Ruthlessly Simple Dependency Management with Carthage

What

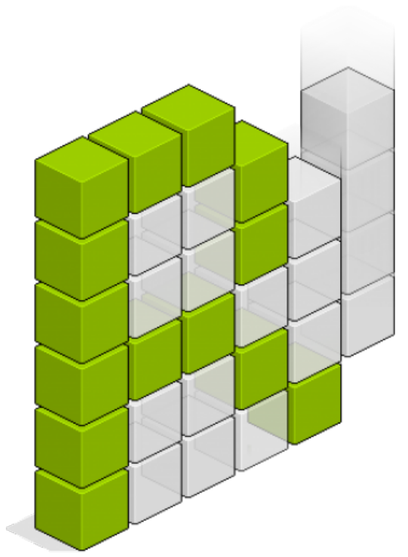
Why

How to use it

How it works

Justin Spahr-Summers

@jspahrsummers



The Problem

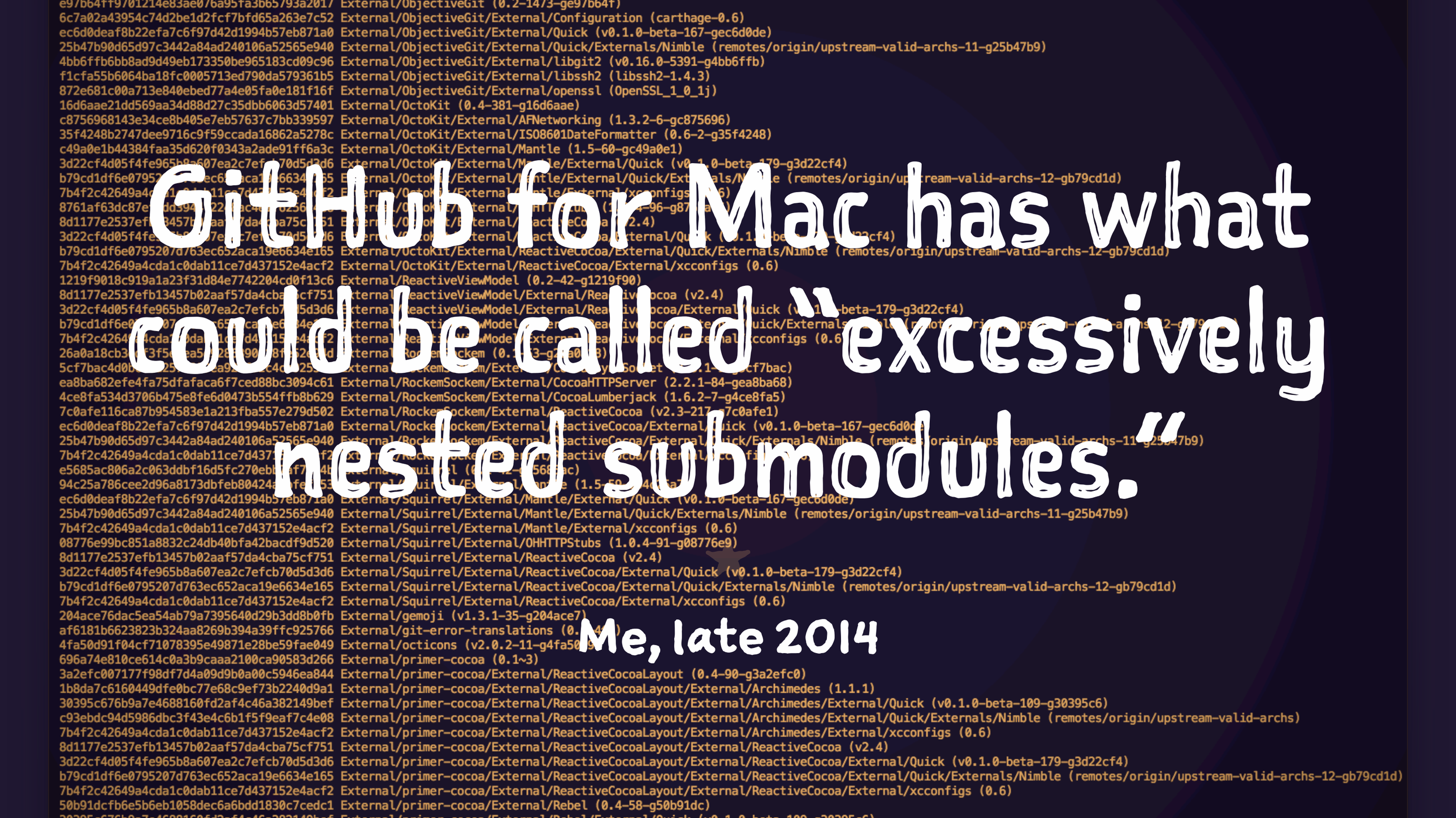
Dependencies in Cocoa (historically)

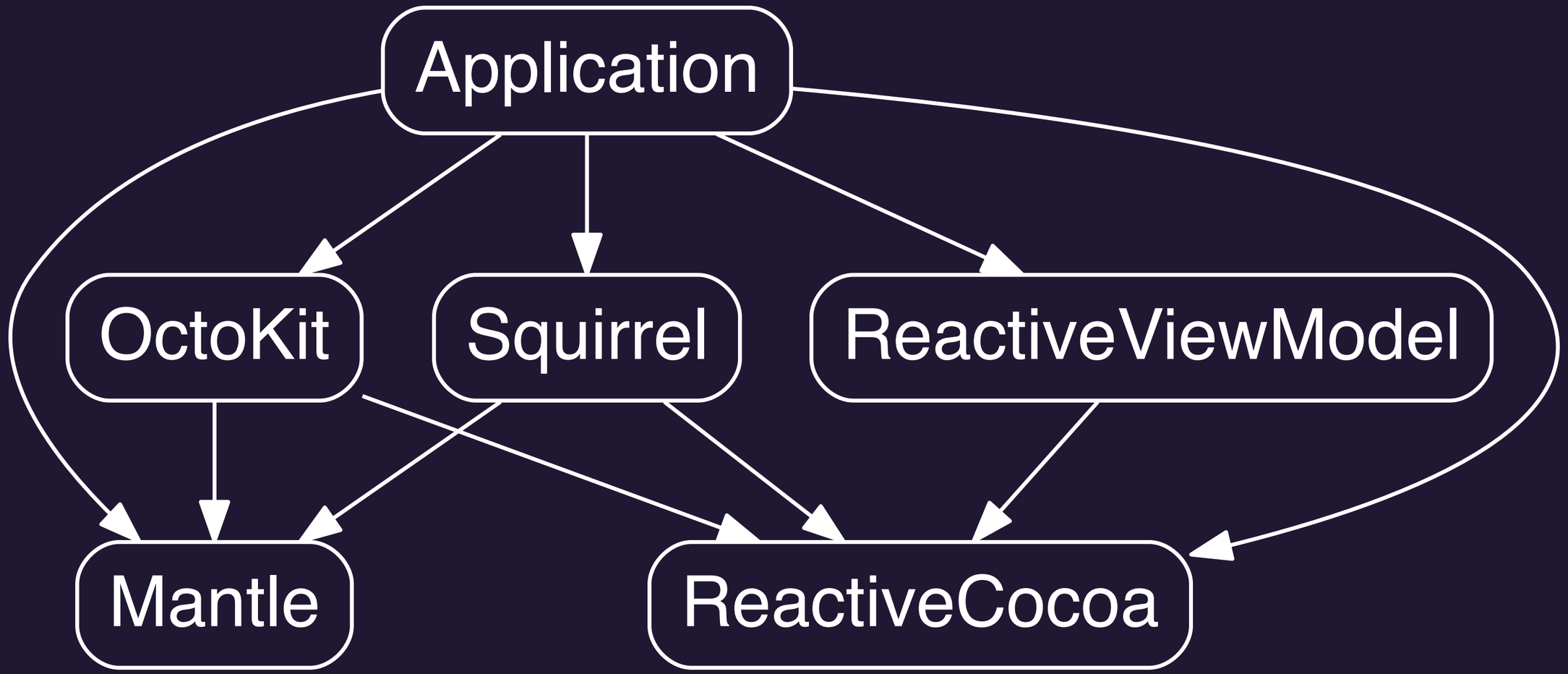
1. Copied source files
2. Zipped binaries
3. SVN externals, Git submodules
4. Git subtrees

Dependencies on other platforms

1. Dependency managers

Our Problem


GitHub for Mac has what could be called "excessively nested submodules."
Me, late 2014


Application
OctoKit
Squirrel
ReactiveViewModel
Mantle
ReactiveCocoa

Why not use CocoaPods?

Podspecs

Less control

Centralized

@robrix

@mdiep

@keithduncan

@alanjrogers

Our goals

1. Pick compatible versions for all dependencies
2. Check out dependencies with Git
3. Build frameworks with Xcode

Using Carthage

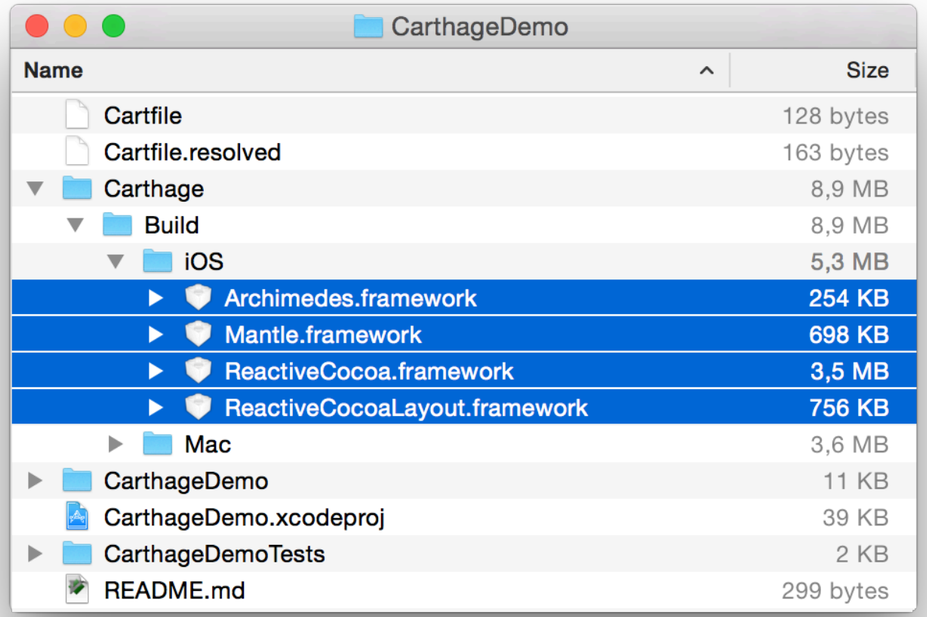
Step 1: Create a Cartfile

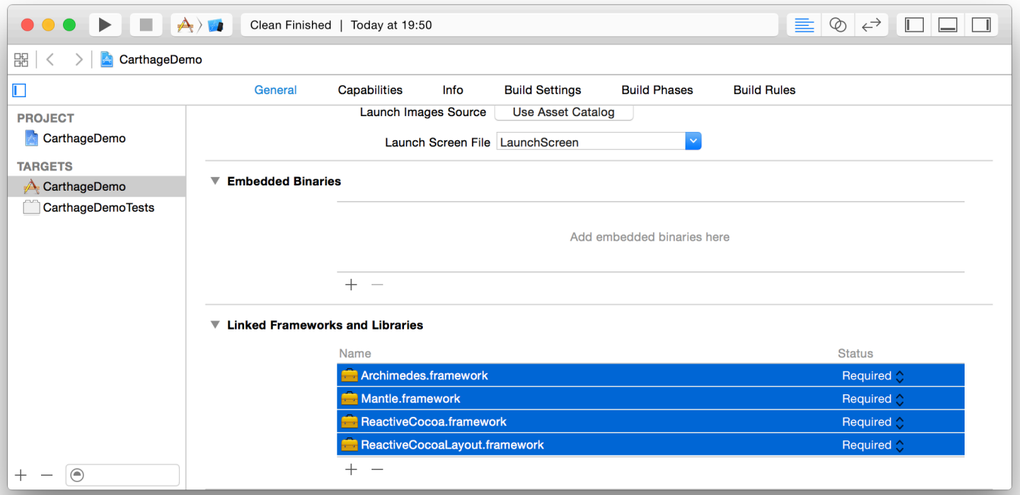
```
github "Mantle/Mantle" ~> 1.5
github "ReactiveCocoa/ReactiveCocoa" >= 2.4.7
github "ReactiveCocoa/ReactiveCocoaLayout" == 0.5.2
```

Step 2: Run Carthage

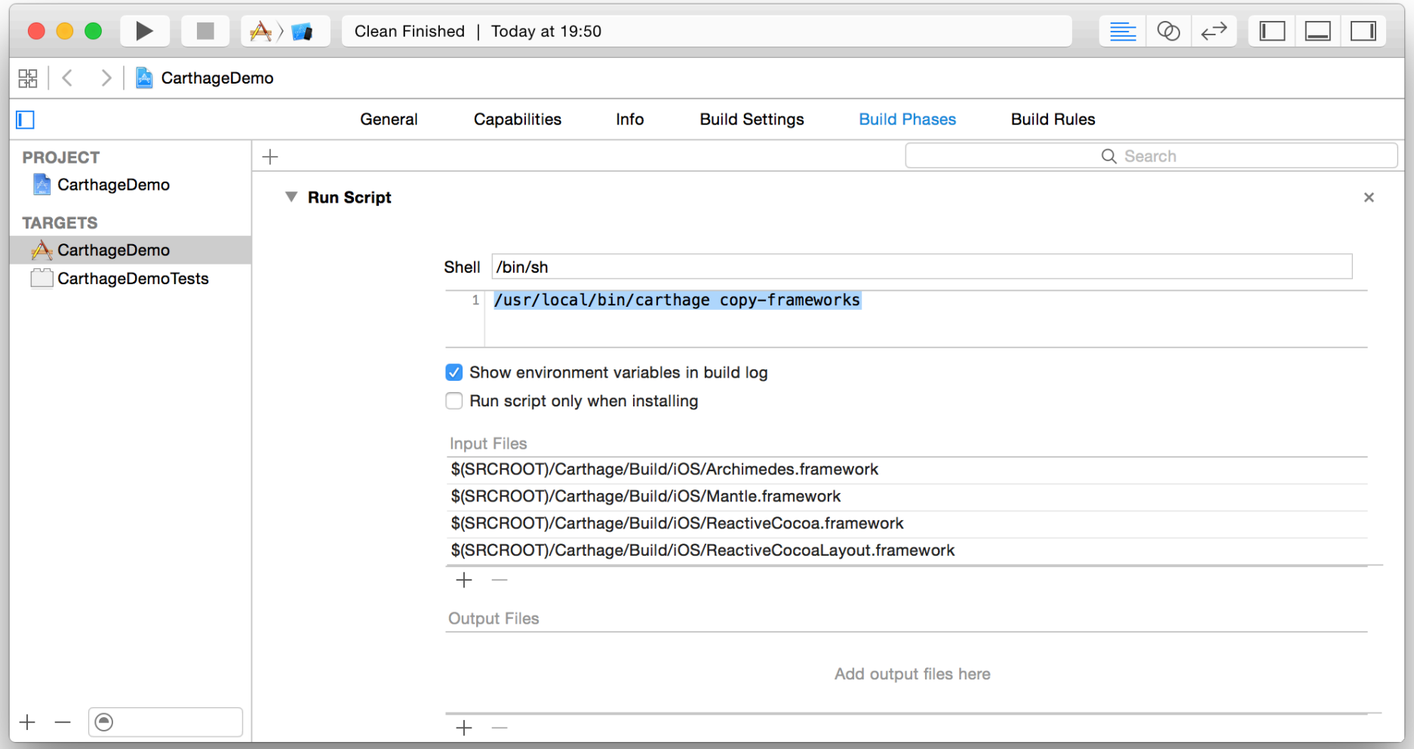
```
$ carthage update
*** Fetching Mantle
*** Fetching ReactiveCocoa
*** Fetching ReactiveCocoaLayout
*** Fetching Archimedes
*** Downloading Archimedes at "1.1.4"
*** Downloading Mantle at "1.5.4"
*** Downloading ReactiveCocoa at "v2.4.7"
*** Downloading ReactiveCocoaLayout at "0.5.2"
```

Step 3: Link Frameworks





Step 4: Strip architectures (iOS only)



That's it!

"Ruthlessly Simple"

Easy: familiar or approachable

Simple: fewer concepts and concerns[1]

[1] See Rich Hickey's talk, Simple Made Easy

CocoaPods is easy

Carthage is simple

Simpler tools are...

Easier to maintain

Easier to understand

Easier to contribute to

More flexible

More composable

Enhanced when other tools improve

Behind the Scenes

Parse the Cartfile

Resolve the dependency graph

Download all dependencies

Build each framework

🔍 Parsing

Parse OGDL into a list of dependencies

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Determine the type of each dependency

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github "ReactiveCocoa/ReactiveCocoa"
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🔍 Parsing

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```

Determine the type of each dependency

```
github "ReactiveCocoa/ReactiveCocoa"
```

Parse any Semantic Version

```
>= 2.4.7
```

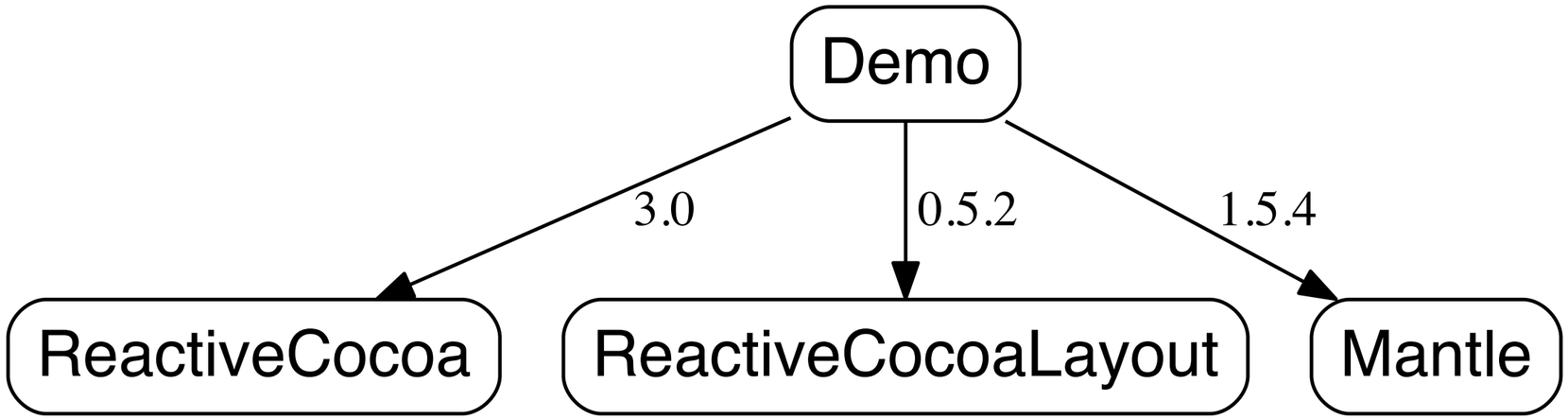
♻ Resolving

CarthageDemo/Cartfile:

```
github "Mantle/Mantle" ~> 1.5
github "ReactiveCocoa/ReactiveCocoa" >= 2.4.7
github "ReactiveCocoa/ReactiveCocoaLayout" == 0.5.2
```

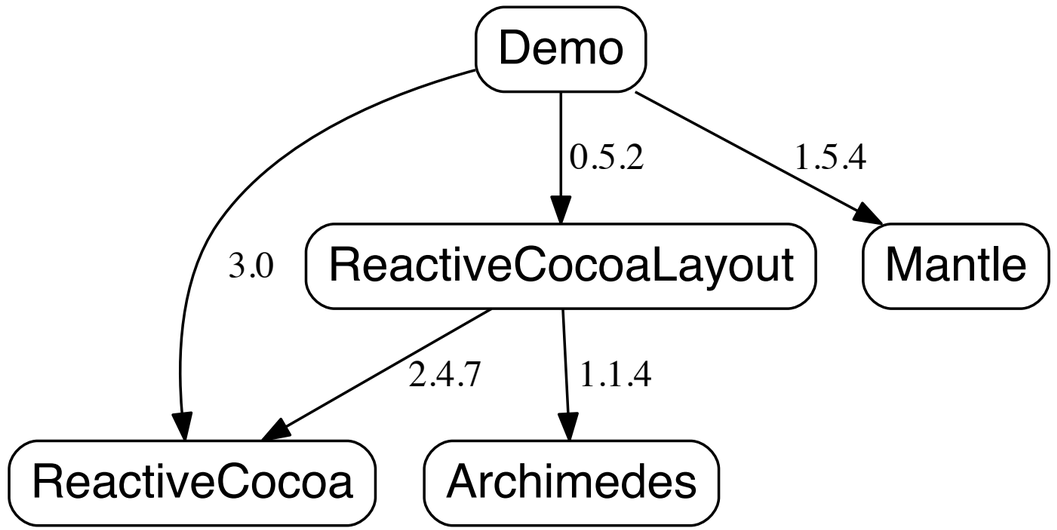
♻ Resolving

Create a graph of the latest dependency versions



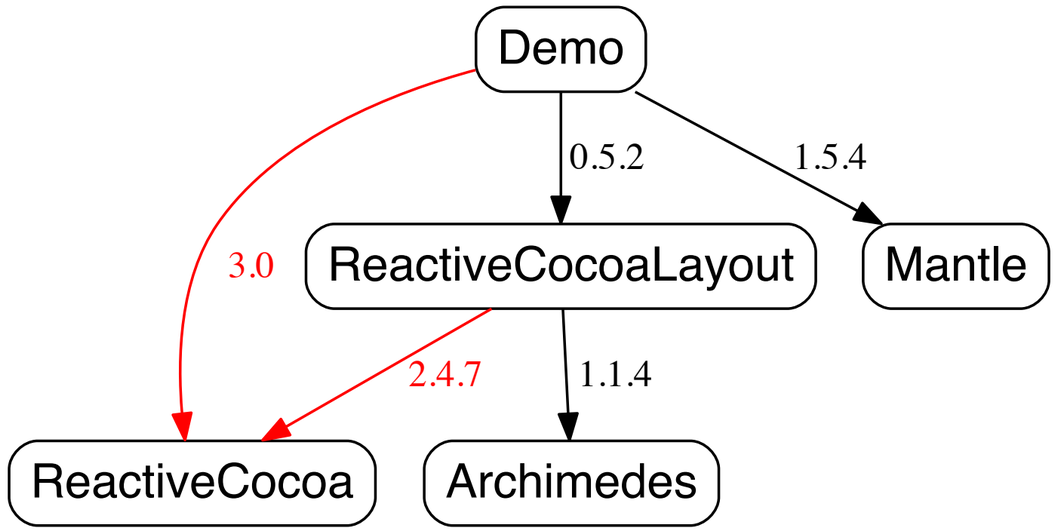
♻ Resolving

Insert dependency Cartfiles into the graph



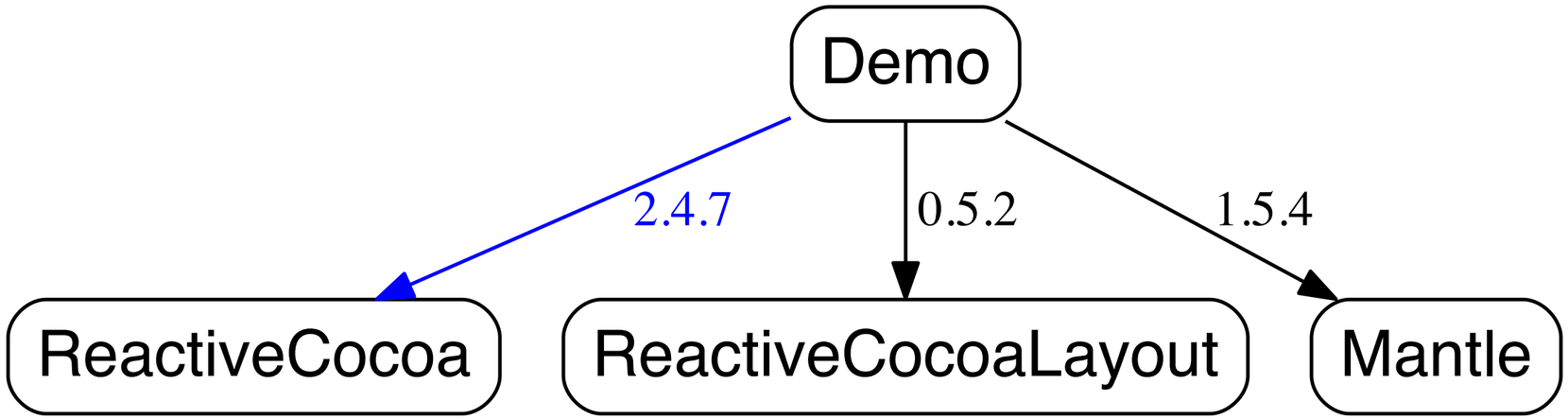
♻ Resolving

If requirements conflict, throw out the graph



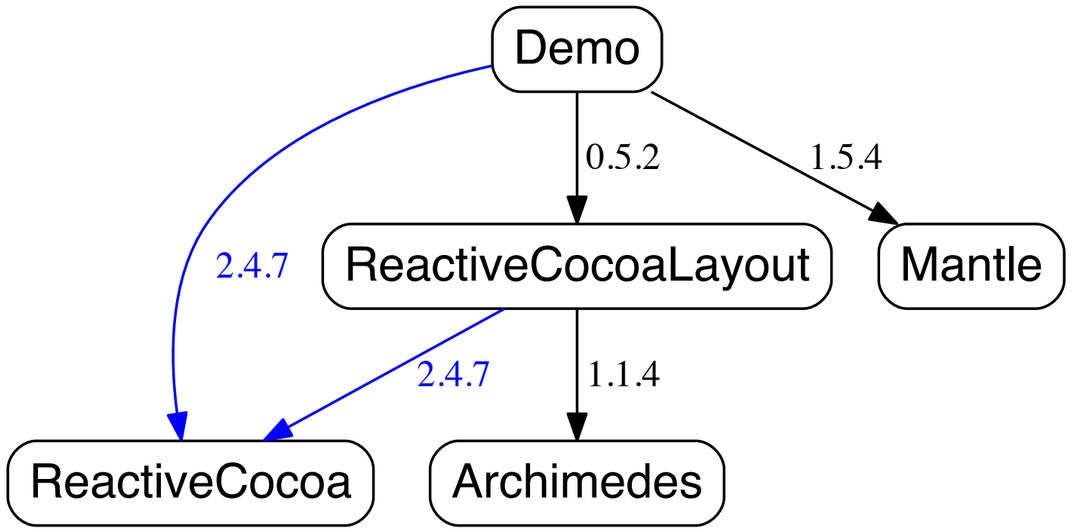
♻ Resolving

Try a new graph with the next possible version



♻ Resolving

Repeat until a valid graph is found



💾 Downloading

1. **Fetch the repository** into Carthage's cache

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2. **Copy the right version** into Carthage/Checkouts

🔨 Building

1. **Symlink Carthage/Build** into the dependency folder

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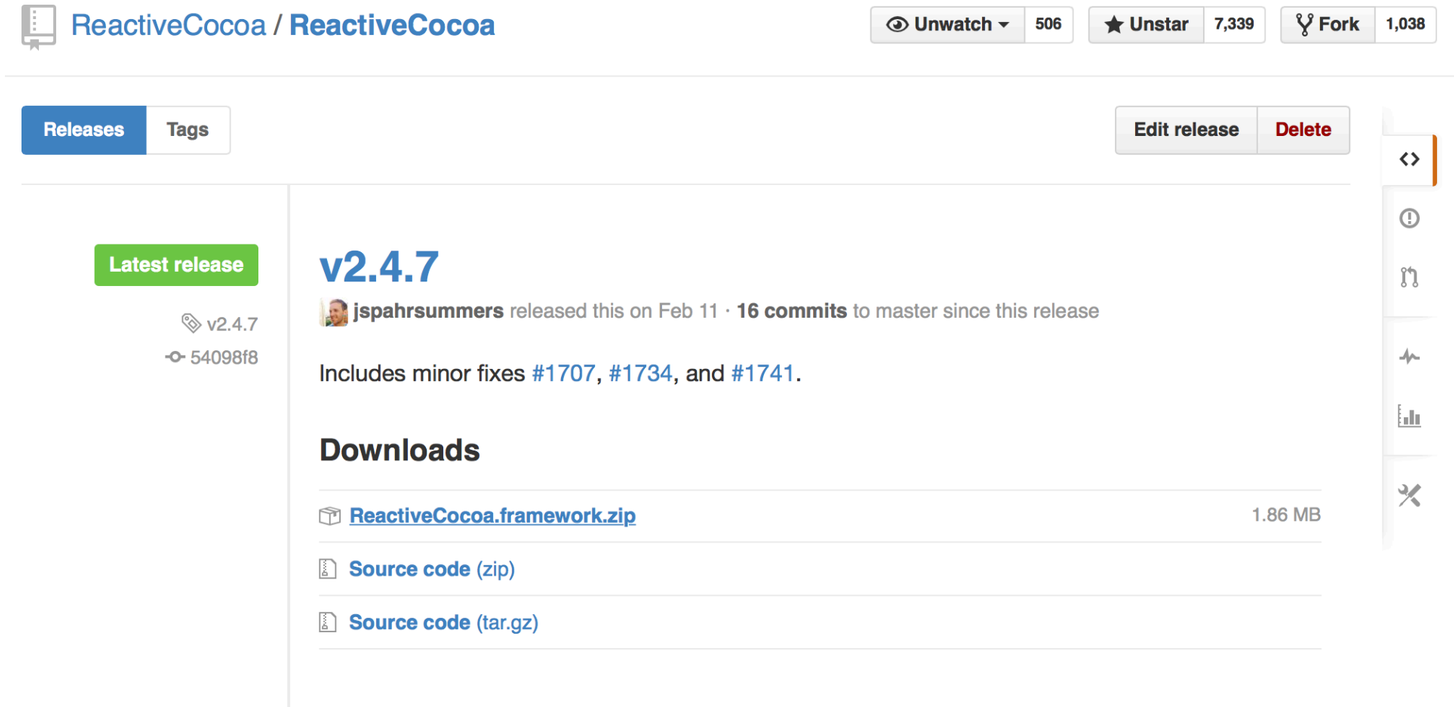
🔨 Building

1. **Symlink Carthage/Build** into the dependency folder
2. **List framework schemes** from the `.xcodeproj`
3. **Build each scheme** for all supported architectures
4. **Combine multiple architectures** with `lipo`
5. **Copy the built frameworks** into Carthage/Build

✨ BONUS: Prebuilt binaries! ✨




```
*** Downloading ReactiveCocoa at "v2.4.7"
```

CarthageKit

Technical Choices

Dynamic frameworks vs. static libraries

- iOS 8+ only
- Can include resources
- Self-contained and ready-to-use
- Avoid duplicate symbol errors
- **Required for Swift**

Swift vs. Objective-C

- Type safety
- Value types *(especially enums)*
- Much faster to write
- Better modularization
- The Next Big Thing™

ReactiveCocoa

- Simplifies networking (with the GitHub API)
- Simplifies the dependency resolver
- Simplifies shelling out, via ReactiveTask
- Carthage helps test RAC 3.0 in the real world

1.0

Per-project settings

Review CarthageKit API

Review command line flags

Profit!!! 

What

Why

How to use it

How it works

Questions? Comments?

Slides and notes, plus my demo project, are available at:
https://github.com/jspahrsummers/carthage-talk

Thanks to everyone who reviewed this presentation, and to Realm for inviting me to speak![2]

[2] ❤ Matt Diephouse, Rob Rix, Alan Rogers, Keith Duncan, Nacho Soto, Tom Brow, James Lawton, Arwa Jumkawala, JP Simard, Tim Anglade, Brendan Forster, Benjamin Encz, Robert Böhnke, and you!