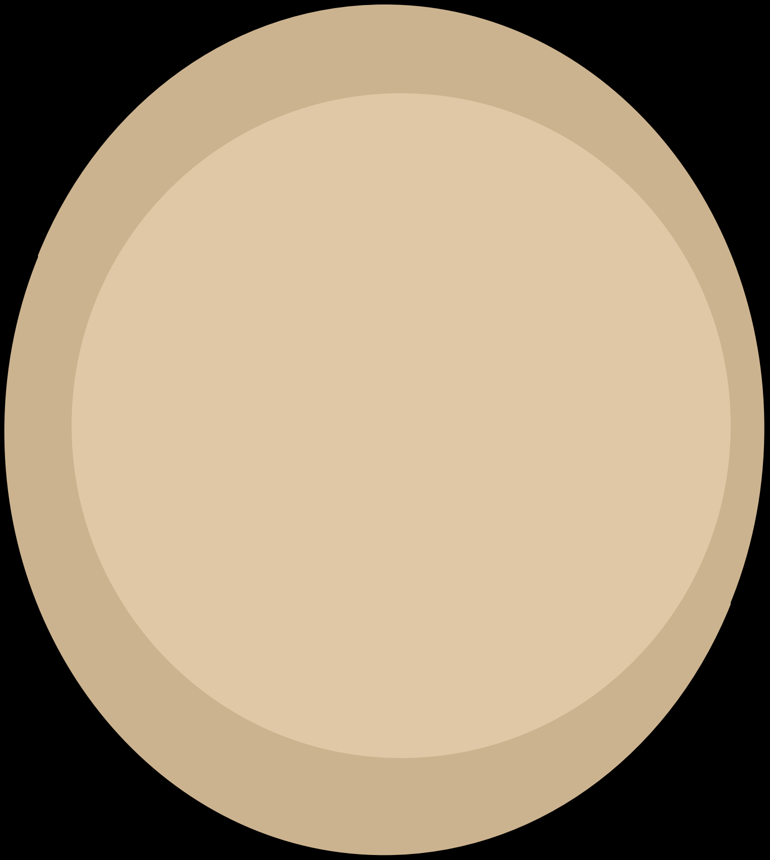
Mastering Schemes in Xcode 4

Session 313

Chris Hanson and Rick Ballard
Xcode Engineers

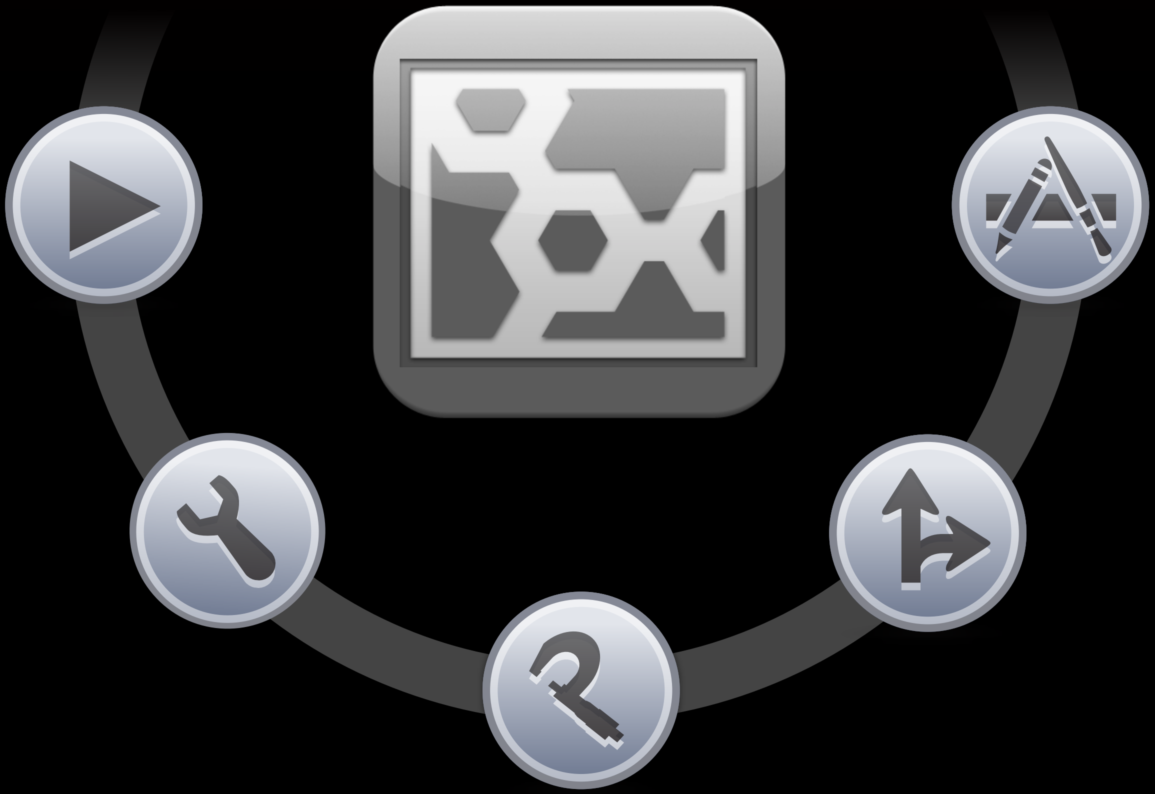
Introduction



Introduction

Introduction

What Is a Scheme?



What Is a Scheme?

What We'll Cover

- Project concepts: workspaces, projects, targets, schemes, and run destinations
- The scheme actions: run, test, profile, analyze, archive
- Build locations
- Scheme management
- Custom scheme actions

Project Concepts

Project Concepts

- Workspaces
- Projects
  - Build configurations
- Targets
  - Build settings
  - Build phases
  - Build rules
- Schemes
- Run destinations

What Is a Workspace?

- Container for references to projects and other files
- Groups together projects you want to use together
- Provides a unique symbol index, location for build products, saved window state, and more
- Allows implicit dependencies to be found between targets
- Projects opened by themselves act as an implicit workspace

Project Concepts

- Workspaces
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What's in a Project?

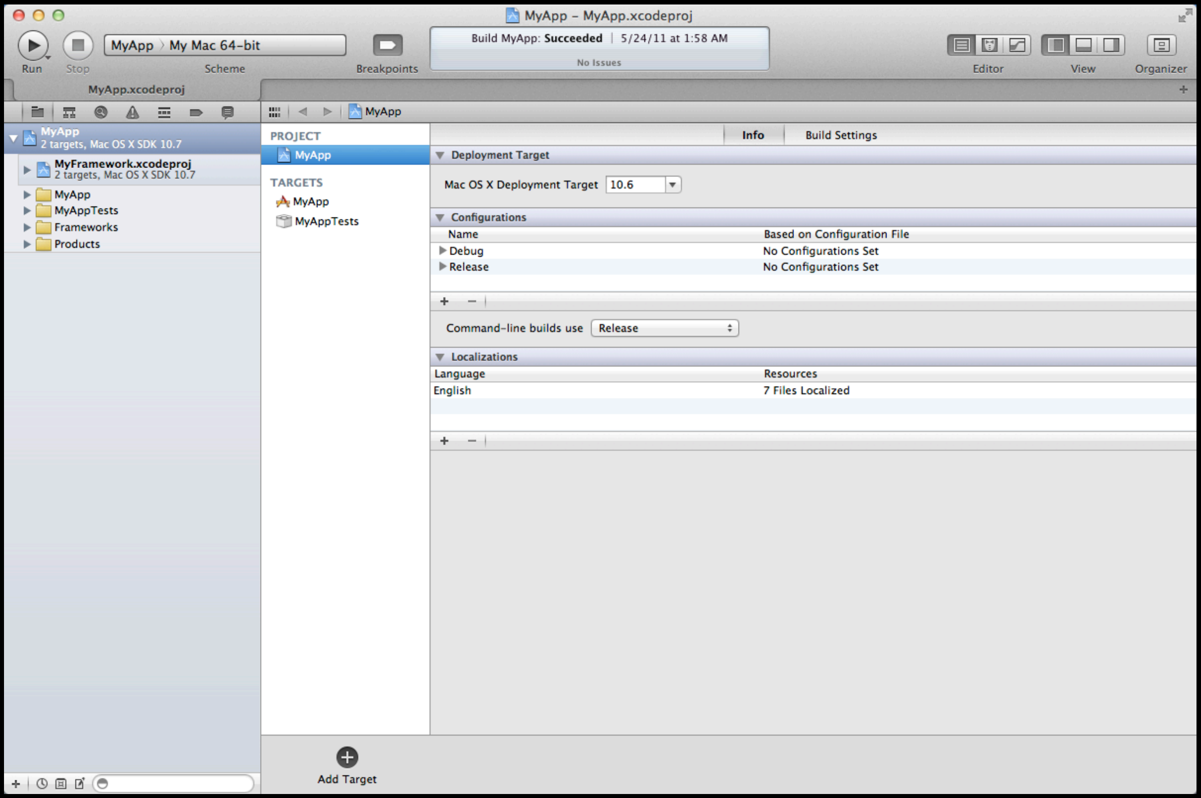
- References to source files
- Targets which build products
- Schemes which build targets and perform actions
- Build configurations used for organizing target build settings

Build Configurations

Collections of build settings

- By default, projects have Debug and Release configurations
- All build setting values live in a configuration
- Define a new configuration if you need different build setting values for a specific purpose
  - Most projects can get by with Debug and Release

The Project Editor



Build MyApp: **Succeeded** | 5/24/11 at 1:58 AM

No Issues

Deployment Target

Mac OS X Deployment Target 10.6

Configurations

Name	Based on Configuration File
Debug	No Configurations Set
Release	No Configurations Set

Command-line builds use Release

Localizations

Language	Resources
English	7 Files Localized

Project Concepts

- Workspaces
- Projects
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- Targets
  - Build settings
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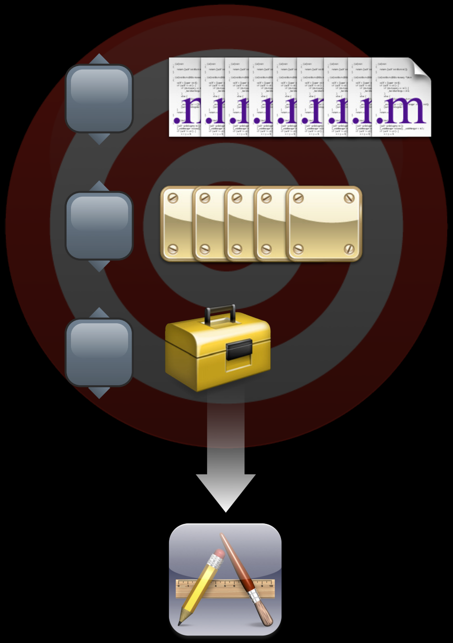
- Run destinations

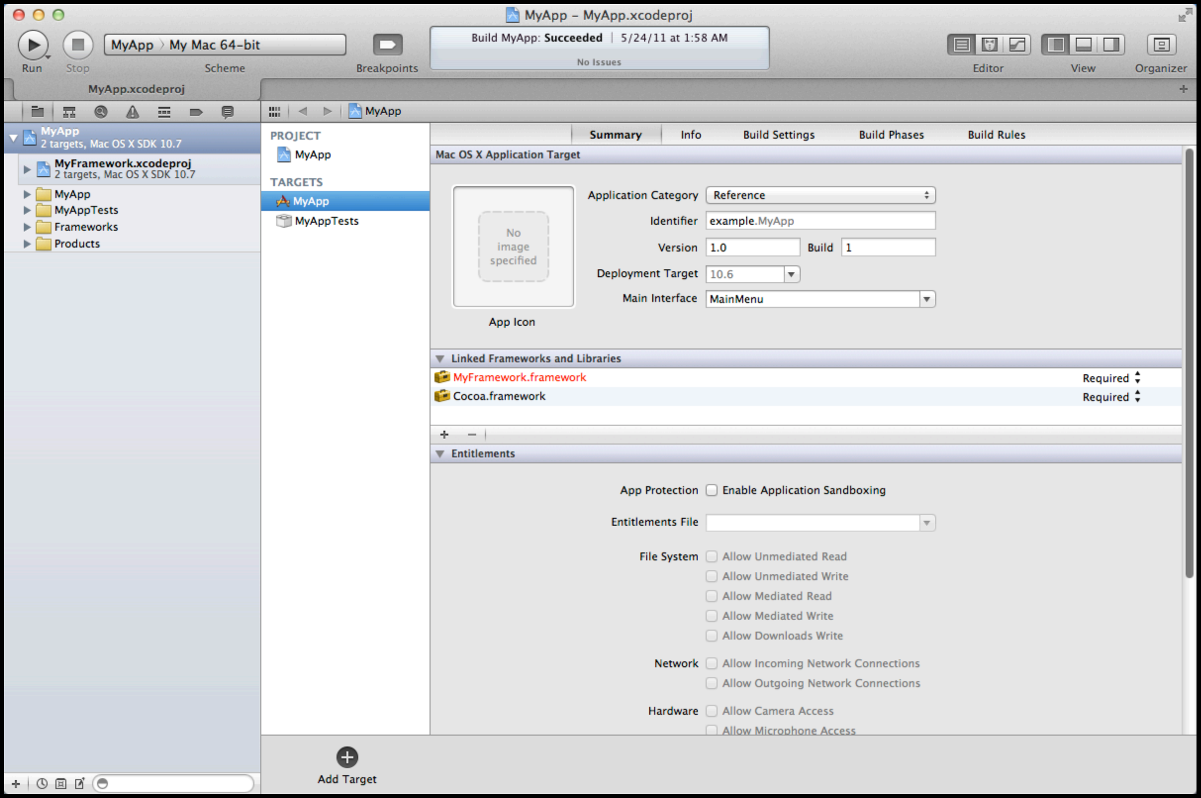
What’s in a Target?

Instructions for building one product



- References some or all source files in the project
- Contains build phases—the high-level sequence of steps
- Build rules determine how to handle each file type
- Build settings control how it’s done
- Can depend on one or more other targets

Target Settings



Mac OS X Application Target

Application Category: Reference
Identifier: example.MyApp
Version: 1.0 Build: 1
Deployment Target: 10.6
Main Interface: MainMenu

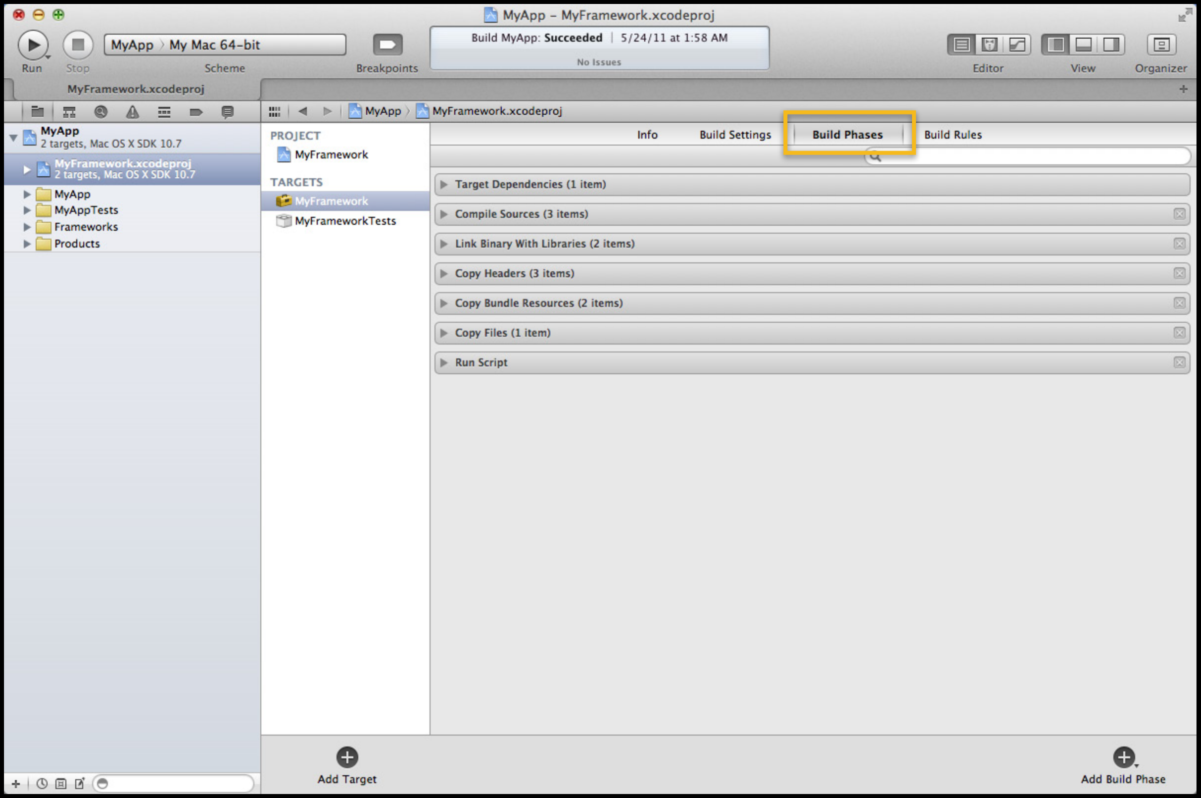
Linked Frameworks and Libraries

MyFramework.framework	Required
Cocoa.framework	Required

Entitlements

App Protection: Enable Application Sandboxing
Entitlements File:
File System: Allow Unmediated Read, Allow Unmediated Write, Allow Mediated Read, Allow Mediated Write, Allow Downloads Write
Network: Allow Incoming Network Connections, Allow Outgoing Network Connections
Hardware: Allow Camera Access, Allow Microphone Access

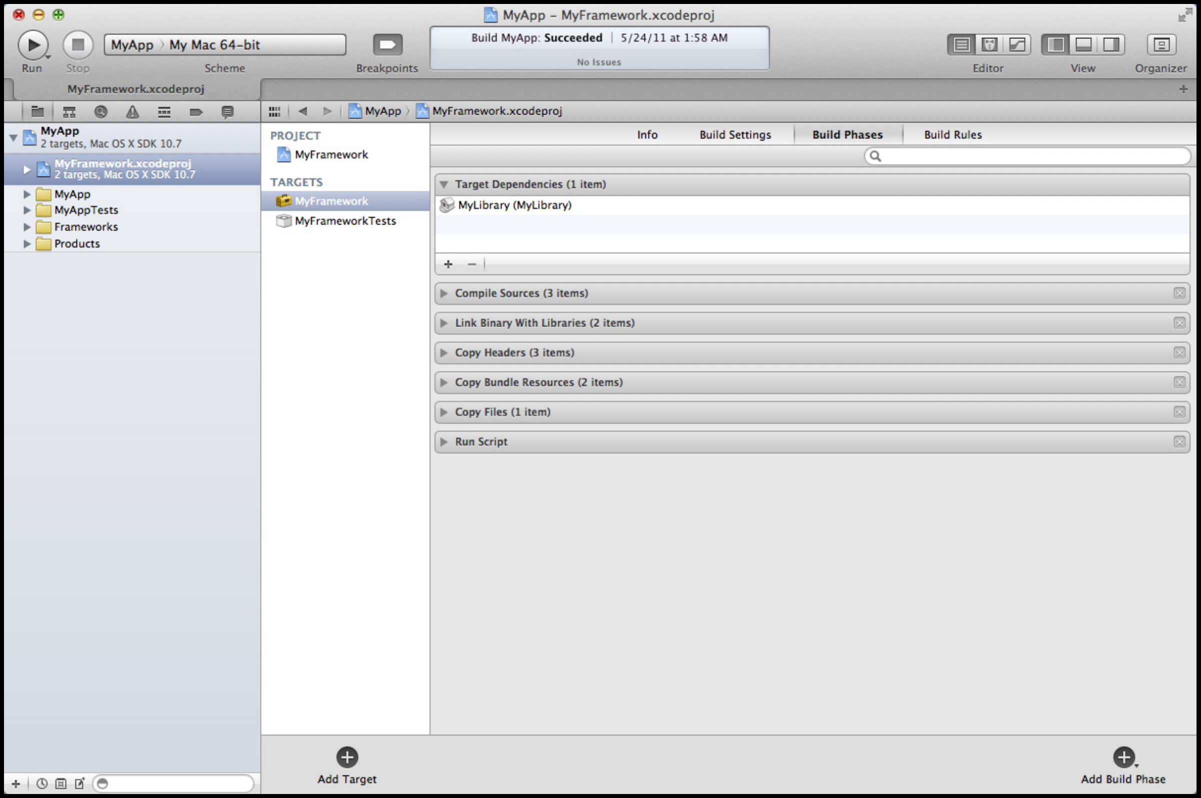
Build Phases



- Target Dependencies (1 item)
- Compile Sources (3 items)
- Link Binary With Libraries (2 items)
- Copy Headers (3 items)
- Copy Bundle Resources (2 items)
- Copy Files (1 item)
- Run Script

Build Phases

Target dependencies

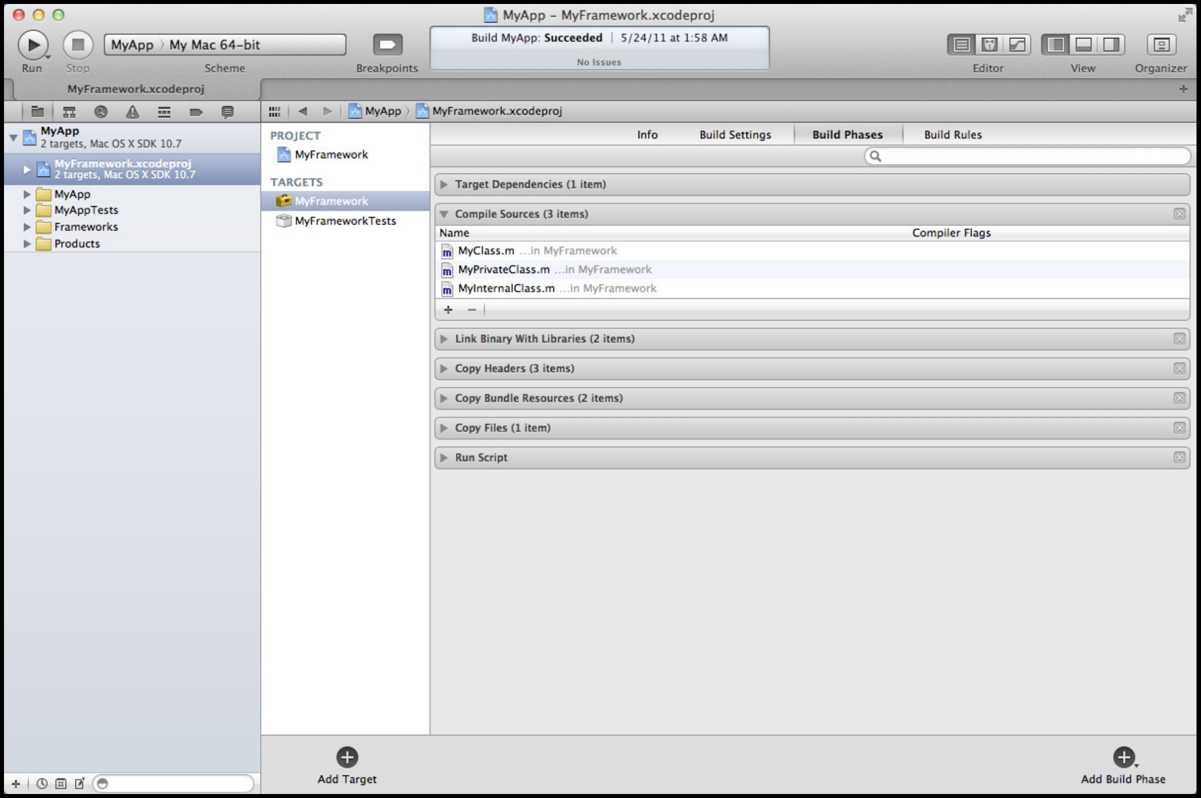


Target Dependencies (1 item)
MyLibrary (MyLibrary)

Compile Sources (3 items)
Link Binary With Libraries (2 items)
Copy Headers (3 items)
Copy Bundle Resources (2 items)
Copy Files (1 item)
Run Script

Build Phases

Compile sources


MyApp – MyFramework.xcodeproj

Build MyApp: Succeeded | 5/24/11 at 1:58 AM

No Issues

Target Dependencies (1 item)

Compile Sources (3 items)

Name	Compiler Flags
MyClass.m ...in MyFramework	
MyPrivateClass.m ...in MyFramework	
MyInternalClass.m ...in MyFramework	

Link Binary With Libraries (2 items)

Copy Headers (3 items)

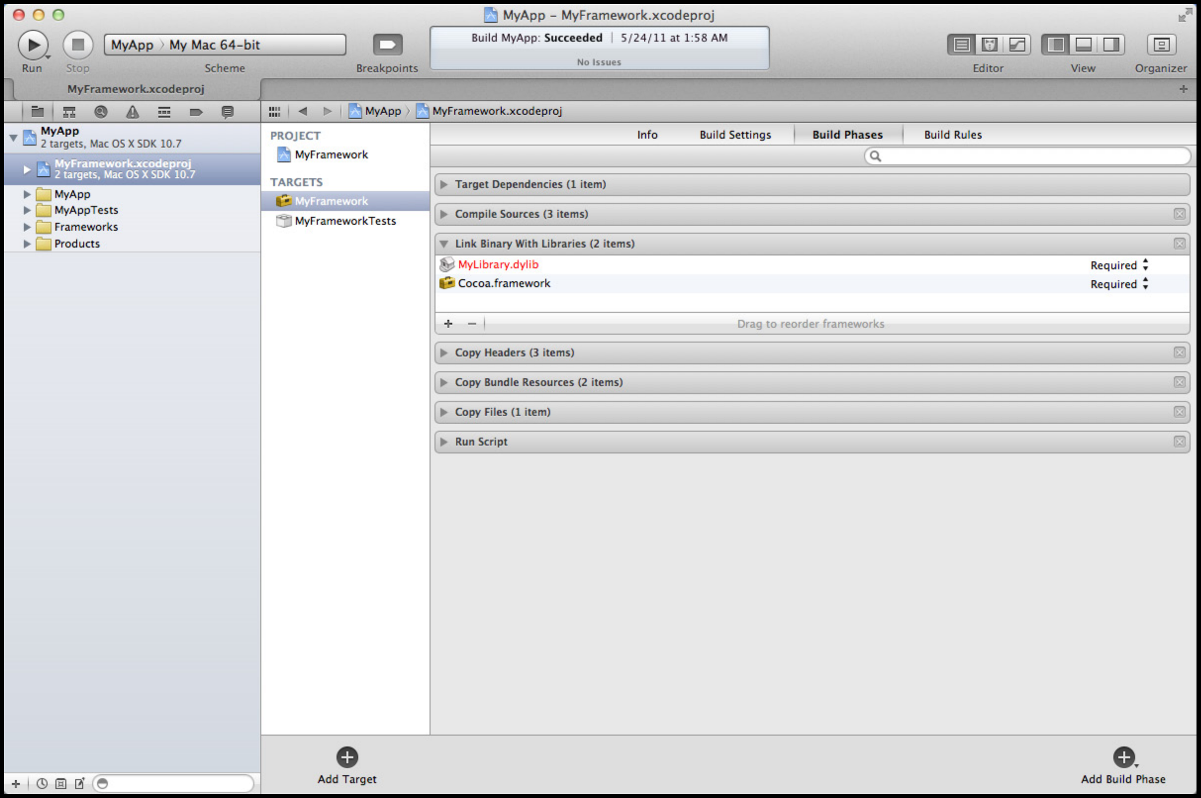
Copy Bundle Resources (2 items)

Copy Files (1 item)

Run Script

Build Phases

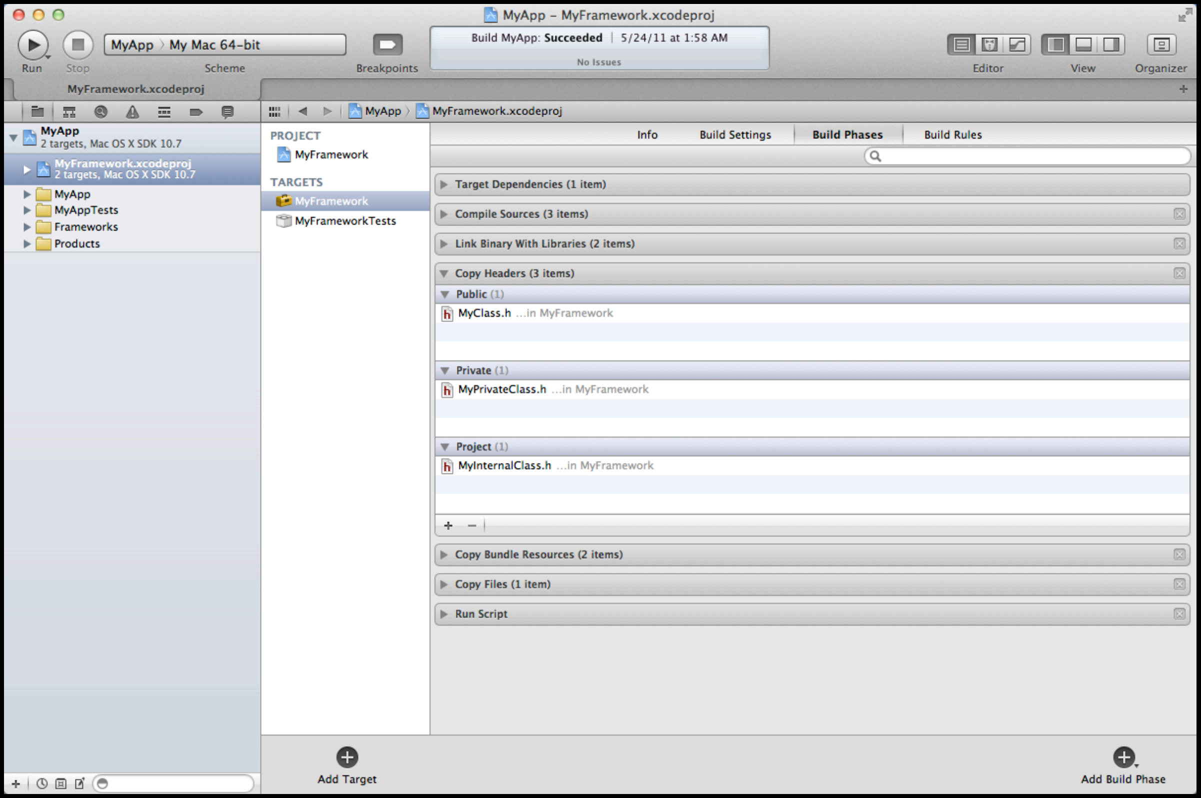
Link binary with libraries



- Target Dependencies (1 item)
- Compile Sources (3 items)
- Link Binary With Libraries (2 items)
  - MyLibrary.dylib — Required
  - Cocoa.framework — Required
  - Drag to reorder frameworks
- Copy Headers (3 items)
- Copy Bundle Resources (2 items)
- Copy Files (1 item)
- Run Script

Build Phases

Copy headers

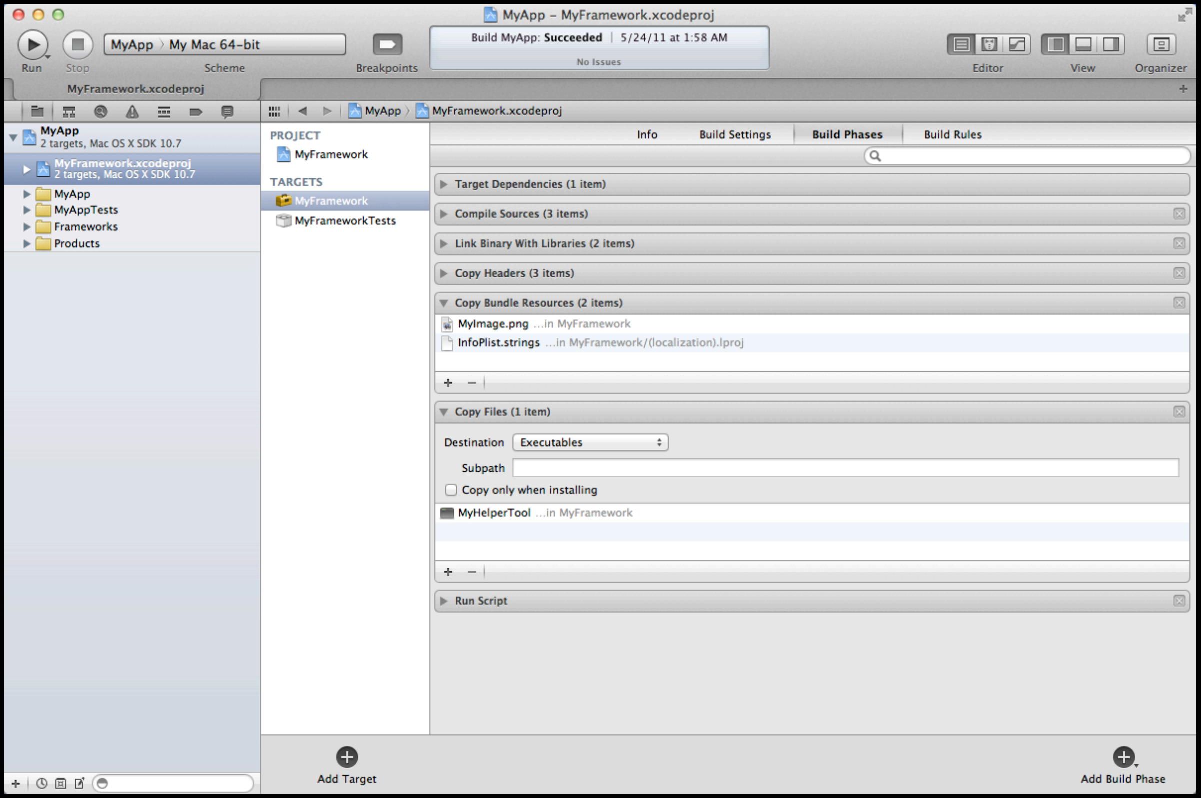


Build MyApp: Succeeded | 5/24/11 at 1:58 AM
No Issues

- Target Dependencies (1 item)
- Compile Sources (3 items)
- Link Binary With Libraries (2 items)
- Copy Headers (3 items)
  - Public (1)
    - MyClass.h ...in MyFramework
  - Private (1)
    - MyPrivateClass.h ...in MyFramework
  - Project (1)
    - MyInternalClass.h ...in MyFramework
- Copy Bundle Resources (2 items)
- Copy Files (1 item)
- Run Script

Build Phases

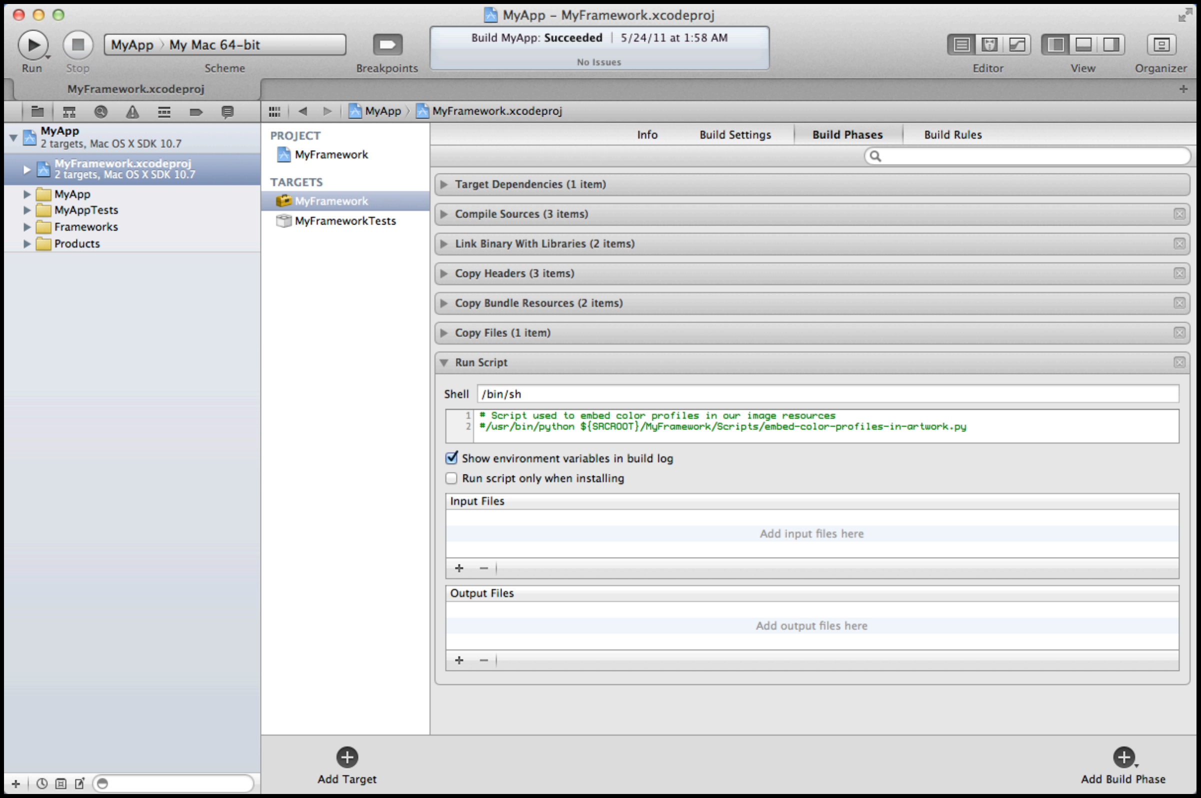
Copy files



Target Dependencies (1 item)
Compile Sources (3 items)
Link Binary With Libraries (2 items)
Copy Headers (3 items)
Copy Bundle Resources (2 items)
MyImage.png ...in MyFramework
InfoPlist.strings ...in MyFramework/(localization).lproj
Copy Files (1 item)
Destination: Executables
Subpath:
Copy only when installing
MyHelperTool ...in MyFramework
Run Script

Build Phases

Run script



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- Compile Sources (3 items)
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- Copy Headers (3 items)
- Copy Bundle Resources (2 items)
- Copy Files (1 item)
- Run Script

Shell /bin/sh

```
# Script used to embed color profiles in our image resources
#/usr/bin/python ${SRCROOT}/MyFramework/Scripts/embed-color-profiles-in-artwork.py
```

☑ Show environment variables in build log

☐ Run script only when installing

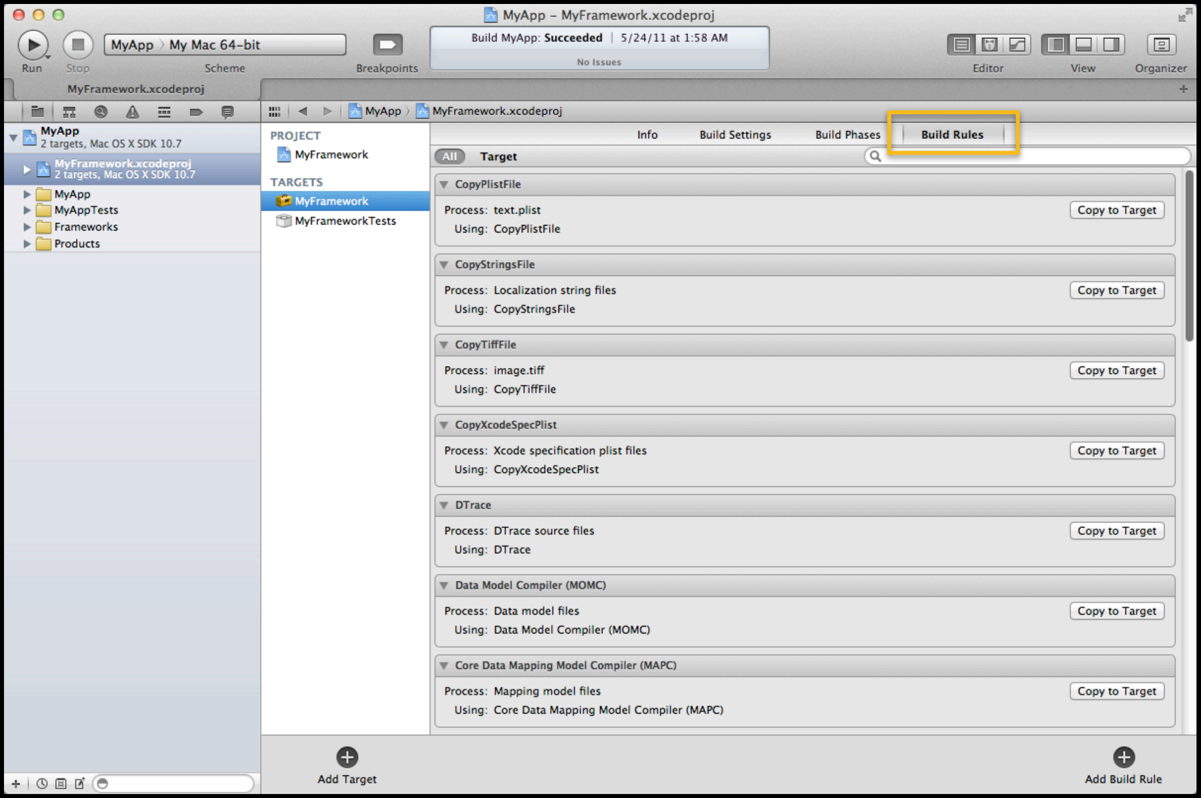
Input Files

Add input files here

Output Files

Add output files here

Build Rules



CopyPlistFile
Process: text.plist
Using: CopyPlistFile
Copy to Target

CopyStringsFile
Process: Localization string files
Using: CopyStringsFile
Copy to Target

CopyTiffFile
Process: image.tiff
Using: CopyTiffFile
Copy to Target

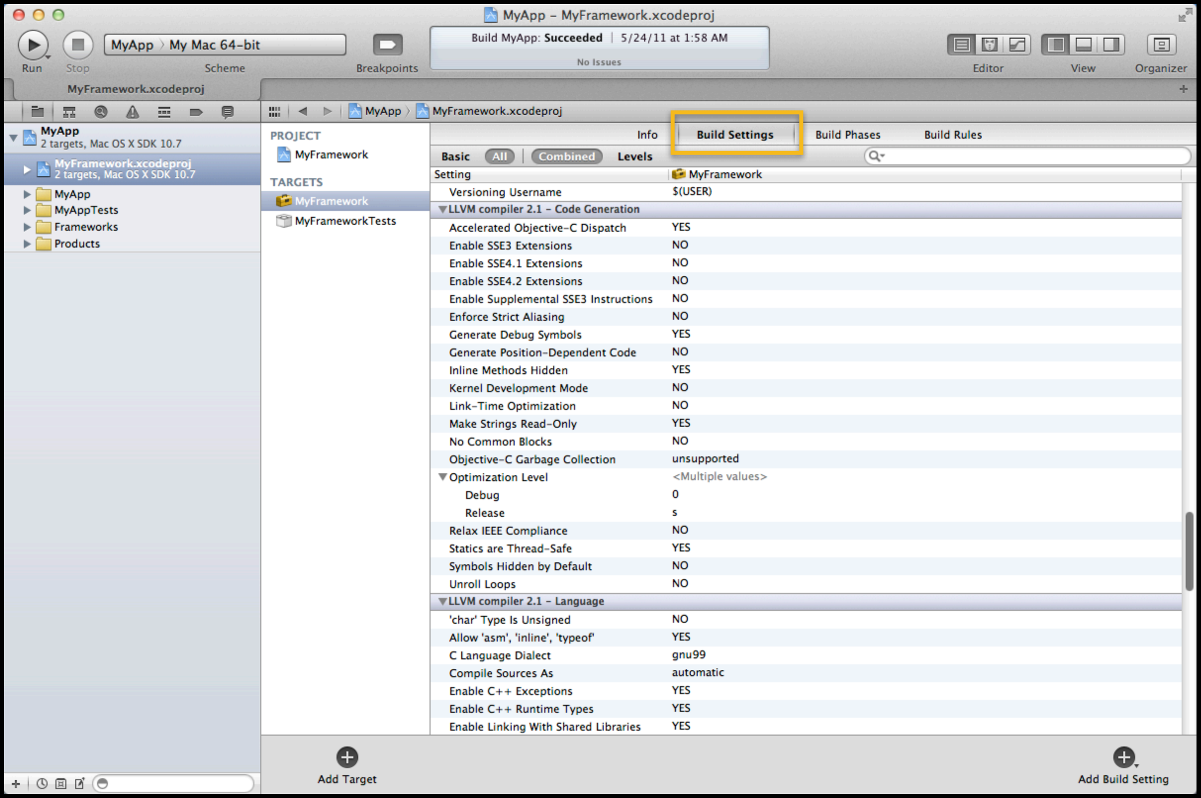
CopyXcodeSpecPlist
Process: Xcode specification plist files
Using: CopyXcodeSpecPlist
Copy to Target

DTrace
Process: DTrace source files
Using: DTrace
Copy to Target

Data Model Compiler (MOMC)
Process: Data model files
Using: Data Model Compiler (MOMC)
Copy to Target

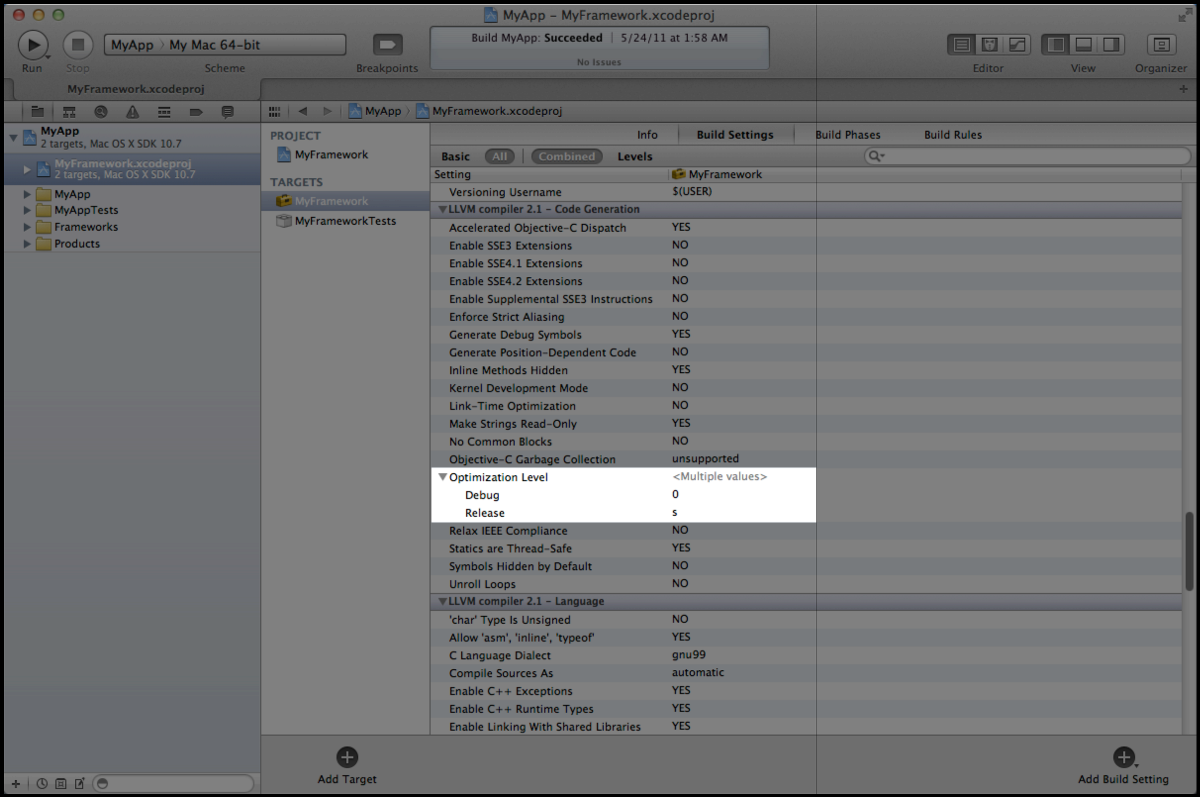
Core Data Mapping Model Compiler (MAPC)
Process: Mapping model files
Using: Core Data Mapping Model Compiler (MAPC)
Copy to Target

Build Settings



Setting	MyFramework
Versioning Username	$(USER)
▼LLVM compiler 2.1 – Code Generation	
Accelerated Objective-C Dispatch	YES
Enable SSE3 Extensions	NO
Enable SSE4.1 Extensions	NO
Enable SSE4.2 Extensions	NO
Enable Supplemental SSE3 Instructions	NO
Enforce Strict Aliasing	NO
Generate Debug Symbols	YES
Generate Position-Dependent Code	NO
Inline Methods Hidden	YES
Kernel Development Mode	NO
Link-Time Optimization	NO
Make Strings Read-Only	YES
No Common Blocks	NO
Objective-C Garbage Collection	unsupported
▼Optimization Level	<Multiple values>
Debug	0
Release	s
Relax IEEE Compliance	NO
Statics are Thread-Safe	YES
Symbols Hidden by Default	NO
Unroll Loops	NO
▼LLVM compiler 2.1 – Language	
'char' Type Is Unsigned	NO
Allow 'asm', 'inline', 'typeof'	YES
C Language Dialect	gnu99
Compile Sources As	automatic
Enable C++ Exceptions	YES
Enable C++ Runtime Types	YES
Enable Linking With Shared Libraries	YES

Build Settings



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Generate Debug Symbols	YES
Generate Position-Dependent Code	NO
Inline Methods Hidden	YES
Kernel Development Mode	NO
Link-Time Optimization	NO
Make Strings Read-Only	YES
No Common Blocks	NO
Objective-C Garbage Collection	unsupported
▼Optimization Level	<Multiple values>
Debug	0
Release	s
Relax IEEE Compliance	NO
Statics are Thread-Safe	YES
Symbols Hidden by Default	NO
Unroll Loops	NO
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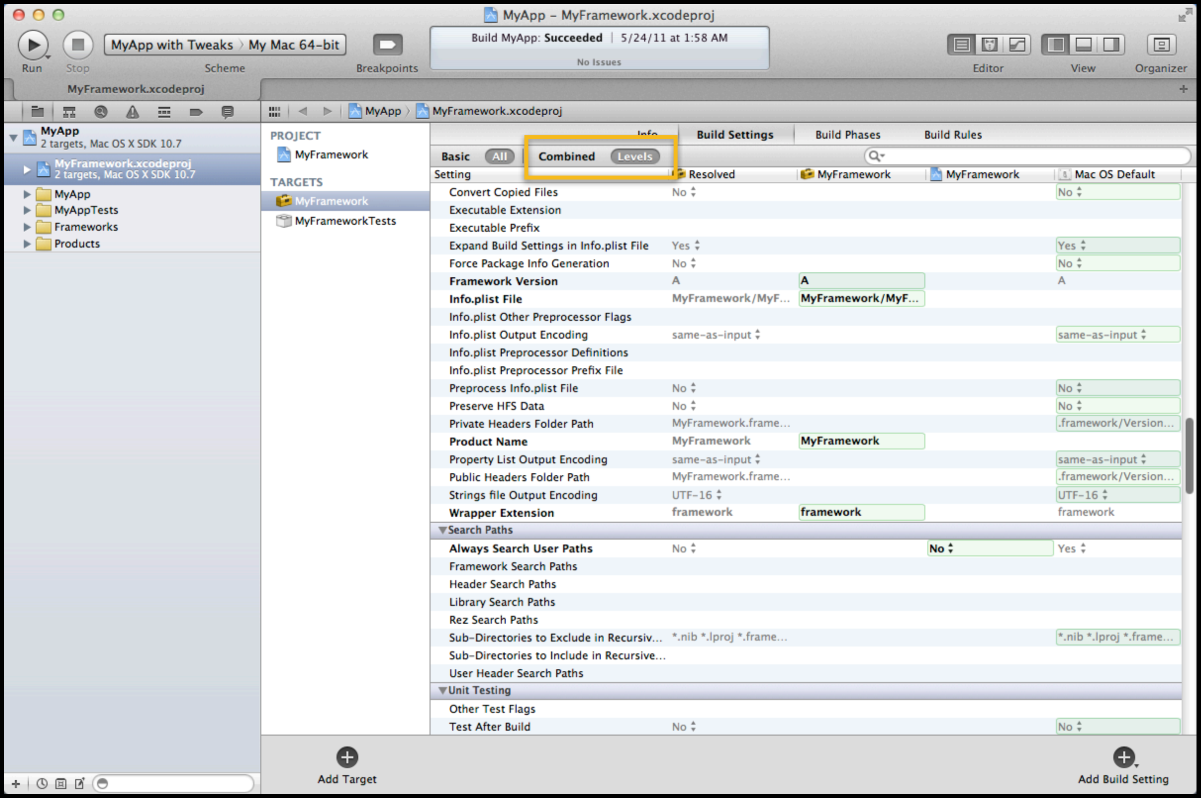
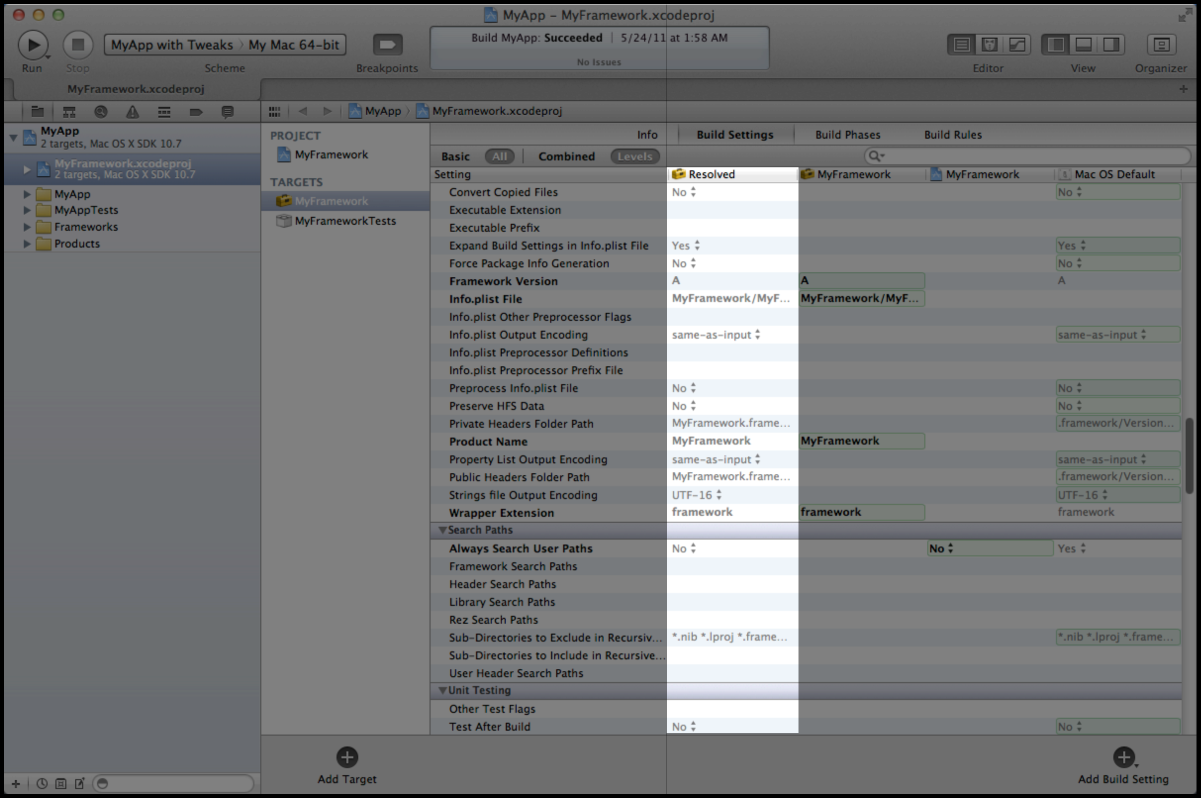


Setting	Resolved	MyFramework	MyFramework	Mac OS Default
Convert Copied Files	No			No
Executable Extension				
Executable Prefix				
Expand Build Settings in Info.plist File	Yes			Yes
Force Package Info Generation	No			No
Framework Version	A	**A**		A
Info.plist File	MyFramework/MyF...	**MyFramework/MyF...**		
Info.plist Other Preprocessor Flags				
Info.plist Output Encoding	same-as-input			same-as-input
Info.plist Preprocessor Definitions				
Info.plist Preprocessor Prefix File				
Preprocess Info.plist File	No			No
Preserve HFS Data	No			No
Private Headers Folder Path	MyFramework.frame...			.framework/Version...
Product Name	MyFramework	**MyFramework**		
Property List Output Encoding	same-as-input			same-as-input
Public Headers Folder Path	MyFramework.frame...			.framework/Version...
Strings file Output Encoding	UTF-16			UTF-16
Wrapper Extension	framework	**framework**		framework
▼Search Paths				
Always Search User Paths	No		**No**	Yes
Framework Search Paths				
Header Search Paths				
Library Search Paths				
Rez Search Paths				
Sub-Directories to Exclude in Recursiv...	*.nib *.lproj *.frame...			*.nib *.lproj *.frame...
Sub-Directories to Include in Recursive...				
User Header Search Paths				
▼Unit Testing				
Other Test Flags				
Test After Build	No			No

Build Settings



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Strings file Output Encoding	UTF-16			UTF-16
Wrapper Extension	framework	**framework**		framework
▼Search Paths				
Always Search User Paths	No		**No**	Yes
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Header Search Paths				
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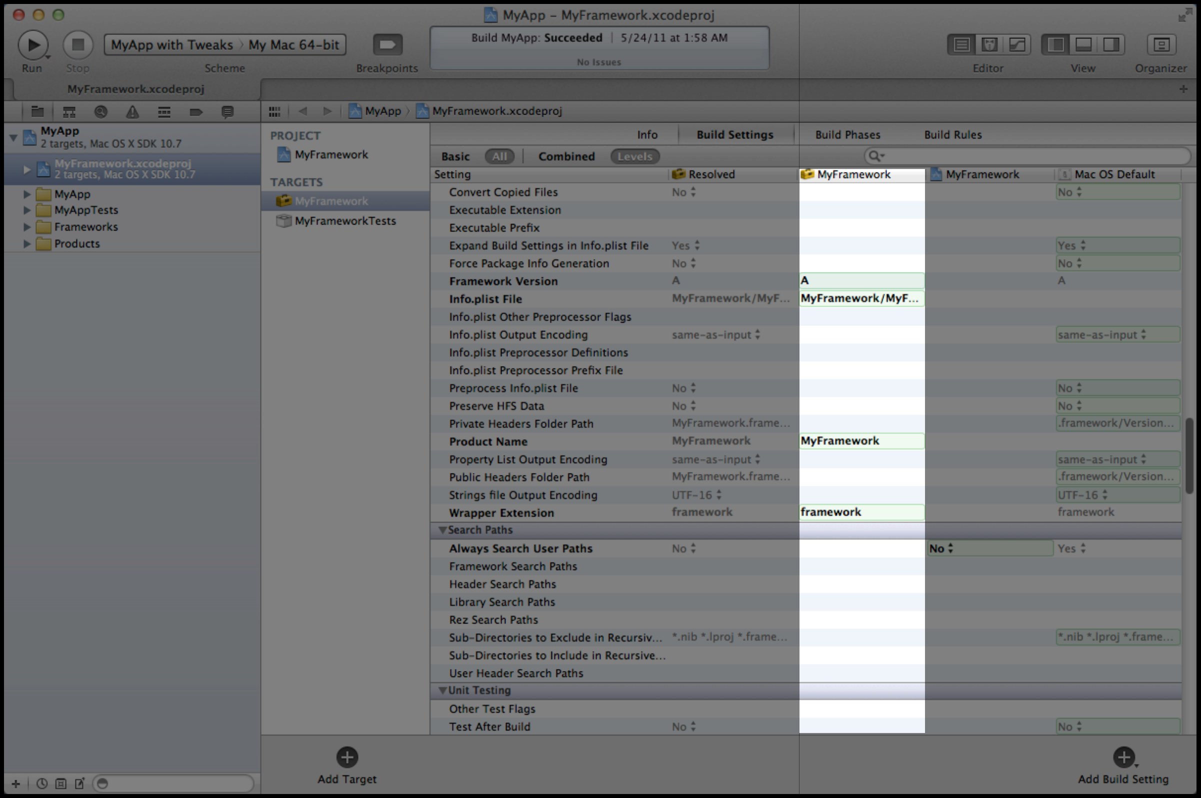
Build Settings



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Info.plist Preprocessor Prefix File				
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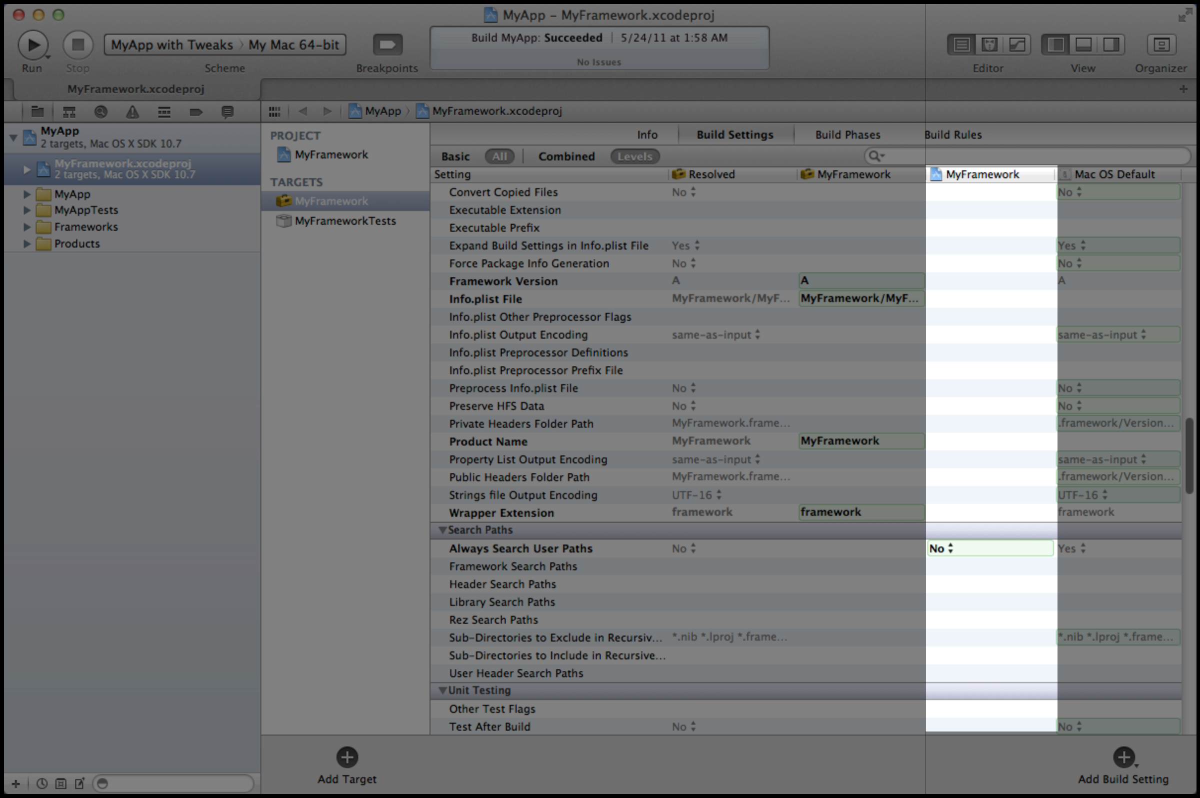

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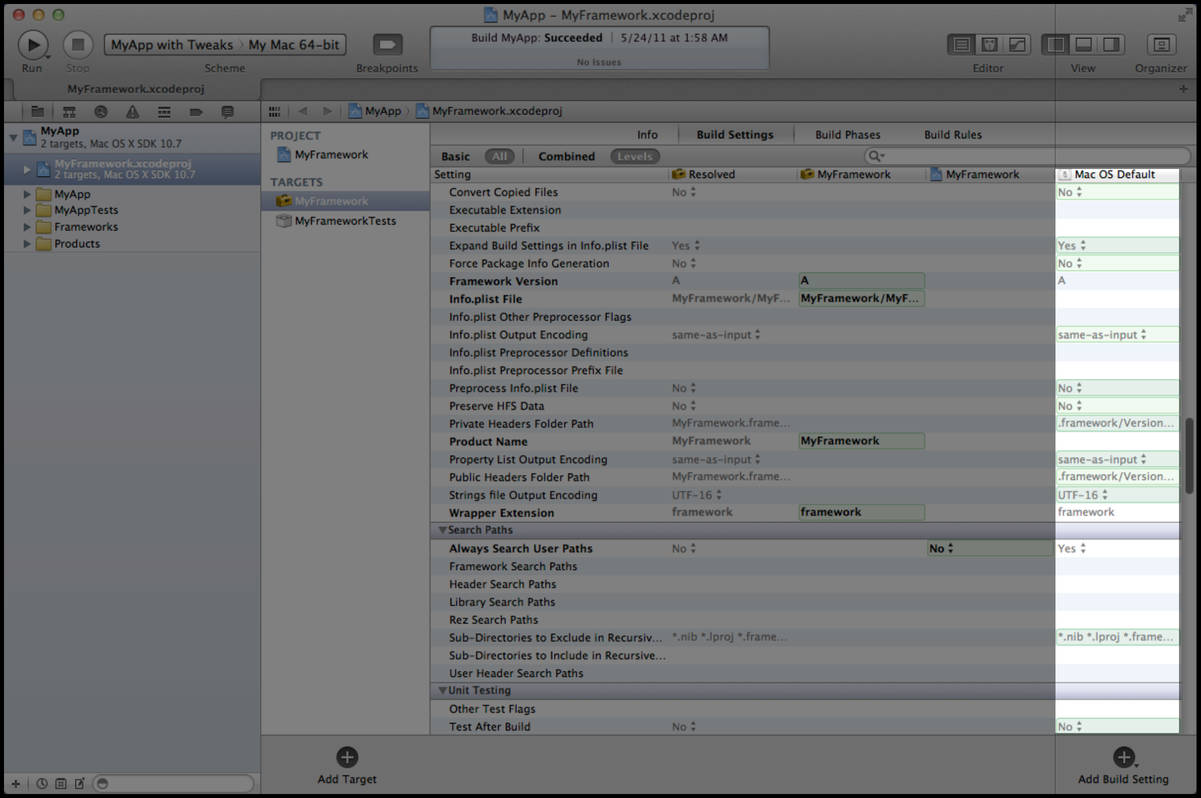

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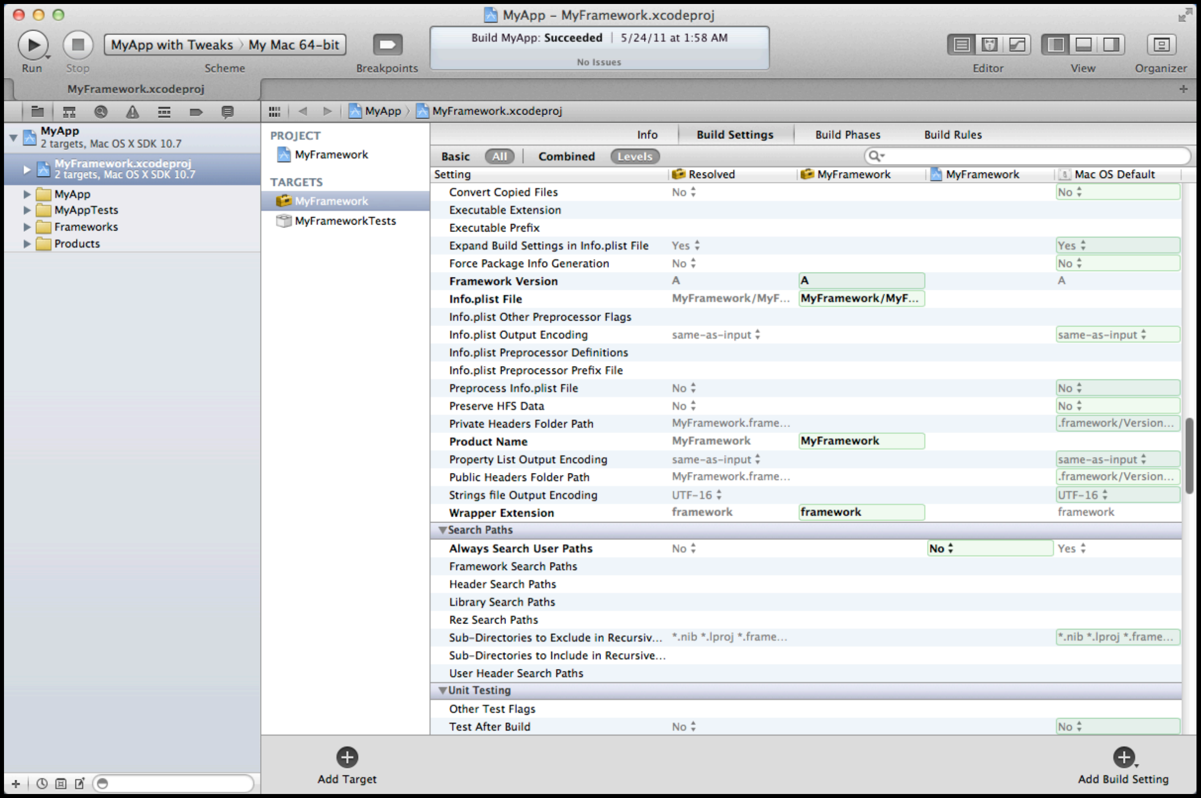

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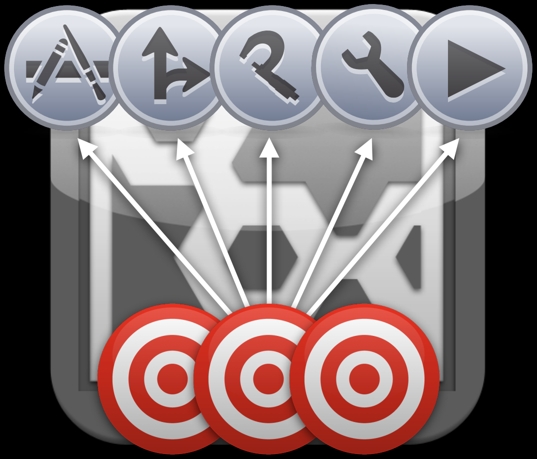
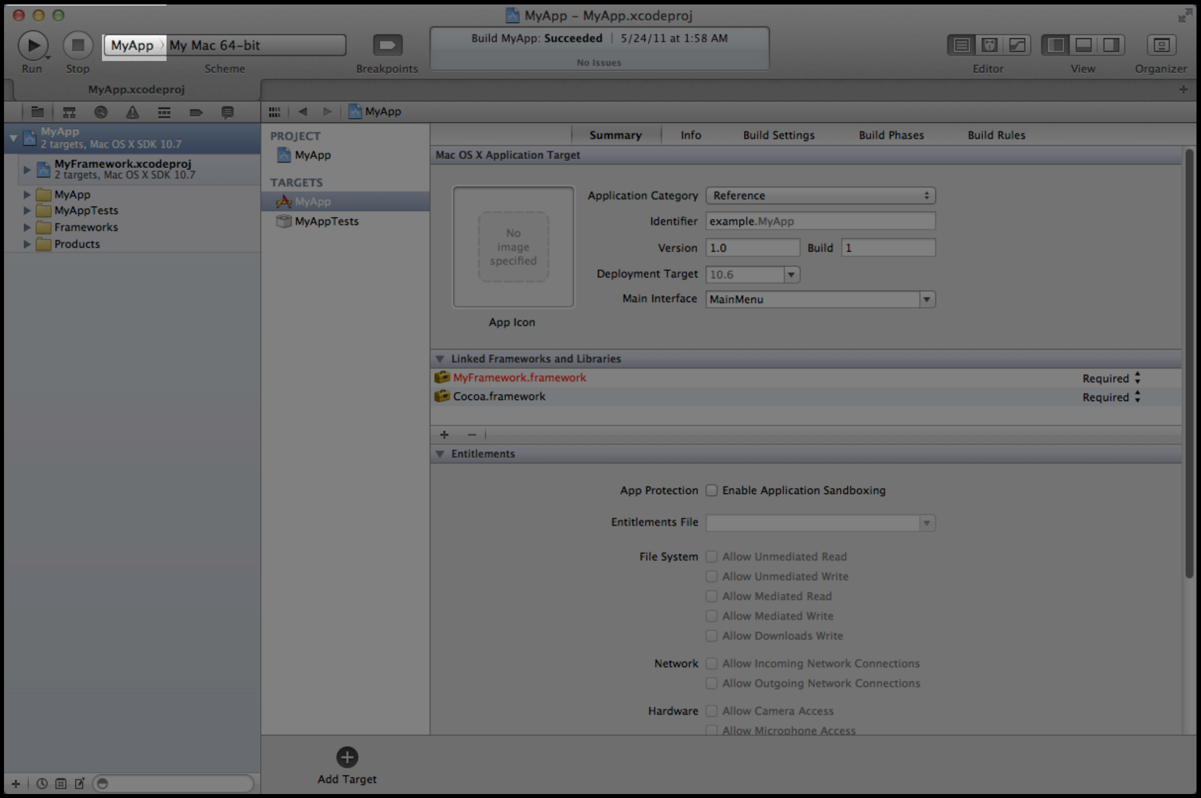
What’s in a Scheme?

Instructions for building targets and performing actions



- Actions for running, testing, profiling, analyzing, and archiving products
- A specification of targets to build for each action

Schemes



Build MyApp: **Succeeded** | 5/24/11 at 1:58 AM

No Issues

MyApp
2 targets, Mac OS X SDK 10.7

MyFramework.xcodeproj
2 targets, Mac OS X SDK 10.7

- MyApp
- MyAppTests
- Frameworks
- Products

Mac OS X Application Target

Application Category: Reference
Identifier: example.MyApp
Version: 1.0 Build: 1
Deployment Target: 10.6
Main Interface: MainMenu

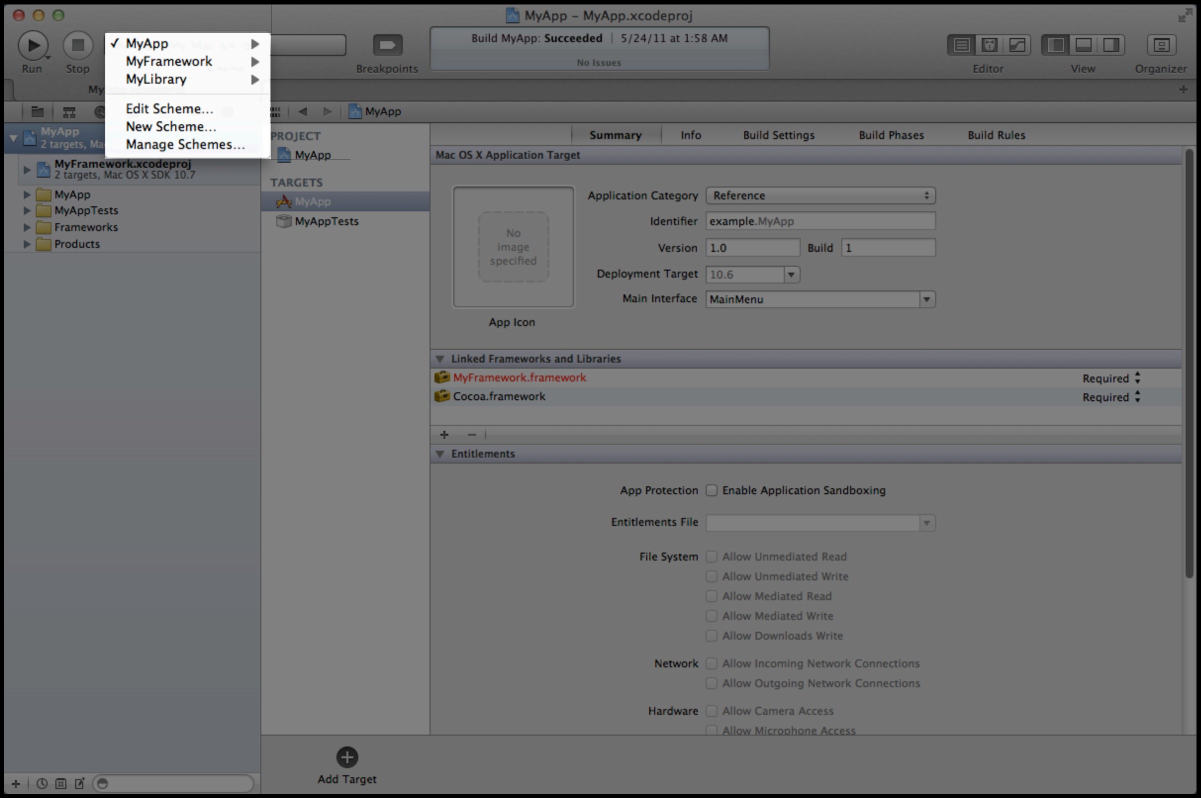
Linked Frameworks and Libraries

MyFramework.framework	Required
Cocoa.framework	Required

Entitlements

App Protection: ☐ Enable Application Sandboxing
Entitlements File:
File System: ☐ Allow Unmediated Read
☐ Allow Unmediated Write
☐ Allow Mediated Read
☐ Allow Mediated Write
☐ Allow Downloads Write
Network: ☐ Allow Incoming Network Connections
☐ Allow Outgoing Network Connections
Hardware: ☐ Allow Camera Access
☐ Allow Microphone Access

Schemes



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Mac OS X Application Target

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Main Interface	MainMenu

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	☐ Allow Downloads Write
Network	☐ Allow Incoming Network Connections
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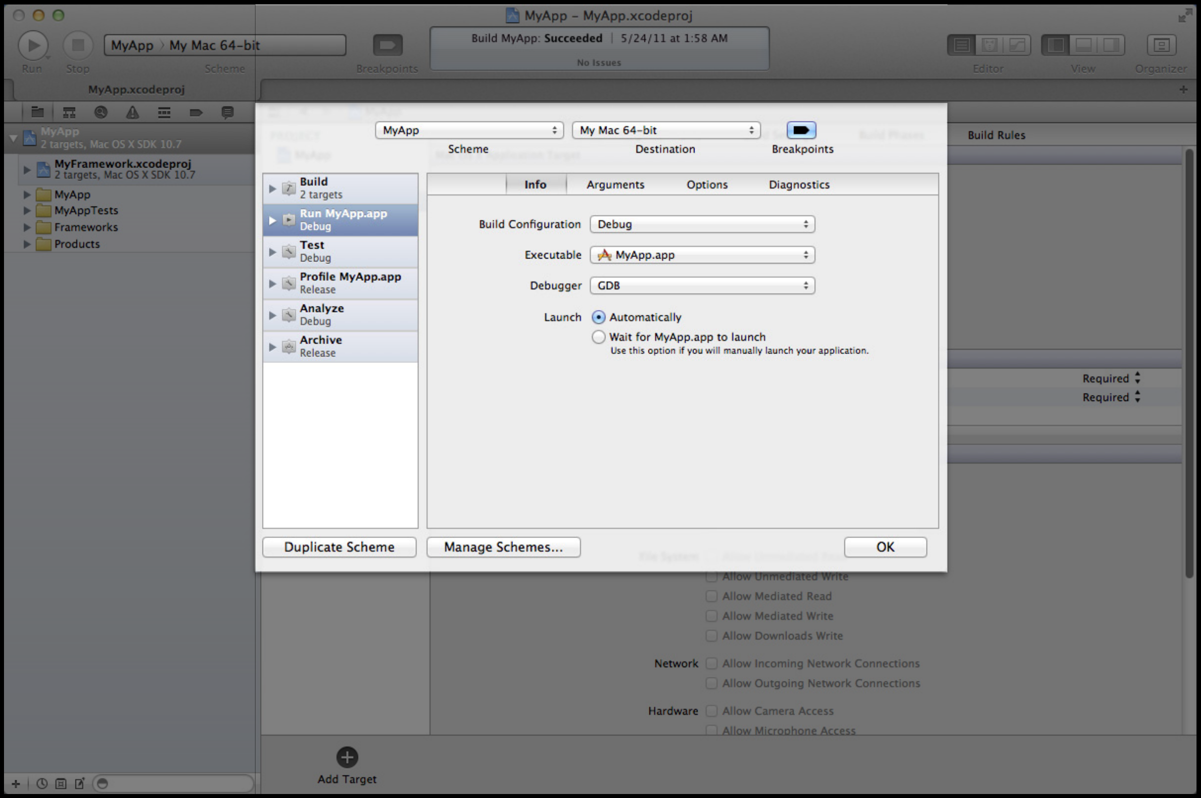
	☐ Allow Microphone Access

Schemes



MyApp – MyApp.xcodeproj

Build MyApp: Succeeded | 5/24/11 at 1:58 AM

No Issues

Scheme: MyApp

Destination: My Mac 64-bit

Breakpoints

Build – 2 targets
Run MyApp.app – Debug
Test – Debug
Profile MyApp.app – Release
Analyze – Debug
Archive – Release

Info | Arguments | Options | Diagnostics

Build Configuration: Debug

Executable: MyApp.app

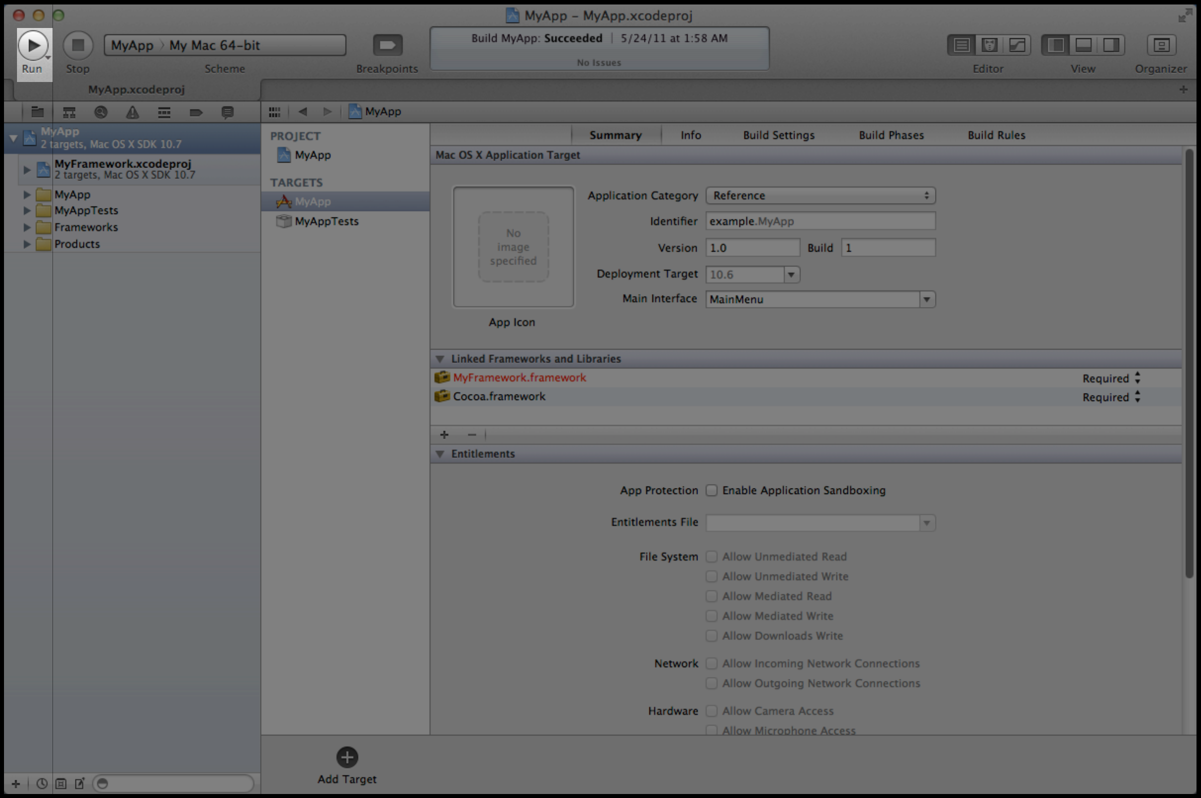
Debugger: GDB

Launch: (●) Automatically ( ) Wait for MyApp.app to launch

Use this option if you will manually launch your application.

Duplicate Scheme | Manage Schemes... | OK

Schemes



MyApp – MyApp.xcodeproj

MyApp › My Mac 64-bit

Build MyApp: Succeeded | 5/24/11 at 1:58 AM

No Issues

MyApp.xcodeproj

MyApp
2 targets, Mac OS X SDK 10.7

MyFramework.xcodeproj
2 targets, Mac OS X SDK 10.7

MyApp
MyAppTests
Frameworks
Products

PROJECT
MyApp

TARGETS
MyApp
MyAppTests

Mac OS X Application Target

No image specified

App Icon

Application Category	Reference
Identifier	example.MyApp
Version	1.0
Build	1
Deployment Target	10.6
Main Interface	MainMenu

Linked Frameworks and Libraries

MyFramework.framework	Required
Cocoa.framework	Required

Entitlements

App Protection: Enable Application Sandboxing

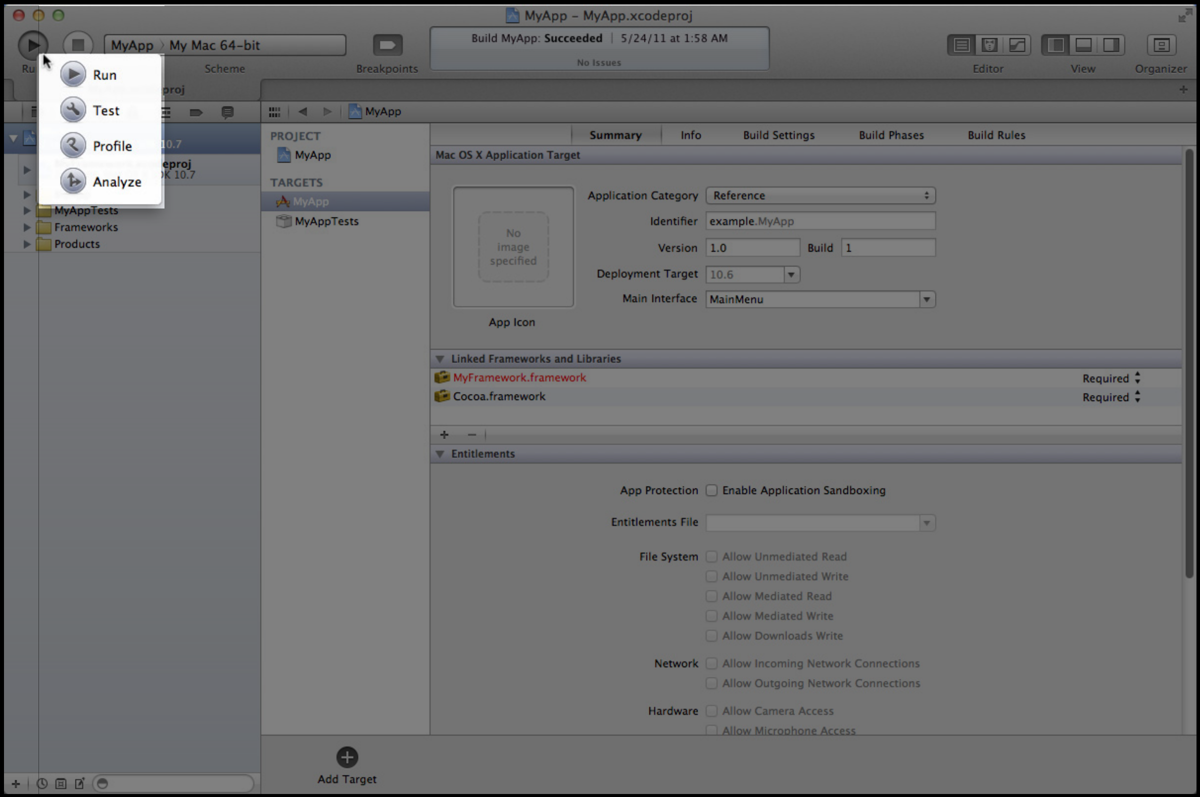
Entitlements File

File System: Allow Unmediated Read, Allow Unmediated Write, Allow Mediated Read, Allow Mediated Write, Allow Downloads Write

Network: Allow Incoming Network Connections, Allow Outgoing Network Connections

Hardware: Allow Camera Access, Allow Microphone Access

Schemes



Build MyApp: Succeeded | 5/24/11 at 1:58 AM

No Issues

Mac OS X Application Target

Application Category: Reference

Identifier: example.MyApp

Version: 1.0 Build: 1

Deployment Target: 10.6

Main Interface: MainMenu

Linked Frameworks and Libraries

MyFramework.framework	Required
Cocoa.framework	Required

Entitlements

App Protection: Enable Application Sandboxing

Entitlements File

File System: Allow Unmediated Read, Allow Unmediated Write, Allow Mediated Read, Allow Mediated Write, Allow Downloads Write

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Hardware: Allow Camera Access, Allow Microphone Access

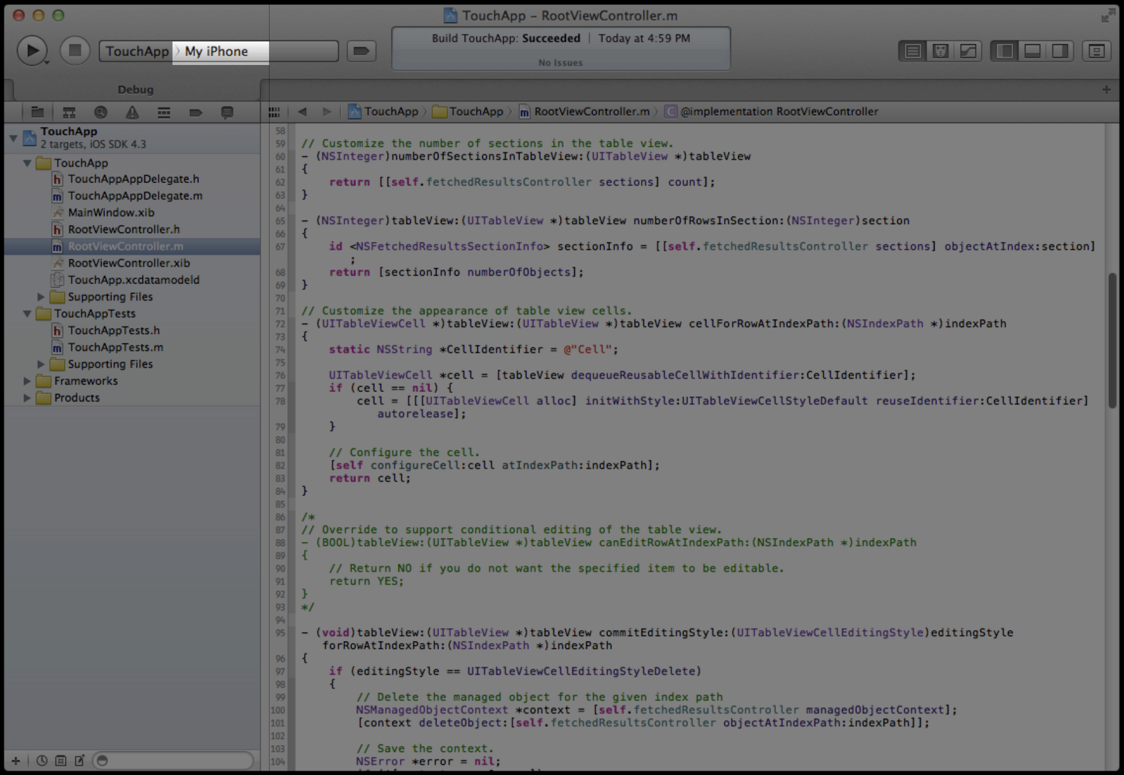
Project Concepts

- Workspaces
- Projects
  - Build configurations
- Targets
  - Build settings
  - Build phases
  - Build rules
- Schemes
- Run destinations

What Is a Run Destination?

- The platform and SDK you want to build for
- The device you want to run on
- On the Mac—architecture you want to target

Run Destinations



```
// Customize the number of sections in the table view.
- (NSInteger)numberOfSectionsInTableView:(UITableView *)tableView
{
    return [[self.fetchedResultsController sections] count];
}

- (NSInteger)tableView:(UITableView *)tableView numberOfRowsInSection:(NSInteger)section
{
    id <NSFetchedResultsSectionInfo> sectionInfo = [[self.fetchedResultsController sections] objectAtIndex:section]
       ;
    return [sectionInfo numberOfObjects];
}

// Customize the appearance of table view cells.
- (UITableViewCell *)tableView:(UITableView *)tableView cellForRowAtIndexPath:(NSIndexPath *)indexPath
{
    static NSString *CellIdentifier = @"Cell";

    UITableViewCell *cell = [tableView dequeueReusableCellWithIdentifier:CellIdentifier];
    if (cell == nil) {
        cell = [[[UITableViewCell alloc] initWithStyle:UITableViewCellStyleDefault reuseIdentifier:CellIdentifier]
           autorelease];
    }

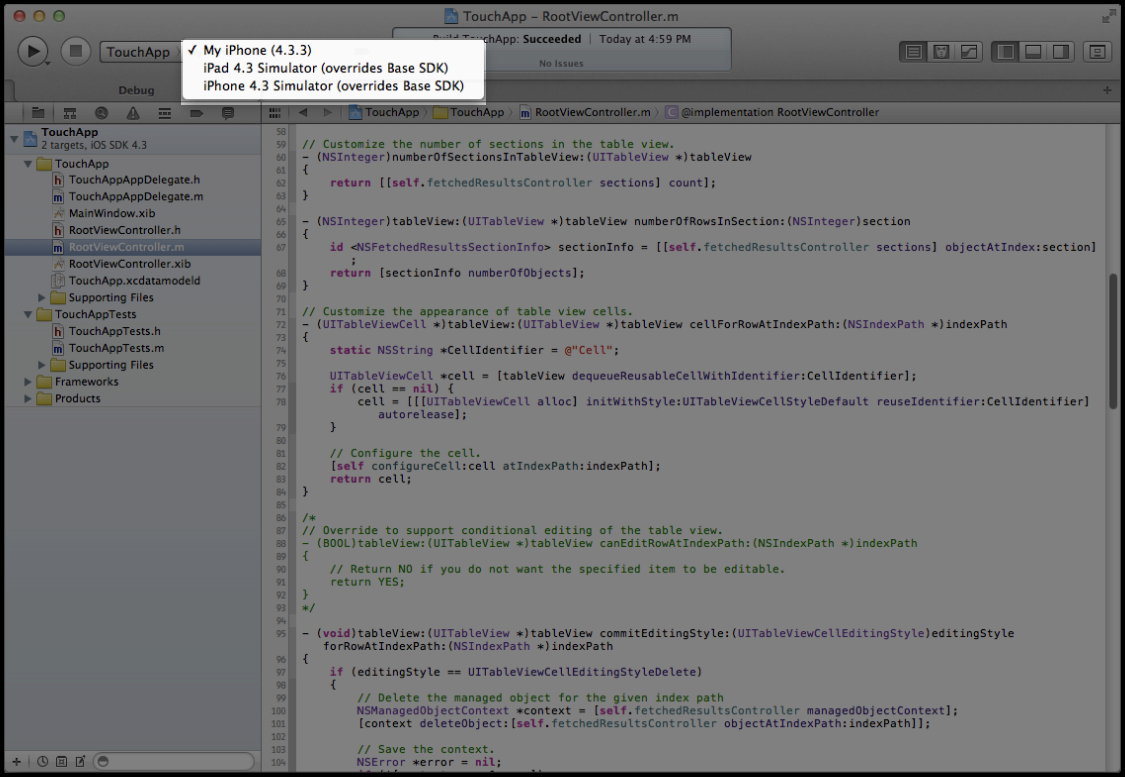
    // Configure the cell.
    [self configureCell:cell atIndexPath:indexPath];
    return cell;
}

/*
// Override to support conditional editing of the table view.
- (BOOL)tableView:(UITableView *)tableView canEditRowAtIndexPath:(NSIndexPath *)indexPath
{
    // Return NO if you do not want the specified item to be editable.
    return YES;
}
*/

- (void)tableView:(UITableView *)tableView commitEditingStyle:(UITableViewCellEditingStyle)editingStyle
   forRowAtIndexPath:(NSIndexPath *)indexPath
{
    if (editingStyle == UITableViewCellEditingStyleDelete)
    {
        // Delete the managed object for the given index path
        NSManagedObjectContext *context = [self.fetchedResultsController managedObjectContext];
        [context deleteObject:[self.fetchedResultsController objectAtIndexPath:indexPath]];

        // Save the context.
        NSError *error = nil;
```

Run Destinations



```
// Customize the number of sections in the table view.
- (NSInteger)numberOfSectionsInTableView:(UITableView *)tableView
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{
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    {
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What Is a Run Destination?

- The platform and SDK you want to build for
- The device you want to run on
- On the Mac—architecture you want to target

What Is a Run Destination?

- The platform and SDK you want to build for
  - Choose among those in platforms compatible with your targets' Base SDK, Supported Platforms, and Deployment Target
- The device you want to run on
- On the Mac—architecture you want to target

What Is a Run Destination?

- The platform and SDK you want to build for
  - Choose among those in platforms compatible with your targets' Base SDK, Supported Platforms, and Deployment Target
- The device you want to run on
  - Choose among plugged-in devices configured for development, available simulators, and the local Mac
  - Only devices compatible with the targets' SDK are available
- On the Mac—architecture you want to target

What Is a Run Destination?

- The platform and SDK you want to build for
  - Choose among those in platforms compatible with your targets' Base SDK, Supported Platforms, and Deployment Target
- The device you want to run on
  - Choose among plugged-in devices configured for development, available simulators, and the local Mac
  - Only devices compatible with the targets' SDK are available
- On the Mac—architecture you want to target
  - Choose among those specified in your targets' Architectures
  - Only architectures compatible with the local Mac

Scheme Actions

Schemes Support Five Actions

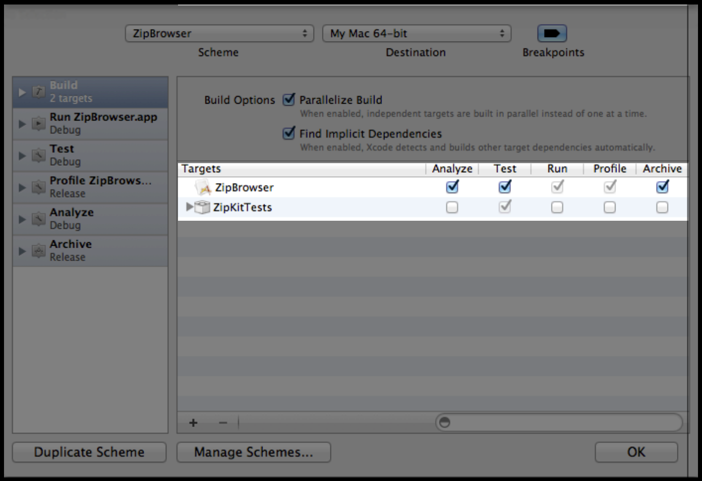
- Run
- Test
- Profile
- Analyze
- Archive

A Scheme Builds Targets

Building is not an action itself, it is a step performed before each action

- You always build with a purpose
- The action to perform affects how you build: which targets and which configuration
- The default "build" command builds for the run action

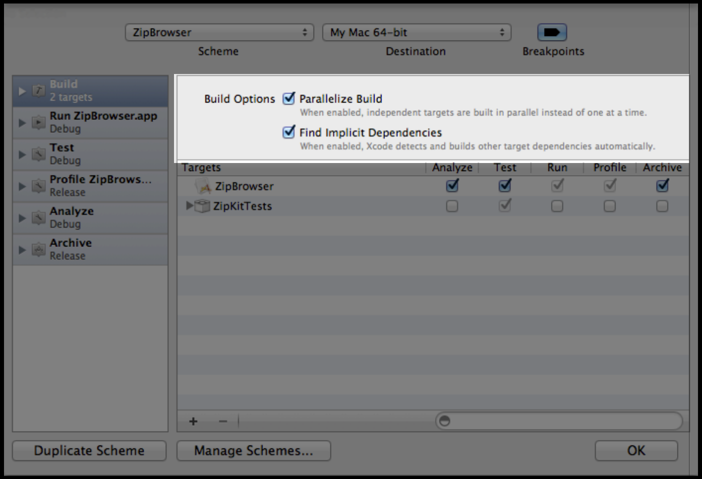
Building



Build Options ✓ Parallelize Build
When enabled, independent targets are built in parallel instead of one at a time.
✓ Find Implicit Dependencies
When enabled, Xcode detects and builds other target dependencies automatically.

Targets	Analyze	Test	Run	Profile	Archive
ZipBrowser	✓	✓	✓	✓	✓
ZipKitTests	☐	✓	☐	☐	☐

Building



Build Options [✓ Parallelize Build]
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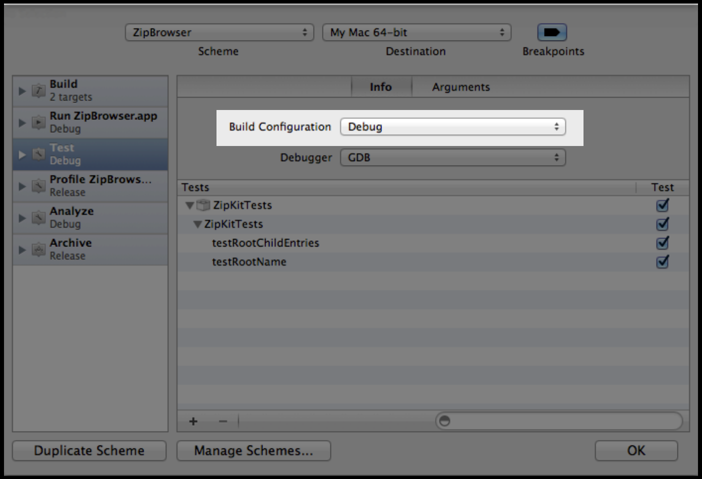
When enabled, Xcode detects and builds other target dependencies automatically.

Targets	Analyze	Test	Run	Profile	Archive
ZipBrowser	✓	✓	✓	✓	✓
ZipKitTests	☐	✓	☐	☐	☐

Scheme Action Build Configuration



Build Configuration: Debug

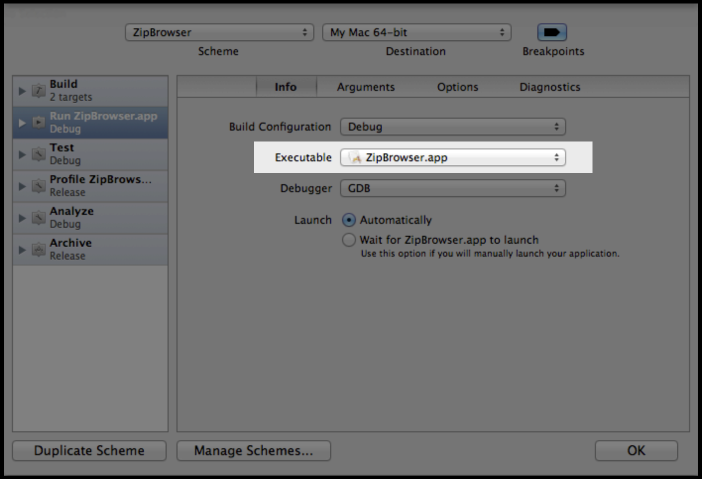
Debugger: GDB

```
ZipKitTests
  ZipKitTests
    testRootChildEntries
    testRootName
```

The Five Scheme Actions

- Run
- Test
- Profile
- Analyze
- Archive

Configuring the Run Action



Build Configuration: Debug

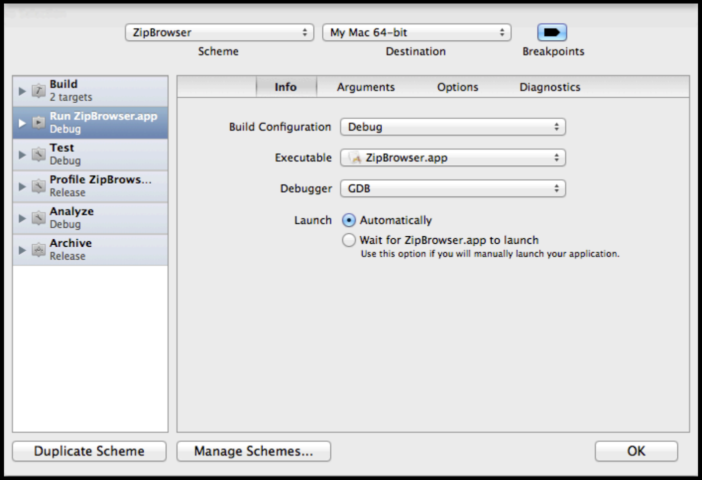
Executable: ZipBrowser.app

Debugger: GDB

Launch: [✓ Automatically] Wait for ZipBrowser.app to launch

Use this option if you will manually launch your application.

Configuring the Run Action



Build Configuration: Debug

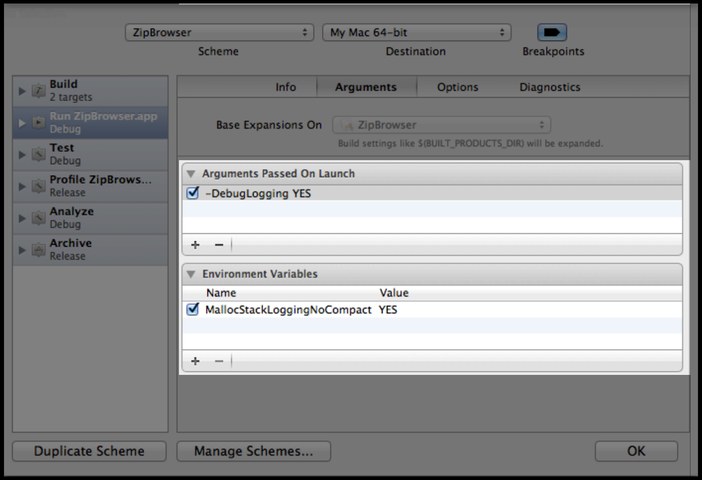
Executable: ZipBrowser.app

Debugger: GDB

Launch: [✓ Automatically] Wait for ZipBrowser.app to launch

Use this option if you will manually launch your application.

Run Action Arguments



Base Expansions On: ZipBrowser

Build settings like $(BUILT_PRODUCTS_DIR) will be expanded.

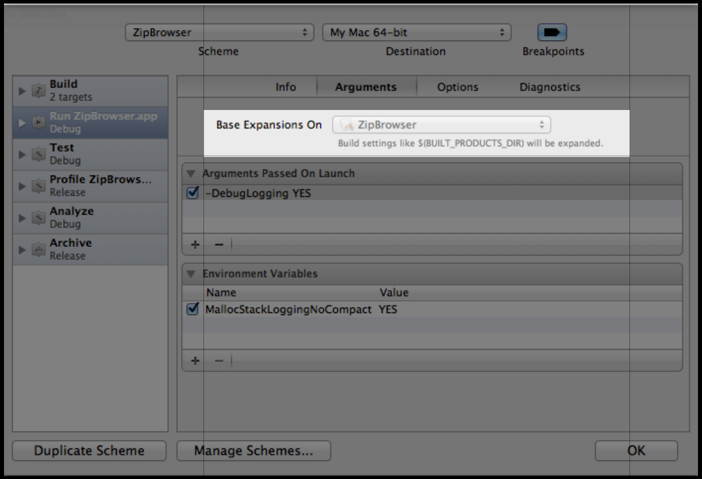
Arguments Passed On Launch

- [✓] -DebugLogging YES

Environment Variables

Name	Value
[✓] MallocStackLoggingNoCompact	YES

Run Action Arguments



Base Expansions On: ZipBrowser

Build settings like $(BUILT_PRODUCTS_DIR) will be expanded.

Arguments Passed On Launch

- ✓ -DebugLogging YES

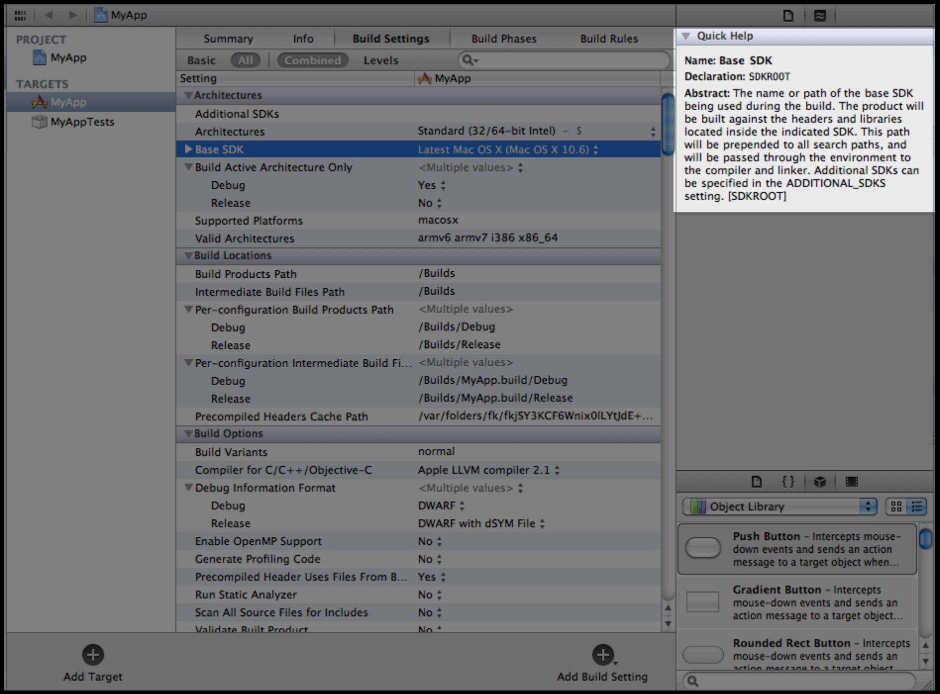
Environment Variables

	Name	Value
✓	MallocStackLoggingNoCompact	YES

Build Setting References

- Every build setting has an all-caps raw name
- Reference setting values with ${SETTING_NAME}

Build Setting References



MyApp

PROJECT
MyApp

TARGETS
MyApp
MyAppTests

Summary | Info | Build Settings | Build Phases | Build Rules

Basic | All | Combined | Levels

Setting	MyApp
▼ Architectures	
Additional SDKs	
Architectures	Standard (32/64-bit Intel) – $
▶ Base SDK	Latest Mac OS X (Mac OS X 10.6)
▼ Build Active Architecture Only	<Multiple values>
Debug	Yes
Release	No
Supported Platforms	macosx
Valid Architectures	armv6 armv7 i386 x86_64
▼ Build Locations	
Build Products Path	/Builds
Intermediate Build Files Path	/Builds
▼ Per-configuration Build Products Path	<Multiple values>
Debug	/Builds/Debug
Release	/Builds/Release
▼ Per-configuration Intermediate Build Fi...	<Multiple values>
Debug	/Builds/MyApp.build/Debug
Release	/Builds/MyApp.build/Release
Precompiled Headers Cache Path	/var/folders/fk/fkjSY3KCF6Wnix0lLYtJdE+...
▼ Build Options	
Build Variants	normal
Compiler for C/C++/Objective-C	Apple LLVM compiler 2.1
▼ Debug Information Format	<Multiple values>
Debug	DWARF
Release	DWARF with dSYM File
Enable OpenMP Support	No
Generate Profiling Code	No
Precompiled Header Uses Files From B...	Yes
Run Static Analyzer	No
Scan All Source Files for Includes	No
Validate Built Product	No

Add Target | Add Build Setting

Quick Help

Name: Base SDK
Declaration: SDKROOT
Abstract: The name or path of the base SDK being used during the build. The product will be built against the headers and libraries located inside the indicated SDK. This path will be prepended to all search paths, and will be passed through the environment to the compiler and linker. Additional SDKs can be specified in the ADDITIONAL_SDKS setting. [SDKROOT]

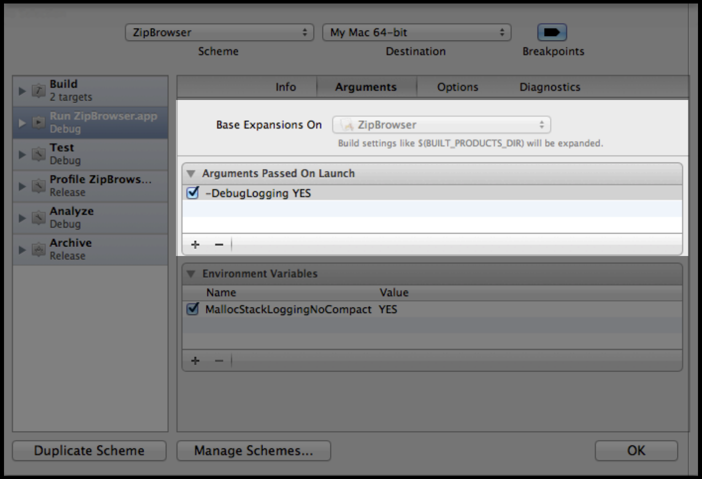
Object Library

Push Button – Intercepts mouse-down events and sends an action message to a target object when...

Gradient Button – Intercepts mouse-down events and sends an action message to a target object...

Rounded Rect Button – Intercepts mouse-down events and sends an

Run Action Arguments



Scheme: ZipBrowser
Destination: My Mac 64-bit

Base Expansions On: ZipBrowser
Build settings like $(BUILT_PRODUCTS_DIR) will be expanded.

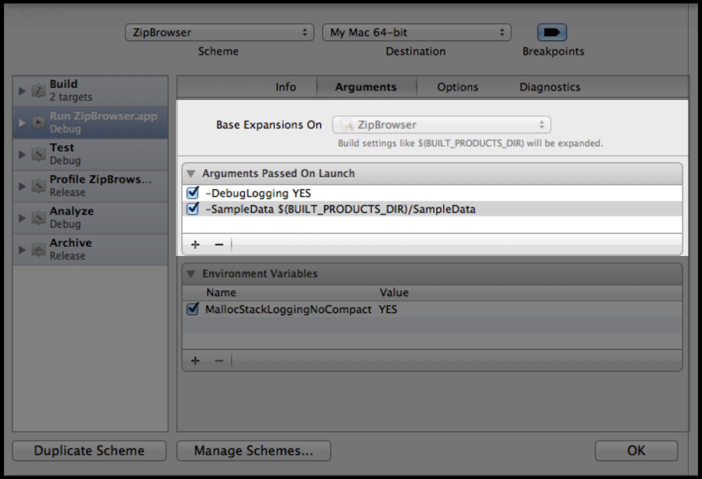
Arguments Passed On Launch

- [✓] -DebugLogging YES

Environment Variables

	Name	Value
✓	MallocStackLoggingNoCompact	YES

Run Action Arguments



Base Expansions On: ZipBrowser

Build settings like $(BUILT_PRODUCTS_DIR) will be expanded.

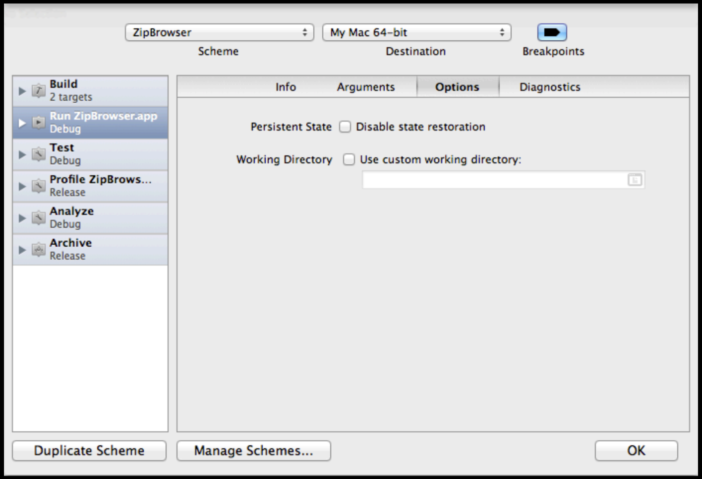
Arguments Passed On Launch

- [✓] -DebugLogging YES
- [✓] -SampleData $(BUILT_PRODUCTS_DIR)/SampleData

Environment Variables

	Name	Value
✓	MallocStackLoggingNoCompact	YES

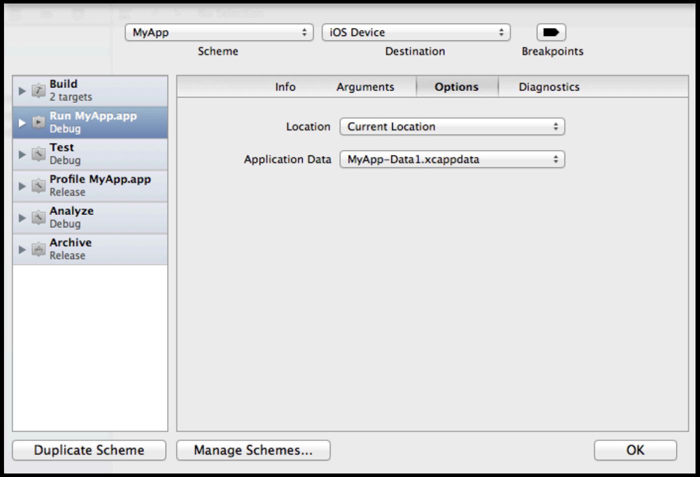
Run Action Options



Persistent State ☐ Disable state restoration

Working Directory ☐ Use custom working directory:

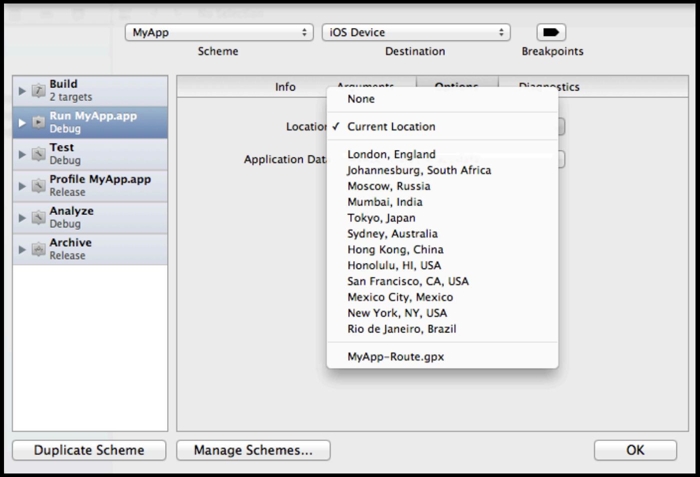
Run Action Options



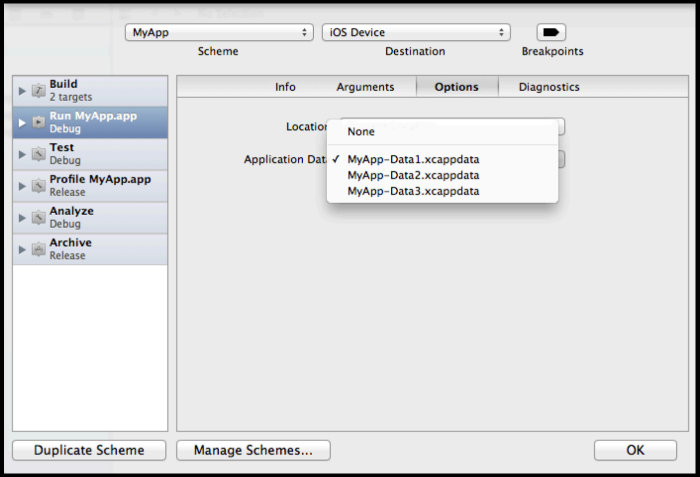
Location: Current Location

Application Data: MyApp-Data1.xcappdata

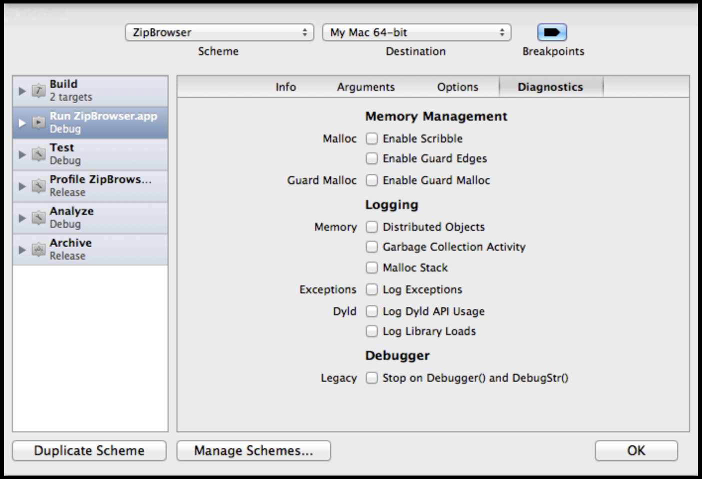
Run Action Options



Run Action Options



Run Action Diagnostics



Memory Management

Malloc ☐ Enable Scribble
☐ Enable Guard Edges
Guard Malloc ☐ Enable Guard Malloc

Logging

Memory ☐ Distributed Objects
☐ Garbage Collection Activity
☐ Malloc Stack
Exceptions ☐ Log Exceptions
Dyld ☐ Log Dyld API Usage
☐ Log Library Loads

Debugger

Legacy ☐ Stop on Debugger() and DebugStr()

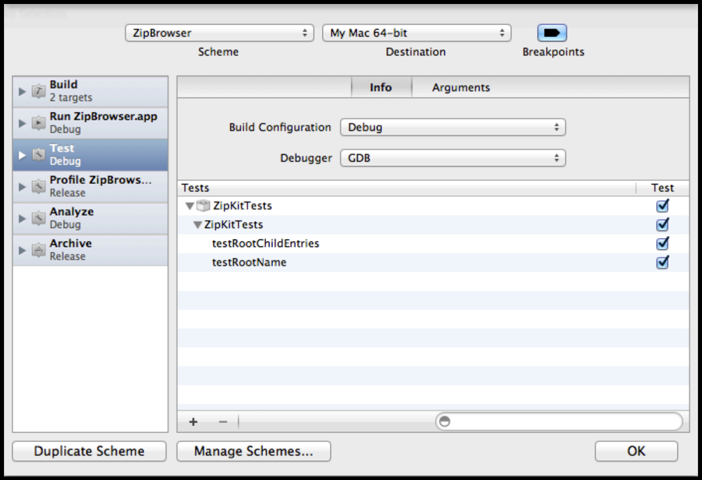
The Five Scheme Actions

- Run
- Test
- Profile
- Analyze
- Archive

The Test Action

- Xcode natively supports the OCUnit Objective-C Testing Framework
  - Tests are written in Objective-C, but can test C++ code too
- Tests run in the debugger automatically
- Test failures show up in the issues navigator and test log

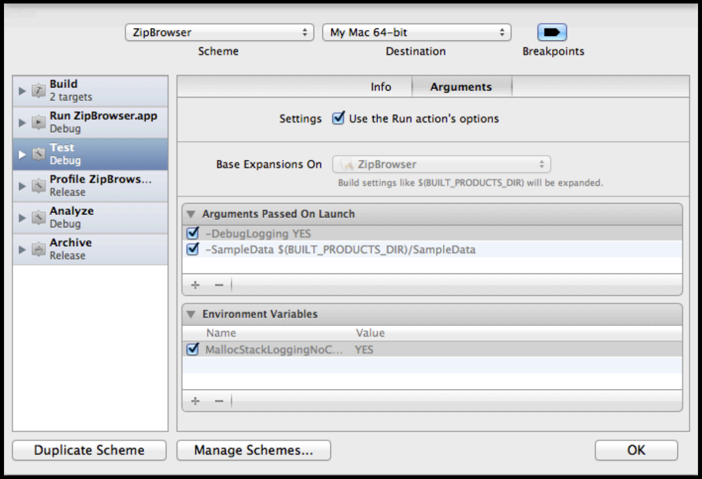
Configuring the Test Action



Build Configuration: Debug
Debugger: GDB

Tests	Test
ZipKitTests	✓
ZipKitTests	✓
testRootChildEntries	✓
testRootName	✓

Test Action Arguments



Settings ☑ Use the Run action's options

Base Expansions On: ZipBrowser

Build settings like $(BUILT_PRODUCTS_DIR) will be expanded.

Arguments Passed On Launch

☑ -DebugLogging YES

☑ -SampleData $(BUILT_PRODUCTS_DIR)/SampleData

Environment Variables

	Name	Value
☑	MallocStackLoggingNoC…	YES

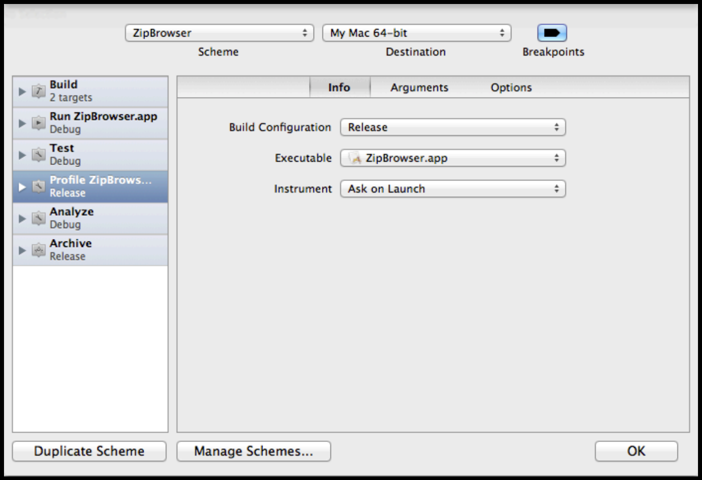
Demo

Unit testing in Xcode

The Five Scheme Actions

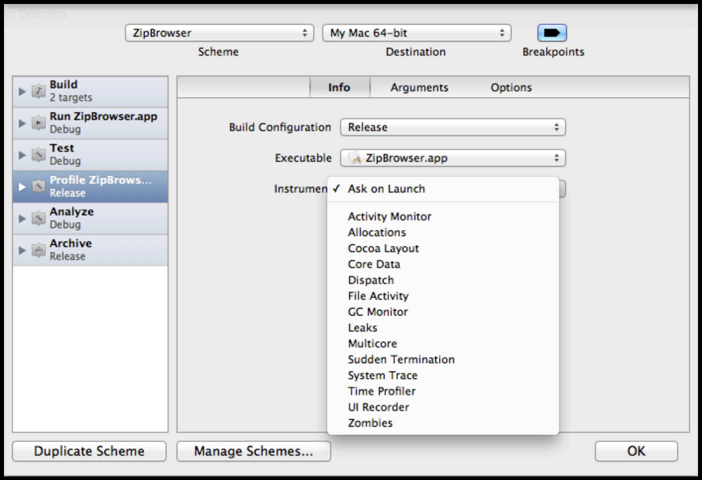
- Run
- Test
- Profile
- Analyze
- Archive

The Profile Action



Build Configuration: Release
Executable: ZipBrowser.app
Instrument: Ask on Launch

The Profile Action



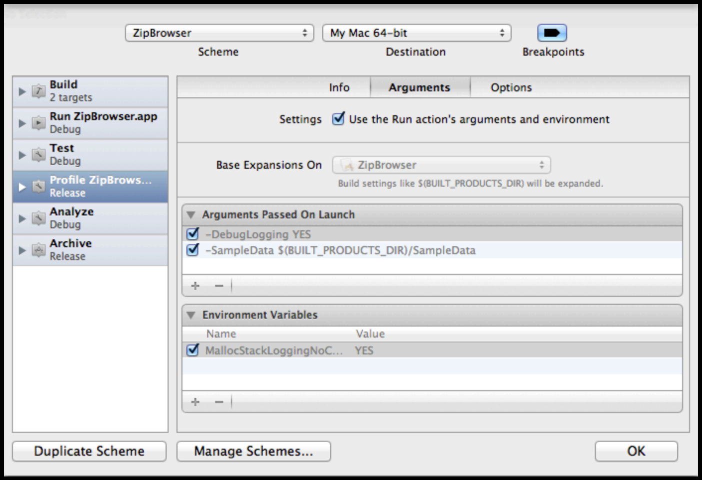
Build Configuration: Release

Executable: ZipBrowser.app

Instrument: ✓ Ask on Launch

Activity Monitor
Allocations
Cocoa Layout
Core Data
Dispatch
File Activity
GC Monitor
Leaks
Multicore
Sudden Termination
System Trace
Time Profiler
UI Recorder
Zombies

The Profile Action



Settings ✓ Use the Run action's arguments and environment

Base Expansions On: ZipBrowser

Build settings like $(BUILT_PRODUCTS_DIR) will be expanded.

Arguments Passed On Launch

- ✓ -DebugLogging YES
- ✓ -SampleData $(BUILT_PRODUCTS_DIR)/SampleData

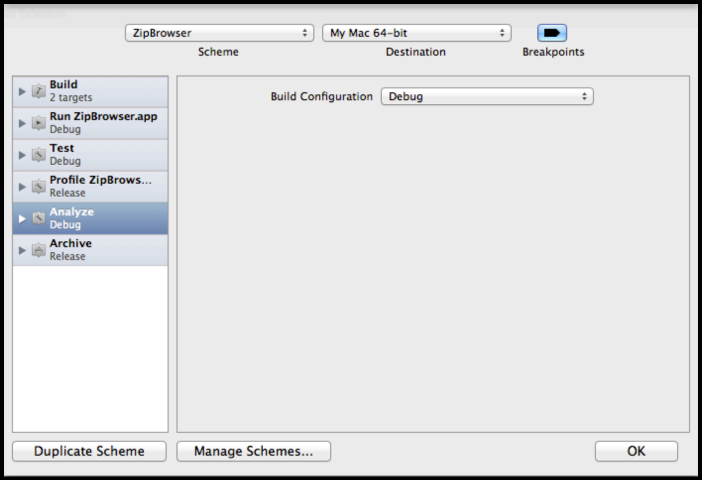
Environment Variables

	Name	Value
✓	MallocStackLoggingNoC...	YES

The Five Scheme Actions

- Run
- Test
- Profile
- Analyze
- Archive

The Analyze Action

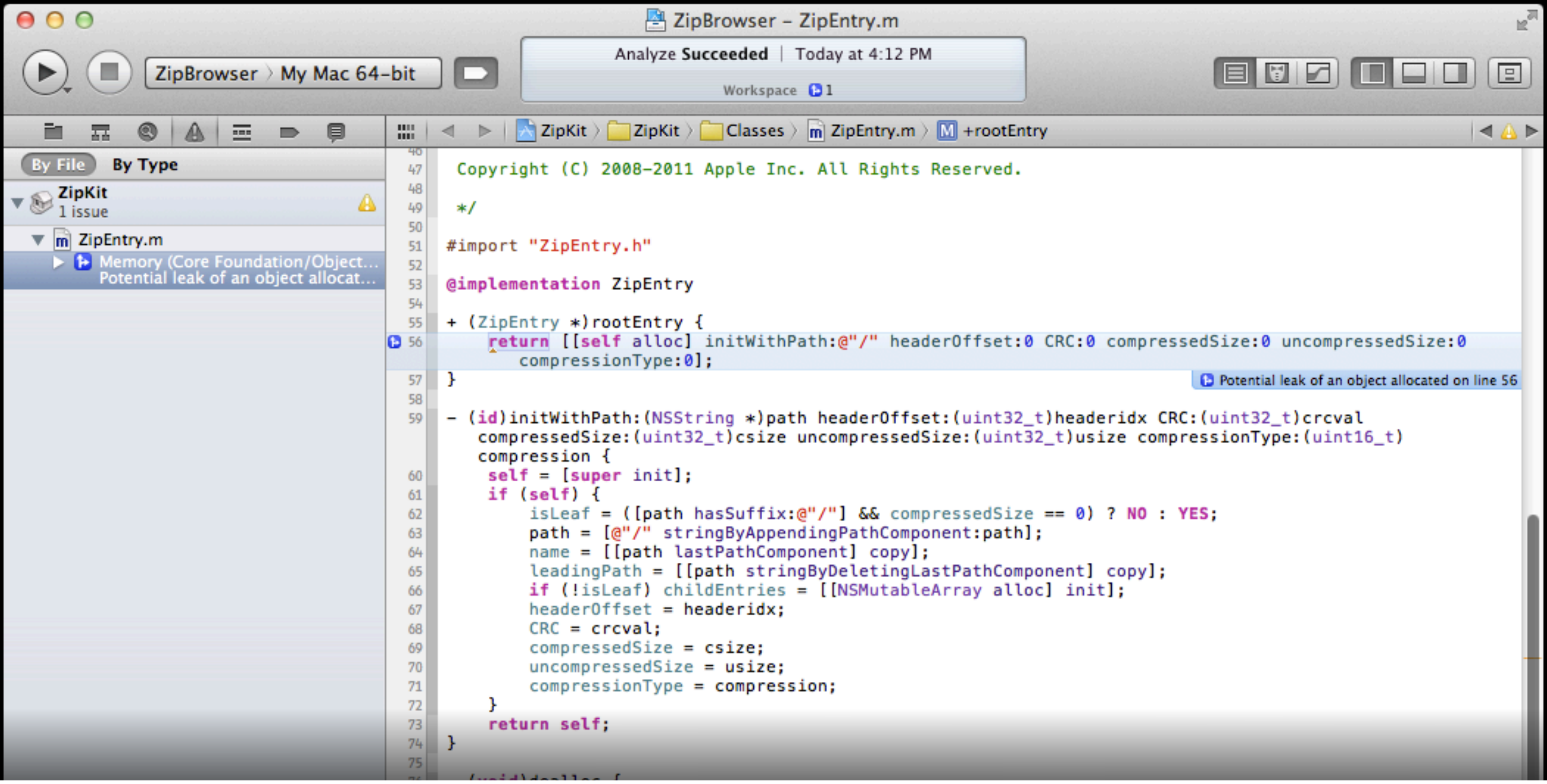


Scheme: ZipBrowser
Destination: My Mac 64-bit
Breakpoints

- Build
  2 targets
- Run ZipBrowser.app
  Debug
- Test
  Debug
- Profile ZipBrows...
  Release
- Analyze
  Debug
- Archive
  Release

Build Configuration: Debug

The Analyze Action


ZipBrowser – ZipEntry.m
ZipBrowser 〉 My Mac 64-bit
Workspace 1
ZipKit 〉 ZipKit 〉 Classes 〉 ZipEntry.m 〉 +rootEntry
By File
By Type
ZipKit
1 issue
ZipEntry.m

Analyze **Succeeded** | Today at 4:12 PM

Memory (Core Foundation/Object…
Potential leak of an object allocat…

```
 Copyright (C) 2008-2011 Apple Inc. All Rights Reserved.

 */

#import "ZipEntry.h"

@implementation ZipEntry

+ (ZipEntry *)rootEntry {
    return [[self alloc] initWithPath:@"/" headerOffset:0 CRC:0 compressedSize:0 uncompressedSize:0
       compressionType:0];
}                                                                       Potential leak of an object allocated on line 56

- (id)initWithPath:(NSString *)path headerOffset:(uint32_t)headeridx CRC:(uint32_t)crcval
   compressedSize:(uint32_t)csize uncompressedSize:(uint32_t)usize compressionType:(uint16_t)
   compression {
    self = [super init];
    if (self) {
        isLeaf = ([path hasSuffix:@"/"] && compressedSize == 0) ? NO : YES;
        path = [@"/" stringByAppendingPathComponent:path];
        name = [[path lastPathComponent] copy];
        leadingPath = [[path stringByDeletingLastPathComponent] copy];
        if (!isLeaf) childEntries = [[NSMutableArray alloc] init];
        headerOffset = headeridx;
        CRC = crcval;
        compressedSize = csize;
        uncompressedSize = usize;
        compressionType = compression;
    }
    return self;
}

  (void)dealloc {
```

The Five Scheme Actions

- Run
- Test
- Profile
- Analyze
- Archive

The Archive Action

Not just for iOS

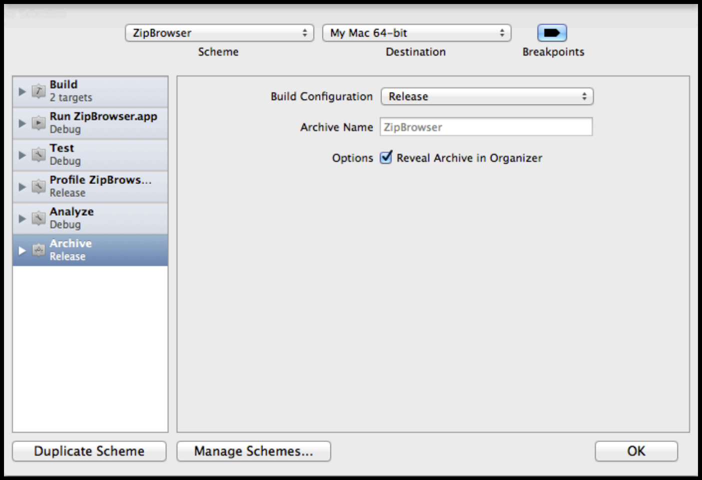
- Archiving is how you distribute your application
  - Share with testers
  - Verify prior to submission
  - Submit to the Mac and iOS App Store

The Archive Action

What's an archive?

- A time stamped ".xcarchive" bundle with…
  - An install-style build of your application
  - Your application's debug symbols, in a separate dSYM file
  - Verification and submission status for your application
  - Your own comments

The Archive Action



Build Configuration: Release

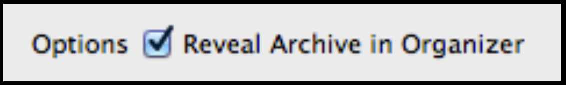
Archive Name: ZipBrowser

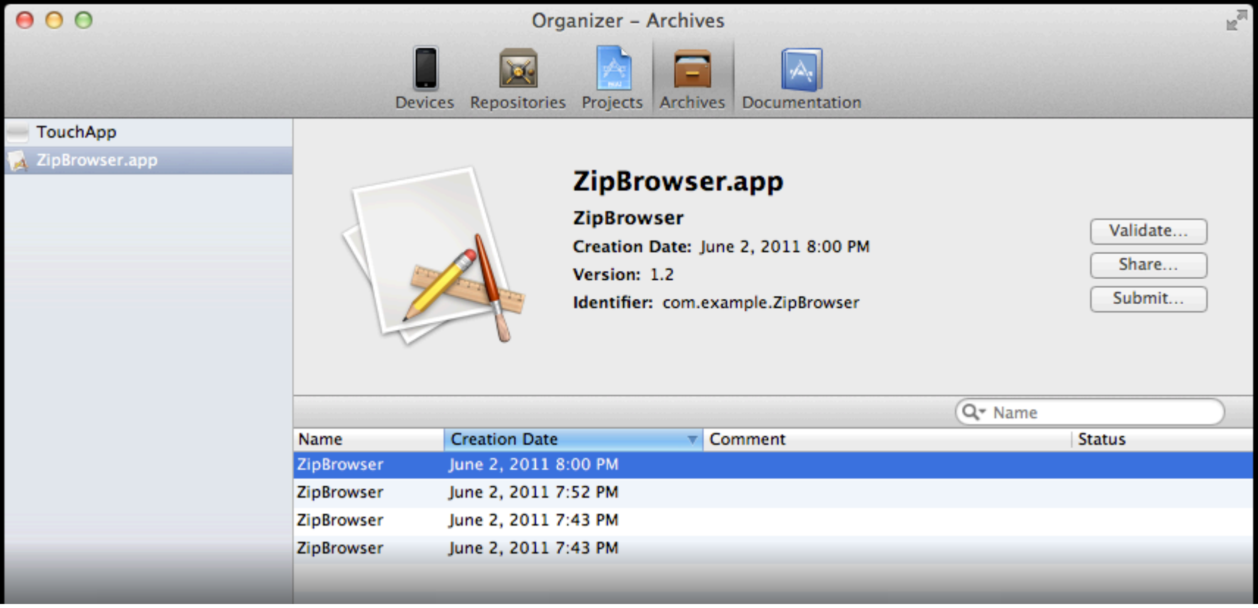
Options: ☑ Reveal Archive in Organizer

The Archive Action

Managing archives

- Work with archives via the Archive organizer


Options ☑ Reveal Archive in Organizer



ZipBrowser.app

ZipBrowser

Creation Date: June 2, 2011 8:00 PM

Version: 1.2

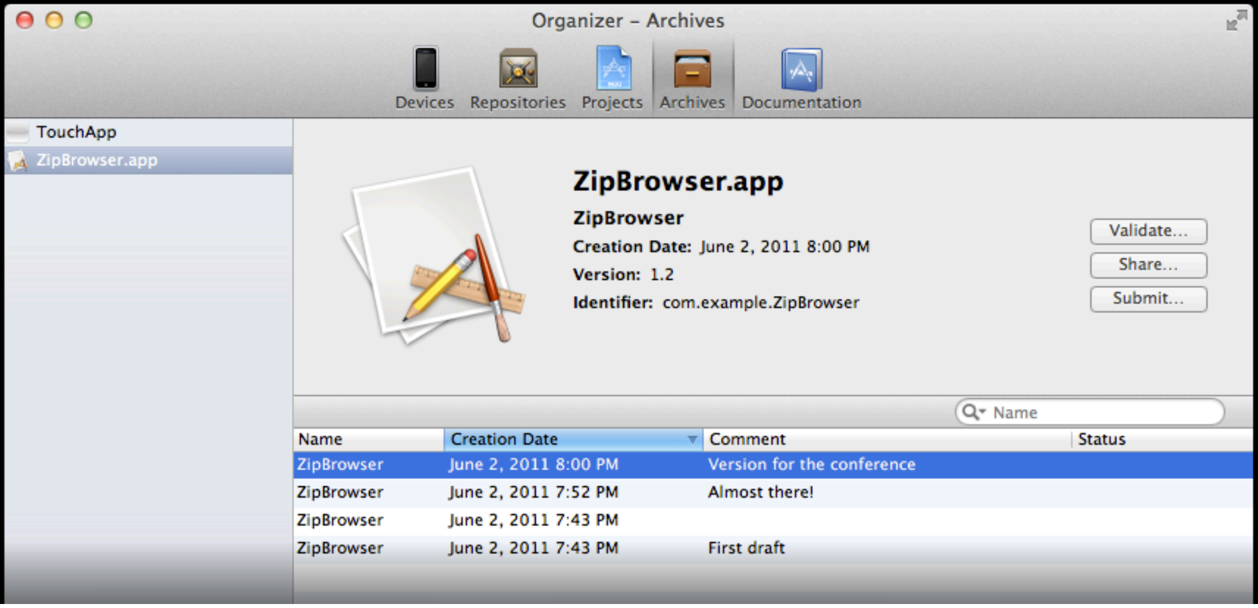
Identifier: com.example.ZipBrowser

Name	Creation Date	Comment	Status
ZipBrowser	June 2, 2011 8:00 PM		
ZipBrowser	June 2, 2011 7:52 PM		
ZipBrowser	June 2, 2011 7:43 PM		
ZipBrowser	June 2, 2011 7:43 PM		

The Archive Action

Managing archives

- Work with archives via the Archive organizer
- Use comments



ZipBrowser.app

ZipBrowser

Creation Date: June 2, 2011 8:00 PM

Version: 1.2

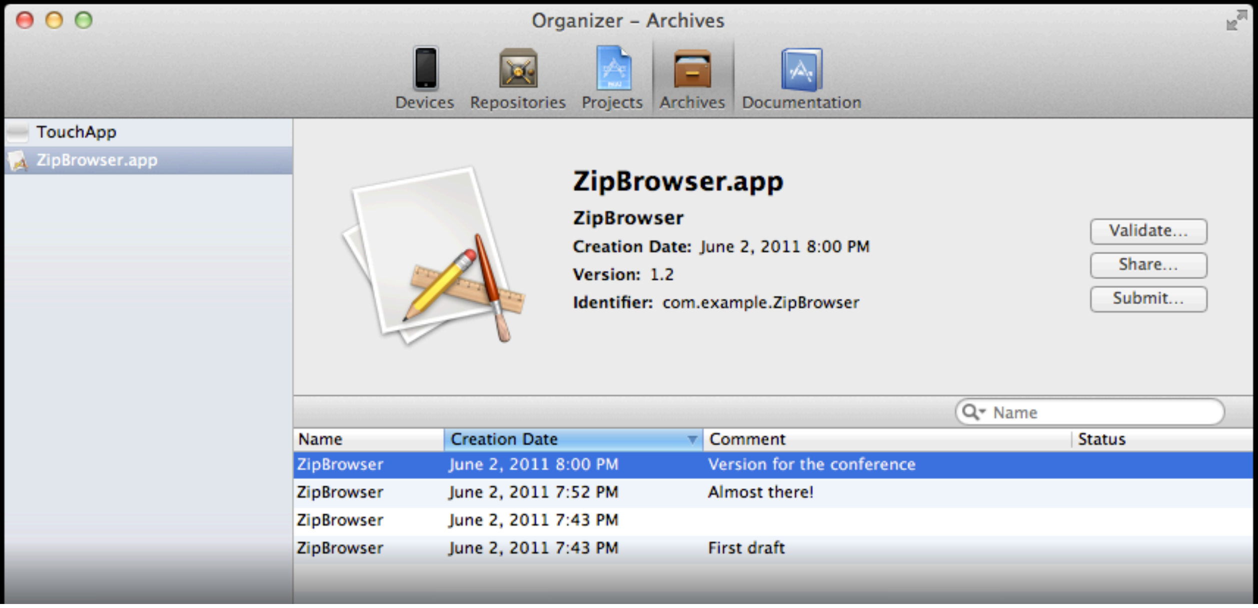
Identifier: com.example.ZipBrowser

Name	Creation Date	Comment	Status
ZipBrowser	June 2, 2011 8:00 PM	Version for the conference	
ZipBrowser	June 2, 2011 7:52 PM	Almost there!	
ZipBrowser	June 2, 2011 7:43 PM		
ZipBrowser	June 2, 2011 7:43 PM	First draft	

The Archive Action

Managing archives

- Work with archives via the Archive organizer
- Use comments
- Validate for sale, share with testers, and submit to the App Store!



ZipBrowser.app

ZipBrowser

Creation Date: June 2, 2011 8:00 PM

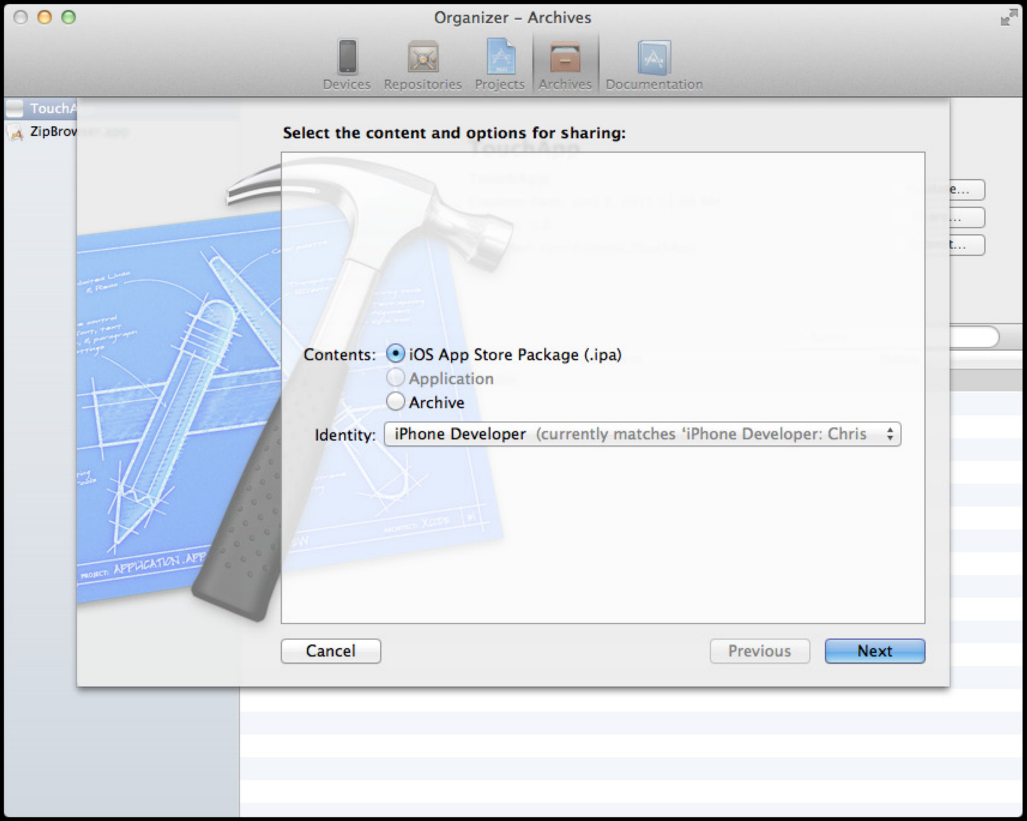
Version: 1.2

Identifier: com.example.ZipBrowser

Name	Creation Date	Comment	Status
ZipBrowser	June 2, 2011 8:00 PM	Version for the conference	
ZipBrowser	June 2, 2011 7:52 PM	Almost there!	
ZipBrowser	June 2, 2011 7:43 PM		
ZipBrowser	June 2, 2011 7:43 PM	First draft	

The Archive Action

Sharing your application



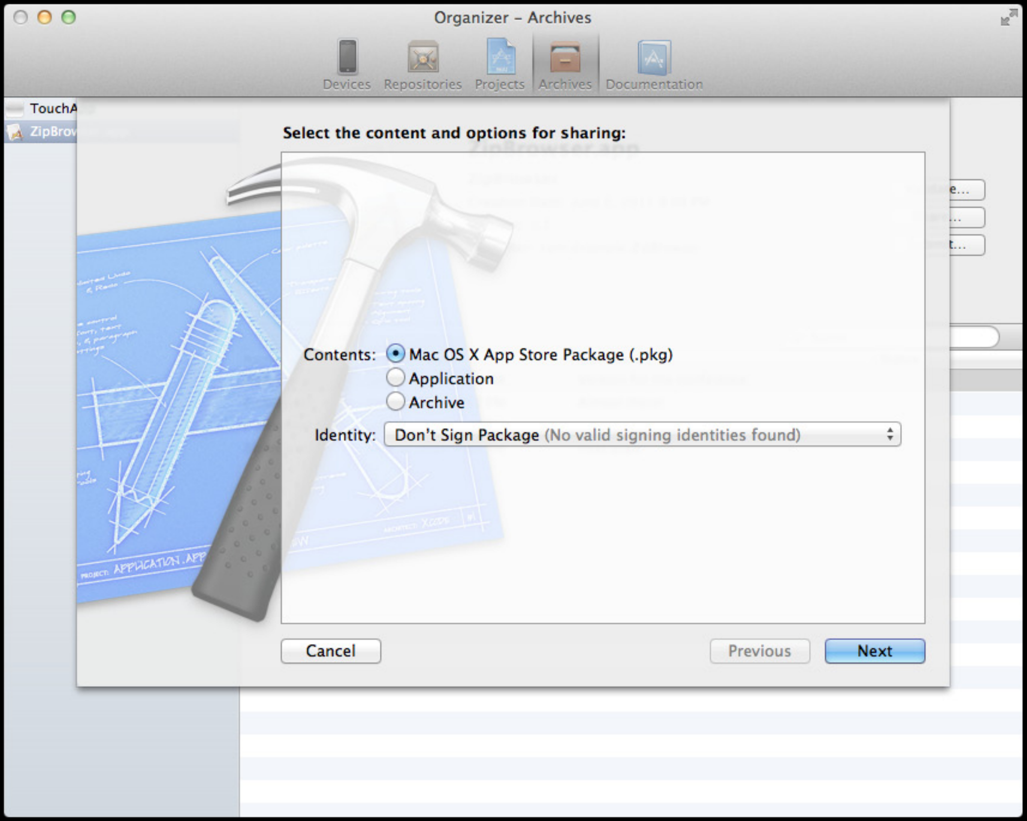
Select the content and options for sharing:

Contents: [✓ iOS App Store Package (.ipa)] Application Archive

Identity: iPhone Developer (currently matches 'iPhone Developer: Chris

The Archive Action

Sharing your application



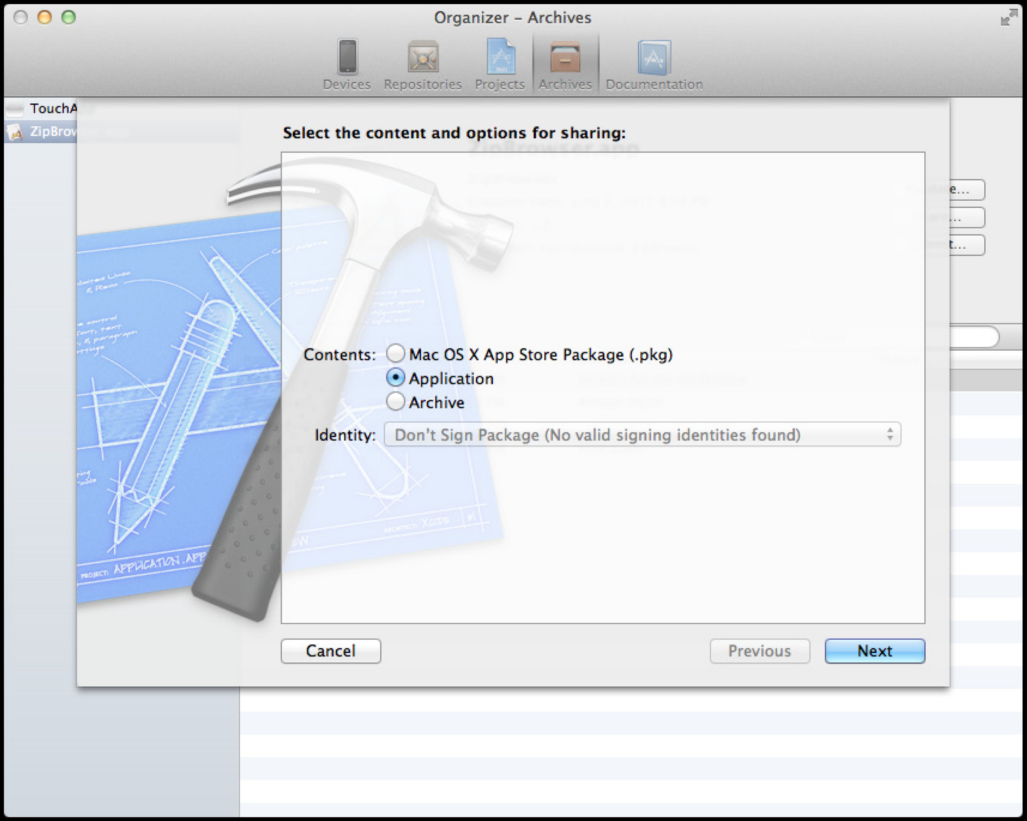
Select the content and options for sharing:

Contents: [✓ Mac OS X App Store Package (.pkg)] Application Archive

Identity: Don't Sign Package (No valid signing identities found)

The Archive Action

Sharing your application



Select the content and options for sharing:

Contents: ( ) Mac OS X App Store Package (.pkg) [✓ Application] ( ) Archive

Identity: Don't Sign Package (No valid signing identities found)

The Archive Action

Application archives

- Contain only a single application
- Archives with anything else cannot be submitted to the Mac or iOS App Store

The Archive Action

Pro tip

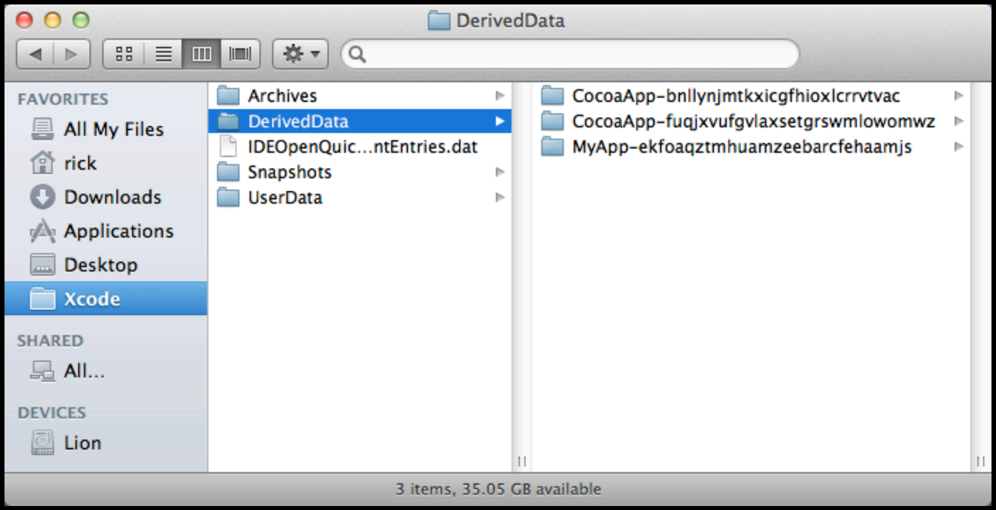
- Turn on the Skip Install build setting for library and framework targets
- Your application should embed them itself
  - Static libraries are always incorporated into your application
  - Copy Files build phase for frameworks and dynamic libraries

Build Locations

Build Locations

- Every workspace has its own derived data directory
  - By default, build products go in the workspace’s derived data directory
- Build products from different workspaces don’t mix unless you change where their build products go
- Workspaces are distinguished by path

Derived Data



Archives
DerivedData
IDEOpenQuic...ntEntries.dat
Snapshots
UserData

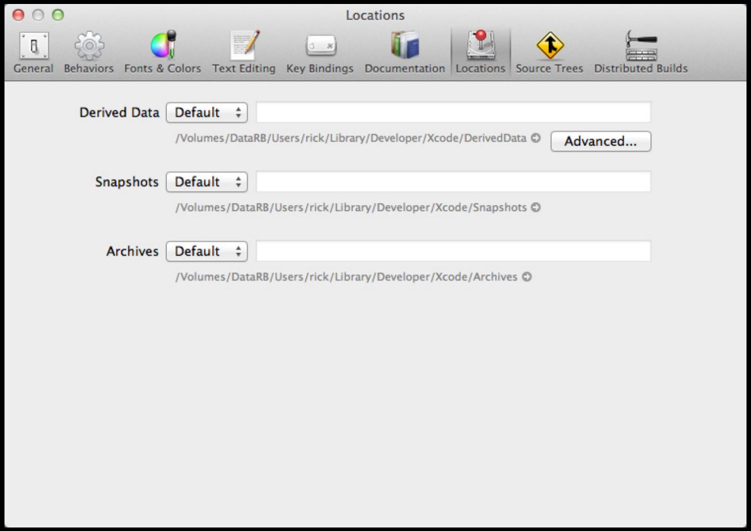
CocoaApp-bnllynjmtkxicgfhioxlcrrvtvac
CocoaApp-fuqjxvufgvlaxsetgrswmlowomwz
MyApp-ekfoaqztmhuamzeebarcfehaamjs

3 items, 35.05 GB available

Demo

Finding build products

Customizing Locations

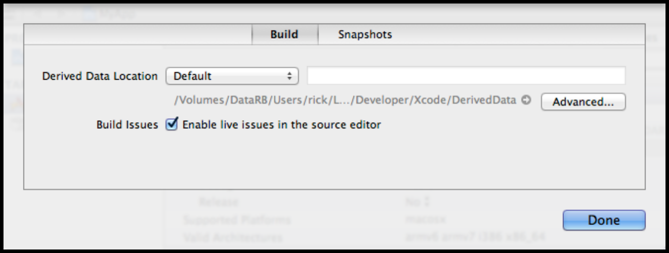


Derived Data Default
/Volumes/DataRB/Users/rick/Library/Developer/Xcode/DerivedData

Snapshots Default
/Volumes/DataRB/Users/rick/Library/Developer/Xcode/Snapshots

Archives Default
/Volumes/DataRB/Users/rick/Library/Developer/Xcode/Archives

Customizing Locations

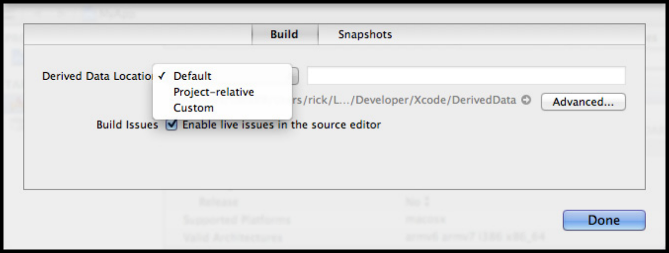


Derived Data Location: Default

/Volumes/DataRB/Users/rick/L.../Developer/Xcode/DerivedData

Build Issues: [✓] Enable live issues in the source editor

Customizing Locations

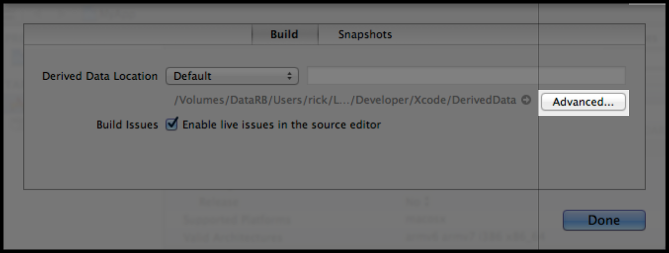


Derived Data Locatio ✓ Default
Project-relative
Custom

rs/rick/L.../Developer/Xcode/DerivedData

Build Issues ✓ Enable live issues in the source editor

Customizing Locations

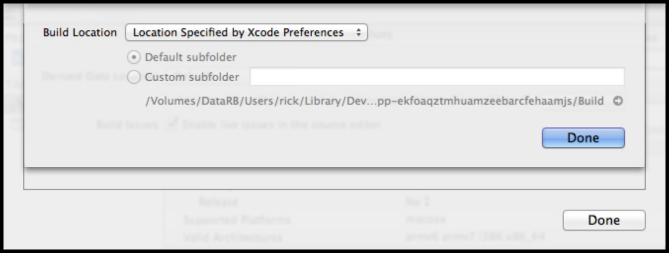


Derived Data Location: Default

/Volumes/DataRB/Users/rick/L.../Developer/Xcode/DerivedData

Build Issues: ✓ Enable live issues in the source editor

Advanced Build Location Customization

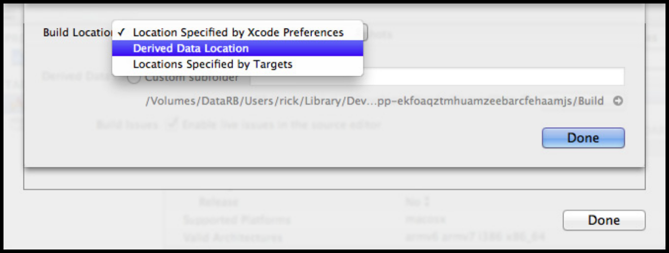


Build Location: Location Specified by Xcode Preferences

[✓ Default subfolder] Custom subfolder

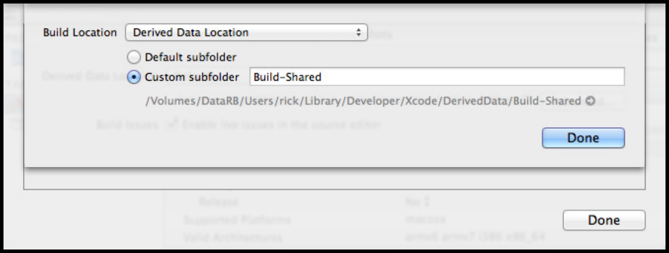
/Volumes/DataRB/Users/rick/Library/Dev...pp-ekfoaqztmhuamzeebarcfehaamjs/Build

Advanced Build Location Customization


Build Locatio
✓ Location Specified by Xcode Preferences
Derived Data Location
Locations Specified by Targets
Custom subfolder
Done
Done

/Volumes/DataRB/Users/rick/Library/Dev...pp-ekfoaqztmhuamzeebarcfehaamjs/Build

Advanced Build Location Customization

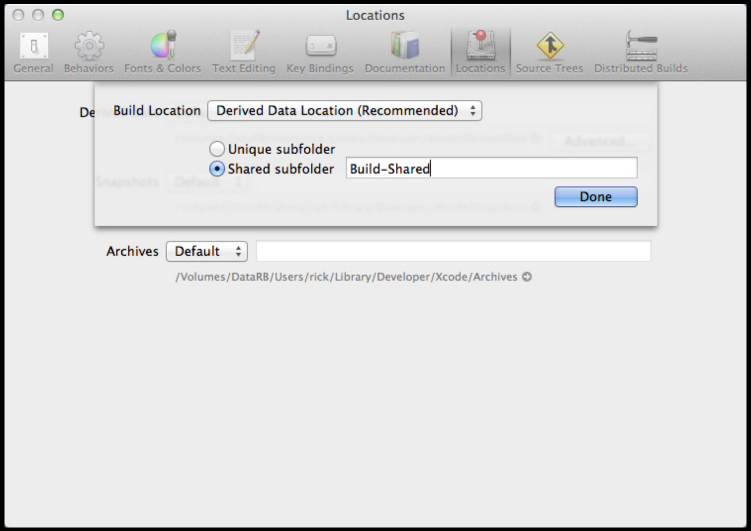


Build Location: Derived Data Location

Default subfolder [✓ Custom subfolder] Build-Shared

/Volumes/DataRB/Users/rick/Library/Developer/Xcode/DerivedData/Build-Shared

Advanced Build Location Customization



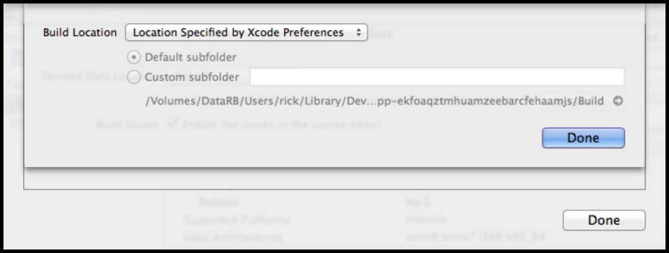
Build Location: Derived Data Location (Recommended)

Unique subfolder [✓ Shared subfolder] Build-Shared

Archives: Default

/Volumes/DataRB/Users/rick/Library/Developer/Xcode/Archives

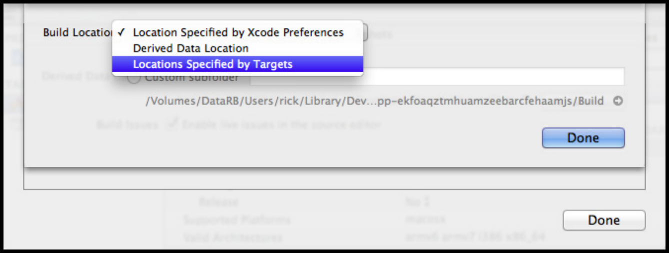
Advanced Build Location Customization


Build Location: Location Specified by Xcode Preferences

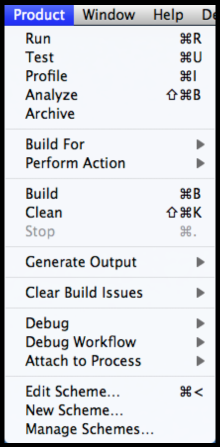
(● Default subfolder) ○ Custom subfolder

/Volumes/DataRB/Users/rick/Library/Dev...pp-ekfoaqztmhuamzeebarcfehaamjs/Build

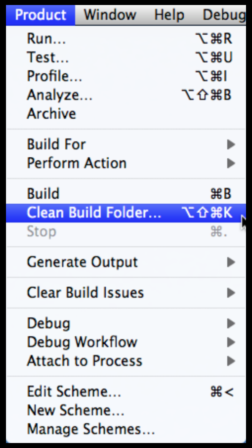
Advanced Build Location Customization


Build Locatio
✓ Location Specified by Xcode Preferences
Derived Data Location
Locations Specified by Targets
Custom subfolder
/Volumes/DataRB/Users/rick/Library/Dev...pp-ekfoaqztmhuamzeebarcfehaamjs/Build
Done
Done

Clean Build Folder



Clean Build Folder

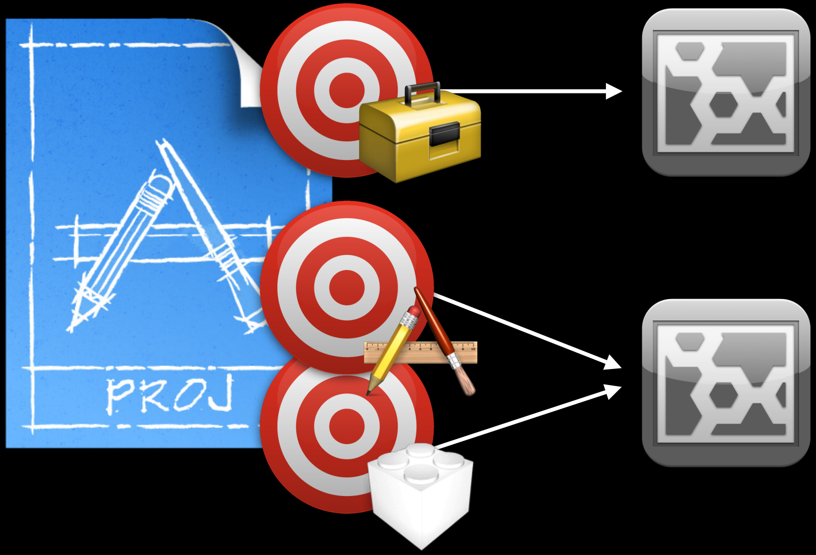


Scheme Management

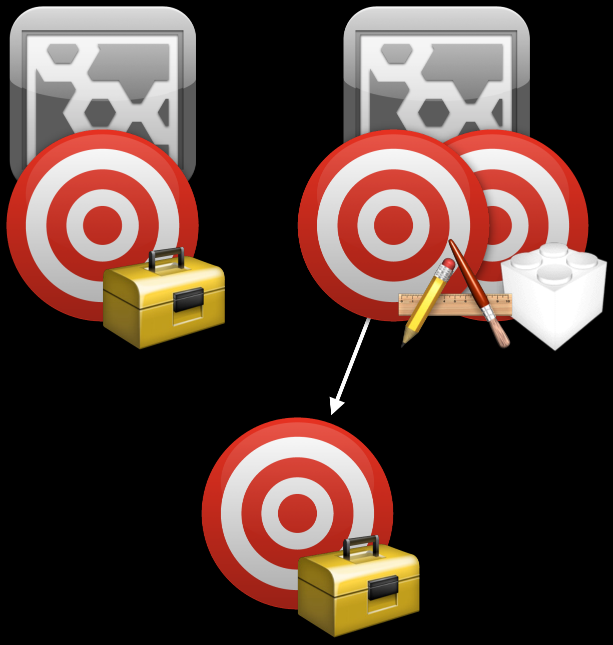
When Are Schemes Created?

- Manually by the user
- Automatically
  - When creating a new target or project
  - When opening a project or workspace for the first time

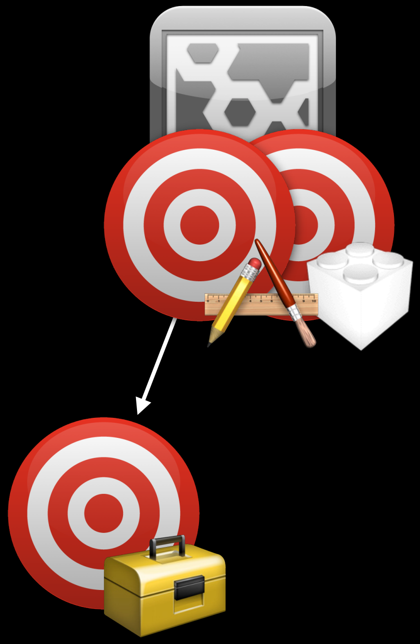
What Schemes Are Created?



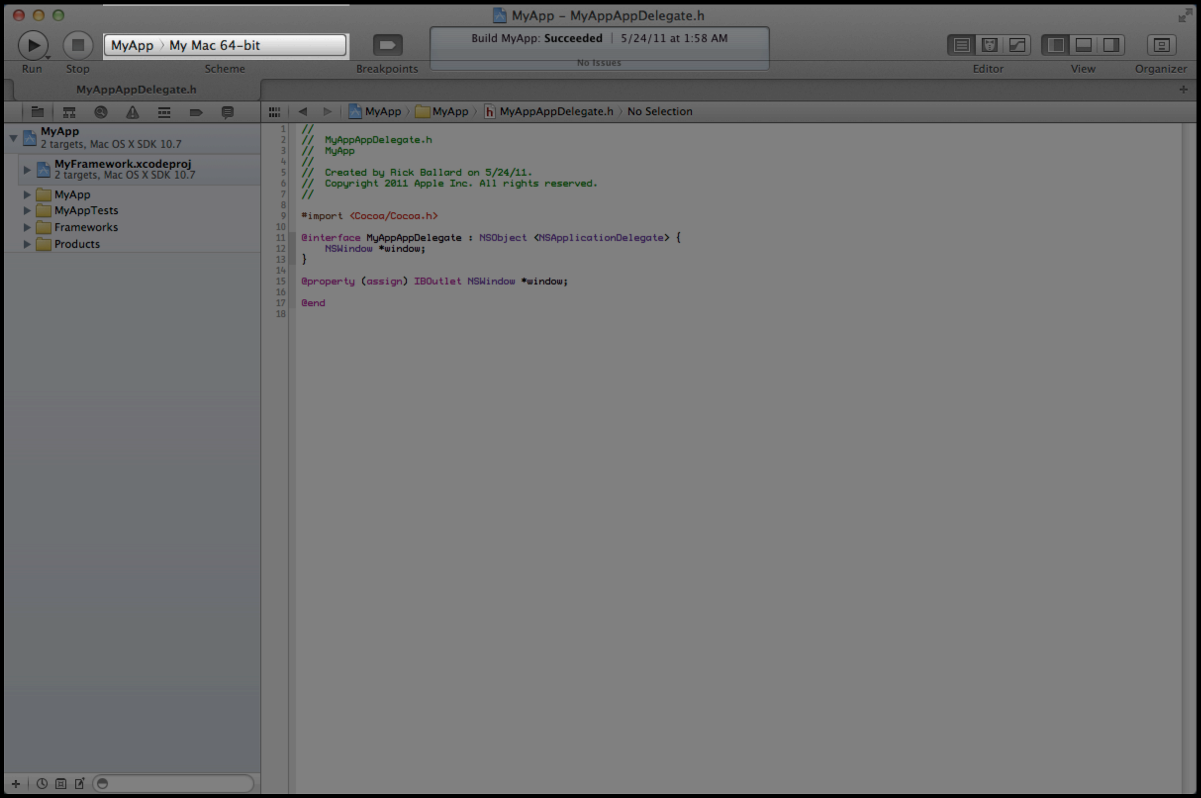
What Schemes Should You Keep?



What Schemes Should You Keep?



Managing Schemes


MyApp – MyAppAppDelegate.h
MyApp › My Mac 64-bit
Run
Stop
Scheme
Breakpoints
Build MyApp: Succeeded | 5/24/11 at 1:58 AM
No Issues
Editor
View
Organizer
MyAppAppDelegate.h
MyApp › MyApp › MyAppAppDelegate.h › No Selection
MyApp
2 targets, Mac OS X SDK 10.7
MyFramework.xcodeproj
2 targets, Mac OS X SDK 10.7
MyApp
MyAppTests
Frameworks
Products

```
//
//  MyAppAppDelegate.h
//  MyApp
//
//  Created by Rick Ballard on 5/24/11.
//  Copyright 2011 Apple Inc. All rights reserved.
//

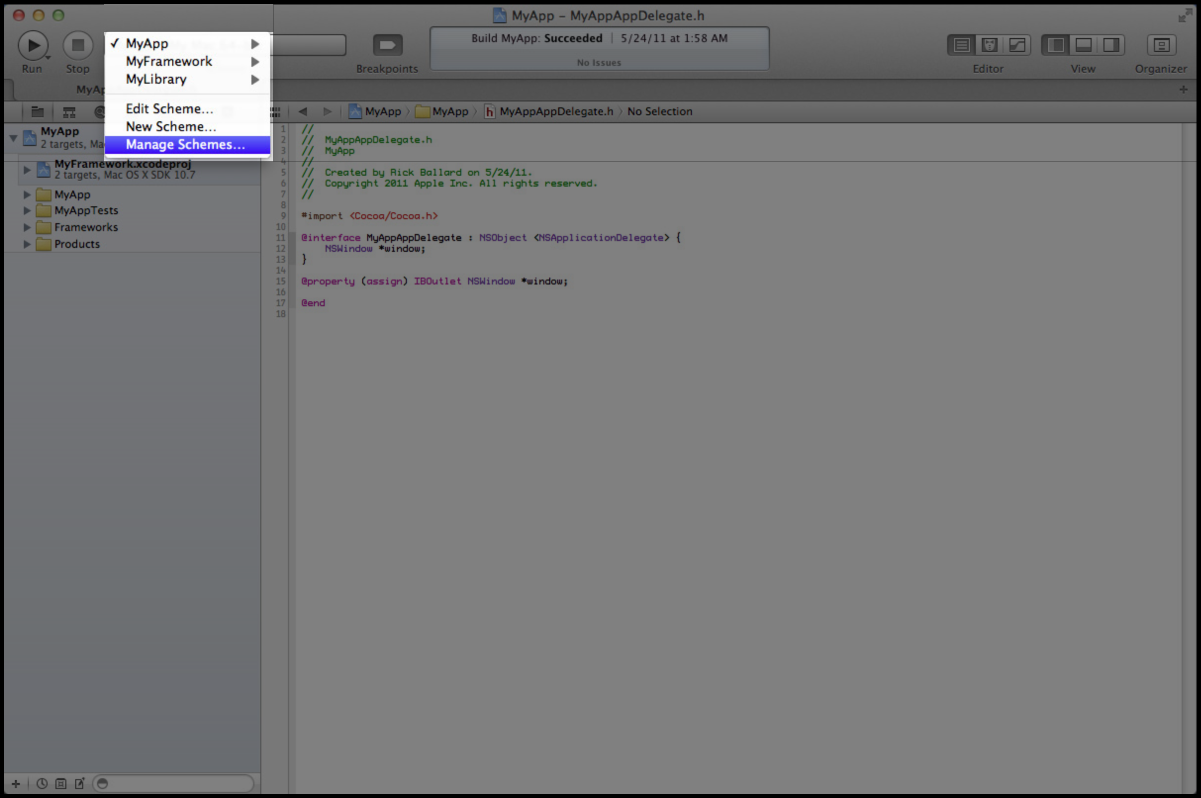
#import <Cocoa/Cocoa.h>

@interface MyAppAppDelegate : NSObject <NSApplicationDelegate> {
    NSWindow *window;
}

@property (assign) IBOutlet NSWindow *window;

@end
```

Managing Schemes



```
//
//  MyAppAppDelegate.h
//  MyApp
//
//  Created by Rick Ballard on 5/24/11.
//  Copyright 2011 Apple Inc. All rights reserved.
//

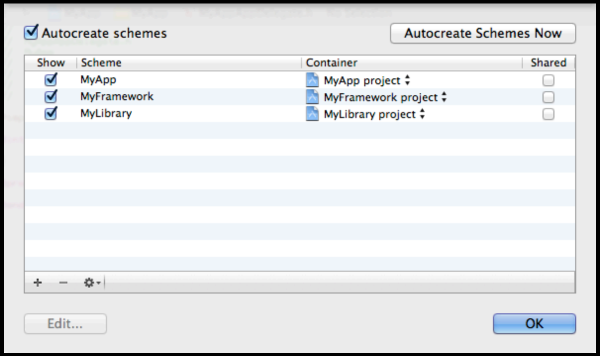
#import <Cocoa/Cocoa.h>

@interface MyAppAppDelegate : NSObject <NSApplicationDelegate> {
    NSWindow *window;
}

@property (assign) IBOutlet NSWindow *window;

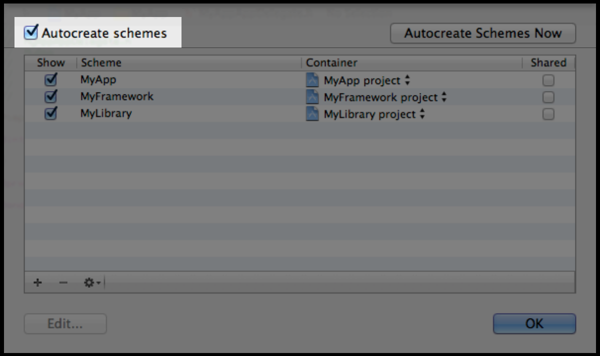
@end
```

Managing Schemes



Show	Scheme	Container	Shared
✓	MyApp	MyApp project	☐
✓	MyFramework	MyFramework project	☐
✓	MyLibrary	MyLibrary project	☐

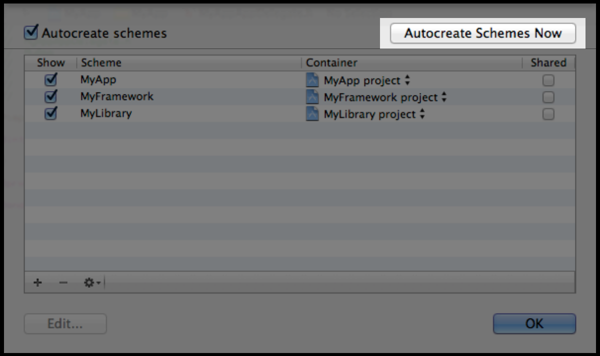
Managing Scheme Autocreation



☑ Autocreate schemes

Show	Scheme	Container	Shared
✓	MyApp	MyApp project	☐
✓	MyFramework	MyFramework project	☐
✓	MyLibrary	MyLibrary project	☐

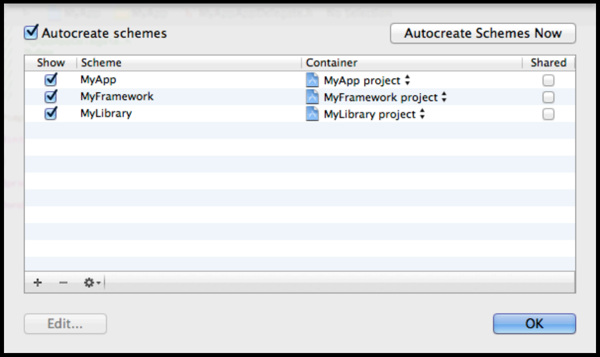
Managing Scheme Autocreation



☑ Autocreate schemes

Show	Scheme	Container	Shared
✓	MyApp	MyApp project	☐
✓	MyFramework	MyFramework project	☐
✓	MyLibrary	MyLibrary project	☐

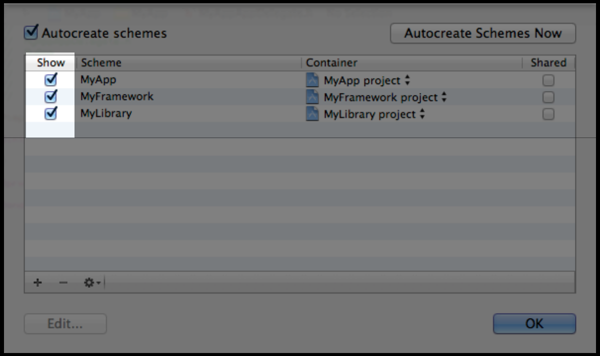
Hiding Schemes



☑ Autocreate schemes

Show	Scheme	Container	Shared
✓	MyApp	MyApp project	☐
✓	MyFramework	MyFramework project	☐
✓	MyLibrary	MyLibrary project	☐

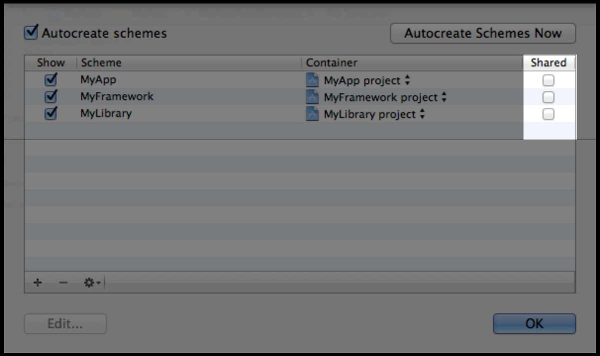
Hiding Schemes



☑ Autocreate schemes

Show	Scheme	Container	Shared
☑	MyApp	MyApp project	☐
☑	MyFramework	MyFramework project	☐
☑	MyLibrary	MyLibrary project	☐

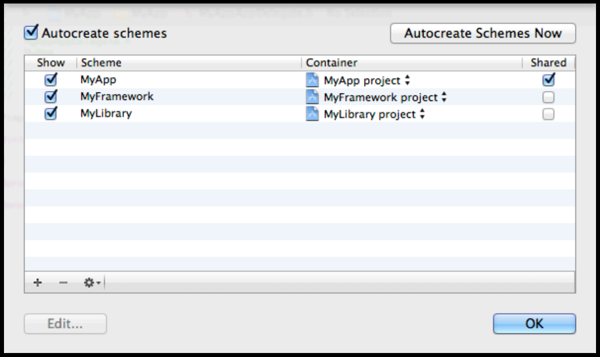
Sharing Schemes



☑ Autocreate schemes

Show	Scheme	Container	Shared
✓	MyApp	MyApp project	☐
✓	MyFramework	MyFramework project	☐
✓	MyLibrary	MyLibrary project	☐

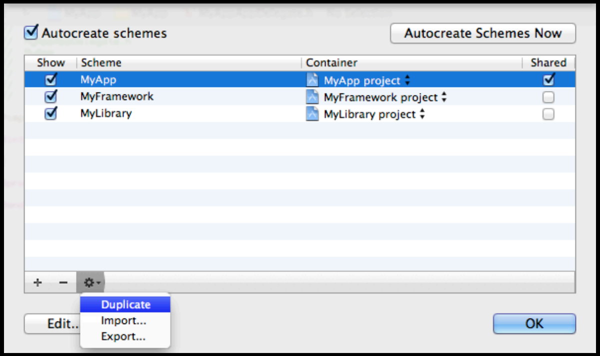
Sharing Schemes



✓ Autocreate schemes

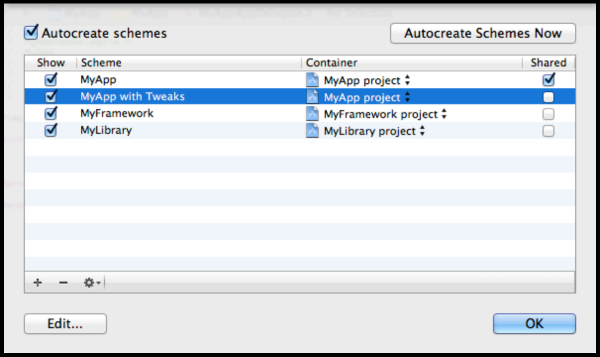
Show	Scheme	Container	Shared
✓	MyApp	MyApp project	✓
✓	MyFramework	MyFramework project	☐
✓	MyLibrary	MyLibrary project	☐

Duplicating Schemes



Show	Scheme	Container	Shared
✓	MyApp	MyApp project	✓
✓	MyFramework	MyFramework project	
✓	MyLibrary	MyLibrary project	

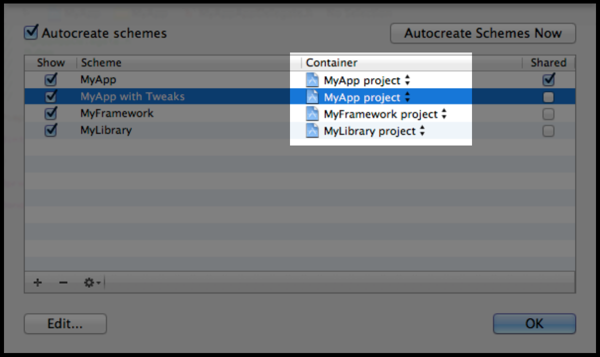
Duplicating Schemes



☑ Autocreate schemes

Show	Scheme	Container	Shared
✓	MyApp	MyApp project	✓
✓	MyApp with Tweaks	MyApp project	☐
✓	MyFramework	MyFramework project	☐
✓	MyLibrary	MyLibrary project	☐

Where Schemes Are Stored

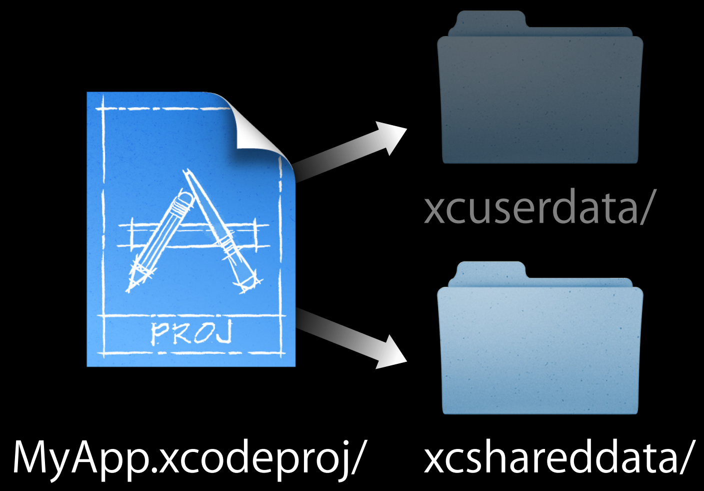


Show	Scheme	Container	Shared
✓	MyApp	MyApp project	✓
✓	MyApp with Tweaks	MyApp project	
✓	MyFramework	MyFramework project	
✓	MyLibrary	MyLibrary project	

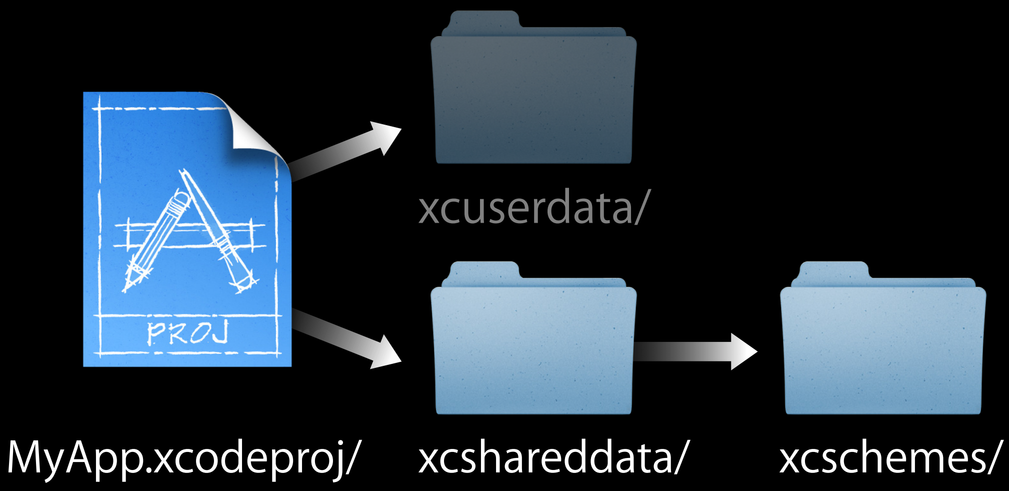
Where Schemes Are Stored

MyApp.xcodeproj/

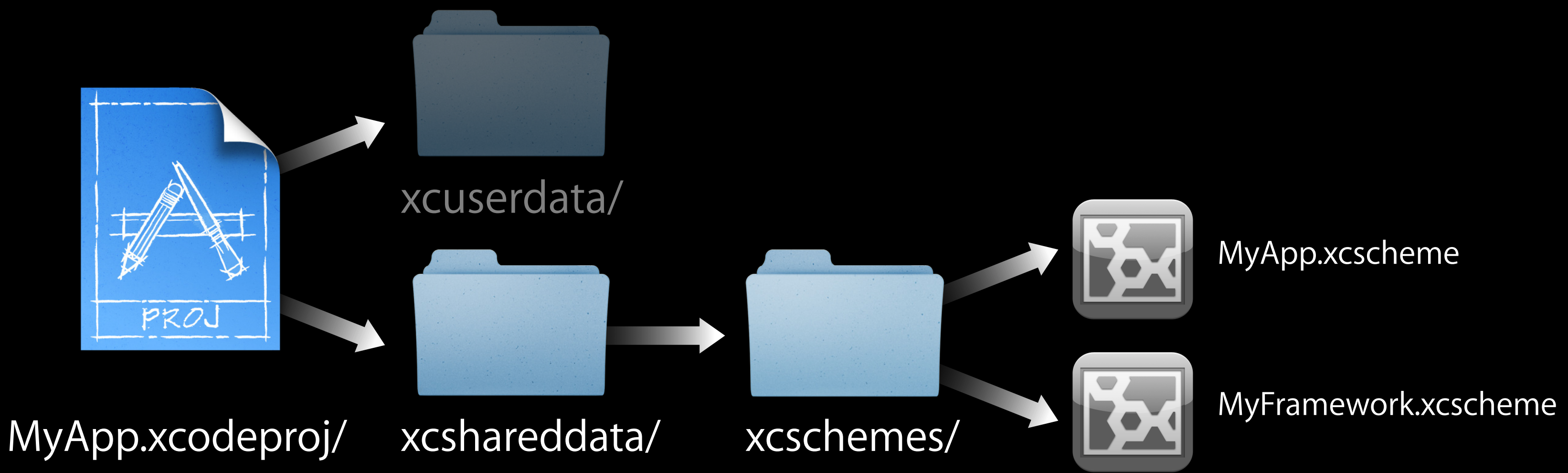
Where Schemes Are Stored



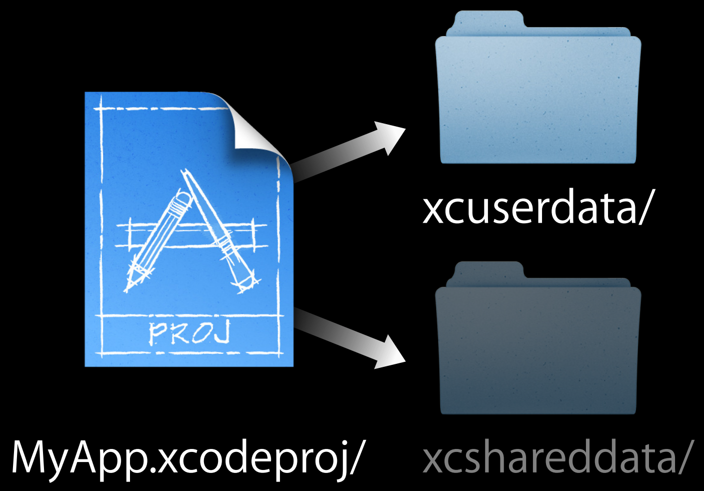
Where Schemes Are Stored



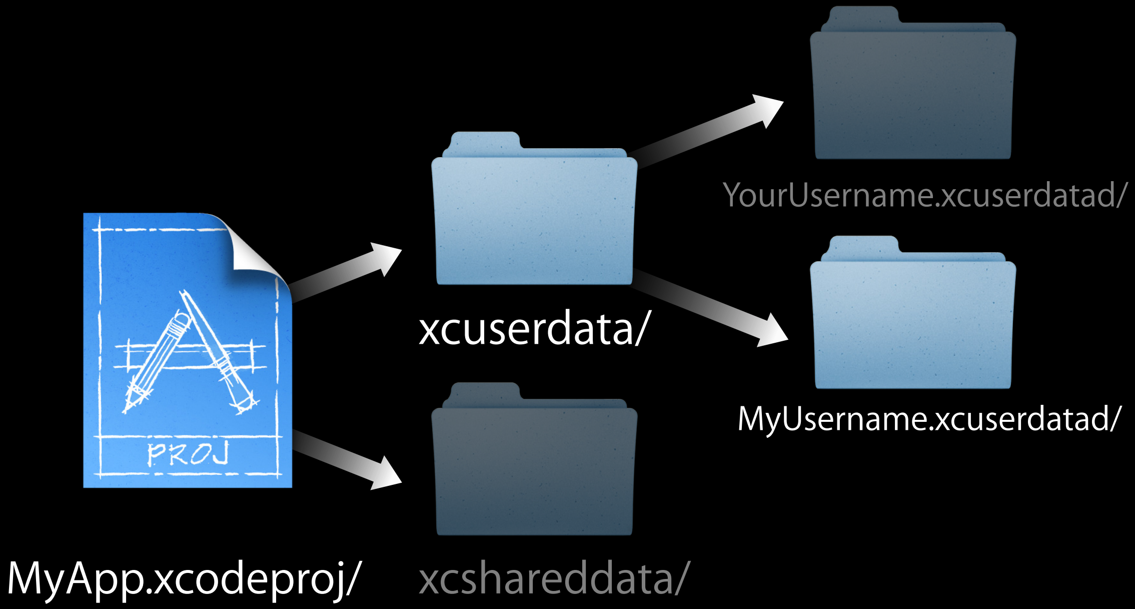
Where Schemes Are Stored



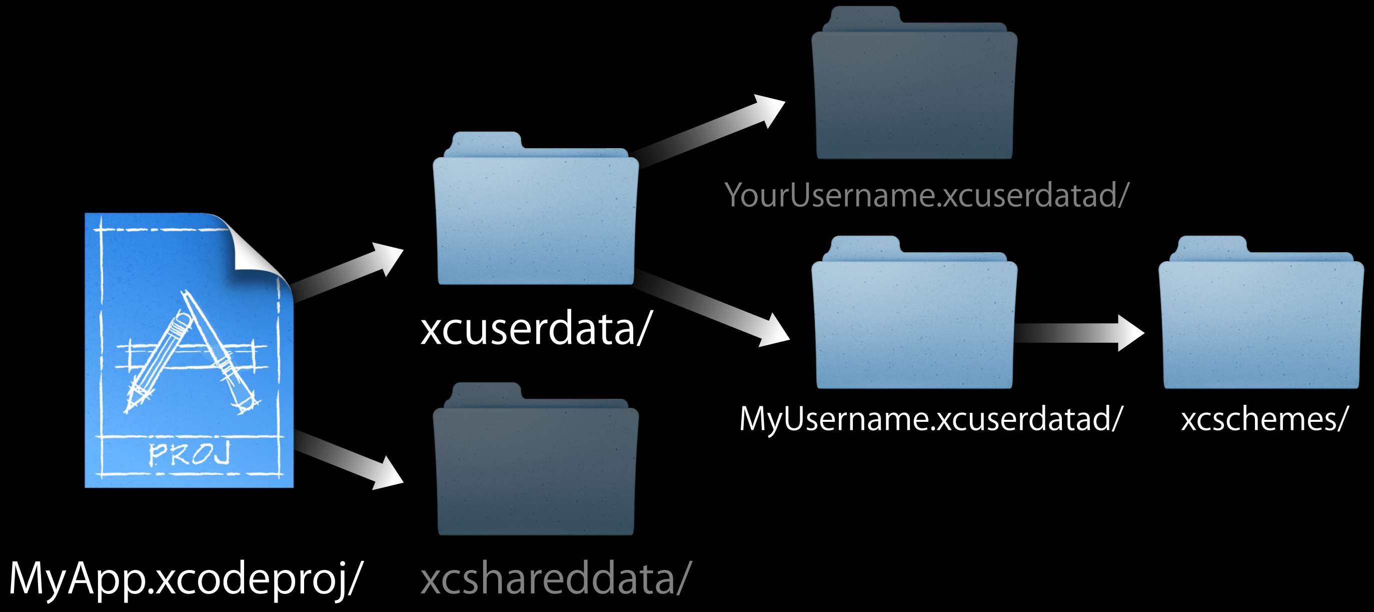
Where Schemes Are Stored



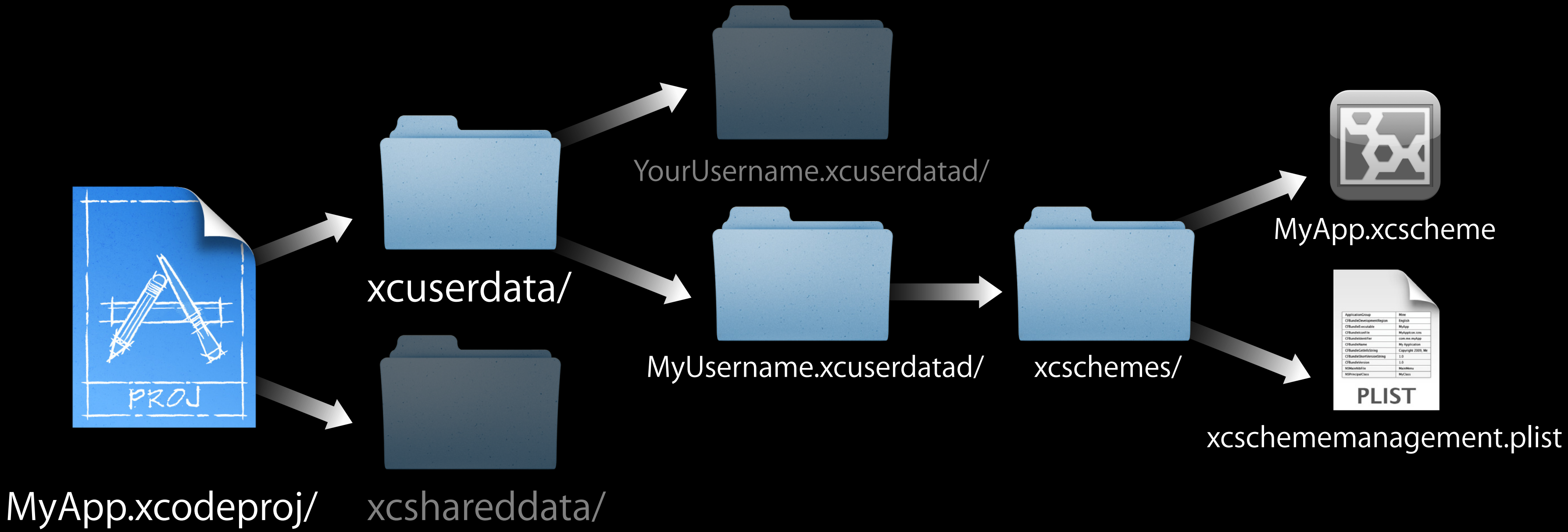
Where Schemes Are Stored



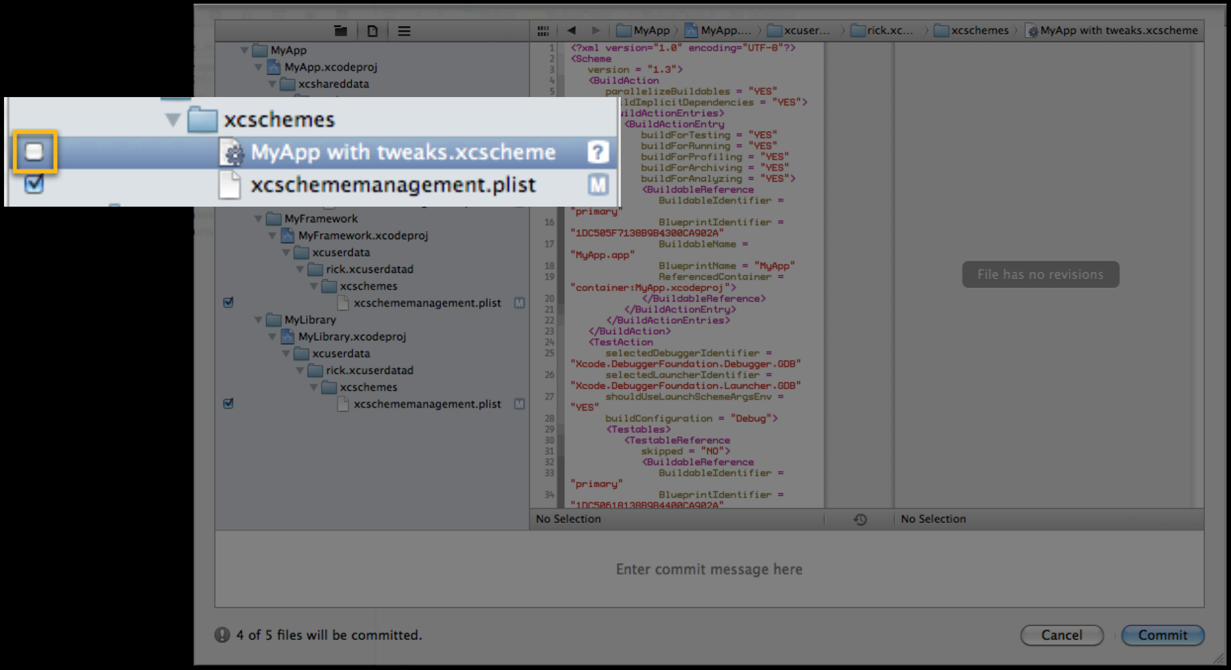
Where Schemes Are Stored



Where Schemes Are Stored



Managing Schemes in Source Control



MyApp
MyApp.xcodeproj
xcshareddata
xcschemes
MyApp with tweaks.xcscheme ?
xcschememanagement.plist M
MyFramework
MyFramework.xcodeproj
xcuserdata
rick.xcuserdatad
xcschemes
xcschememanagement.plist M
MyLibrary
MyLibrary.xcodeproj
xcuserdata
rick.xcuserdatad
xcschemes
xcschememanagement.plist M

MyApp › MyApp.... › xcuser... › rick.xc... › xcschemes › MyApp with tweaks.xcscheme

```
<?xml version="1.0" encoding="UTF-8"?>
<Scheme
   version = "1.3">
   <BuildAction
      parallelizeBuildables = "YES"
       ldImplicitDependencies = "YES">
       ildActionEntries>
         <BuildActionEntry
            buildForTesting = "YES"
            buildForRunning = "YES"
            buildForProfiling = "YES"
            buildForArchiving = "YES"
            buildForAnalyzing = "YES">
            <BuildableReference
               BuildableIdentifier =
"primary"
               BlueprintIdentifier =
"1DC505F7138B9B4300CA902A"
               BuildableName =
"MyApp.app"
               BlueprintName = "MyApp"
               ReferencedContainer =
"container:MyApp.xcodeproj">
            </BuildableReference>
         </BuildActionEntry>
      </BuildActionEntries>
   </BuildAction>
   <TestAction
      selectedDebuggerIdentifier =
"Xcode.DebuggerFoundation.Debugger.GDB"
      selectedLauncherIdentifier =
"Xcode.DebuggerFoundation.Launcher.GDB"
      shouldUseLaunchSchemeArgsEnv =
"YES"
      buildConfiguration = "Debug">
      <Testables>
         <TestableReference
            skipped = "NO">
            <BuildableReference
               BuildableIdentifier =
"primary"
               BlueprintIdentifier =
"1DC50618138B9B4400CA902A"
```

No Selection

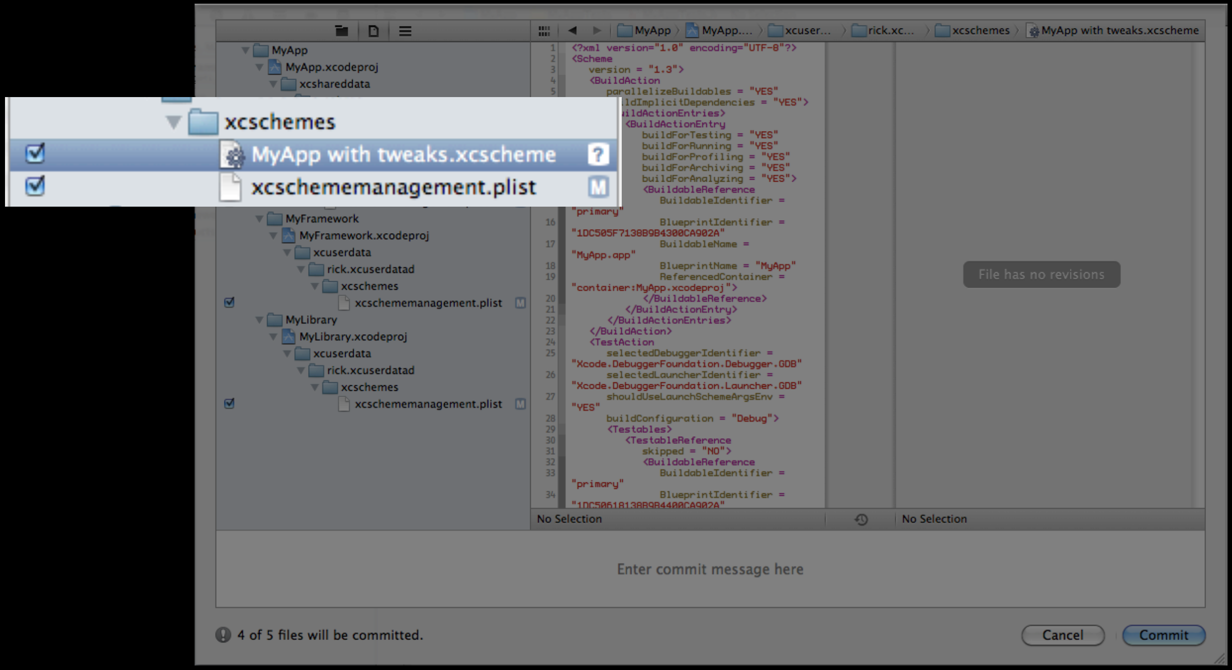
File has no revisions

No Selection

Enter commit message here

4 of 5 files will be committed.

Managing Schemes in Source Control

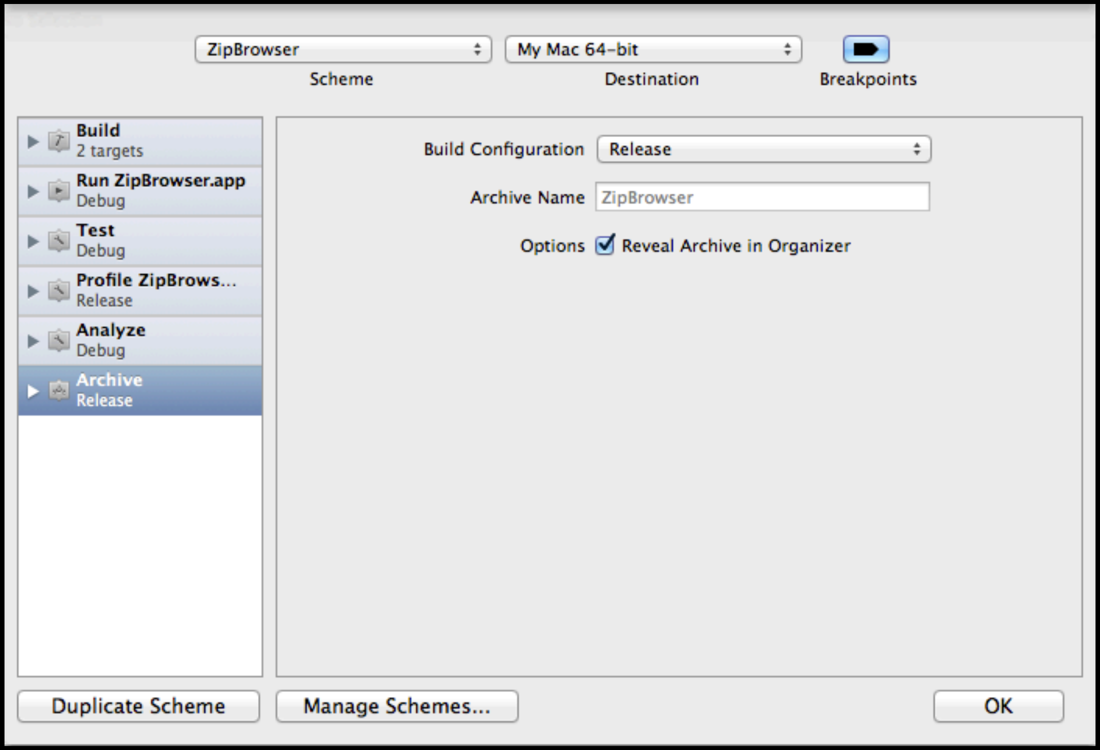


```
<?xml version="1.0" encoding="UTF-8"?>
<Scheme
   version = "1.3">
   <BuildAction
      parallelizeBuildables = "YES"
      ildImplicitDependencies = "YES">
      uildActionEntries>
         <BuildActionEntry
            buildForTesting = "YES"
            buildForRunning = "YES"
            buildForProfiling = "YES"
            buildForArchiving = "YES"
            buildForAnalyzing = "YES">
            <BuildableReference
               BuildableIdentifier =
"primary"
               BlueprintIdentifier =
"1DC505F7138B9B4300CA902A"
               BuildableName =
"MyApp.app"
               BlueprintName = "MyApp"
               ReferencedContainer =
"container:MyApp.xcodeproj">
            </BuildableReference>
         </BuildActionEntry>
      </BuildActionEntries>
   </BuildAction>
   <TestAction
      selectedDebuggerIdentifier =
"Xcode.DebuggerFoundation.Debugger.GDB"
      selectedLauncherIdentifier =
"Xcode.DebuggerFoundation.Launcher.GDB"
      shouldUseLaunchSchemeArgsEnv =
"YES"
      buildConfiguration = "Debug">
      <Testables>
         <TestableReference
            skipped = "NO">
            <BuildableReference
               BuildableIdentifier =
"primary"
               BlueprintIdentifier =
"1DC50618138B9B4400CA902A"
```

4 of 5 files will be committed.

Custom Scheme Actions

Creating Custom Pre- and Post-actions

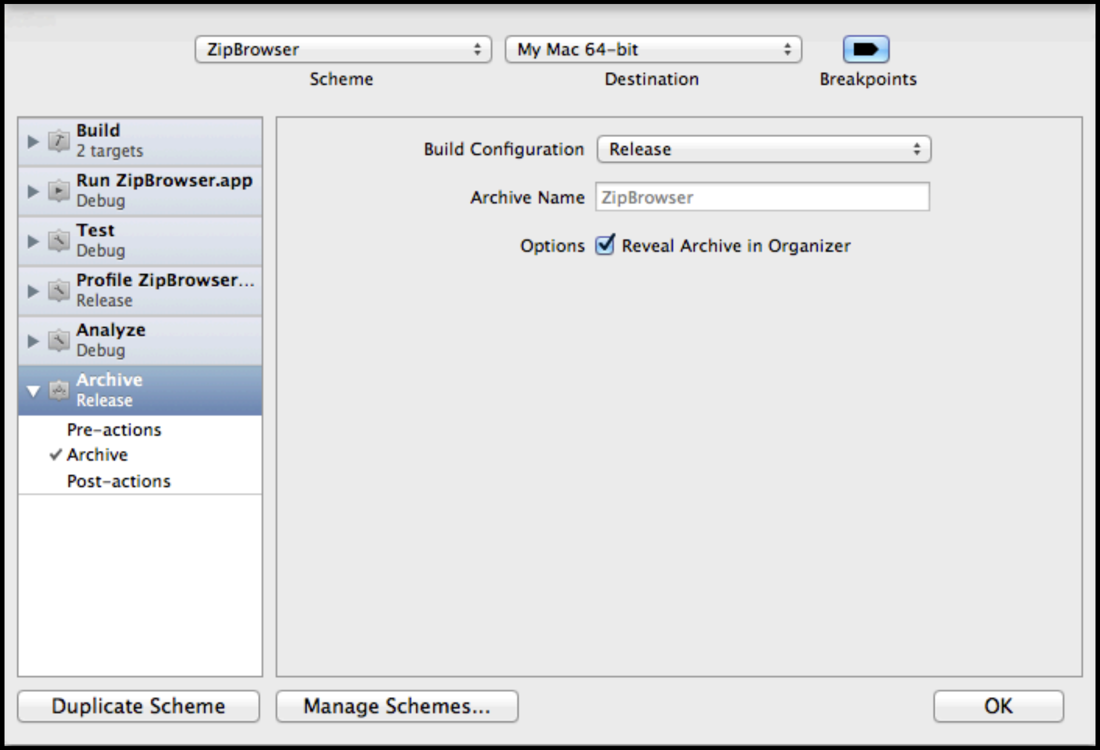


Build Configuration: Release

Archive Name: ZipBrowser

Options: ☑ Reveal Archive in Organizer

Creating Custom Pre- and Post-actions

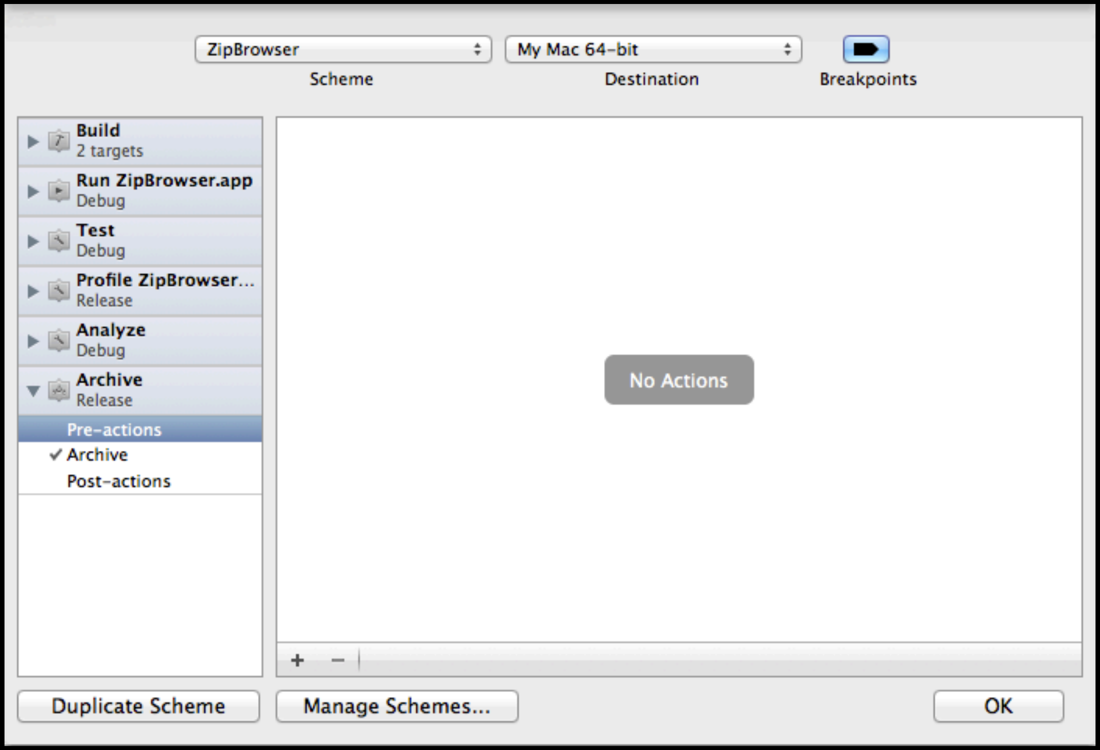


Build Configuration: Release

Archive Name: ZipBrowser

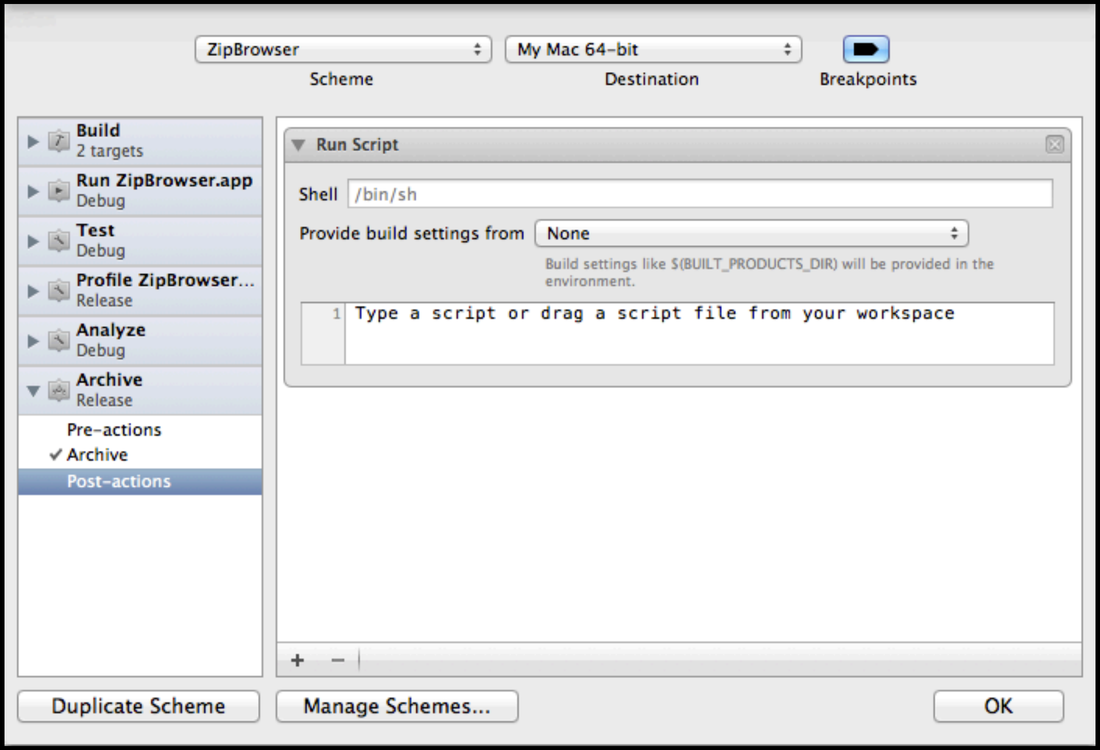
Options: ✓ Reveal Archive in Organizer

Creating Custom Pre- and Post-actions



Custom Scheme Action Types

Run script



Shell /bin/sh

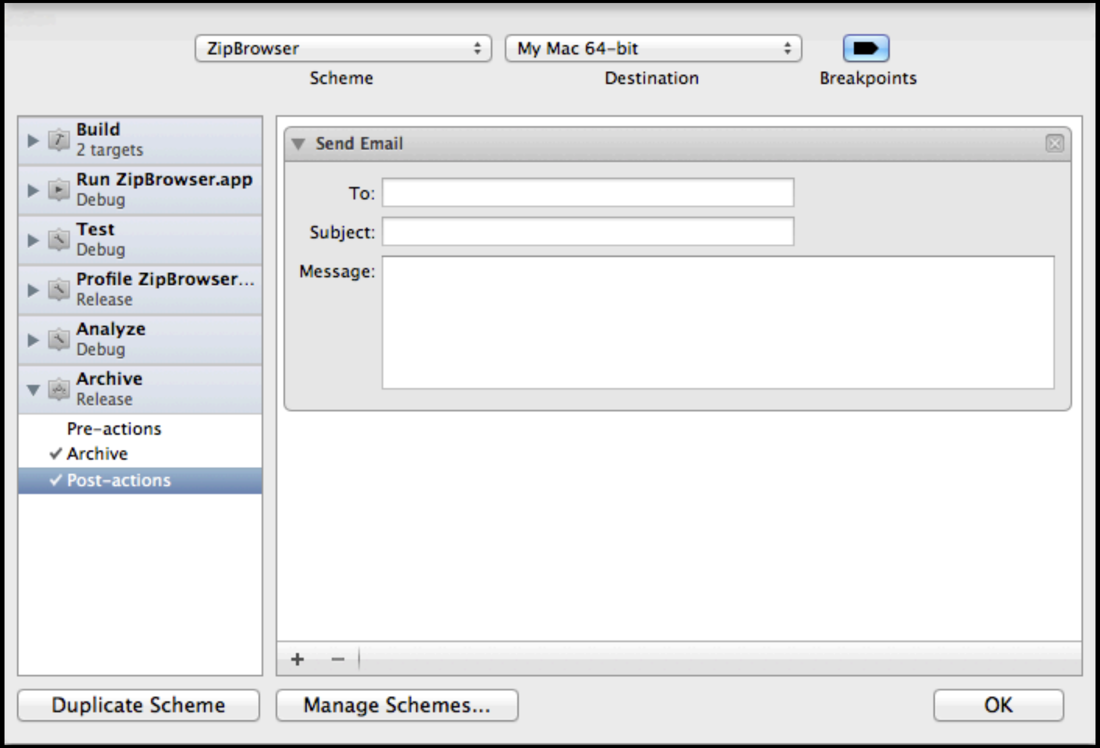
Provide build settings from None

Build settings like $(BUILT_PRODUCTS_DIR) will be provided in the environment.

```
Type a script or drag a script file from your workspace
```

Custom Scheme Action Types

Send email



When to Use Custom Scheme Actions

Run script build phases vs. custom scheme actions

- Build phases help produce a product from a target
- Custom scheme actions help prepare for or follow-up an action

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- Build phases help produce a product from a target
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If you're…	**Then use…**
Generating art for your app	Run Script build phase
Setting up test data	Pre-action Script
Uploading archive to server	Post-action Script

Demo

Custom scheme actions

More Information

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Documentation
Xcode 4 User Guide
http://developer.apple.com/library/ios/#documentation/ToolsLanguages/Conceptual/Xcode4UserGuide/

Apple Developer Forums
http://devforums.apple.com

Related Sessions

Using Interface Builder in Xcode 4	Pacific Heights Tuesday 2:00PM
Maximizing Productivity in Xcode 4	Presidio Wednesday 9:00AM
Introducing Interface Builder Storyboarding	Presidio Wednesday 11:30AM
Mastering Source Control in Xcode 4	Nob Hill Wednesday 3:15PM
Mastering Schemes with Xcode 4	Presidio Thursday 9:00AM
Device Management and App Submission with Xcode 4	Presidio Thursday 3:15PM

Labs

Xcode 4 Lab	Developer Tools Lab A Thursday 11:30AM

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