



Swift's Functional Paradigm

github.com/thillerson/functional_swift_examples

About Me

- Tack Mobile (up in RiNO at DRIVE II)
- iOS, Android, Rails - when I get the chance
- Pertinent: I've been wonder what the heck functional programming means for years now



Functional Programming Concepts

- Lambda calculus - a formal system for expressing computation
- The function is a unit of responsibility
- Declarative vs. Imperative programming
- Pure functions - no state change (referential transparency)
- High-order functions - functions that make use of functions



Swift is Multi-paradigm

- Allows state change
- Allows imperative programming
- but -
- Has function types
- Has high-order functions



Tonight we'll cover...

- Side-effects
- Currying and Partial Application
- High level functions and recursion

Side-effects

- Changes to program state
- Pure functions
 - $f(x)$ always gives the same result
 - functions give answers, don't change state
 - functions with no return type make no sense in functional programming
- Useful: No side effects \Rightarrow no concurrency problems



Currying

- Currying: redefining a function with multiple arguments to be a list of functions with single arguments
- $f(x, y) \rightarrow z$ becomes $g(x) \rightarrow h(y) \rightarrow z$
- Useful for succinct expression of problem steps
- Useful for “function factories”

Partial Application

- Applying an argument to a curried function chain
- Example

Common high level functions

- map
- filter
- reduce

Filter a list to obtain a
sublist matching criteria

Map: transform a list of A
into a list of B

Reduce: transform list A
into single result B

Examples

Why?

- Concurrency benefits with pure functions
- Cede complexity to the compiler
- Change how you think about solving problems
- Reduce custom data types - increase reuse
- Increase testability



Where?

- Network operations dealing with data
- Complicated calculations
- Designing libraries for these and more...

Where Object-Oriented works fine

- View code
- UIKit code
- ...

Examples

- github.com/thillerson/functional_swift_examples



Book Resources

- Functional Swift: objc.io/books/
- Functional Thinking: shop.oreilly.com/product/0636920029687.do



Web Resources

- wikipedia.org/wiki/Functional_programming#Concepts
- ijoshsmith.com/2014/06/09/curried-functions-in-swift/
- oleb.net/blog/2014/07/swift-instance-methods-curried-functions/
- robots.thoughtbot.com/efficient-json-in-swift-with-functional-concepts-and-generics



Learn and Practice

- learnyouahaskell.com/
- exercism.io/





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Assembly.

**A Shared Workspace,
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