Adopting Swift Packages in Xcode

Anders Bertelrud, Xcode Engineer
Balraj Aujla, Xcode Engineer
Leverage open source libraries
Leverage open source libraries
Manage version dependencies
Leverage open source libraries
Manage version dependencies
Share code among your apps
Using an open source package
Using an open source package

A closer look at packages
Using an open source package

A closer look at packages

Package resolution in more detail
Using an open source package
A closer look at packages
Package resolution in more detail
Updating packages
Using an open source package
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Updating packages
Resolving package conflicts
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What’s in a Package?
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Package.swift
What’s in a Package?

- Package.swift
- Sources
What’s in a Package?

- Package.swift
- Sources
- Tests
What’s in a Package?

- Package.swift
- Sources
- CYaml
- Yams
- Tests
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What’s in a Package?

// swift-tools-version:5.0
import PackageDescription

let package = Package(
    name: "Yams",
    products: [<
            .library(name: "Yams",
                     targets: ["Yams"])
        ],
    targets: [<
            .target(name: "CYaml"),
            .target(name: "Yams",
                     dependencies: ["CYaml"],
                     dependencies: ["Yams"])
        ],
    swiftLanguageVersions: [.v4, .v4_2, .v5]
)
What's in a Package?

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// swift-tools-version:5.0
import PackageDescription

let package = Package(
    name: "Yams",
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    ],
    targets: [
        .target(name: "CYaml"),
        .target(name: "Yams",
                dependencies: [ "CYaml" ]),
        .testTarget (name: "YamsTests",
                     dependencies: [ "Yams" ])
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                dependencies: ["CYaml"],
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        .target(name: "Yams",
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    swiftLanguageVersions: [.v4, .v4_2, .v5]
)
```
Linking Package Libraries
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Linking Package Libraries
Package Dependencies
## Package Dependencies

- **Name**: DesignTheme
- **Version Rules**: 1.0.0 – Next Major
- **Location**: https://github.com/WWDC19/DesignTheme.git
dependencies = [
    .package(url: "http://github.com/WWDC19/DesignFont.git"),
    .upToNextMajor(from: "1.0.0")),
]
Package Dependencies
Semantic Versioning

semver.org
1.2.4

Major Version

Breaking changes
1.2.4

Minor Version
Compatible additions
Patch Version
Bug fixes
Using an open source package
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Swift Package Dependencies

- Yams 2.0.0

Version Rules | Location
--- | ---
2.0.0 - Next Major | https://github.com/psm/Yams.git
Swift Package Dependencies

<table>
<thead>
<tr>
<th>Packages (1 item)</th>
</tr>
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<tr>
<td>Name</td>
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Swift Package Dependencies

- Yams 2.1.0

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Swift Package Dependencies

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</table>
My team has added more packages to our app.
Control Cafe

- Chirashi combo
  10:10
- Open-faced Croque Madame
  12:00
- Frilled tri-tip with potato salad
  14:00
- Peanut curry beef
  16:00
- Chicken saag
  18:00
- Paneer saag
  20:00
- Chicken shawarma salad
  22:00
- Shabbath Cafe

- Salad
  24:00

Shabbath Cafe
Swift Package Dependencies

- Yams 2.0.0
- DesignTheme 1.0.0
- DesignFont 1.2.0
- DesignColor 1.0.1
Where are these packages coming from?
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---

**Lunch**

- **DesignTheme**
  - 1.0.0
  - 1.0.0 up to next major

- **Yams**
  - 2.0.0
  - 2.0.0 up to next major
# Packages (2 items)

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**Swift Package Dependencies**

- ![Yams](https://github.com/jpsim/Yams.git) 2.0.0
- ![DesignTheme](https://github.com/WWDC19/DesignTheme.git) 1.0.0
- ![DesignFont](https://github.com/WWDC19/DesignTheme.git) 1.2.0
- ![DesignColor](https://github.com/WWDC19/DesignTheme.git) 1.0.1
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![Diagram](image.png)
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Lunch

1.0.0 up to next major

Yams

2.0.0 up to next major

DesignTheme

1.0.0

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// swift-tools-version:5.1
// The swift-tools-version declares the minimum version of Swift required to build this package.

import PackageDescription

let package = Package(
    name: "DesignTheme",
    platforms: [
        .iOS(.v13), .macOS(.v10_15), .tvOS(.v13), .watchOS(.v6)
    ],
    products: [
        .library(
            name: "DesignTheme",
            targets: ["DesignTheme"]
        ),
    ],
    dependencies: [  
        .package(url: "https://github.com/WwDC19/DesignFont.git", .upToNextMajor(from: "1.0.0")),
        .package(url: "https://github.com/WwDC19/DesignColor.git", .upToNextMinor(from: "1.0.0"))
    ],
    targets: [  
        .target(
            name: "DesignTheme",
            dependencies: ["DesignColor", "DesignFont"]
        ),  
        .testTarget(
            name: "DesignThemeTests",
            dependencies: ["DesignTheme"]
        )
    ]
)
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// The `swift-tools-version` declares the minimum version of Swift required to build this package.

import PackageDescription

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]
```json
"dependencies": [
  .package(url: "https://github.com/WWDC19/DesignFont.git", .upToNextMajor(from: "1.0.0")),
  .package(url: "https://github.com/WWDC19/DesignColor.git", .upToNextMinor(from: "1.0.0"))
]
```
dependencies: [
    .package(url: "https://github.com/WWDC19/DesignFont.git", .upToNextMajor(from: "1.0.0")),
    .package(url: "https://github.com/WWDC19/DesignColor.git", .upToNextMinor(from: "1.0.0"))
]
Importing Package Dependencies

import Yams
Lunch → DesignTheme → DesignFont
Lunch

DesignTheme

DesignFont

import DesignFont
Using an open source package
A closer look at packages
Package resolution in more detail
Updating packages
Resolving package conflicts
Using an open source package
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Resolving package conflicts
There is a new version of DesignFont!
DesignFont 1.2.0
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Add Package Dependency...

Reset Package Caches
Resolve Package Versions
Update to Latest Package Versions
Add Package Dependency...

Reset Package Caches
Resolve Package Version
Update to Latest Package Versions
Add Package Dependency...

Reset Package Caches
Resolve Package Versions

Update to Latest Package Versions
What does updating package version do?
"revision": "2e65a59a086e8431fbb622b9ce1e974b73fece46",
"version": "1.0.1"
},
{
"package": "DesignFont",
"repositoryURL": "https://github.com/WDC19/DesignFont.git",
"state": {
"branch": null,
"revision": "073ddce1946066cf890edc3afe6459bb28c6e18",
"version": "1.2.1"
}
},
{
"package": "DesignTheme",
"repositoryURL": "https://github.com/WDC19/DesignTheme.git",
"state": {
"branch": null,
"revision": "647fda63a35e6bf8325011bddd7a492dd92c71",
"version": "1.2.0"}
"revision": "2ec55a086e84313ffe62b9ce1e974b73fcede46",
"version": "1.0.1"
},
{
 "package": "DesignFont",
 "repositoryURL": "https://github.com/WWDC19/DesignFont.git",
 "state": {
 "branch": null,
 "revision": "073add7e1946066cf8f90edc3afe6479bb28c6e18",
 "version": "1.2.1"
 }
},
{
 "package": "DesignTheme",
 "repositoryURL": "https://github.com/WWDC19/DesignTheme.git",
 "state": {}
}
", "revision": "2ec55a086e84313ffe62b9ce1e974b73fcede46",
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 "package": "DesignFont",
 "repositoryURL": "https://github.com/WWDC19/DesignFont.git",
 "state": {
 "branch": null,
 "revision": "647fa631a35e6bf8325011bddd7ea4922d92c71",
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 "package": "DesignTheme",
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  "version": "1.0.1"
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    "revision": "647fda631a35e6bf832501110d7a4922dd92c71",
    "version": "1.2.0"
  }
}
Why do we need Package.resolved?
Check in your Package.resolved
Keep packages up to date
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chick'n
$42.00

DesignFont 2.0.0
Lunch → DesignFont

2.0.0 up to next major
Choose Package Options:

Repository: https://github.com/WWDC19/DesignFont.git

Rules:
- Version: Up to Next Major 2.0.0 < 3.0.0
- Branch: master
- Commit:

[Cancel] [Previous] [Next]
Add Package to Lunch:

Package Resolution Failed
"DesignFont" could not be resolved:

- Fetching https://github.com/WWDC19/DesignTheme.git 0.8 seconds
- Fetching https://github.com/WWDC19/DesignFont.git 0.7 seconds
- Fetching https://github.com/WWDC19/DesignColor.git 0.7 seconds
- Fetching https://github.com/WWDC19/Typography.git 0.7 seconds

Resolving package dependencies 0.1 seconds

The package dependency graph can not be resolved, possibly because of these requirements:
https://github.com/WWDC19/DesignFont.git - 2.3.0..<3.0.0

The package dependency graph can not be resolved, possibly because of these requirements:
Activity Log Complete 5/29/19, 2:45 PM 4.5 seconds
The package dependency graph cannot be resolved, possibly because of these requirements:

https://github.com/WWD19/DesignFont.git - 2.0.0..<3.0.0

The package dependency graph cannot be resolved, possibly because of these requirements:

Activity Log Complete   5/29/19, 2:55 PM   4.5 seconds
2 errors
Lunch

2.0.0 up to next major

DesignFont

Resolving package dependencies 0.1 seconds

The package dependency graph can not be resolved, possibly because of these requirements:

https://github.com/WWDC19/DesignFont.git - 2.0.0..<3.0.0

Activity Log Complete  5/29/19, 2:55 PM  4.5 seconds
2 errors
Debugging Package Resolution
Resolving package dependencies 0.1 seconds

The package dependency graph can not be resolved, possibly because of these requirements:
https://github.com/WWDCl9/DesignFont.git - 2.0.0..<3.0.0

Activity Log Complete  5/29/19, 2:55 PM  4.5 seconds
2 errors
You can only have one version of a package in a workspace.
1.0.0 up to next major

DesignTheme
2.0.0
1.0.0 up to next major
1.2.0
1.2.1 X
2.0.0 X
2.0.0 up to next major

DesignFont

Lunch
1.0.0 X
2.0.0

Resolving package dependencies 0.1 seconds
The package dependency graph can not be resolved, possibly because of these requirements:
https://github.com/MWD19/DesignFont.git - 2.0.0..<3.0.0

Activity Log Complete 5/29/19, 2:55 PM  4.5 seconds
2 errors
DesignTheme
2.0.0
DesignTheme

2.0.0 → ?
// swift-tools-version:5.1
// The swift-tools-version declares the minimum version of Swift required to build this package.

import PackageDescription

let package = Package(
    name: "DesignTheme",
    platforms: [
        .iOS(.v13), .macOS(.v10_15), .tvOS(.v13), .watchOS(.v6)
    ],
    products: [
        .library(
            name: "DesignTheme",
            targets: ["DesignTheme"],
        ),
    ],
    dependencies: [
        .package(url: "https://github.com/WMDC19/DesignFont.git", upToNextMajor(from: "2.0.0")),
        // DesignColor occasionally adjusts the provided color in minor updates. Resolving from up to next minor version in order
        .package(url: "https://github.com/WMDC19/DesignColor.git", upToNextMinor(from: "1.6.8")),
    ],
    targets: [
        .target(
            name: "DesignTheme",
            dependencies: ["DesignColor", "DesignFont"],
        ),
    ]
)
import PackageDescription

let package = Package(
    name: "DesignTheme",
    platforms: [
        .iOS(.v13), .macOS(.v10_15), .tvOS(.v13), .watchOS(.v6)
    ],
    products: [
        .library(
            name: "DesignTheme",
            targets: ["DesignTheme"],
        ),
    ],
    dependencies: [
        .package(url: "https://github.com/WwDC19/DesignFont.git", .upToNextMajor(from: "2.0.0"))
    ],
    targets: [
        .target(
            name: "DesignTheme",
            dependencies: ["DesignColor", "DesignFont"],
        ),
        .testTarget(
            name: "DesignThemeTests",
            dependencies: ["DesignTheme"],
        )
    ]
)
dependencies: [
    .package(url: "https://github.com/WWDC19/DesignFont.git", .upToNextMajor(from: "2.0.0")),
]
Updating Version Rules
<table>
<thead>
<tr>
<th>Name</th>
<th>Version Rules</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yams</td>
<td>2.0.0 – Next Major</td>
<td><a href="https://github.com/gsinn/Yams.git">https://github.com/gsinn/Yams.git</a></td>
</tr>
<tr>
<td>DesignTheme</td>
<td>1.0.0 – Next Major</td>
<td><a href="https://github.com/WWDC19/DesignTheme.git">https://github.com/WWDC19/DesignTheme.git</a></td>
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<td>Name</td>
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<td>--------------</td>
<td>-----------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Yams</td>
<td>2.0.0 – Next Major</td>
<td><a href="https://github.com/psim/Yams.git">https://github.com/psim/Yams.git</a></td>
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</table>
## Packages (2 items)

<table>
<thead>
<tr>
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</tr>
</thead>
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<tr>
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</tbody>
</table>
Swift Package Dependencies

- DesignTheme 2.0.0
- Yams 2.0.0
- DesignFont 2.0.0
- DesignColor 1.0.1
PROJECT

Lunch

TARGETS

Lunch

Packages (2 Items)

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1.2.4

Major Version
Breaking changes
## Swift Package Dependencies

### DesignTheme 2.0.0

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### Choose Package Repository:

<table>
<thead>
<tr>
<th>WWDC19 (GitHub)</th>
<th>Last Updated</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecast</td>
<td>Yesterday, 10:10 PM</td>
<td>WWDC19</td>
</tr>
<tr>
<td>DesignColor</td>
<td></td>
<td>WWDC19</td>
</tr>
<tr>
<td><strong>DesignFont</strong></td>
<td></td>
<td>WWDC19</td>
</tr>
<tr>
<td>DesignTheme</td>
<td></td>
<td>WWDC19</td>
</tr>
<tr>
<td>LookUp</td>
<td></td>
<td>WWDC19</td>
</tr>
<tr>
<td>pipler</td>
<td></td>
<td>WWDC19</td>
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<tr>
<td>StealTheGlass</td>
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<td>WWDC19</td>
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<tr>
<td>unagi</td>
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<td>WWDC19</td>
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**DesignFont**

- Reading...
### Add Package to Lunch:

Choose package products and targets:

<table>
<thead>
<tr>
<th>Package Product</th>
<th>Kind</th>
<th>Add to Target</th>
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</thead>
<tbody>
<tr>
<td>DesignFont</td>
<td>Library</td>
<td></td>
</tr>
</tbody>
</table>

- DesignFont Library
- Lunch

- [ ] Cancel
- [ ] Previous
- [ ] Finish
PROJECT

TARGETS

Packages (3 Items)

<table>
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</tr>
</tbody>
</table>
// FoodItemRowView.swift
// Lunch
// Copyright © 2019 Apple Inc. All rights reserved.

import SwiftUI

struct FoodItemRowView : View {
    var foodItem: FoodItem

    var body: some View {
        let formatter = NumberFormatter()
        formatter.numberStyle = .currency
        let price = formatter.string(from: foodItem.price as NSNumbers)

        return VStack(alignment: .leading) {
            lunchTheme.foodItem(text: Text(verbatim: foodItem.name))
            lunchTheme.price(text: Text(verbatim: price ?? ""))
        }
    }
}

struct FoodItemRow_Previews : PreviewProvider {
    static var previews: some View {
        return FoodItemRowView(foodItem: FoodItem(name: "chick'n", price: 42)).previewLayout(.fixed(width: 100, height: 70))
    }
}
import SwiftUI
import DesignFont

struct FoodItemRowView: View {
    var foodItem: FoodItem

    var body: some View {
        let formatter = NumberFormatter()
        formatter.numberStyle = .currency
        let price = formatter.string(from: foodItem.price as NSNumber)

        VStack(alignment: .leading) {
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package
import SwiftUI
import DesignFont

struct FoodItemRowView: View {
    var foodItem: FoodItem

    var body: some View {
        let designFont = DesignFont()
        let formatter = NumberFormatter()
        formatter.numberStyle = .currency
        let price = formatter.string(from: foodItem.price as NSNumber)

        VStack(alignment: .leading) {
            lunchTheme.foodItem(text: Text(verbatim: foodItem.name))
        }
    }
}

struct FoodItemRow_Previews: PreviewProvider {
    static var previews: some View {
        return FoodItemRowView(foodItem: FoodItem(name: "chick'n", price: 42.00))
    }
}
Using an open source package
Using an open source package
A closer look at packages
Using an open source package

A closer look at packages

Package resolution in more detail
Using an open source package
A closer look at packages
Package resolution in more detail
Updating packages
Using an open source package
A closer look at packages
Package resolution in more detail
Updating packages
Resolving package conflicts
Tons of packages already on Github today!
More Information

developer.apple.com/wwdc19/408

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating Swift Packages</td>
<td>Thursday, 9:00</td>
</tr>
<tr>
<td>Swift Packages Lab</td>
<td>Thursday, 12:00</td>
</tr>
<tr>
<td>Swift Packages Lab</td>
<td>Friday, 12:00</td>
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</tbody>
</table>