Modular App Architecture

Slicing up large applications into reasonably-sized chunks

Daniel Peter (🔎 @oh_its_daniel) - CocoaHeads Cologne - 16. August 2021

What this talk is about? ✅

- App architecture
- A practical example of modular app architecture
  - Creating your first package
  - Leveraging .xcworkspaces
- How to structure and work with growing codebases, complexity, and teams
- Sharing partly anecdotal experiences

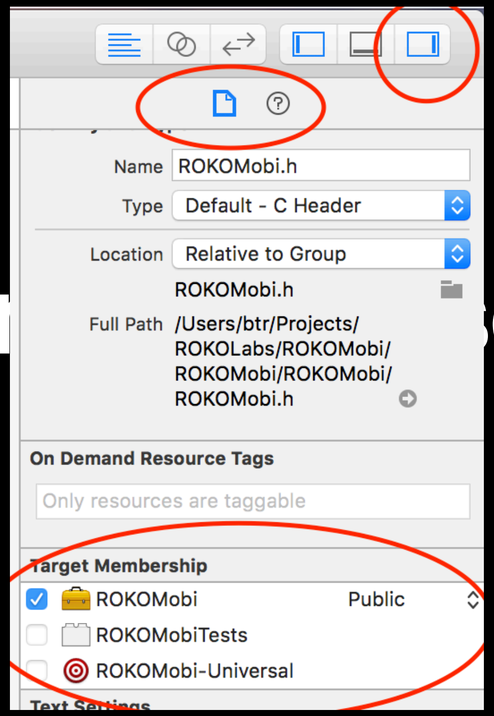
What this talk is not about? ❌

- Screen architecture
  - MVVM, VIPER, MVC, MOAA
- How to migrate your app
  - But feel free to ask questions!
- Integrating non-Swift code via SPM
- Bananas 🍌

Build succeeded 15.08.21, 18:58 6614 seconds
No issues

How to merge conflicts (file project.pbxproj) in Xcode use svn?

Asked 11 years, 7 months ago Active 8 months ago Viewed 88k times



"We'll r se our appl er"

Some developer, somewhere

Reasons to modularise your app

- Growing project with a lot of reused code
- Improving developer experience
  - Easier onboarding
  - Shorter build times
  - Clear module ownership

What you need

- A dependency manager that allows local packages / pods / carts
  - Swift Package Manager (our weapon of choice)
  - CocoaPods (local pod specs + test specs)
  - Whatever floats your boat 🚣
- Code to modularise

What is Swift Package Manager?

Managing dependencies

- Apple's dependency manager
- Tightly integrated into Xcode
- All Swift! No more Ruby / YAML / JSON config files
- Supports multiple platforms
- Open source (https://github.com/apple/swift-package-manager)
- Reference (https://swift.org/package-manager/)

What is a Module?

Name-spaced Swift Code

- Swift organises code into modules
  - import Foundation <- imports the Foundation module
- Modules import other modules as dependencies
- Allows code reusability in multiple projects
- Eliminate the need to reimplement existing things

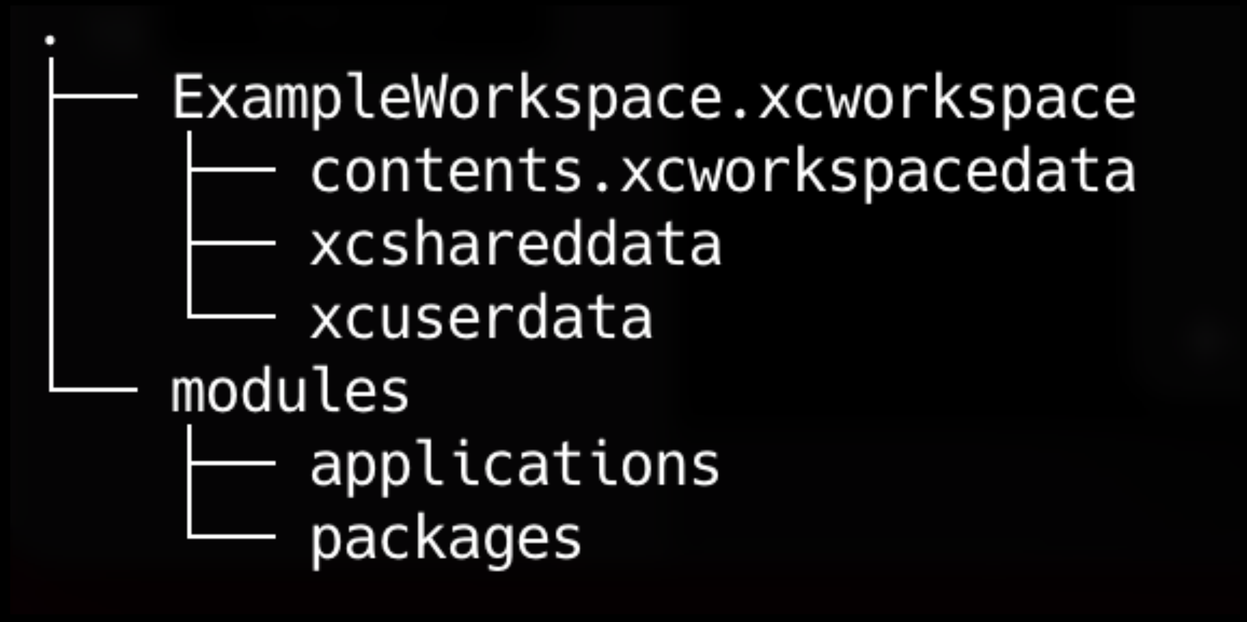
What is a Package?

A module container

- A Swift Package is described by the `Package.swift` manifest file
- Packages define targets
  - Each **target** is a **module**
  - **Targets** build into **products**
  - **Products** can be **libraries** or **executables**
  - **Targets** can define (versioned) **dependencies**
- Packages can be imported in Xcode or into other Swift Packages

Modular App Architecture with SPM

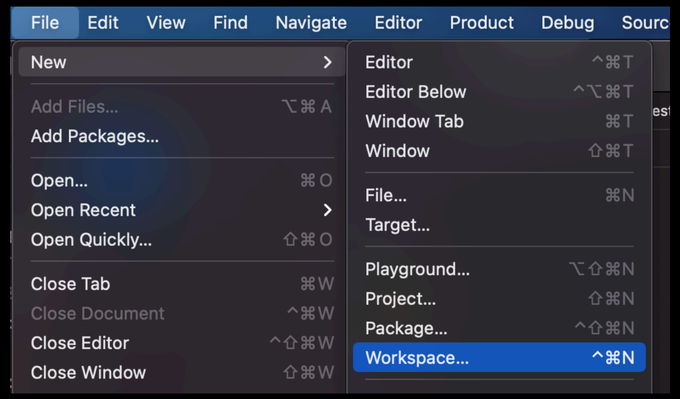
By folder structure



Creating a workspace

A place where everything comes together

1. Create a new folder. This will be the root folder of your application
2. Open Xcode
3. Create a new workspace



4. Will remain empty for now, we'll get back to it later

Creating your first package

Step by step

1. Create a new folder in modules/packages. The folder name defines the package name.
2. Open your terminal and `cd` into the folder
3. Run swift package init

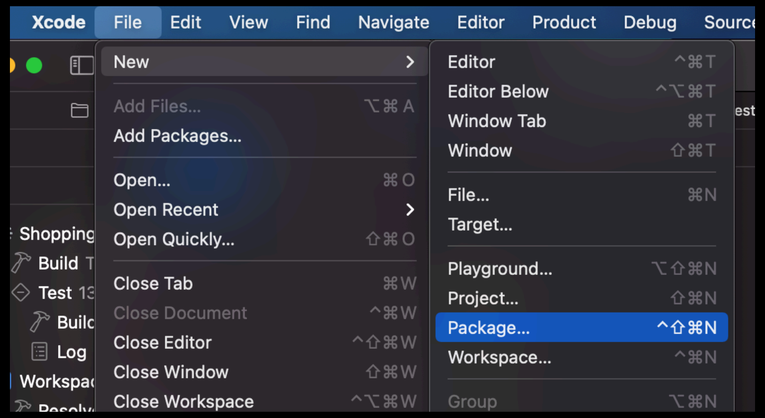
```
~/Code/Misc/talks/Examples/ModularAppArchitecture/modules/packages main swift package init
Creating library package: packages
Creating Package.swift
Creating README.md
Creating .gitignore
Creating Sources/
Creating Sources/packages/packages.swift
Creating Tests/
Creating Tests/packagesTests/
Creating Tests/packagesTests/packagesTests.swift
```

4. Double click the created Package.swift file

The Xcode Way

GUI-based package creation

1. Open Xcode
2. Create a new package via File -> New -> Package...



3. Xcode automatically opens the newly created package

Fun fact

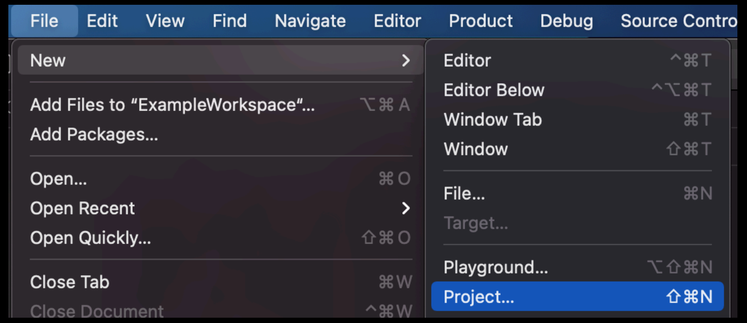
swift package init --type executable

```
~/Code/Misc/talks/Examples/ModularAppArchitecture/modules/packages main swift package init -help
OVERVIEW: Initialize a new package

USAGE: swift package init <options>

OPTIONS:
  --type <type>           Package type: empty | library | executable | system-module | manifest (default: library)
  --name <name>           Provide custom package name
  --version               Show the version.
  -help, -h, --help       Show help information.
```

Creating your first application

Probably not your first application

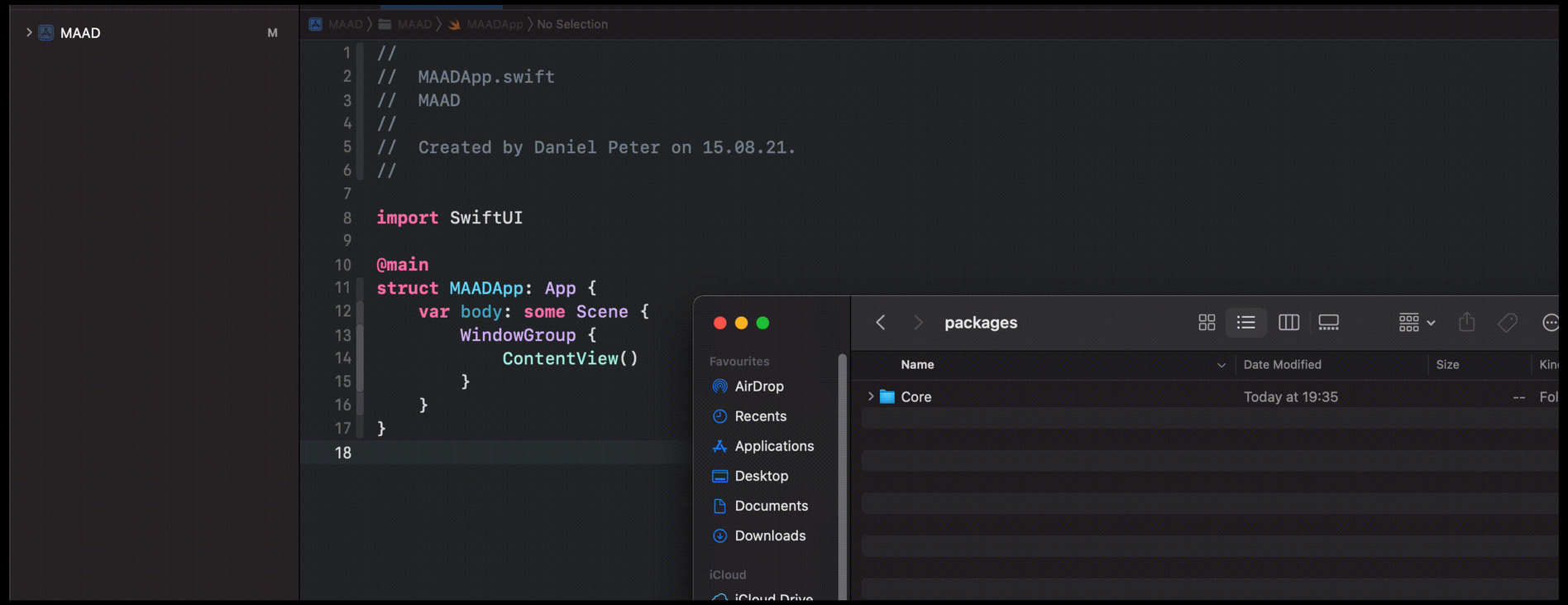
1. Back to Xcode
2. Create your first application in modules/applications via File -> New -> Project



3. Add the app to your workspace by drag and dropping the .xcproject file into the project navigator (left Xcode pane)

Putting together the pieces

Package + App + Workspace = ❤️



1. Drag and drop the package folder onto the project navigator pane to add it to the workspace

Putting together the pieces

Package + App + Workspace = ❤️

1. Import the module in your app

```
import Core
```

2. Use publicly exposed code of your module

```
Button(
  action: { HelloWorldPrinter().sayHello() },
  label: { Text("Hello, world!") }
```

3. Celebrate your modularised app! 🎉

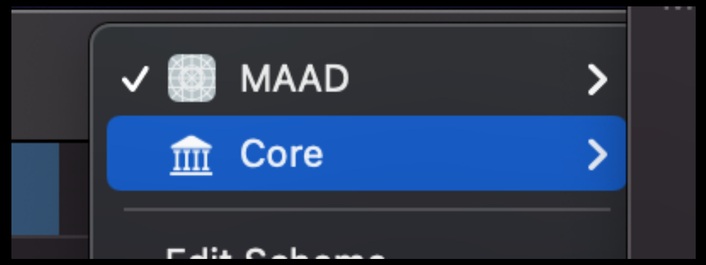
Important!

- Always open your workspace file, .xcproject files are only used for applications
- You can use multiple workspaces, if your workspace gets to larger
- Most files are now managed in modules / packages

  ➡️ Fewer .xcproject merge conflicts

Benefits

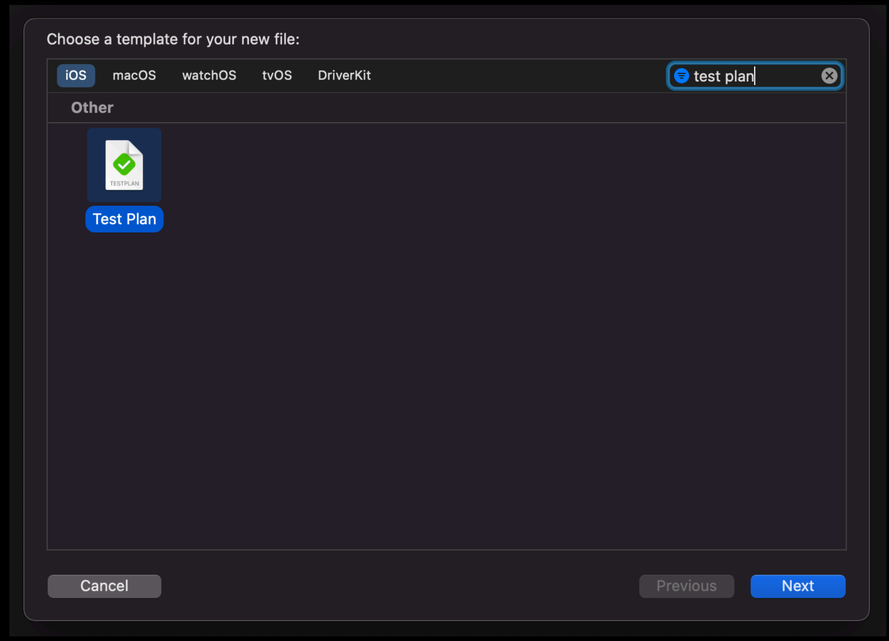
- Each module can be built independently -> fast build times!



- Each module can have an example applications
- Each module can have a test target
- All example applications can be accessed / run via the main workspace

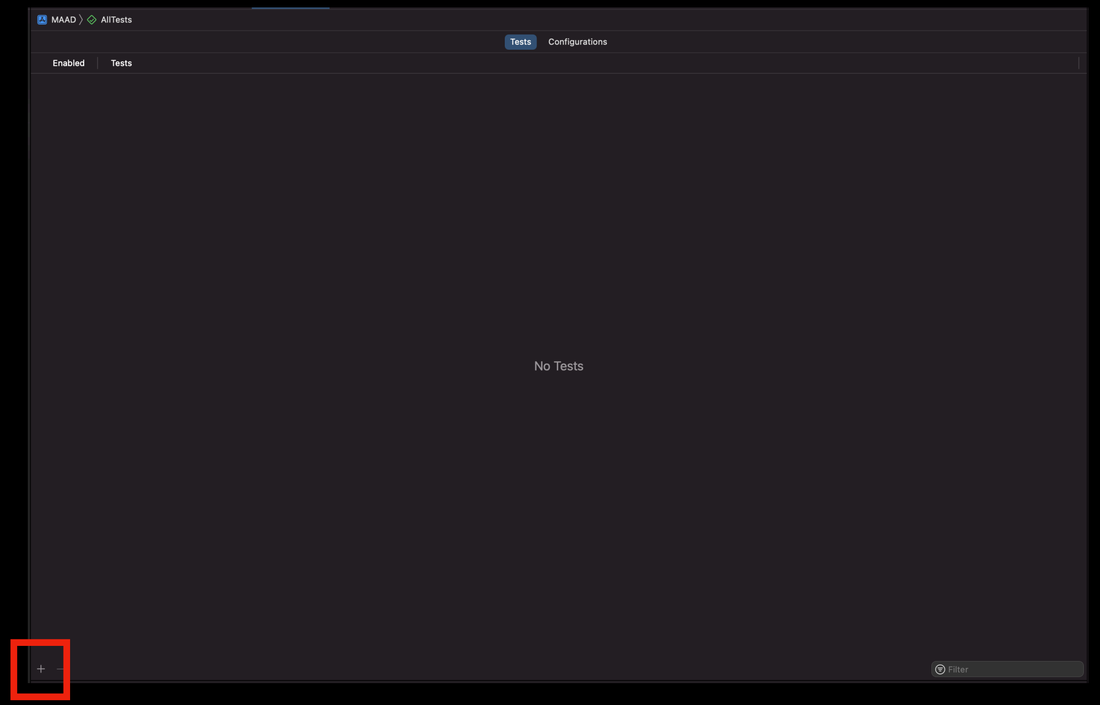
Using test plans

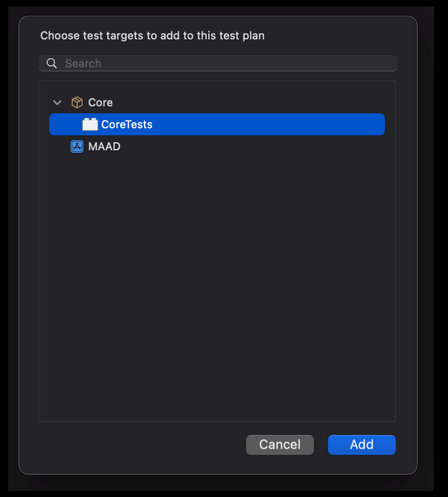
- A test plan is a container for multiple test targets
- Each module has its own test target
- You can add a test plan that runs all module tests
- Test plans can be run on a pre-built app (huge advantage on CI!)
- You can create a new testplan in the "New file" window



Adding test targets

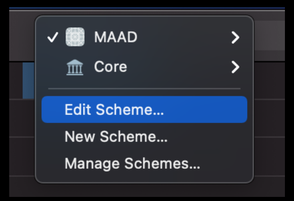
- Double click your test plan
- Click the small plus on the bottom left
- Add a module test target

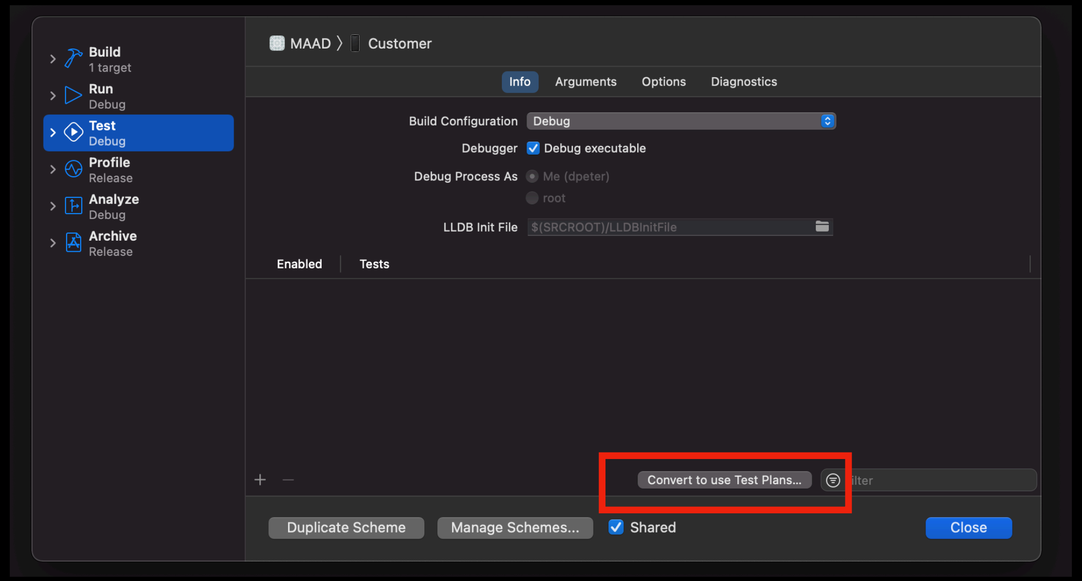


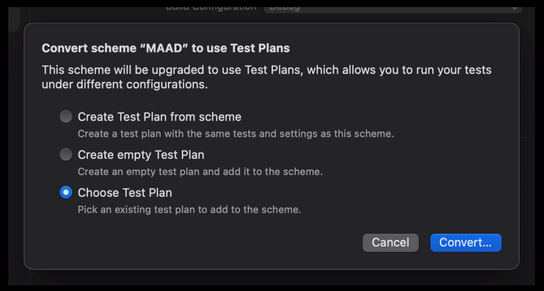


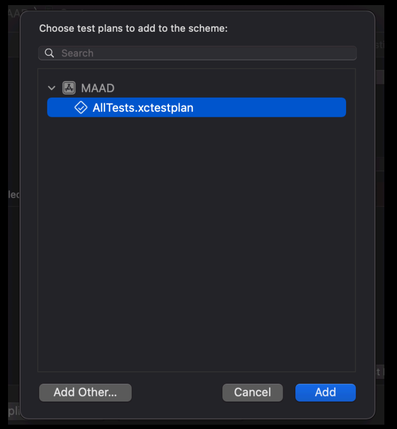
Running test plans

- Configure your app scheme to run the test plan
- Select the app scheme in the scheme selector and click on edit scheme
- Convert your test stage to use test plans
- Choose your created test plan
- Run test via CMD + U (or via the test navigator pane)



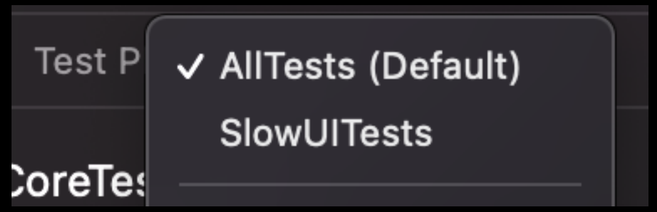






Fun fact

You can define multiple test plans



But how do I slice up my code?

- Typical candidates for packages:
  - Reusable UI components
    - Design Systems
  - Useful helper functions
  - 1 package per feature
    - Clear overview over cross-dependencies
    - Define public entry points, the rest is a black box!

Learning over the years

- Try to keep things mono-repo
  - Easier to update dependencies
  - Better overview over pull requests and fewer PRs overall
- Modularise early to structure your code into small, understandable chunks
- Add a small Readme to each module, explaining what it does and who maintains it
  - Easier onboarding for new joiners
  - Clear definition of scope
- Use OWNERSHIP file in git to assign pull requests to owners
- Keep it maintainable and low cost.
  - Add helper scripts to generate modules fast
  - Automate the process where possible

Further reading

How the Zalando iOS App Abandoned CocoaPods and Reduced Build Time

https://engineering.zalando.com/posts/2017/02/how-the-zalando-ios-app-abandoned-cocoapods-and-reduced-build-time.html

Architecture and Automation: How Development Processes Work at N26

https://medium.com/insiden26/architecture-and-automation-how-development-processes-work-at-n26-e204500fbc10

A Tour of isowords (hyper-modularised code base)

https://www.pointfree.co/episodes/ep142-a-tour-of-isowords-part-1

https://github.com/pointfreeco/isowords


THIS IS IT!

Questions?

Connect with me:

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