

Jim Rea

www.provue.com • [@provuejim](https://twitter.com/provuejim)



The screenshot shows the website for Panorama X Database Software for Macintosh. The page features a blue header with the "Panorama X" logo and a navigation menu. Below the header is a large banner with the text "PANORAMA X" and the tagline "Collect Organize Understand Act". The banner includes several overlapping screenshots of the software interface, showing a data table, a map, and various settings panels. At the bottom of the banner are two buttons: "Play Demo Movie" and "Download Trial". Below the banner is a teal box with the text "New! Panorama 10.1 includes Summary & Crosstab Tables, Charts & Graphs, AppleScript support and more!". At the bottom of the page is a white box with the text "Database Speed, Power & Simplicity".



Jim has been a Mac developer since 1984, is the founder of ProVUE Development, and is the author of OverVUE, Panorama, SiteWarrior, Surf Scout, Power Team. and now Panorama X.

Swiftly Scripting the Command Line

Agenda

- The Current Automation Landscape
- A Recent History
- Why Swift?
- Examples
- Getting Started







PyObjC

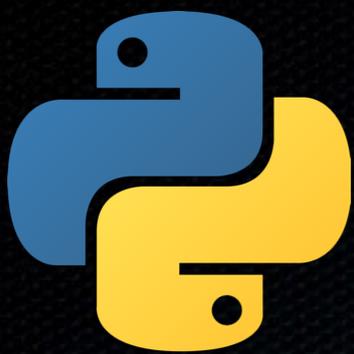
Objective-C

Python

Cocoa

Python Modules

macOS



PyObjC

```
-- OBJECTIVE-C --
```

```
result = [someObject someMethod:firstArg  
withFoo:foo andBar:bar];
```

```
-- PYTHON --
```

```
result =  
someObject.someMethod_withFoo_andBar_(firs  
tArg, foo, bar)
```



PyObjC



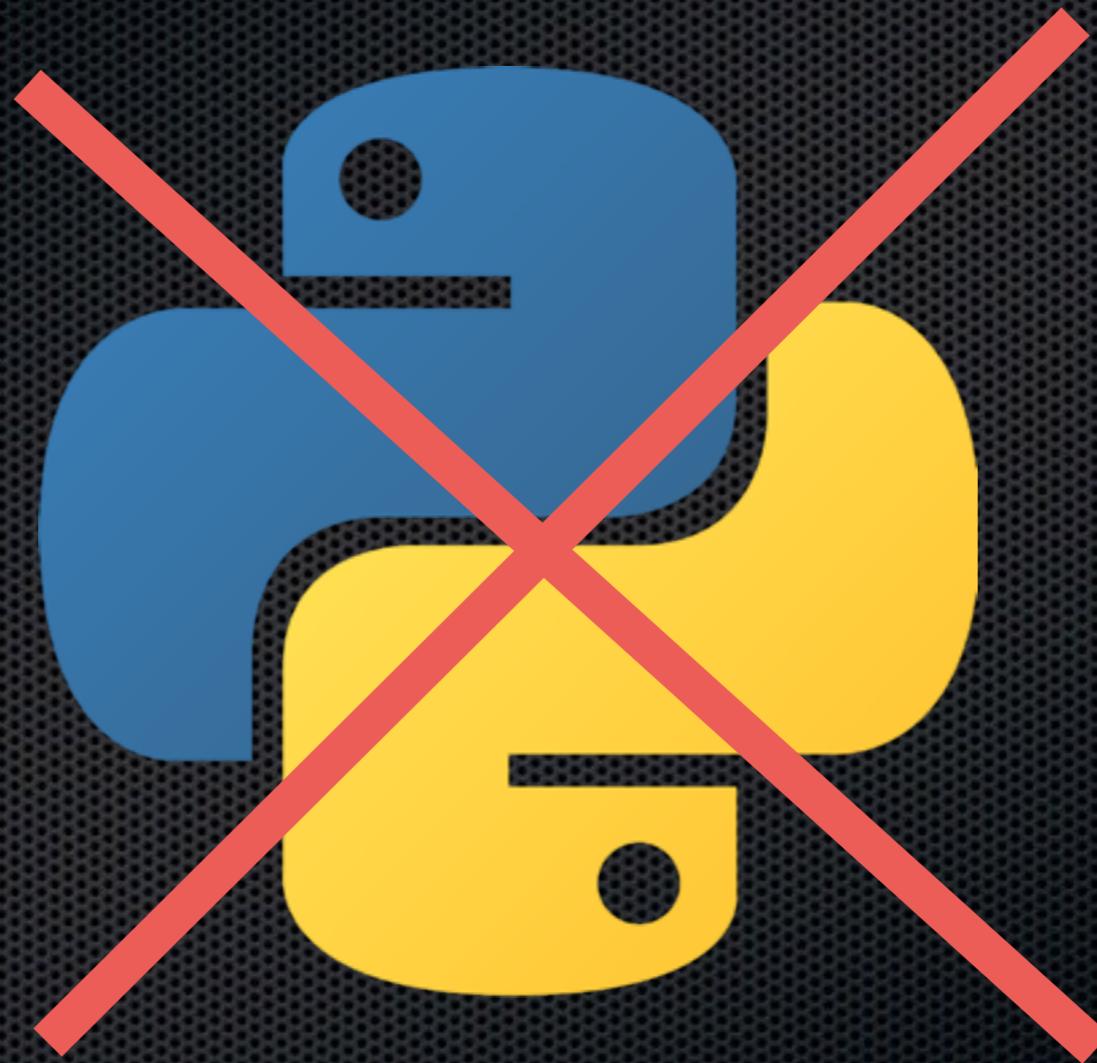
AutoPkgr

make-profile-pkg



**No Maintenance for
Python 2.7 past
January 1, 2020**
python.org





~~[C]~~



Swift Applications



- macOS apps
- iOS/watchOS/tvOS apps
- Libraries & Frameworks
- Server side web apps
- Scripting/automation



A Brief Swift History

- Modern successor to Objective-C
- Derives ideas from
 - Objective-C
 - Rust
 - Haskell
 - Ruby
 - Python
 - C#
 - CLU
 - and more...

A Brief Swift History



- July 2010 by Chris Lattner at Apple



A Brief Swift History



- <https://www.swiftcommunitypodcast.org>





A Swift History

- 2010 ○ Development starts by Chris Lattner (Apple)
- 2014 ○ Announced at WWDC
Reached 1.0 with Xcode 6.0
- 2015 ○ Open Sourced swift.org
1.2
2.0 with Xcode 7.0 (El Capitan)
- 2016 ○ 3.0 with Xcode 8.0 (Sierra)



A Swift History

- 2016 ○ 3.0 with Xcode 8.0 (Sierra)
- 2017 ○ 4.0 with Xcode 9.0 (High Sierra)
- 2018 ○ 4.2 with Xcode 10.0 (Mojave)
- 2019 ○ 5.0 🙏



A Swift History

2014



1.0

(1.0 != 4.2)

2018



4.2

2019



5.0





A Swift History

2014



1.0

2018



4.2

2019



5.0 🙏

ABI Stability

Why Swift?





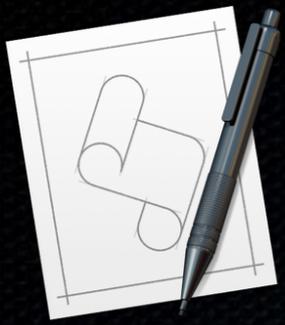
Apple's Goals with Swift

- Fast
- Modern
- Safe
- Interactive



Apple's Goals with Swift

- Fast
- Modern
- Safe
- Interactive



Interpreted vs. Compiled



- Bash
- Python
- JavaScript
- AppleScript
- C
- C++
- Objective-C
- Swift



Apple's Goals with Swift

- Fast
- Modern
- Safe
- Interactive



Modern Language Features

Objective-C

```
NSString * str = @"hello, ";
```

Swift

```
var str = "hello, "
```



Modern Language Features

Objective-C

```
NSString * str = @"hello, ";
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Swift

```
var str = "hello, "
```



Modern Language Features

Objective-C

```
NSString * str = @"hello, ";
```

Swift

```
var str = "hello, "
```



Modern Language Features

Objective-C

```
NSString * str = @"hello, ";  
str = [str stringByAppendingString:@"world"]
```

Swift

```
var str = "hello, "  
str += " world"
```



Modern Language Features

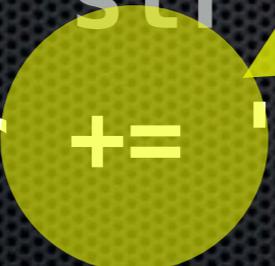
Objective-C

```
NSString * str = @"hello, ";  
str = [str stringByAppendingString:@"world"]
```

Swift

```
var str = "hello, "  
str += " world"
```

Custom operator



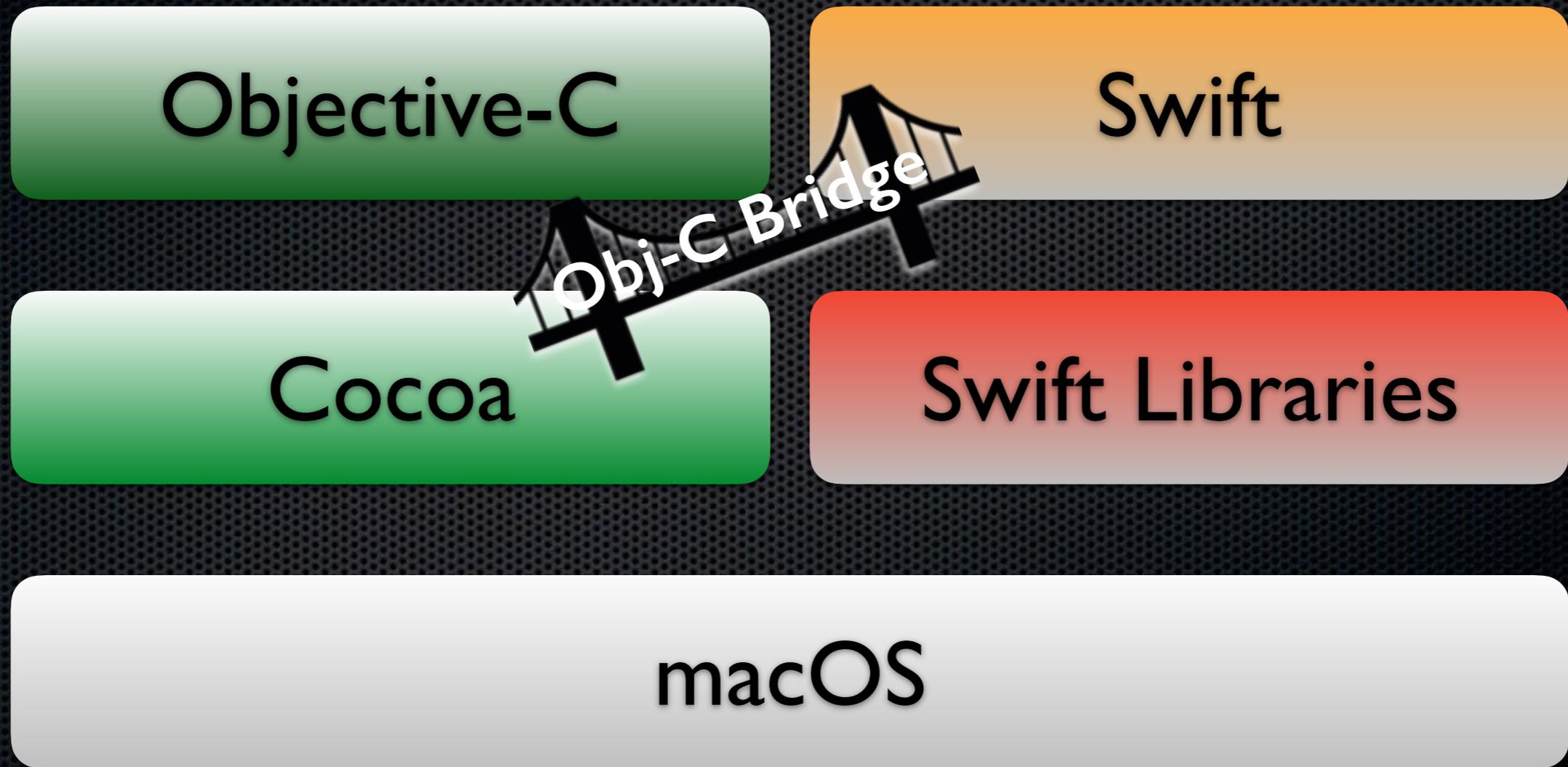


Modern Language Features

- Closures unified with function pointers
- Tuples and multiple return values
- Generics
- Fast and concise iteration over a range or collection
- Structs that support methods, extensions, and protocols
- Functional programming patterns, e.g., map and filter
- Powerful error handling built-in
- Advanced control flow with do, guard, defer, and repeat
- Enums
- String interpolation (v5)



Swift-ObjC





Swift-ObjC

Objective-C

```
UITableView *myTableView = [[UITableView alloc]
initWithFrame:CGRectZero
style:UITableViewStyleGrouped];
```

Swift

```
let myTableView = UITableView(frame: .zero,
style: .grouped)
```



Apple's Goals with Swift

- Fast
- Modern
- Safe
- Interactive

“Objective-C without the C”

–Craig Federighi



Apple's Goals with Swift

- Fast
- Modern
- Safe
- Interactive



REPL

(Read Eval Print Loop)

```
Welcome to Apple Swift version 4.  
Type :help for assistance.  
  1> print("Hello, World!")  
Hello, World!
```



REPL

(Read Eval Print Loop)

```
Welcome to Apple Swift version 4.  
Type :help for assistance.  
  1> print("Hello, World!")  
Hello, World!  
  2> :script  
Python Interactive Interpreter. T  
>>> █
```



Swift Playgrounds

Learn serious code on your iPad.
In a seriously fun way.

Download the new Swift Playgrounds free 





Script Mode

MyScript.py

```
#!/usr/bin/python  
print("Hello, World!")
```



Script Mode

MyScript.swift

```
#!/usr/bin/swift  
print("Hello, World!")
```



Script Mode

MyScript.swift



The "swift" command requires the command line developer tools. Would you like to install the tools now?

Choose Install to continue. Choose Get Xcode to install Xcode and the command line developer tools from the App Store.



Command Line Tools





Mac GUI Application

macOS System Frameworks

Cocoa Application - Application User Interface Responds to User Events, Manages App Behavior

App Kit Notification Center Game Center Sharing Full Screen Mode Cocoa Autolayout Popovers Software Configuration Accessibility Apple Script Spotlight

Media Plays, records, editing audiovisual media, Rendering 2D and 3D graphics

AV Foundation Audio Playback, editing, Analysis & Recording
Core Animation 2D rendering & Animation, 3D Transformations
Core Audio Audio Services for recording, playback and synchronization
Core Image Fast Image Processing, Uses GPU Based acceleration
Core Text Handles Unicode Fonts & texts
Open AL Delivers 3D Audio, High performance positional playbacks in games
Open GL Portable 3D graphics apps & Games, Imaging functions & Effects
Quartz OSX Graphics, Rendering support for 2D content, Event Routing & Cursor Management

Core Services - Fundamental Services for low level network communication, Automatic Reference Counting, Data Formatting, String Manipulation

Address Book Centralized Database for contacts & groups
Core Foundation declares C based programmatic interfaces, Data Types & Data Management
Quick Look Enables Spotlight & finder to display thumbnail images
Security User Authentication, Certificates & keys, Authorization, Keychain Services etc
Core Data Data Model Management & Storage, Undo/Redo, Validation of property values
Foundation Objective C Framework for Object Behavior, Internationalization, Data Types & Data Management
Social Supports integration with Social Networking services
Webkit Display HTML Content in apps, contains WebCore and JavaScript Core

Core OS - Related to hardware and networking. Interfaces for running high-performance computation tasks on CPU or GPU

Accelerate Accelerate complex operations, improve performance using vector unit, Supports data parallelism, 3d Graphic imaging, image processing
Directory Services Provides access to collected information about users, groups, computers, printers in a networked environment
Disk Arbitration Notifies when local or remote volumes are mounted and unmounted
Open CL Makes the high-performance parallel processing power of GPUs available to general purpose computing
System Configuration Provides access to current network configuration information. Determines reachability of remote hosts. Notifies about change in network

Kernel & Device Drivers - Device drivers & BSD Libraries, low level components. Support for file system security, interprocess communications, device drivers

BSD Provides basis for file systems and networking facilities, POSIX Thread support, BSD Sockets
File System Supports multiple volume formats (NTFC, ExFAT, FAT etc) & File Protocols (AFP, NFS etc)
Mach Protected Memory, Preemptive multitasking, Advanced Virtual Memory, Real Time Support
Networking Supports network kernel extensions (NKEs), Create network modules, Configure protocol stacks, Monitor and modify network traffic



Command Line Tools

macOS System Frameworks

Cocoa Application - Application User Interface Responds to User Events, Manages App Behavior

- App Kit
- Notification Center
- Game Center
- Sharing
- Full Screen Mode
- Cocoa Autolayout
- Popovers
- Software Configuration
- Accessibility
- Apple Script
- Spotlight

Media Plays, records, editing audiovisual media, Rendering 2D and 3D graphics

- AV Foundation**
Audio Playback, editing, Analysis & Recording
- Core Animation**
2D rendering & Animation
3D Transformations
- Core Audio**
Audio Services for recording, playback and synchronization
- Core Image**
Fast Image Processing
Uses GPU Based acceleration
- Core Text**
Handles Unicode Fonts & texts
- Open AL**
Delivers 3D Audio
High performance positional playbacks in games
- Open GL**
Portable 3D graphics apps & Games
Imaging functions & Effects
- Quartz**
OSX Graphics, Rendering support for 2D content
Event Routing & Cursor Management

Core Services - Fundamental Services for low level network communication, Automatic Reference Counting, Data Formatting, String Manipulation

- Address Book**
Centralized Database for contacts & groups
- Core Foundation**
declares C based programmatic interfaces
Data Types & Data Management
- Quick Look**
Enables Spotlight & finder to display thumbnail images
- Security**
User Authentication, Certificates & keys, Authorization, Keychain Services etc
- Core Data**
Data Model Management & Storage, Undo/Redo, Validation of property values
- Foundation**
Objective C Framework for Object Behavior, Internationalization, Data Types & Data Management
- Social**
Supports integration with Social Networking services
- Webkit**
Display HTML Content in apps. contains WebCore and JavaScript Core

Core OS - Related to hardware and networking. Interfaces for running high-performance computation tasks on CPU or GPU

- Accelerate**
Accelerate complex operations, improve performance using vector unit, Supports data parallelism, 3d Graphic imaging, image processing
- Directory Services**
Provides access to collected information about users, groups, computers, printers in a networked environment
- Disk Arbitration**
Notifies when local or remote volumes are mounted and unmounted
- Open CL**
Makes the high-performance parallel processing power of GPUs available to general purpose computing
- System Configuration**
Provides access to current network configuration information. Determines reachability of remote hosts. Notifies about change in network

Kernel & Device Drivers - Device drivers & BSD Libraries, low level components. Support for file system security, interprocess communications, device drivers

- BSD**
Provides basis for file systems and networking facilities, POSIX Thread support, BSD Sockets
- File System**
Supports multiple volume formats (NTFC, ExFAT, FAT etc) & File Protocols (AFP, NFS etc)
- Mach**
Protected Memory, Preemptive multitasking, Advanced Virtual Memory, Real Time Support
- Networking**
Supports network kernel extensions (NKEs). Create network modules, Configure protocol stacks, Monitor and modify network traffic

Python Notification Alert

```
#!/usr/bin/env python
from Foundation import NSUserNotification
from Foundation import NSUserNotificationCenter
from Foundation import NSUserNotificationDefaultSoundName
from optparse import OptionParser

def NotificationAlert(strTitle = 'Alert Title', strMessage = 'Message', bSound = True):
    notification = NSUserNotification.alloc().init()
    notification.setTitle_(strTitle)
    notification.setInformativeText_(strMessage)
    notification.
    if bSound:
        notification.setSoundName_(NSUserNotificationDefaultSoundName)

    center = NSUserNotificationCenter.defaultUserNotificationCenter()
    center.deliverNotification_(notification)

def main():
    NotificationAlert('Example', 'Test', True)

if __name__ == '__main__':
    main()
```



Example

Test

Swift Notification Alert

```
import Foundation

func createNotification(title: String, name: String) {
    let notification = NSUserNotification()
    notification.title = title
    notification.subtitle = name
    NSUserNotificationCenter.default.scheduleNotification(notification)
}

createNotification(title:"Example", name:"Test")
```



Example
Test



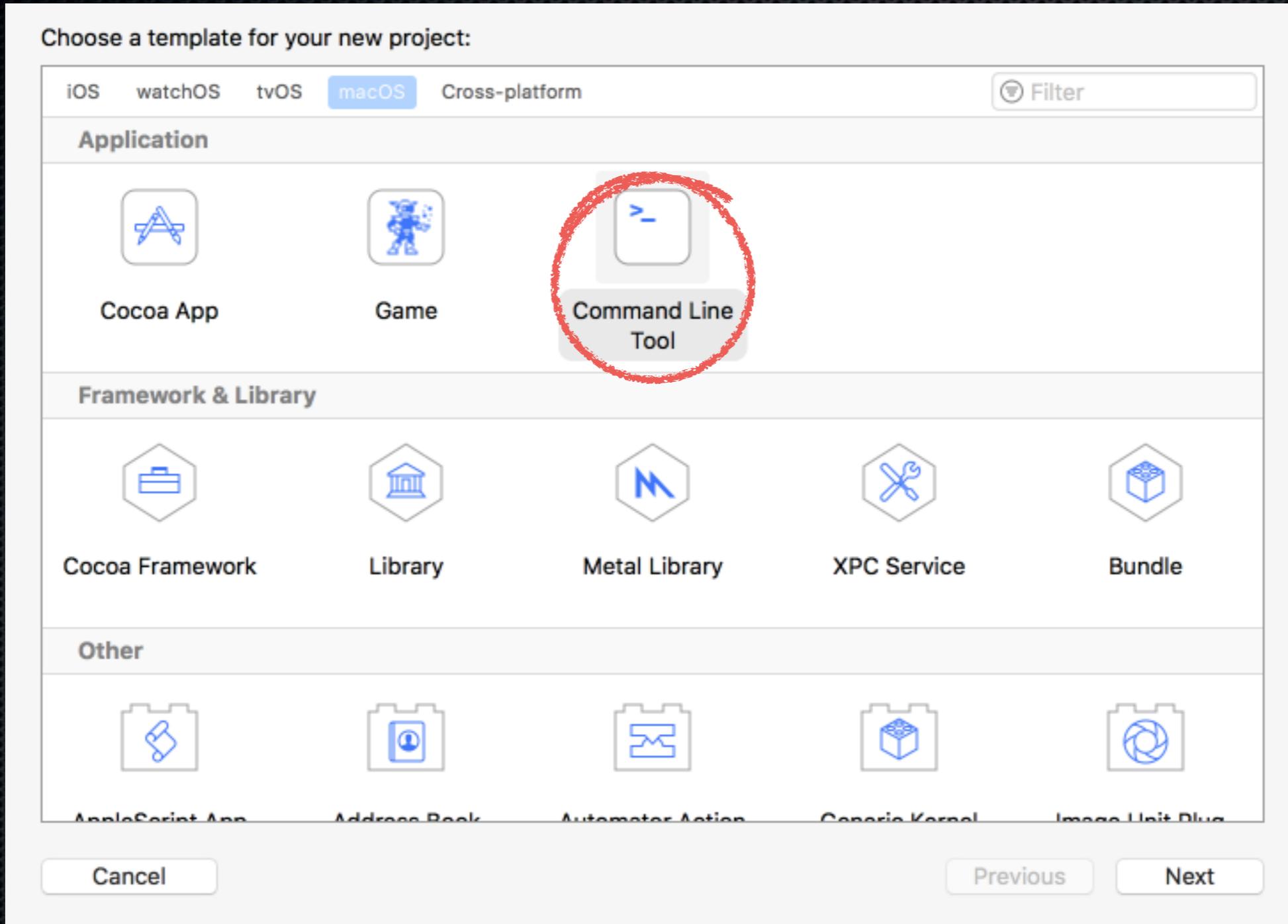
Xcode Advantages



- Excellent editor with interactive syntax checking and auto-completion
- Built in debugger
- Built in Git support
- Documentation included
- Private source code
- Code signing and notarization



Command Line Tools





Command Line Tools

Choose options for your new project:

Product Name:

Team:

Organization Name:

Organization Identifier:

Bundle Identifier:

Language:

A red dashed circle highlights the 'Organization Identifier' field, which contains the text 'com.macTech'. A blue arrow points from the bottom right towards the 'Language' field, which contains the text 'Swift'.



Command Line Tools

A screenshot of the Xcode IDE showing a Swift file named 'main.swift'. The code in the file is as follows:

```
1 //  
2 // main.swift  
3 // MacTech Demo  
4 //  
5 // Created by Jim Rea on 2/11/19.  
6 // Copyright © 2019 Jim Rea. All rights reserved.  
7 //  
8  
9 import Foundation  
10  
11 print("Hello, World!")  
12  
13
```

The 'Identity and Type' panel on the right shows the file's name as 'main.swift', type as 'Default - Swift Source', and full path as '/Users/jimrea/Development/ProVUE/MacTech LA Demo/MacTech Demo/MacTech Demo/main.swift'. A circular magnifying glass is overlaid on the code, with a blue arrow pointing to the 'import Foundation' line. The magnified text shows:

```
import Foundation  
print("Hello, World!")
```



Command Line Tools

A screenshot of the Xcode IDE showing a Swift file named 'main.swift' being executed. The code in the editor includes a comment block and a print statement. The output console at the bottom right displays the result of the execution. A blue arrow points from the play button in the top toolbar to the console. Another blue arrow points from the console output to a callout box.

```
1 //  
2 // main.swift  
3 // MacTech Demo  
4 //  
5 // Created by Jim Rea on 2/11/19.  
6 // Copyright © 2019 Jim Rea. All rights reserved.  
7 //  
8 //  
9 import Foundation  
10  
11 print("Hello, World!")  
12  
13
```

Hello, World!
Program ended with exit code: 0

Hello, World!
Program ended with exit code: 0



Command Line Tools

<https://medium.com/quick-code/lets-build-a-command-line-app-in-swift-328ce274f1cc>

A screenshot of a web browser displaying a Medium article. The browser's address bar shows the URL 'medium.com/quick-code/lets-build-a-com...'. The page header includes the Medium logo, 'Quick Code', and navigation links like 'HOME', 'TOP COURSES', 'SUBMIT ARTICLE', 'WEB DEV', 'MOBILE DEV', 'PROGRAMMING', and 'QUICK CO'. The article title is 'Lets build a Command line app in Swift' by Sandeep Joshi, dated Jan 10, 2018. Below the title is a featured image showing a laptop screen with code and a smartphone. At the bottom of the article preview, there is a notification: 'Never miss a story from Quick Code, when you sign up for Medium. Learn more' and a 'GET UPDATES' button.



Command Line Tools

<https://www.raywenderlich.com/511-command-line-programs-on-macos-tutorial>

A screenshot of a web browser displaying a tutorial article. The browser's address bar shows the URL 'www.raywenderlich.com/511-command-line-p...'. The page features a dark navigation bar with a search icon and a 'Become a subscriber' button. A red banner below the navigation bar reads 'ARCHIVE This content has been archived.' The main content area has a teal header with the text 'macOS Tutorials' and 'The highest-quality macOS tutorials on the web!'. The article title is 'Command Line Programs on macOS Tutorial'. The subtext reads: 'Discover how easy it is to make your own terminal-based apps with this command line programs on macOS tutorial. Updated for Xcode 9 and Swift 4!'. The author's name is 'By Eric Soto', with a small profile picture. Below the author's name, it says 'Jul 21 2017 · Beginner · Article · 30 mins'. To the right of the text is an illustration of a laptop with a terminal window showing green code on a dark background.

www.raywenderlich.com/511-command-line-p...

Google yj bm kuranda News Tasks JRea Follow Politics Tech RSS Tech News Weather Reference Development >>

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ARCHIVE This content has been archived.

macOS Tutorials
The highest-quality macOS tutorials on the web!

Command Line Programs on macOS Tutorial

Discover how easy it is to make your own terminal-based apps with this command line programs on macOS tutorial. Updated for Xcode 9 and Swift 4!

 **By Eric Soto**
Jul 21 2017 · Beginner · Article · 30 mins





Command Line Tools

https://dev.to/ceri_anneblog/how-to-make-a-command-line-tool-in-xcode-2f81

A screenshot of a web browser displaying a Dev.to article. The browser's address bar shows the URL 'dev.to/ceri_anneblog/how-to-make-a-command-line-tool-in-xcode-2f81'. The article title is 'How to make a command line tool in Xcode' by Ceri-anne, dated Sep 1 '18, with a 1-minute read time. The article includes hashtags for #swift, #xcode, and #macos. The main text begins with 'MacOS command line tools can be handy for automating tasks and they're also a great way to have more fun with Swift, so here's how to set one up:'. A sub-section titled 'Creating the project' contains the first step: '1) Create a new Xcode project, select MacOS and command line'. At the bottom of the article, there is a small image of the Xcode project creation dialog box. The article's engagement metrics are shown at the bottom: 9 likes, 3 unicorns, 10 claps, and 1 discussion.

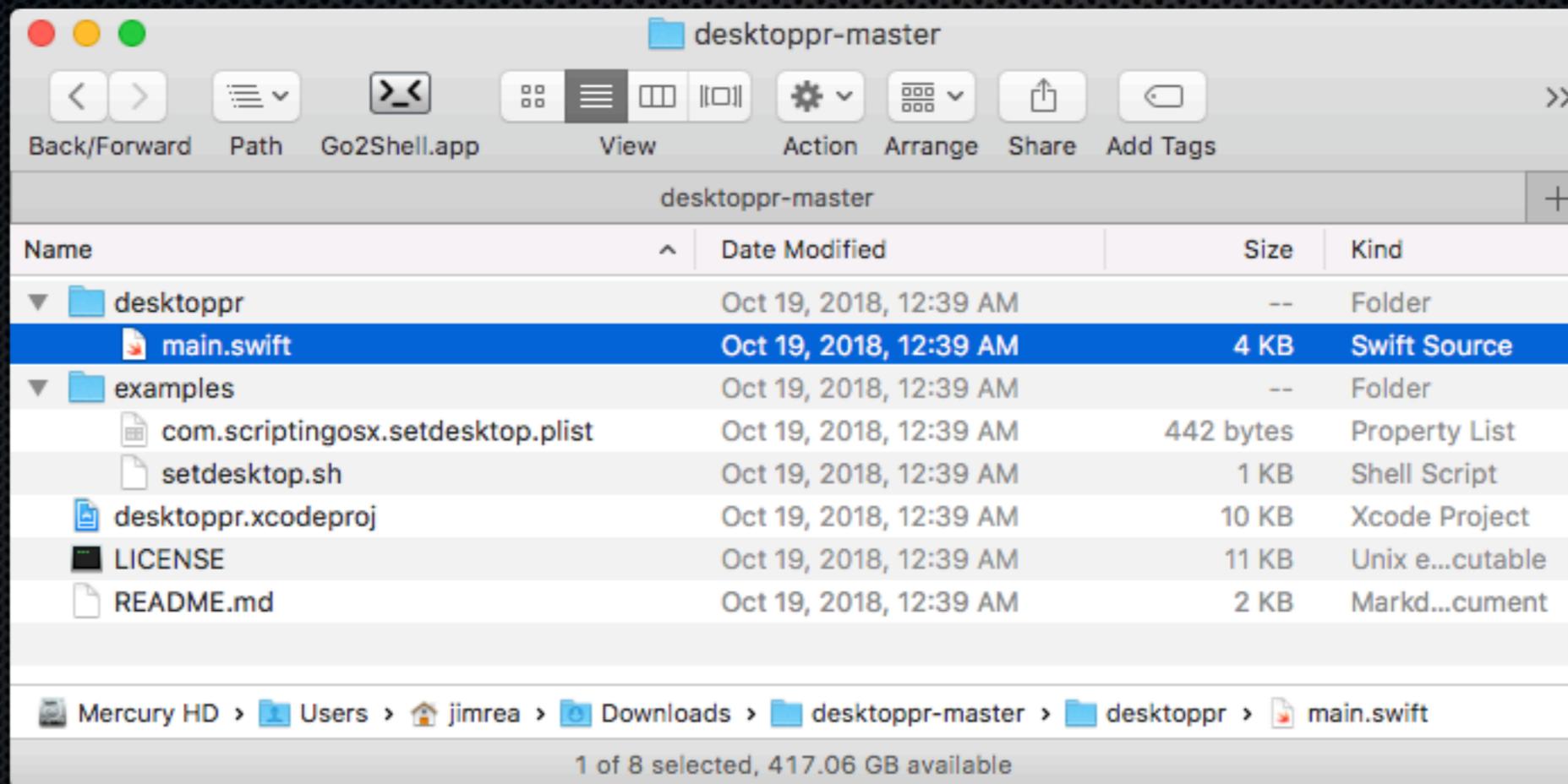
Swift Open Source Projects

- desktoppr
- DEPNotify
- SplashBuddy
- NoMAD & NoMADLogin-AD
- ProfileCreator
- replay

Swift Projects

desktoppr - command line tool to manage the desktop image

<https://scriptingosx.com/2018/09/managing-the-desktop-picture-on-macos/>



Swift Projects

DEPNotify - lightweight notification of DEP enrollment status

<https://gitlab.com/Mactroll/DEPNotify>



Swift Projects

SplashBuddy - onboarding splash screen for Jamf Pro

<https://github.com/Shufflepuck/SplashBuddy>

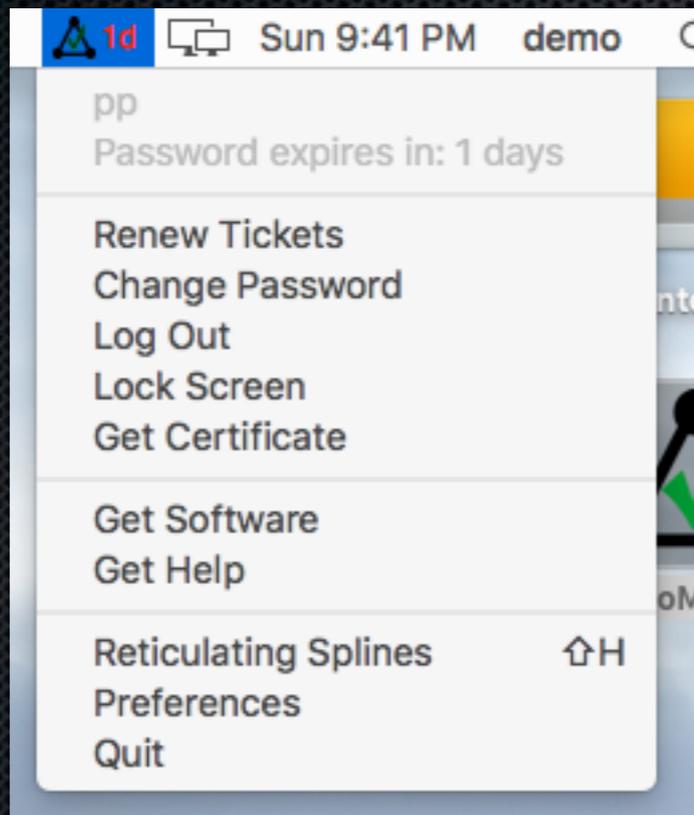


Swift Projects

NoMAD & NoMADLogin-AD - Active Directory enhancements

<https://gitlab.com/Mactroll/NoMAD>

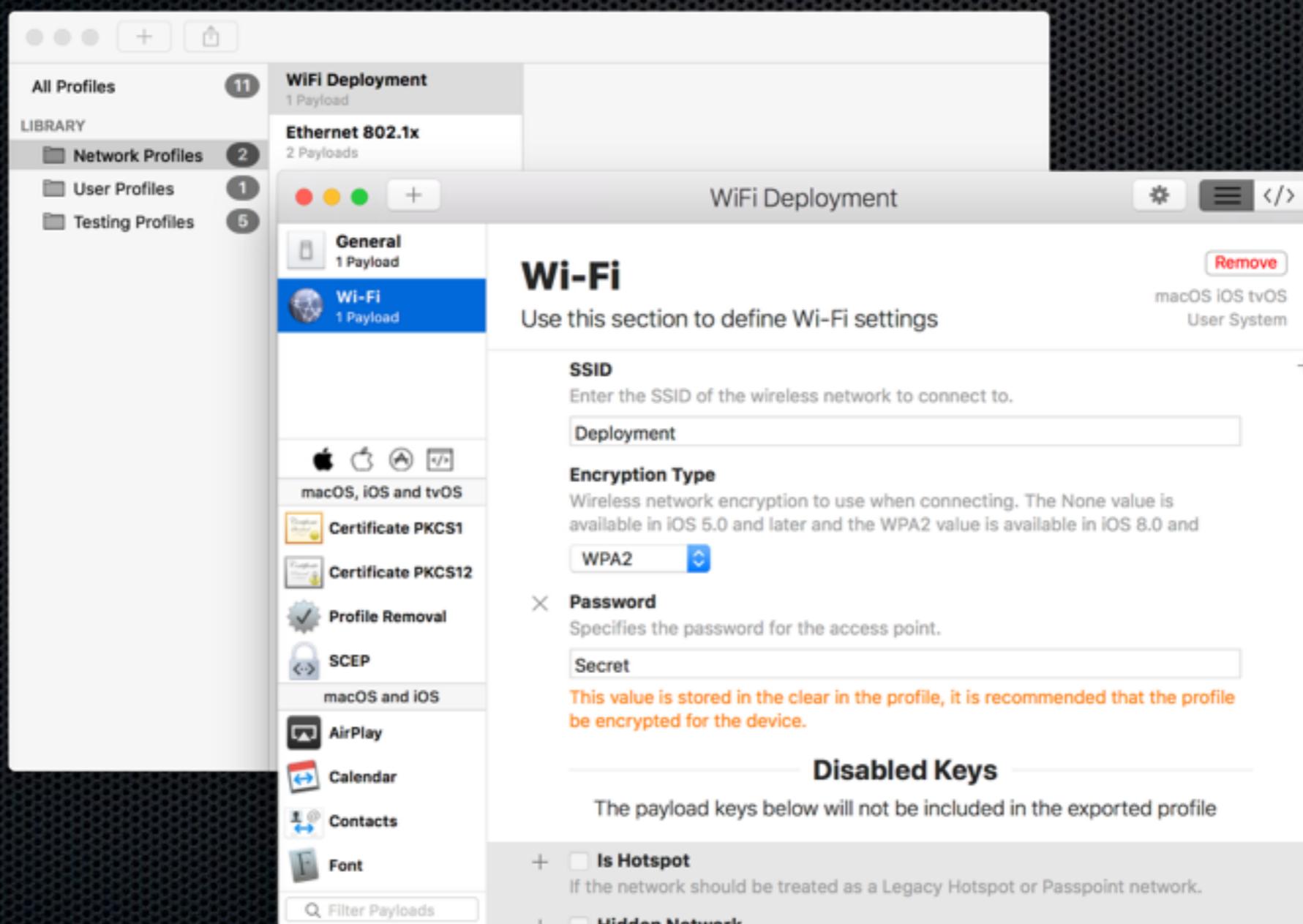
<https://gitlab.com/orchardandgrove-oss/NoMADLogin-AD>



Swift Projects

Profile Creator - Creates configuration profiles

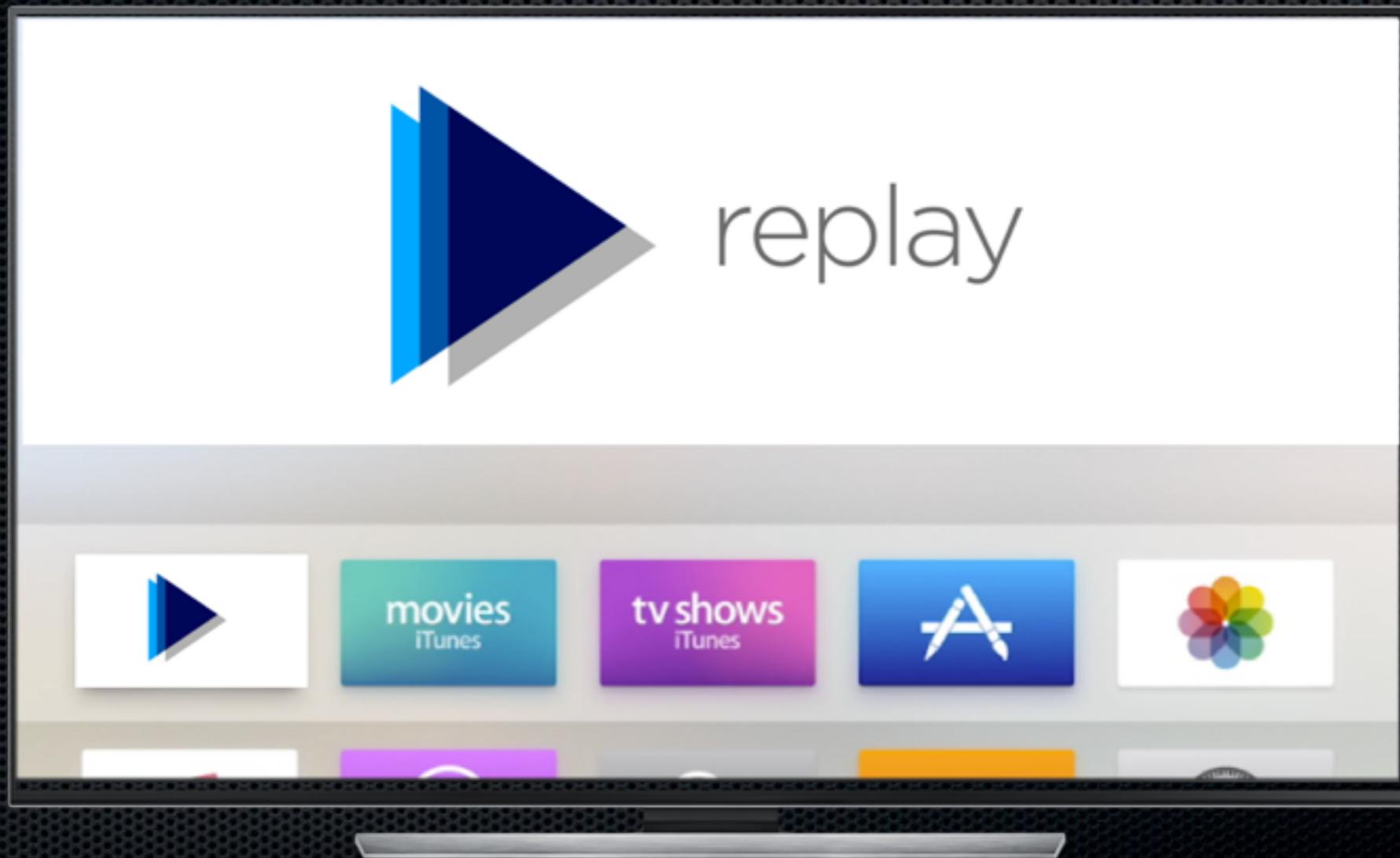
<https://github.com/erikberglund/ProfileCreator>



Swift Projects

replay - converts AppleTV into a video kiosk

<https://github.com/vmware/replay-app-for-tvos>





Getting Started



macOS 10.14 Mojave



Xcode 10



Getting Started

The screenshot shows the Apple Books app interface. At the top, there's a navigation bar with 'Library', navigation arrows, and icons for 'Featured', 'Top Charts', 'NYTimes', 'Categories', and 'Top Authors'. A search bar is on the right. The main content area is for the book 'The Swift Programming Language (Swift 4.2)' by Apple Inc. It features the Swift logo, the book title, and the 'Swift 4.2 Edition' subtitle. Below this are 'Get' and 'Get Sample' buttons. The book has a 5-star rating from 1,501 reviews and was published on June 2, 2014. A 'REQUIREMENTS' section states that the book can only be viewed on an iOS device with Apple Books on iOS 12 or later, or a Mac with iBooks 1.0 or later and OS X 10.9 or later. There's also a 'MORE APPLE INC.' section with 'Collection' and 'Alert Me' options. The 'About the Book' section describes Swift as a programming language for creating iOS, macOS, watchOS, and tvOS apps. Below this are 'Screenshots' showing code snippets and diagrams. At the bottom, an 'Information' section lists: Language: English, Genre: Programming, Publisher: Apple Inc., Seller: Apple Inc., Published: Jun 2, 2014, Updated: Sep 18, 2018, Pages: 500, Size: 4.3 MB.



Getting Started



- Everyone Can Code
<https://www.apple.com/everyone-can-code/>
- Stanford's Swift Course
<https://itunes.apple.com/us/course/developing-ios-11-apps-with-swift/id1309275316>



Everyone Can Code

- Julian Schiavo
<https://schiavo.me>



Questions?



Jim Rea

www.provue.com

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