

#WWDC18

Create Your Own Swift Playgrounds Subscription

Session 413

Holly Borla, Xcode Engineer

Grace Kendall, Playgrounds Engineer

What's Next

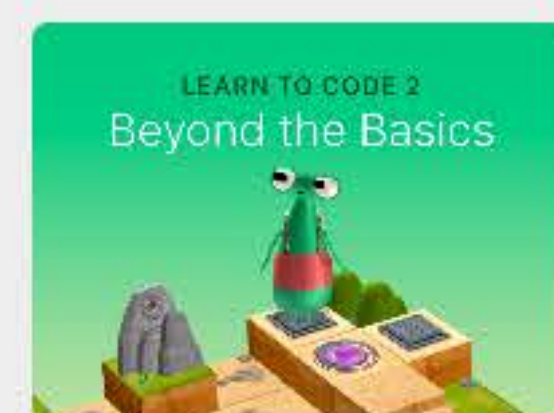
[Edit](#) [Done](#)



Hour of Code



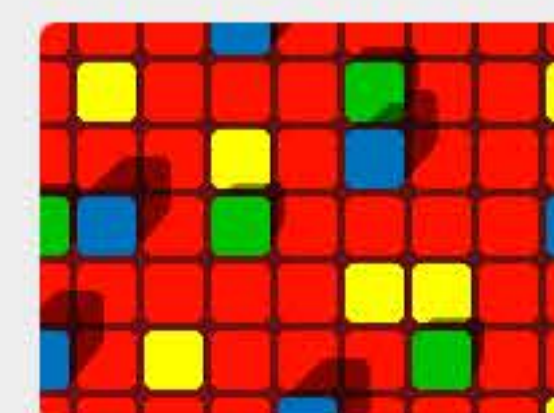
Learn to Code 1



Learn to Code 2



Battleship



Blink



Rock, Paper, Scissors



Learn to Code 3

Learn to Code



Learn to Code 1

Fundamentals of Swift
Swift 4.1 Edition

GET



Learn to Code 2

Beyond the Basics
Swift 4.1 Edition

GET



Explore the Universe

Challenges

[See All](#)



Code Machine

Beginner
Swift 4.1 Edition

GET



Augmented Reality

Intermediate
Swift 4.1 Edition

GET



Battleship

Intermediate
Swift 4.1 Edition



Hour of Code

Beginner
Swift 4.1 Edition

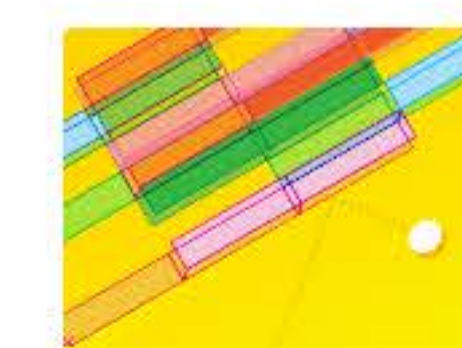
GET



Cipher

Intermediate
Swift 4.1 Edition

GET



Brick Breaker

Intermediate
Swift 4.1 Edition

Starting Points

[See All](#)



Blank

Swift 4 Edition

GET



Answers





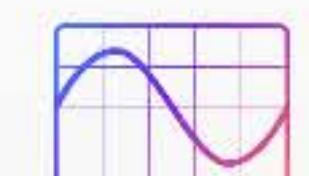
Swift 4.1 Edition

GET





Puzzle World




Swift 4.1 Edition

 Swift 4 Edition GET	 Swift 4.1 Edition GET	 Swift 4.1 Edition GET
 Shapes Swift 4.1 Edition GET	 Graphing Swift 4.1 Edition GET	

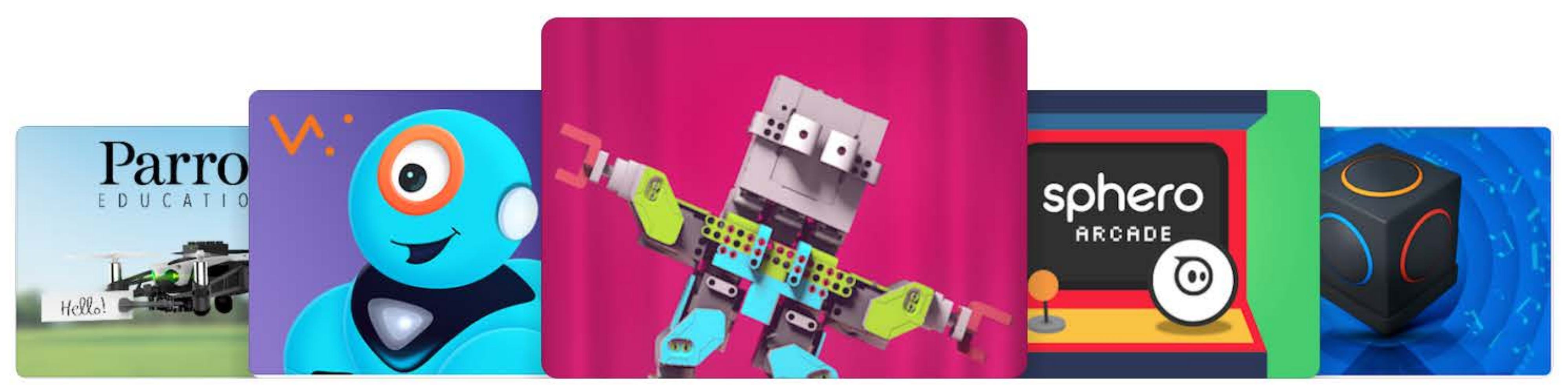
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Playground book format review

Swift Playgrounds Author Template

Swift Playgrounds subscription format overview

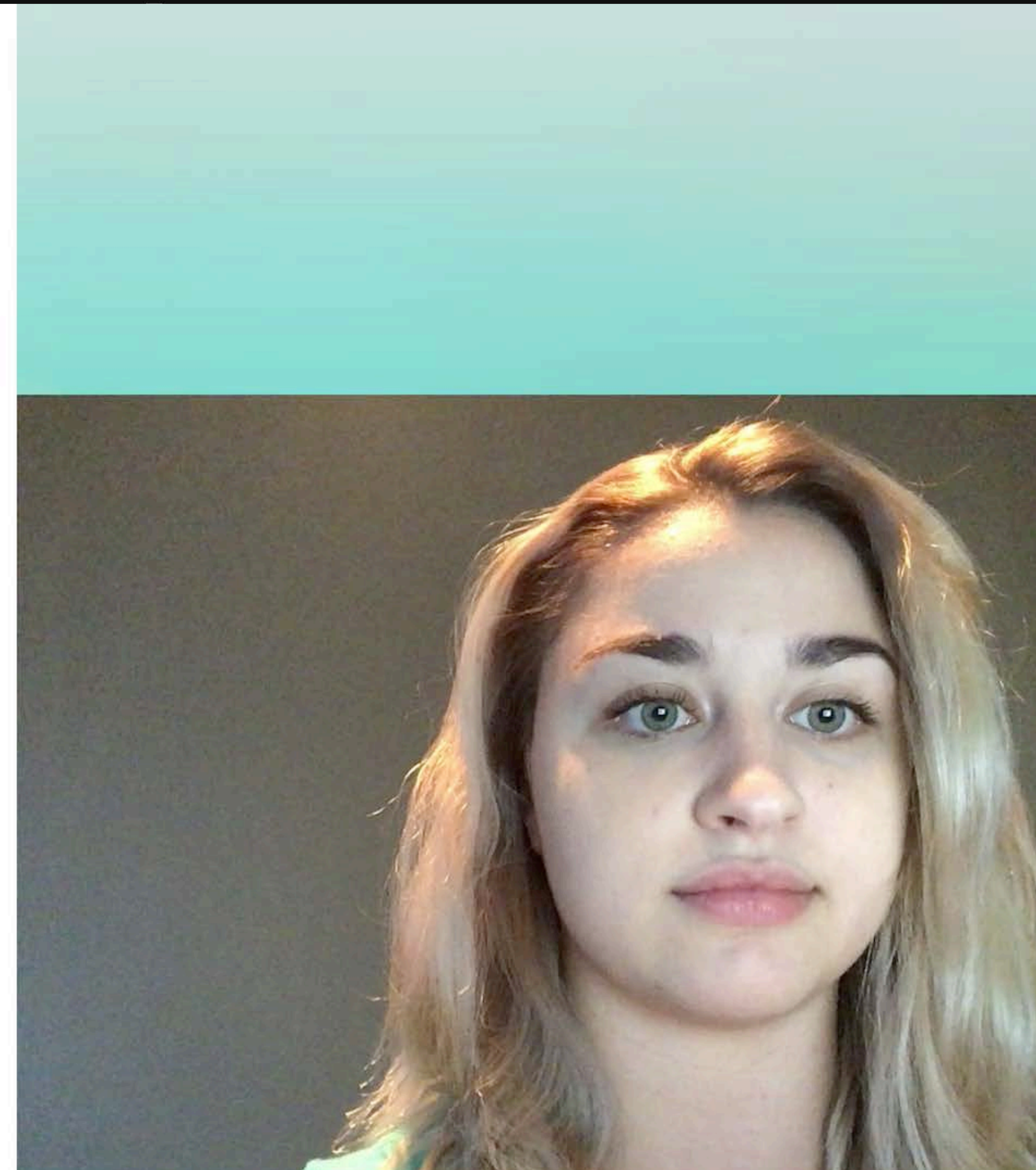
Hosting your own subscription feed

CIBumpDistortionLinear

This filter creates a concave or convex distortion that originates from a line in the image.

For more information on the Core Image Filters, visit the [Core Image Filter Reference](#).

```
let filter = CIFilter(name:
  "CIBumpDistortionLinear")!
// Set the input center
filter.setValue(CIVector(x: 300, y:
  400), forKey: "inputCenter")
// Set the input radius
filter.setValue(300, forKey:
  "inputRadius")
// Set the input angle
filter.setValue(0, forKey:
  "inputAngle")
// Set the input scale
filter.setValue(0.5, forKey:
  "inputScale")
```



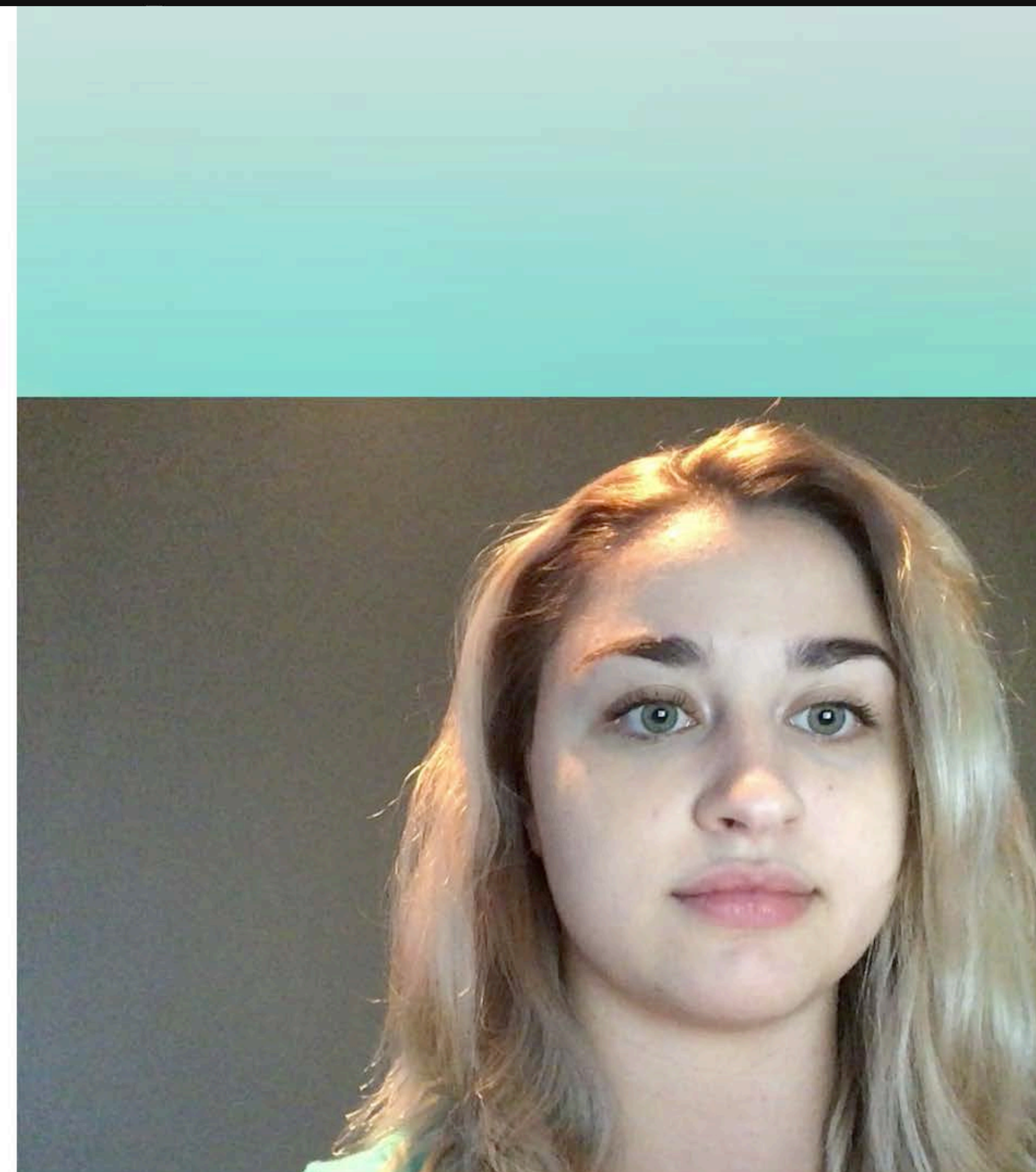
▶ Run My Code

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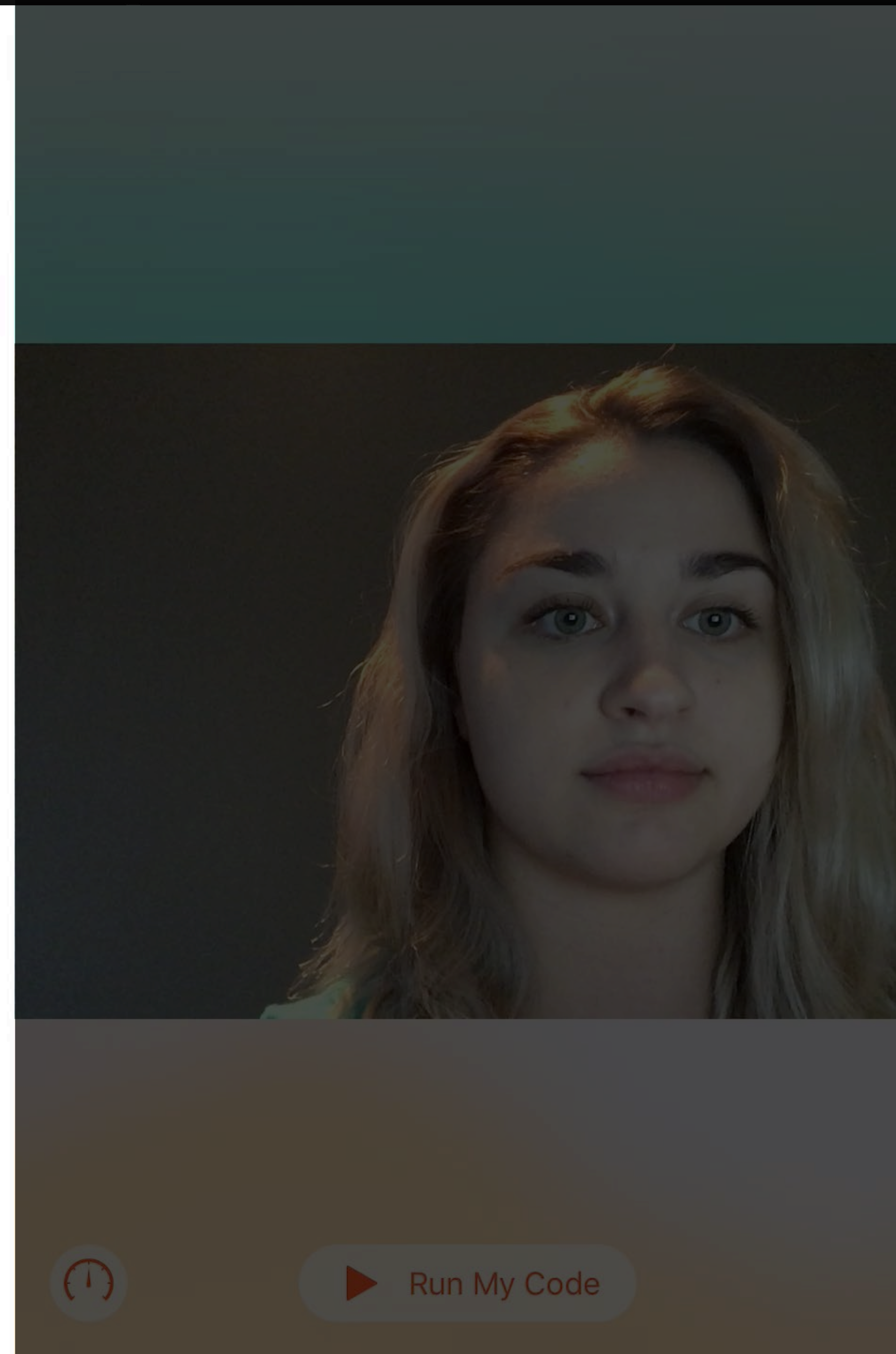
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filter.setValue(0.5, forKey:
  "inputScale")
```



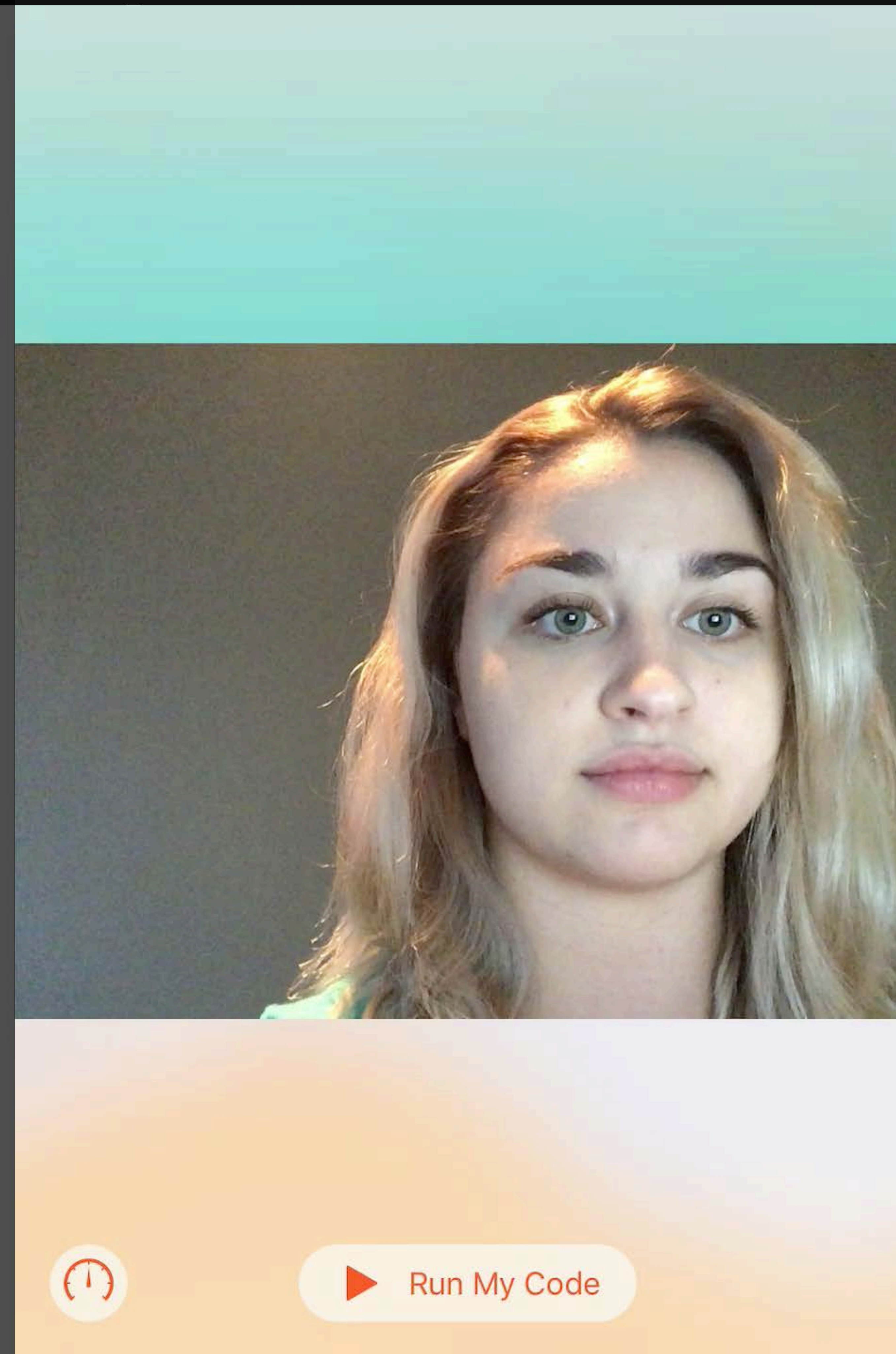
▶ Run My Code

CIBumpDistortionLinear

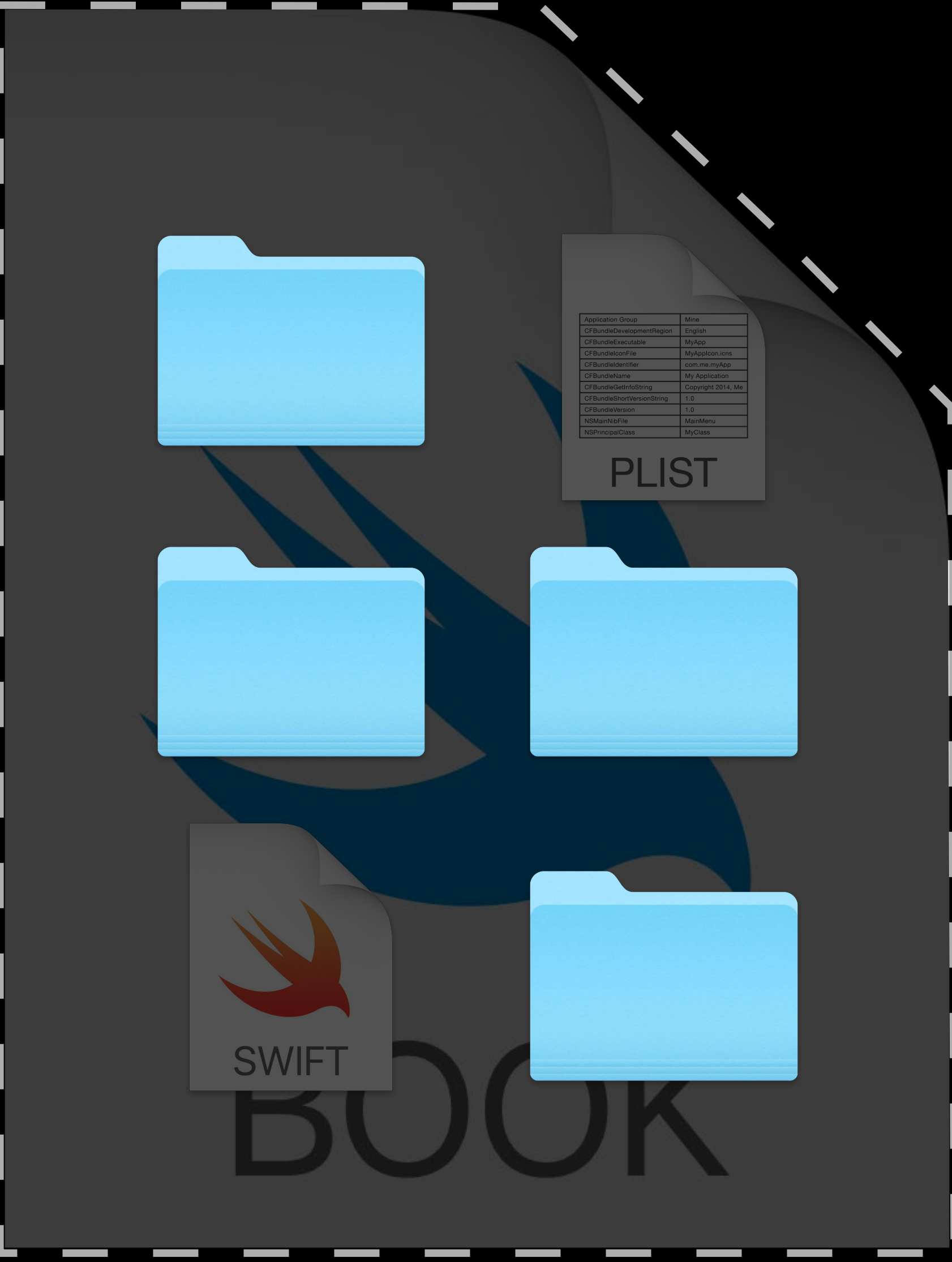
This filter creates a concave or convex distortion that originates from a line in the image.

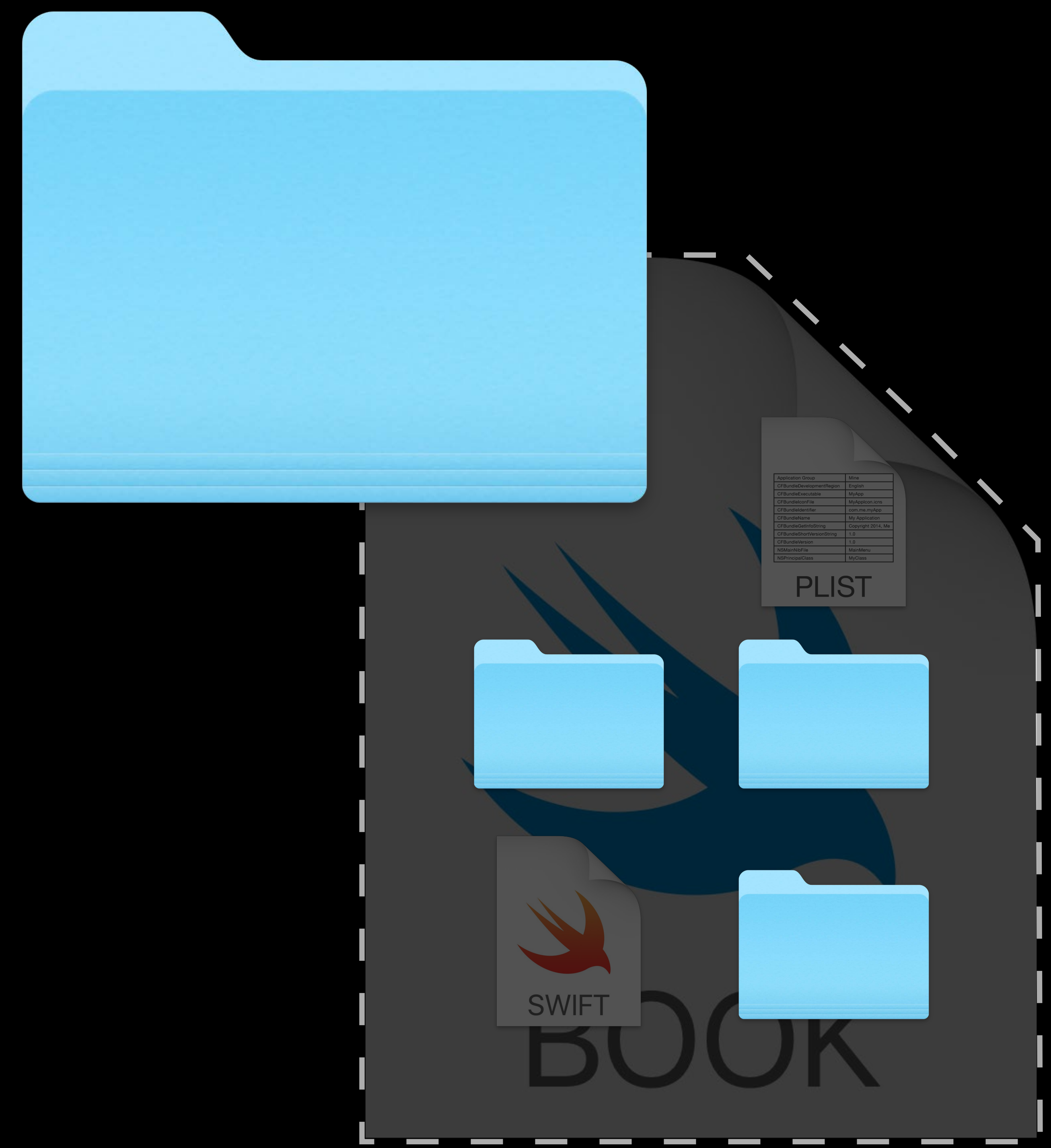
For more information on the Core Image Filters, visit the [Core Image Filter Reference](#).

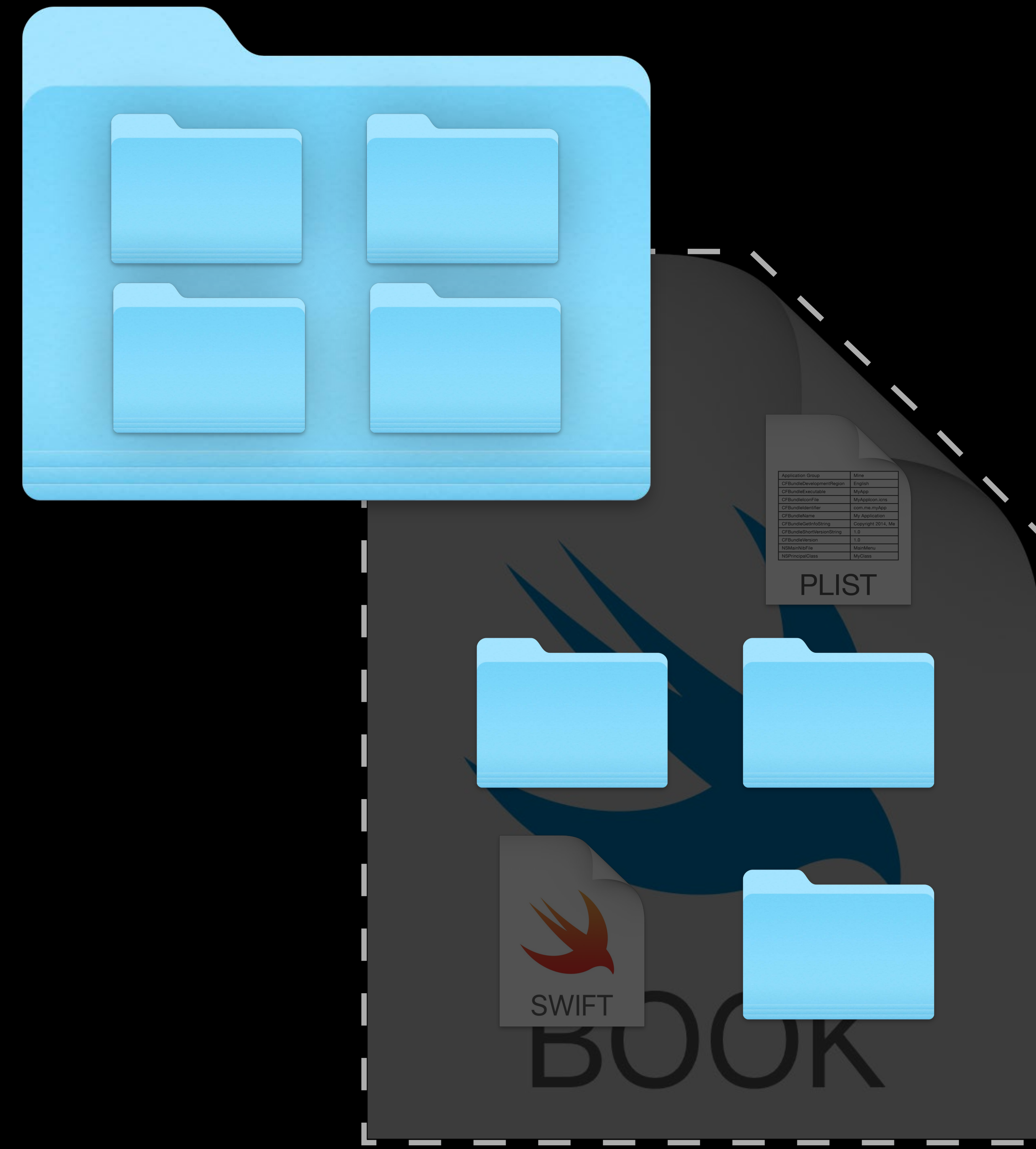
```
let filter = CIFilter(name:
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    "inputScale")
```

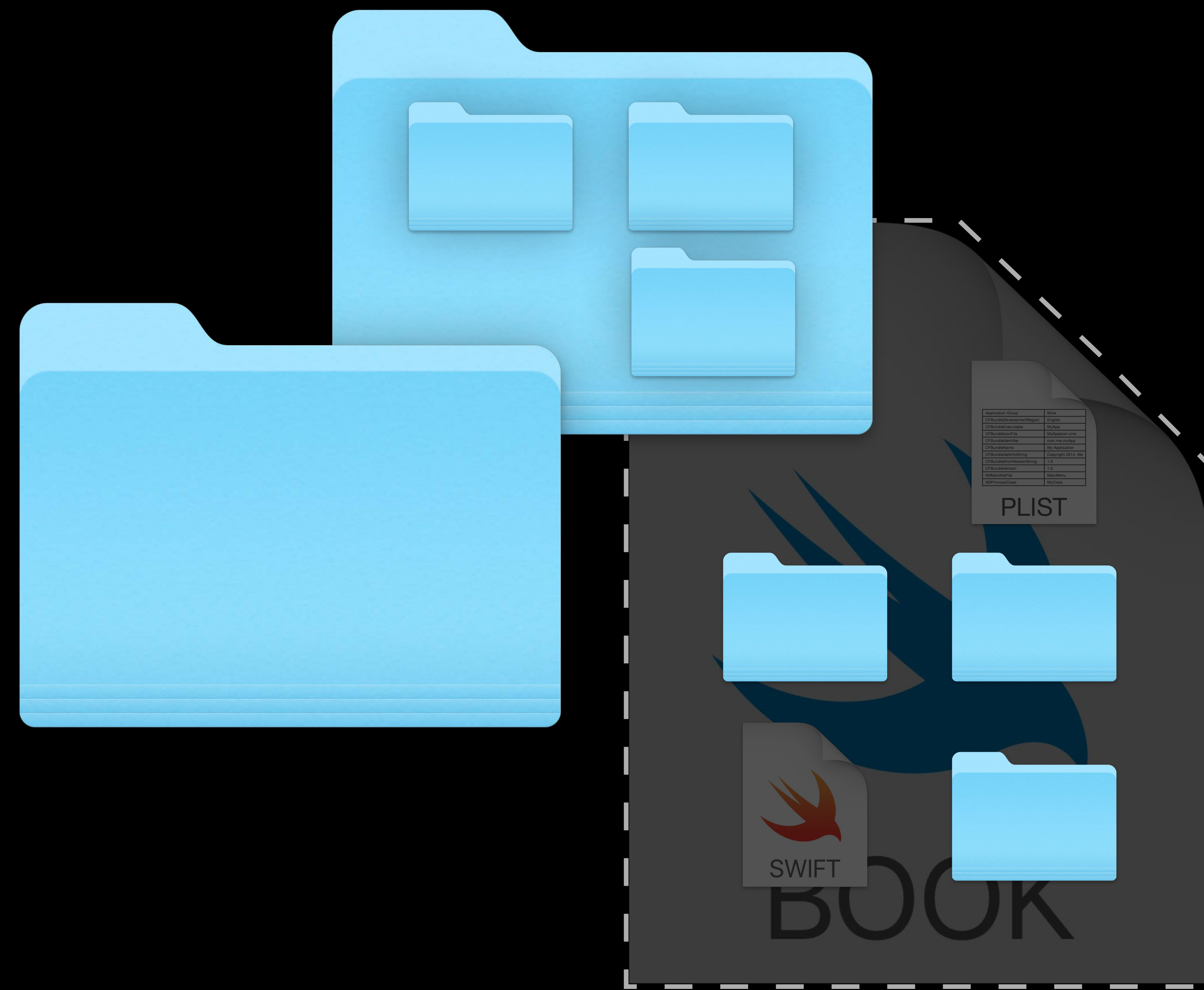


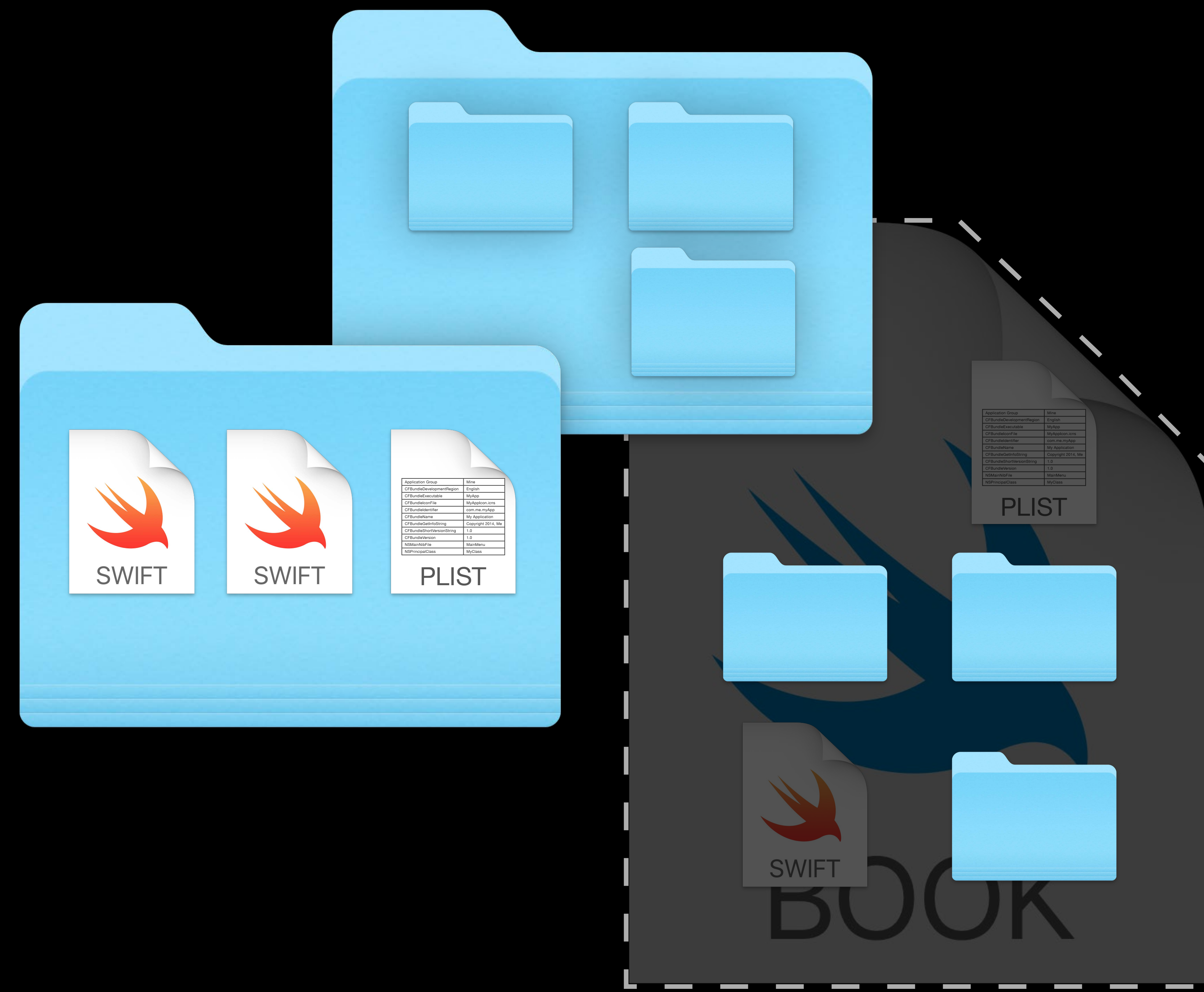


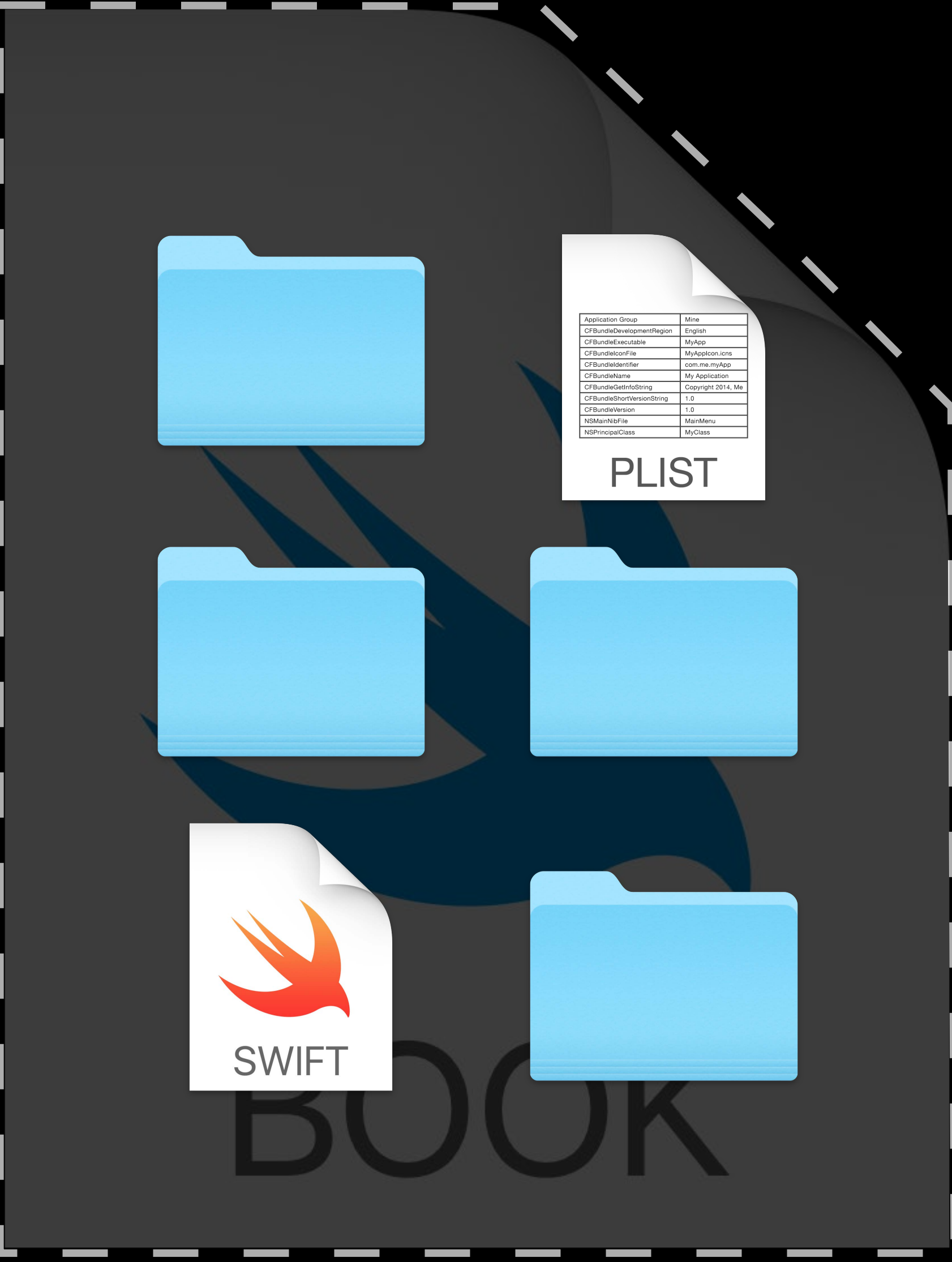


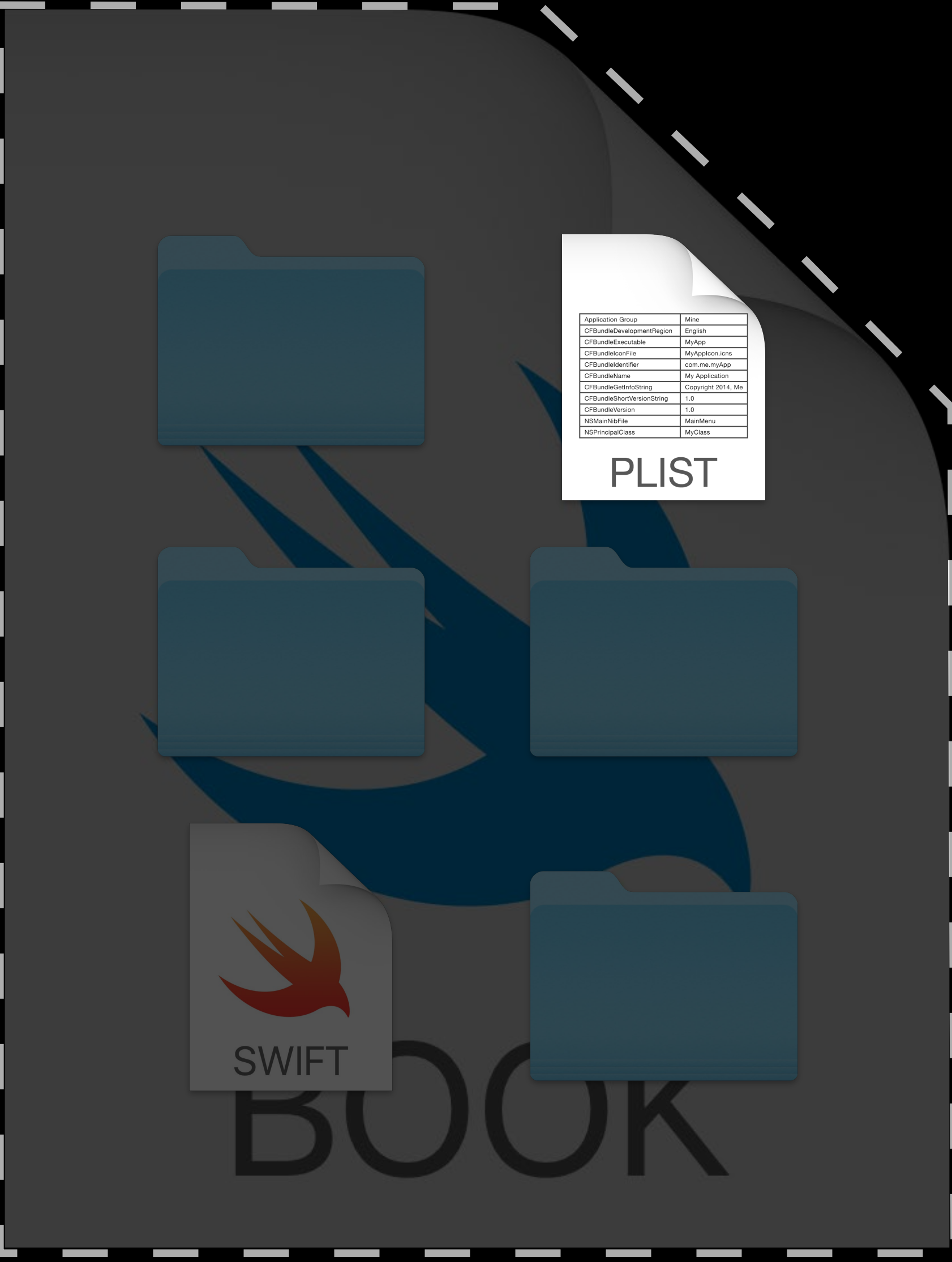


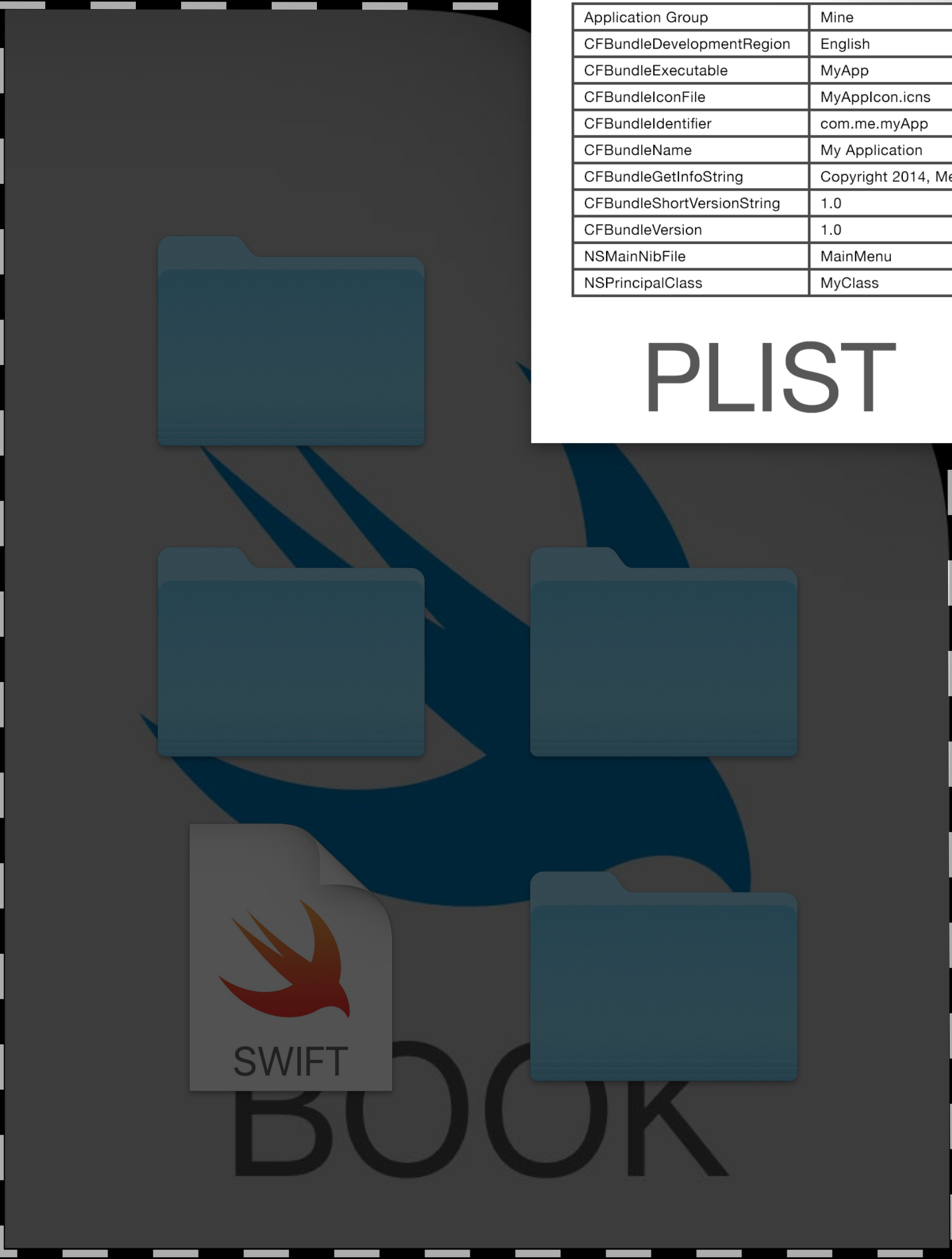






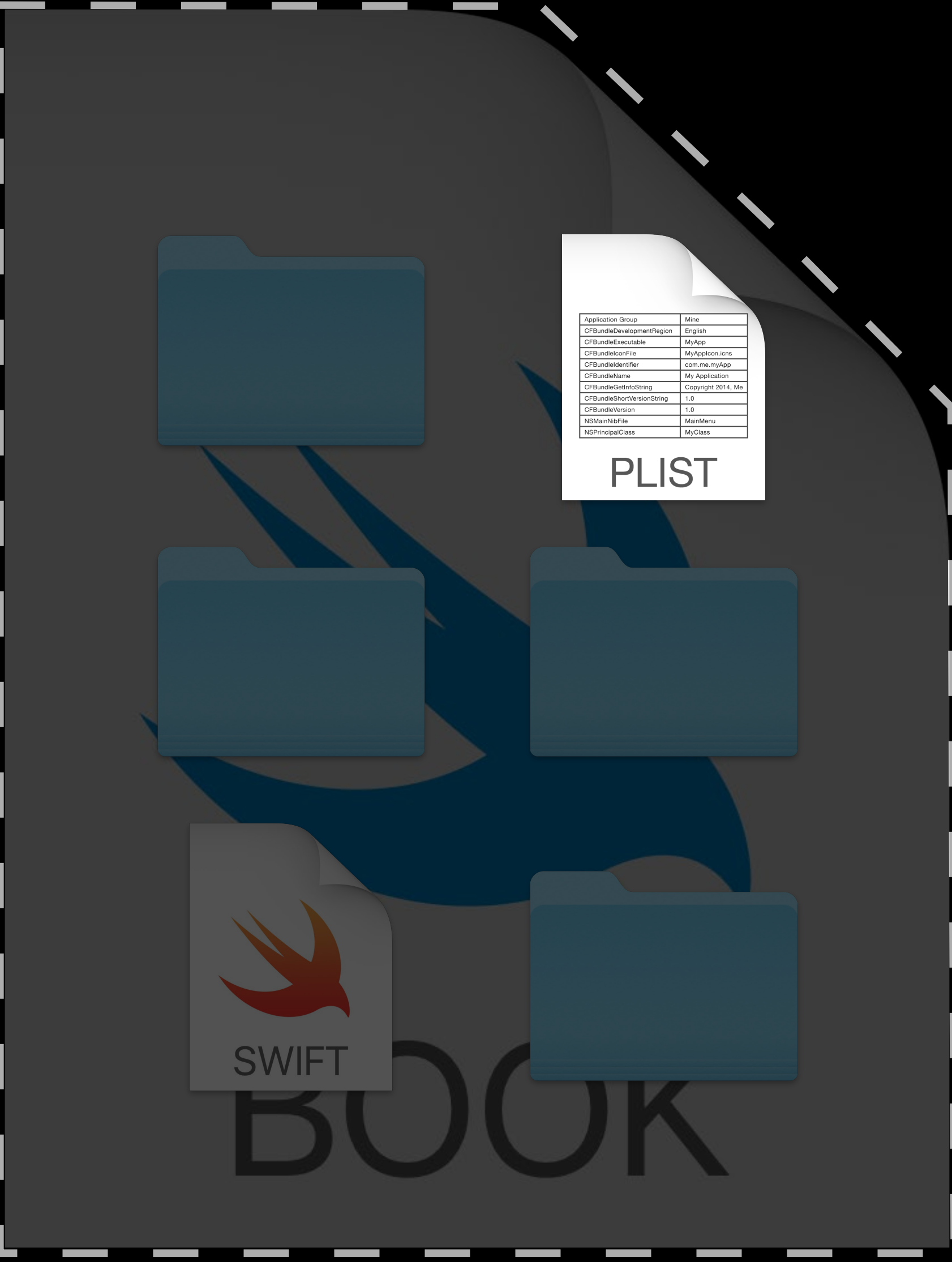






Application Group	Mine
CFBundleDevelopmentRegion	English
CFBundleExecutable	MyApp
CFBundleIconFile	MyAppIcon.icns
CFBundleIdentifier	com.me.myApp
CFBundleName	My Application
CFBundleGetInfoString	Copyright 2014, Me
CFBundleShortVersionString	1.0
CFBundleVersion	1.0
NSMainNibFile	MainMenu
NSPrincipalClass	MyClass

PLIST

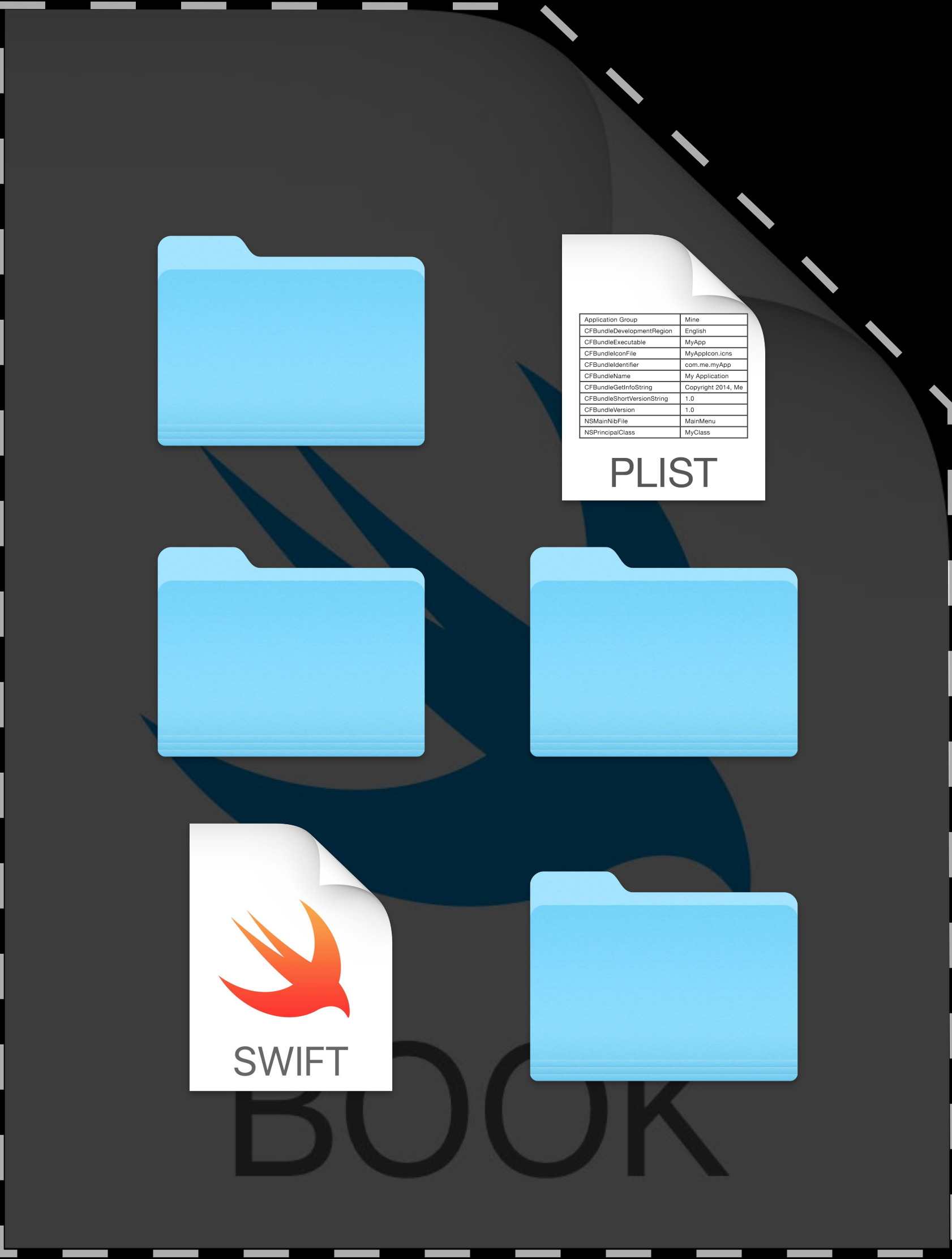


PLIST



SWIFT

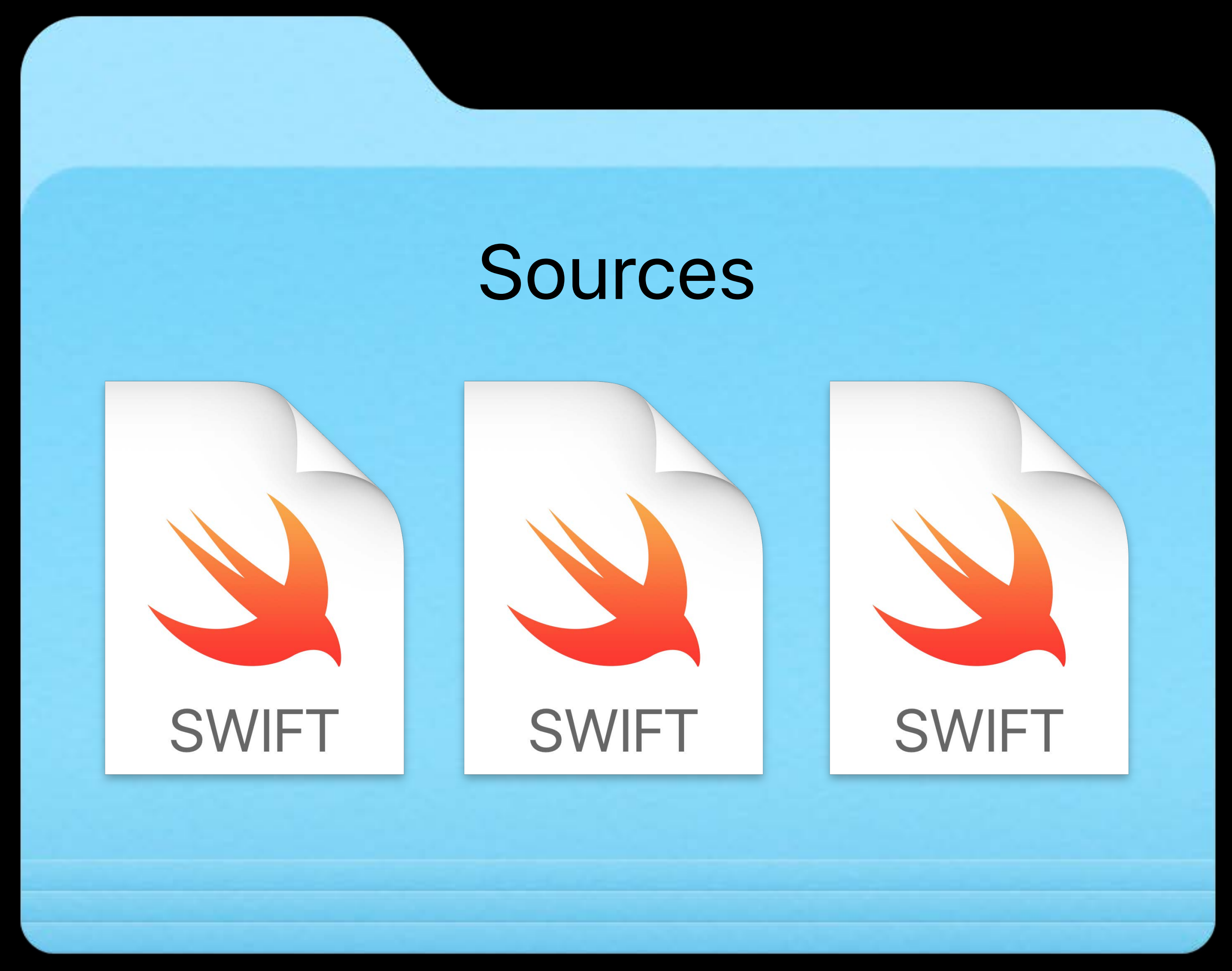
BOOK











Auxiliary Source Files

Perform any necessary setup before running the learner's code

Implement the live view for a page

Provide abstractions to be used by the learner

Communicate with the live view

Auxiliary Source Files

Perform any necessary setup before running the learner's code

Implement the live view for a page

Provide abstractions to be used by the learner

Communicate with the live view

```
// PlaygroundSupport framework
```

```
extension PlaygroundLiveViewMessageHandler {
```

```
    /// Sends a live view message (as a `PlaygroundValue`) to a remote object.
```

```
    public func send(_ message: PlaygroundValue)
```

```
}
```

```
// PlaygroundSupport framework

extension PlaygroundLiveViewMessageHandler {
    /// Sends a live view message (as a `PlaygroundValue`) to a remote object.
    public func send(_ message: PlaygroundValue)
}

public enum PlaygroundValue {
    case array([PlaygroundSupport.PlaygroundValue])
    case dictionary([String : PlaygroundSupport.PlaygroundValue])
    case string(String)
    case data(Data)
    case date(Date)
    case integer(Int)
    case floatingPoint(Double)
    case boolean(Bool)
}
```

```
// LiveViewSupport.swift
// An auxiliary source file in my book-level sources

public protocol PlaygroundValueConvertible {
    func asPlaygroundValue() -> PlaygroundValue
}
```

```
// LiveViewSupport.swift
// An auxiliary source file in my book-level sources

public protocol PlaygroundValueConvertible {
    func asPlaygroundValue() -> PlaygroundValue
}

public func sendValue(_ value: PlaygroundValueConvertible) {
    let page = PlaygroundPage.current
    let proxy = page.liveView as! PlaygroundRemoteLiveViewProxy
    proxy.send(value.asPlaygroundValue())
}
```

```
// LiveViewSupport.swift
// An auxiliary source file in my book-level sources

public protocol PlaygroundValueConvertible {
    func asPlaygroundValue() -> PlaygroundValue
}

public func sendValue(_ value: PlaygroundValueConvertible) {
    let page = PlaygroundPage.current
    let proxy = page.liveView as! PlaygroundRemoteLiveViewProxy
    proxy.send(value.asPlaygroundValue())
}
```

```
//#-hidden-code
sendValue(value)
//#-end-hidden-code
```

More Information

Playground Book Format Reference

<https://developer.apple.com>

Swift Playgrounds Author Template

LiveViewTestApp iPad Running LiveViewTestApp on iPad

PlaygroundBook > PlaygroundBook > Sources > FilterRenderer.swift > No Selection

LiveViewTestApp PID 3268

- CPU 22%
- Memory 14.2 MB
- Energy Impact Low
- Disk Zero KB/s
- Network Zero KB/s

Thread 1 Queue: com.app...in-thread (serial)

Thread 3

com.apple.uikit.eventfetch-thread (7)

Thread 9 Queue: com.app...fferqueue (serial)

0 FilterRenderer.render(pixelBuffer:)

1 LiveViewController.captureOutput(_did...)

16 _pthread_wqthread

Thread 10

Thread 14

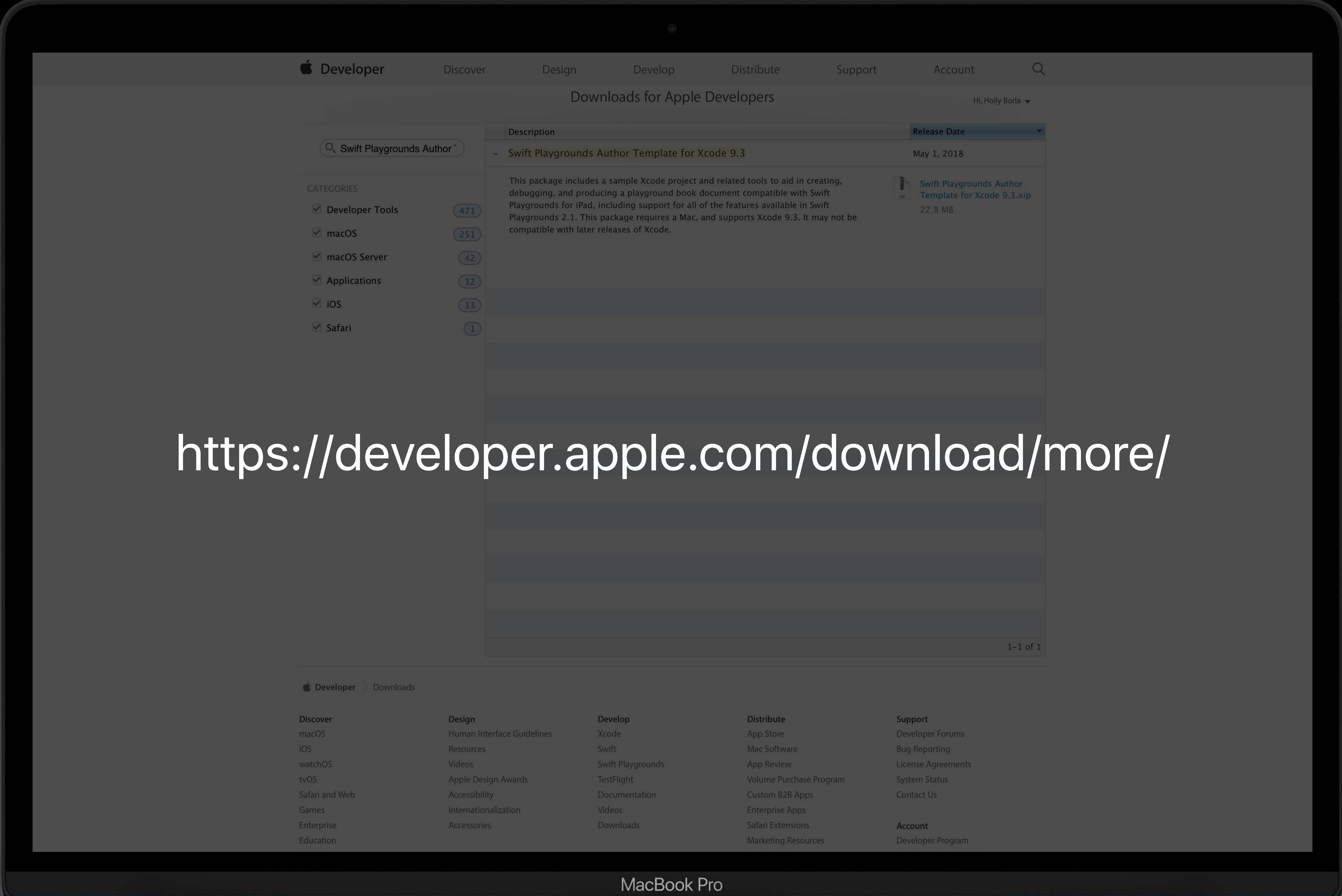
```
38     guard outputPixelFormatPool != nil else { return }
39
40     inputFormatDescription = formatDescription
41
42     context = CIContext()
43     isPrepared = true
44 }
45
46 /// Render pixel buffer.
47 func render(pixelBuffer: CVPixelBuffer) -> CVPixelBuffer? {
48     guard let filter = filter, let ciContext = context, isPrepared else { return nil }
49
50     let sourceImage = CIImage(cvImageBuffer: pixelBuffer)
51     filter.setValue(sourceImage, forKey: kCIInputImageKey)
52
53     guard let filteredImage = filter.value(forKey: kCIOutputImageKey) as? CIImage else { return nil }
54
55     var pbuf: CVPixelBuffer?
56     CVPixelBufferPoolCreatePixelBuffer(kCFAllocatorDefault, outputPixelFormatPool!, &pbuf)
57     guard let outputPixelFormat = pbuf else { return nil }
58
59     // Render the filtered image out to a pixel buffer (no locking needed, as CIContext's render
60     // method will do that)
61     ciContext.render(filteredImage, to: outputPixelFormat, bounds: sourceImage.extent,
62                     colorSpace: outputColorSpace)
63     return outputPixelFormat
64 }
65
66 func allocateOutputBufferPool(with inputFormatDescription: CMFormatDescription,
67                               outputRetainedBufferCountHint: Int) -> (CVPixelBufferPool?, CGColorSpace?, CMFormatDescription?) {
68     let inputMediaSubType = CMFormatDescriptionGetMediaSubType(inputFormatDescription)
69     if inputMediaSubType != kCVPixelFormatType_32BGRA {
70         assertionFailure("Invalid input pixel buffer type \(inputMediaSubType)")
71         return (nil, nil, nil)
72     }
73 }
```

2018-05-23 13:17:17.718326-0700 LiveViewTestApp[3268:1019634] [MC] System group container for systemgroup.com.apple.configurationprofiles path is /private/var/containers/Shared/SystemGroup/systemgroup.com.apple.configurationprofiles

2018-05-23 13:17:17.718677-0700 LiveViewTestApp[3268:1019634] [MC] Reading from public effective user settings. (lldb)

pixelBuffer = (CVPixelBuffer) 0x00000001c412...
self = (Book_Sources.FilterRenderer) 0x00000000...
filter = (CIFilter) 0x00000001c00eae80
ciContext = (CIContext) 0x00000001c4003e40
filteredImage = (CIImage) 0x00000001c00016...
pbuf = (CVPixelBuffer?) 0x00000001c0122f80
outputPixelFormat = (CVPixelBuffer) 0x00000000...
sourceImage = (CIImage) 0x00000001c40043...





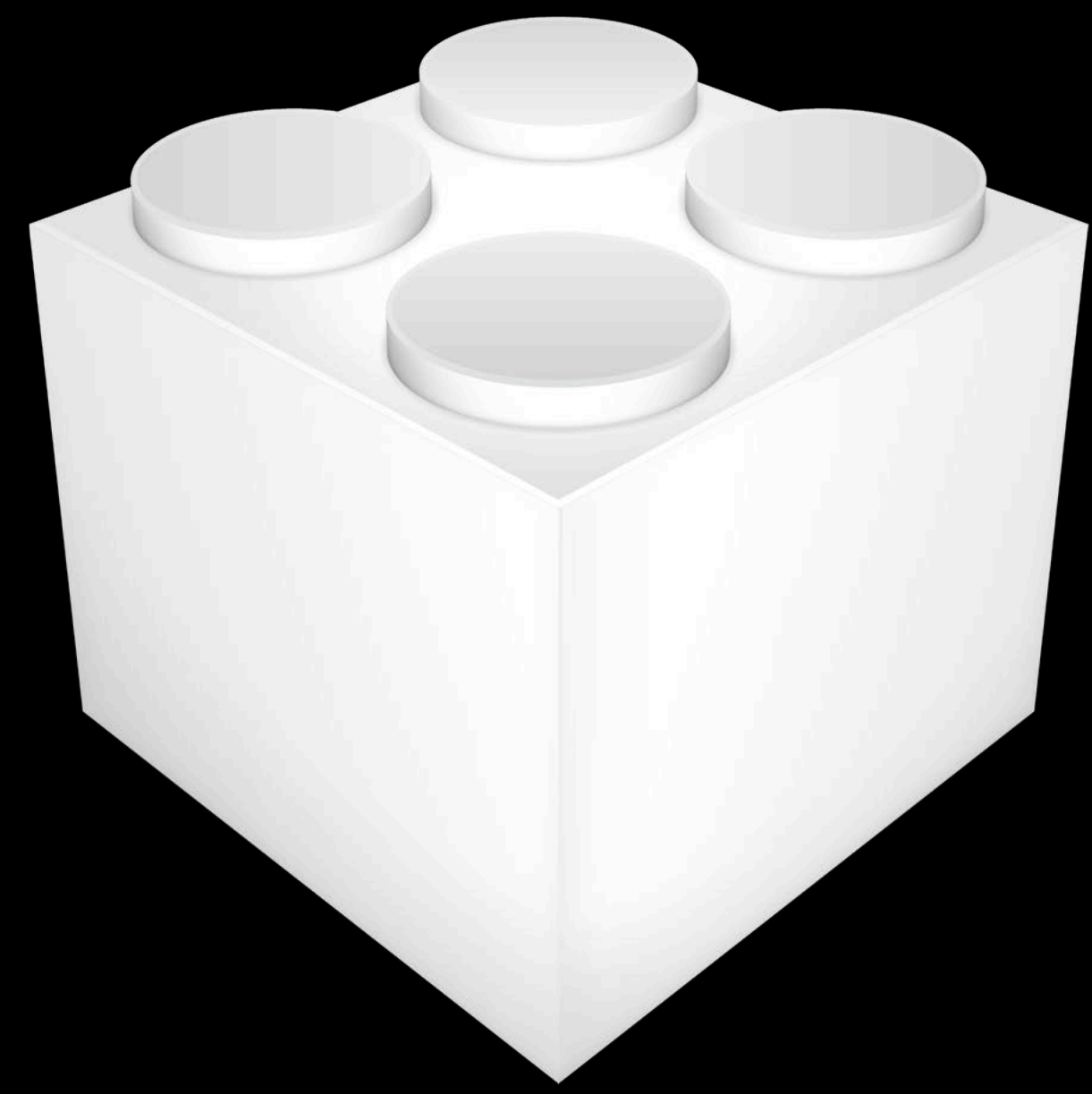
<https://developer.apple.com/download/more/>



Swift Playgrounds 2.1



Xcode 9.3



PlaygroundBook



Book_Sources



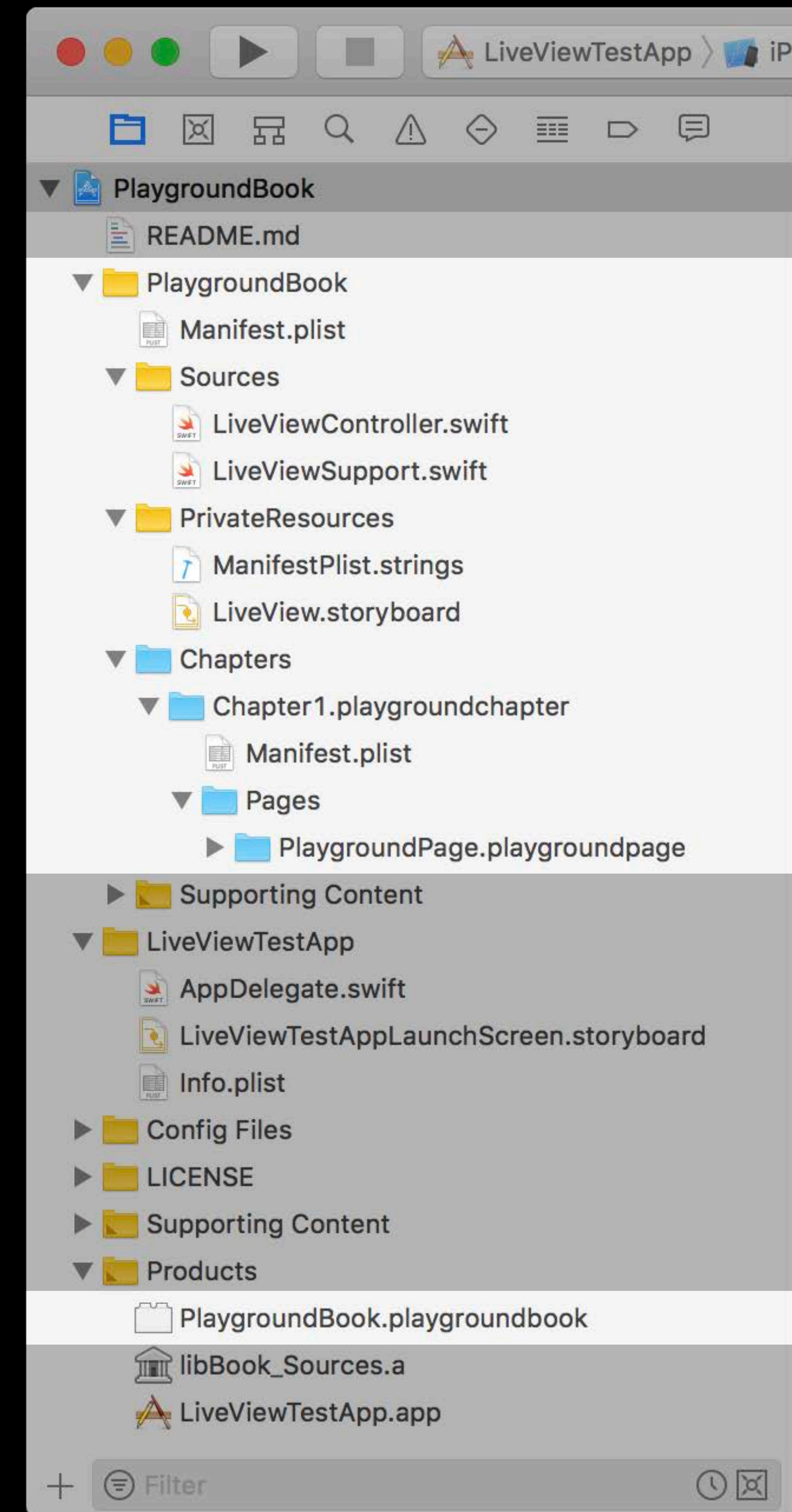
LiveViewTestApp

PlaygroundBook Target

Outputs a playground book

Stored in PlaygroundBook group in Xcode

Contains playground book with one page

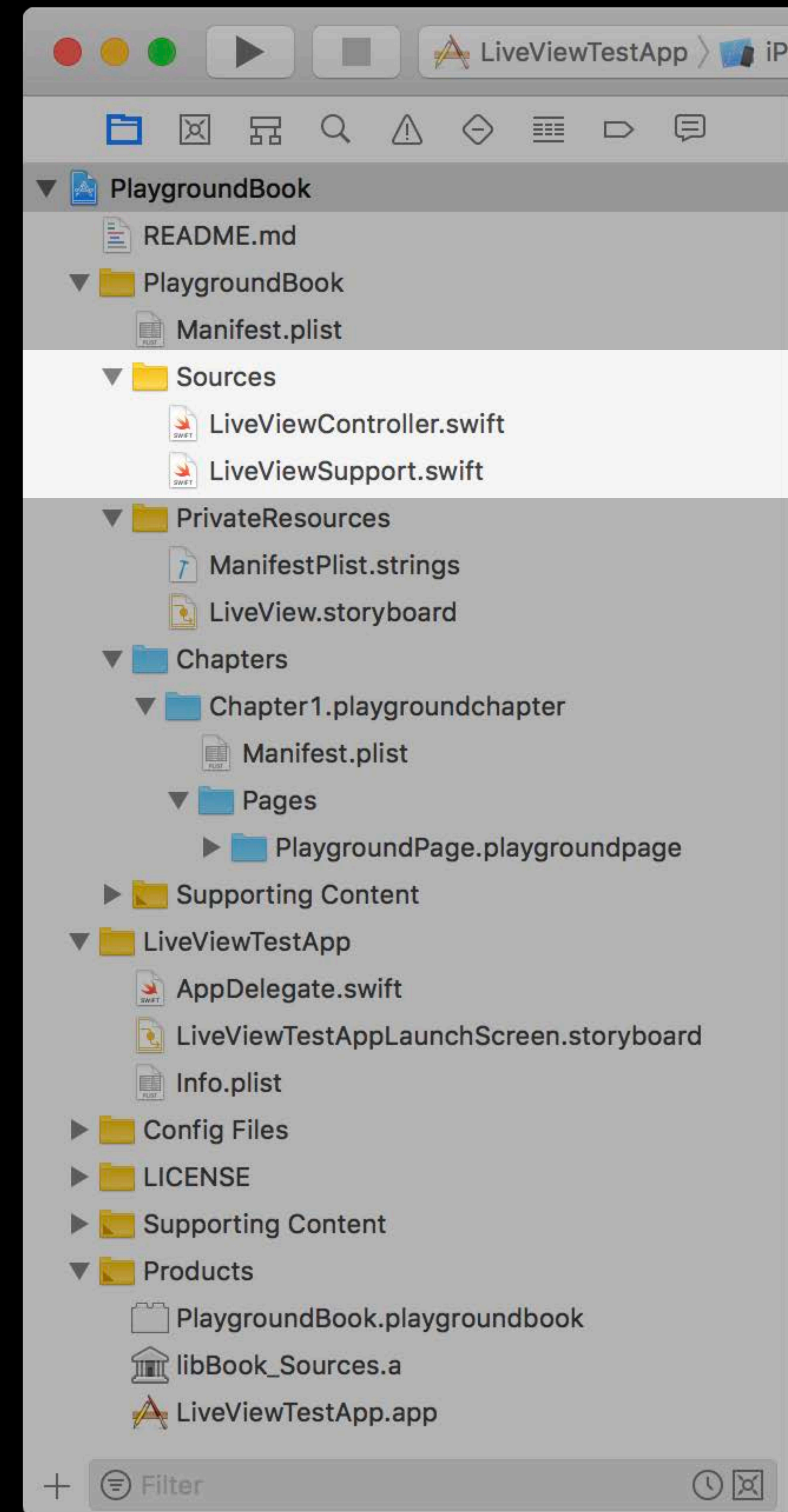


Book_Sources Target

Compiles book-level sources

Allows full editor integration

Used by LiveViewTestApp

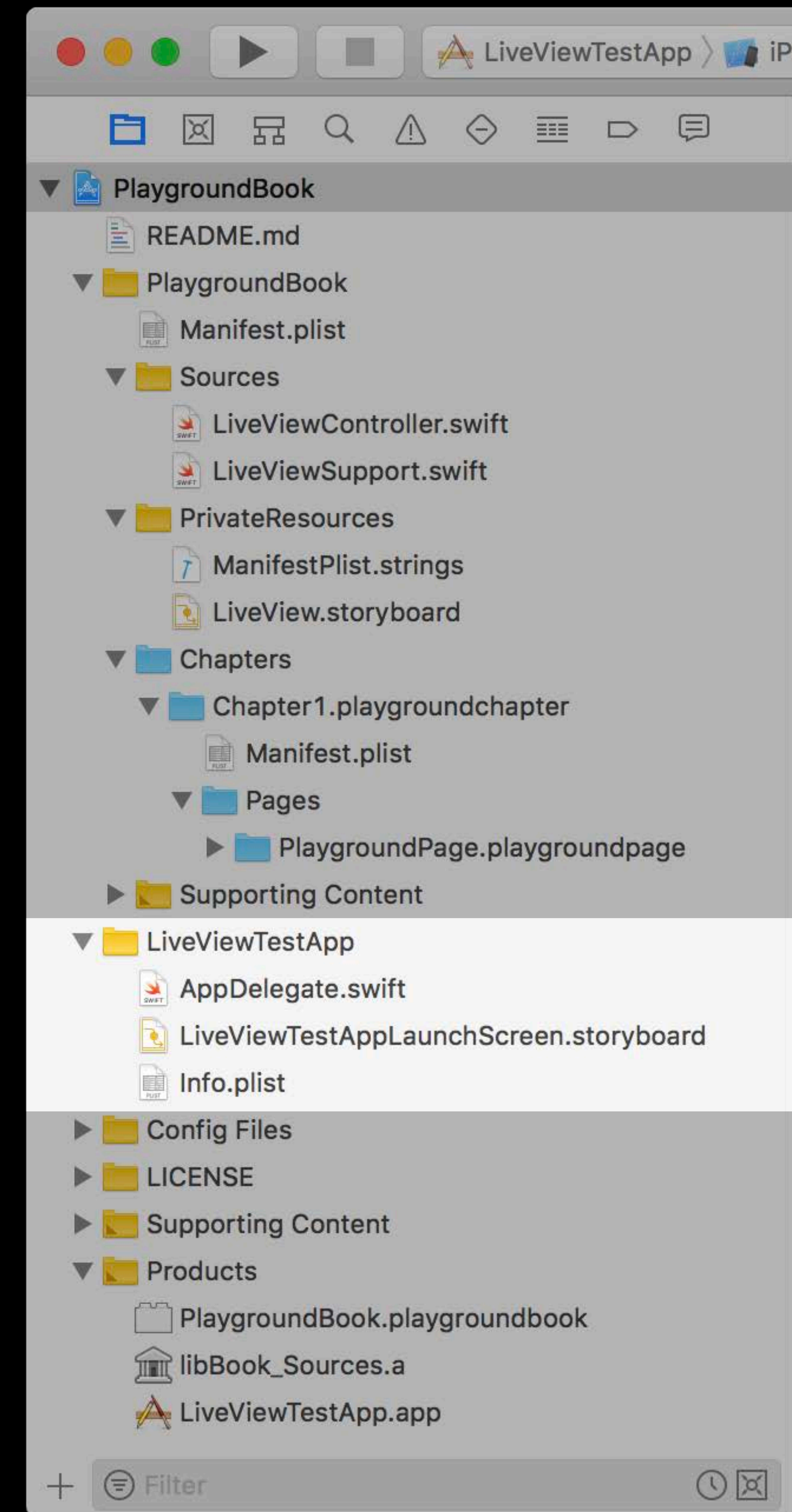


LiveViewTestApp Target

Outputs a live view debugging app

Shows live view in full screen or side-by-side view

Runs on iPad or iOS Simulator



Supporting Frameworks

Playgrounds Frameworks

PlaygroundSupport

PlaygroundBluetooth

Other Frameworks

LiveViewHost

Supporting Frameworks

Playgrounds Frameworks

PlaygroundSupport

PlaygroundBluetooth

Other Frameworks

LiveViewHost

Supporting Frameworks

Playgrounds Frameworks

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Other Frameworks

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Supporting Frameworks

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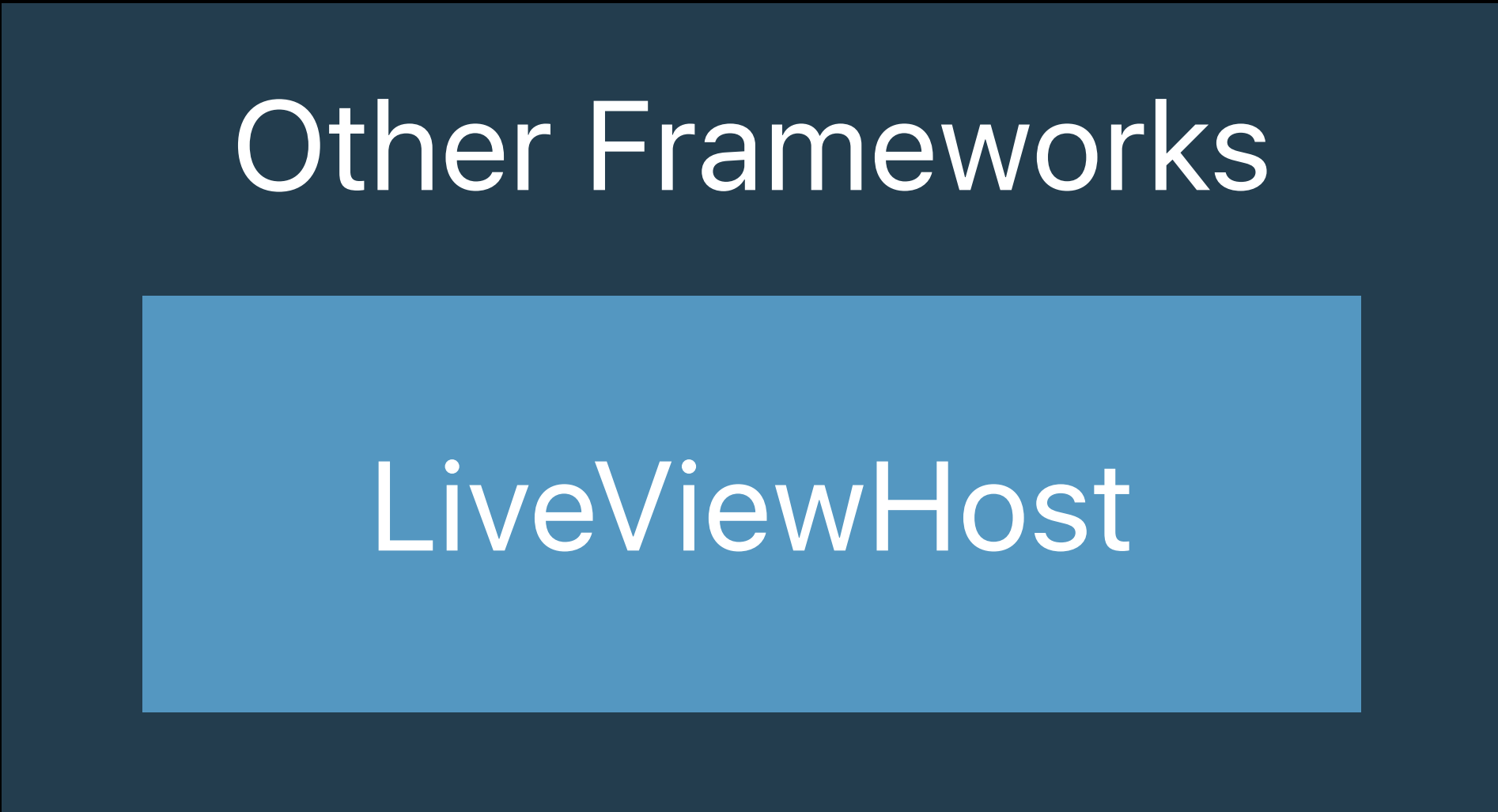
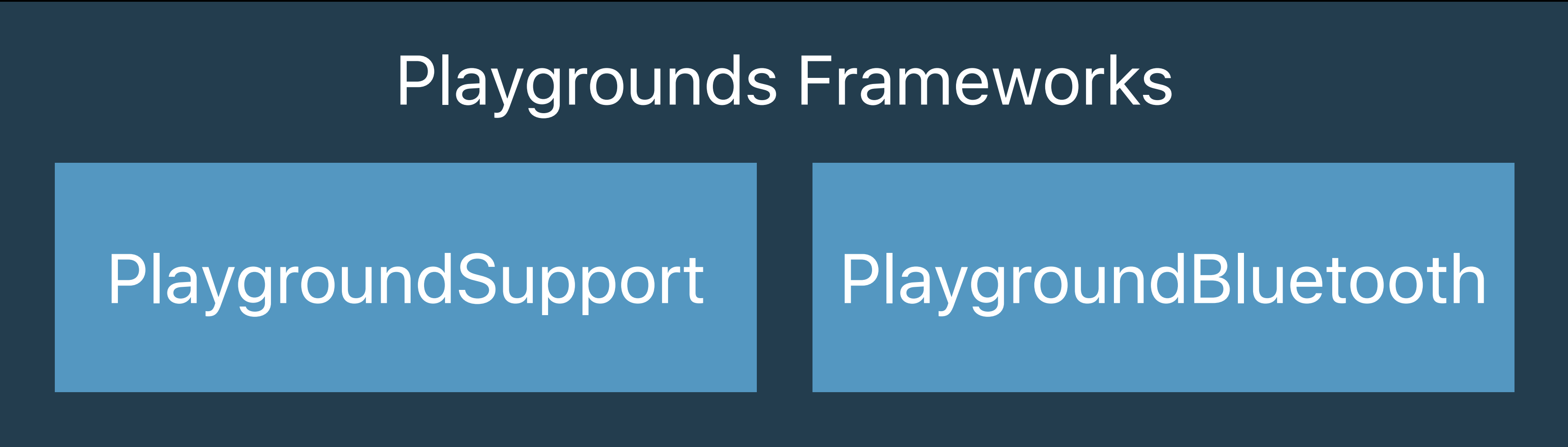
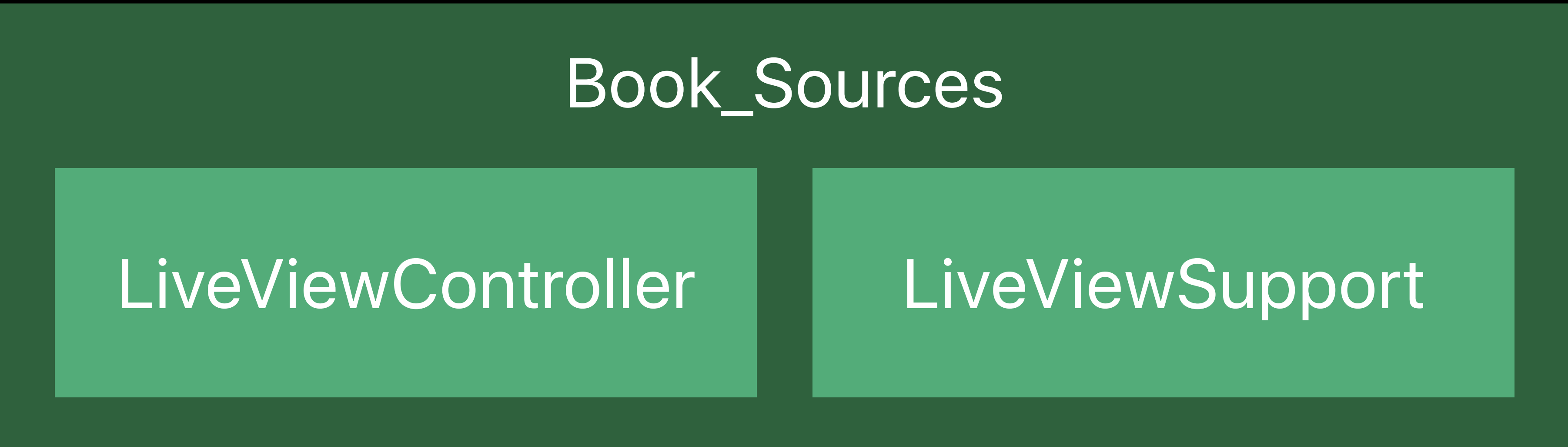
Playgrounds Frameworks

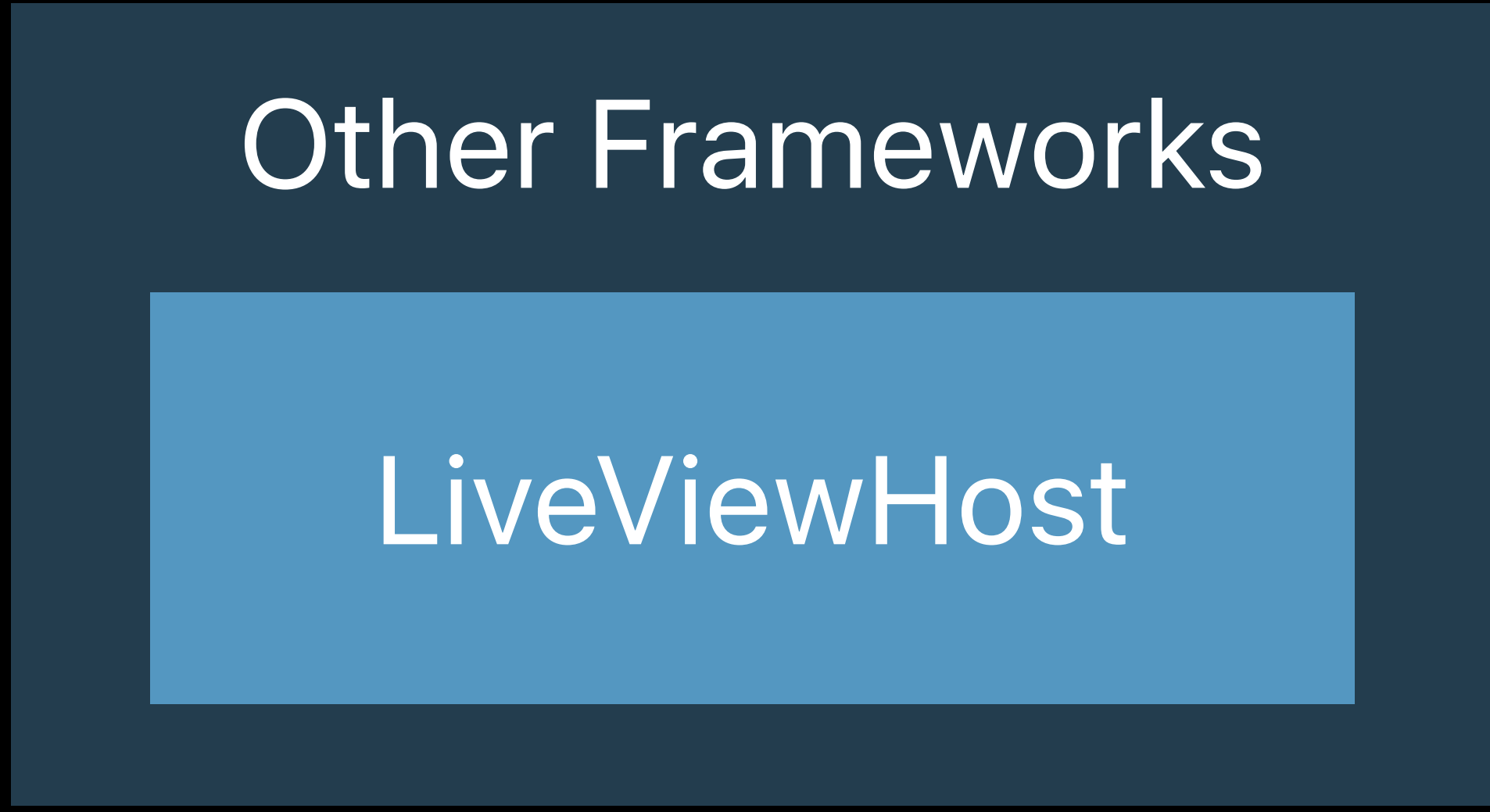
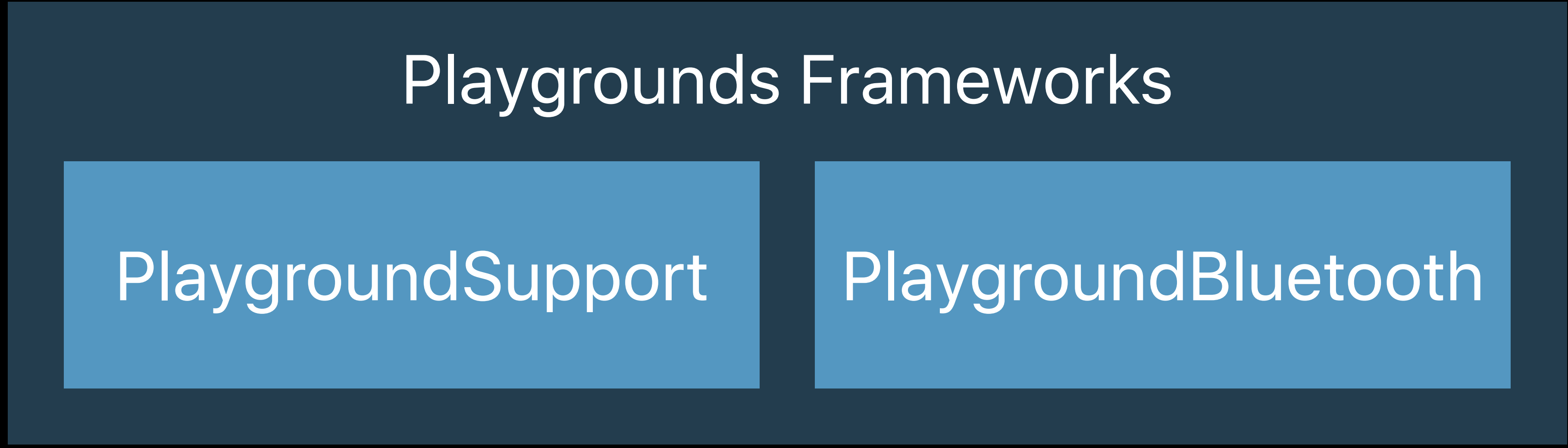
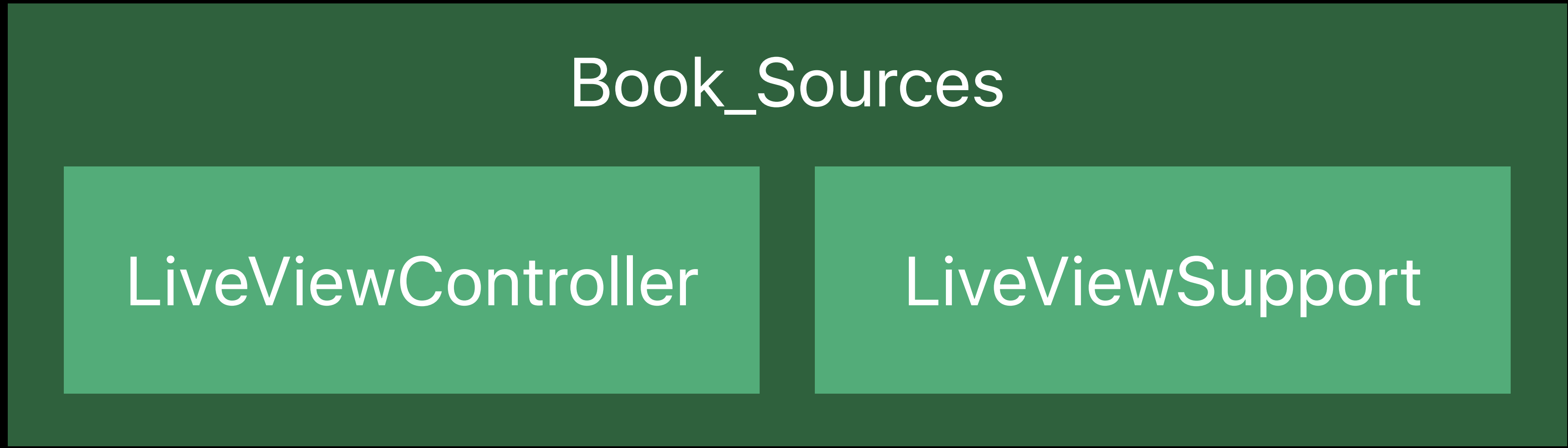
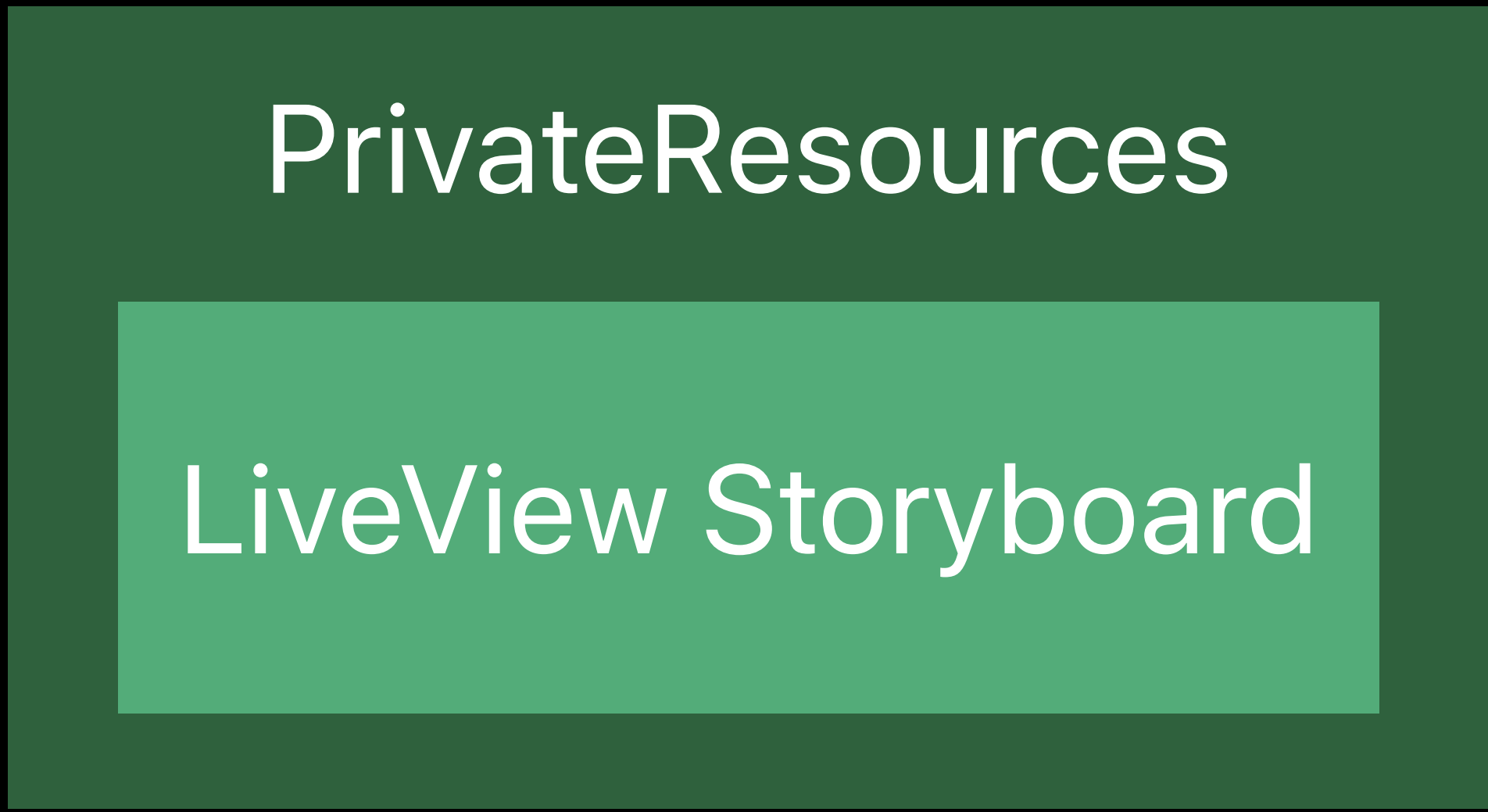
PlaygroundSupport

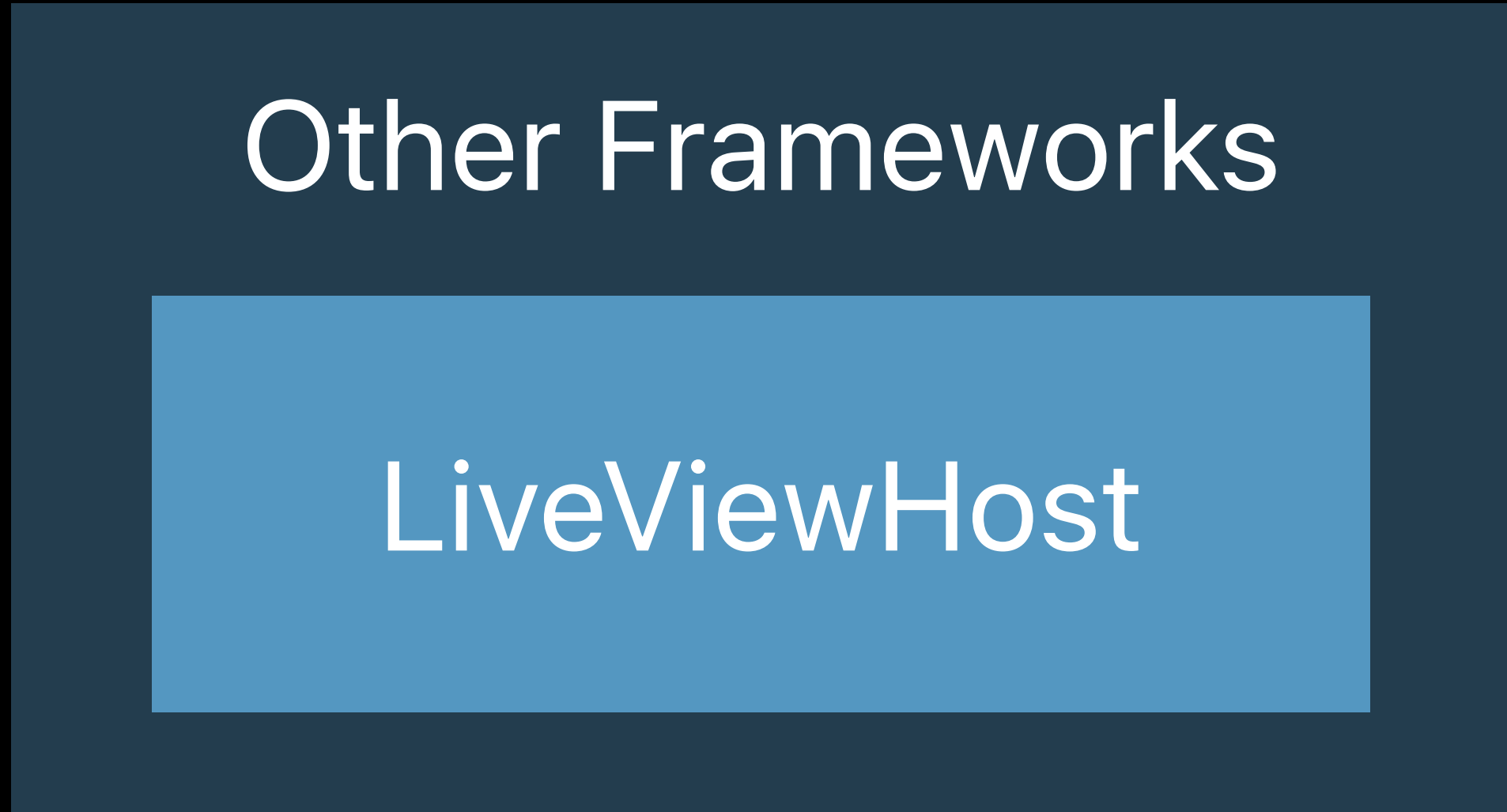
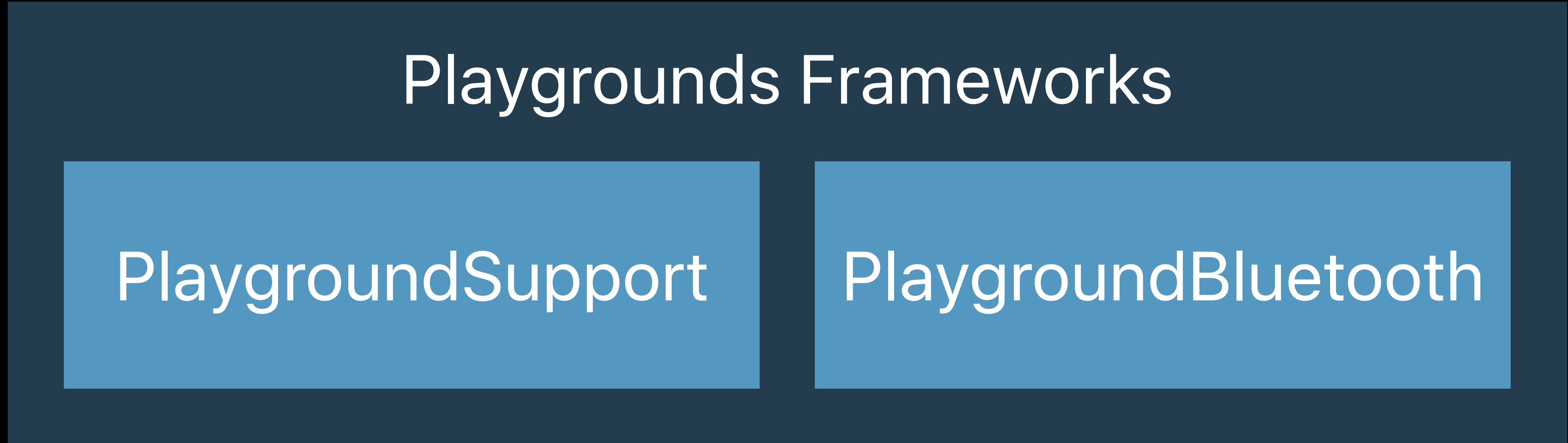
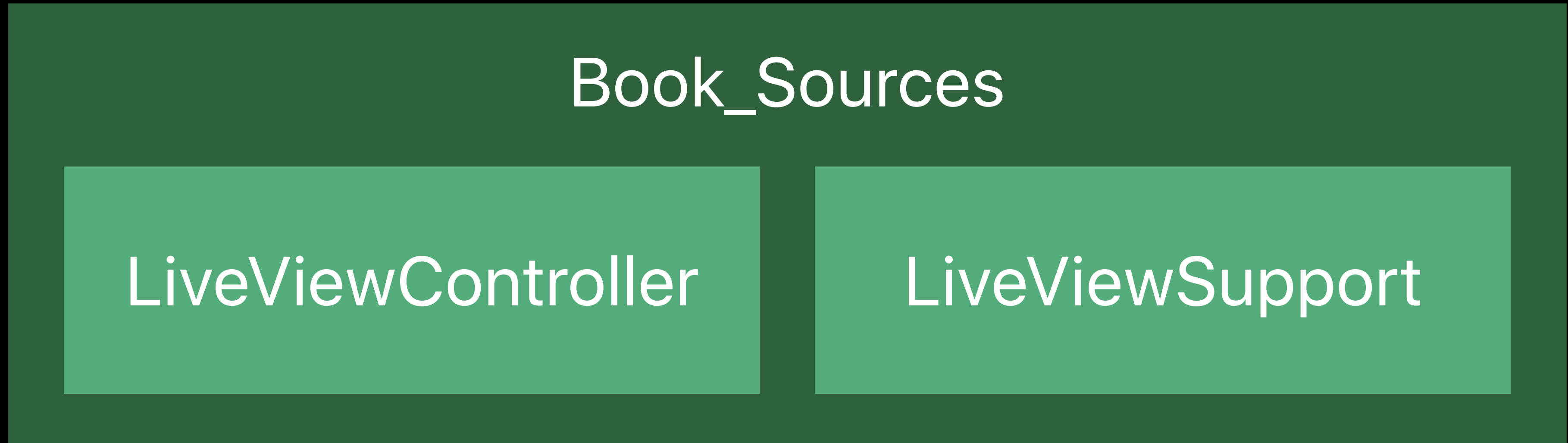
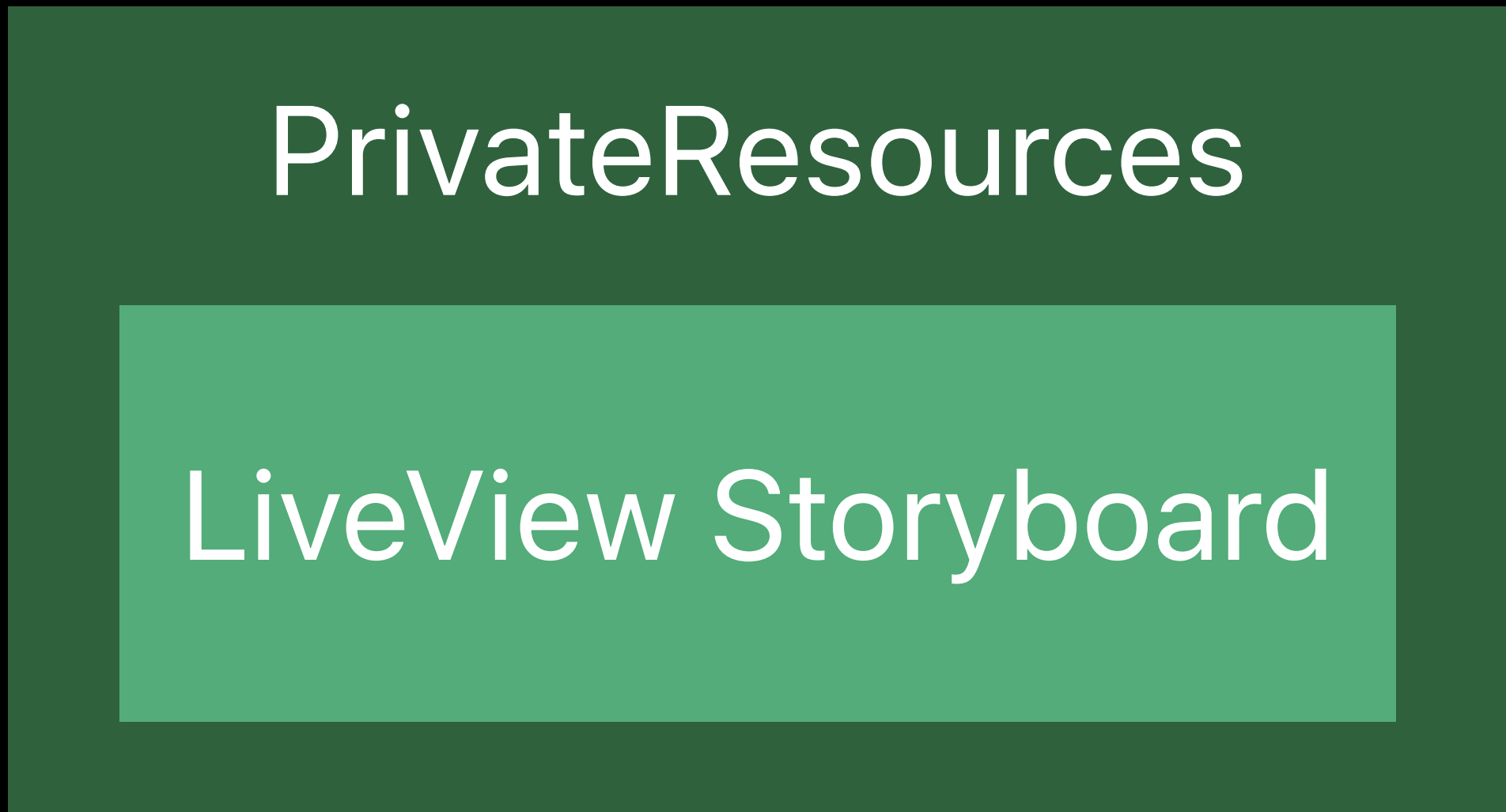
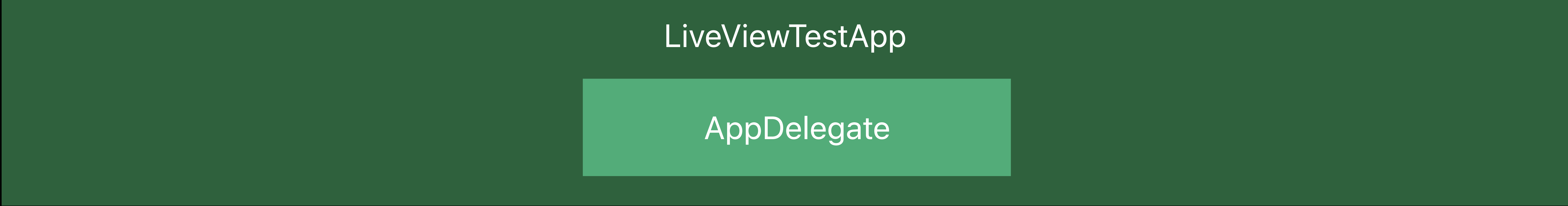
PlaygroundBluetooth

Other Frameworks

LiveViewHost







```
// AppDelegate.swift
```

```
@UIApplicationMain
```

```
class AppDelegate: LiveViewHost.AppDelegate {
```

```
    override func setUpLiveView() -> PlaygroundLiveViewable {
```

```
        return Book_Sources.instantiateLiveView()
```

```
    }
```

```
}
```

Demo

Creating a Subscription

Grace Kendall, Playgrounds Engineer

What's Next

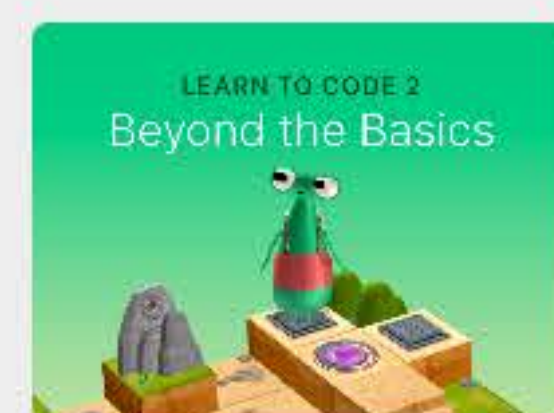
[Edit](#) [Done](#)



Hour of Code



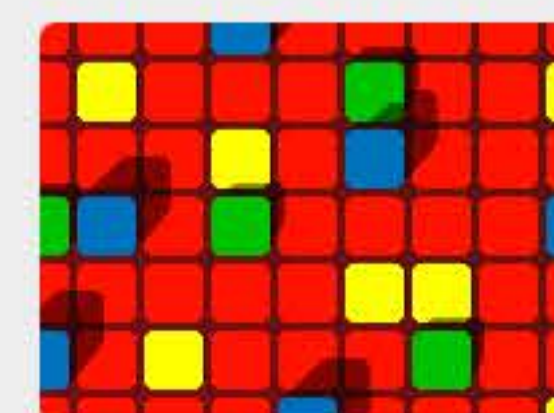
Learn to Code 1



Learn to Code 2



Battleship



Blink



Rock, Paper, Scissors



Learn to Code 3

Learn to Code



Learn to Code 1
Fundamentals of Swift
Swift 4.1 Edition

GET



Learn to Code 2
Beyond the Basics
Swift 4.1 Edition

GET



Learn to Code 3
Explore the Universe

Challenges

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Code Machine
Beginner
Swift 4.1 Edition

GET



Augmented Reality
Intermediate
Swift 4.1 Edition

GET



Battleship
Intermediate
Swift 4.1 Edition



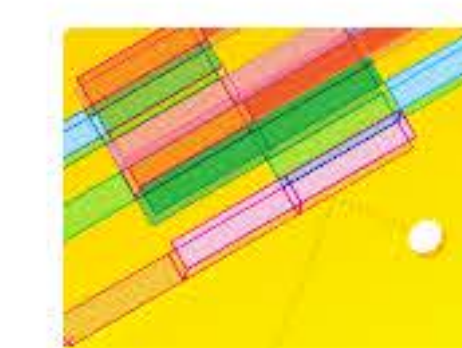
Hour of Code
Beginner
Swift 4.1 Edition

GET



Cipher
Intermediate
Swift 4.1 Edition

GET



Brick Breaker
Intermediate
Swift 4.1 Edition

Starting Points

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Blank
Swift 4 Edition

GET





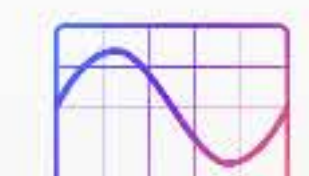


Answers
Swift 4.1 Edition



GET






Puzzle World
Swift 4.1 Edition

 Swift 4 Edition GET	 Swift 4.1 Edition GET	 Swift 4.1 Edition GET
 Shapes Swift 4.1 Edition GET	 Graphing Swift 4.1 Edition GET	

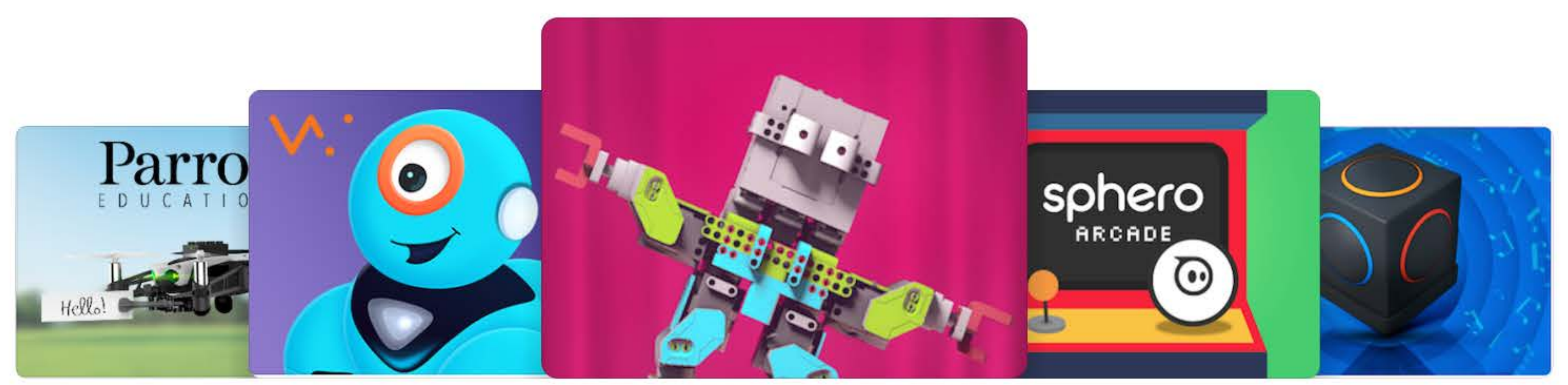
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 Parrot Education Learn to code and pilot a Parrot drone... GET	 Parrot Template Learn to code and pilot a Parrot drone... GET
--	---

Sphero [SUBSCRIPTION](#) [See All](#)

 Sphero Arcade Code classic games with Sphero. GET	 R2-D2 by Sphero Use Swift code to help R2-D2. GET	 Sphero Template Build your own program. GET
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Hour of Code

Beginner
Swift 4.1 Edition

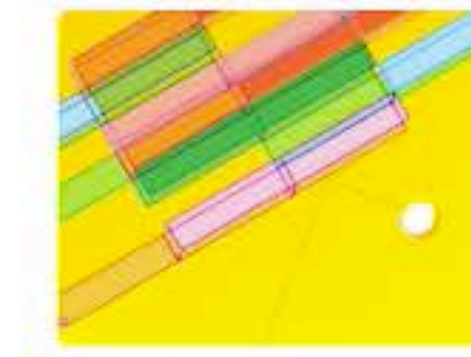
GET



Cipher

Intermediate
Swift 4.1 Edition

GET

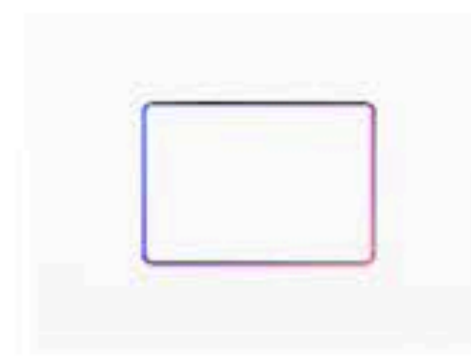


Brick Breaker

Intermediate
Swift 4.1 Edition

Starting Points

[See All](#)



Blank

Swift 4 Edition

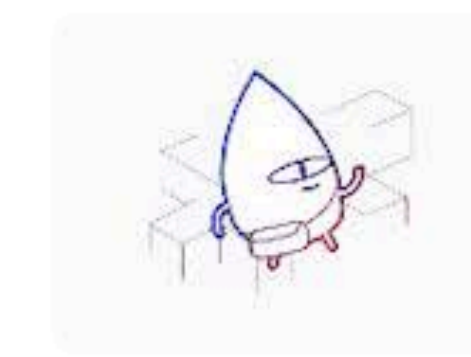
GET



Answers

Swift 4.1 Edition

GET



Puzzle World

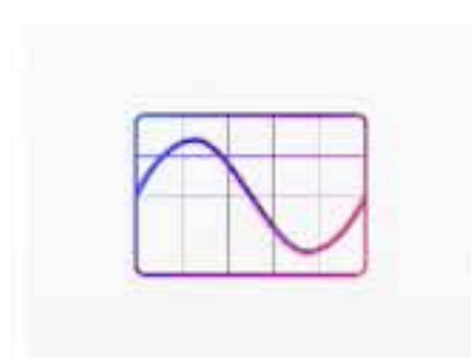
Swift 4.1 Edition



Shapes

Swift 4.1 Edition

GET



Graphing

Swift 4.1 Edition

GET

Parrot Education

SUBSCRIPTION

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Parrot Education

Learn to code and pilot a Parrot drone...

GET



Parrot Template

Learn to code and pilot a Parrot drone...

GET

Sphero

SUBSCRIPTION

[See All](#)



Sphero Arcade

Code classic games with Sphero.

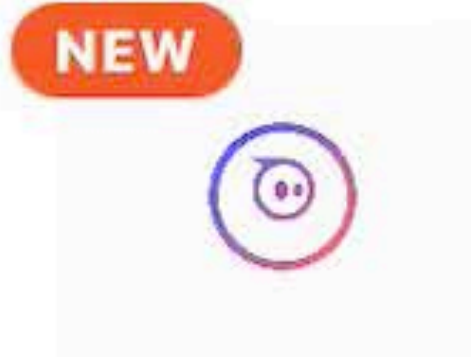
GET



R2-D2 by Sphero

Use Swift code to help R2-D2.

GET



Sphero Template

Build your own program

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Discover great playgrounds from leading developers



Hour of Code

Beginner
Swift 4.1 Edition

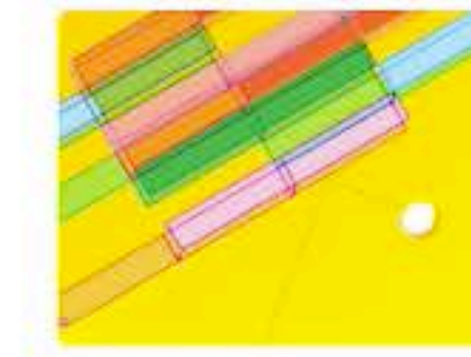
GET



Cipher

Intermediate
Swift 4.1 Edition

GET

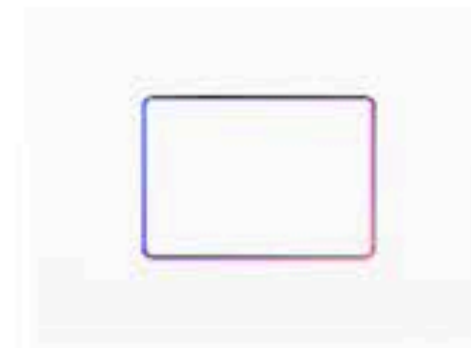


Brick Breaker

Intermediate
Swift 4.1 Edition

Starting Points

[See All](#)



Blank

Swift 4 Edition

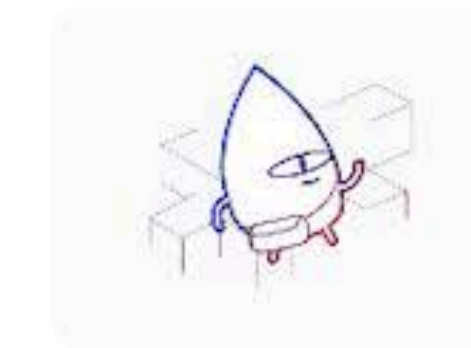
GET



Answers

Swift 4.1 Edition

GET



Puzzle World

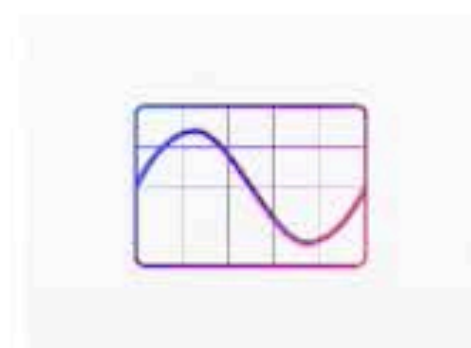
Swift 4.1 Edition



Shapes

Swift 4.1 Edition

GET



Graphing

Swift 4.1 Edition

GET

Parrot Education

SUBSCRIPTION

[See All](#)



Parrot Education

Learn to code and pilot a Parrot drone...

GET



Parrot Template

Learn to code and pilot a Parrot drone...

GET

Sphero

SUBSCRIPTION

[See All](#)



Sphero Arcade

Code classic games with Sphero.

GET



R2-D2 by Sphero

Use Swift code to help R2-D2.

GET



Sphero Template

Build your own program

Subscribe for More

Discover great playgrounds from leading developers

How to Publish Subscriptions

Subscription content is hosted online

Data is published in JSON files

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
}
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
}
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
}
```

Playground Feed Format

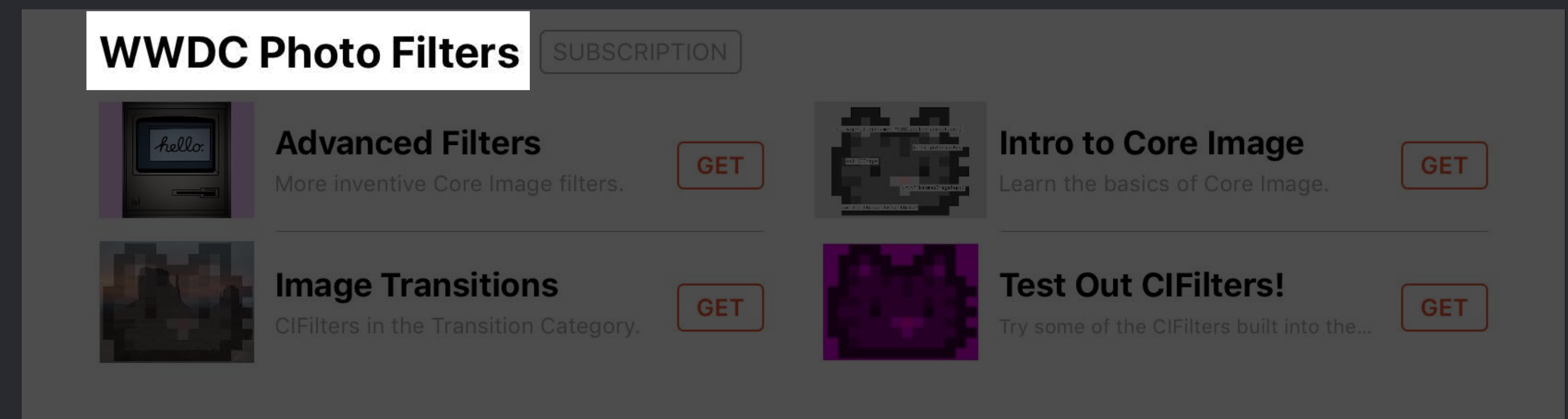
Overarching, descriptive data

Data for each document





```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```

```
{  
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  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```




The screenshot displays the WWDC Photo Filters app interface. At the top, there is a white banner with the text "WWDC Photo Filters" and a "SUBSCRIPTION" button. Below the banner, there are four document cards arranged in a 2x2 grid. Each card features a small image, a title, a brief description, and a "GET" button.

Image	Title	Description	Action
	Advanced Filters	More inventive Core Image filters.	GET
	Intro to Core Image	Learn the basics of Core Image.	GET
	Image Transitions	CIFilters in the Transition Category.	GET
	Test Out CIFilters!	Try some of the CIFilters built into the...	GET


```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```

```
{
  "title": "WWDC Photo Filters",
  "publisherName": "Holly and Grace",
  "feedIdentifier": "io.github.WWDCPhotoFilters",
  "contactURL": "mailto:example@example.com",
  "formatVersion": "1.0",
  "documents": []
}
```

< New Playground



Intro to Core Image

Holly and Grace

Learn the basics of Core Image.

GET

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
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```
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  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```

```
{  
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  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```



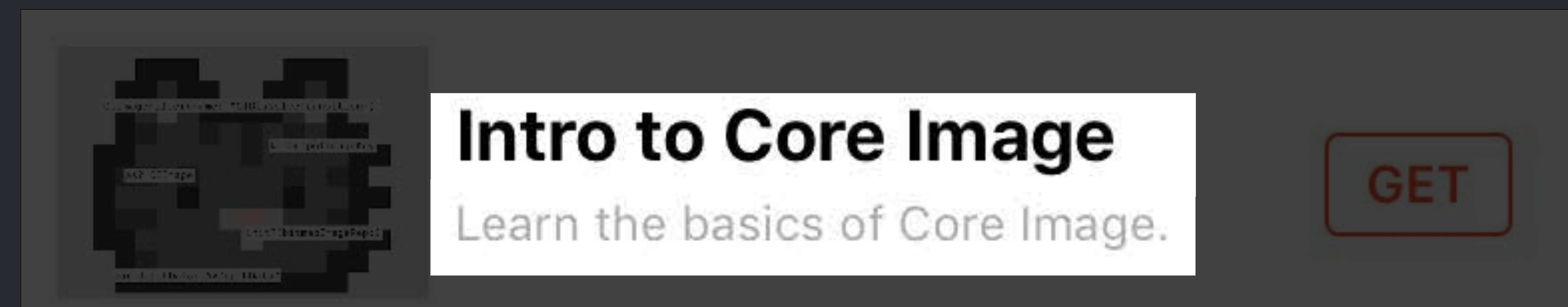
```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": []  
}
```

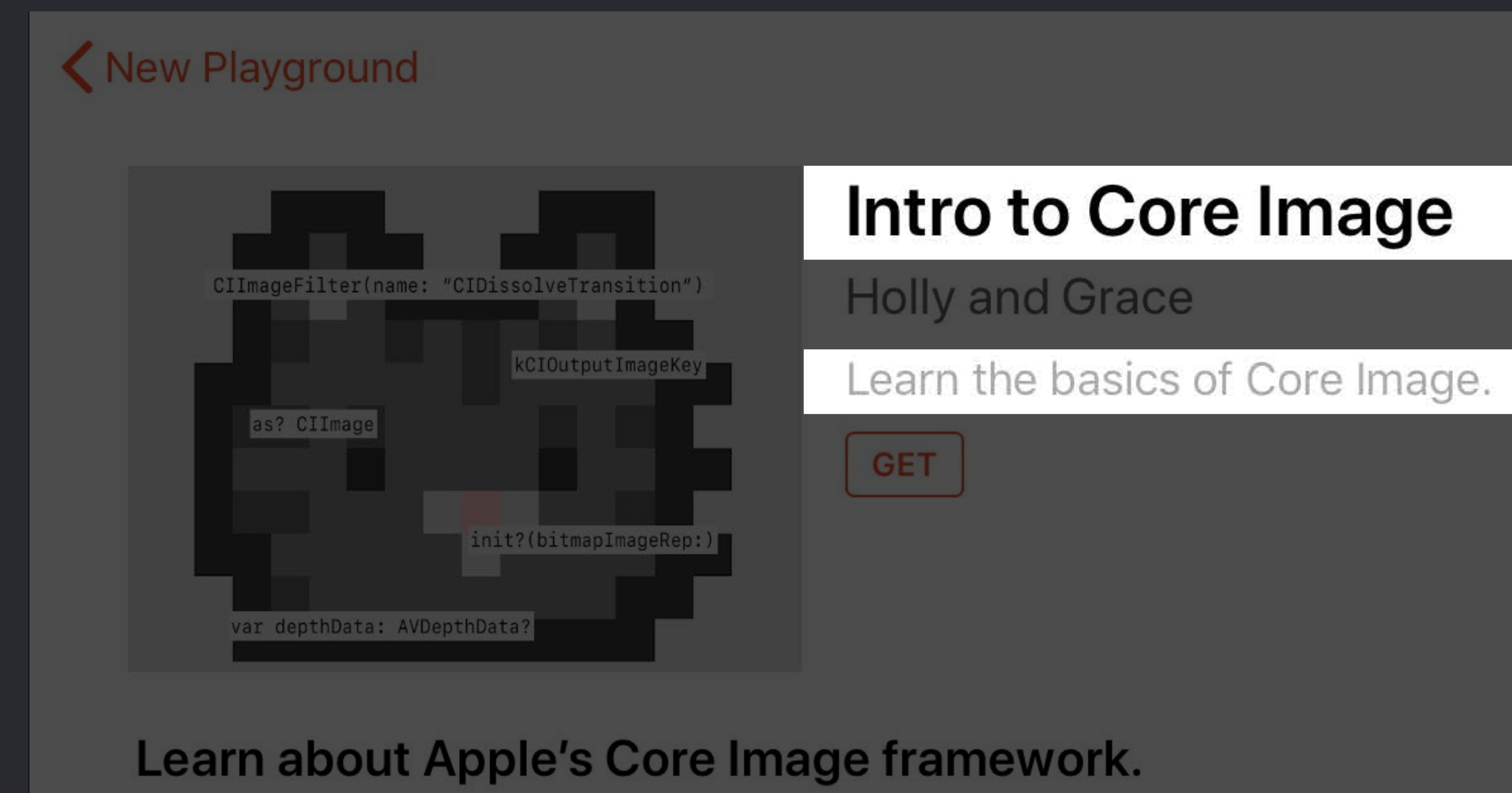


```
"documents": [  
  {  
    "title": "Intro to Core Image",  
    "overviewSubtitle": "Learn the basics of Core Image.",  
    "detailSubtitle": "Learn about Apple's Core Image framework.",  
    "description": "Part of a series of playgrounds around image filtering.",  
    "contentIdentifier": "io.github.WWDCPhotoFilters.introToCoreImage",  
    "contentVersion": "1.0",  
    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",  
    "additionalInformation": [  
      {  
        "name": "Made for",  
        "value": "WWDC18"  
      }  
    ]  
  }  
]
```

```
"documents": [  
  {  
    "title": "Intro to Core Image",  
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    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",  
    "additionalInformation": [  
      {  
        "name": "Made for",  
        "value": "WWDC18"  
      }  
    ]  
  }  
]
```

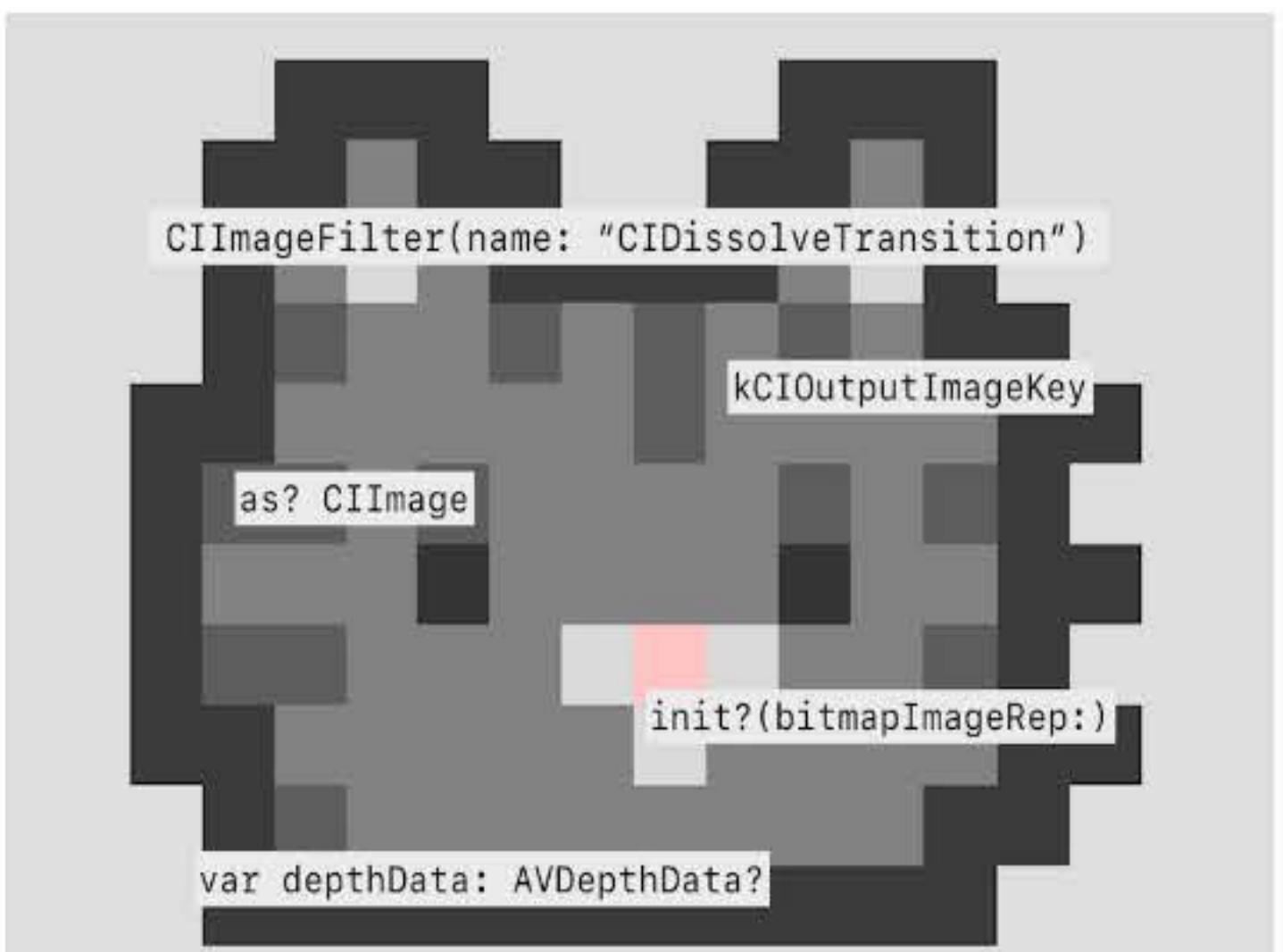



```
"documents": [  
  {  
    "title": "Intro to Core Image",  
    "overviewSubtitle": "Learn the basics of Core Image.",  
    "detailSubtitle": "Learn about Apple's Core Image framework.",  
    "description": "Part of a series of playgrounds around image filtering.",  
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    "contentVersion": "1.0",  
    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",  
    "additionalInformation": [  
      {  
        "name": "Made for",  
        "value": "WWDC18"  
      }  
    ]  
  }  
]
```



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"documents": [
  {
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    "contentVersion": "1.0",
    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",
    "additionalInformation": [
      {
        "name": "Made for",
        "value": "WWDC18"
      }
    ]
  }
]
```

< New Playground



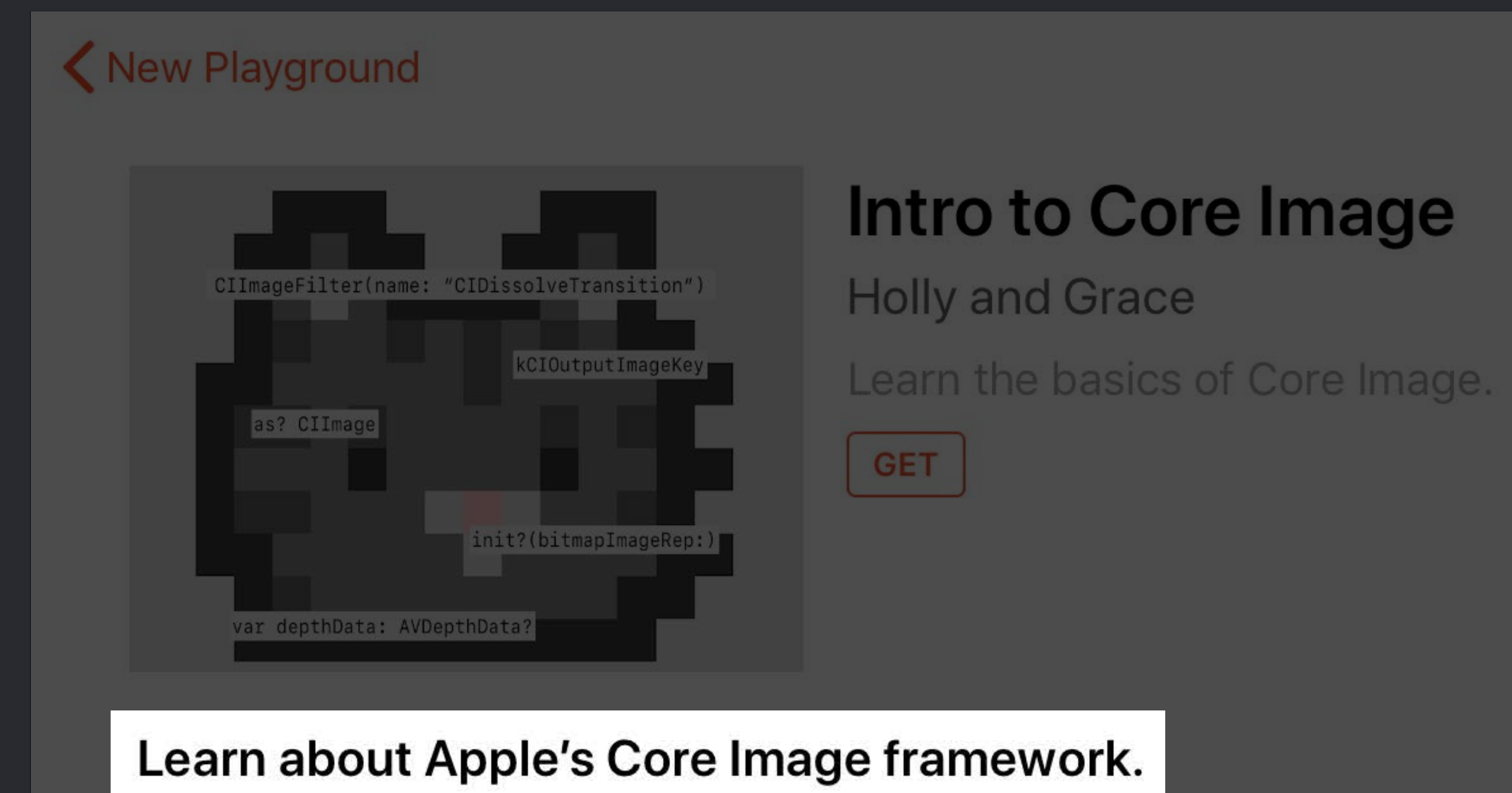
Intro to Core Image
Holly and Grace
Learn the basics of Core Image.

GET

Learn about Apple's Core Image framework.

The screenshot shows a Swift Playground interface. On the left, there is a preview of a pixelated image. On the right, there is a code editor with the following Swift code: `CIImageFilter(name: "CIDissolveTransition")`, `as? CIImage`, `init?(bitmapImageRep:)`, `var depthData: AVDepthData?`, and `kCIColorOutputImageKey`. The playground title is "Intro to Core Image" by Holly and Grace, with a "GET" button.

```
"documents": [  
  {  
    "title": "Intro to Core Image",  
    "overviewSubtitle": "Learn the basics of Core Image.",  
    "detailSubtitle": "Learn about Apple's Core Image framework.",  
    "description": "Part of a series of playgrounds around image filtering.",  
    "contentIdentifier": "io.github.WWDCPhotoFilters.introToCoreImage",  
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    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",  
    "additionalInformation": [  
      {  
        "name": "Made for",  
        "value": "WWDC18"  
      }  
    ]  
  }  
]
```



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"documents": [  
  {  
    "title": "Intro to Core Image",  
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      {  
        "name": "Made for",  
        "value": "WWDC18"  
      }  
    ]  
  }  
]
```

Learn about Apple's Core Image framework.

Description

Part of a series of playgrounds around image filtering.

Information

Made for WWDC18

```
"documents": [  
  {  
    "title": "Intro to Core Image",  
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    "contentVersion": "1.0",  
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      {  
        "name": "Made for",  
        "value": "WWDC18"  
      }  
    ]  
  }  
]
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  }  
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        "name": "Made for",
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    ]
  }
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    "contentVersion": "1.0",  
    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",  
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    ]  
  }  
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```
"documents": [  
  {  
    "title": "Intro to Core Image",  
    "overviewSubtitle": "Learn the basics of Core Image.",  
    "detailSubtitle": "Learn about Apple's Core Image framework.",  
    "description": "Part of a series of playgrounds around image filtering.",  
    "contentIdentifier": "io.github.WWDCPhotoFilters.introToCoreImage",  
    "contentVersion": "1.0",  
    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",  
    "additionalInformation": [  
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        "name": "Made for",  
        "value": "WWDC18"  
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    ]  
  }  
]
```

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"documents": [
  {
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    "overviewSubtitle": "Learn the basics of Core Image.",
    "detailSubtitle": "Learn about Apple's Core Image framework.",
    "description": "Part of a series of playgrounds around image filtering.",
    "contentIdentifier": "io.github.WWDCPhotoFilters.introToCoreImage",
    "contentVersion": "1.0",
    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",
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        "name": "Made for",
        "value": "WWDC18"
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    ]
  }
]
```

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    "detailSubtitle": "Learn about Apple's Core Image framework.",  
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    "additionalInformation": [  
      {  
        "name": "Made for",  
        "value": "WWDC18"  
      }  
    ]  
  }  
]
```

Learn about Apple's Core Image framework.

Description

Part of a series of playgrounds around image filtering.

Information

Made for WWDC18

```
"documents": [  
  {  
    ...  
    "publishedDate": "2018-05-09T09:00:00+07:00",  
    "lastUpdatedDate": "2018-05-10T12:30:00+07:00",  
    "thumbnailURL": "IntrotoCI/thumbnail.png",  
    "bannerImageURL": "IntrotoCI/bannerImage.png",  
    "previewImageURLs": [  
      "IntrotoCI/previewImage.png"  
    ]  
  }  
]
```

```
"documents": [  
  {  
    ...  
    "publishedDate": "2018-05-09T09:00:00+07:00",  
    "lastUpdatedDate": "2018-05-10T12:30:00+07:00",  
    "thumbnailURL": "IntrotoCI/thumbnail.png",  
    "bannerImageURL": "IntrotoCI/bannerImage.png",  
    "previewImageURLs": [  
      "IntrotoCI/previewImage.png"  
    ]  
  }  
]
```

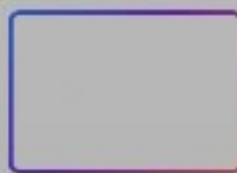



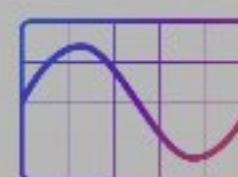


```
"documents": [  
  {  
    ...  
    "publishedDate": "2018-05-09T09:00:00+07:00",  
    "lastUpdatedDate": "2018-05-10T12:30:00+07:00",  
    "thumbnailURL": "IntrotoCI/thumbnail.png",  
    "bannerImageURL": "IntrotoCI/bannerImage.png",  
    "previewImageURLs": [  
      "IntrotoCI/previewImage.png"  
    ]  
  }  
]
```

```
"documents": [  
  {  
    ...  
    "publishedDate": "2018-05-09T09:00:00+07:00",  
    "lastUpdatedDate": "2018-05-10T12:30:00+07:00",  
    "thumbnailURL": "IntrotoCI/thumbnail.png",  
    "bannerImageURL": "IntrotoCI/bannerImage.png",  
    "previewImageURLs": [  
      "IntrotoCI/previewImage.png"  
    ]  
  }  
]
```

Starting Points

[See All](#)

 Blank Swift 4 Edition GET	 Answers Swift 4.1 Edition GET	 Puzzle World Swift 4.1 Edition
 Shapes Swift 4.1 Edition GET	 Graphing Swift 4.1 Edition GET	

WWDC Photo Filters SUBSCRIPTION

[See All](#)

 Advanced Filters More inventive Core Image filters. GET	 Intro to Core Image Learn the basics of Core Image. GET
 Image Transitions CIFilters in the Transition Category. GET	 Test Out CIFilters! Try some of the CIFilters built into the... GET




Parrot Education SUBSCRIPTION

[See All](#)

 Parrot Education Learn to code and pilot a Parrot drone... GET	 Parrot Template Learn to code and pilot a Parrot drone... GET
--	---

Sphero SUBSCRIPTION

[See All](#)

 Sphero Arcade Code classic games with Sphero. GET	 R2-D2 by Sphero Use Swift code to help R2-D2. GET	 Sphero Tem Build your own prog
---	---	--

[← New Playground](#)



Intro to Core Image

Holly and Grace

Learn the basics of Core Image.

GET

Learn about Apple's Core Image framework.

Description

Part of a series of playgrounds around image filtering.

Information

Languages English

Cancel

Add Subscription Edit

Learn to Code 1
Swift 4 Edition

Code 3

GET

Challenges



Code Machine
Beginner
Swift 4 Edition



Hour of Code
Beginner
Swift 4 Edition



Augmented Reality
Intermediate
Swift 4 Edition



Rock, Paper, Scissors
Beginner
Swift 4 Edition

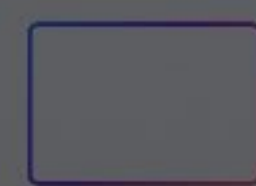


Running Maze
Intermediate
Swift 4 Edition



Spirals
Beginner
Swift 4 Edition

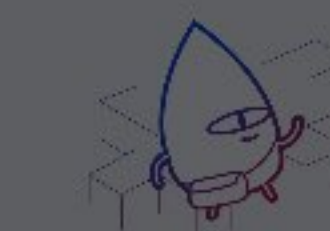
Starting Points



Blank
Swift 4 Edition



Shapes
Swift 4 Edition



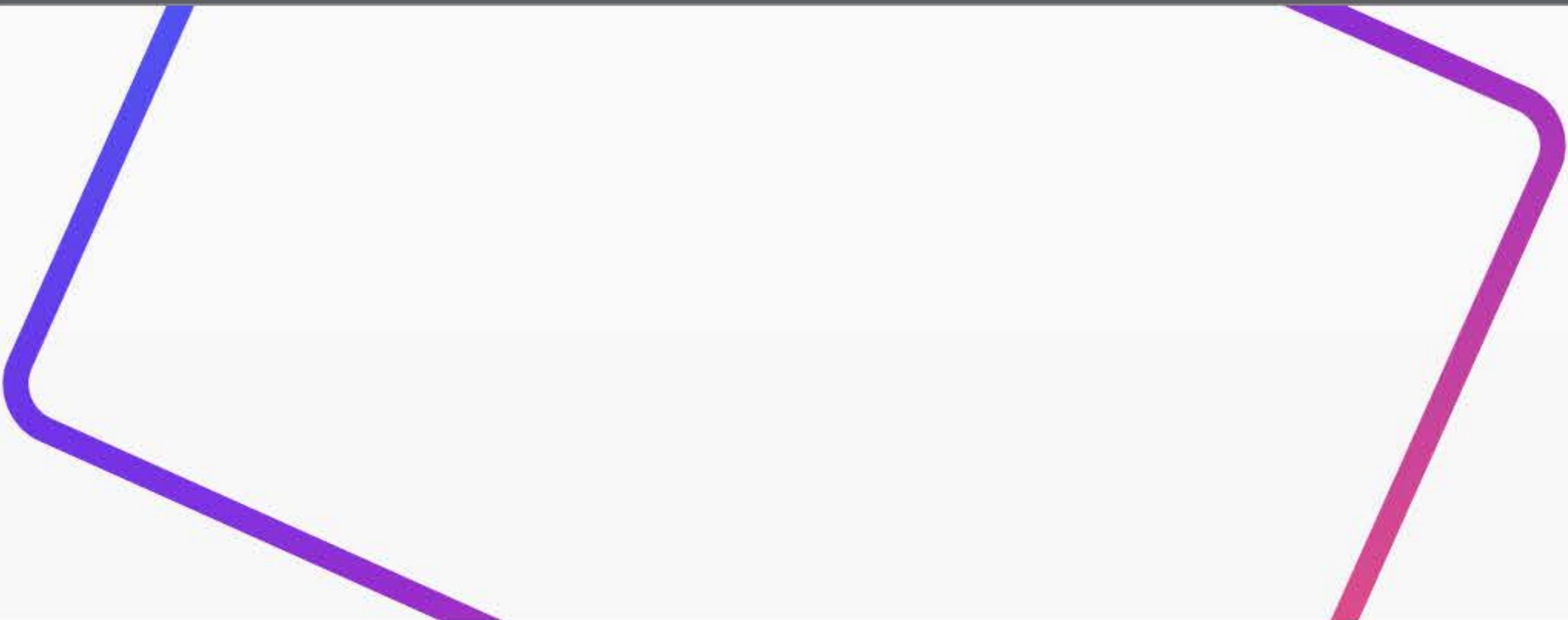
Puzzle World
Swift 4 Edition

WWDC Photo Filters

SUBSCRIPTION

Advanced Filters

Intro to Core Image



GET

Blank
Apple
Swift 4 Edition

Description
Create with no limits as you explore coding in Swift.

Take advantage of real iOS frameworks like UIKit or SceneKit, and hardware features like Multi-Touch gestures, the accelerometer, and the gyroscope. Follow your imagination and see where it takes you!

Publishing a Subscription

Web Hosts

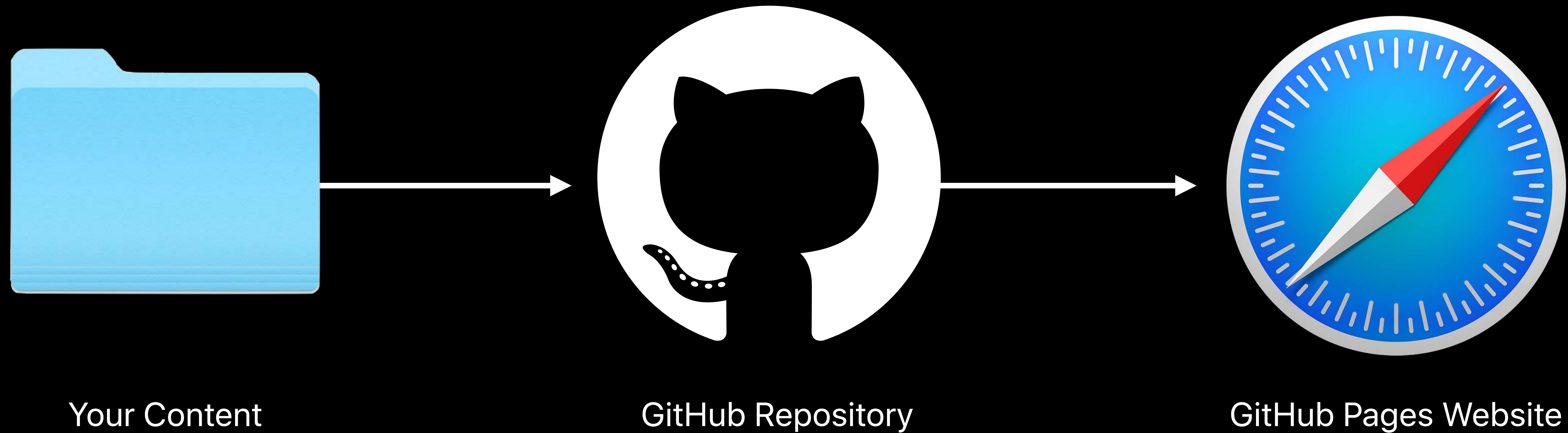
An example using GitHub Pages



Your Content

Web Hosts

An example using GitHub Pages



github.com

Features Business Explore Marketplace Pricing Search GitHub Sign in or Sign up

Built for developers

GitHub is a development platform inspired by the way you work. From **open source** to **business**, you can host and review code, manage projects, and build software alongside millions of other developers.

Username
WWDCPhotoFilters ✓

Email
you@example.com

Password
Create a password
Use at least one letter, one numeral, and seven characters.

Sign up for GitHub

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github.com

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Create a new repository

A repository contains all the files for your project, including the revision history.

Owner: WWDCPhotoFilters / Repository name: WWDCPhotoFilters.github.io ✓

Great repository names are short and memorable. Need inspiration? How about **crispy-meme**.

Description (optional): Holly and Grace's WWDC2018 Swift Playgrounds Subscription

Public
Anyone can see this repository. You choose who can commit.

Private
You choose who can see and commit to this repository.

Initialize this repository with a README
This will let you immediately clone the repository to your computer. Skip this step if you're importing an existing repository.

Add .gitignore: None | Add a license: None ⓘ

Create repository

WWDCPhotoFiltersWorkspace: Ready | Today at 5:25 PM

WWDCPhotoFilters.github.io > index.html > No Selection

- WWDCPhotoFilters.github.io
 - AdvancedFilters ?
 - feed.json
 - index.html** M
 - IntroToCI ?

```
1 Hello WWDC!  
2  
3
```

Identity and Type

Name index.html
Type Default - HTML
Location Relative to Folder Referen...
index.html
Full Path /Users/lscs/Documents/WWDCPhotoFilters.github.io/index.html

Text Settings

Text Encoding No Explicit Encoding
Line Endings No Explicit Line Endings
Indent Using Spaces
Widths Tab 4 Indent 4
 Wrap lines

+ Filter

The screenshot shows the Xcode IDE interface. At the top, the menu bar includes Xcode, File, Edit, View, Find, Navigate, Editor, Product, Debug, Source Control, Window, and Help. The system status bar on the right shows the time as Tue 9:41 AM. The main workspace is titled 'WWDCPhotoFiltersWorkspace: Ready' and shows the current time as 'Today at 5:25 PM'. The left sidebar contains a file explorer for the project 'WWDCPhotoFilters.github.io', listing folders 'AdvancedFilters' and 'IntroToCI', and files 'feed.json' and 'index.html'. The central editor displays the content of 'index.html' with the text 'Hello WWDC!' on the first line. The right sidebar shows the 'Identity and Type' and 'Text Settings' for the selected file. The 'Identity and Type' section shows the file name 'index.html', type 'Default - HTML', and full path. The 'Text Settings' section shows 'Text Encoding' as 'No Explicit Encoding', 'Line Endings' as 'No Explicit Line Endings', 'Indent Using' as 'Spaces', and 'Wrap lines' checked.

WWDCPhotoFiltersWorkspace: Ready | Today at 5:28 PM

WWDCPhotoFilters.github.io > index.html > No Selection

1	Hello WWDC 2018!	1	Hello WWDC!
2		2	
3		3	

Filter: WWDCPhotoFilters.github.io > master > Local Revision | 1/1 | WWDCPhotoFilters.github.io > master > 5/31/18 LSCS 6cbd4fd (HEAD)

Updating our index.html file

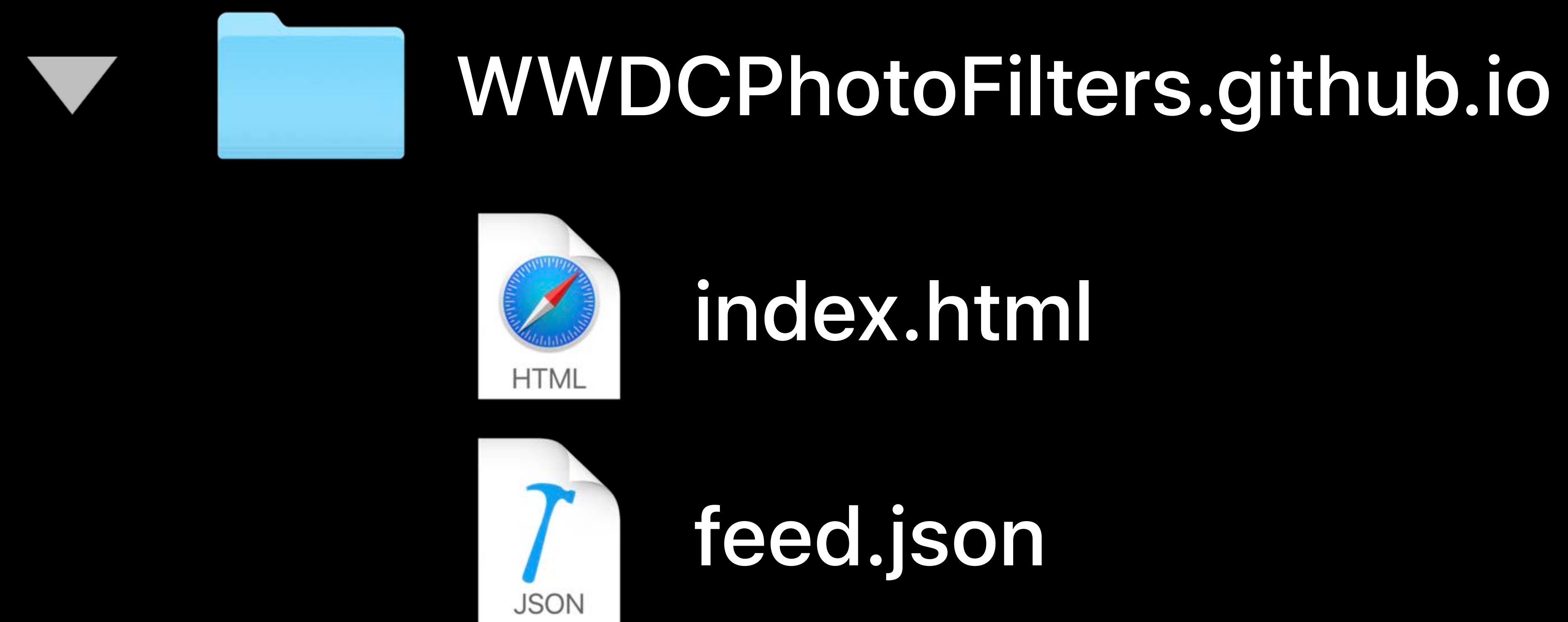
Push to remote: origin/master

Cancel Commit 1 File and Push

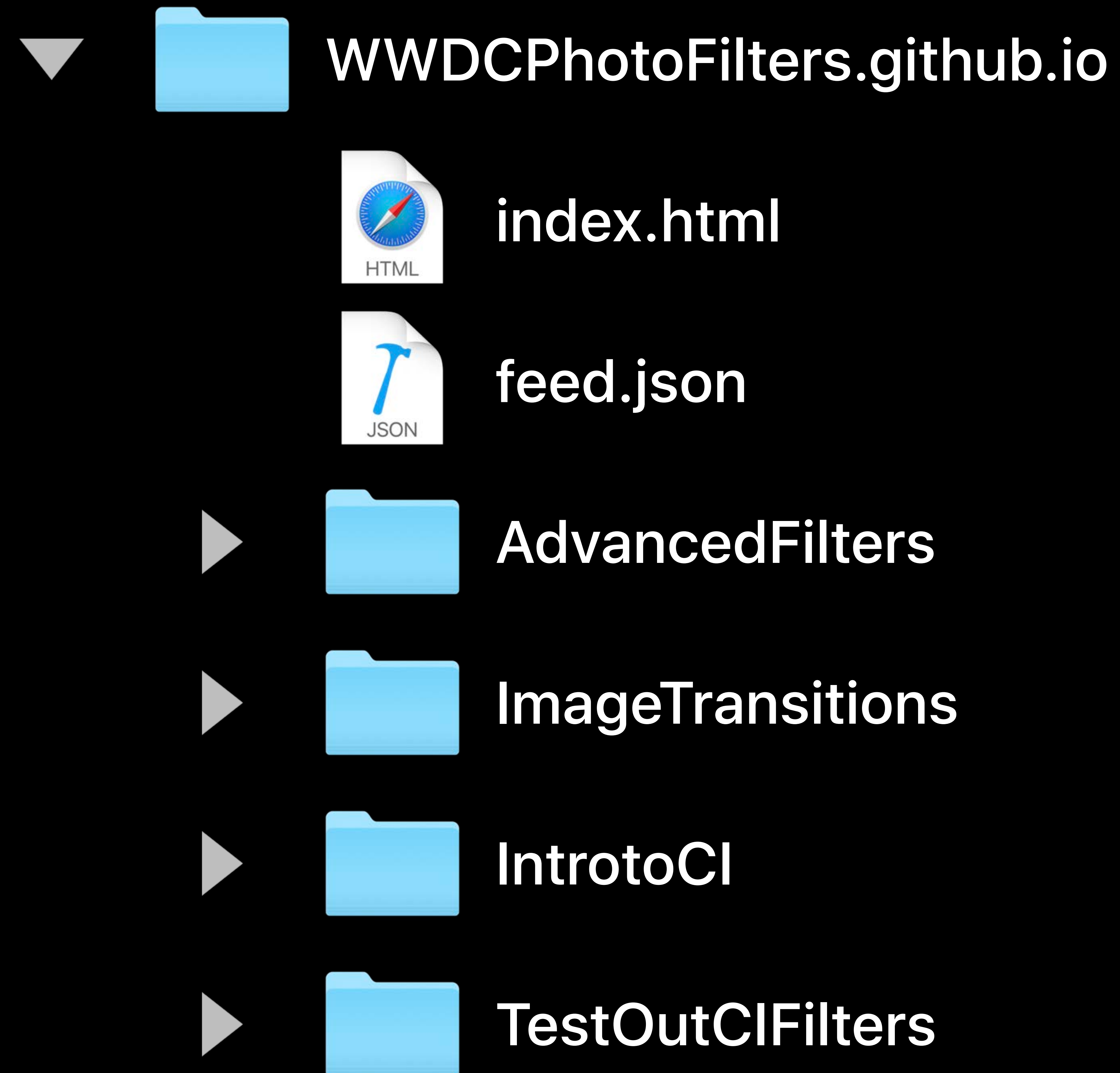
How to Structure Your Repository



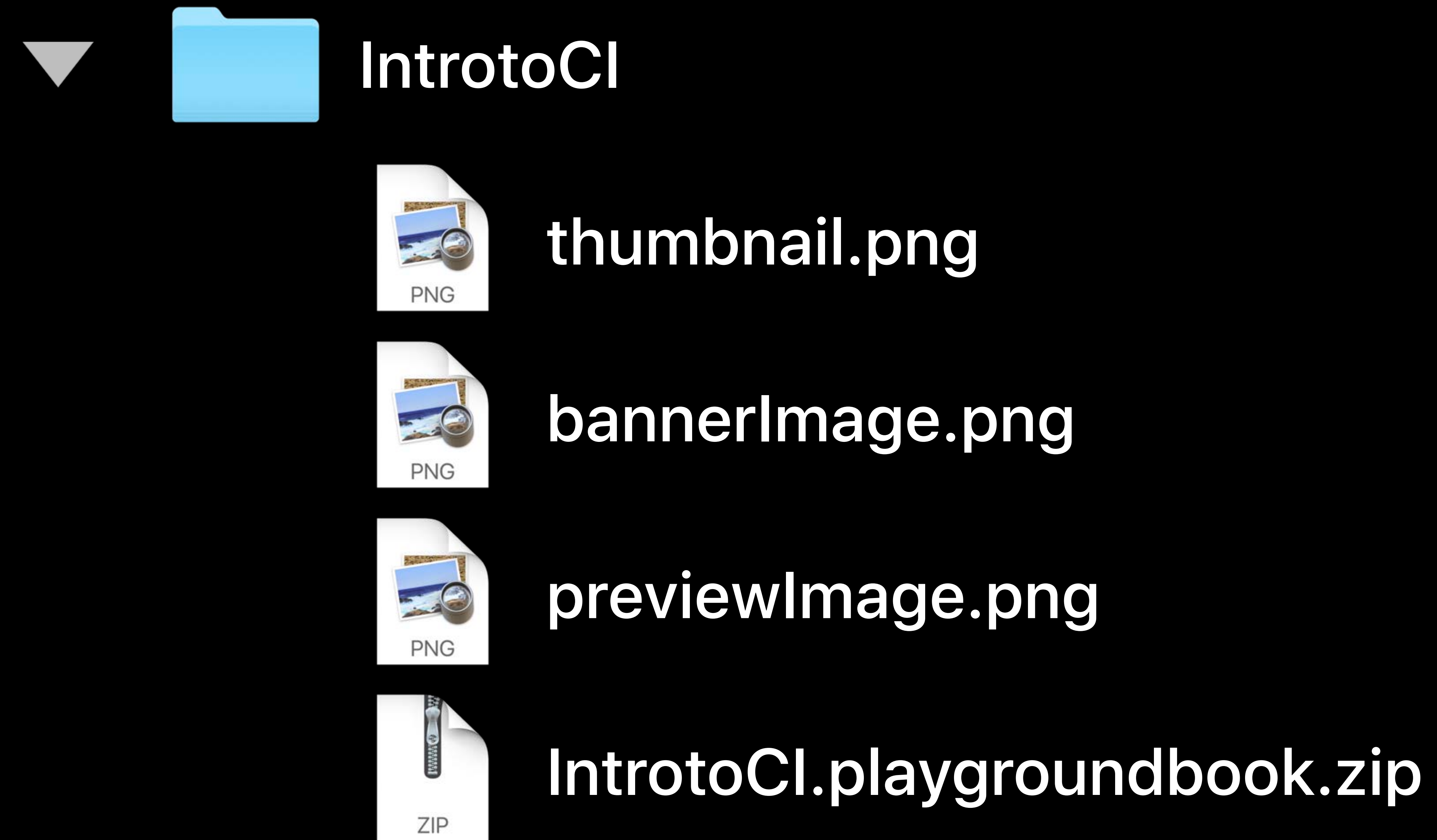
How to Structure Your Repository



How to Structure Your Repository

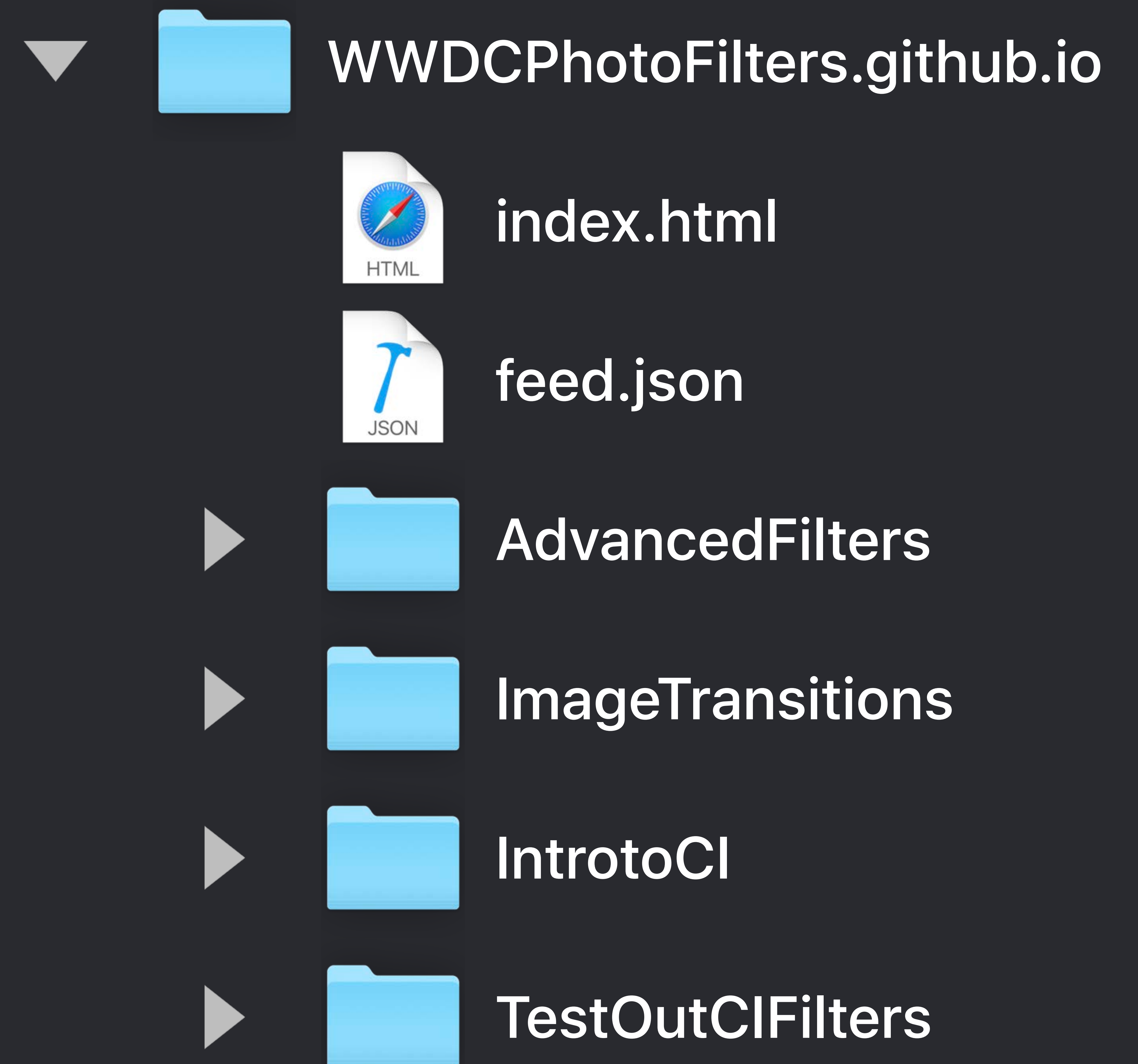


How to Structure Your Repository



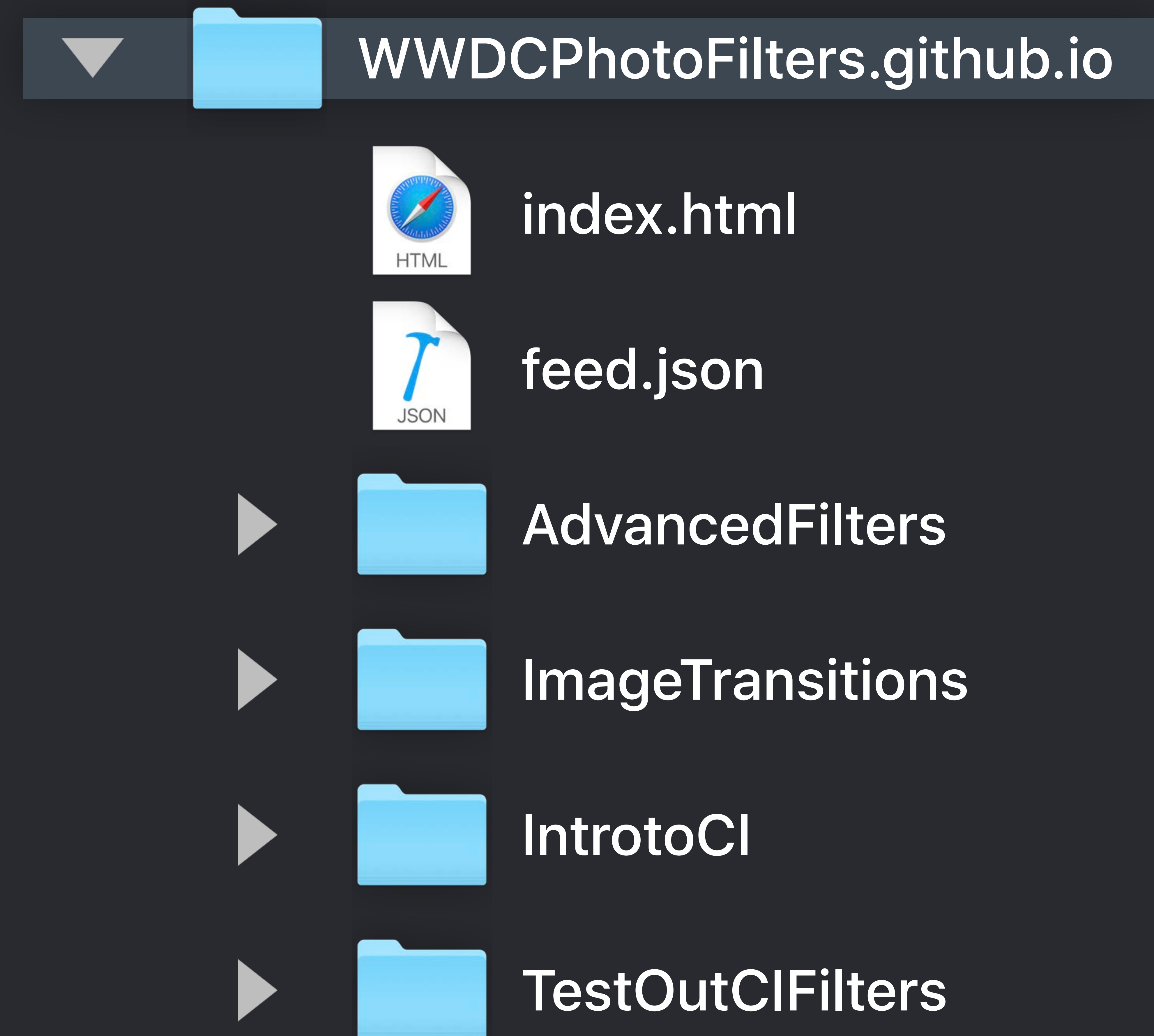
```
// feed.json
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": [...]  
}
```



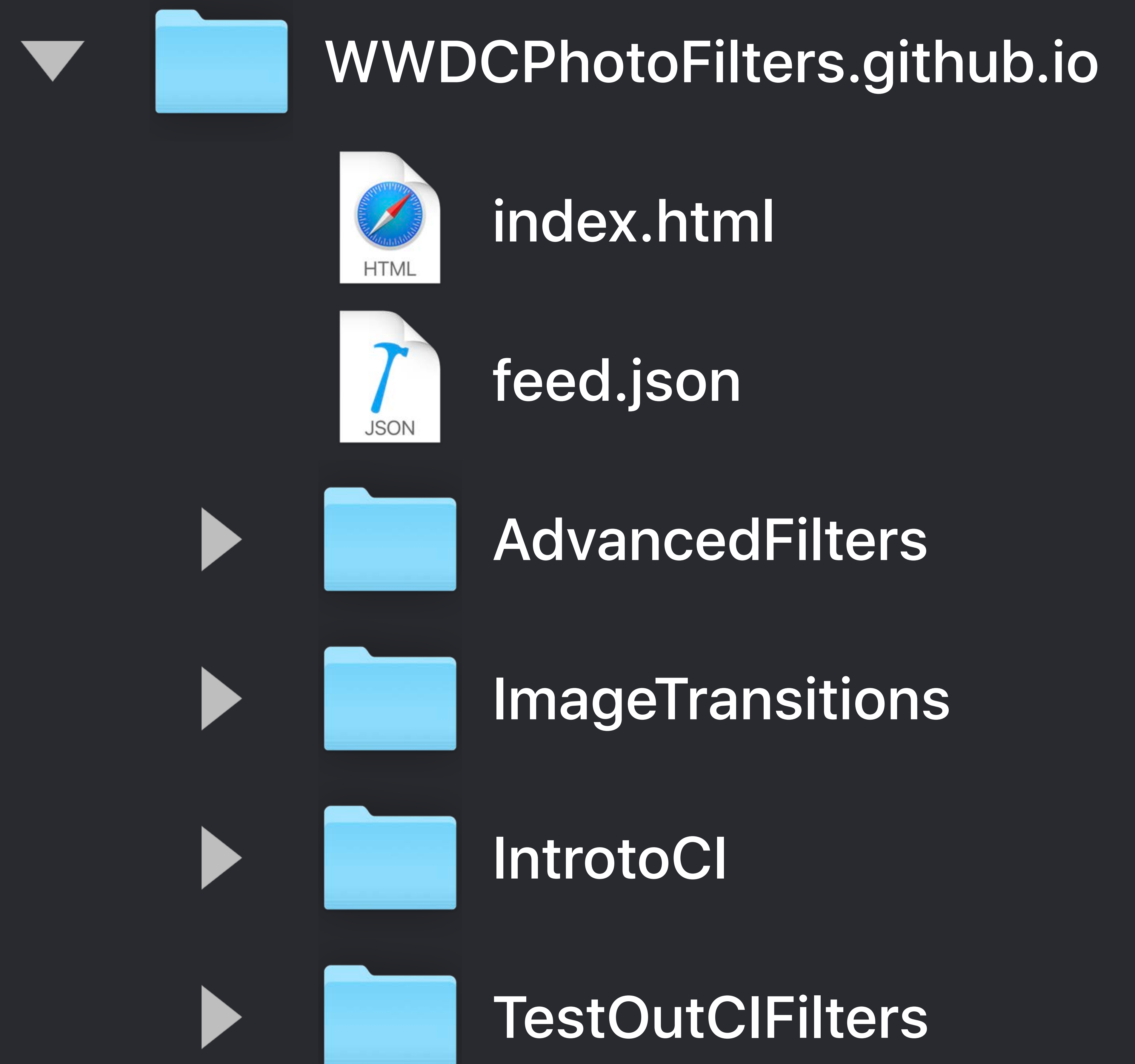
```
// feed.json

{
  "title": "WWDC Photo Filters",
  "publisherName": "Holly and Grace",
  "feedIdentifier": "io.github.WWDCPhotoFilters",
  "contactURL": "mailto:example@example.com",
  "formatVersion": "1.0",
  "documents": [...]
}
```



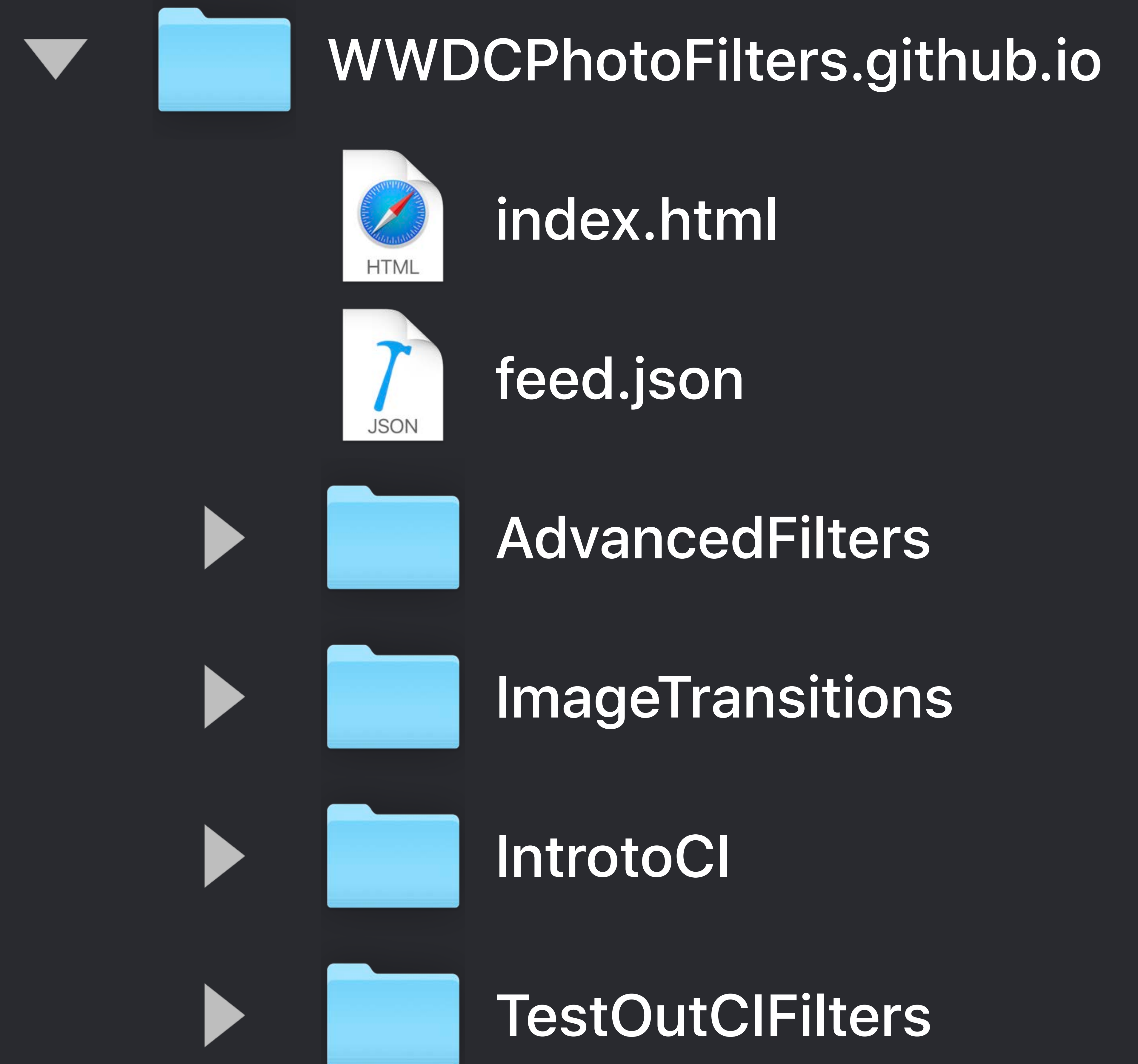
```
// feed.json
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": [...]  
}
```



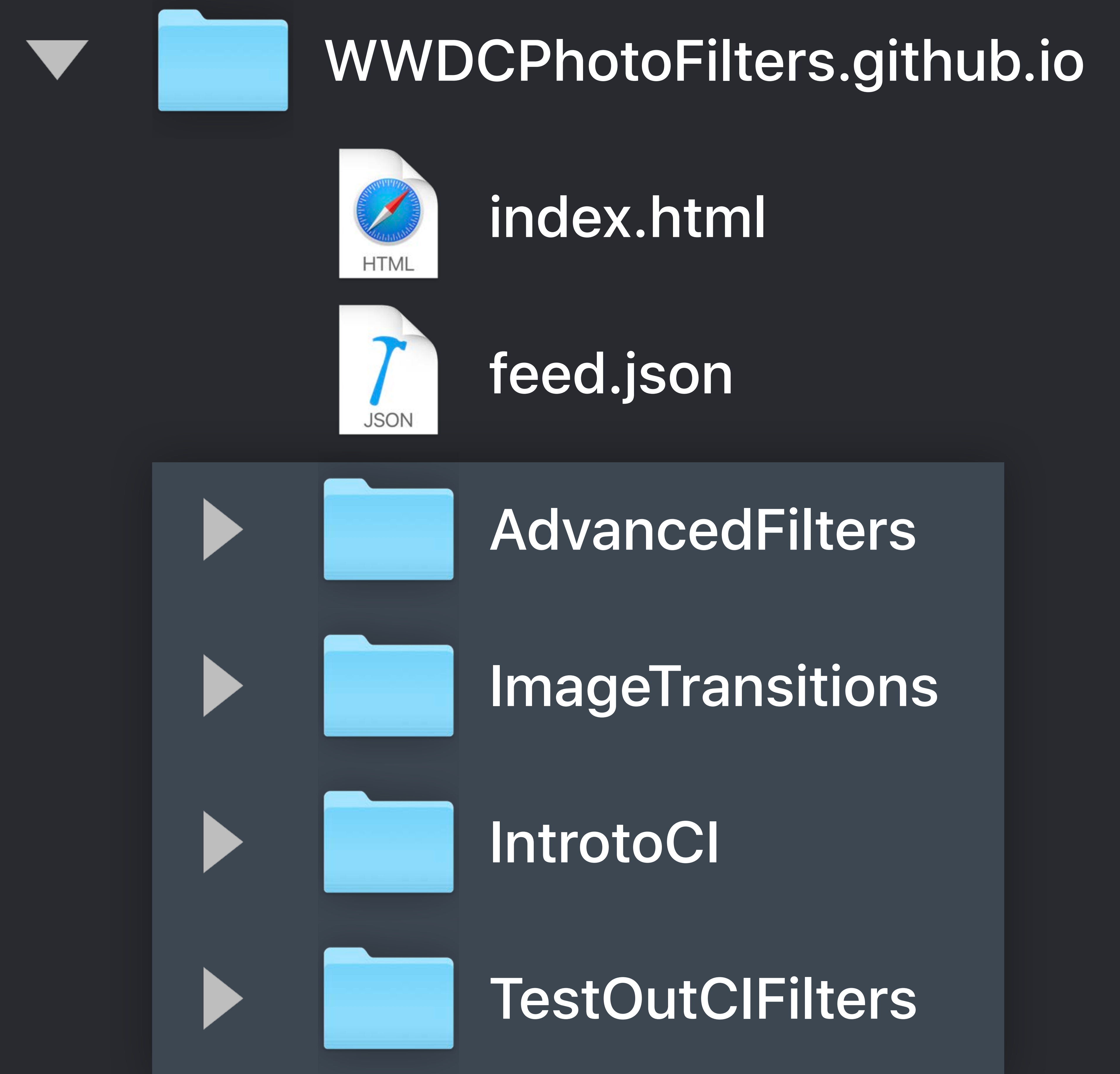
```
// feed.json
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": [  
    {},  
    {},  
    {},  
    {}  
  ]  
}
```



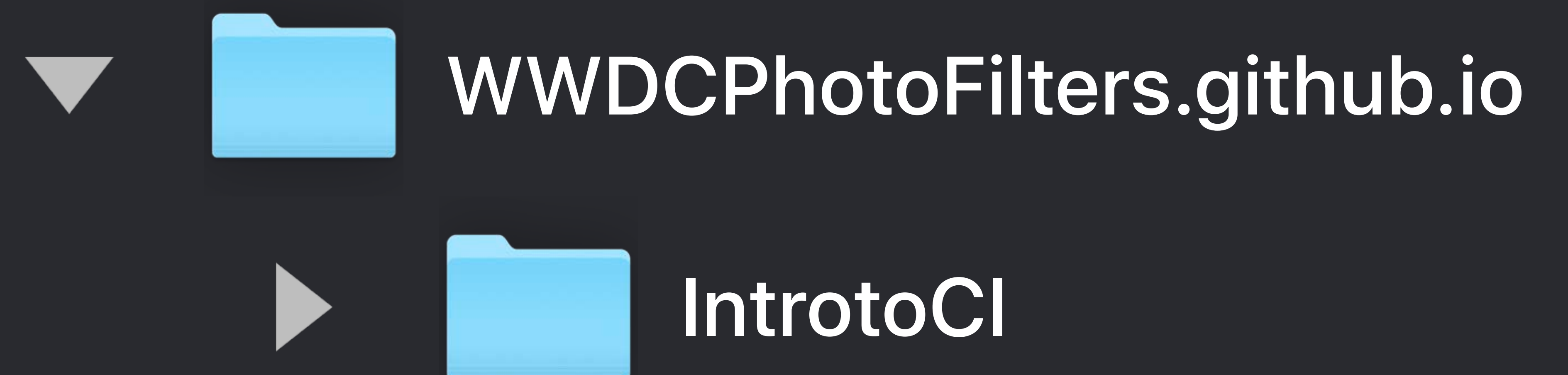
```
// feed.json
```

```
{  
  "title": "WWDC Photo Filters",  
  "publisherName": "Holly and Grace",  
  "feedIdentifier": "io.github.WWDCPhotoFilters",  
  "contactURL": "mailto:example@example.com",  
  "formatVersion": "1.0",  
  "documents": [  
    {},  
    {},  
    {},  
    {}  
  ]  
}
```



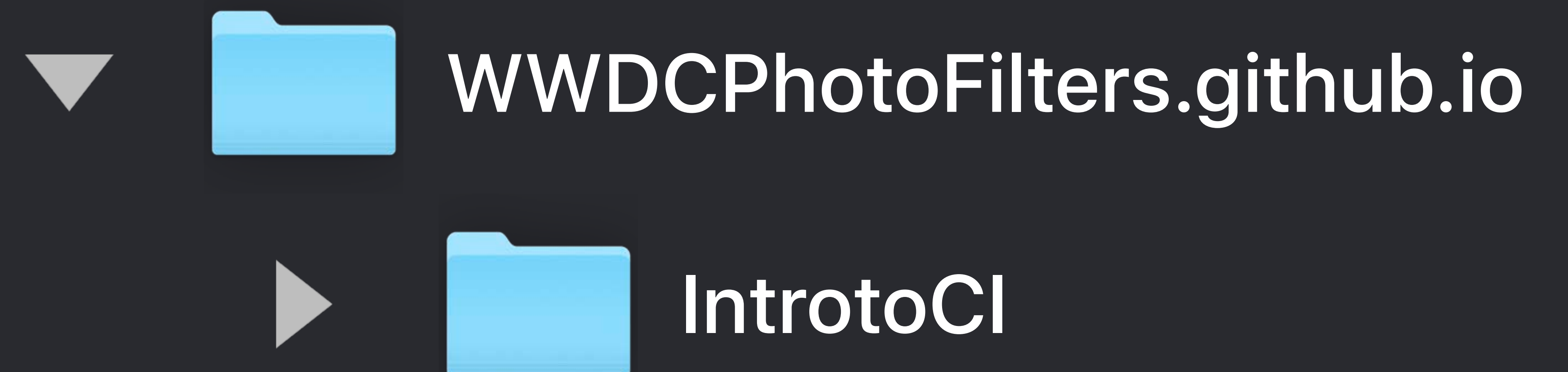
```
// feed.json
```

```
"documents": [  
  {  
    "title": "Intro to Core Image",  
    "overviewSubtitle": "Learn the basics of Core Image.",  
    "detailSubtitle": "Learn about Apple's Core Image framework.",  
    "description": "Part of a series of playgrounds around image filtering.",  
    "contentIdentifier": "io.github.WWDCPhotoFilters.introToCoreImage",  
    "contentVersion": "1.0",  
    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",  
    "additionalInformation": [  
      {  
        "name": "Languages",  
        "value": "English"  
      }  
    ]  
  }  
]
```




```
// feed.json
```

```
"documents": [  
  {  
    "title": "Intro to Core Image",  
    "overviewSubtitle": "Learn the basics of Core Image.",  
    "detailSubtitle": "Learn about Apple's Core Image framework.",  
    "description": "Part of a series of playgrounds around image filtering.",  
    "contentIdentifier": "io.github.WWDCPhotoFilters.introToCoreImage",  
    "contentVersion": "1.0",  
    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",  
    "additionalInformation": [  
      {  
        "name": "Languages",  
        "value": "English"  
      }  
    ]  
  }  
]
```



Blank Swift 4 Edition GET

Answers Swift 4.1 Edition GET

Puzzle World Swift 4.1 Edition

Shapes Swift 4.1 Edition GET

Graphing GET

MeeBot Playgrounds SUBSCRIPTION See All

MeeBot Dances GET Code your own dance moves for MeeB...

Parrot Education SUBSCRIPTION See All

Add Subscription
Enter a Subscription URL

Cancel Subscribe

↶ ↷ 📄

1 2 3 4 5 6 7 8 9 0

q w e r t y u i o p ⌫

@ # \$ % & * () ' " return

a s d f g h j k l

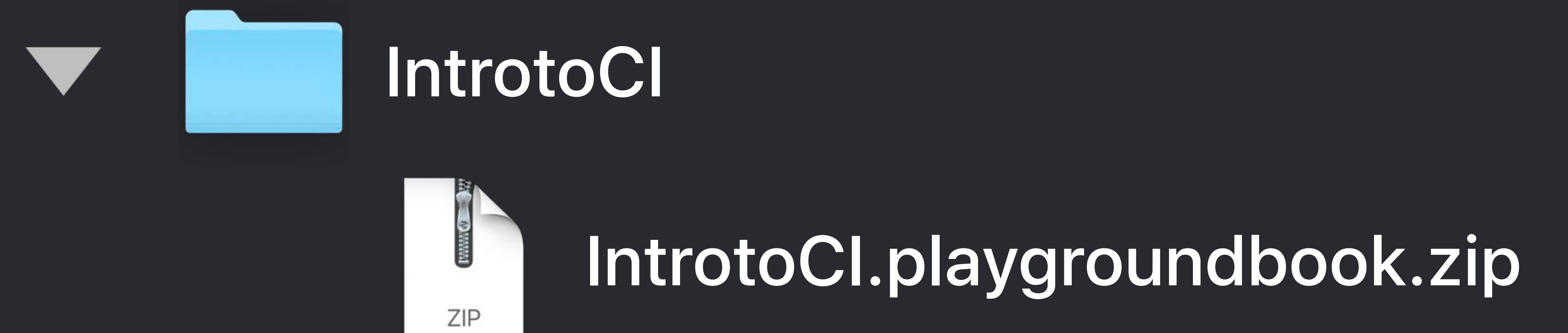
⬆ % - + = / ; : ! ? ⬆

z x c v b n m , .

.?123 😊 🎤 [] .?123 📄

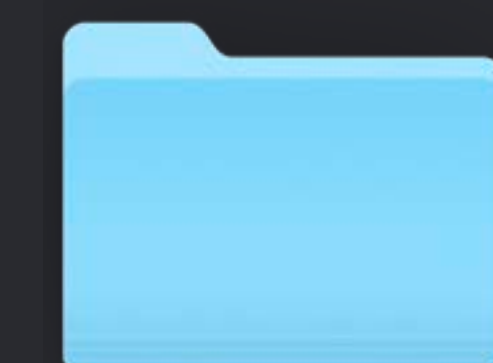
```
// feed.json
```

```
"documents": [  
  {  
    "title": "Intro to Core Image",  
    "overviewSubtitle": "Learn the basics of Core Image.",  
    "detailSubtitle": "Learn about Apple's Core Image framework.",  
    "description": "Part of a series of playgrounds around image filtering.",  
    "contentIdentifier": "io.github.WWDCPhotoFilters.introToCoreImage",  
    "contentVersion": "1.0",  
    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",  
    "additionalInformation": [  
      {  
        "name": "Languages",  
        "value": "English"  
      }  
    ]  
  }  
]
```

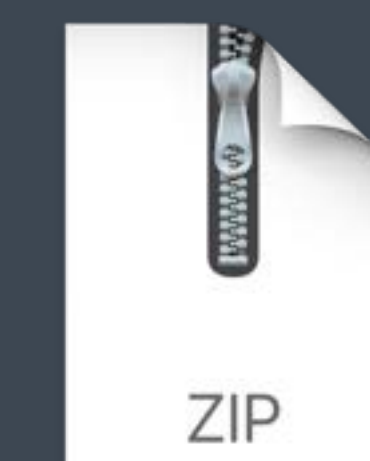


```
// feed.json
```

```
"documents": [  
  {  
    "title": "Intro to Core Image",  
    "overviewSubtitle": "Learn the basics of Core Image.",  
    "detailSubtitle": "Learn about Apple's Core Image framework.",  
    "description": "Part of a series of playgrounds around image filtering.",  
    "contentIdentifier": "io.github.WWDCPhotoFilters.introToCoreImage",  
    "contentVersion": "1.0",  
    "url": "https://WWDCPhotoFilters.github.io/IntrotoCI/IntrotoCI.playgroundbook.zip",  
    "additionalInformation": [  
      {  
        "name": "Languages",  
        "value": "English"  
      }  
    ]  
  }  
]
```



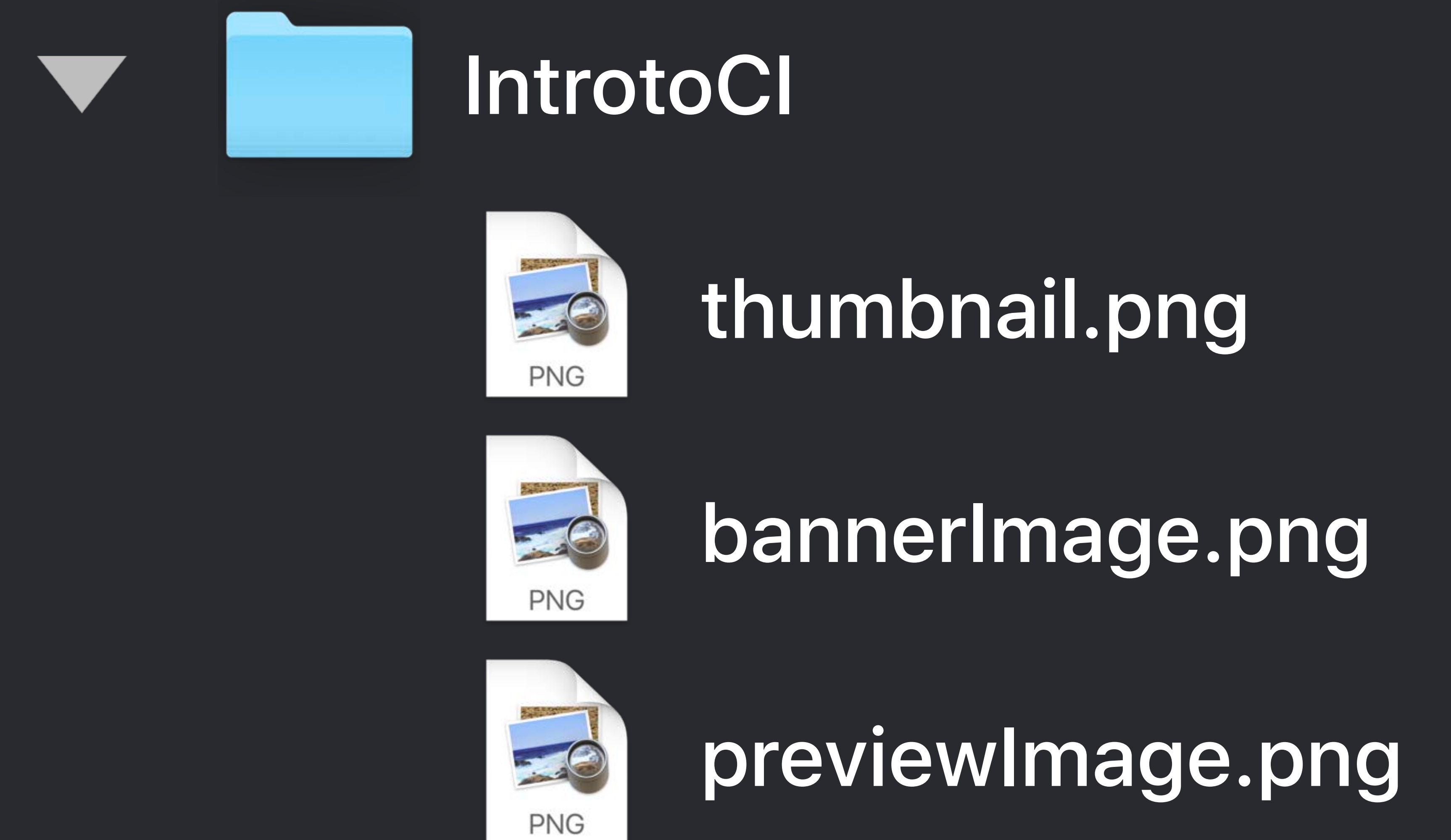
IntrotoCI



IntrotoCI.playgroundbook.zip

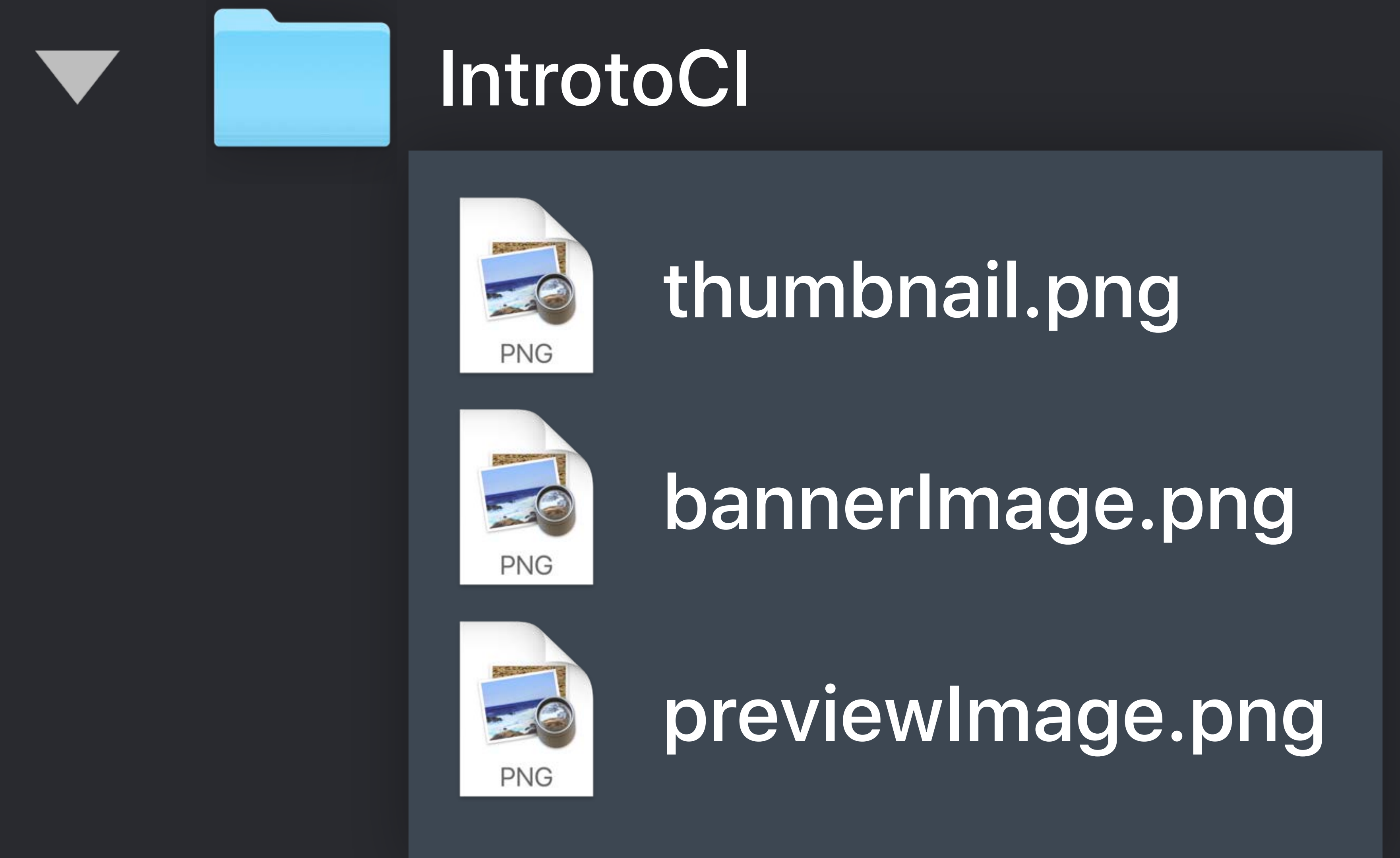
```
// feed.json
```

```
"documents": [  
  {  
    ...  
    "publishedDate": "2018-05-09T09:00:00+07:00",  
    "lastUpdatedDate": "2018-05-10T12:30:00+07:00",  
    "thumbnailURL": "IntrotoCI/thumbnail.png",  
    "bannerImageURL": "IntrotoCI/bannerImage.png",  
    "previewImageURLs": [  
      "IntrotoCI/previewImage.png"  
    ]  
  }  
]
```



```
// feed.json
```

```
"documents": [  
  {  
    ...  
    "publishedDate": "2018-05-09T09:00:00+07:00",  
    "lastUpdatedDate": "2018-05-10T12:30:00+07:00",  
    "thumbnailURL": "IntrotoCI/thumbnail.png",  
    "bannerImageURL": "IntrotoCI/bannerImage.png",  
    "previewImageURLs": [  
      "IntrotoCI/previewImage.png"  
    ]  
  }  
]
```



iPad

9:41 AM

100%



wwdcphotofilters.github.io



Hello WWDC!

Subscribe

Creating a Subscribe Link

```
<a href="https://developer.apple.com/u1/sp0?url=https://WWDCPhotoFilters.github.io/feed.json">  
Subscribe  
</a>
```


Creating a Subscribe Link

```
<a href="https://developer.apple.com/u1/sp0?url=https://WWDCPhotoFilters.github.io/feed.json">  
Subscribe  
</a>
```

Creating a Subscribe Link

```
<a href="https://developer.apple.com/u1/sp0?url=https://WWDCPhotoFilters.github.io/feed.json">  
Subscribe  
</a>
```

Demo

More Information

<https://developer.apple.com/wwdc18/413>

 **WWDC18**