Developer Tools Kickoff

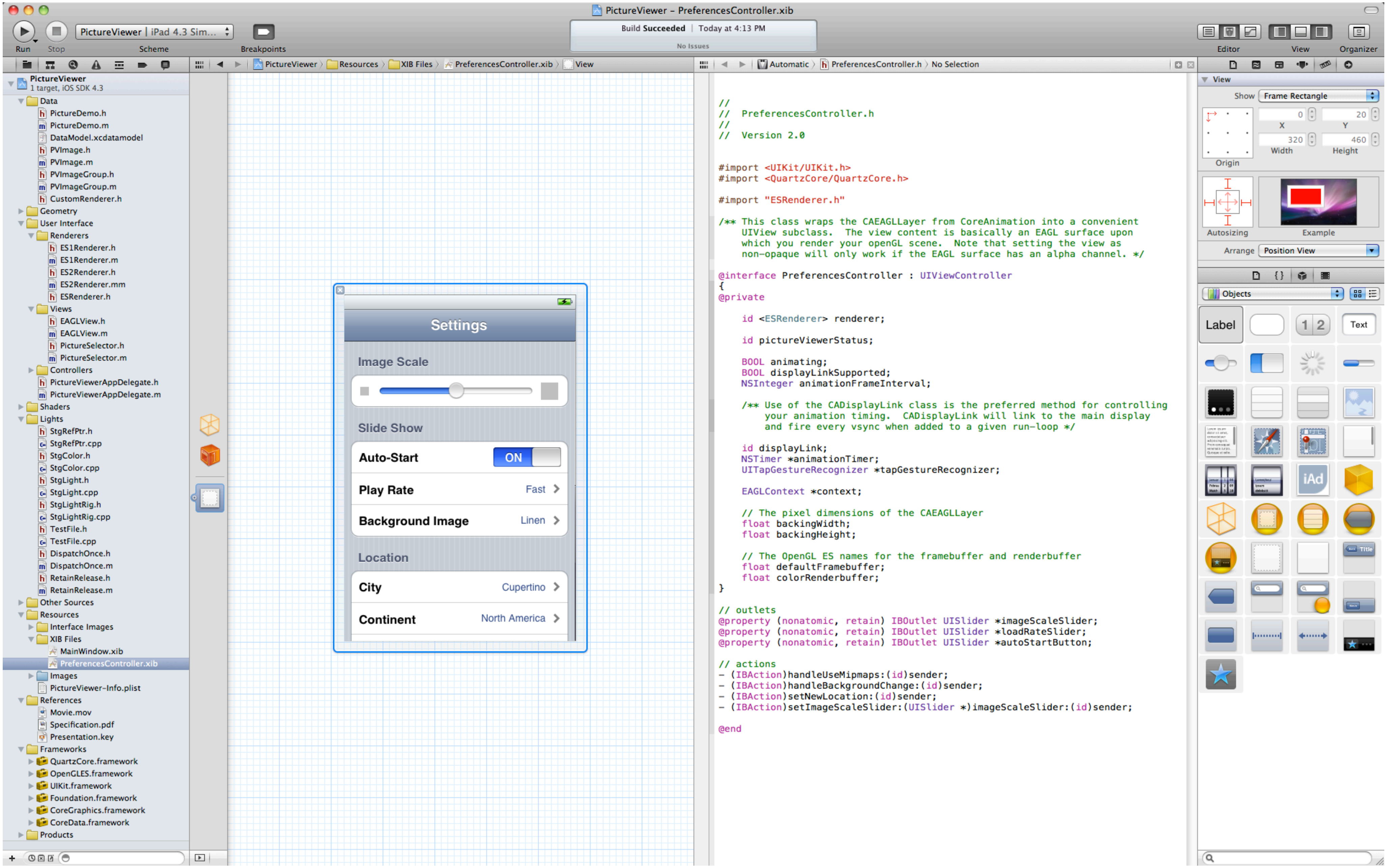
Session 300

Andreas Wendker

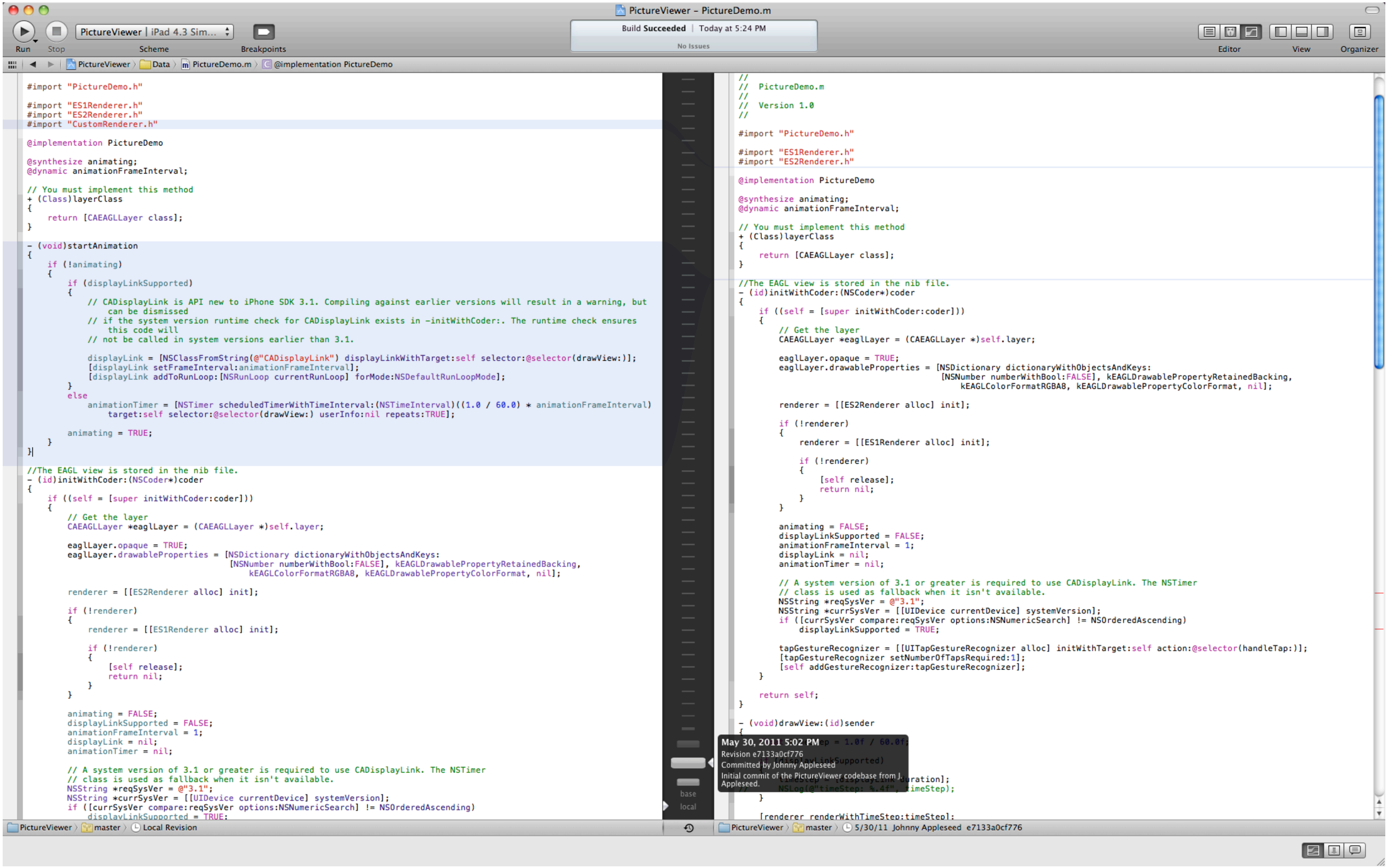
These are confidential sessions—please refrain from streaming, blogging, or taking pictures

14 Billion Apps Downloaded

Xcode 4 Released March 2011



```
//
//  PreferencesController.h
//
//  Version 2.0


#import <UIKit/UIKit.h>
#import <QuartzCore/QuartzCore.h>

#import "ESRenderer.h"

/** This class wraps the CAEAGLLayer from CoreAnimation into a convenient
    UIView subclass.  The view content is basically an EAGL surface upon
    which you render your openGL scene.  Note that setting the view as
    non-opaque will only work if the EAGL surface has an alpha channel. */

@interface PreferencesController : UIViewController
{
@private

    id <ESRenderer> renderer;

    id pictureViewerStatus;

    BOOL animating;
    BOOL displayLinkSupported;
    NSInteger animationFrameInterval;

    /** Use of the CADisplayLink class is the preferred method for controlling
        your animation timing.  CADisplayLink will link to the main display
        and fire every vsync when added to a given run-loop */

    id displayLink;
    NSTimer *animationTimer;
    UITapGestureRecognizer *tapGestureRecognizer;

    EAGLContext *context;

    // The pixel dimensions of the CAEAGLLayer
    float backingWidth;
    float backingHeight;

    // The OpenGL ES names for the framebuffer and renderbuffer
    float defaultFramebuffer;
    float colorRenderbuffer;
}

// outlets
@property (nonatomic, retain) IBOutlet UISlider *imageScaleSlider;
@property (nonatomic, retain) IBOutlet UISlider *loadRateSlider;
@property (nonatomic, retain) IBOutlet UISlider *autoStartButton;

// actions
- (IBAction)handleUseMipmaps:(id)sender;
- (IBAction)handleBackgroundChange:(id)sender;
- (IBAction)setNewLocation:(id)sender;
- (IBAction)setImageScaleSlider:(UISlider *)imageScaleSlider:(id)sender;

@end
```


PictureViewer – PictureDemo.m
PictureViewer | iPad 4.3 Sim...
Run
Stop
Scheme
Breakpoints
Build Succeeded | Today at 5:24 PM
No Issues
Editor
View
Organizer
base
local

PictureViewer 〉 Data 〉 PictureDemo.m 〉 @implementation PictureDemo

```
#import "PictureDemo.h"

#import "ES1Renderer.h"
#import "ES2Renderer.h"
#import "CustomRenderer.h"

@implementation PictureDemo

@synthesize animating;
@dynamic animationFrameInterval;

// You must implement this method
+ (Class)layerClass
{
    return [CAEAGLLayer class];
}

- (void)startAnimation
{
    if (!animating)
    {
        if (displayLinkSupported)
        {
            // CADisplayLink is API new to iPhone SDK 3.1. Compiling against earlier versions will result in a warning, but
                can be dismissed
            // if the system version runtime check for CADisplayLink exists in -initWithCoder:. The runtime check ensures
                this code will
            // not be called in system versions earlier than 3.1.

            displayLink = [NSClassFromString(@"CADisplayLink") displayLinkWithTarget:self selector:@selector(drawView:)];
            [displayLink setFrameInterval:animationFrameInterval];
            [displayLink addToRunLoop:[NSRunLoop currentRunLoop] forMode:NSDefaultRunLoopMode];
        }
        else
            animationTimer = [NSTimer scheduledTimerWithTimeInterval:(NSTimeInterval)((1.0 / 60.0) * animationFrameInterval)
                target:self selector:@selector(drawView:) userInfo:nil repeats:TRUE];

        animating = TRUE;
    }
}

//The EAGL view is stored in the nib file.
- (id)initWithCoder:(NSCoder*)coder
{
    if ((self = [super initWithCoder:coder]))
    {
        // Get the layer
        CAEAGLLayer *eaglLayer = (CAEAGLLayer *)self.layer;

        eaglLayer.opaque = TRUE;
        eaglLayer.drawableProperties = [NSDictionary dictionaryWithObjectsAndKeys:
                                        [NSNumber numberWithBool:FALSE], kEAGLDrawablePropertyRetainedBacking,
                                            kEAGLColorFormatRGBA8, kEAGLDrawablePropertyColorFormat, nil];

        renderer = [[ES2Renderer alloc] init];

        if (!renderer)
        {
            renderer = [[ES1Renderer alloc] init];

            if (!renderer)
            {
                [self release];
                return nil;
            }
        }

        animating = FALSE;
        displayLinkSupported = FALSE;
        animationFrameInterval = 1;
        displayLink = nil;
        animationTimer = nil;

        // A system version of 3.1 or greater is required to use CADisplayLink. The NSTimer
        // class is used as fallback when it isn't available.
        NSString *reqSysVer = @"3.1";
        NSString *currSysVer = [[UIDevice currentDevice] systemVersion];
        if ([currSysVer compare:reqSysVer options:NSNumericSearch] != NSOrderedAscending)
            displayLinkSupported = TRUE;
```

PictureViewer 〉 master 〉 Local Revision

```
//
//  PictureDemo.m
//
//  Version 1.0
//

#import "PictureDemo.h"

#import "ES1Renderer.h"
#import "ES2Renderer.h"

@implementation PictureDemo

@synthesize animating;
@dynamic animationFrameInterval;

// You must implement this method
+ (Class)layerClass
{
    return [CAEAGLLayer class];
}

//The EAGL view is stored in the nib file.
- (id)initWithCoder:(NSCoder*)coder
{
    if ((self = [super initWithCoder:coder]))
    {
        // Get the layer
        CAEAGLLayer *eaglLayer = (CAEAGLLayer *)self.layer;

        eaglLayer.opaque = TRUE;
        eaglLayer.drawableProperties = [NSDictionary dictionaryWithObjectsAndKeys:
                                        [NSNumber numberWithBool:FALSE], kEAGLDrawablePropertyRetainedBacking,
                                            kEAGLColorFormatRGBA8, kEAGLDrawablePropertyColorFormat, nil];

        renderer = [[ES2Renderer alloc] init];

        if (!renderer)
        {
            renderer = [[ES1Renderer alloc] init];

            if (!renderer)
            {
                [self release];
                return nil;
            }
        }

        animating = FALSE;
        displayLinkSupported = FALSE;
        animationFrameInterval = 1;
        displayLink = nil;
        animationTimer = nil;

        // A system version of 3.1 or greater is required to use CADisplayLink. The NSTimer
        // class is used as fallback when it isn't available.
        NSString *reqSysVer = @"3.1";
        NSString *currSysVer = [[UIDevice currentDevice] systemVersion];
        if ([currSysVer compare:reqSysVer options:NSNumericSearch] != NSOrderedAscending)
            displayLinkSupported = TRUE;

        tapGestureRecognizer = [[UITapGestureRecognizer alloc] initWithTarget:self action:@selector(handleTap:)];
        [tapGestureRecognizer setNumberOfTapsRequired:1];
        [self addGestureRecognizer:tapGestureRecognizer];
    }

    return self;
}

- (void)drawView:(id)sender
{
            ep = 1.0f / 60.0f;

            inkSupported)

                                  uration];
//      NSLog(@"timeStep: %.4f", timeStep);
    }

    [renderer renderWithTimeStep:timeStep];
```

May 30, 2011 5:02 PM
Revision e7133a0cf776
Committed by Johnny Appleseed
Initial commit of the PictureViewer codebase from J. Appleseed.

PictureViewer 〉 master 〉 5/30/11 Johnny Appleseed e7133a0cf776

Single Window

IB Inside

Assistant

Version Editor

- Single Window
- IB Inside
- Assistant
- Version Editor
- LLVM Compiler 2
- Fix-It
- Debugger
- Instruments

LLVM Compiler 2

Schemes

Improved Code Completion

Automatic Provisioning

Archives

Debugger

Single Window

Subversion

Branching & Merging

Git

Jump Bar

Version Editor

IB Inside

Behaviors

Live Issues

LLDB

Unit Testing

Project & Target Editor

Instruments

Fix-It

One-Click Filtering

C++ in LLVM

Blame

Assistant

Tabs

Workspaces

Quick Help

App Validation

Code Snippets

Smaller Packages

Free on Lion

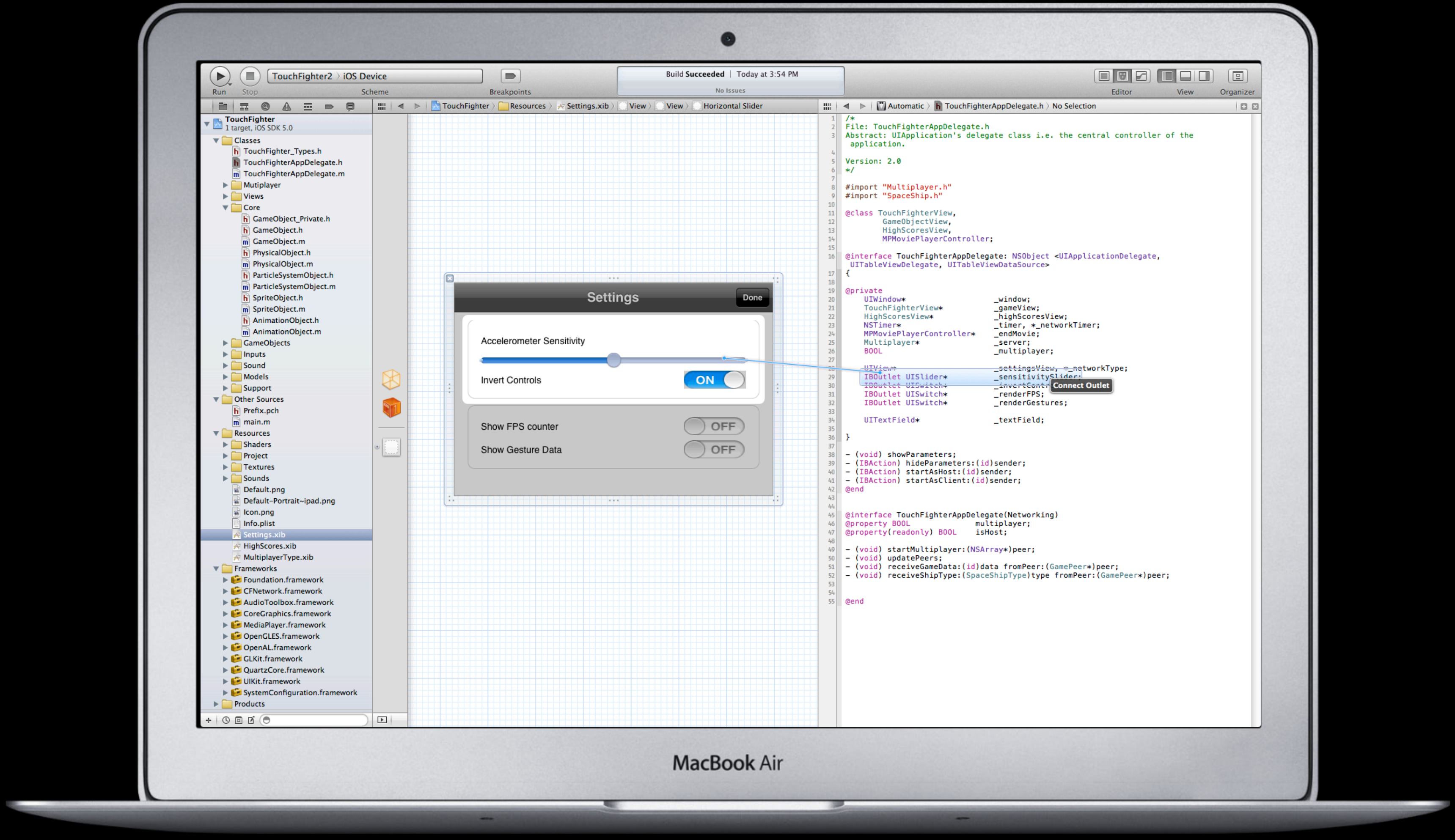
Xcode in Mac App Store

Xcode 4.1

5
Xcode 4.2

Xcode 4.1

Built for Lion



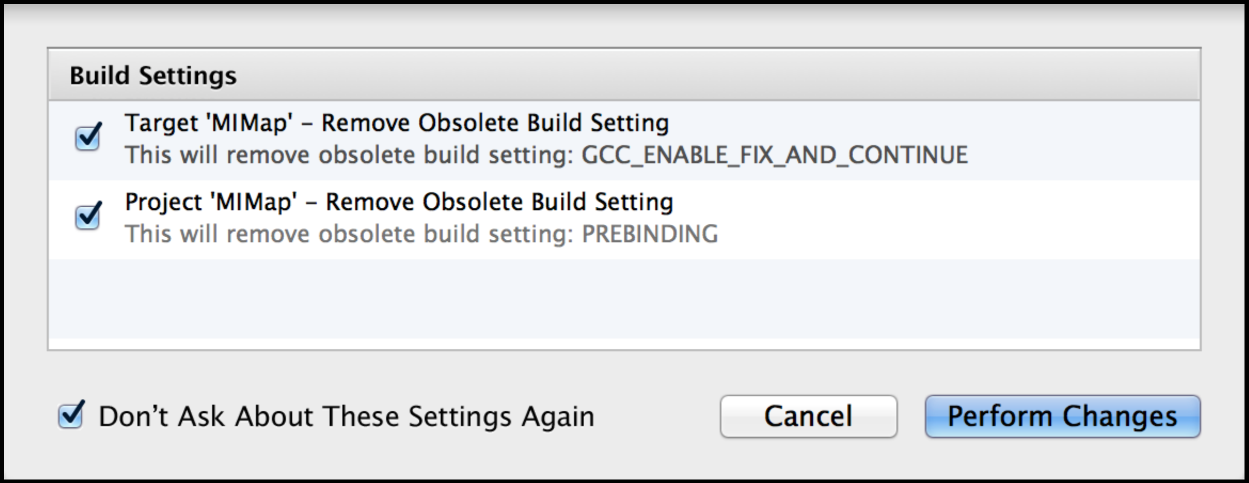
Accelerometer Sensitivity

Invert Controls ON

Show FPS counter OFF

Show Gesture Data OFF

```
/*
File: TouchFighterAppDelegate.h
Abstract: UIApplication's delegate class i.e. the central controller of the
 application.

Version: 2.0
*/

#import "Multiplayer.h"
#import "SpaceShip.h"

@class TouchFighterView,
        GameObjectView,
        HighScoresView,
        MPMoviePlayerController;

@interface TouchFighterAppDelegate: NSObject <UIApplicationDelegate,
 UITableViewDelegate, UITableViewDataSource>
{

@private
    UIWindow*                   _window;
    TouchFighterView*           _gameView;
    HighScoresView*             _highScoresView;
    NSTimer*                    _timer, *_networkTimer;
    MPMoviePlayerController*    _endMovie;
    Multiplayer*                _server;
    BOOL                        _multiplayer;

    UIView*                     _settingsView, *_networkType;
    IBOutlet UISlider*          _sensitivitySlider;
    IBOutlet UISwitch*          _invertCont
    IBOutlet UISwitch*          _renderFPS;
    IBOutlet UISwitch*          _renderGestures;

    UITextField*                _textField;

}

- (void) showParameters;
- (IBAction) hideParameters:(id)sender;
- (IBAction) startAsHost:(id)sender;
- (IBAction) startAsClient:(id)sender;
@end


@interface TouchFighterAppDelegate(Networking)
@property BOOL              multiplayer;
@property(readonly) BOOL    isHost;

- (void) startMultiplayer:(NSArray*)peer;
- (void) updatePeers;
- (void) receiveGameData:(id)data fromPeer:(GamePeer*)peer;
- (void) receiveShipType:(SpaceShipType)type fromPeer:(GamePeer*)peer;


@end
```



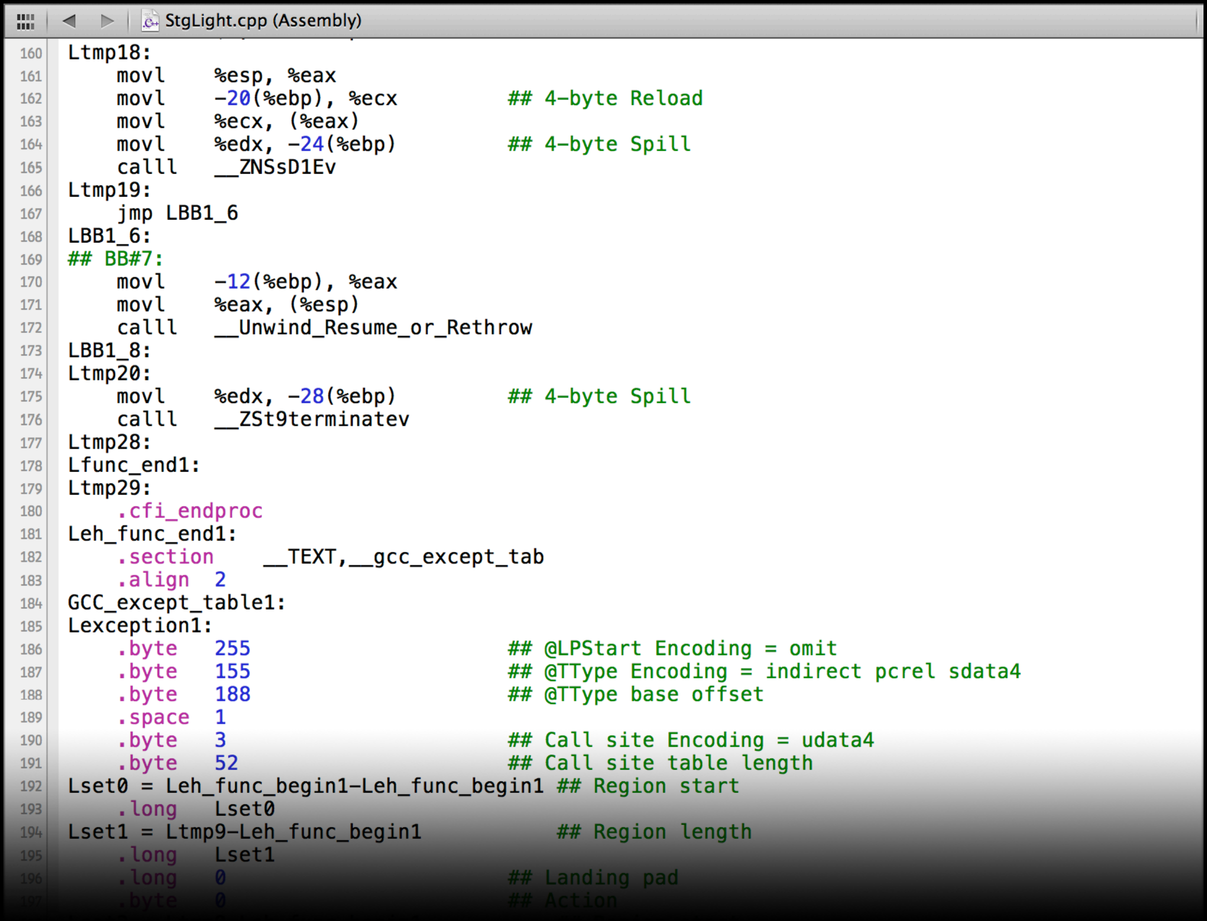
Build Settings

☑ Target 'MIMap' – Remove Obsolete Build Setting
This will remove obsolete build setting: GCC_ENABLE_FIX_AND_CONTINUE

☑ Project 'MIMap' – Remove Obsolete Build Setting
This will remove obsolete build setting: PREBINDING

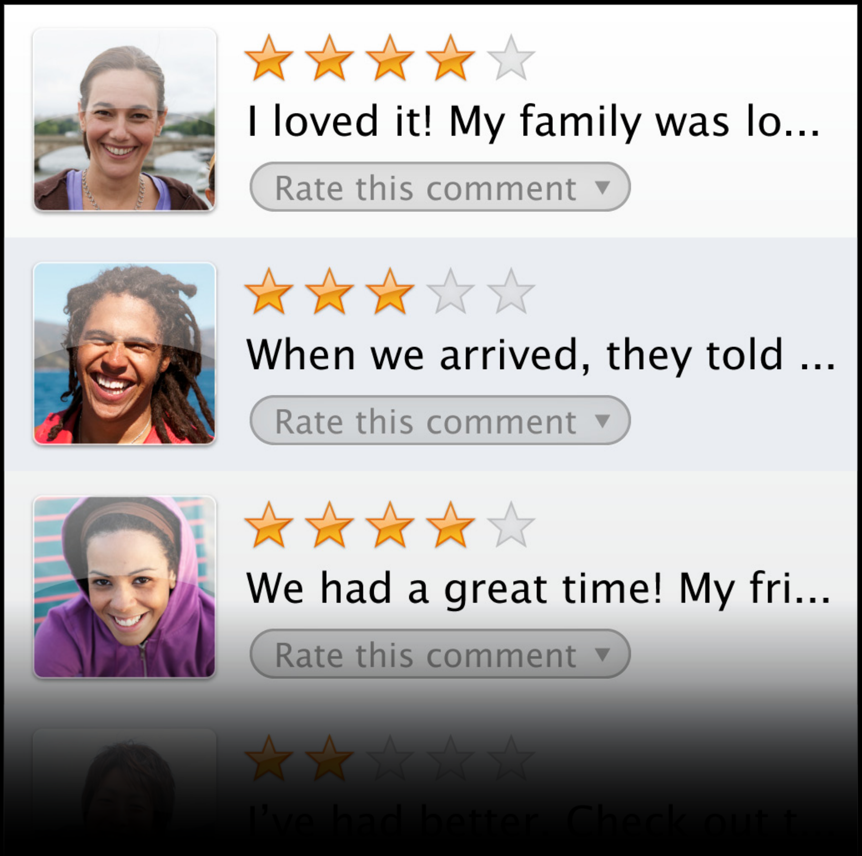
☑ Don't Ask About These Settings Again

Modernize Your Project



```
Ltmp18:
    movl    %esp, %eax
    movl    -20(%ebp), %ecx         ## 4-byte Reload
    movl    %ecx, (%eax)
    movl    %edx, -24(%ebp)         ## 4-byte Spill
    calll   __ZNSsD1Ev
Ltmp19:
    jmp LBB1_6
LBB1_6:
## BB#7:
    movl    -12(%ebp), %eax
    movl    %eax, (%esp)
    calll   __Unwind_Resume_or_Rethrow
LBB1_8:
Ltmp20:
    movl    %edx, -28(%ebp)         ## 4-byte Spill
    calll   __ZSt9terminatev
Ltmp28:
Lfunc_end1:
Ltmp29:
    .cfi_endproc
Leh_func_end1:
    .section    __TEXT,__gcc_except_tab
    .align  2
GCC_except_table1:
Lexception1:
    .byte   255                     ## @LPStart Encoding = omit
    .byte   155                     ## @TType Encoding = indirect pcrel sdata4
    .byte   188                     ## @TType base offset
    .space  1
    .byte   3                       ## Call site Encoding = udata4
    .byte   52                      ## Call site table length
Lset0 = Leh_func_begin1-Leh_func_begin1 ## Region start
    .long   Lset0
Lset1 = Ltmp9-Leh_func_begin1           ## Region length
    .long   Lset1
    .long   0                       ## Landing pad
    .byte   0                       ## Action
```

Assembly & Preprocessing



★★★★☆

I loved it! My family was lo...

★★★☆☆

When we arrived, they told ...

★★★★☆

We had a great time! My fri...

★★☆☆☆

I've had better. Check out t...

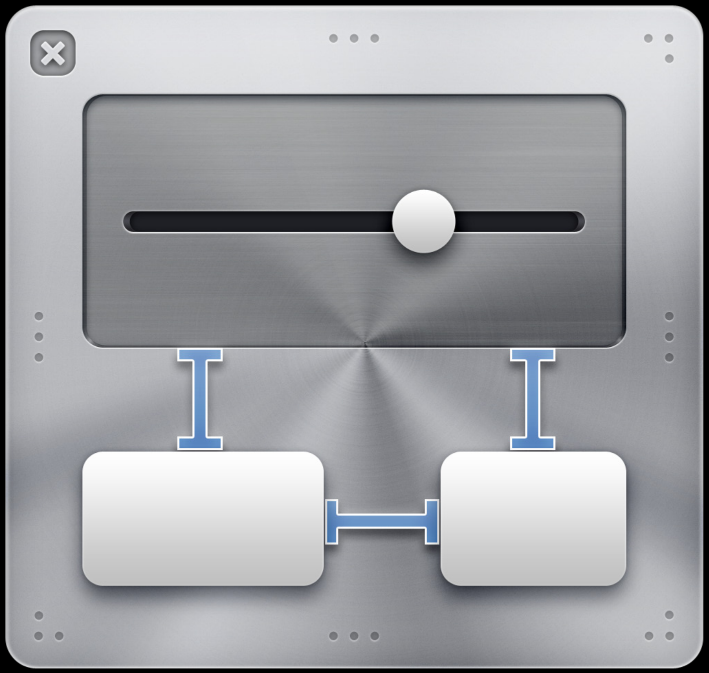
View-based tables

New Cocoa controls

Mac push notifications

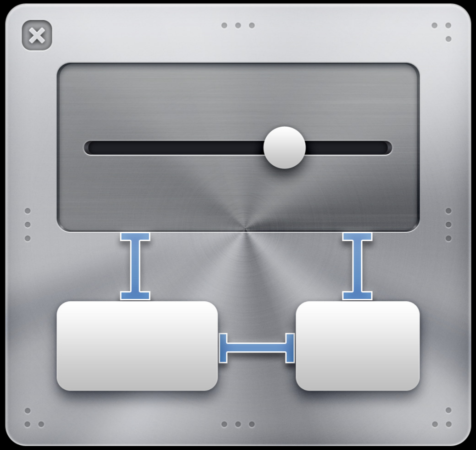
Entitlements Editor

Custom behaviors



Auto Layout

Auto Layout



Max Drukman

dwim

dwim

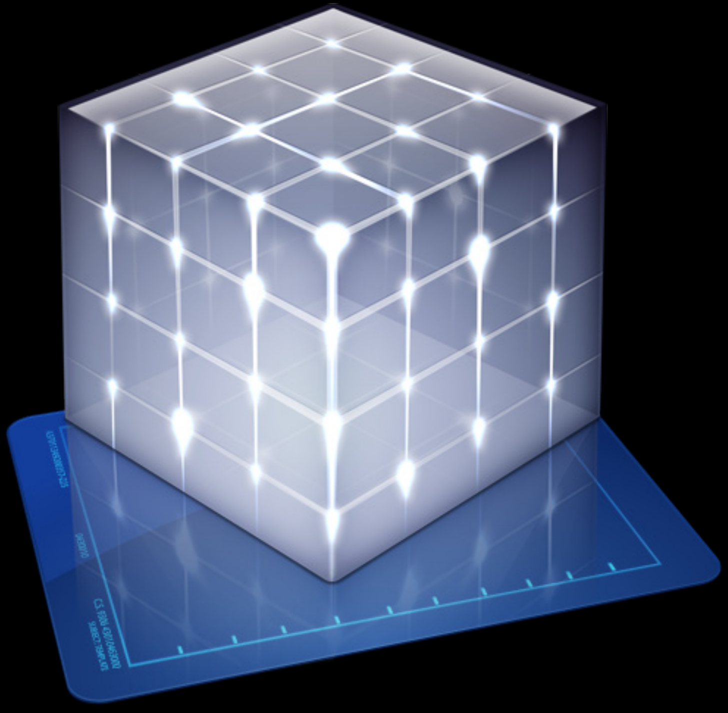
Demo

5
Xcode 4.2

Data Sync

Unit Tests

System Trace for iOS



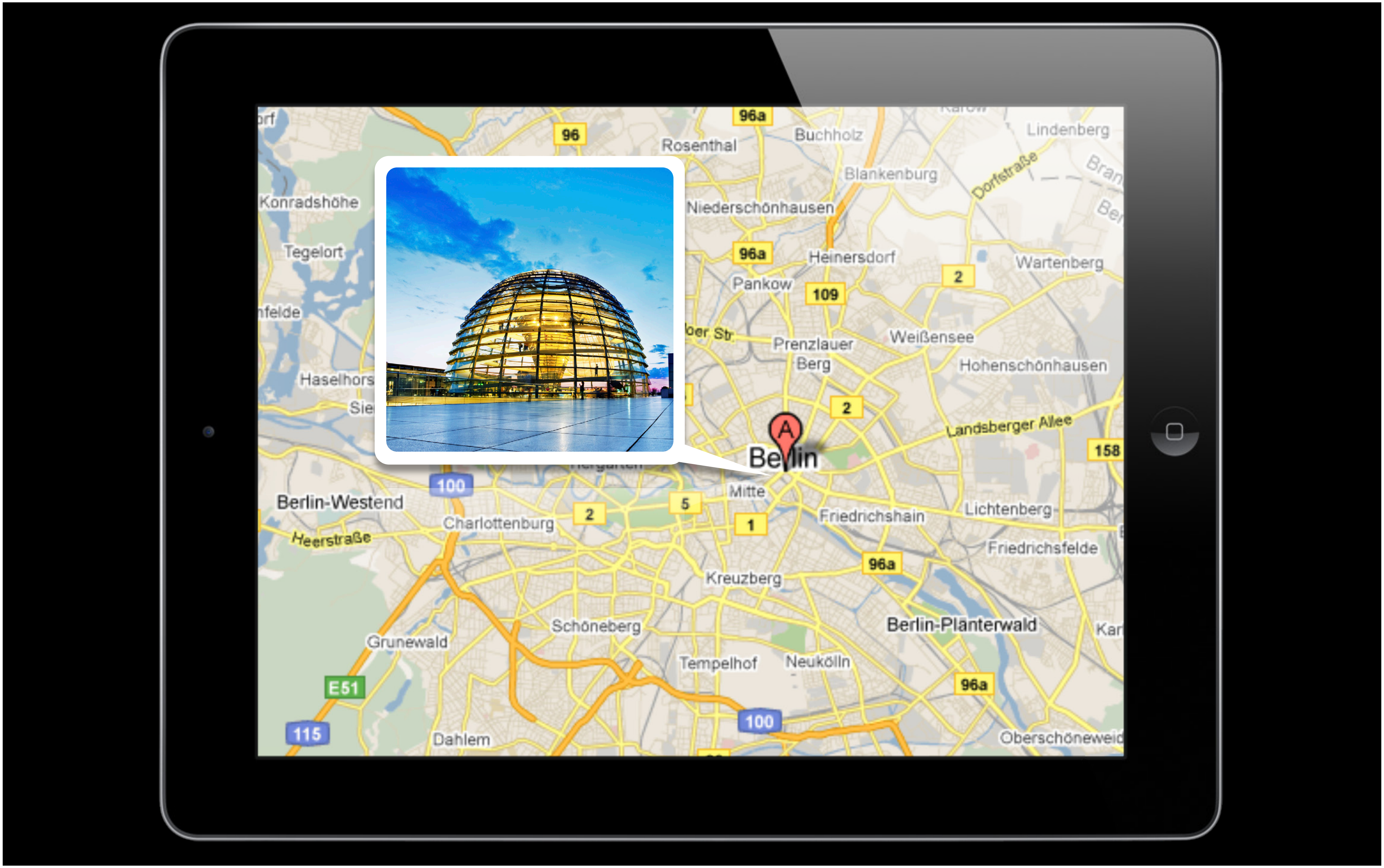
Networking Activity

Simulate Locations

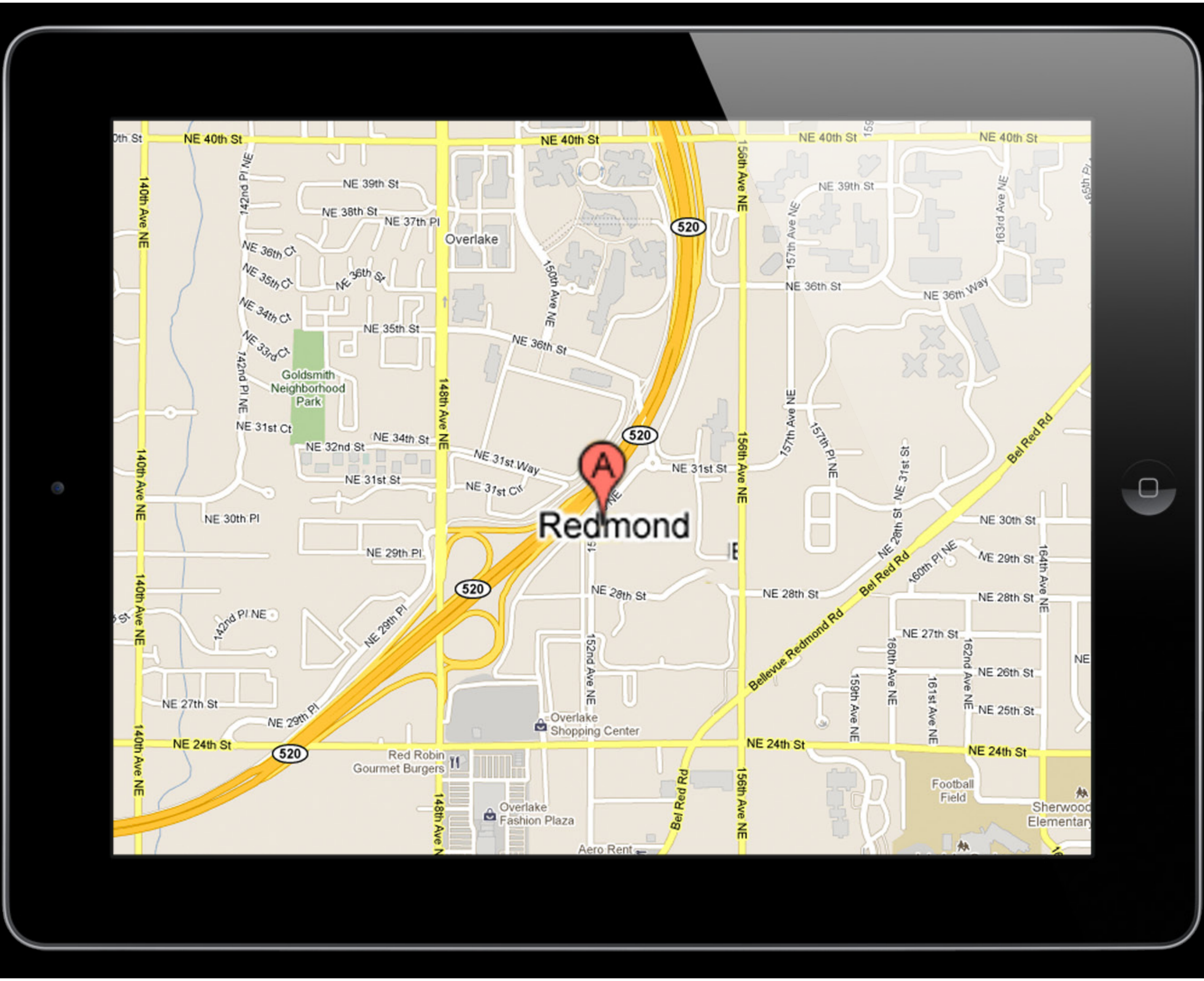
De Anza Eight
Cupertino's Smog Pro & Auto Service
Bagel Street Cafe
BJ's Restaurant & Brewery
Apple
ani One
Sobrato Development
Infinite Loop
Infinite Loop 2
Infinite Loop 1
Infinite Loop 4
Infinite Loop 5
Infinite Loop 6
Basketball Court
Mariani Ave
iani Ave

De Anza Eight
Cupertino's Smog Pro & Auto Service
Bagel Street Cafe
BJ's Restaurant & Brewery
Apple
Infinite Loop
Infinite Loop 2
Infinite Loop 4
Infinite Loop 1
Infinite Loop 5
Infinite Loop 6
Basketball Court
Mariani Ave
Sobrato Development
ani One

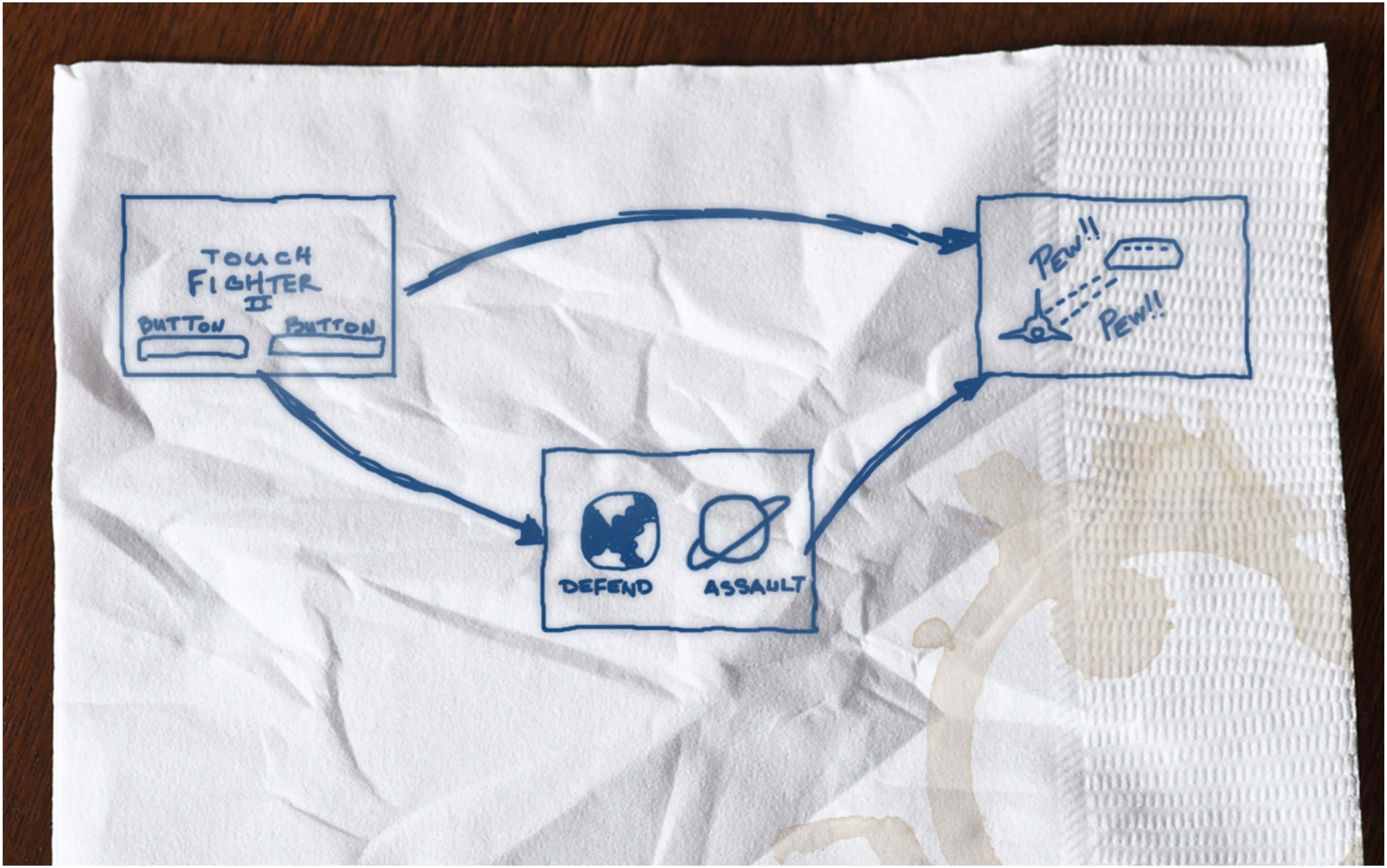
Courbevoie
D909
Levallois-Perret
Hauts-de-Sein
Paris
D1
Bd Bineau
Neuilly-sur-Seine
D7
17
Seine-Saint-Denis
nt-de-Flandres
Pa
N3
Le Pré-Saint
19e
Belleville
Hôpital
aint-Louis
Saint-Farg
20e
N185
Port
Dauphine
Chaillot
Bois de
Boulogne
16e
A
7e
1er
Sainte-Avoye
Paris
11e
Tour Eiffel - Parc
du Champ-de-Mars
Monnaie
6e
Grenelle
Arsenal
Charonne
5e
ulogne-Billancourt
15e
12e
Saint-M
E5
Montparnasse
Bercy
Saint-Lambert
14e
13e
D50
Petit-Montrouge
Maison
Blanche
Gare
E15
Issy-les-Moulineaux
Bd Brune

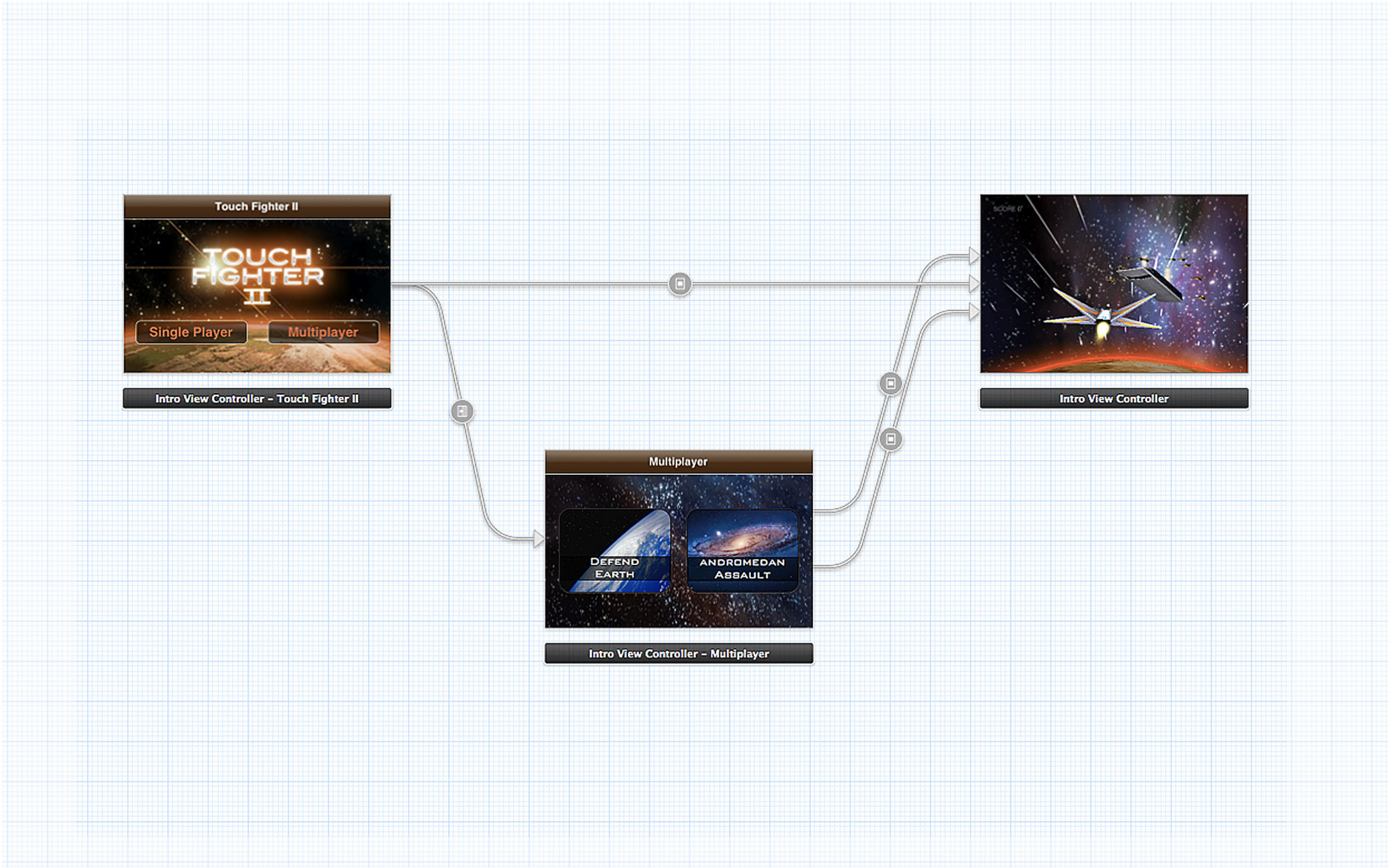

96
96a
Rosenthal
Buchholz
Lindenberg
Blankenburg
Dorfstraße
Konradshöhe
Niederschönhausen
Tegelort
96a
Heinersdorf
Pankow
109
2
Wartenberg
Prenzlauer Berg
Weißensee
Hohenschönhausen
Haselhorst
2
Landsberger Allee
158
Berlin
A
Berlin-Westend
100
Mitte
Charlottenburg
2
5
1
Friedrichshain
Lichtenberg
Heerstraße
Friedrichsfelde
96a
Kreuzberg
Schöneberg
Berlin-Planterwald
Grunewald
Tempelhof
Neukölln
E51
96a
115
100
Dahlem
Oberschöneweide

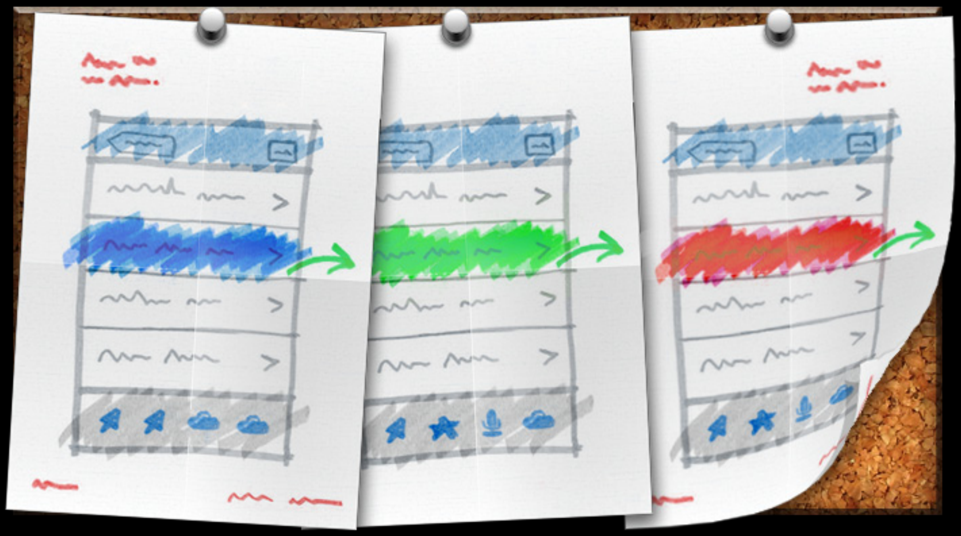
Johns
Vood
Camden
Town
Dalston
Hackney
A1
Regents
Park
Is
Regent's
Park
Clerl
e End
A5
A40
Marylebone
tepney
A4202
Bayswater
A
London
Rotherhithe
Knightsbridge
Newington
A201
Victoria
Lambeth
A308
Chelsea
Walworth
A3220
A3212
Pimlico
A2
Isle of Do
Deptford
Peckham
G
Vauxhall
A3
Stockwell
Camberwell
A2
Battersea
sons
een
rk Rd
A322
New Cross
Gate



NE 40th St
NE 39th St
NE 38th St
NE 37th Pl
NE 36th Ct
NE 35th Ct
NE 34th Ct
NE 33rd Ct
NE 36th St
NE 35th St
NE 34th St
NE 32nd St
NE 31st St
NE 31st Ct
NE 31st Way
NE 30th Pl
NE 29th Pl
NE 28th St
NE 27th St
NE 26th St
NE 25th St
NE 24th St
NE 36th Way
NE 30th St
NE 29th St
140th Ave NE
142nd Pl NE
148th Ave NE
150th Ave NE
152nd Ave NE
156th Ave NE
157th Ave NE
157th Pl NE
159th Ave NE
160th Ave NE
160th Pl NE
161st Ave NE
162nd Ave NE
163rd Ave NE
164th Ave NE
520
A
Redmond
Overlake
Goldsmith Neighborhood Park
Bel Red Rd
Bellevue Redmond Rd
Overlake Shopping Center
Red Robin Gourmet Burgers
Overlake Fashion Plaza
Aero Rent
Football Field
Sherwood Elementary

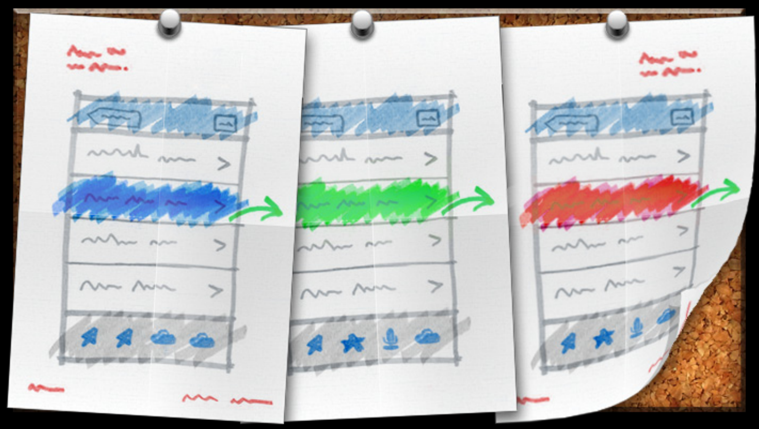

TOUCH
FIGHTER
II
BUTTON
BUTTON
DEFEND
ASSAULT
PEW!!
PEW!!


Touch Fighter II
TOUCH FIGHTER II
Single Player
Multiplayer
Intro View Controller – Touch Fighter II
Multiplayer
DEFEND EARTH
ANDROMEDAN ASSAULT
Intro View Controller – Multiplayer
Intro View Controller

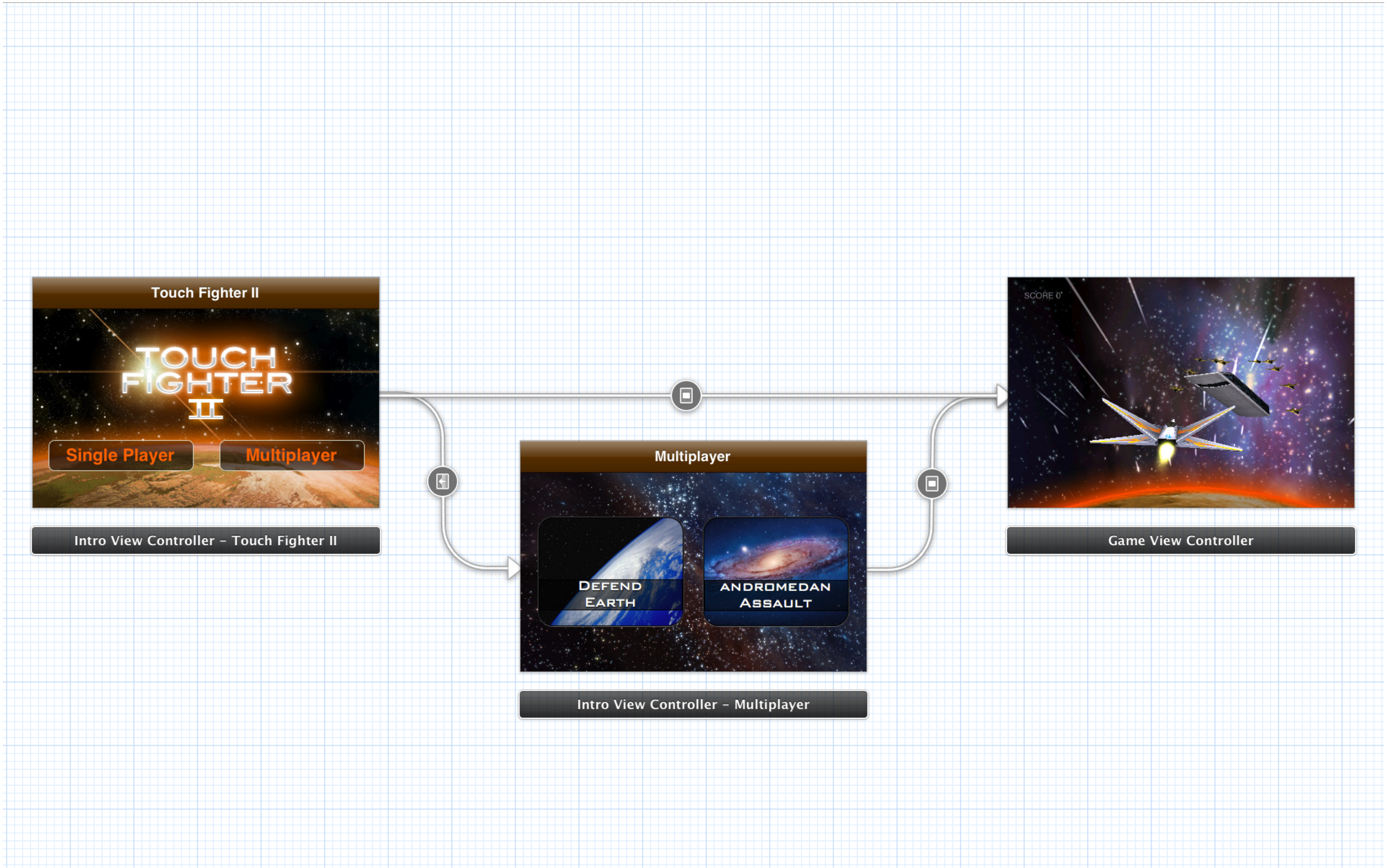


Storyboarding

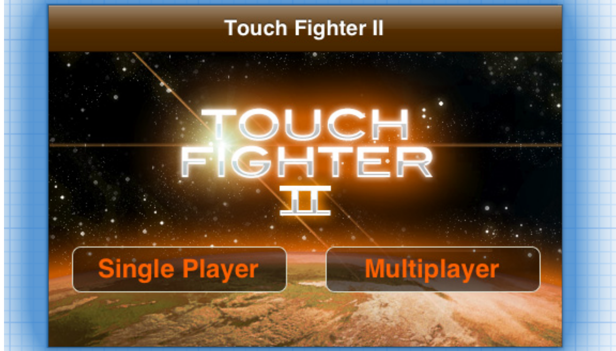
Storyboarding



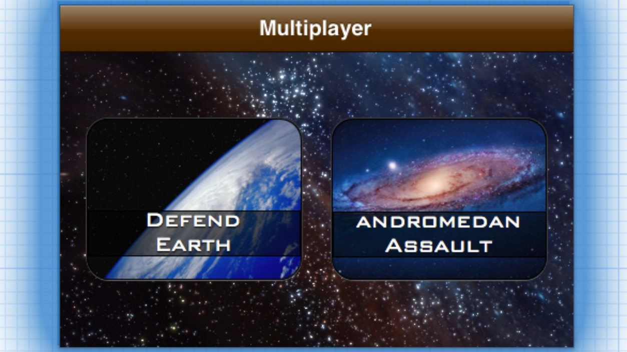
Jon Hess


Touch Fighter II
TOUCH FIGHTER II
Single Player
Multiplayer
Intro View Controller – Touch Fighter II
Multiplayer
DEFEND EARTH
ANDROMEDAN ASSAULT
Intro View Controller – Multiplayer
SCORE 0
Game View Controller

Scenes



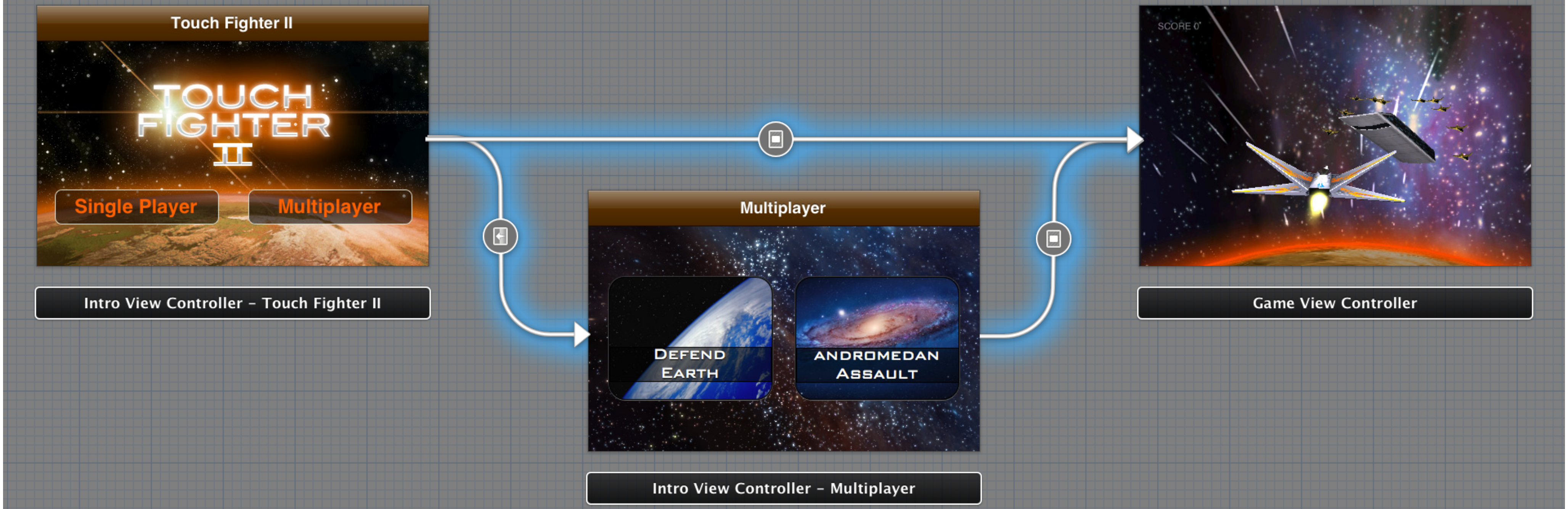
Intro View Controller – Touch Fighter II

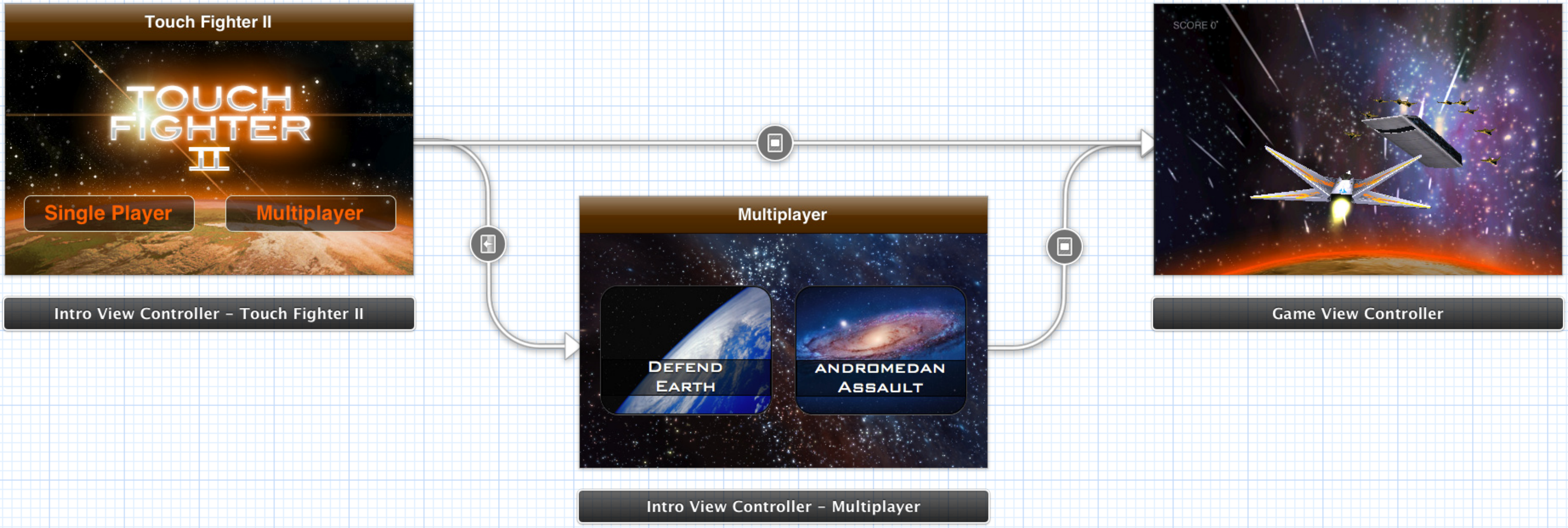


Intro View Controller – Multiplayer

Game View Controller

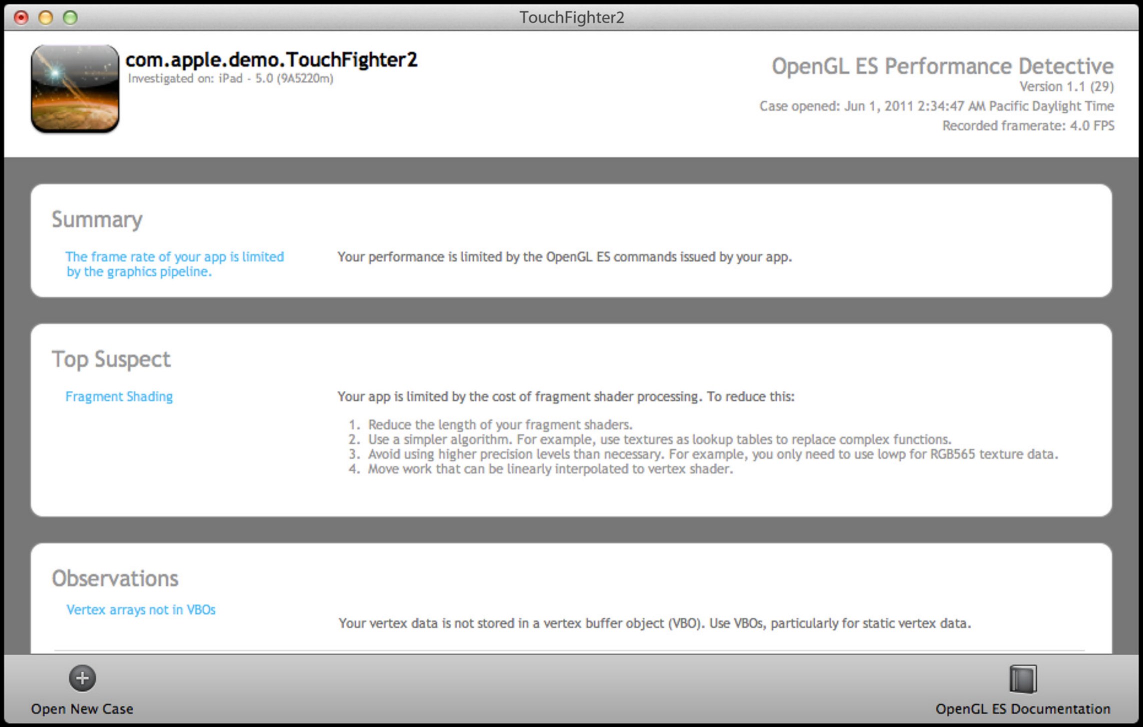
Segues


Touch Fighter II
TOUCH FIGHTER II
Single Player
Multiplayer
Intro View Controller – Touch Fighter II
Multiplayer
DEFEND EARTH
ANDROMEDAN ASSAULT
Intro View Controller – Multiplayer
SCORE 0
Game View Controller


Touch Fighter II
TOUCH FIGHTER II
Single Player
Multiplayer
Intro View Controller – Touch Fighter II
Multiplayer
DEFEND EARTH
ANDROMEDAN ASSAULT
Intro View Controller – Multiplayer
SCORE 0
Game View Controller

Demo

OpenGL|ES™



com.apple.demo.TouchFighter2
Investigated on: iPad - 5.0 (9A5220m)

OpenGL ES Performance Detective
Version 1.1 (29)
Case opened: Jun 1, 2011 2:34:47 AM Pacific Daylight Time
Recorded framerate: 4.0 FPS

Summary

The frame rate of your app is limited by the graphics pipeline.	Your performance is limited by the OpenGL ES commands issued by your app.

Top Suspect

Fragment Shading

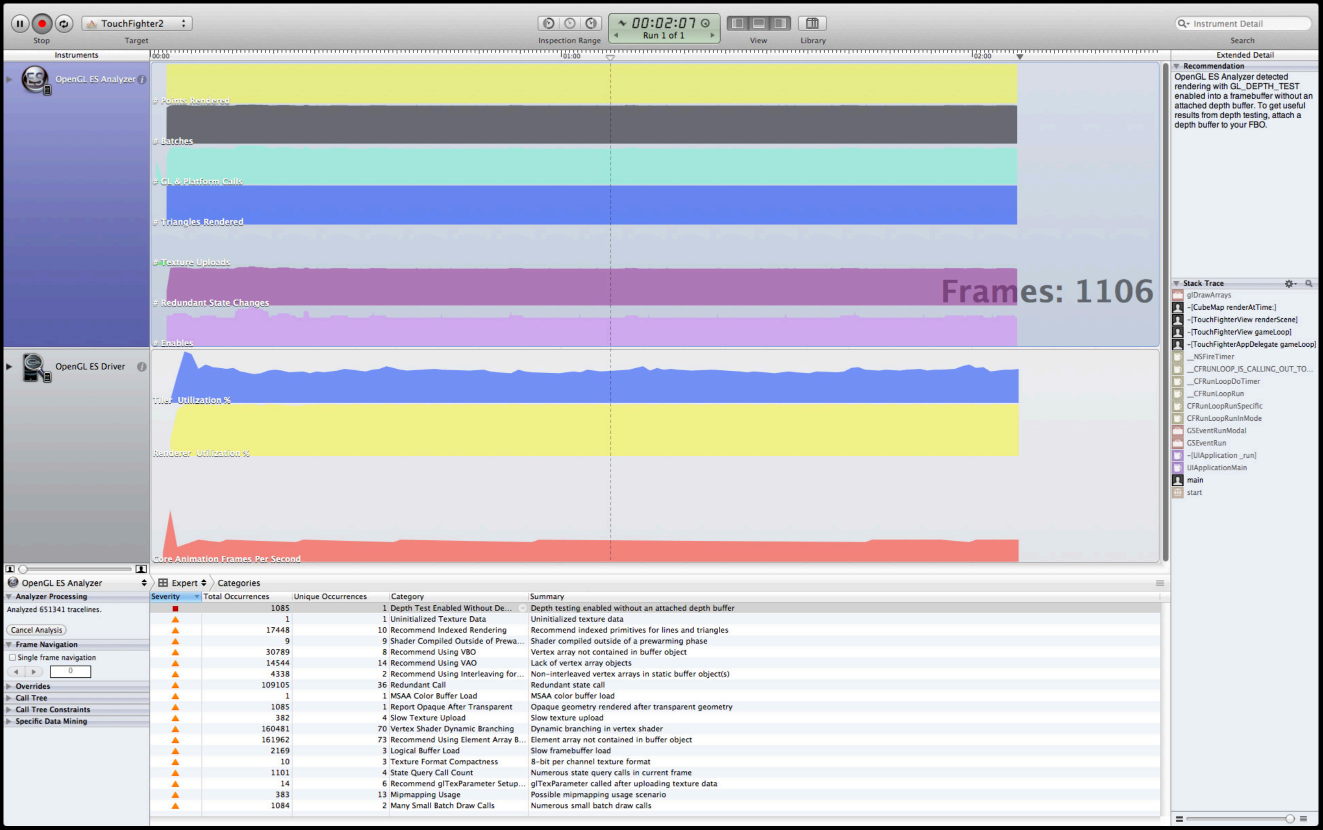
Your app is limited by the cost of fragment shader processing. To reduce this:

1. Reduce the length of your fragment shaders.
2. Use a simpler algorithm. For example, use textures as lookup tables to replace complex functions.
3. Avoid using higher precision levels than necessary. For example, you only need to use lowp for RGB565 texture data.
4. Move work that can be linearly interpolated to vertex shader.

Observations

Vertex arrays not in VBOs	Your vertex data is not stored in a vertex buffer object (VBO). Use VBOs, particularly for static vertex data.

OpenGL ES Performance Detective



Instrument Detail

Search

Extended Detail

Recommendation

OpenGL ES Analyzer detected rendering with GL_DEPTH_TEST enabled into a framebuffer without an attached depth buffer. To get useful results from depth testing, attach a depth buffer to your FBO.

Stack Trace

```
glDrawArrays
-[CubeMap renderAtTime:]
-[TouchFighterView renderScene]
-[TouchFighterView gameLoop]
-[TouchFighterAppDelegate gameLoop]
__NSFireTimer
__CFRUNLOOP_IS_CALLING_OUT_TO...
__CFRunLoopDoTimer
__CFRunLoopRun
CFRunLoopRunSpecific
CFRunLoopRunInMode
GSEventRunModal
GSEventRun
-[UIApplication _run]
UIApplicationMain
main
start
```

OpenGL ES Analyzer

Analyzer Processing

Analyzed 651341 tracelines.

Cancel Analysis

Frame Navigation

□ Single frame navigation

0

Overrides

Call Tree

Call Tree Constraints

Specific Data Mining

Expert

Categories

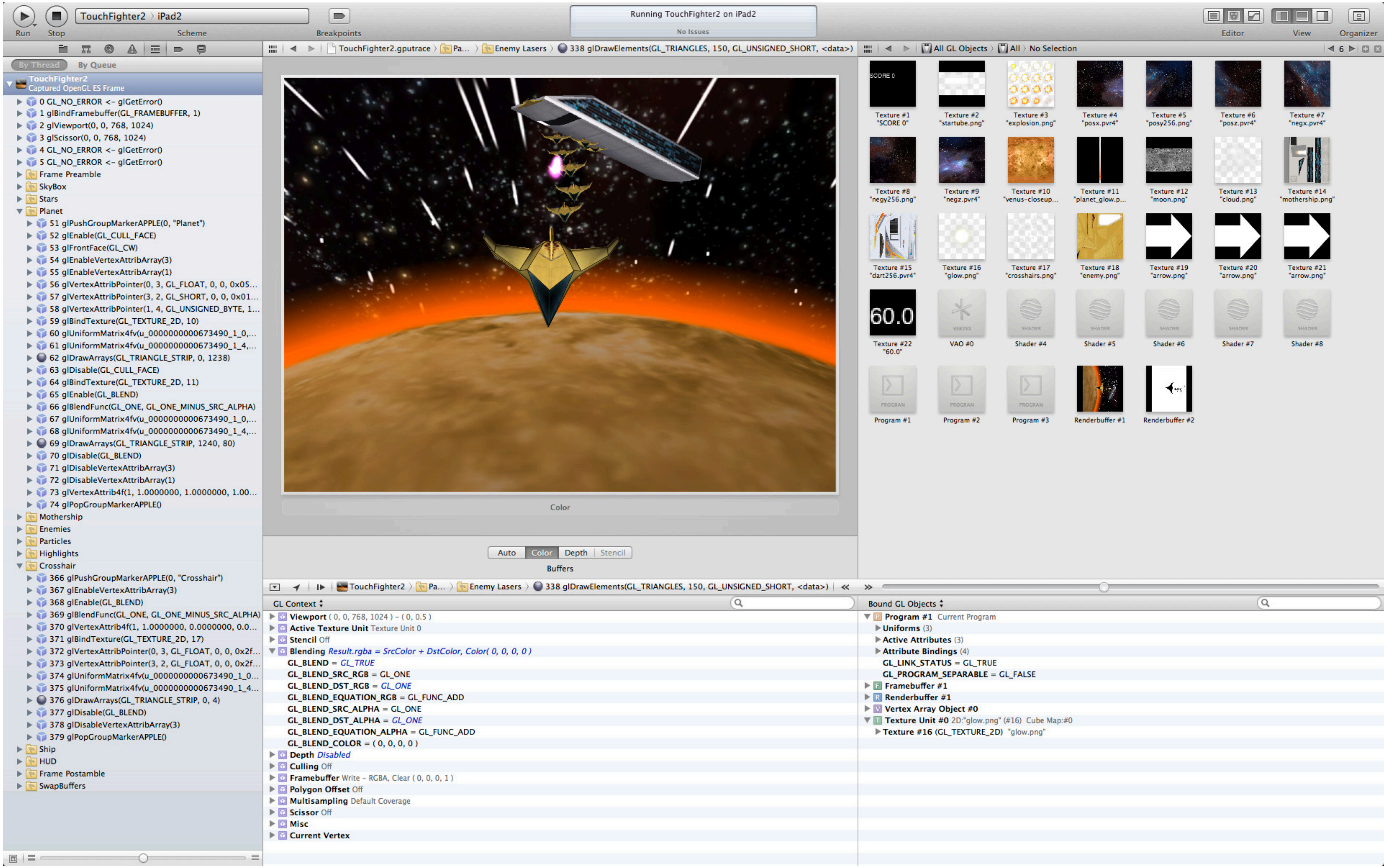
Severity	Total Occurrences	Unique Occurrences	Category	Summary
🟥	1085	1	Depth Test Enabled Without De...	Depth testing enabled without an attached depth buffer
▲	1	1	Uninitialized Texture Data	Uninitialized texture data
▲	17448	10	Recommend Indexed Rendering	Recommend indexed primitives for lines and triangles
▲	9	9	Shader Compiled Outside of Prewa...	Shader compiled outside of a prewarming phase
▲	30789	8	Recommend Using VBO	Vertex array not contained in buffer object
▲	14544	14	Recommend Using VAO	Lack of vertex array objects
▲	4338	2	Recommend Using Interleaving for...	Non-interleaved vertex arrays in static buffer object(s)
▲	109105	36	Redundant Call	Redundant state call
▲	1	1	MSAA Color Buffer Load	MSAA color buffer load
▲	1085	1	Report Opaque After Transparent	Opaque geometry rendered after transparent geometry
▲	382	4	Slow Texture Upload	Slow texture upload
▲	160481	70	Vertex Shader Dynamic Branching	Dynamic branching in vertex shader
▲	161962	73	Recommend Using Element Array B...	Element array not contained in buffer object
▲	2169	3	Logical Buffer Load	Slow framebuffer load
▲	10	3	Texture Format Compactness	8-bit per channel texture format
▲	1101	4	State Query Call Count	Numerous state query calls in current frame
▲	14	6	Recommend glTexParameter Setup...	glTexParameter called after uploading texture data
▲	383	13	Mipmapping Usage	Possible mipmapping usage scenario
▲	1084	2	Many Small Batch Draw Calls	Numerous small batch draw calls

OpenGL ES Analyzer Instrument

OpenGL ES Debugger

OpenGL ES Debugger

Matthew Firlik



TouchFighter2.gputrace 〉 Pa... 〉 Enemy Lasers 〉 338 glDrawElements(GL_TRIANGLES, 150, GL_UNSIGNED_SHORT, <data>)

All GL Objects 〉 All 〉 No Selection

```
TouchFighter2
Captured OpenGL ES Frame
  0 GL_NO_ERROR <- glGetError()
  1 glBindFramebuffer(GL_FRAMEBUFFER, 1)
  2 glViewport(0, 0, 768, 1024)
  3 glScissor(0, 0, 768, 1024)
  4 GL_NO_ERROR <- glGetError()
  5 GL_NO_ERROR <- glGetError()
  Frame Preamble
  SkyBox
  Stars
  Planet
    51 glPushGroupMarkerAPPLE(0, "Planet")
    52 glEnable(GL_CULL_FACE)
    53 glFrontFace(GL_CW)
    54 glEnableVertexAttribArray(3)
    55 glEnableVertexAttribArray(1)
    56 glVertexAttribPointer(0, 3, GL_FLOAT, 0, 0, 0x05...
    57 glVertexAttribPointer(3, 2, GL_SHORT, 0, 0, 0x01...
    58 glVertexAttribPointer(1, 4, GL_UNSIGNED_BYTE, 1...
    59 glBindTexture(GL_TEXTURE_2D, 10)
    60 glUniformMatrix4fv(u_0000000000673490_1_0,...
    61 glUniformMatrix4fv(u_0000000000673490_1_4,...
    62 glDrawArrays(GL_TRIANGLE_STRIP, 0, 1238)
    63 glDisable(GL_CULL_FACE)
    64 glBindTexture(GL_TEXTURE_2D, 11)
    65 glEnable(GL_BLEND)
    66 glBlendFunc(GL_ONE, GL_ONE_MINUS_SRC_ALPHA)
    67 glUniformMatrix4fv(u_0000000000673490_1_0,...
    68 glUniformMatrix4fv(u_0000000000673490_1_4,...
    69 glDrawArrays(GL_TRIANGLE_STRIP, 1240, 80)
    70 glDisable(GL_BLEND)
    71 glDisableVertexAttribArray(3)
    72 glDisableVertexAttribArray(1)
    73 glVertexAttrib4f(1, 1.0000000, 1.0000000, 1.00...
    74 glPopGroupMarkerAPPLE()
  Mothership
  Enemies
  Particles
  Highlights
  Crosshair
    366 glPushGroupMarkerAPPLE(0, "Crosshair")
    367 glEnableVertexAttribArray(3)
    368 glEnable(GL_BLEND)
    369 glBlendFunc(GL_ONE, GL_ONE_MINUS_SRC_ALPHA)
    370 glVertexAttrib4f(1, 1.0000000, 0.0000000, 0.0...
    371 glBindTexture(GL_TEXTURE_2D, 17)
    372 glVertexAttribPointer(0, 3, GL_FLOAT, 0, 0, 0x2f...
    373 glVertexAttribPointer(3, 2, GL_FLOAT, 0, 0, 0x2f...
    374 glUniformMatrix4fv(u_0000000000673490_1_0...
    375 glUniformMatrix4fv(u_0000000000673490_1_4...
    376 glDrawArrays(GL_TRIANGLE_STRIP, 0, 4)
    377 glDisable(GL_BLEND)
    378 glDisableVertexAttribArray(3)
    379 glPopGroupMarkerAPPLE()
  Ship
  HUD
  Frame Postamble
  SwapBuffers
```

TouchFighter2 〉 Pa... 〉 Enemy Lasers 〉 338 glDrawElements(GL_TRIANGLES, 150, GL_UNSIGNED_SHORT, <data>)

```
GL Context
  Viewport ( 0, 0, 768, 1024 ) - ( 0, 0.5 )
  Active Texture Unit Texture Unit 0
  Stencil Off
  Blending Result.rgba = SrcColor + DstColor, Color( 0, 0, 0, 0 )
    GL_BLEND = GL_TRUE
    GL_BLEND_SRC_RGB = GL_ONE
    GL_BLEND_DST_RGB = GL_ONE
    GL_BLEND_EQUATION_RGB = GL_FUNC_ADD
    GL_BLEND_SRC_ALPHA = GL_ONE
    GL_BLEND_DST_ALPHA = GL_ONE
    GL_BLEND_EQUATION_ALPHA = GL_FUNC_ADD
    GL_BLEND_COLOR = ( 0, 0, 0, 0 )
  Depth Disabled
  Culling Off
  Framebuffer Write - RGBA, Clear ( 0, 0, 0, 1 )
  Polygon Offset Off
  Multisampling Default Coverage
  Scissor Off
  Misc
  Current Vertex
```

```
Bound GL Objects
  Program #1  Current Program
    Uniforms (3)
    Active Attributes (3)
    Attribute Bindings (4)
    GL_LINK_STATUS = GL_TRUE
    GL_PROGRAM_SEPARABLE = GL_FALSE
  Framebuffer #1
  Renderbuffer #1
  Vertex Array Object #0
  Texture Unit #0 2D:"glow.png" (#16)  Cube Map:#0
    Texture #16 (GL_TEXTURE_2D)  "glow.png"
```

Fully-rendered frame

OpenGL ES call history

Access to all resources

Full stack backtraces

“Moon Surface”

Texture #12

- glBindTexture()
- glUniformMatrix4fv()
- glDrawElements()

“Planet”

Demo

Mac OS X and iOS

Apple LLVM Compiler 3

LLVM

Fast compile times

Better code generation

Xcode integration

New language features

LLVM

LLVM

Compiler Transition Complete

LLVM

* LLVM-GCC for Compatibility

Compiler Transition Complete

OpenGL JIT

Code Completion

Link Time Optimization

Open Source

LLVM

Fix-its

LLVM-GCC

Clang

C++

Indexer

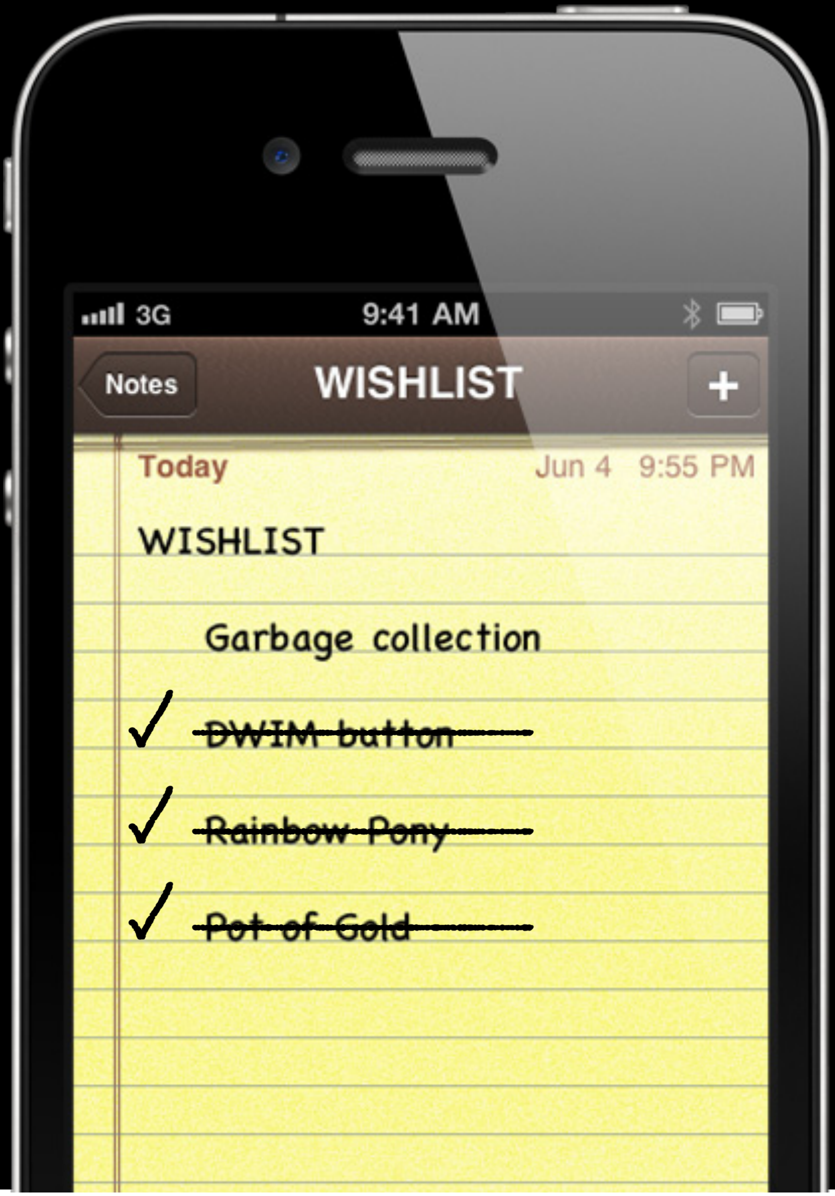
Objective-C

Static Analyzer

OpenCL JIT

Syntax Coloring

*** LLVM-GCC for Source Compatibility**



Today Jun 4 9:55 PM

WISHLIST

Garbage collection

✓ ~~DWIM button~~

✓ ~~Rainbow Pony~~

✓ ~~Pot of Gold~~

Garbage Collection

- ✓ Reduces crashes
- ✓ No object cleanup code
- ✓ Development ease

Garbage Collection

- ✗ Garbage builds up
- ✗ Performance stutters
- ✗ Nondeterministic
- ✓ Reduces crashes
- ✓ No object cleanup code
- ✓ Development ease

Manual Memory

- ✓ Instantly freed objects
- ✓ Smooth performance
- ✓ Predictable behavior
- ✗ Mistakes cause crashes
- ✗ Write a lot of code
- ✗ Development pain

Manual Memory	Garbage Collection
✓ Instantly freed objects	✗ Garbage builds up
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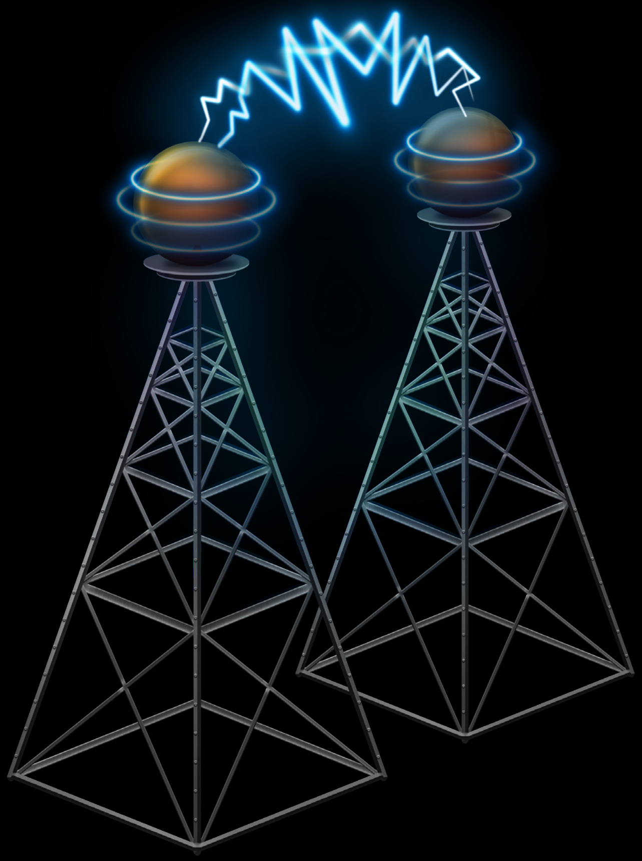
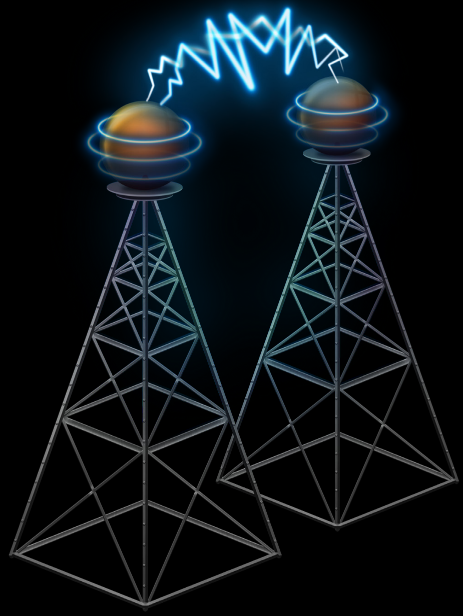


Automatic Reference Counting

Automatic Reference Counting

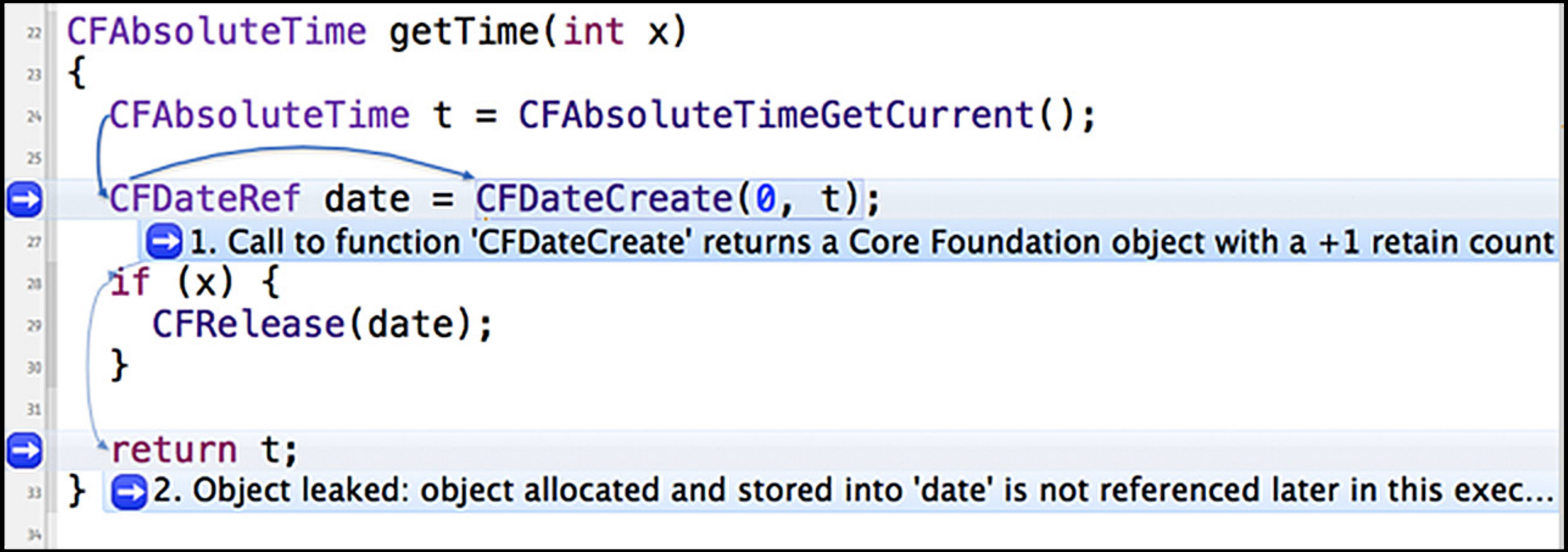


Chris Lattner

```
-(void)logSomething {
  NSString *string =
    [[NSString alloc] init];

  NSLog(@"%@\n", string);

  ~~[string release~~];
}
```



```
CFAbsoluteTime getTime(int x)
{
  CFAbsoluteTime t = CFAbsoluteTimeGetCurrent();

  CFDateRef date = CFDateCreate(0, t);
```

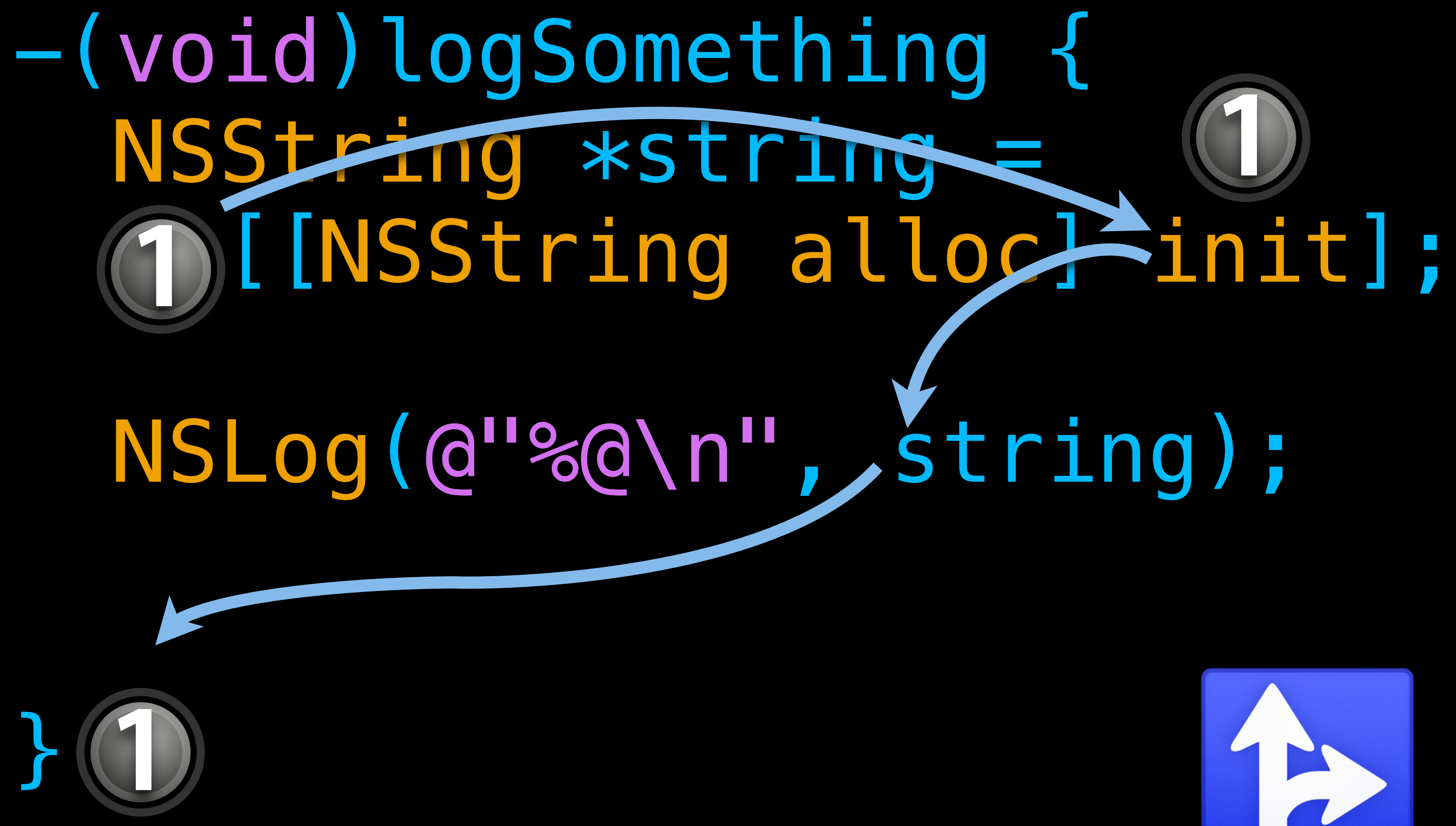
1. Call to function 'CFDateCreate' returns a Core Foundation object with a +1 retain count

```
  if (x) {
    CFRelease(date);
  }

  return t;
}
```

2. Object leaked: object allocated and stored into 'date' is not referenced later in this exec...

Xcode Static Analyzer



```
-(void)logSomething {
  NSString *string =
  [[NSString alloc] init];

  NSLog(@"%@\n", string);

}
```

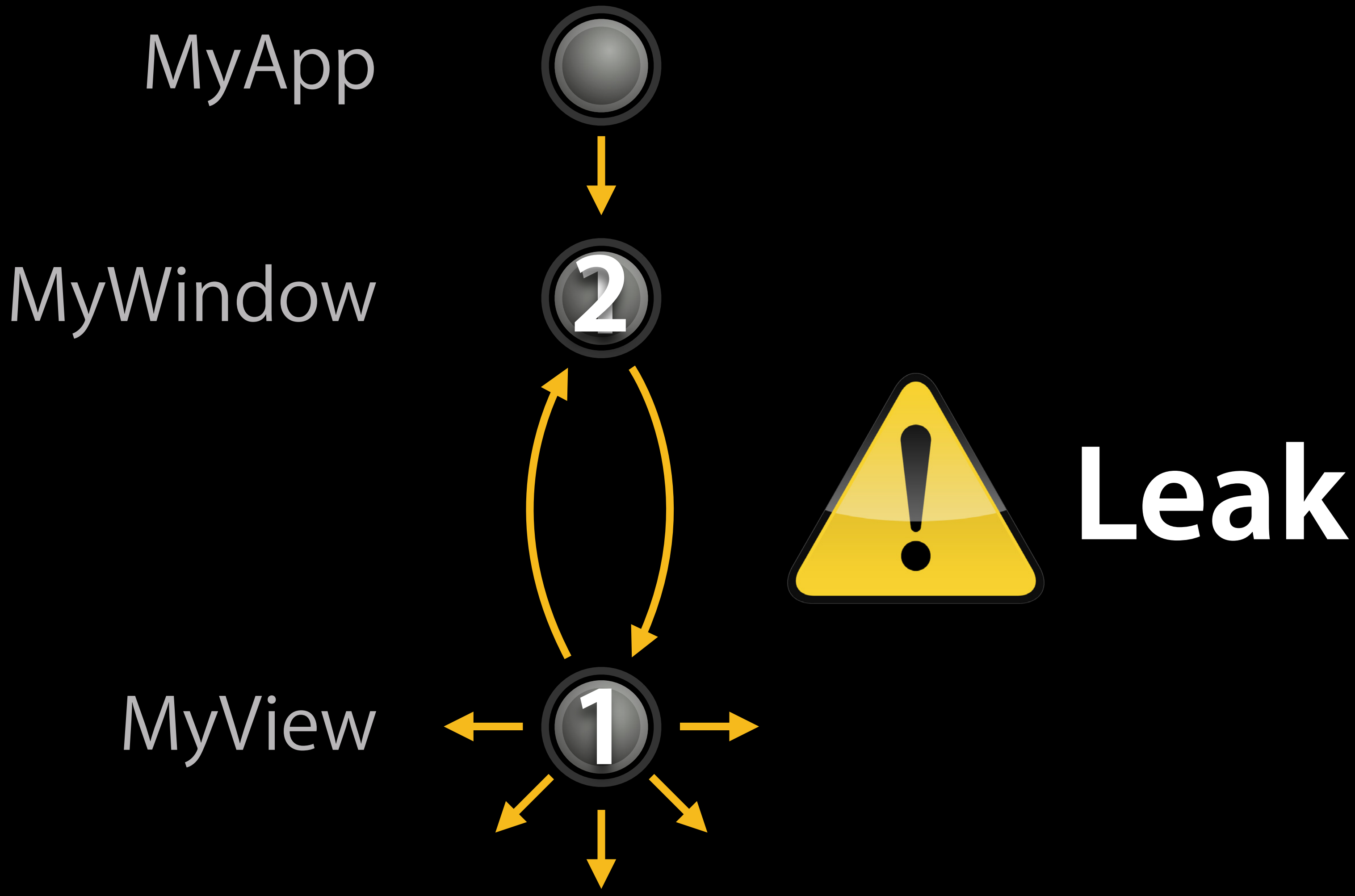
Leak

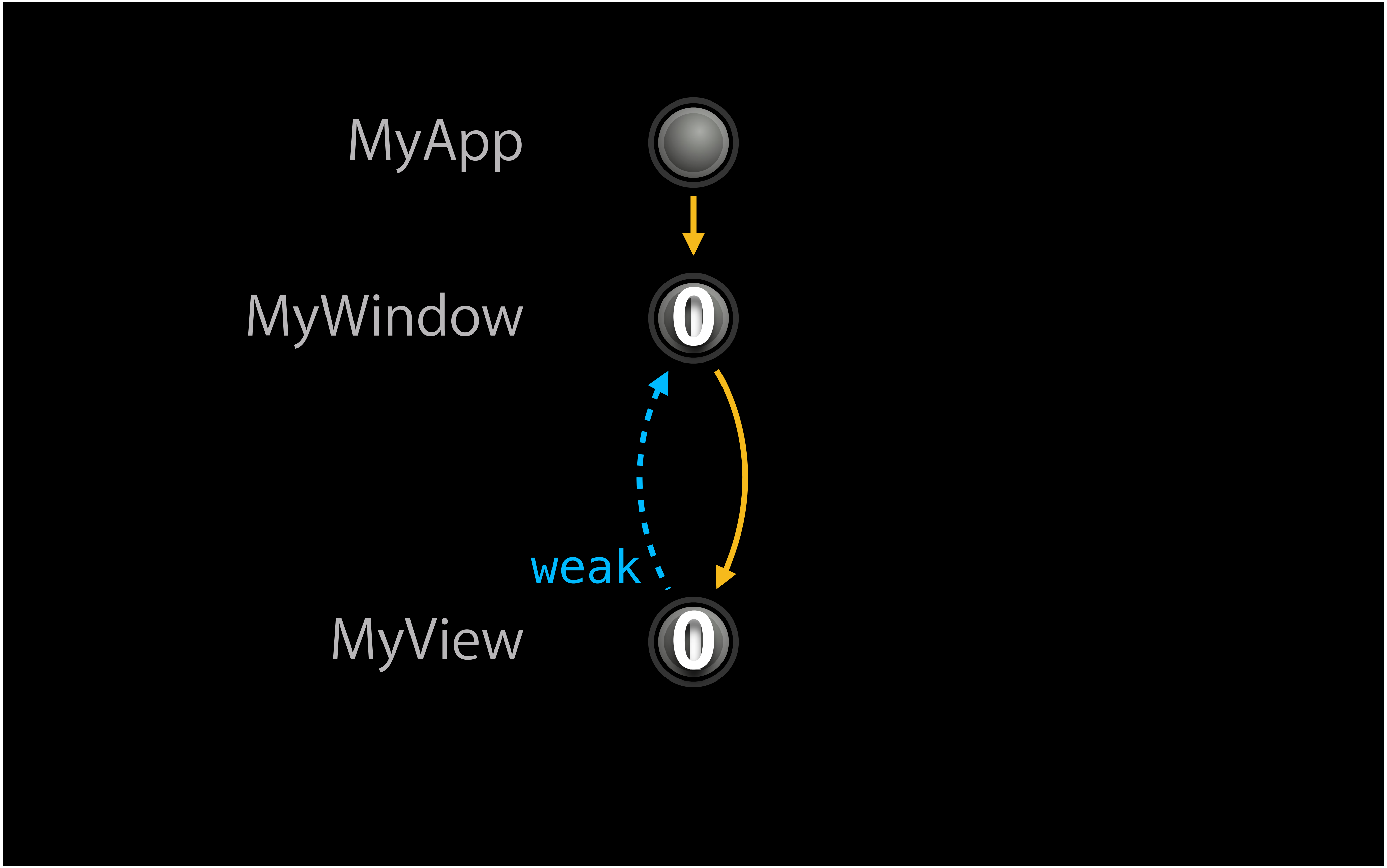
~~retain~~

~~release~~

~~autorelease~~

```
@autoreleasepool { }
NSAutoreleasePool
```


MyApp
MyWindow
2
MyView
1
Leak


MyApp
MyWindow
0
weak
MyView
0

~~Leaks~~

~~Crashes~~

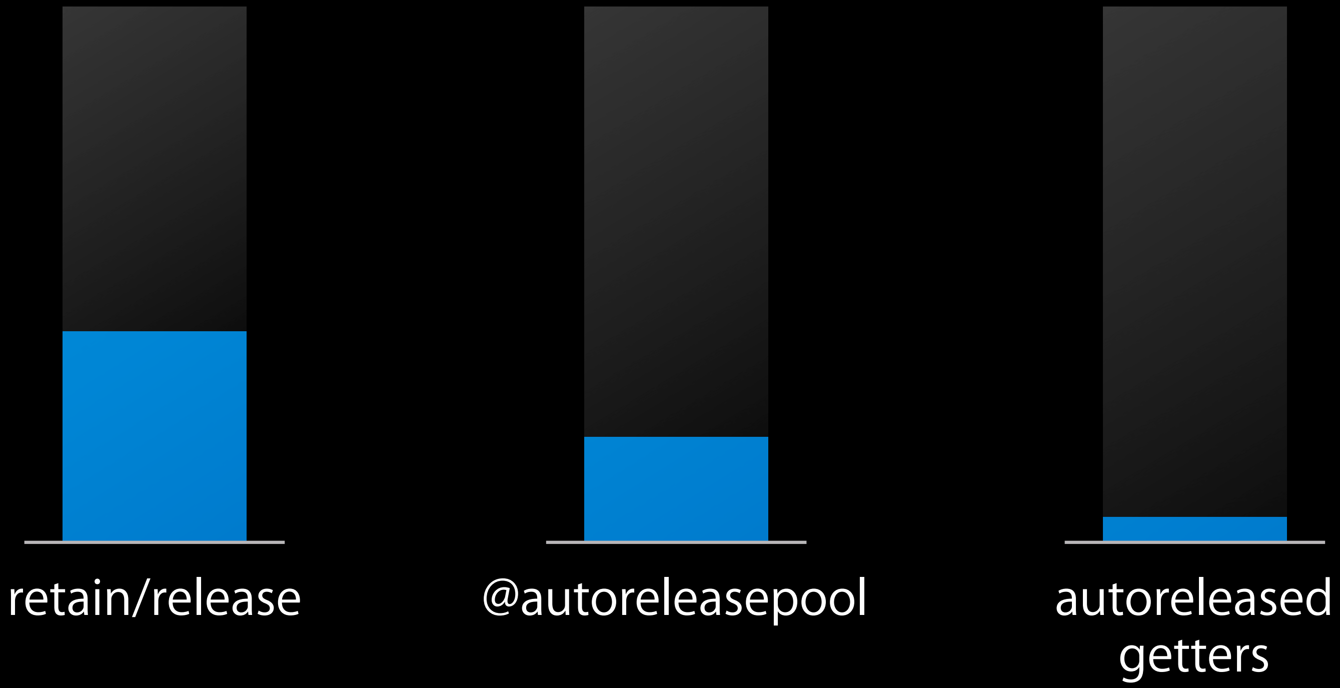
ARC Migration Tool

Step #1 Check for issues

Step #2 Convert your code

Step #3 Present diffs

Demo

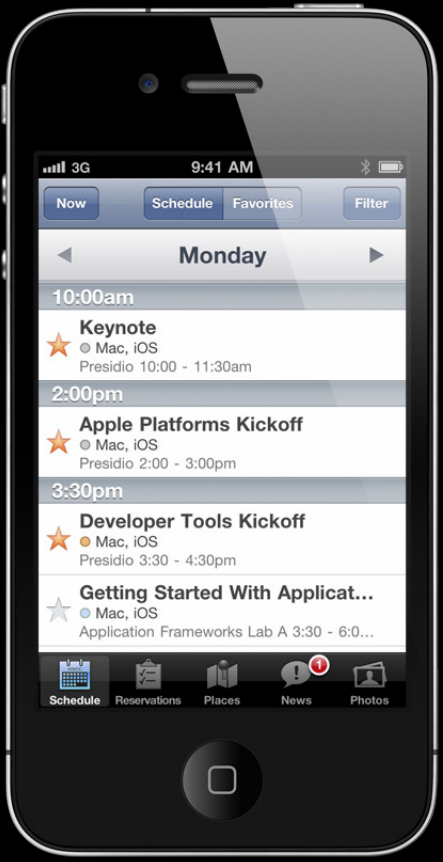

retain/release
@autoreleasepool
autoreleased getters

iOS 5

Mac OS X 10.7

iOS 5

Mac OS X 10.7



10:00am

Keynote
Mac, iOS
Presidio 10:00 - 11:30am

2:00pm

Apple Platforms Kickoff
Mac, iOS
Presidio 2:00 - 3:00pm

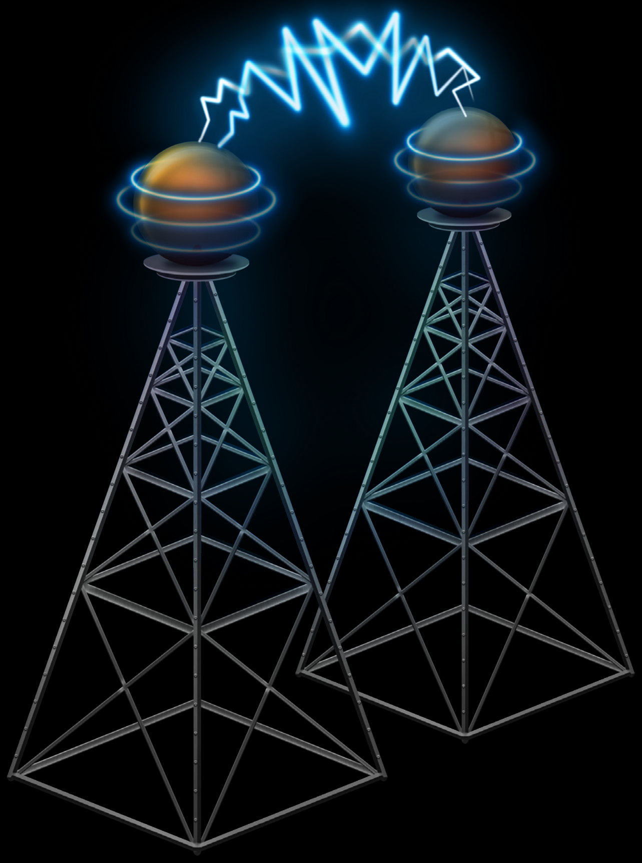
3:30pm

Developer Tools Kickoff
Mac, iOS
Presidio 3:30 - 4:30pm

Getting Started With Applicat...
Mac, iOS
Application Frameworks Lab A 3:30 - 6:0...

iOS 5 and 4

Mac OS X 10.7 and 10.6



ARC

Color palette
Unlimited Undo & Redo
Transparency Effects
Precise control over font, text style, & paragraph settings
Text spacing
Alignment
Grid tool
Writing Tools
PROJECT: APPLICATION.APP
ARCHITECT: XCODE
#1

Xcode 4.1

5
Xcode 4.2

WWDC2011