Developer Tools #WWDC15

Continuous Integration and Code Coverage in Xcode

Session 410

Matt Moriarity Xcode Engineer

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Agenda

What is Xcode Server

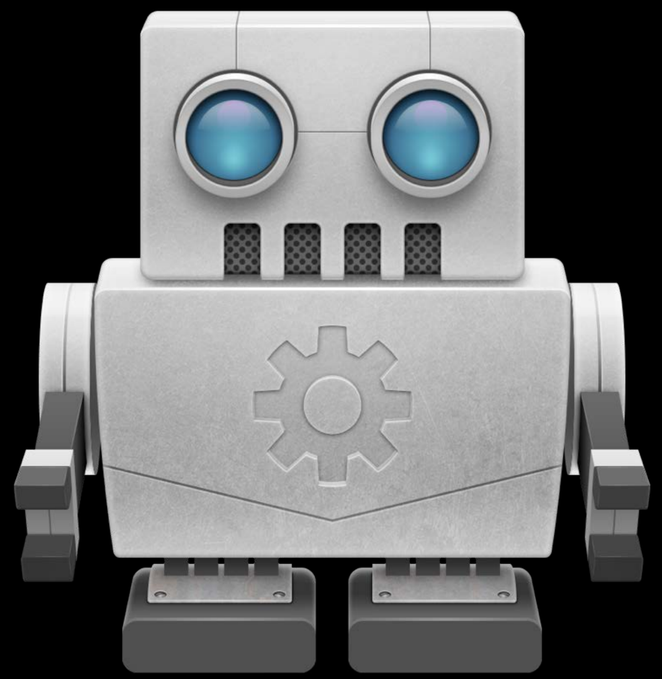
What's new in Xcode 7

Code coverage

Extending Xcode Server

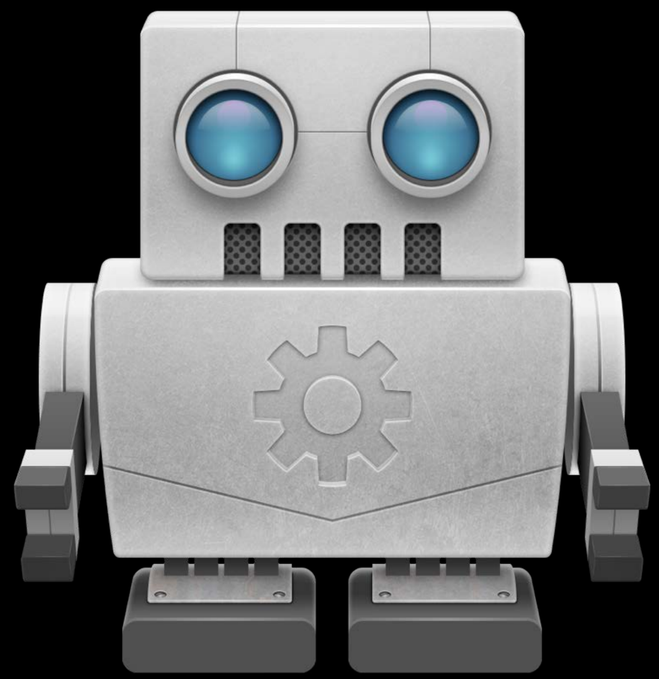
Demos

What Is Xcode Server



What Is Xcode Server

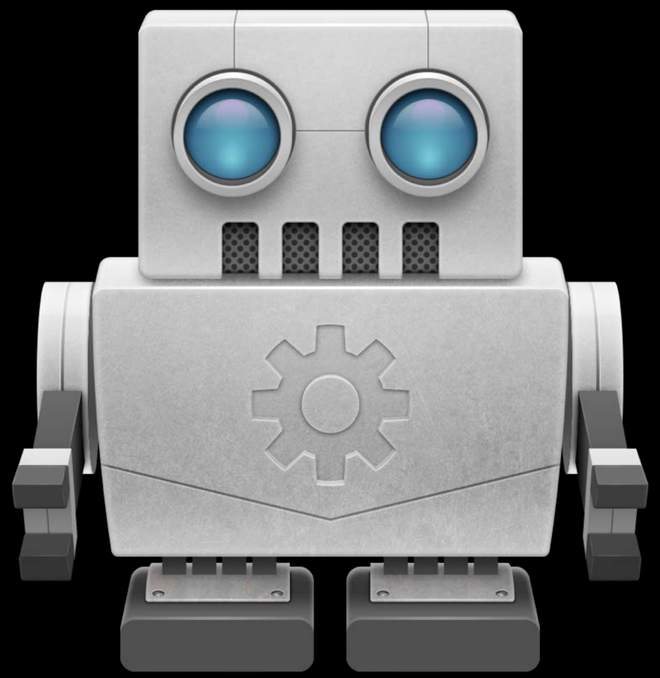
Continuous integration



What Is Xcode Server

Continuous integration

Enhances collaboration and improves software quality

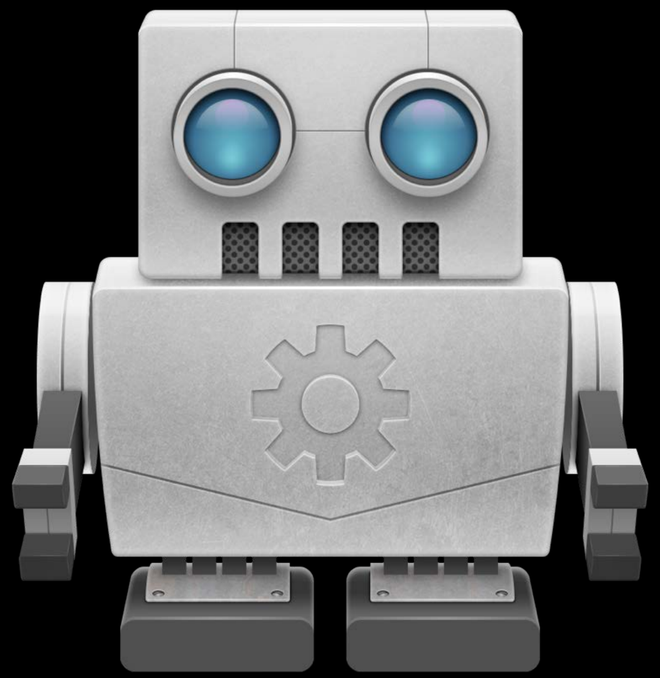


What Is Xcode Server

Continuous integration

Enhances collaboration and improves software quality

Builds and tests projects on a schedule



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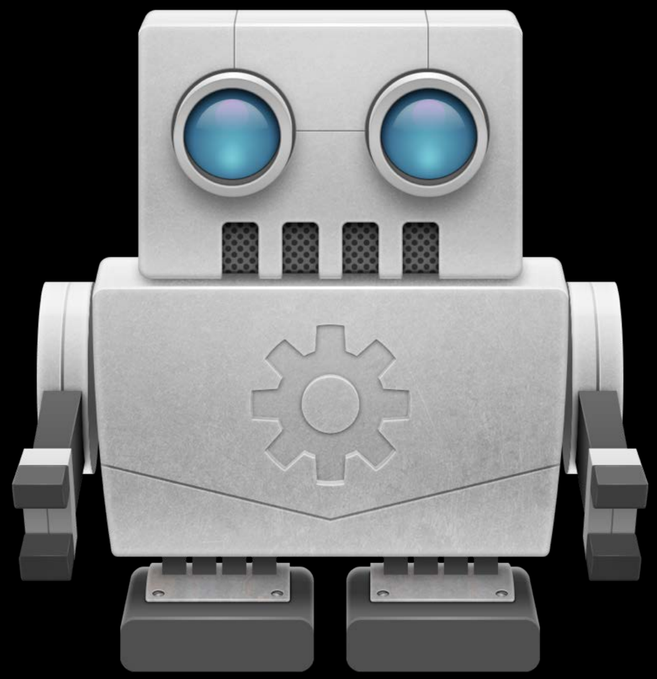
Easy to set up with Xcode and OS X Server



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Continuous integration

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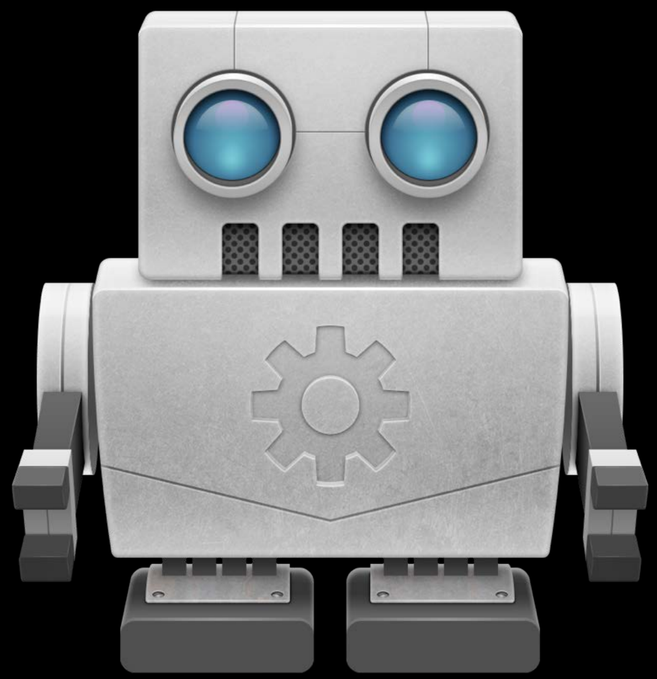
Easy to set up with Xcode and OS X Server

Deep integration with Xcode



What Is Xcode Server

Terminology

What Is Xcode Server

Terminology

Scheme

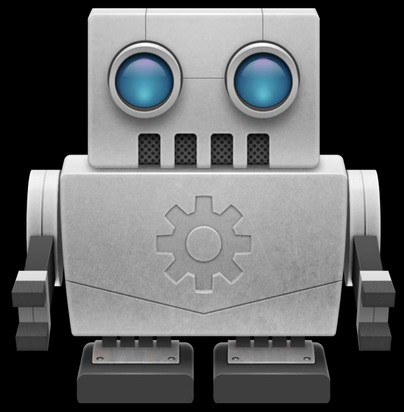
Recipe for building
your project

What Is Xcode Server

Terminology

Scheme

Recipe for building your project



Bot

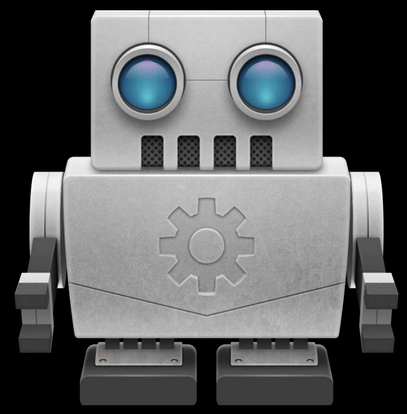
Analyze, build, test, and archive on a schedule

What Is Xcode Server

Terminology

Scheme

Recipe for building your project



Bot

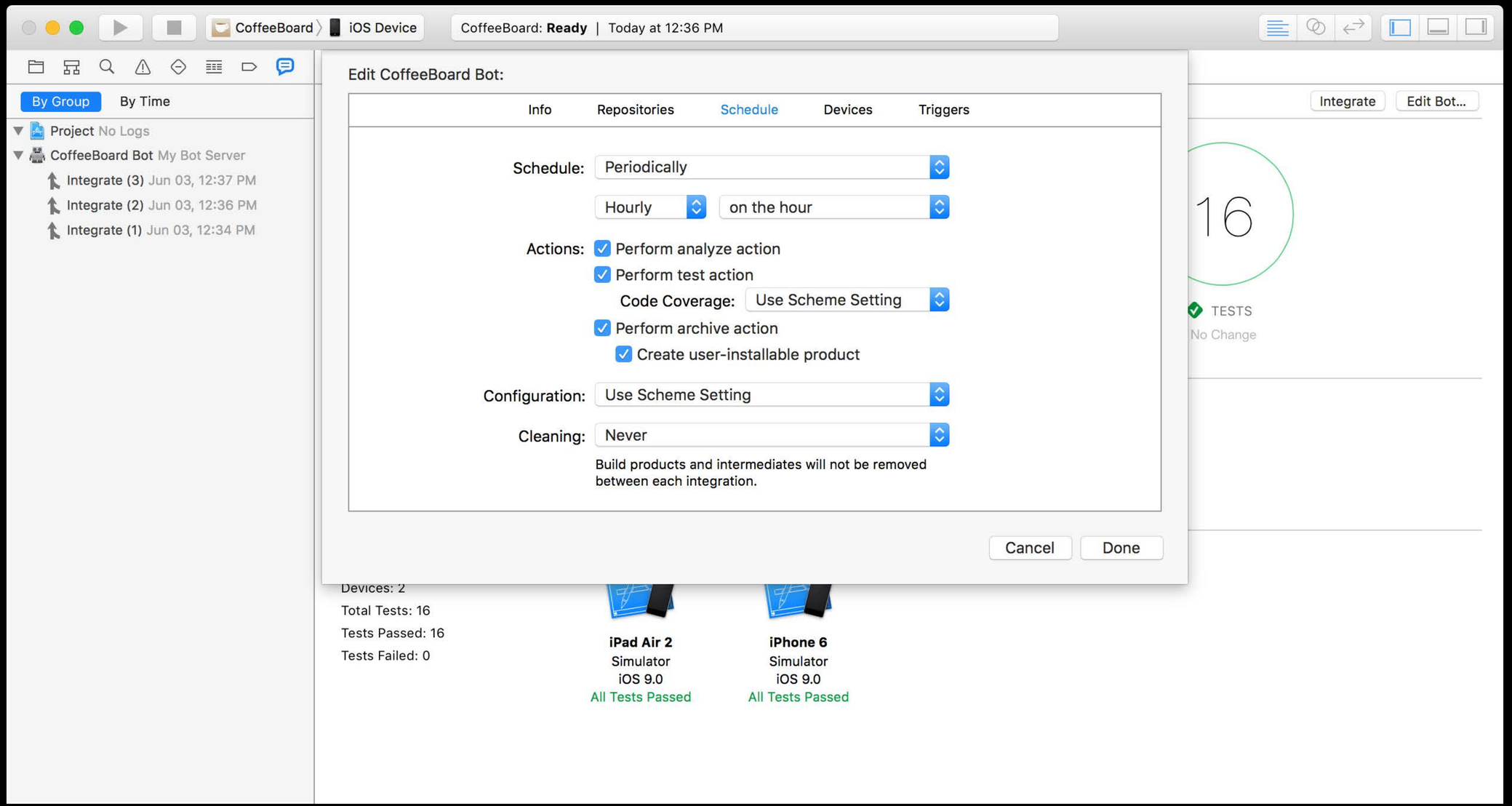
Analyze, build, test, and archive on a schedule

Integration

A single run of a bot

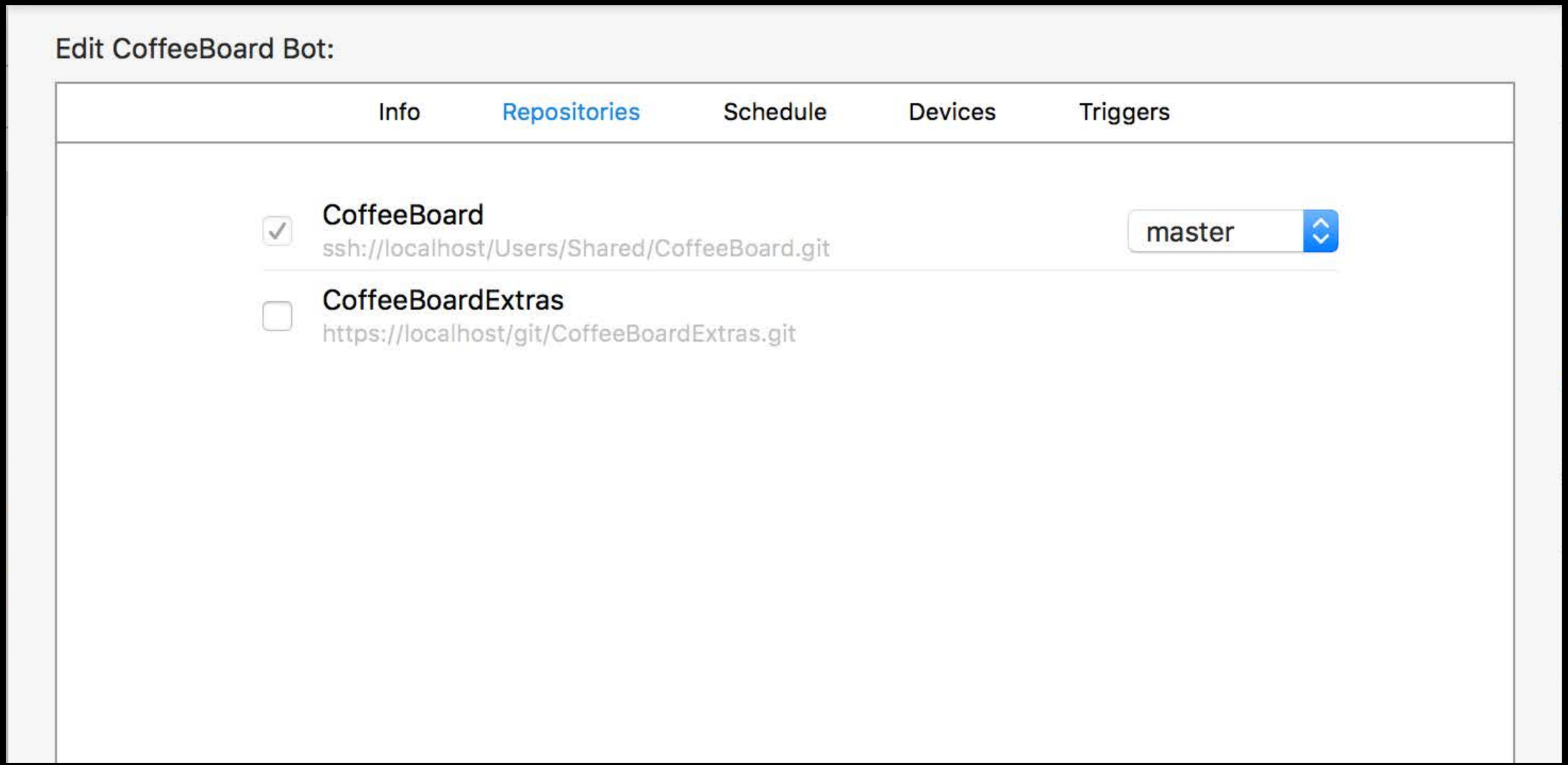
New in Xcode Server

Better bot editing



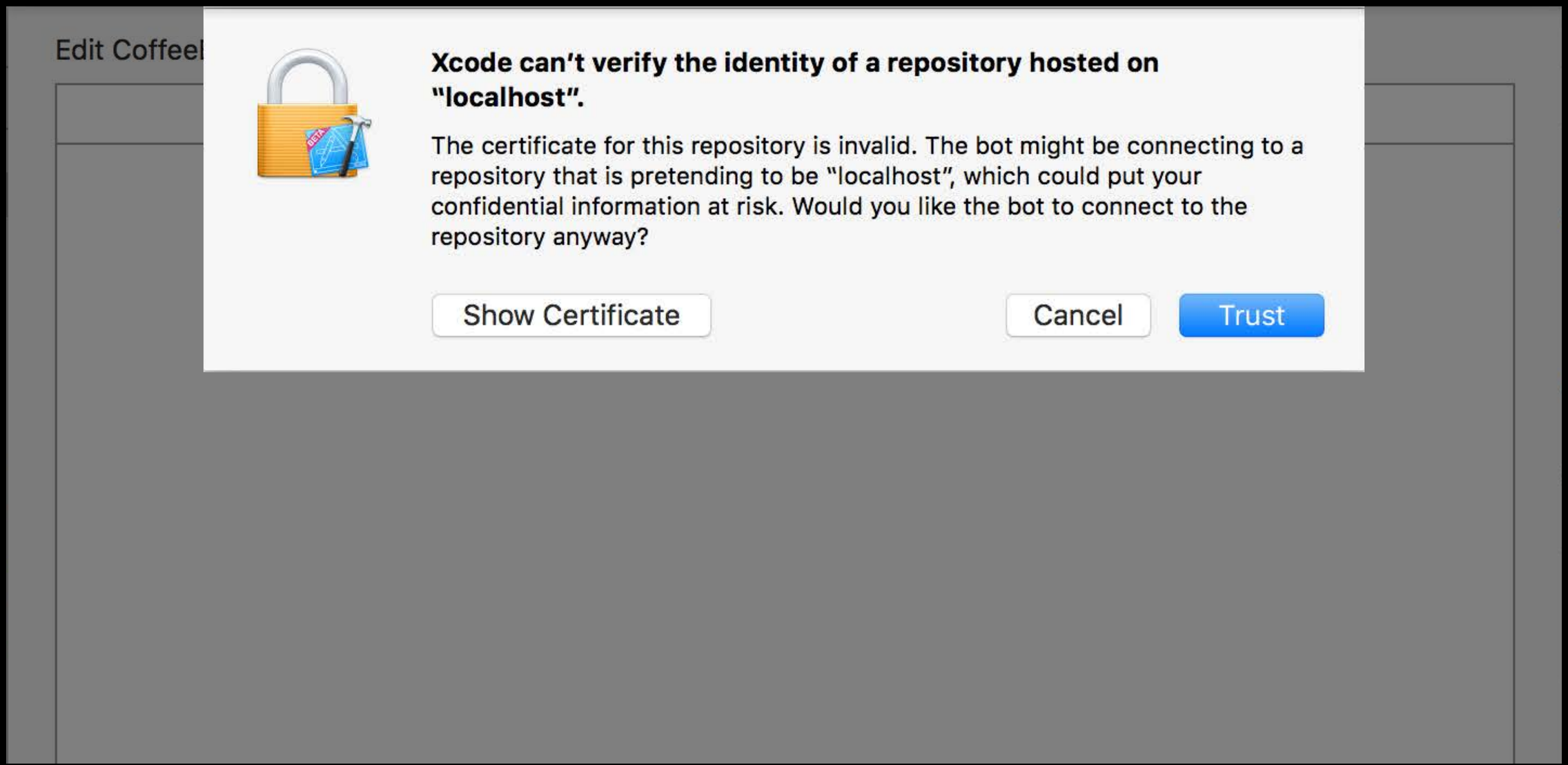
New in Xcode Server

Choosing repositories and branches



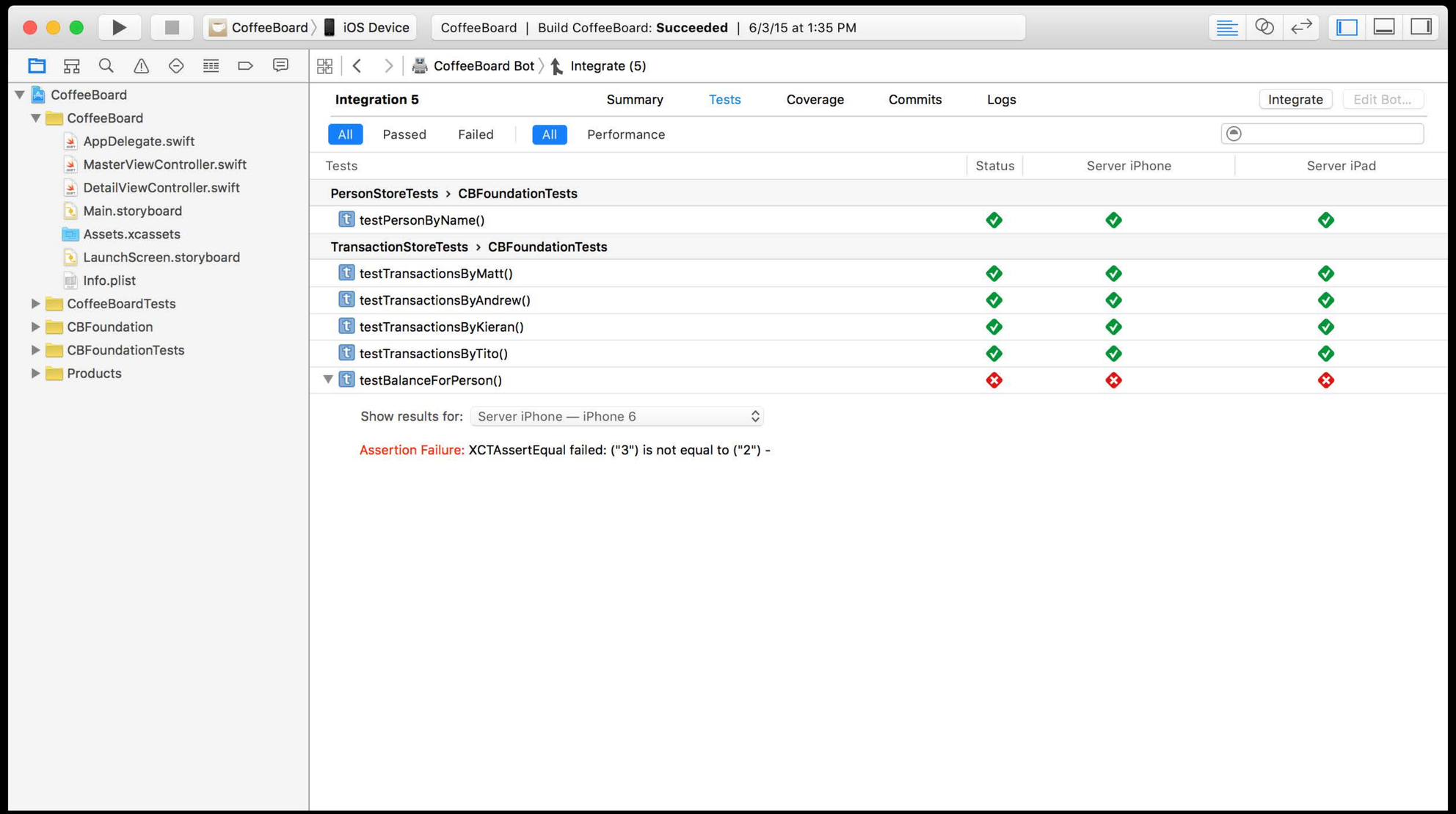
New in Xcode Server

Source control security



New in Xcode Server

Updated reports



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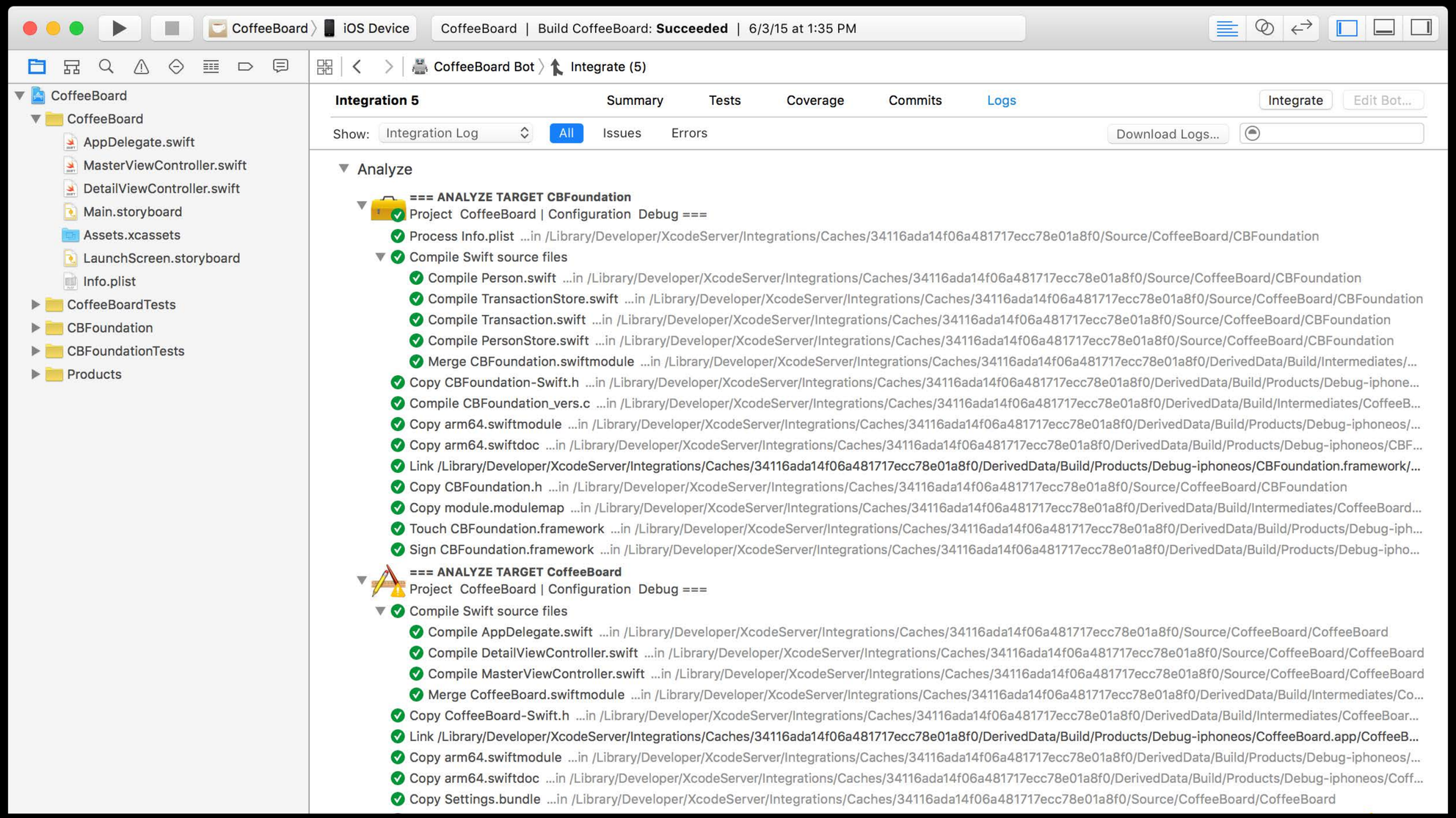


New in Xcode Server

Improved issue tracking

CoffeeBoard | Build CoffeeBoard: **Succeeded** | 6/3/15 at 1:35 PM

CoffeeBoard Bot 〉 Integrate (5)

Integration 5 Summary Tests Coverage Commits Logs Integrate Edit Bot...

0	2	0	1 / 6
ERRORS	WARNINGS	ISSUES	TESTS
No Change	No Change	No Change	+1

New Issues

Test Failure XCTAssertEqual failed: ("3") is not equal to ("2") -
Test case: -[TransactionStoreTests testBalanceForPerson()] in CoffeeBoard/CBFoundationTests/TransactionStoreTests.swift:52
Introduced by Eric Dudiak (82dbae2)

Unresolved Issues (2 warnings)

Warning Prototype table cells must have reuse identifiers
In CoffeeBoard/CoffeeBoard/Base.lproj/Main.storyboard
Claimed by eric, introduced 4 integrations ago by Eric Dudiak (4ae382e, b4b95c7, 585e747)

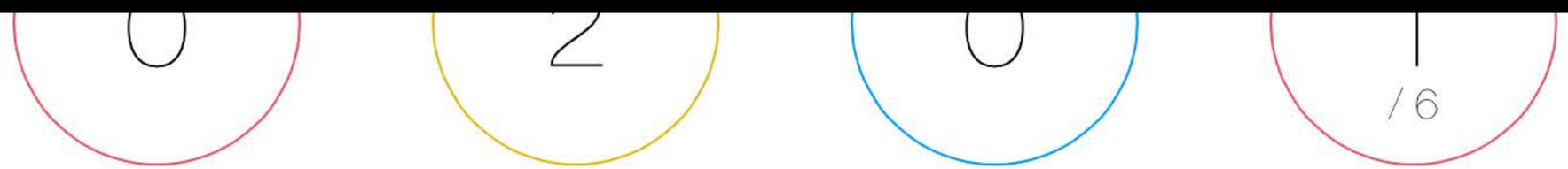
Warning Scene is unreachable due to lack of entry points and does not have an identifier for runtime access via -instantiateViewControllerWithIdentifier:.
In CoffeeBoard/CoffeeBoard/Base.lproj/Main.storyboard
Introduced 4 integrations ago by Eric Dudiak (4ae382e, b4b95c7, 585e747)

Build Results

2 Files (Product & Archive)

Product
CoffeeBoard.ipa

Archive
Archive.xcarchive



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Build Results

2 Files (Product & Archive)

Total: 44.4 MB

Product
CoffeeBoard.ipa
17.2 MB Save

Archive
Archive.xcarchive
27.2 MB Save

Device Testing

New Issues

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IPA

Product

CoffeeBoard.ipa

17.2 MB

Save

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In CoffeeBoard/C yboard

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Copy Issue

Jump to Integration

Claim Issue

Silence Issue ▶

For this integration

Until resolved

Forever

Build Results

2 Files (Product & Archive)

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Product

CoffeeBoard.ipa

17.2 MB

Save

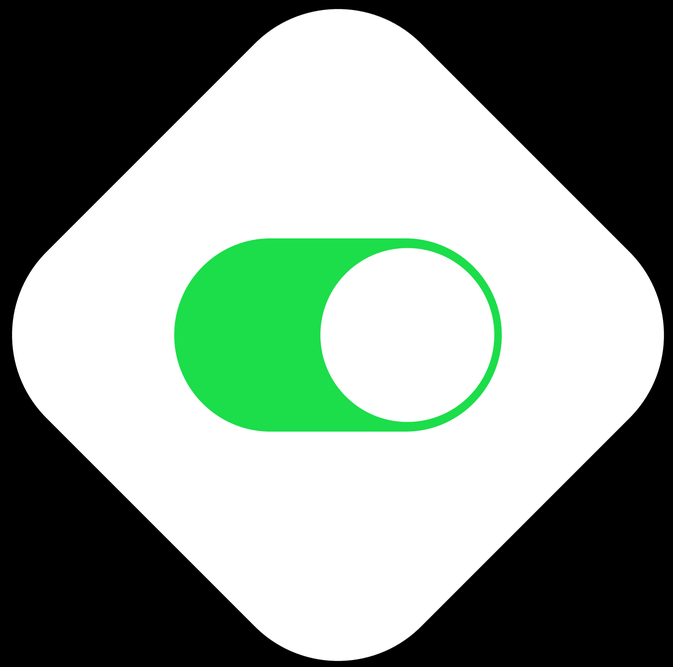
Device Testing

New in Xcode Server

Xcode 7 features

New in Xcode Server

Xcode 7 features



User Interface Testing

New in Xcode Server

Xcode 7 features

On Demand Resources

New in Xcode Server

Xcode 7 features

Code Coverage

Code Coverage

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A tool for measuring the value of tests

Code Coverage

A tool for measuring the value of tests

Shows which code is exercised by unit tests

Code Coverage

A tool for measuring the value of tests

Shows which code is exercised by unit tests

Exposes areas of your code that
are untested

Code Coverage

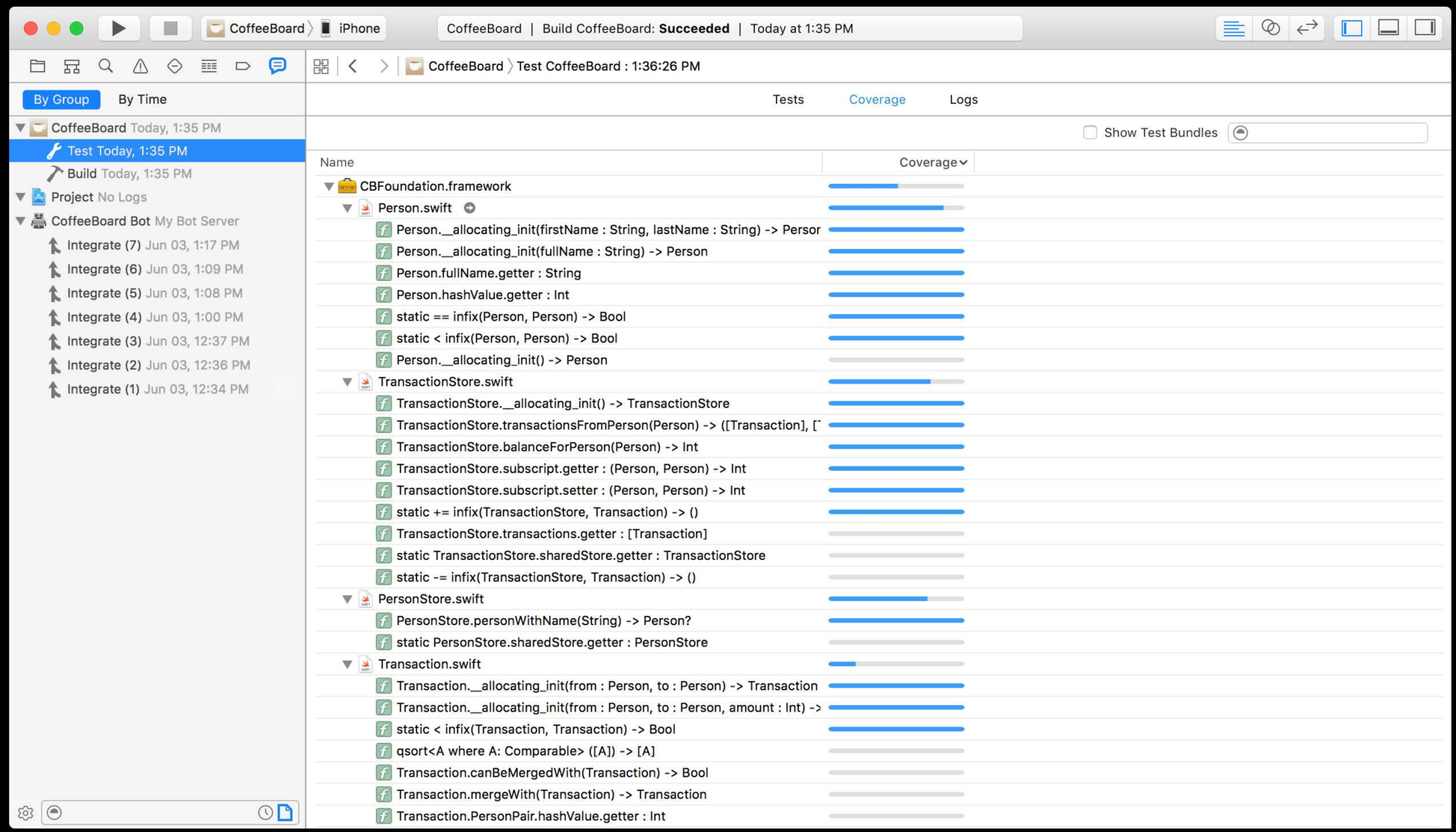
Code Coverage

Tightly integrated with LLVM

Counts each expression that is executed

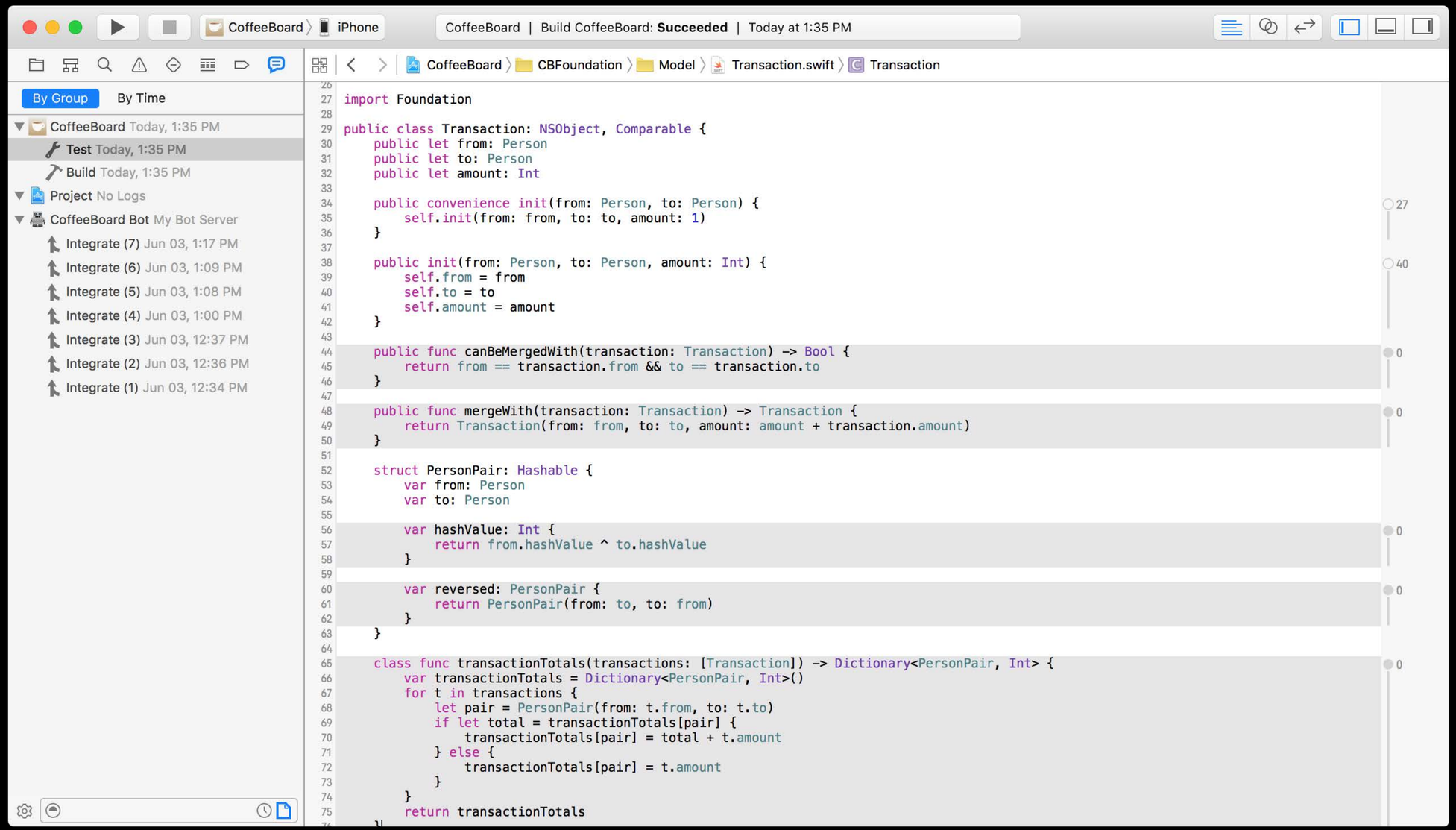
Code Coverage

Hierarchical coverage report



Code Coverage

In the editor

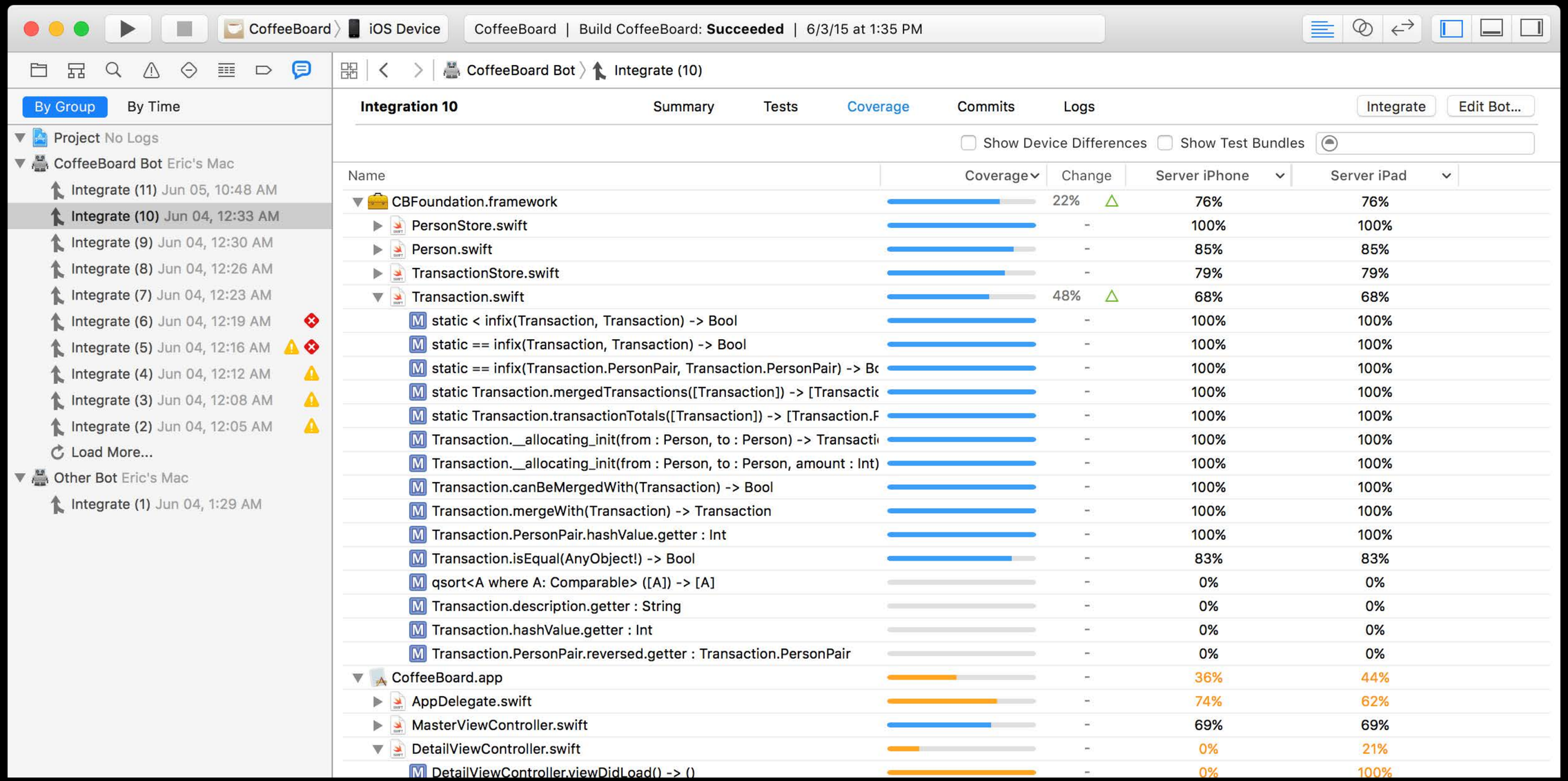


Code Coverage

In Xcode Server

Code Coverage

Multiple devices



		-	100%	100%
		-	83%	83%
		-	0%	0%
		-	0%	0%
		-	0%	0%
PersonPair		-	0%	0%
		-	36%	44%
		-	74%	62%
		-	69%	69%
		-	0%	21%
		-	0%	100%
		-	0%	100%
		-	0%	71%
		-	0%	62%
lTableView) ->		-	0%	43%
()		-	0%	0%
		-	0%	0%

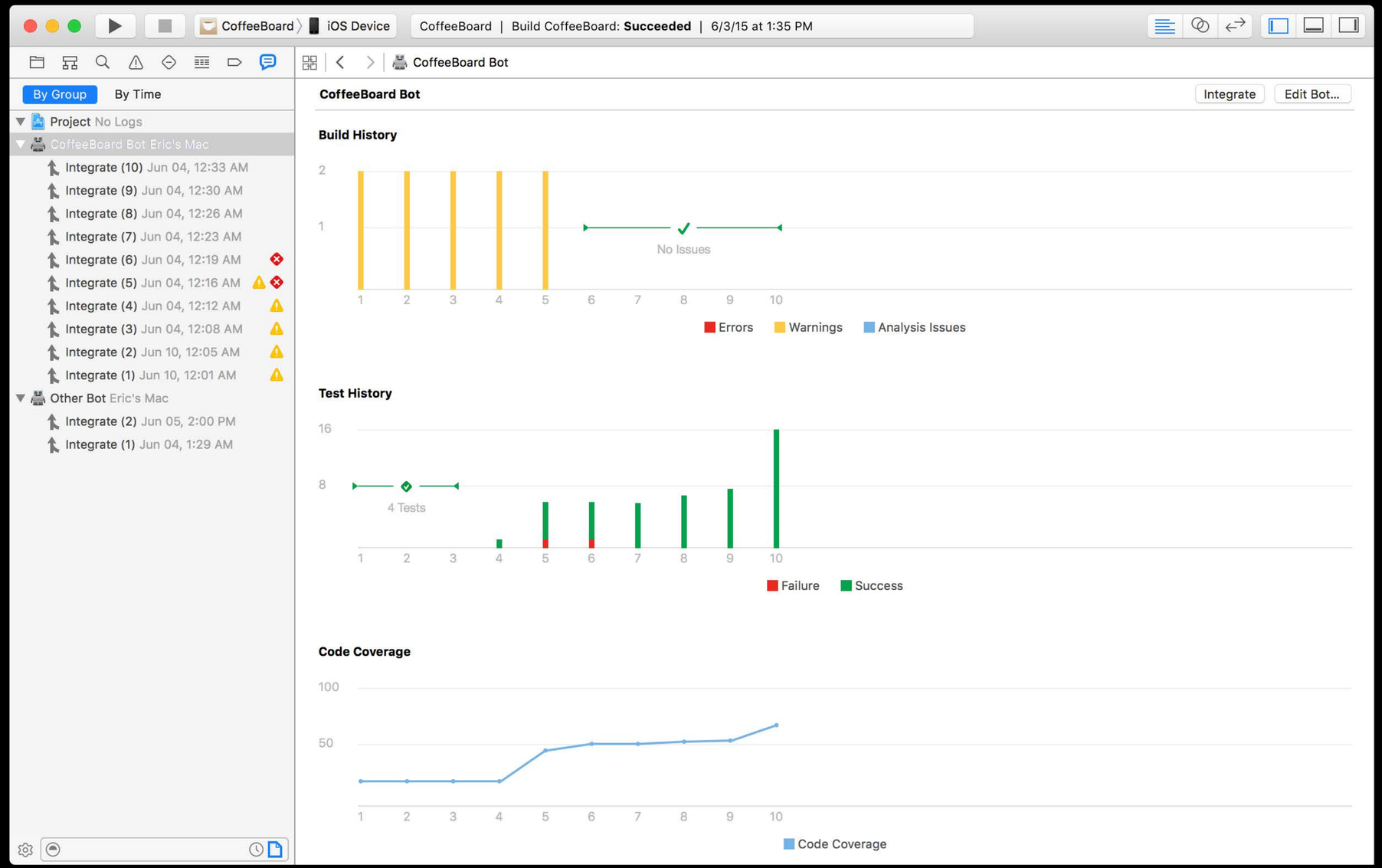
Summary Tests Coverage Commits Logs

Show Device Differences Show Test Bu

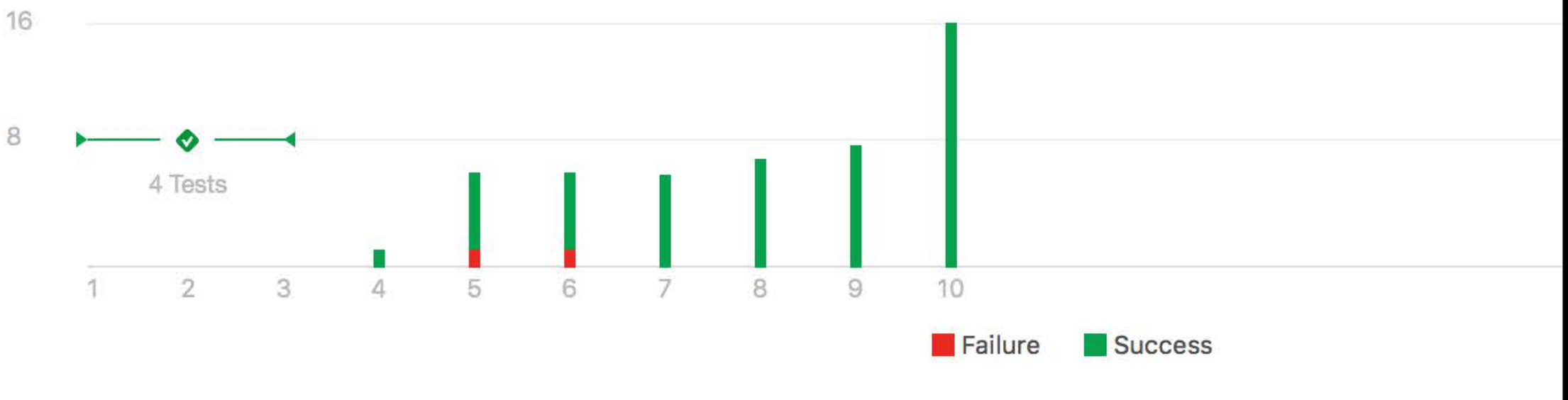
	Coverage	Change	Server iPhone
ework		22% △	76%
ft		-	100%
		-	85%
e.swift		-	79%
t		48% △	68%
Transaction, Transaction) -> Bool		-	100%
(Transaction, Transaction) -> Bool		-	100%
(Transaction.PersonPair, Transaction.PersonPair) -> Bo		-	100%
ction.mergedTransactions([Transaction]) -> [Transactio		-	100%
ction.transactionTotals([Transaction]) -> [Transaction.F		-	100%
_allocating_init(from : Person, to : Person) -> Transacti		-	100%
_allocating_init(from : Person, to : Person, amount : Int)		-	100%
anBeMergedWith(Transaction) -> Bool		-	100%
ergeWith(Transaction) -> Transaction		-	100%
ersonPair.hashValue.getter : Int		-	100%
sEqual(AnyObject!) -> Bool		-	83%

Code Coverage

Coverage trends



Test History



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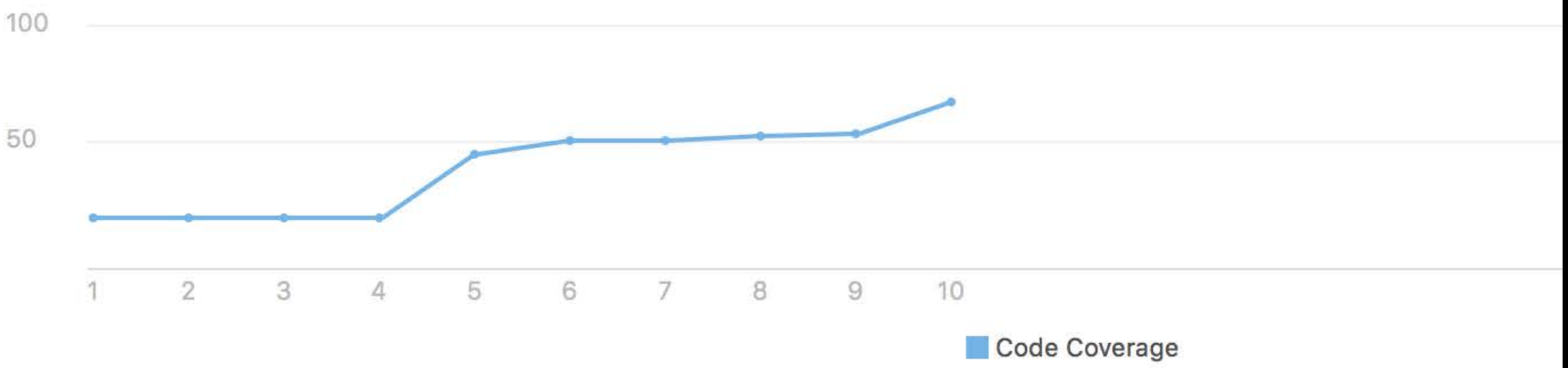
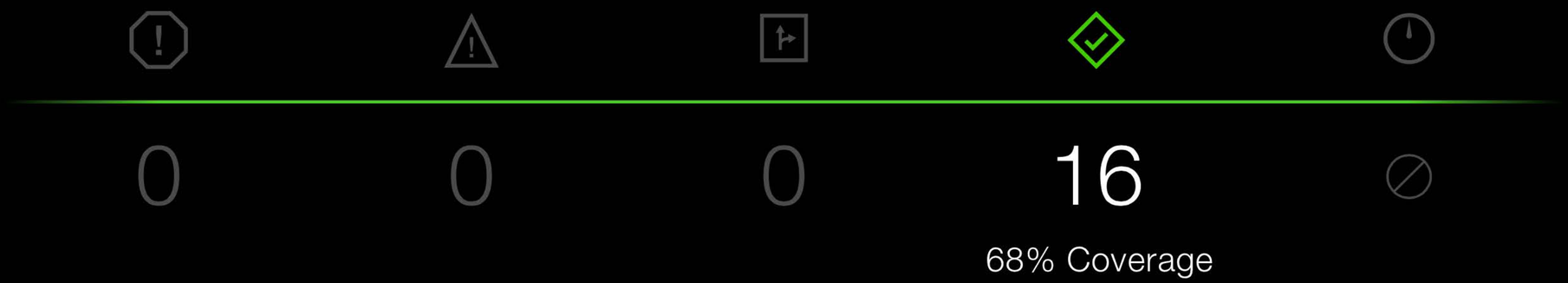
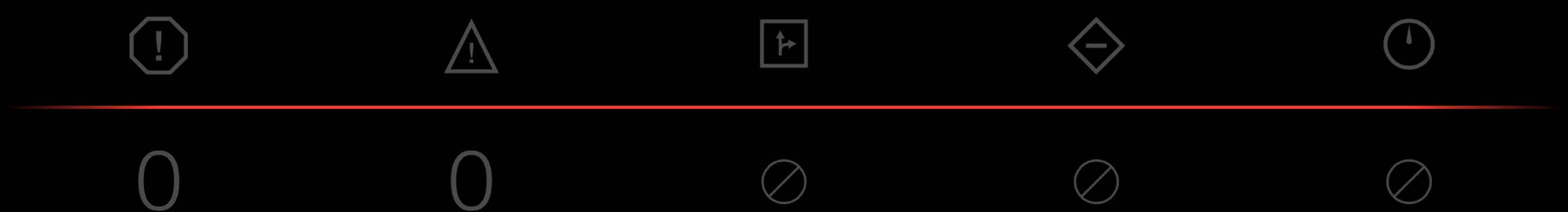


CoffeeBoard Bot 4 hrs ago



Other Bot 26 min ago



0

16

68% Coverage

Demo

Code coverage in Xcode

Eric Dudiak Xcode Engineer

Extending Xcode Server

Extending Xcode Server

Triggers

Extending Xcode Server

Triggers

Custom actions: Email notifications or scripts

Extending Xcode Server

Triggers

Custom actions: Email notifications or scripts

Use your language of choice

- Include a #! in your script, otherwise Bash is assumed

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Triggers

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Before and after integrations run

Extending Xcode Server

Triggers

Custom actions: Email notifications or scripts

Use your language of choice

- Include a #! in your script, otherwise Bash is assumed

Before and after integrations run

Gated on the result of the integration

Extending Xcode Server

Environment variables in triggers

`XCS`	Always set to 1, use to detect Xcode Server
`XCS_BOT_NAME`	The name of the current bot
`XCS_BOT_ID`	The ID of the current bot
`XCS_INTEGRATION_NUMBER`	The sequential number of the current integration
`XCS_INTEGRATION_ID`	The ID of the current integration
`XCS_INTEGRATION_RESULT`	The overall result of the integration
`XCS_SOURCE_DIR`	Location where your project's code was checked out
`XCS_OUTPUT_DIR`	Location where logs and assets for the integration are stored
`XCS_DERIVED_DATA_DIR`	Location where derived data is stored for this bot
`XCS_PRODUCT`	Path to an .ipa or .app, if the bot produced one
`XCS_(TYPE)_COUNT`	Number of issues of each type (error, warning, failed test, etc.)
`XCS_(TYPE)_CHANGE`	Change in number of issues from previous integration

Extending Xcode Server

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Extending Xcode Server

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Open standards

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- Secure communication over HTTPS

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- REST pattern of resources and actions

Extending Xcode Server

Open standards

- Secure communication over HTTPS
- REST pattern of resources and actions
- Data exchanged using JSON

Extending Xcode Server

Open standards

- Secure communication over HTTPS
- REST pattern of resources and actions
- Data exchanged using JSON

Compatible with most scripting languages

Extending Xcode Server

API example: bots

```
GET  https://my-server:20343/api/bots

{
  "count": 3,
  "results": [{
    "_id": "2787279335349c6fad1f8c0477eaf3df",
    "name": "CoffeeBoard Bot",
    "configuration": {
      "builtFromClean": 0,
      "schemeName": "CoffeeBoard",
      "performsAnalyzeAction": true,
      "performsTestAction": true,
      "performsArchiveAction": true,
      "exportsProductFromArchive": false,
      "triggers": [],
      "scheduleType": 2,
    }
```

Extending Xcode Server

API example: integrations

Extending Xcode Server

API example: integrations

```
GET  .../bots/2787279335349c6fad1f8c0477eaf3df/integrations
```

Extending Xcode Server

API example: integrations

```
GET  .../bots/2787279335349c6fad1f8c0477eaf3df/integrations

{
  "count": 30,
"results: [{
  "_id": "93040d36151067716da6ff05a20032bc",
  "bot": { ... },
  "number": 23,
  "currentStep": "completed",
  "result": "build-errors",
  "buildResultSummary": {
    "errorCount": 3,
    "errorChange": -1,
    "warningCount": 11,
    "warningChange": 0,
```

Extending Xcode Server

API example: integrating a bot

Extending Xcode Server

API example: integrating a bot

```
POST .../bots/2787279335349c6fad1f8c0477eaf3df/integrations
```

Extending Xcode Server

API example: integrating a bot

```
POST .../bots/2787279335349c6fad1f8c0477eaf3df/integrations
```

```
{
  "_id": "93040d361510677l6da6ff05a20032bc",
  "bot": { ... },
  "number": 23,
  "currentStep": "pending"
}
```

Extending Xcode Server

API example: integrating a bot

```
POST .../bots/2787279335349c6fad1f8c0477eaf3df/integrations
{ "shouldClean": true }

{
  "_id": "93040d361510677716da6ff05a20032bc",
  "bot": { ... },
  "number": 23,
  "currentStep": "pending"
}
```

Demo

Extending Xcode Server

Eric Dudiak Xcode Engineer

Extending Xcode Server

Available endpoints

`GET /bots`	List bots on server
`POST /bots`	Create a new bot
`GET /bots/(id)`	Retrieve a bot by ID
`PATCH /bots/(id)`	Update a bot's configuration
`GET /bots/(id)/integrations`	Get the most recent integrations for a bot
`POST /bots/(id)/integrations`	Enqueue a new integration
`GET /integrations`	List integrations on server
`GET /integrations/(id)`	Retrieve an integration by ID
`GET /integrations/(id)/commits`	List the commits included in an integration
`GET /integrations/(id)/issues`	List the build issues produced by an integration
`GET /devices`	List devices connected to server
`GET /repositories`	List hosted repositories on server
`POST /repositories`	Create a new hosted repository

Summary

Xcode Server improvements

New testing features

Code coverage

Triggers

Xcode Server API

More Information

Xcode Server and Continuous Integration Guide
http://developer.apple.com/library

Apple Developer Forums
http://developer.apple.com/forums

Stefan Lesser
Swift Evangelist
slesser@apple.com

Related Sessions

UI Testing in Xcode	Presidio	Wednesday 11:00AM
Continuous Integration with Xcode 6		WWDC 2014

Related Lab

Testing and Continuous Integration	Developer Tools Lab B	Thursday 1:30PM

WWDC15