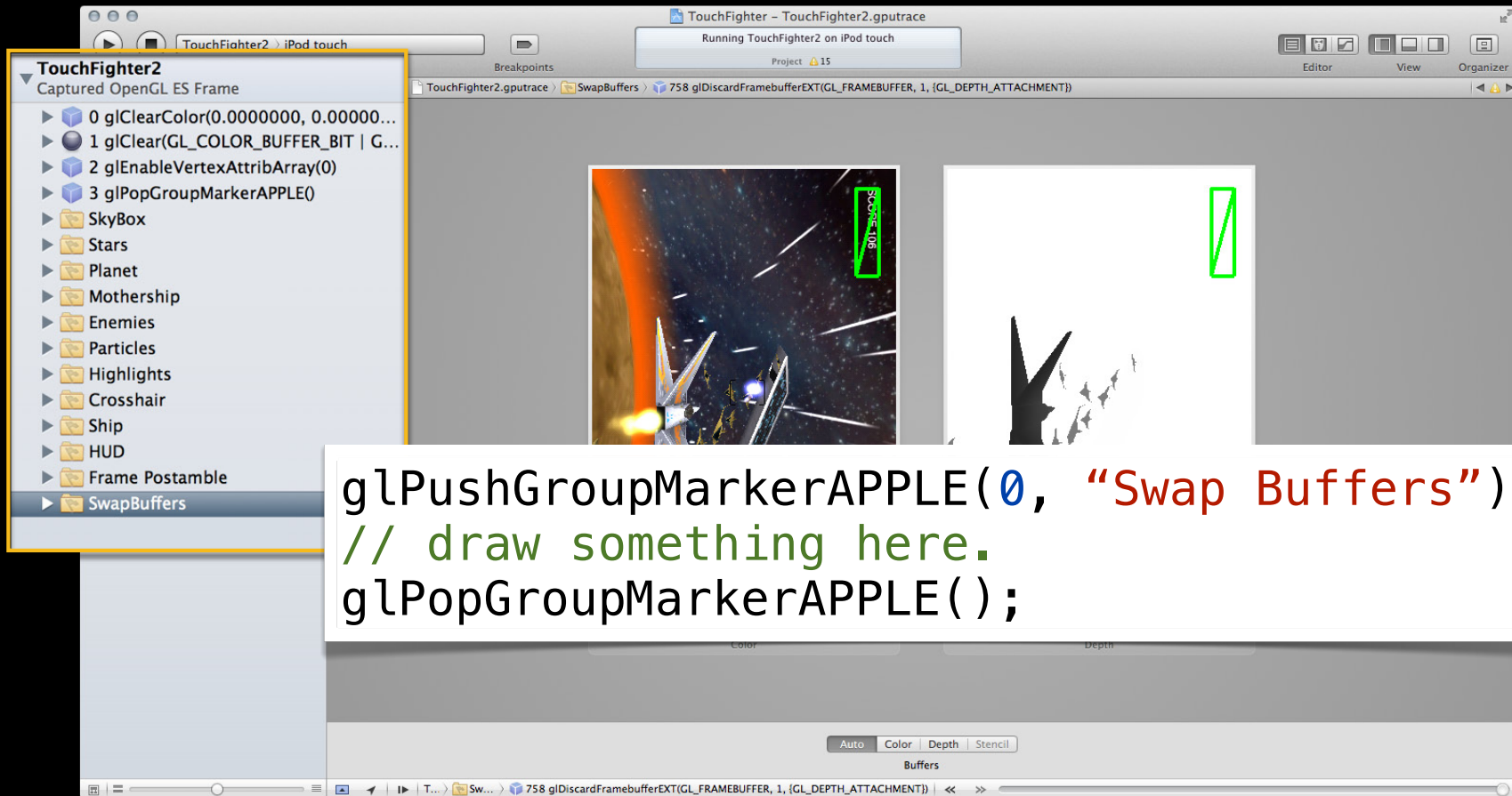
The screenshot shows the Xcode IDE with a project named "TouchFighter2" targeting "iPod touch". The main editor displays the code for "TouchFighterAppDelegate.m". A breakpoint configuration dialog is open over the code, showing the following settings:

- TouchFighterAppDelegate.m:37**
- Condition:** `k == 21`
- Ignore:** 0 times before stopping
- Action:** Capture OpenGL Frame
- Options:**  Automatically continue after evaluating actions

The "Done" button is visible at the bottom right of the dialog. In the background, the code for the delegate class is visible, including imports for various headers and the definition of the `TouchFighterAppDelegate` interface. A yellow box highlights the camera icon in the bottom toolbar of Xcode.

# OpenGL ES Debugging

Only on  
iOS

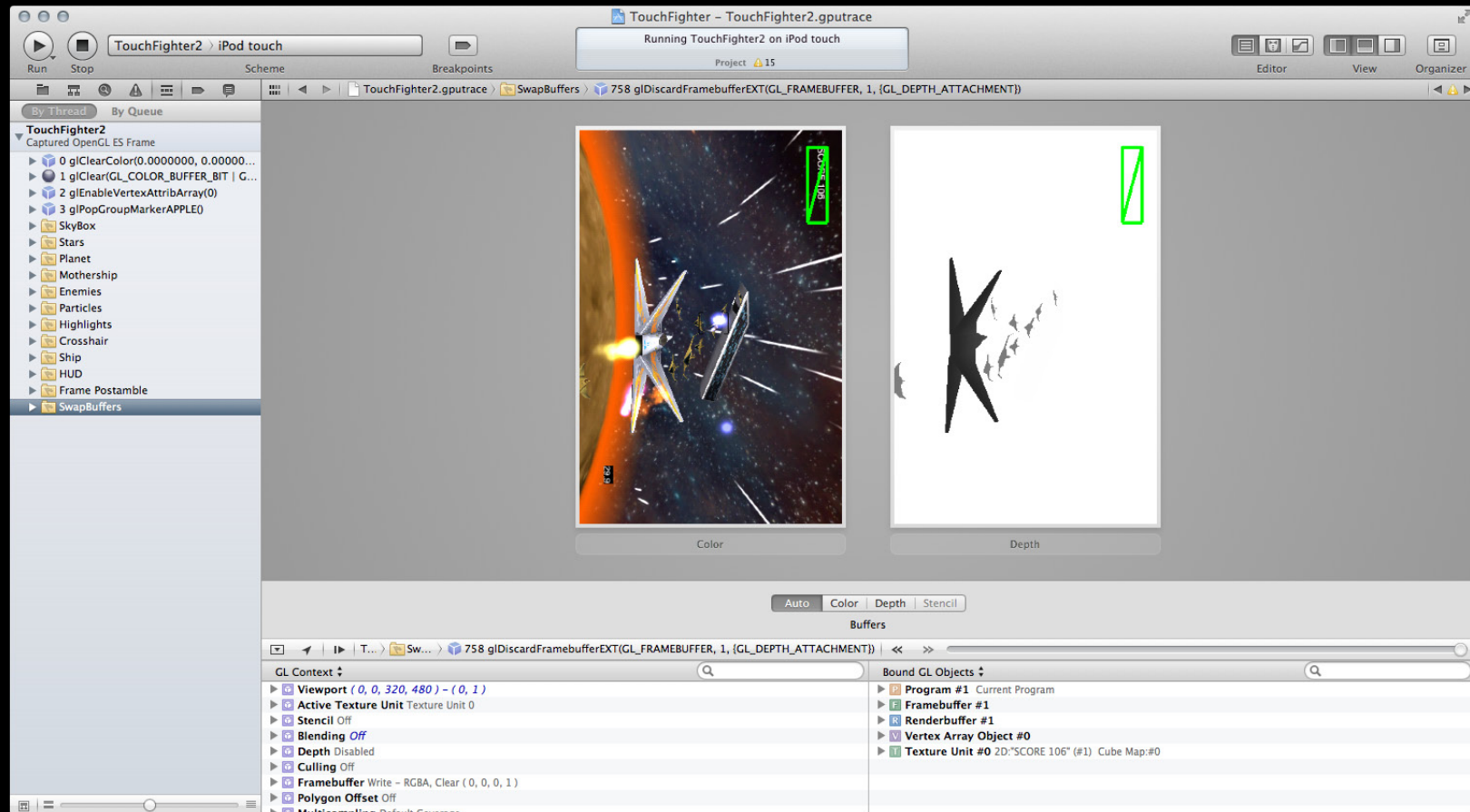


```
0 glClearColor(0.000000, 0.000000...
1 glClear(GL_COLOR_BUFFER_BIT | G...
2 glEnableVertexArray(0)
3 glPopGroupMarkerAPPLE()
SkyBox
Stars
Planet
Mothership
Enemies
Particles
Highlights
Crosshair
Ship
HUD
Frame Postamble
SwapBuffers
```

```
glPushGroupMarkerAPPLE(0, "Swap Buffers");
// draw something here.
glPopGroupMarkerAPPLE();
```

# OpenGL ES Debugging

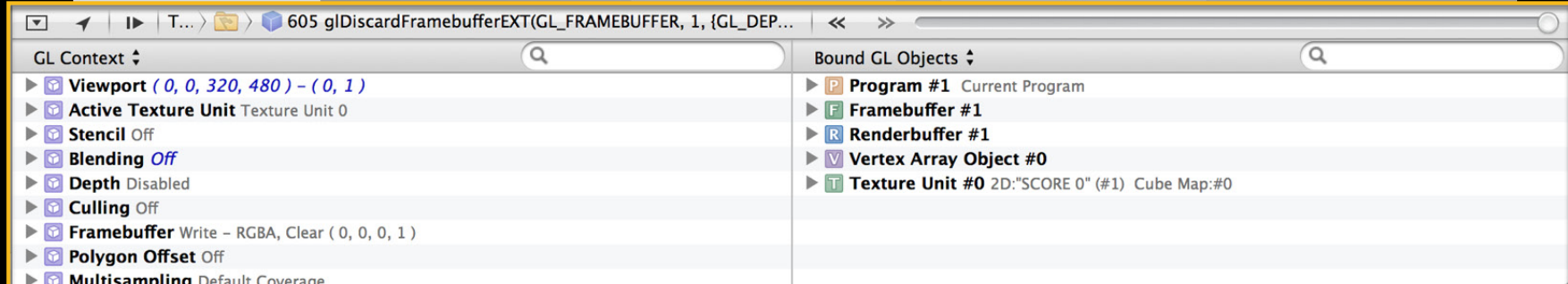
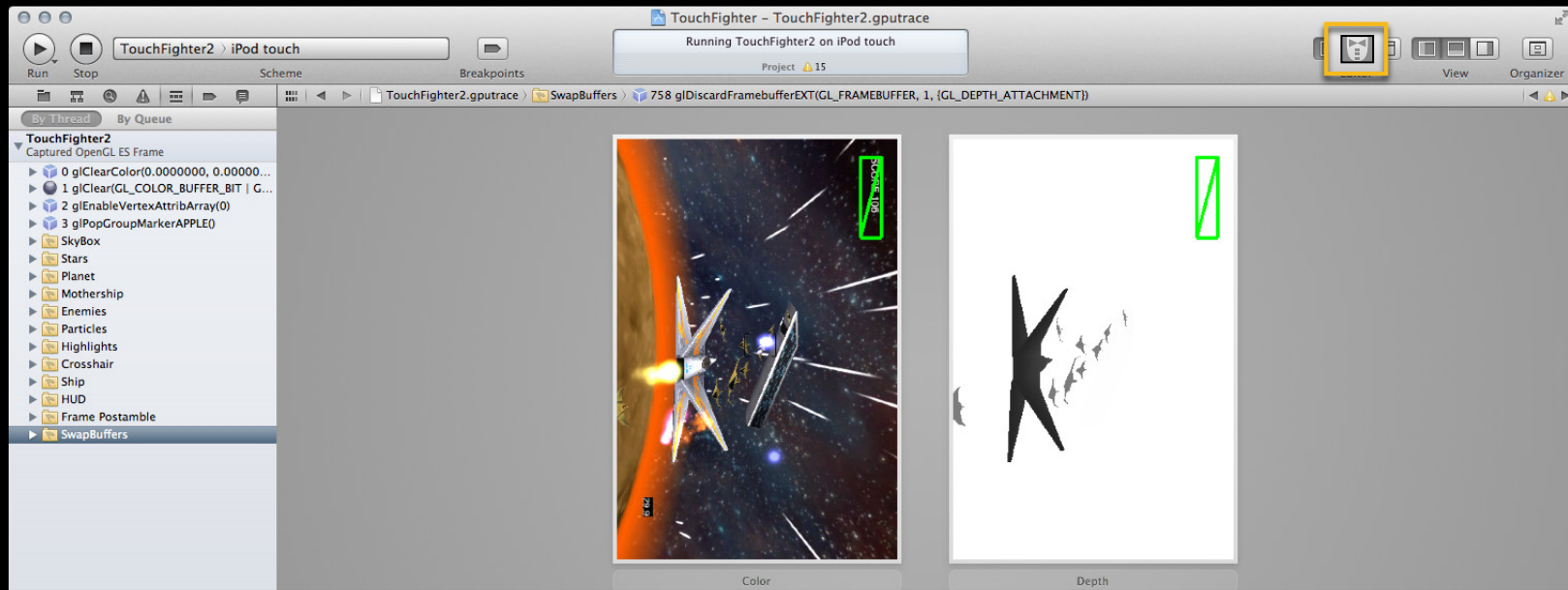
Only on  
iOS





# OpenGL ES Debugging

Only on iOS



# OpenGL ES Debugging

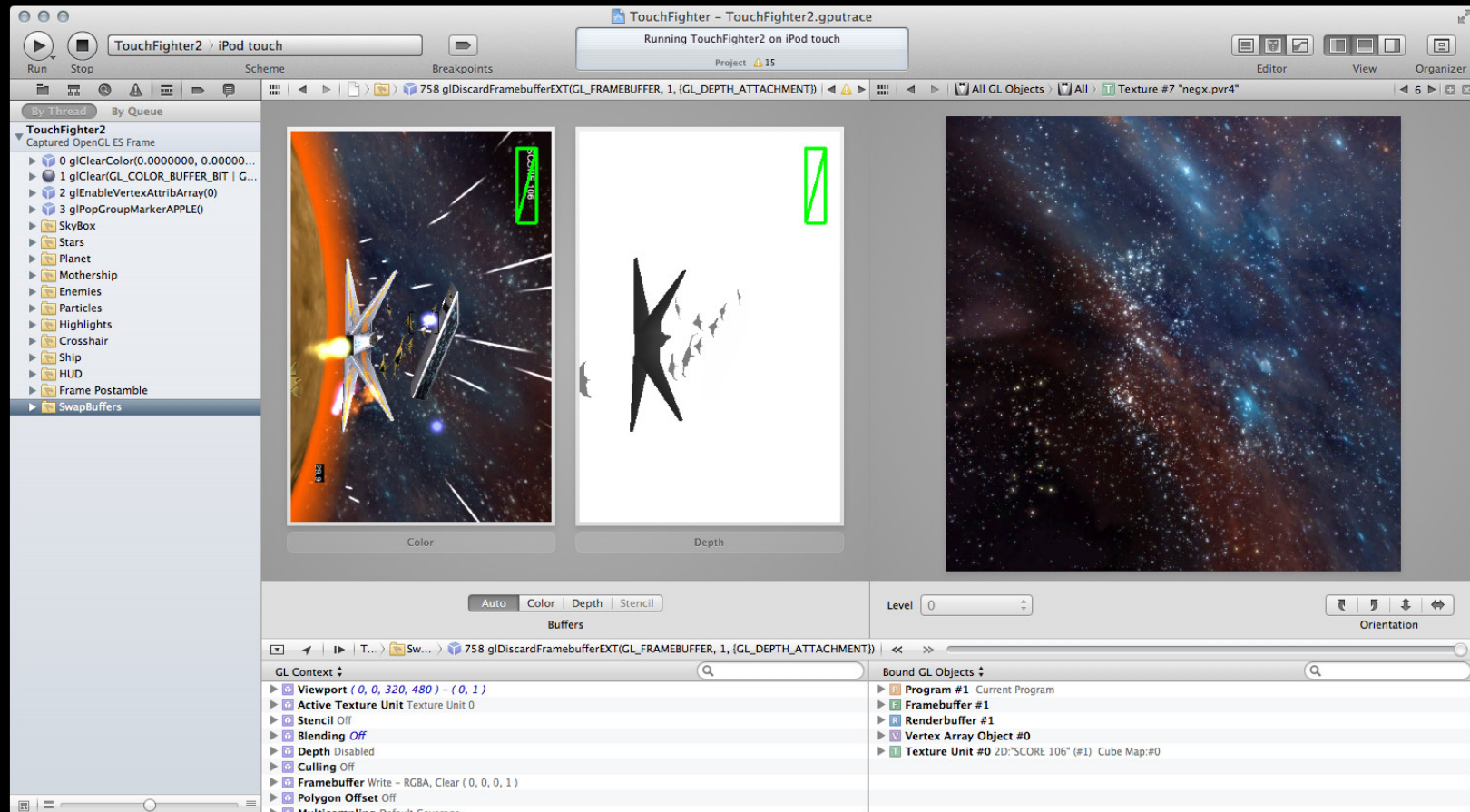
Only on iOS

The screenshot displays the Xcode OpenGL ES debugging interface for the TouchFighter2 application on an iPod touch. The interface is divided into several panels:

- Top Panel:** Shows the application name "TouchFighter2" and the target device "iPod touch". It includes "Run" and "Stop" buttons, a "Scheme" dropdown, and a "Breakpoints" section.
- Left Panel:** A tree view showing the application's structure, including "TouchFighter2", "SkyBox", "Stars", "Planet", "Mothership", "Enemies", "Particles", "Highlights", "Crosshair", "Ship", "HUD", "Frame Postamble", and "SwapBuffers".
- Center Panel:** Displays two side-by-side images: "Color" (the rendered 3D scene) and "Depth" (a grayscale depth map). Below these images are "Auto", "Color", "Depth", and "Stencil" tabs, and a "Buffers" section.
- Right Panel:** A "Texture Browser" showing a grid of textures. The selected texture is "Texture #1 'SCORE 106'". Other textures include "startube.png", "explosion.png", "posz.pvr4", "posy256.png", "negz.pvr4", "negz256.png", "venus-closeup...", "planet\_glow.p...", "moon.png", "cloud.png", "mothership.png", "dart256.pvr4", "glow.png", "crosshairs.pvr4", "enemy.png", "arrow.png", "29.9", "VERTEX", "SHADER", "VAO #0", "Shader #4", "Shader #5", "Shader #6", "Shader #7", "Shader #8", "Program #1", and "Program #2".
- Bottom Panel:** A "GL Context" log showing the current state of the OpenGL ES context. The log includes:
  - Viewport (0, 0, 320, 480) - (0, 1)
  - Active Texture Unit Texture Unit 0
  - Stencil Off
  - Blending Off
  - Depth Disabled
  - Culling Off
  - Framebuffer Write - RGBA, Clear (0, 0, 0, 1)
  - Polygon Offset Off
  - Multisampling Default Coverage

# OpenGL ES Debugging

Only on  
iOS



# Demo

**Anders Bertelrud**  
Xcode Architect



