Swift API Design Guidelines

The Grand Renaming

Session 403

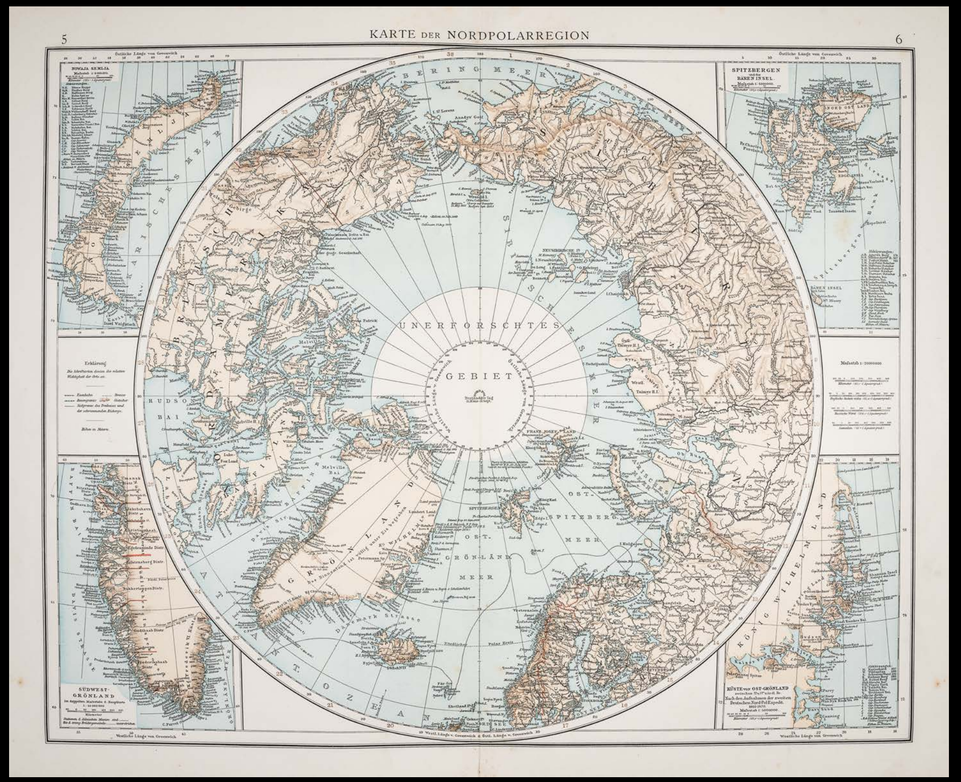
Doug Gregor Swift Engineer
Michael Ilseman Swift Engineer

Roadmap

Swift API Design Guidelines

The Grand Renaming

Mapping Objective-C APIs into Swift



Why?

Languages Have Character

Every language has its own feel

Languages Have Character

Every language has its own feel

```
DispatchQueue.main.async {
  self.listDocumentsViewController?.present(signedOutController, animated: true)
}
```

Languages Have Character

Every language has its own feel

Feel of everyday APIs

```
DispatchQueue.main.async {
  self.listDocumentsViewController?.present(signedOutController, animated: true)
}
```

Next

Introduction to Coding Guidelines for Cocoa

Developing a Cocoa framework, plug-in, or other executable with a public API requires some approaches and conventions that are different from those used in application development. The primary clients of your product are developers, and it is important that they are not mystified by your programmatic interface. This is where API naming conventions come in handy, for they help you to make your interfaces consistent and clear. There are also programming techniques that are special to—or of greater importance with—frameworks, such as versioning, binary compatibility, error-handling, and memory management. This topic includes information on both Cocoa naming conventions and recommended programming practices for frameworks.

Organization of This Document

The articles contained in this topic fall into two general types. The first and larger group presents naming conventions for programmatic interfaces. These are the same conventions (with some minor exceptions) that Apple uses for its own Cocoa frameworks. These articles on naming conventions include the following:

- Code Naming Basics
- Naming Methods
- Naming Functions
- Naming Properties and Data Types
- Acceptable Abbreviations and Acronyms

The second group (currently with a membership of one) discusses aspects of framework programming:

- Tips and Techniques for Framework Developers

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Introduction to Coding Guidelines for Cocoa

For Objective-C

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Next

What is “Swifty?”

API Design Guidelines

SE-0023

Principles

Clarity at the point of use

Clarity is more important than brevity

Concise code is a consequence of using contextual cues

Clarity at the Point of Use

Design APIs to make uses clear and concise

Uses of APIs always have surrounding context

Clarity at the Point of Use

Design APIs to make uses clear and concise

Uses of APIs always have surrounding context

```
if let completedPosition = tasks.index(of: completed) {
  tasks.remove(at: completedPosition)
}
```

Clarity at the Point of Use

Design APIs to make uses clear and concise

Uses of APIs always have surrounding context

```
if let c = a.index(of: b) {
  a.remove(at: c)
}
```

Clarity at the Point of Use

Design APIs to make uses clear and concise

Uses of APIs always have surrounding context

Don’t optimize for bad code

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if let c = a.index(of: b) {
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Design APIs to make uses clear and concise

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Don’t optimize for bad code

```
if let completedPosition = tasks.index(of: completed) {
  tasks.remove(at: completedPosition)
}
```

Strive for Clear Usage

```
removeItem
```

Strive for Clear Usage

```
friends.removeItem(ted)
```

Strive for Clear Usage

```
friends.removeItem(ted)
```

Strive for Clear Usage

```
friends.removeItem(ted)
friends.removeObject(ted)
```

Strive for Clear Usage

```
friends.removeItem(ted)
friends.removeObject(ted)
friends.removeElement(ted)
```

Strive for Clear Usage

```
friends.removeItem(ted)
friends.removeObject(ted)
friends.removeElement(ted)
organicCompounds.removeElement(caffeine)
```

Strive for Clear Usage

```
friends.removePerson(ted)
```

Strive for Clear Usage

```
friends.removePerson(ted)
primes.removeNumber(currentMultiple)
activeViews.removeView(closedView)
```

Omit Needless Words

```
friends.remove(ted)
```

Omit Needless Words

```
friends.remove(ted)
```

Omit Needless Words

```
friends.remove(ted)
```

Omit Needless Words

```
friends.remove(caffeine)
```

Error: cannot convert value of type 'Compound' to expected argument type 'Person'

Clarity Is More Important Than Brevity

Brevity itself is not a worthwhile goal

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Concise code is a consequence of using contextual cues

Clarity Is More Important Than Brevity

Brevity itself is not a worthwhile goal

Concise code is a consequence of using contextual cues

```
func glanceList(list: [Ingredient]) -> [[String: AnyObject]] {
    if list.isEmpty { return [] }
    let end: [Ingredient].Index = list.index(list.startIndex, offsetBy: 3,
                                             limitedBy: list.endIndex)!
    let shortList: ArraySlice<Ingredient> = list[0..<end]
    let serializedList: [[String: AnyObject]] = shortList.map {
        (ingredient: Ingredient) -> [String: AnyObject] in return ingredient.asDictionary
    }

    return serializedList
}
```

Clarity Is More Important Than Brevity

Brevity itself is not a worthwhile goal

Concise code is a consequence of using contextual cues

```
func glanceList(list: [Ingredient]) -> [[String: AnyObject]] {
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    let serializedList = shortList.map {
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    }

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Concise code is a side effect of contextual cues

```
func glanceList(list: [Ingredient]) -> [[String: AnyObject]] {
    if list.isEmpty { return [] }
    let end = list.index(list.startIndex, offsetBy: 3,
                         limitedBy: list.endIndex)!
    let shortList = list[0..<end]
    let serializedList = shortList.map {

    let serializedList: [[String: AnyObject]]

    return serializedList
}
```

Which Words Are Needed?

Write out a use case

```
mainView.addChild(sideBar, atPoint: origin)
```

Does each word contribute to understanding?

Which Words Are Needed?

Write out a use case

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mainView.addChild(sideBar, atPoint: origin)
```

Does each word contribute to understanding?

- Clarify parameter *role*

Which Words Are Needed?

Write out a use case

```
mainView.addChild(sideBar, atPoint: origin)
```

Does each word contribute to understanding?

- Clarify parameter *role*
- Don’t restate type information

Which Words Are Needed?

Write out a use case

```
mainView.addChild(sideBar, at: origin)
```

Does each word contribute to understanding?

- Clarify parameter *role*
- Don’t restate type information

Make Uses of Your APIs Read Grammatically

```
friends.remove(ted)
```

Make Uses of Your APIs Read Grammatically

```
friends.remove(ted)
```

Make Uses of Your APIs Read Grammatically

```
friends.remove(positionOfFormerFriend)
```

Make Uses of Your APIs Read Grammatically

```
friends.remove(at: positionOfFormerFriend)
```

Compound Names

Different APIs can be distinguished by argument label alone

```
friends.remove(ted)                          // remove(_:)

friends.remove(at: positionOfTed)            // remove(at:)
```

Compound Names

Different APIs can be distinguished by argument label alone

```
friends.remove(ted)                          // remove(_:)

friends.remove(at: positionOfTed)            // remove(at:)
```

Two APIs should share a *compound name* if they have the same semantics

```
text.append(aCharacter)                      // append(_:)

text.append(aString)
```

First Argument Should Read Grammatically

If the first argument is part of a prepositional phrase, give it a label

```
truck.removeBoxes(withLabel: "WWDC 2016")
```

First Argument Should Read Grammatically

If the first argument is part of a prepositional phrase, give it a label

```
truck.removeBoxes(withLabel: "WWDC 2016")
```

If the first argument is *not* part of a grammatical phrase, give it a label

```
viewController.dismiss(true)
```

First Argument Should Read Grammatically

If the first argument is part of a prepositional phrase, give it a label

```
truck.removeBoxes(withLabel: "WWDC 2016")
```

If the first argument is *not* part of a grammatical phrase, give it a label

```
viewController.dismiss(animated: true)
```

First Argument Should Read Grammatically

If the first argument is part of a prepositional phrase, give it a label

```
truck.removeBoxes(withLabel: "WWDC 2016")
```

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viewController.dismiss(animated: true)
```

First Argument Should Read Grammatically

If the first argument is part of a prepositional phrase, give it a label

```
truck.removeBoxes(withLabel: "WWDC 2016")
```

If the first argument is *not* part of a grammatical phrase, give it a label

```
viewController.dismiss(animated: true)
```

Otherwise, don’t use a first argument label

```
friends.insert(michael, at: friends.startIndex)
```

Name Methods Based on Their Side Effects

Use a verb to describe the side effect

```
friends.reverse()

viewController.present(animated: true)

organicCompounds.append(caffeine)
```

Name Methods Based on Their Side Effects

Use a verb to describe the side effect

```
friends.reverse()

viewController.present(animated: true)

organicCompounds.append(caffeine)
```

Use a noun to describe the result

```
button.backgroundTitle(for: .disabled)

friends.suffix(3)
```

Mutating/Non-Mutating Pairs

The “ed/ing” rule

Mutating/Non-Mutating Pairs

The “ed/ing” rule

“ed” rule

```
x.reverse()                             // mutating

let y = x.reversed()                    // non-mutating
```

Mutating/Non-Mutating Pairs

The “ed/ing” rule

“ed” rule

```
x.reverse()                             // mutating

let y = x.reversed()                    // non-mutating
```

“ing” rule

```
documentDirectory.appendPathComponent(".list")                          // mutating

let documentFile = documentDirectory.appendingPathComponent(".list")    // non-mutating
```

API Design Guidelines

To facilitate use as a quick reference, the details of many guidelines can be expanded individually. Details are never hidden when this page is printed. Expand all details now

Table of Contents

The Grand Renaming

grand | \'grand\
adjective

1. large or ambitious in scope or scale

The Grand Renaming

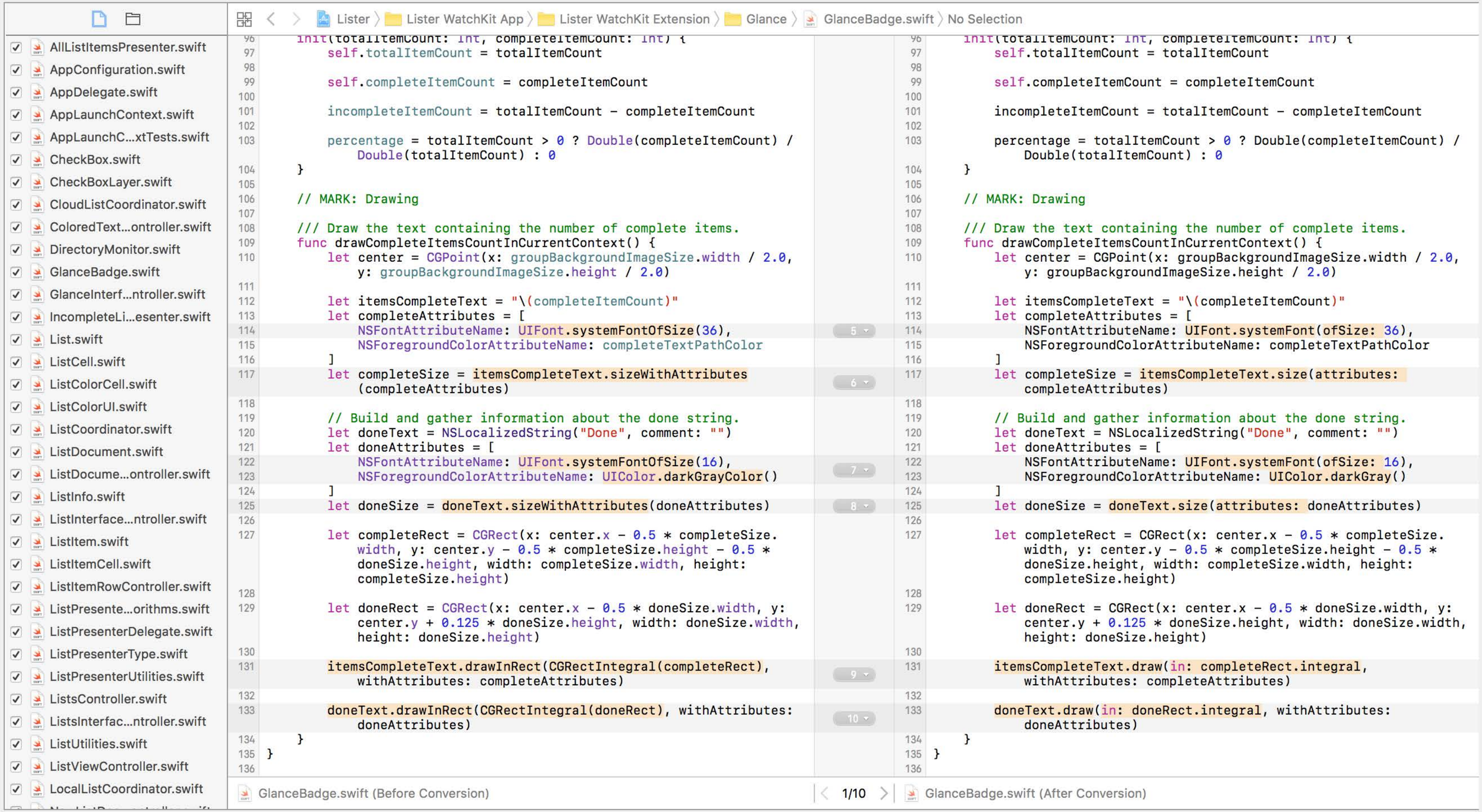
Bring APIs into adherence with the Swift API Design Guidelines *in Swift*

Impacts a huge number of APIs

- The Swift standard library
- All Cocoa and Cocoa Touch frameworks
- Core Graphics and Grand Central Dispatch get "Swifty" makeover

SE-0005 SE-0006 SE-0086 SE-0088

Review changes:



Cancel

Previous

Save

One API, Two Names

Objective-C Names in Swift

```
extension MyController {
  func handleDrag(sender: UIControl, for event: UIEvent) { }

  func setupForDrag() {
    control.addTarget(self, action: Selector("???"),
                      for: [.touchDragInside, .touchDragOutside])
  }
}
```

Objective-C Names in Swift

```
extension MyController {
  func handleDrag(sender: UIControl, for event: UIEvent) { }

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Objective-C Names in Swift

```
extension MyController {
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Objective-C Names in Swift

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                      for: [.touchDragInside, .touchDragOutside])
  }
}
```

Use #selector for Objective-C Selectors

```
extension MyController {
  func handleDrag(sender: UIControl, for event: UIEvent) { }

  func setupForDrag() {
    control.addTarget(self, action: #selector(handleDrag(sender:for:)),
                      for: [.touchDragInside, .touchDragOutside])
  }
}
```

SE-0022

Use #selector for Objective-C Selectors

```
extension MyController {
  func handleDrag(sender: UIControl, for event: UIEvent) { }

  func setupForDrag() {
    control.addTarget(self, action: #selector(handleDrag(sender:for:)),
                      for: [.touchDragInside, .touchDragOutside])
  }
}
```

SE-0022

#selector for Property Getters/Setters

NEW

```
class Artist : NSObject {
  var name: String

  func releaseAlbum(_ album: Album) {
    switch album {
      case .TheGoldExperience:
        self.perform(#selector(setter: Artist.name), with: "T̊", afterDelay: 60.0)
      // …
    }
  }
}
```

SE-0064

Key Paths

```
class Artist : NSObject {
  dynamic var name: String
}
class Album : NSObject {
  dynamic var artist: Artist
}
class MyController : NSObject {
  func monitorNameChanges(album: Album) {
    album.addObserver(self, forKeyPath: "artist.name",
                      options: .new, context: &artistNameContext)
  }
}
```

Key Paths

```
class Artist : NSObject {
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}
class MyController : NSObject {
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    album.addObserver(self, forKeyPath: "artist.name",
                      options: .new, context: &artistNameContext)
  }
}
```

Key Paths via #keyPath

NEW

```
class Artist : NSObject {
  dynamic var name: String
}
class Album : NSObject {
  dynamic var artist: Artist
}
class MyController : NSObject {
  func monitorNameChanges(album: Album) {
    album.addObserver(self, forKeyPath: #keyPath(Album.artist.name),
                      options: .new, context: &artistNameContext)
  }
}
```

SE-0062

Key Paths via #keyPath

NEW

```
class Artist : NSObject {
  dynamic var name: String
}
class Album : NSObject {
  dynamic var artist: Artist
}
class MyController : NSObject {
  func monitorNameChanges(album: Album) {
    album.addObserver(self, forKeyPath: #keyPath(Album.artist.name),
                      options: .new, context: &artistNameContext)
  }
}
```

SE-0062

Controlling Objective-C Names

The Objective-C name of a Swift entity sometimes matters

- Objective-C code in mix-and-match projects
- External tools

```
extension MyController {

  func handleDrag(sender: UIControl, for event: UIEvent) { }  // handleDrag(sender:for:)
}
```

```
// Generated Objective-C
@interface MyController ()
- (void)handleDragWithSender:(UIControl *)sender for:(UIEvent *)event;
@end
```

Controlling Objective-C Names

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extension MyController {

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extension MyController {
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```

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Tool Support for the Grand Renaming

I get by with a little help from my tools

Swift abstracts away the need to reason about Objective-C names

Tool Support for the Grand Renaming

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Swift abstracts away the need to reason about Objective-C names

Swift 3 migrator migrates Swift 2.x code to Swift 3 names

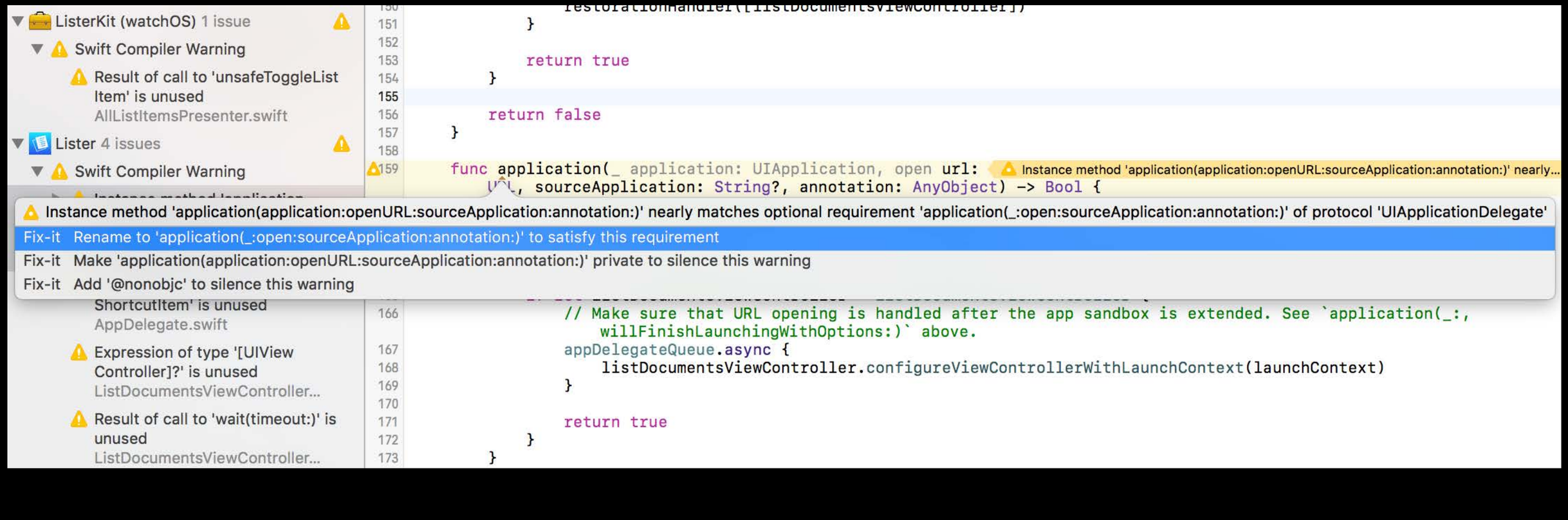
Tool Support for the Grand Renaming

I get by with a little help from my tools

Swift abstracts away the need to reason about Objective-C names

Swift 3 migrator migrates Swift 2.x code to Swift 3 names

Swift 3 compiler helps with renaming-related problems



Objective-C APIs and Swift

Michael Ilseman
Swift Engineer

Swift 2

```
extension UIDocument {
  func saveToURL(_ url: NSURL, forSaveOperation saveOperation: UIDocumentSaveOperation,
                 completionHandler: ((Bool) -> Void)?)
  func revertToContentsOfURL(_ url: NSURL, completionHandler: ((Bool) -> Void)?)
}
```

Automatic Translation of Objective-C APIs

NEW

```
extension UIDocument {
  func saveToURL(_ url: NSURL, forSaveOperation saveOperation: UIDocumentSaveOperation,
                 completionHandler: ((Bool) -> Void)?)
  func revertToContentsOfURL(_ url: NSURL, completionHandler: ((Bool) -> Void)?)
}
```

SE-0005

SE-0069

Automatic Translation of Objective-C APIs

NEW

```
extension UIDocument {
  func saveToURL(_ url: NSURL, forSaveOperation saveOperation: UIDocumentSaveOperation,
                 completionHandler: ((Bool) -> Void)?)
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}
```

Identify first argument labels

SE-0005

SE-0069

Automatic Translation of Objective-C APIs

NEW

```
extension UIDocument {
  func save(toURL url: NSURL, forSaveOperation saveOperation: UIDocumentSaveOperation,
            completionHandler: ((Bool) -> Void)?)
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Identify first argument labels

SE-0005

SE-0069

Automatic Translation of Objective-C APIs

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Identify first argument labels

Remove words that restate type information

SE-0005

SE-0069

Automatic Translation of Objective-C APIs

NEW

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extension UIDocument {
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SE-0005

SE-0069

Automatic Translation of Objective-C APIs

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```

Identify first argument labels

Remove words that restate type information

SE-0005

SE-0069

Automatic Translation of Objective-C APIs

NEW

```
extension UIDocument {
  func save(to url: NSURL, for saveOperation: UIDocumentSaveOperation,
            completionHandler: ((Bool) -> Void)? = nil)
  func revert(toContentsOf url: NSURL, completionHandler: ((Bool) -> Void)? = nil)
}
```

Identify first argument labels

Remove words that restate type information

SE-0005

SE-0069

Automatic Translation of Objective-C APIs

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Identify first argument labels

Remove words that restate type information

Introduce default arguments

SE-0005

SE-0069

Automatic Translation of Objective-C APIs

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extension UIDocument {
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Identify first argument labels

Remove words that restate type information

Introduce default arguments

Use bridged value types

SE-0005 SE-0069

Automatic Translation of Objective-C APIs

```
extension UIDocument {
  func save(to url: URL, for saveOperation: UIDocumentSaveOperation,
            completionHandler: ((Bool) -> Void)? = nil)
  func revert(toContentsOf url: URL, completionHandler: ((Bool) -> Void)? = nil)
}
```

Identify first argument labels

Remove words that restate type information

Introduce default arguments

Use bridged value types

What's New in Foundation for Swift Mission Tuesday 4:00PM

Choosing Your Own Names

Objective-C

```
- (NSLayoutConstraint *)constraintEqualToAnchor:
   (NSLayoutAnchor<AnchorType> *)anchor NS_SWIFT_NAME(constraint(equalTo:));
- (NSLayoutConstraint *)constraintGreaterThanOrEqualToAnchor:
   (NSLayoutAnchor<AnchorType> *)anchor NS_SWIFT_NAME(constraint(greaterThanOrEqualTo:));
```

Generated Swift Interface

```
func constraint(equalTo: NSLayoutAnchor) -> NSLayoutConstraint
func constraint(greaterThanOrEqualTo: NSLayoutAnchor) -> NSLayoutConstraint
```

Types

Names don’t go far enough

```
let cal = NSCalendar(calendarIdentifier: NSCalendarIdentifierGregorian)
```

Types

Names don’t go far enough

```
let cal = NSCalendar(calendarIdentifier: "gregorian")
```

Types

Names don’t go far enough

Objective-C

```
extern NSString * NSCalendarIdentifierGregorian;
```

Generated Swift Interface

```
let NSCalendarIdentifierGregorian: String
```

Types

Names don’t go far enough

Objective-C

```
typedef NSString * NSCalendarIdentifier;
NSCalendarIdentifier NSCalendarIdentifierGregorian;
```

Generated Swift Interface

```
typealias NSCalendarIdentifier = NSString
let NSCalendarIdentifierGregorian: NSCalendarIdentifier
```

Put a Struct on It

NEW

```
typedef NSString * NSCalendarIdentifier NS_EXTENSIBLE_STRING_ENUM;
```

SE-0033

Stringly Typed

Objective-C

```
typedef NSString * NSCalendarIdentifier NS_EXTENSIBLE_STRING_ENUM;
NSCalendarIdentifier NSCalendarIdentifierGregorian;
```

Generated Swift Interface

```
typealias NSCalendarIdentifier = NSString
let NSCalendarIdentifierGregorian: NSCalendarIdentifier
```

Stringly Typed

Objective-C

```
typedef NSString * NSCalendarIdentifier NS_EXTENSIBLE_STRING_ENUM;
NSCalendarIdentifier NSCalendarIdentifierGregorian;
```

Generated Swift Interface

```
typealias NSCalendarIdentifier = NSString
let NSCalendarIdentifierGregorian: NSCalendarIdentifier
```

Stringly Typed

Objective-C

```
typedef NSString * NSCalendarIdentifier NS_EXTENSIBLE_STRING_ENUM;
NSCalendarIdentifier NSCalendarIdentifierGregorian;
```

Generated Swift Interface

```
typealias NSCalendarIdentifier = NSString
let NSCalendarIdentifierGregorian: NSCalendarIdentifier
```

Stringly Typed

Objective-C

```
typedef NSString * NSCalendarIdentifier NS_EXTENSIBLE_STRING_ENUM;
NSCalendarIdentifier NSCalendarIdentifierGregorian;
```

Generated Swift Interface

```
struct NSCalendarIdentifier : RawRepresentable {


    static let gregorian: NSCalendarIdentifier

}
```

~~Stringly Typed~~ Strongly Typed

Objective-C

```
typedef NSString * NSCalendarIdentifier NS_EXTENSIBLE_STRING_ENUM;
NSCalendarIdentifier NSCalendarIdentifierGregorian;
```

Generated Swift Interface

```
struct NSCalendarIdentifier : RawRepresentable {
    init(_ rawValue: String);
    var rawValue: String { get }
    static let gregorian: NSCalendarIdentifier

}
```

Better Types=Clearer Use Site

```
let cal = NSCalendar(calendarIdentifier: NSCalendarIdentifierGregorian)
```

Better Types=Clearer Use Site

```
let cal = NSCalendar(identifier: .gregorian)
```

Better Types=Clearer Use Site

```
let cal = NSCalendar(identifier: .gregorian)
```

Better Types=Clearer Use Site

```
let cal = Calendar(identifier: .gregorian)
```

C APIs

```swift
// Drawing with Core Graphics in Swift 2

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
                    transform: CGAffineTransform = CGAffineTransformIdentity) -> CGAffineTransform {
    var result = CGAffineTransformTranslate(transform, offset.x, offset.y)
    result = CGAffineTransformRotate(result, angle)
    return CGAffineTransformTranslate(result, -offset.x, -offset.y)
}

// Trace a path in red
func trace(in context: CGContext, path: CGPath) {
    let red = CGColorCreateGenericRGB(1, 0, 0, 1)
    CGContextSaveGState(context)
    CGContextAddPath(context, path)
    CGContextSetStrokeColorWithColor(context, red)
    CGContextStrokePath(context)
    CGContextRestoreGState(context)
}
```

Import as Member

Reconstructive surgery with NS_SWIFT_NAME

SE-0044

Properties

C

```
CFStringRef kCGColorWhite;
```

Generated Swift Interface

```
let kCGColorWhite: CFString
```

Swift use

```
let color = kCGColorWhite
```

Properties

C

```
CFStringRef kCGColorWhite NS_SWIFT_NAME(CGColor.white);
```

Generated Swift Interface

```
let kCGColorWhite: CFString
```

Swift use

```
let color = kCGColorWhite
```

Properties

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```
CFStringRef kCGColorWhite NS_SWIFT_NAME(CGColor.white);
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let kCGColorWhite: CFString
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Swift use

```
let color = kCGColorWhite
```

Properties

C

```
CFStringRef kCGColorWhite NS_SWIFT_NAME(CGColor.white);
```

Generated Swift Interface

```
extension CGColor {  static let white: CFString  }
```

Swift use

```
let color = kCGColorWhite
```

Properties

C

```
CFStringRef kCGColorWhite NS_SWIFT_NAME(CGColor.white);
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Swift use

```
let color = CGColor.white
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Properties

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```
CFStringRef kCGColorWhite NS_SWIFT_NAME(CGColor.white);
```

Generated Swift Interface

```
extension CGColor {  static let white: CFString  }
```

Swift use

```
let color = CGColor.white
```

Initializers

C

```
CGAffineTransform CGAffineTransformMakeTranslation(CGFloat tx,  CGFloat ty)
        NS_SWIFT_NAME(CGAffineTransform.init(translationX:y:));
```

Generated Swift Interface

```
func CGAffineTransformMakeTranslation(_: CGFloat, _: CGFloat) -> CGAffineTransform
```

Swift use

```
let translate = CGAffineTransformMakeTranslation(1.0, 0.5)
```

Initializers

C

```
CGAffineTransform CGAffineTransformMakeTranslation(CGFloat tx,  CGFloat ty)
        NS_SWIFT_NAME(CGAffineTransform.init(translationX:y:));
```

Generated Swift Interface

```
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        NS_SWIFT_NAME(CGAffineTransform.init(translationX:y:));
```

Generated Swift Interface

```
extension CGAffineTransform { init(translationX: CGFloat, y: CGFloat) }
```

Swift use

```
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```

Initializers

C

```
CGAffineTransform CGAffineTransformMakeTranslation(CGFloat tx,  CGFloat ty)
        NS_SWIFT_NAME(CGAffineTransform.init(translationX:y:));
```

Generated Swift Interface

```
extension CGAffineTransform { init(translationX: CGFloat, y: CGFloat) }
```

Swift use

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let translate = CGAffineTransformMakeTranslation(1.0, 0.5)
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Initializers

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CGAffineTransform CGAffineTransformMakeTranslation(CGFloat tx,  CGFloat ty)
        NS_SWIFT_NAME(CGAffineTransform.init(translationX:y:));
```

Generated Swift Interface

```
extension CGAffineTransform { init(translationX: CGFloat, y: CGFloat) }
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Swift use

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Initializers

C

```
CGAffineTransform CGAffineTransformMakeTranslation(CGFloat tx,  CGFloat ty)
        NS_SWIFT_NAME(CGAffineTransform.init(translationX:y:));
```

Generated Swift Interface

```
extension CGAffineTransform { init(translationX: CGFloat, y: CGFloat) }
```

Swift use

```
let translate = CGAffineTransform(translationX: 1.0, y: 0.5)
```

Methods

C

```
void CGContextFillPath(CGContextRef) NS_SWIFT_NAME(CGContext.fillPath(self:));
```

Generated Swift Interface

```
func CGContextFillPath(_: CGContext)
```

Swift use

```
CGContextFillPath(context)
```

Methods

C

```
void CGContextFillPath(CGContextRef) NS_SWIFT_NAME(CGContext.fillPath(self:));
```

Generated Swift Interface

```
func CGContextFillPath(_: CGContext)
```

Swift use

```
CGContextFillPath(context)
```

Methods

C

```
void CGContextFillPath(CGContextRef) NS_SWIFT_NAME(CGContext.fillPath(self:));
```

Generated Swift Interface

```
func CGContextFillPath(_: CGContext)
```

Swift use

```
CGContextFillPath(context)
```

Methods

C

```
void CGContextFillPath(CGContextRef) NS_SWIFT_NAME(CGContext.fillPath(self:));
```

Generated Swift Interface

```
extension CGContext { func fillPath() }
```

Swift use

```
CGContextFillPath(context)
```

Methods

C

```
void CGContextFillPath(CGContextRef) NS_SWIFT_NAME(CGContext.fillPath(self:));
```

Generated Swift Interface

```
extension CGContext { func fillPath() }
```

Swift use

```
CGContextFillPath(context)
```

Methods

C

```
void CGContextFillPath(CGContextRef) NS_SWIFT_NAME(CGContext.fillPath(self:));
```

Generated Swift Interface

```
extension CGContext { func fillPath() }
```

Swift use

```
context.fillPath()
```

Methods

C

```
void CGContextFillPath(CGContextRef) NS_SWIFT_NAME(CGContext.fillPath(self:));
```

Generated Swift Interface

```
extension CGContext { func fillPath() }
```

Swift use

```
context.fillPath()
```

Computed Properties

C

```
CFStringRef ArtistGetName(ArtistRef) NS_SWIFT_NAME(getter:Artist.name(self:));
void ArtistSetName(ArtistRef, CFStringRef)
   NS_SWIFT_NAME(setter:Artist.name(self:newValue:));
```

Generated Swift Interface

```
func ArtistGetName(_: Artist) -> CFString
func ArtistSetName(_: Artist, _: CFString)
```

Computed Properties

C

```
CFStringRef ArtistGetName(ArtistRef) NS_SWIFT_NAME(getter:Artist.name(self:));
void ArtistSetName(ArtistRef, CFStringRef)
   NS_SWIFT_NAME(setter:Artist.name(self:newValue:));
```

Generated Swift Interface

```
func ArtistGetName(_: Artist) -> CFString
func ArtistSetName(_: Artist, _: CFString)
```

Computed Properties

C

```
CFStringRef ArtistGetName(ArtistRef) NS_SWIFT_NAME(getter:Artist.name(self:));
void ArtistSetName(ArtistRef, CFStringRef)
   NS_SWIFT_NAME(setter:Artist.name(self:newValue:));
```

Generated Swift Interface

```
func ArtistGetName(_: Artist) -> CFString
func ArtistSetName(_: Artist, _: CFString)
```

Computed Properties

C

```
CFStringRef ArtistGetName(ArtistRef) NS_SWIFT_NAME(getter:Artist.name(self:));
void ArtistSetName(ArtistRef, CFStringRef)
   NS_SWIFT_NAME(setter:Artist.name(self:newValue:));
```

Generated Swift Interface

```
extension Artist { var name: CFString { get set } }
```

Computed Properties

C

```
CFStringRef ArtistGetName(ArtistRef) NS_SWIFT_NAME(getter:Artist.name(self:));
void ArtistSetName(ArtistRef, CFStringRef)
   NS_SWIFT_NAME(setter:Artist.name(self:newValue:));
```

Generated Swift Interface

```
extension Artist { var name: CFString { get set } }
```

Computed Properties

Swift use

```
let formerName = ArtistGetName(myArtist)
ArtistSetName(myArtist, "千")
```

Computed Properties

Swift use

```
let formerName = ArtistGetName(myArtist)
ArtistSetName(myArtist, "")
```

Computed Properties

Swift use

```
let formerName = myArtist.name

myArtist.name = "∓"
```

Computed Properties

Swift use

```
let formerName = myArtist.name
myArtist.name = "Ŧ"
```

Better Together

```
typedef NSString * NSCalendarIdentifier NS_EXTENSIBLE_STRING_ENUM
    NS_SWIFT_NAME(Calendar.Identifier);
```

Better Together

```
typedef NSString * NSCalendarIdentifier NS_EXTENSIBLE_STRING_ENUM
    NS_SWIFT_NAME(Calendar.Identifier);
```

Generated Swift Interface

```
struct Calendar.Identifier : RawRepresentable {
    init(_ rawValue: String);
    var rawValue: String { get }
    static let gregorian: Calendar.Identifier
}
```

NEW

NEW

NEW

NEW

```swift
// Drawing with Core Graphics in Swift 2

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
        transform: CGAffineTransform = CGAffineTransformIdentity) -> CGAffineTransform {
   var result = CGAffineTransformTranslate(transform, offset.x, offset.y)
   result = CGAffineTransformRotate(result, angle)
   return CGAffineTransformTranslate(result, -offset.x, -offset.y)
}

// Trace a path in red
func trace(in context: CGContext, path: CGPath) {
   let red = CGColorCreateGenericRGB(1, 0, 0, 1)
   CGContextSaveGState(context)
   CGContextAddPath(context, path)
   CGContextSetStrokeColorWithColor(context, red)
   CGContextStrokePath(context)
   CGContextRestoreGState(context)
}
```

```swift
// Drawing with Core Graphics in Swift 2

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
        transform: CGAffineTransform = CGAffineTransformIdentity) -> CGAffineTransform {
   var result = CGAffineTransformTranslate(transform, offset.x, offset.y)
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   return CGAffineTransformTranslate(result, -offset.x, -offset.y)
}

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func trace(in context: CGContext, path: CGPath) {
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   CGContextSaveGState(context)
   CGContextAddPath(context, path)
   CGContextSetStrokeColorWithColor(context, red)
   CGContextStrokePath(context)
   CGContextRestoreGState(context)
}
```

```swift
// Drawing with Core Graphics in Swift 2

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
        transform: CGAffineTransform = .identity) -> CGAffineTransform {
   var result = CGAffineTransformTranslate(transform, offset.x, offset.y)
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   return CGAffineTransformTranslate(result, -offset.x, -offset.y)
}

// Trace a path in red
func trace(in context: CGContext, path: CGPath) {
   let red = CGColorCreateGenericRGB(1, 0, 0, 1)
   CGContextSaveGState(context)
   CGContextAddPath(context, path)
   CGContextSetStrokeColorWithColor(context, red)
   CGContextStrokePath(context)
   CGContextRestoreGState(context)
}
```

```swift
// Drawing with Core Graphics in Swift 2

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
        transform: CGAffineTransform = .identity) -> CGAffineTransform {
    var result = CGAffineTransformTranslate(transform, offset.x, offset.y)
    result = CGAffineTransformRotate(result, angle)
    return CGAffineTransformTranslate(result, -offset.x, -offset.y)
}

// Trace a path in red
func trace(in context: CGContext, path: CGPath) {
    let red = CGColorCreateGenericRGB(1, 0, 0, 1)
    CGContextSaveGState(context)
    CGContextAddPath(context, path)
    CGContextSetStrokeColorWithColor(context, red)
    CGContextStrokePath(context)
    CGContextRestoreGState(context)
}
```

```swift
// Drawing with Core Graphics in Swift 2

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
        transform: CGAffineTransform = .identity) -> CGAffineTransform {
    var result = transform.translateBy(x: offset.x, y: offset.y)
    result = result.rotate(angle)
    return result.translateBy(x: -offset.x, y: -offset.y)
}

// Trace a path in red
func trace(in context: CGContext, path: CGPath) {
    let red = CGColorCreateGenericRGB(1, 0, 0, 1)
    CGContextSaveGState(context)
    CGContextAddPath(context, path)
    CGContextSetStrokeColorWithColor(context, red)
    CGContextStrokePath(context)
    CGContextRestoreGState(context)
}
```

```swift
// Drawing with Core Graphics in Swift 2

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
        transform: CGAffineTransform = .identity) -> CGAffineTransform {
    return transform.translateBy(x: offset.x, y: offset.y)
                    .rotate(angle)
                    .translateBy(x: -offset.x, y: -offset.y)
}

// Trace a path in red
func trace(in context: CGContext, path: CGPath) {
    let red = CGColorCreateGenericRGB(1, 0, 0, 1)
    CGContextSaveGState(context)
    CGContextAddPath(context, path)
    CGContextSetStrokeColorWithColor(context, red)
    CGContextStrokePath(context)
    CGContextRestoreGState(context)
}
```

```swift
// Drawing with Core Graphics in Swift 2

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
        transform: CGAffineTransform = .identity) -> CGAffineTransform {
   return transform.translateBy(x: offset.x, y: offset.y)
                   .rotate(angle)
                   .translateBy(x: -offset.x, y: -offset.y)
}

// Trace a path in red
func trace(in context: CGContext, path: CGPath) {
   let red = CGColorCreateGenericRGB(1, 0, 0, 1)
   CGContextSaveGState(context)
   CGContextAddPath(context, path)
   CGContextSetStrokeColorWithColor(context, red)
   CGContextStrokePath(context)
   CGContextRestoreGState(context)
}
```

```swift
// Drawing with Core Graphics in Swift 2

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
        transform: CGAffineTransform = .identity) -> CGAffineTransform {
   return transform.translateBy(x: offset.x, y: offset.y)
                   .rotate(angle)
                   .translateBy(x: -offset.x, y: -offset.y)
}

// Trace a path in red
func trace(in context: CGContext, path: CGPath) {
   let red = CGColor(red: 1, green: 0, blue: 0, alpha: 1)
   CGContextSaveGState(context)
   CGContextAddPath(context, path)
   CGContextSetStrokeColorWithColor(context, red)
   CGContextStrokePath(context)
   CGContextRestoreGState(context)
}
```

```swift
// Drawing with Core Graphics in Swift 2

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
        transform: CGAffineTransform = .identity) -> CGAffineTransform {
   return transform.translateBy(x: offset.x, y: offset.y)
                   .rotate(angle)
                   .translateBy(x: -offset.x, y: -offset.y)
}

// Trace a path in red
func trace(in context: CGContext, path: CGPath) {
   let red = CGColor(red: 1, green: 0, blue: 0, alpha: 1)
   CGContextSaveGState(context)
   CGContextAddPath(context, path)
   CGContextSetStrokeColorWithColor(context, red)
   CGContextStrokePath(context)
   CGContextRestoreGState(context)
}
```

```
// Drawing with Core Graphics in Swift 3

// Get a transform that will rotate around a given offset
func rotationAround(offset: CGPoint, angle: CGFloat,
        transform: CGAffineTransform = .identity) -> CGAffineTransform {
   return transform.translateBy(x: offset.x, y: offset.y)
                   .rotate(angle)
                   .translateBy(x: -offset.x, y: -offset.y)
}

// Trace a path in red
func trace(in context: CGContext, path: CGPath) {
   let red = CGColor(red: 1, green: 0, blue: 0, alpha: 1)
   context.saveGState()
   context.addPath(path)
   context.setStrokeColor(red)
   context.strokePath()
   context.restoreGState()
}
```

Summary

API design guidelines in Swift

Grand renaming

Crafting good Swift APIs from Objective-C

More Information

https://developer.apple.com/wwdc16/403

Swift Evolution

https://swift.org

SE-0005	Better Translation of Objective-C APIs Into Swift
SE-0006	Apply API Guidelines to the Standard Library
SE-0022	Referencing the Objective-C selector of a method
SE-0023	API Design Guidelines
SE-0033	Import Objective-C Constants as Swift Types
SE-0044	Import as Member
SE-0046	Establish consistent label behavior across all parameters including first labels
SE-0062	Referencing Objective-C key-paths
SE-0064	Referencing the Objective-C selector of property getters and setters
SE-0086	Drop NS Prefix in Swift Foundation
SE-0088	Modernize libdispatch for Swift 3 naming conventions

Related Sessions

What's New in Foundation for Swift	Mission	Tuesday 4:00PM
Concurrent Programming with GCD in Swift 3	Pacific Heights	Friday 4:00PM

Labs

Swift Open Hours	Developer Tools Lab A	Tuesday 12:00PM
Swift Open Hours	Developer Tools Lab A	Tuesday 3:00PM
Swift Open Hours	Developer Tools Lab A	Wednesday 9:00AM
Swift Open Hours	Developer Tools Lab A	Wednesday 12:00PM
Swift Open Hours	Developer Tools Lab A	Wednesday 3:00PM
Swift Open Hours	Developer Tools Lab A	Thursday 9:00AM
Swift Open Hours	Developer Tools Lab A	Thursday 12:00PM
Swift Open Hours	Developer Tools Lab A	Thursday 3:00PM

Labs

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Swift Open Hours	Developer Tools Lab A	Friday 9:00AM
Swift Open Hours	Developer Tools Lab A	Friday 12:00PM
Swift Open Hours	Developer Tools Lab A	Friday 3:00PM

WWDC16