https://github.com/GroundSpeed/BreakingGround

QUALITY IS AS QUALITY DOES

Don Miller
Founder of GroundSpeed™
Co-founder of Seed Coworking
@donmiller

Don Miller | GroundSpeed™
rapid web + mobile software

OBJECTIVES

- What is Unit Testing?
- Why Unit Testing?
- Xcode - Setting Up Unit Tests
- Xcode - Creating Performance Tests When Using A 3rd Party API
- Xcode - Testing parse.com Connection
- Xcode - Code Coverage

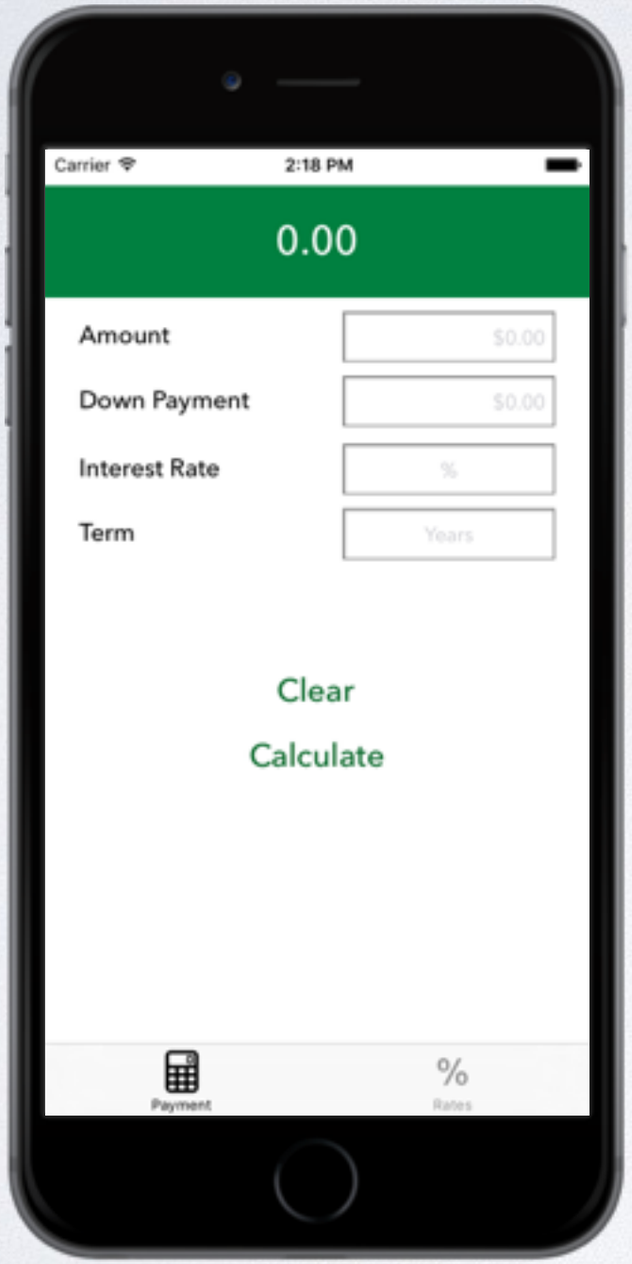
WHAT IS UNIT TESTING?

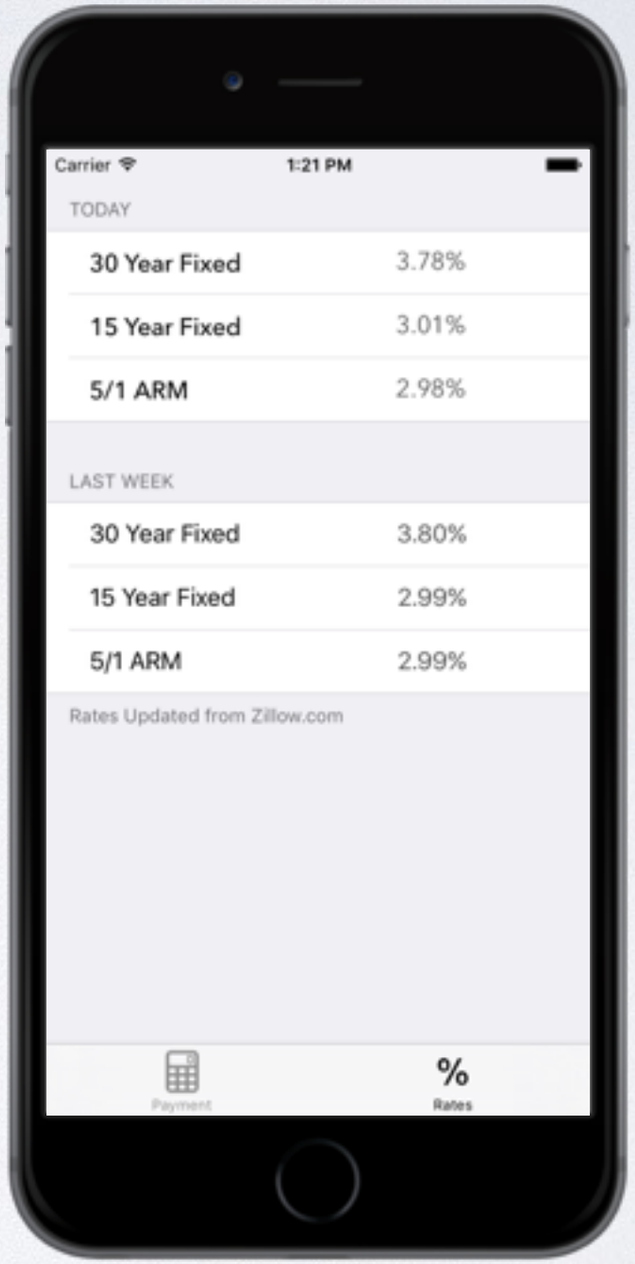
- Test small pieces of your code
- Xcode provides a separate testing environment that allows you to bolt on tests to your application
- Unit testing is a great way to test methods that you are planning to create
  - You can start by calling the method as you have planned
  - Once test fails, start writing the method to make it pass

WHY UNIT TEST?

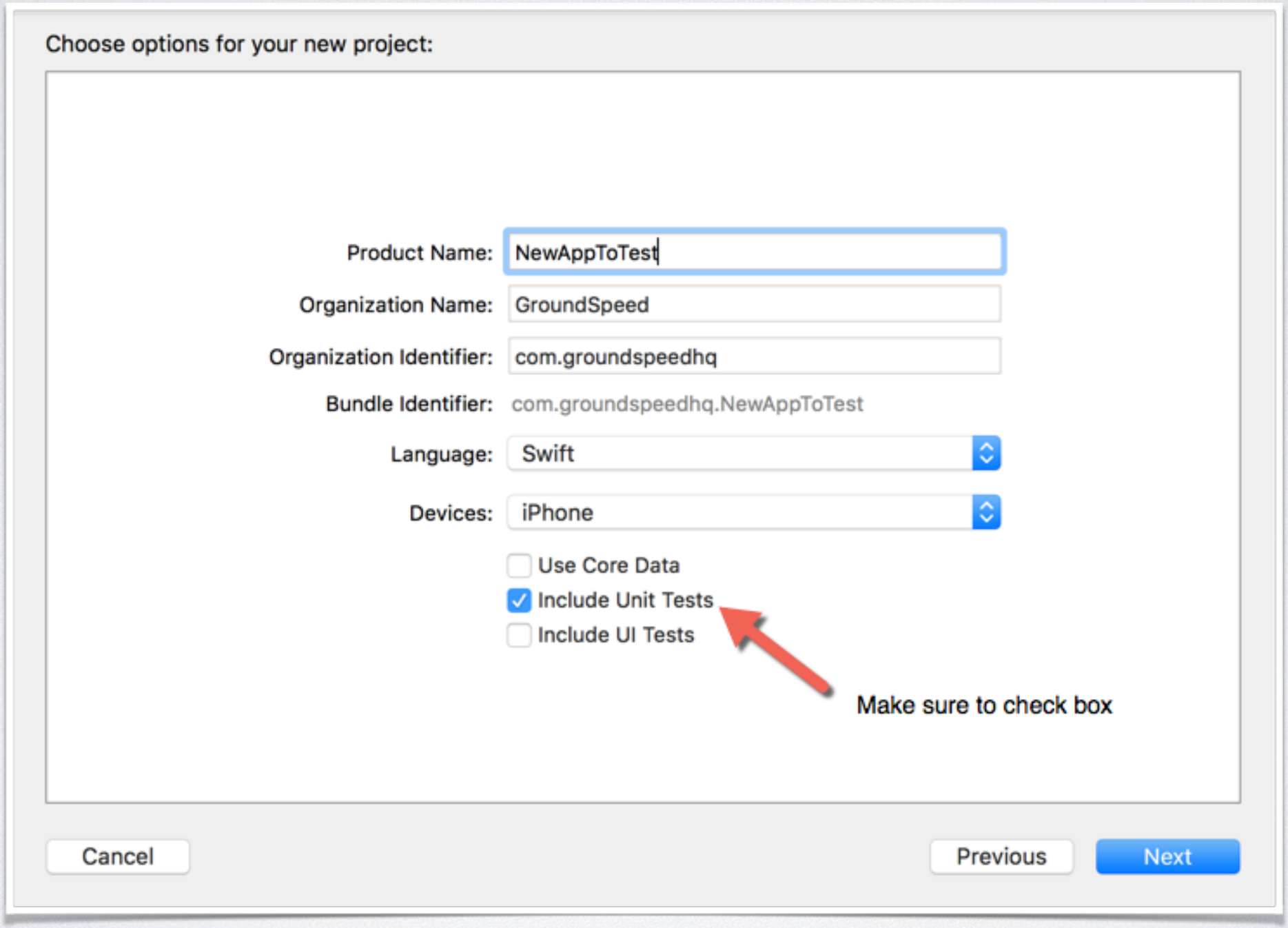
- Verify your code does what you expect
- Makes refactoring much less painful
- Creates a discipline of creating smaller more concise methods

APP WE WILL BE TESTING

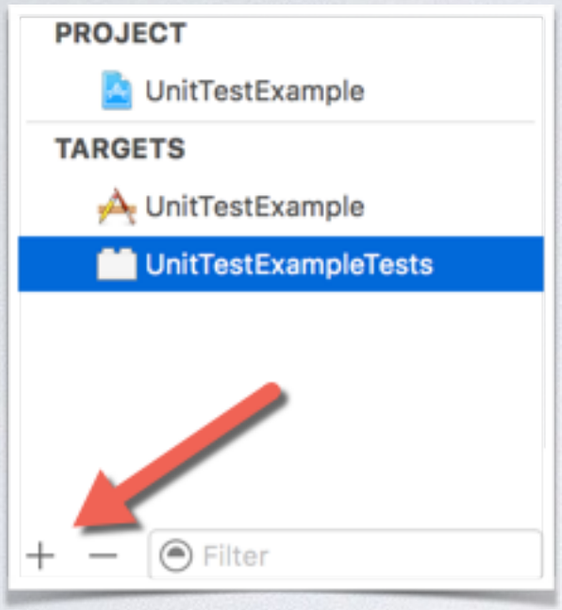


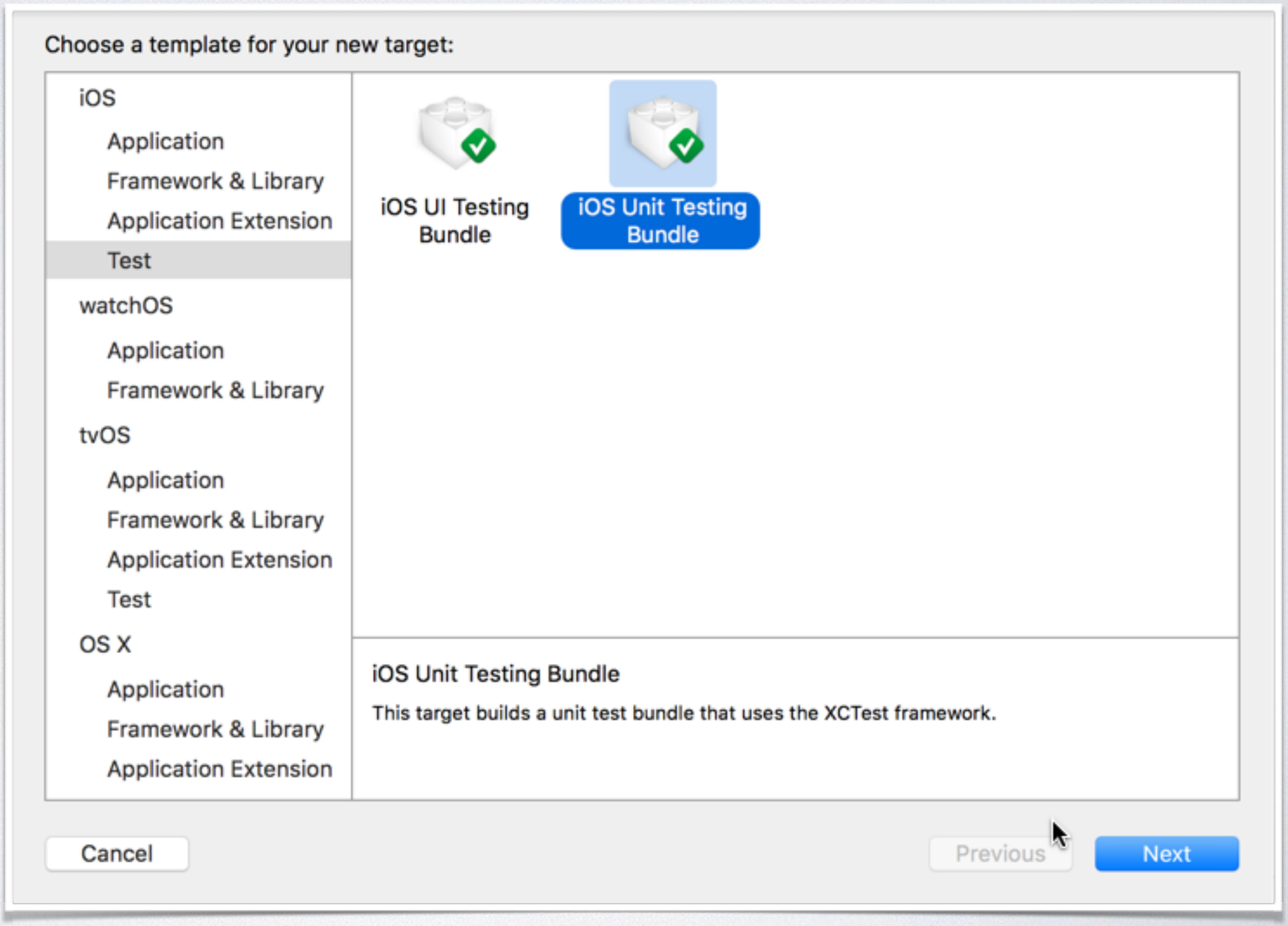


HOW TO ADD UNIT TESTS?

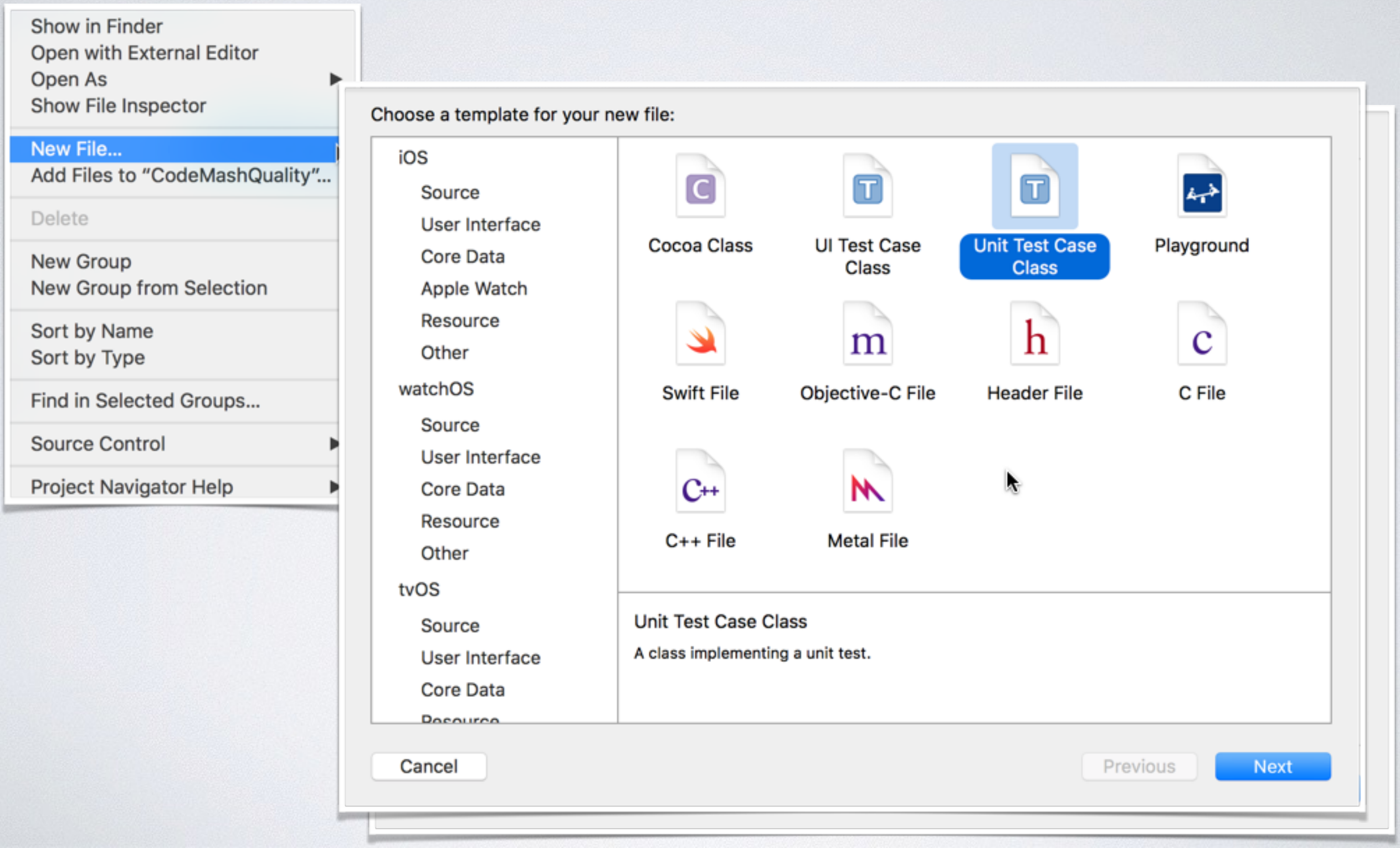


HOW TO ADD TESTS TO AN EXISTING PROJECT





ADDING NEW TEST CLASSES



UNIT TEST CONVENTIONS

- All Unit Test methods should begin with “test”
- Unit Test methods cannot have parameters
- Unit Test methods are subclasses of XCTestCase
- There are no restrictions on the amount of test classes or tests
- To run code prior to each test, override the setup method
- To run code after each test, override the teardown method

FUNDAMENTAL TEST

- All of the XCTest assertions come down to a single, base assertion

```
XCTAssert(expression, format…)
```

- If the expression evaluates to true, the test passes. Otherwise, the test fails, printing the formatted message.

BOOLEAN TESTS

- For Bool values, or simple boolean expressions, use XCTAssertTrue & XCTAssertFalse

```
XCTAssertTrue(expression, format...)
XCTAssertFalse(expression, format...)
```

EQUALITY TESTS

- When testing whether two values are equal, use XCTAssert[Not]Equal for scalar values and XCTAssert[Not]EqualObjects for objects

```
XCTAssertEqual(expression1, expression2, format...)
XCTAssertNotEqual(expression1, expression2, format...)
```

```
func testOnePlusOneEqualsTwo() {
    XCTAssertEqual(1 + 1, 2, "one plus one should equal two")
}
```

NIL TESTS

- Use XCTAssert[Not]Nil to assert the existence (or non-existence) of a given value

```
XCTAssertNil(expression, format...)
XCTAssertNotNil(expression, format...)
```

UNCONDITIONAL FAILURE

- The XCTFail assertion will always fail

```
XCTFail(format...)
```

PERFORMANCE TESTING

```
func testDateFormatterPerformance() {
    let dateFormatter = NSDateFormatter()
    dateFormatter.dateStyle = .LongStyle
    dateFormatter.timeStyle = .ShortStyle

    let date = NSDate()

    measureBlock() {
        let string = dateFormatter.stringFromDate(date)
    }
}
```

XCTESTEXPECTATION

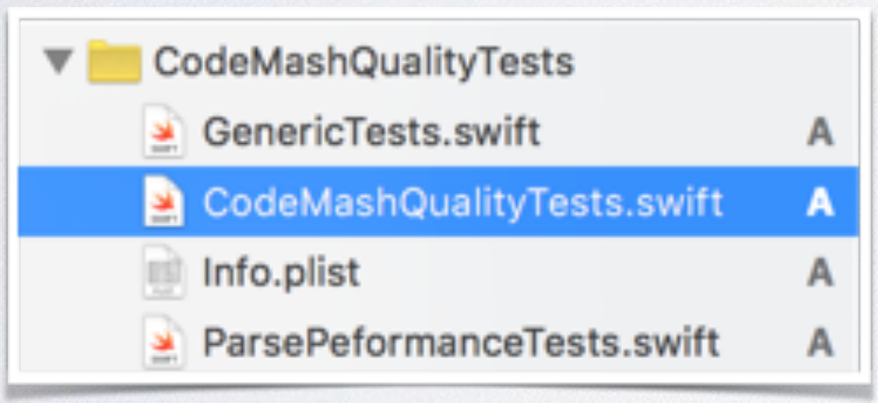
```swift
func testPerformanceZillowConnection() {
    self.measureBlock {
        self.callAsynchronousZillowConnection()
    }
}

func callAsynchronousZillowConnection() {

    let URL = NSURL(string: GlobalHelper().kPostEndpoint)!
    let expectation = expectationWithDescription("GET \(URL)")

    let session = NSURLSession.sharedSession()
    let task = session.dataTaskWithURL(URL) { data, response, error in
        XCTAssertNotNil(data, "data should not be nil")
        XCTAssertNil(error, "error should be nil")

        if let HTTPResponse = response as? NSHTTPURLResponse,
            responseURL = HTTPResponse.URL,
            MIMEType = HTTPResponse.MIMEType
        {
            XCTAssertEqual(responseURL.absoluteString, URL.absoluteString, "HTTP response URL should be equal to original URL")
            XCTAssertEqual(HTTPResponse.statusCode, 200, "HTTP response status code should be 200")
            XCTAssertEqual(MIMEType, "application/json", "HTTP response content type should be application/json")
        } else {
            XCTFail("Response was not NSHTTPURLResponse")
        }

        expectation.fulfill()
    }
    task.resume()
    waitForExpectationsWithTimeout(task.originalRequest!.timeoutInterval) { error in
        if let error = error {
            print("Error: \(error.localizedDescription)")
        }
        task.cancel()
    }
}
```

```swift
import UIKit

class GlobalHelper: NSObject {

    static let kApiKey = "X1-ZWz1f3t3bvl4i3_1brbp"
    let kPostEndpoint = "https://www.zillow.com/webservice/GetRateSummary.htm?zws-id=\(kApiKey)&output=json"


    func getMonthlyPayment(amount: Float, downPayment: Float, term: Float, interestRate: Float, lblPayment: UILabel) -> UILabel {
        // A = payment Amount per period
        // P = initial Principal (loan amount)
        // r = interest rate per period
        // n = total number of payments or periods

        let principal : Float = amount - downPayment
        let payments = term*12
        let rate = interestRate/12/100
        let amount = calculatPMTWithRatePerPeriod(rate, numberOfPayments: payments, loanAmount: principal, futureValue: 0, type: 0)

        if (isnan(amount) || isinf(amount))
        {
            lblPayment.font = UIFont.boldSystemFontOfSize(18)
            lblPayment.textColor = UIColor.redColor()
            lblPayment.text = "You must enter all required fields.";
        }
        else
        {
            lblPayment.font = UIFont(name: "Avenir Next", size: 28)
            lblPayment.textColor = UIColor.whiteColor()
            lblPayment.text = String(format: "%.02f", amount)
        }

        return lblPayment
    }

    func calculatPMTWithRatePerPeriod (ratePerPeriod: Float, numberOfPayments: Float, loanAmount: Float, futureValue: Float, type: Float) -> Float {

        var q : Float

        q = pow(1 + ratePerPeriod, numberOfPayments)

        let returnValue = (ratePerPeriod * (futureValue + (q * loanAmount))) / ((-1 + q) * (1 + ratePerPeriod * (type)))

        return returnValue

    }
}

extension String {
    func toPercent() -> String {
        return String.localizedStringWithFormat("%.2f%%", Float(self)!)
    }
}
```

@TESTABLE

- @testable solves the problem of previous Swift versions by giving you access to everything that is internal

- Access levels were different in Objective-C and this problem was not noticed until Swift 1.0




```
9  import XCTest
10 @testable import CodeMashQuality
```

TEST OUR GETPAYMENT() METHOD

```
24      func testGetPayment() {
25          let amount: Float = 100000.00
26          let downPayment: Float = 1000.00
27          let interestRate: Float = 5.0
28          let term: Float = 30
29          let label : UILabel = UILabel()
30
31          let result = GlobalHelper().getMonthlyPayment(amount, downPayment: downPayment, term: term, interestRate:
                interestRate, lblPayment: label)
32
33          XCTAssert(result.text == "531.45", "\(result.text) should equal 531.45")
34          XCTAssert(result.textColor == UIColor.whiteColor(), "\(result.textColor) should be white")
35      }
36
37      func testGetPaymentBadNumber() {
38          let amount: Float = 0
39          let downPayment: Float = 0
40          let interestRate: Float = 0
41          let term: Float = 0
42          let label : UILabel = UILabel()
43
44          let result = GlobalHelper().getMonthlyPayment(amount, downPayment: downPayment, term: term, interestRate:
                interestRate, lblPayment: label)
45
46          XCTAssert(result.text == "You must enter all required fields.", "\(result.text) should read You must enter all
                required fields.")
47          XCTAssert(result.textColor == UIColor.redColor(), "\(result.textColor) should be red")
48      }
```

TEST CALCULATEPAYMENT() METHOD

```
51      func testCalculatePayment() {
52          let amount: Float = 100000.00
53          let downPayment: Float = 1000.00
54          let interestRate: Float = 5.0
55          let term: Float = 30
56
57          let principal : Float = amount - downPayment
58          let payments = term*12
59          let rate = interestRate/12/100
60
61          var result = GlobalHelper().calculatPMTWithRatePerPeriod(rate, numberOfPayments: payments, loanAmount: principal,
                futureValue: 0.0, type: 0.0)
62          result = round(100*result)/100  //Round to two decimal places
63          XCTAssert(result == 531.45, "\(result) should equal 531.45")
64
65      }
```

TEST THE ZILLOW API JSON CALL

```
67      func testJsonCall() {
68          let zillowRates : Dictionary<String, String> = ApiHelper().getRatesFromZillow()
69
70          XCTAssert(zillowRates.count == 6, "\(zillowRates.count) should include 6 records")
71      }
```

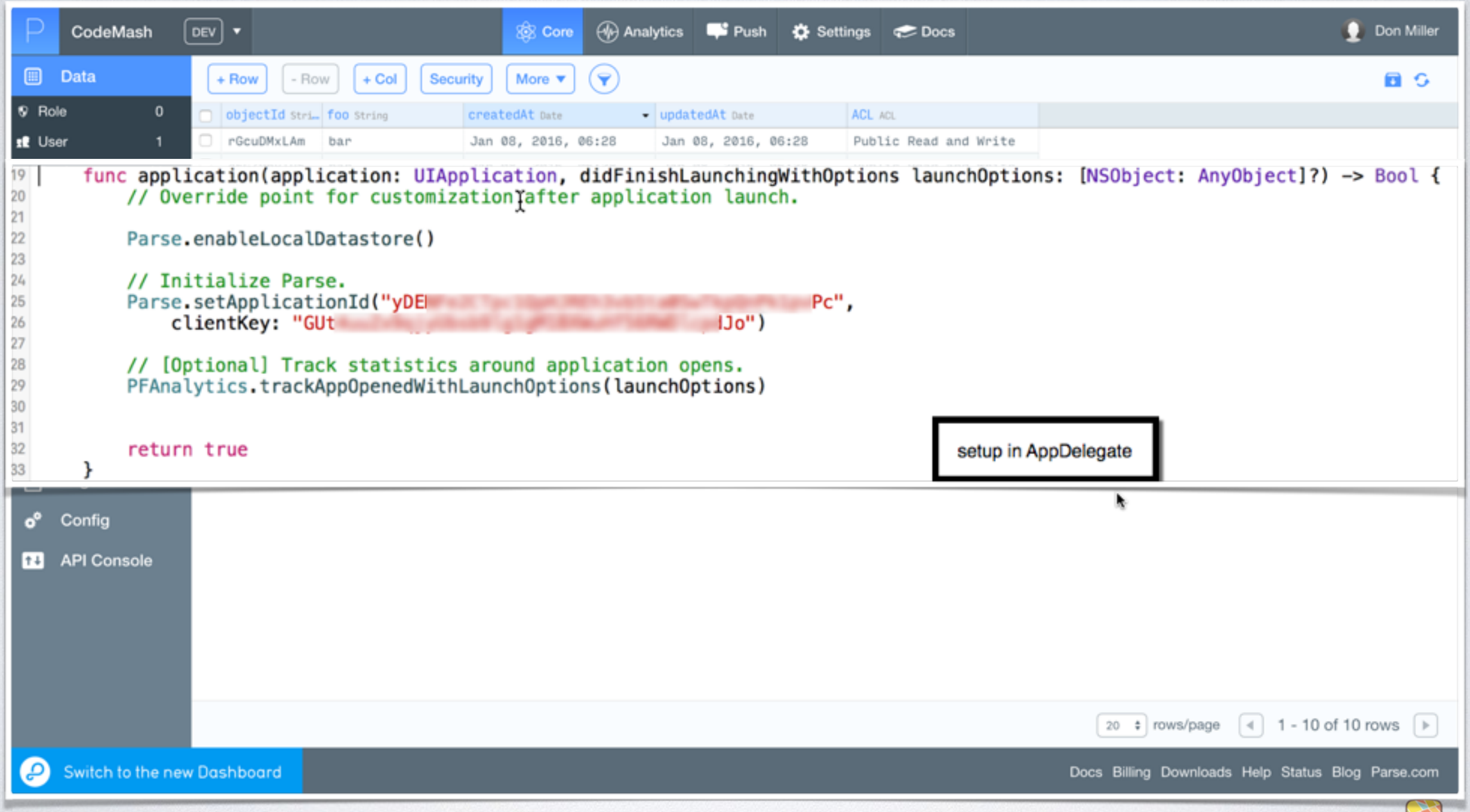
TEST THE RATES MODEL

```
73      func testRatesModel() {
74          let rates = Rates()
75
76          rates.thirtyYearFixed = "2.00"
77          rates.fifteenYearFixed = "1.00"
78          rates.fiveOneARM = "1.50"
79
80          XCTAssertNotNil(rates.thirtyYearFixed)
81          XCTAssertNotNil(rates.fifteenYearFixed)
82          XCTAssertNotNil(rates.fiveOneARM)
83      }
84
85      func testRatesModelForPercentSign() {
86          let rates = Rates()
87
88          rates.thirtyYearFixed = "2.00".toPercent()
89          rates.fifteenYearFixed = "1.00".toPercent()
90          rates.fiveOneARM = "1.50".toPercent()
91
92          XCTAssertTrue(rates.thirtyYearFixed.characters.last! == "%", "\(rates.thirtyYearFixed) should end with a percent")
93          XCTAssertTrue(rates.fifteenYearFixed.characters.last! == "%", "\(rates.thirtyYearFixed) should end with a percent")
94          XCTAssertTrue(rates.fiveOneARM.characters.last! == "%", "\(rates.thirtyYearFixed) should end with a percent")
95      }
```

CALL ZILLOW TO VERIFY A 200 JSON RESPONSE

```
97      func testPerformanceZillowConnection() {
98          self.measureBlock {
99              self.callAsynchronousZillowConnection()
100         }
101     }
102
103     func callAsynchronousZillowConnection() {
104
105         let URL = NSURL(string: GlobalHelper().kPostEndpoint)!
106         let expectation = expectationWithDescription("GET \(URL)")
107
108         let session = NSURLSession.sharedSession()
109         let task = session.dataTaskWithURL(URL) { data, response, error in
110             XCTAssertNotNil(data, "data should not be nil")
111             XCTAssertNil(error, "error should be nil")
112
113             if let HTTPResponse = response as? NSHTTPURLResponse,
114                 responseURL = HTTPResponse.URL,
115                 MIMEType = HTTPResponse.MIMEType
116             {
117                 XCTAssertEqual(responseURL.absoluteString, URL.absoluteString, "HTTP response URL should be equal to original
                        URL")
118                 XCTAssertEqual(HTTPResponse.statusCode, 200, "HTTP response status code should be 200")
119                 XCTAssertEqual(MIMEType, "application/json", "HTTP response content type should be application/json")
120             } else {
121                 XCTFail("Response was not NSHTTPURLResponse")
122             }
123
124             expectation.fulfill()
125         }
126         task.resume()
127         waitForExpectationsWithTimeout(task.originalRequest!.timeoutInterval) { error in
128             if let error = error {
129                 print("Error: \(error.localizedDescription)")
130             }
131             task.cancel()
132         }
133     }
```

WORKING WITH PARSE



CREATE TEST TO CHECK FOR PARSE CORRECT SETUP

```
9  import XCTest
10 import Parse
11 import Bolts
12
13 class ParsePeformanceTests: XCTestCase {
14
15     func testParsePerformanceOnMainThread() {
16         // This is an example of a performance test case.
17         self.measureBlock {
18             self.checkParseIsSetup()
19         }
20     }
21
22     func checkParseIsSetup() {
23         let testObject = PFObject(className: "TestObject")
24         testObject["foo"] = "bar"
25
26         do { try testObject.save()
27             print("Object has been saved.")
28         }
29         catch let e as NSError { print("Parse save error: \(e)") }
30     }
```

TEST PARSE PERFORMANCE

```
44      func testParsePerformanceGettingProducts() {
45          // This is an example of a performance test case.
46          self.measureBlock {
47              self.checkParsePullingData()
48          }
49      }
50
51      func checkParsePullingData() {
52          let query = PFQuery(className:"Products")
53
54          do { let objects = try query.findObjects()
55              for object in objects {
56                  print(object.objectId)
57              }
58          }
59          catch let e as NSError { print("Parse load error: \(e)") }
60      }
```

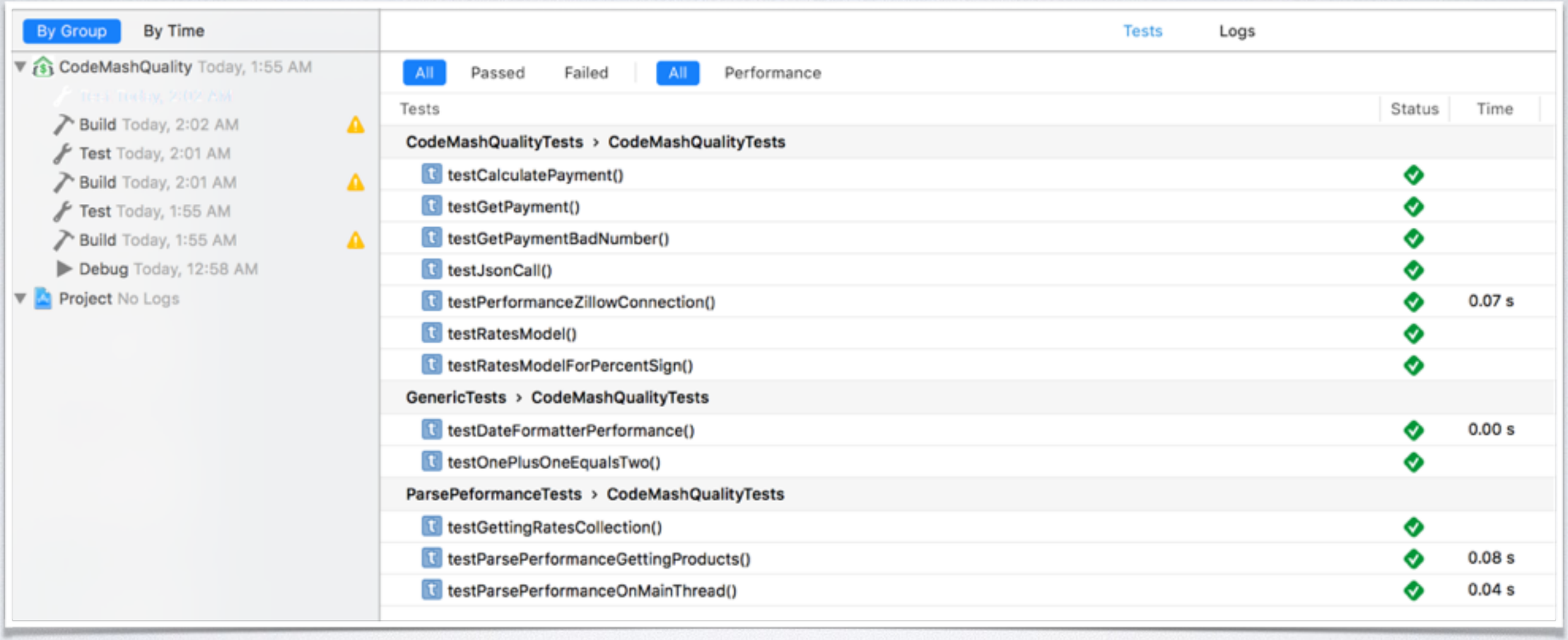
TEST LOADING OF PRODUCTS OBJECT FROM PARSE

```
12 class Products {
13
14     var objectId : String?
15     var productId : Int?
16     var photo : String?
17     var photoFile : PFFile = PFFile()
18     var photoImage : UIImage?
19     var title : String?
20     var flyer : String?
21     var productDesc : String?
22     var itemCode : String?
23     var packagingOptions : String?
```

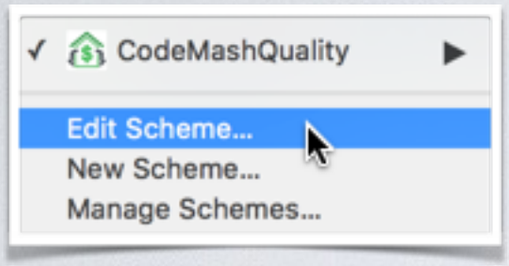
```
62     func testGettingRatesCollection() {
63         let arrayProducts : Array<Products> = Products().getAllProductsFromParse()
64
65         XCTAssert(arrayProducts.count > 0, "\(arrayProducts.count) should be greater than zero")
66     }
```

```
30     var masterCase : Int?
31
32     func getAllProductsFromParse() -> Array<Products> {
33         let query = PFQuery(className:"Products")
34         var arrayProducts : Array<Products> = []
35
36         do { let objects = try query.findObjects()
37             for object in objects {
38                 self.objectId = object["objectId"] as? String
39                 self.productId = object["Id"] as? Int
40                 self.photoImage = object["PhotoImage"] as? UIImage
41                 self.title = object["Title"] as? String
42                 self.productDesc = object["Description"] as? String
43
44                 arrayProducts.append(self)
45             }
46         }
47         catch let e as NSError { print("Parse load error: \(e)") }
48
49         return arrayProducts
50     }
```

CODE COVERAGE



CODE COVERAGE



QUESTIONS? THANK YOU!

Don Miller

don@GroundSpeedHQ.com

@donmiller

http://github.com/donmiller

http://github.com/groundspeed

GroundSpeed™
rapid web + mobile software