Developer Tools

#WWDC15

Protocol-Oriented Programming in Swift

Session 408

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1. Implicit Sharing

The sad story

Defensive Copying

Inefficiency

Race Conditions

Locks

More Inefficiency

Deadlock

Complexity

Bugs!

2. Inheritance All Up In Your Business

One superclass — choose well!

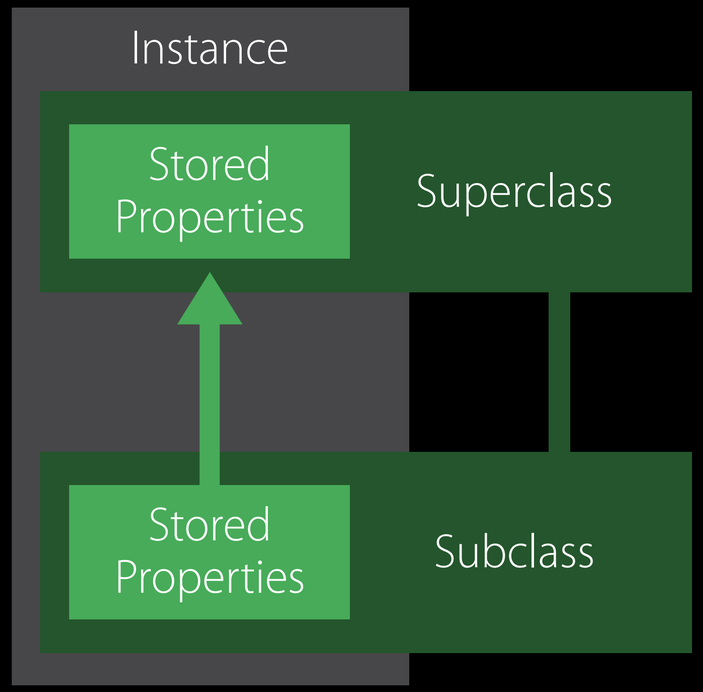
Single Inheritance weight gain

No retroactive modeling

Superclass may have stored properties

- You must accept them
- Initialization burden
- Don't break superclass invariants!

Know what/how to override (and when not to)



3. Lost Type Relationships

```
class Ordered {
  func precedes(other: Ordered) -> Bool
}

func binarySearch(sortedKeys: [Ordered], forKey k: Ordered) -> Int {
  var lo = 0, hi = sortedKeys.count
  while hi > lo {
    let mid = lo + (hi - lo) / 2
    if sortedKeys[mid].precedes(k) { lo = mid + 1 }
    else { hi = mid }
  }
  return lo
}
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class Label : Ordered { var text: String = "" ... }

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```

`as! ASubclass`

A sign that a type relationship was lost
Usually due to using classes for abstraction

A Better Abstraction Mechanism

Supports value types (and classes)

Supports static type relationships (and dynamic dispatch)

Non-monolithic

Supports retroactive modeling

Doesn't impose instance data on models

Doesn't impose initialization burdens on models

Makes clear what to implement

Swift Is a Protocol-Oriented Programming Language

Start with a Protocol

Your first stop for new abstractions

Starting Over with Protocols

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Starting Over with Protocols

error: protocol methods may not have bodies

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```

error: method does not override any method from its superclass

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}
```

protocol requires function 'precedes' with type '(Ordered) -> Bool'
candidate has non-matching type '(Number) -> Bool'

Starting Over with Protocols

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  func precedes(other: Ordered) -> Bool
}

struct Number : Ordered {
  var value: Double = 0
  func precedes(other: Number) -> Bool {
    return self.value < other.value
  }
}
```

Starting Over with Protocols

```
protocol Ordered {
  func precedes(other: Self) -> Bool
}

struct Number : Ordered {
  var value: Double = 0
  func precedes(other: Number) -> Bool {
    return self.value < other.value
  }
}
```

Starting Over with Protocols

"Self" requirement

```
protocol Ordered {
  func precedes(other: Self) -> Bool
}

struct Number : Ordered {
  var value: Double = 0
  func precedes(other: Number) -> Bool {
    return self.value < other.value
  }
}
```

Starting Over with Protocols

```
protocol Ordered {
  func precedes(other: Self) -> Bool
}

struct Number : Ordered {
  var value: Double = 0
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    return self.value < other.value
  }
}
```