

Improving the Stability of Your Apps

Making the CrashMan go away

Session 123

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iOS Binary Compatibility Engineer

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

Agenda

- Binary Compatibility
- Coding for Tomorrow
- Anticipating the User
- Testing

Binary Compatibility

Binary Compatibility



Binary Compatibility



Binary Compatibility



whoami

```
-(BOOL) isiPad {
    BOOL answer = NO;
    size_t size;
    sysctlbyname( "hw.machine", NULL, &size, NULL, 0 );
    char *ident = malloc( size );
    sysctlbyname( "hw.machine", machine, NULL, NULL, 0 );
    if( strncmp( ident, "iPad1,1", 7 ) ) {
        answer = YES;
    }
    free( ident );
    return( answer );
}
```



whoami



whoami



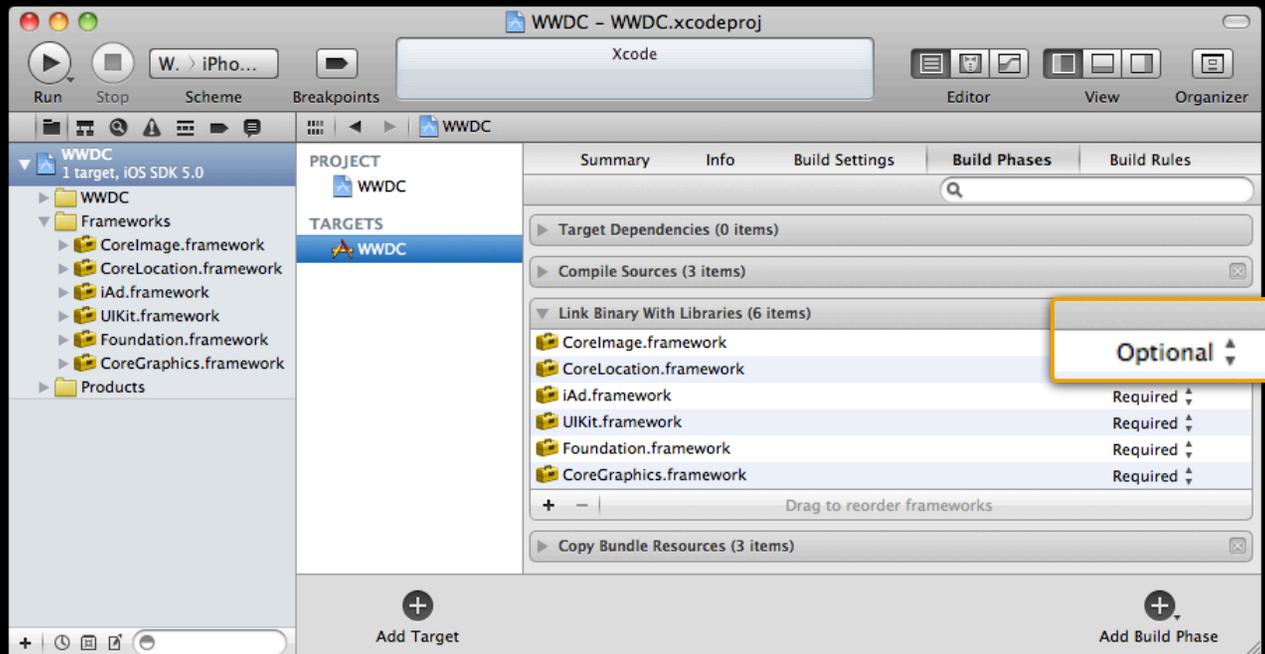
- iPhone/iPod or iPad

```
- (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:
(NSDictionary *)launchOptions {
    if ( UI_USER_INTERFACE_IDIOM() == UIUserInterfaceIdiomPad ) {
        // Load iPad UI
    }
    else {
        // Load iPhone UI
    }
}
```

New and Shiny

- Core Image
 - Weak Linking
 - Run-time class availability

Weak Linking



Class Availability

```
#import <CoreImage/CoreImage.h>
if( [CIImage class] ) {
    CIImage *myImage = ...
}
```

Orientation

- Start in landscape
- Only support landscape

Orientation

- Info.plist



A screenshot of an Info.plist file showing a table of supported interface orientations. A yellow arrow points to the first row. The table has three columns: Key, Type, and Value.

Supported interface orientations	Array	(2 items)
Item 0	String	Landscape (left home button)
Item 1	String	Landscape (right home button)
Initial interface orientation	String	Landscape (left home button)

- View Controllers

```
- (BOOL)shouldAutorotateToInterfaceOrientation:(UIInterfaceOrientation)
interfaceOrientation {
    return( UIInterfaceOrientationIsLandscape(interfaceOrientation) );
}
```

- GLKit

plist All Stars

- “Wifi needs to remain active while my app is running”
- “I want to share documents via iTunes”
- “My application does not work without a gyroscope”

plist All Stars



Main nib file base name	String	MainWindow
▶ Supported interface orientations	Array	(2 items)
Initial interface orientation	String	Landscape (left home button)
▶ Application uses Wi-Fi	Boolean	YES
Application supports iTunes file sharing	Boolean	YES
▼ Required device capabilities	Diction...	(1 item)
gyroscope	Boolean	YES

Coding for Tomorrow

Jake Behrens

Developer Technical Support Engineer

Coding for Tomorrow

One step beyond

- Custom functionality
- Small time, big impact
- Crash reports

Custom Functionality

- Extend existing classes
- Think about future software
- It comes down to users



Categories Can Be Dangerous

```
@implementation UINavigationController (MyNavigationBar)

- (void)drawRect:(CGRect)rect {
    UIImage *myImage = [UIImage imageNamed:@"myNavigationBar"];
    [myImage drawInRect:rect];
}

@end
```



Method Swizzling Is Bad

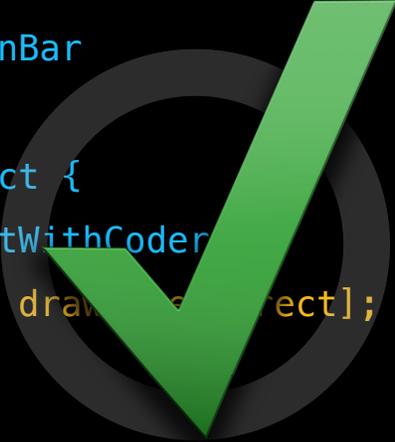
```
Method appleMethod = class_getInstanceMethod(navBarClass, appleSelector);
Method myMethod = class_getInstanceMethod(navBarClass, mySelector);

if (class_addMethod(navBarClass, appleSelector,
                   method_getImplementation(myMethod),
                   method_getTypeEncoding(myMethod))) {
    class_replaceMethod(navBarClass, mySelector,
                       method_getImplementation(appleMethod),
                       method_getTypeEncoding(appleMethod));
}
else {
    method_exchangeImplementations(appleMethod, myMethod);
}
```

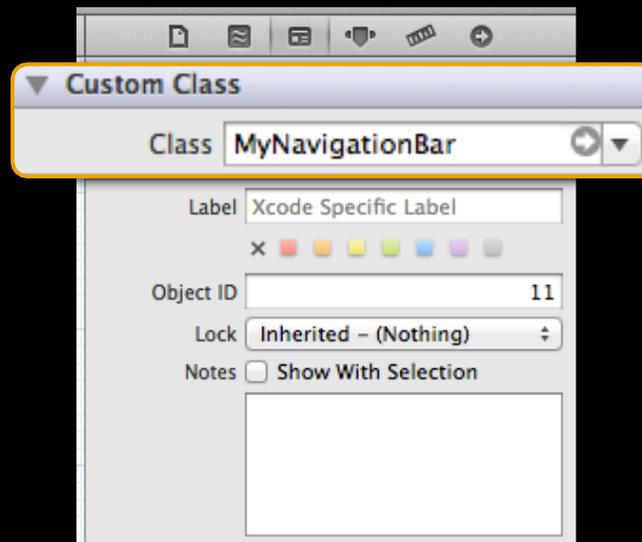


Subclassing Is Good

```
@implementation MyNavigationBar  
  
- (void)drawRect:(CGRect)rect {  
    // Set the image in initWithCoder  
    [self.myBackgroundImage drawInRect:rect];  
}  
  
@end
```



Edit the .xib



iOS 5 Is Even Better

Appearance Proxy API

- UINavigationController

`-setBackgroundImage:forBarMetrics:`



Polishing Your App

Russian Hill
Thursday 2:00PM

Customizing the Appearance of UIKit Controls

Russian Hill
Friday 10:15AM

Note Important Notes

- Optional delegate methods
- Subclasses
- Class collision

Important: You should not embed `UIWebView` or `UITableView` objects in `UIScrollView` objects. If you do so, unexpected behavior can result because touch events for the two objects can be mixed up and wrongly handled.

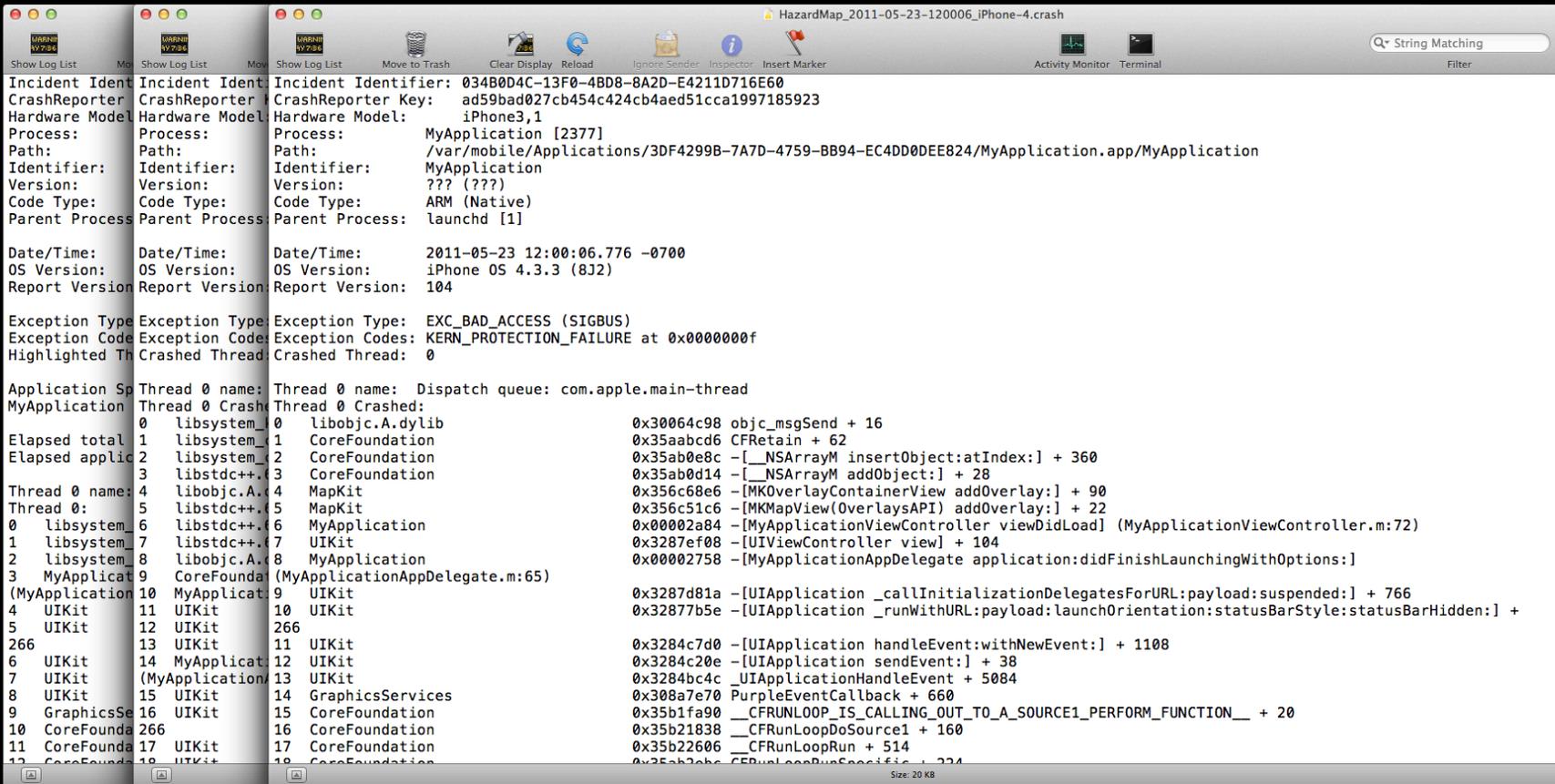
.h (Engineering Journal)

```
CLLocationManager.h

/*
 * regionMonitoringAvailable
 *
 * Discussion:
 *     Determines whether the device supports region monitoring.
 *     If NO, all attempts to monitor regions will fail.
 */
+ (BOOL)regionMonitoringAvailable __OSX_AVAILABLE_STARTING(__MAC_NA,__IPHONE_4_0);
```

Code That Is Not Your Own

- Read through the code
- Take ownership
- Analyze and Profile



How to Prepare

- Build and Archive
 - Binary
 - .dSYM



Where Do I Find Crash Logs?

- Test devices
- iTunes Connect
- Users
 - `~/Library/Logs/CrashReporter/MobileDevice/<DEVICE_NAME>`
- Technical Note TN2151

```
MyApplication_2011-05-16-133013_iPod-touch-4G.crash
String Matching
Filter

Incident Identifier: 9AFB284A-465A-4C97-9F3D-CAE796C09A2B
CrashReporter Key: 705bdead36f670033614a97d5ff7602dde720616
Hardware Model: iPod4,1
Process: MyApplication [445]
Path: /var/mobile/Applications/F44A77A7-0916-4014-ADA0-8A082A3F74DC/MyApplication.app/MyApplication
Identifier: MyApplication
Version: ??? (???)
Code Type: ARM (Native)
Parent Process: launchd [1]

Date/Time: 2011-05-16 13:30:13.961 -0700
OS Version: iPhone OS 4.3.3 (8J2)
Report Version: 104

Exception Type: EXC_CRASH (SIGABRT)
Exception Codes: 0x00000000, 0x00000000
Crashed Thread: 0

Thread 0 name: Dispatch queue: com.apple.main-thread
Thread 0 Crashed:
0  libsystem_kernel.dylib 0x32695a1c 0x32684000 + 72220
1  libsystem_c.dylib 0x3680f3b4 0x367dc000 + 209844
2  libsystem_c.dylib 0x36807bf8 0x367dc000 + 179192
3  libstdc++.6.dylib 0x311b5a64 0x31171000 + 281188
4  libobjc.A.dylib 0x30b8c06c 0x30b86000 + 24684
5  libstdc++.6.dylib 0x311b3e36 0x31171000 + 273974
6  libstdc++.6.dylib 0x311b3e8a 0x31171000 + 274058
7  libstdc++.6.dylib 0x311b3f5a 0x31171000 + 274266
8  libobjc.A.dylib 0x30b8ac84 0x30b86000 + 19588
9  CoreFoundation 0x365d645e 0x365ce000 + 33886
10 MyApplication 0x000af7ca 0xae000 + 6090
11 UIKit 0x333a2f08 0x3336c000 + 225032
12 UIKit 0x333a12ae 0x3336c000 + 217774
13 UIKit 0x334cc538 0x3336c000 + 1443128
14 MyApplication 0x000af4c2 0xae000 + 5314
15 UIKit 0x333a181a 0x3336c000 + 219162
16 UIKit 0x3339bb5e 0x3336c000 + 195422
17 UIKit 0x333707d0 0x3336c000 + 18384
18 UIKit 0x3337020e 0x3336c000 + 16910
19 UIKit 0x3336fc4c 0x3336c000 + 15436
20 GraphicsServices 0x312abc70 0x312c7000 + 20000

Size: 15 KB
```

```
MyApplication_2011-05-16-133013_iPod-touch-4G.crash
String Matching
Filter

Incident Identifier: 9AFB284A-465A-4C97-9F3D-CAE796C09A2B
CrashReporter Key: 705bdead36f670033614a97d5ff7602dde720616
Hardware Model: iPod4,1
Process: MyApplication [445]
Path: /var/mobile/Applications/F44A77A7-0916-4014-ADA0-8A082A3F74DC/MyApplication.app/MyApplication
Identifier: MyApplication
Version: ??? (???)
Code Type: ARM (Native)
Parent Process: launchd [1]

Date/Time: 2011-05-16 13:30:13.961 -0700
OS Version: iPhone OS 4.3.3 (8J2)
Report Version: 104

Exception Type: EXC_CRASH (SIGABRT)
Exception Codes: 0x00000000, 0x00000000
Crashed Inread: 0

Thread 0 name: Dispatch queue: com.apple.main-thread
Thread 0 Crashed:
0  libsystem_kernel.dylib 0x31b71a1c __pthread_kill + 8
1  libsystem_c.dylib 0x35ceb3b4 pthread_kill + 52
2  libsystem_c.dylib 0x35ce3bf8 abort + 72
3  libstdc++.6.dylib 0x30691a64 __gnu_cxx::__verbose_terminate_handler() + 376
4  libobjc.A.dylib 0x3006806c objc_terminate + 104
5  libstdc++.6.dylib 0x3068fe36 __cxxabiv1::__terminate(void (*)()) + 46
6  libstdc++.6.dylib 0x3068fe8a std::terminate() + 10
7  libstdc++.6.dylib 0x3068f65a __cxa_throw + 78
8  libobjc.A.dylib 0x30066c84 objc_exception_throw + 64
9  CoreFoundation 0x35eb245c [__NSArrayI objectAtIndex:]: + 154
10 MyApplication 0x000027ca -[MyApplicationViewController viewDidLoad] (MyApplicationViewController.m:36)
11 UIKit 0x3287e108 -[UIViewController view] + 104
12 UIKit 0x3287d2ae -[UIWindow addRootViewControllerViewIfPossible] + 26
13 UIKit 0x329a8538 -[UIWindow setRootViewController:] + 160
14 MyApplication (MyApplicationAppDelegate.m:24) 0x000024c2 -[MyApplicationAppDelegate application:didFinishLaunchingWithOptions:]
15 UIKit 0x3287d81a -[UIApplication _callInitializationDelegatesForURL:payload:suspended:] + 766
16 UIKit 0x32877b5e -[UIApplication _runWithURL:payload:launchOrientation:statusBarStyle:statusBarHidden:] +
266
17 UIKit 0x3284c7d0 -[UIApplication handleEvent:withNewEvent:] + 1108
18 UIKit 0x3284c20c -[UIApplication sendEvent:] + 28
Size: 15 KB
```

```
17 - (void)didReceiveMemoryWarning
18 {
19     // Releases the view if it doesn't have a superview.
20     [super didReceiveMemoryWarning];
21
22     // Release any cached data, images, etc that aren't in use.
23 }
24
25 #pragma mark - View lifecycle
26
27 // Implement viewDidLoad to do additional setup after loading the view, typically from a nib.
28 - (void)viewDidLoad
29 {
30     [super viewDidLoad];
31
32     NSArray *myArray = [[NSArray alloc] initWithArray:nil];
33     [myArray release];
34
35     [myArray objectAtIndex:0];
36 }
37
38 - (void)viewDidUnload
39 {
40     [super viewDidUnload];
41     // Release any retained subviews of the main view.
42     // e.g. self.myOutlet = nil;
43 }
44
45 - (BOOL)shouldAutorotateToInterfaceOrientation:(UIInterfaceOrientation)interfaceOrientation
46 {
47     // Return YES for supported orientations
48     return (interfaceOrientation == UIInterfaceOrientationPortrait);
49 }
50
51 @end
52
53
```

Common Exceptions

Mac and iOS

EXC_CRASH	Standard crash exception
EXC_BAD_ACCESS	Memory management

iOS

0x8badf00d	Watchdog timer killed the application
0xdeadfa11	User force-quit the application

Avoiding Crashes

Tips and tricks

- EXC_CRASH
 - Logic issues
- EXC_BAD_ACCESS
 - Ownership
 - Automatic Reference Counting
 - Thread access
- 0x8badf00d
 - MainWindow.xib
 - application:didFinishLaunchingWithOptions:

Change the Future

Summary

- Correct “clever” code
- Take ownership
- Know your crashes

Anticipating the User

Anticipating the User

- Upgrades
- Network gremlins
- Targeting devices
- Know thy customer



Upgrades

Your Application

- User defaults
- Core Data
 - Include data models
 - Complex upgrades are supported
 - Force user to reinstall app
- Custom databases

Upgrades

Device and OS

- New environment
- Application state
 - Save as necessary and on `applicationDidEnterBackground:`
 - Verify on relaunch
- Zero content

Network Shenanigans

- Assume the worst, hope for the best
- Handle errors gracefully
- Test reachability
 - Reachability sample code
 - Does not indicate availability
 - DNS...takes...time
- Disabled UI



Targeting Devices

- Users don't buy Simulators
- Develop for today, plan for yesterday
- Responsiveness

Know thy Customer



Know thy Customer

iOS Accessibility

Marina
Thursday 11:30AM

Ready for Sale

“This app was awesome, with the update it doesn’t work anymore.”

iTunes User Review, iTunes App Store

**“I LOVE this app but since I updated
it won't start, it keeps crashing!
PLEASE FIX!”**

iTunes User Review, iTunes App Store

“Every update makes this game worse. Now the game simply refuses to launch. I want my money back!”

iTunes User Review, iTunes App Store



iTunes User Review, iTunes App Store

**“It’s a fantastic app that does everything that is says...
Very stable as well.”**

iTunes User Review, iTunes App Store

Testing

Prepare for Greatness

Tools



Automation



```
1 var target = UIATarget.localTarget();
2
3
4 target.frontMostApp().mainWindow().tableViews()["Empty list"].cells()["Pickers"].staticTexts()["Pickers"].scrollToVisible();
5 target.frontMostApp().mainWindow().tableViews()["Empty list"].cells()["Toolbar"].scrollToVisible();
6 target.frontMostApp().mainWindow().tableViews()["Empty list"].cells()["Toolbar"].tap();
7 target.frontMostApp().mainWindow().segmentedControls()[1].buttons()["Done, 3 of 3"].tap();
8 target.frontMostApp().mainWindow().toolbar().buttons()["Done"].tap();
9
```

Prepare for Greatness

Tools



Automation



```
ttys003  
[b_arthur ~]$ instruments
```

Prepare for Greatness

Tools



Automation



What's New in Instruments

Marina
Wednesday 2:00PM

Prepare for Greatness

Tools



Automation



iPad + Wi-Fi

iPhone 4

iOS 3.2



iOS 4.0



iOS 5.0



Wrapping Up

- API knows best
- “Code with me if you want to live...”
- [Developer release]; [User init];
- Test plans are awesome

More Information

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Documentation

<http://developer.apple.com>

Apple Developer Forums

<http://devforums.apple.com>

