Frameworks

#WWDC14

Cloud Documents in Your Application

Building a modern document-based application

Session 234
Mike Hess
Software Engineer

Johannes Fortmann
Software Engineer

Changes to iCloud

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iCloud daemon rewritten on top of CloudKit

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Windows support

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- iCloud folder in Finder
- Access to iCloud folder on iOS

Agenda

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Document access

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Document discovery

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Displaying thumbnails in your UI

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Accessing documents outside your iCloud container

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Providing document storage to other apps

Documents in iCloud

What is a document anyway?

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Dealing with Documents

Document Access—Best Practices

Reading and writing documents

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Important—use file coordination!

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- Examples—iCloud, background saving, etc.

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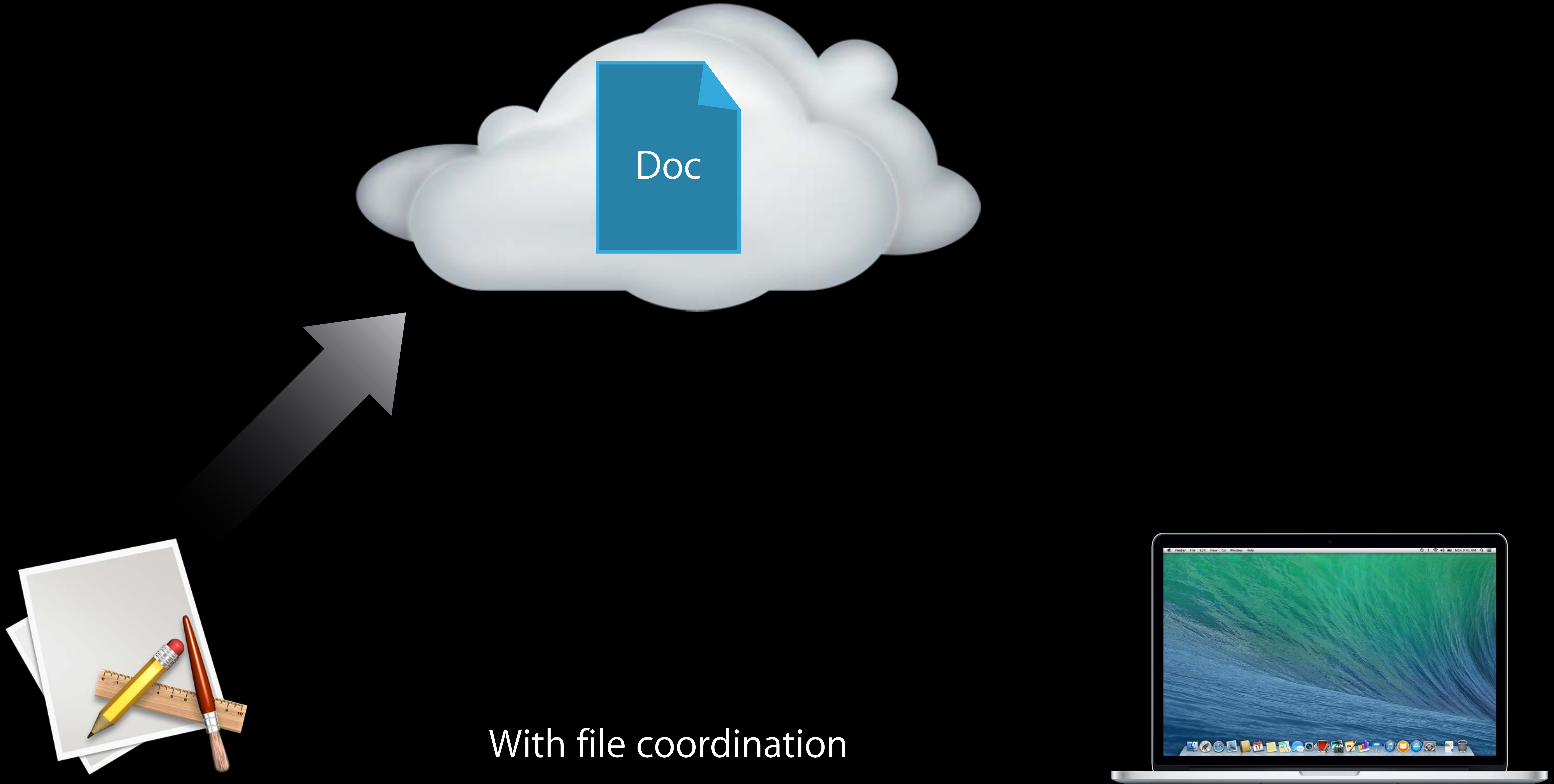

With file coordination

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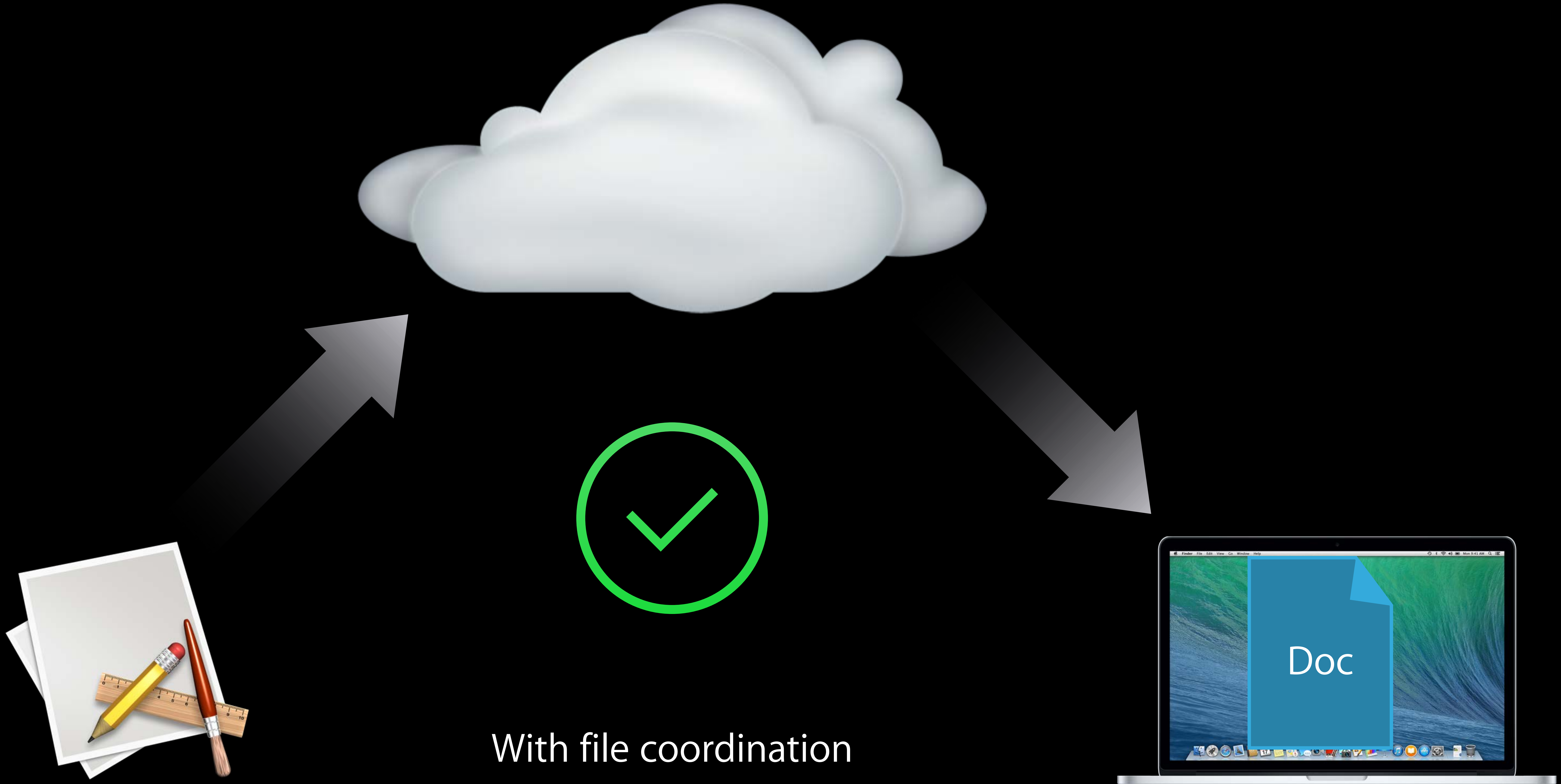

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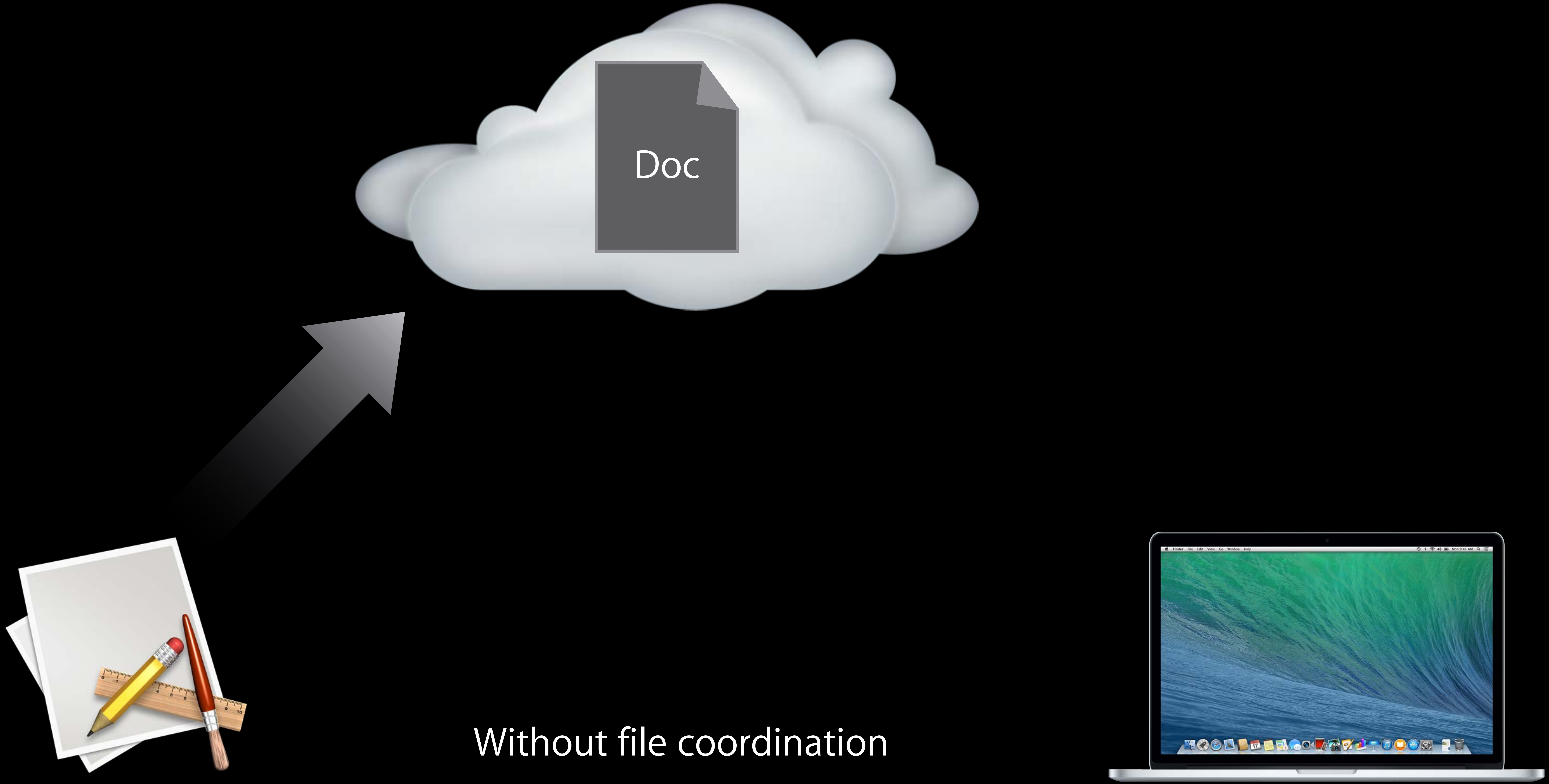

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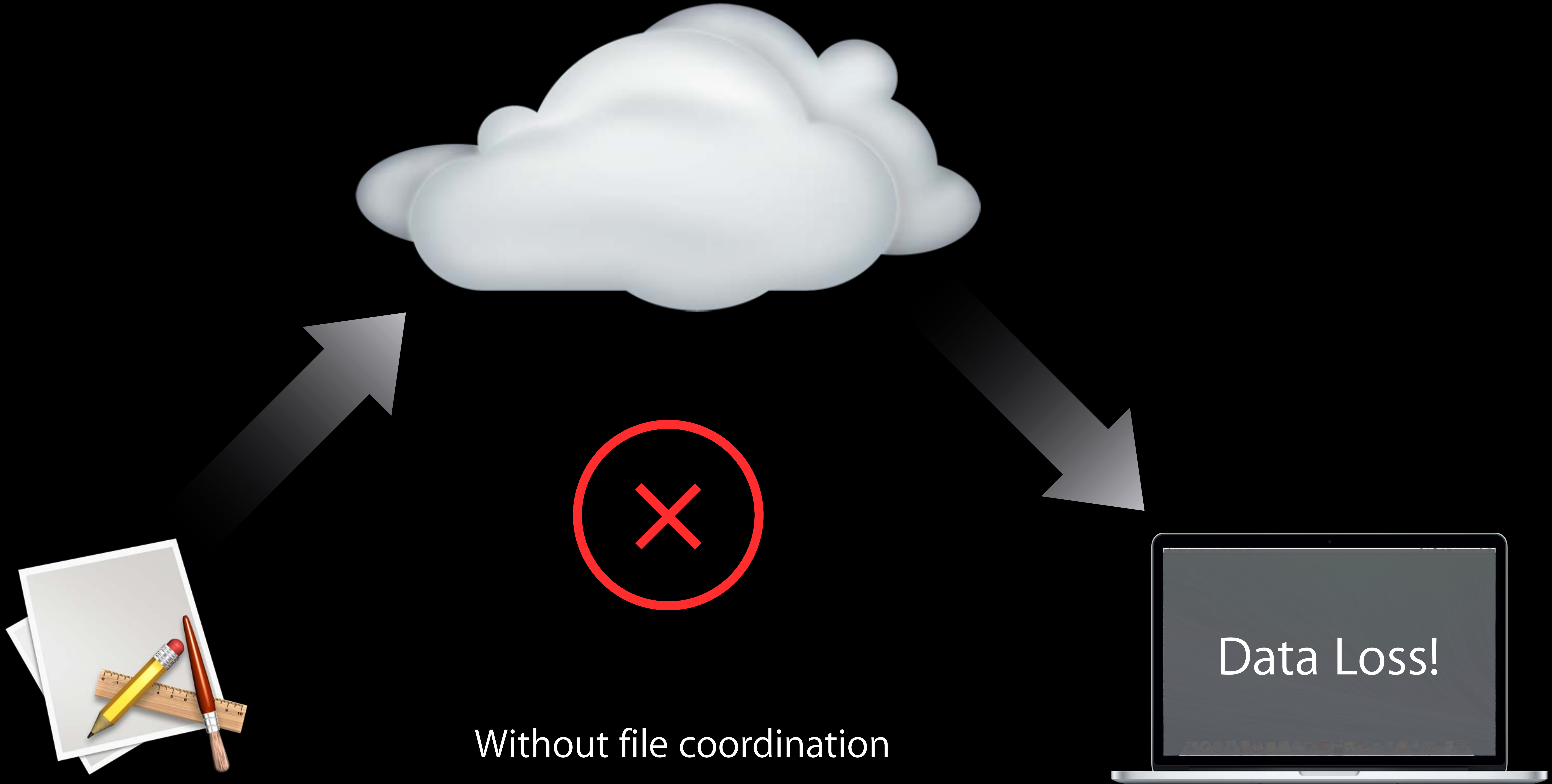

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UIDocument/NSDocument do all heavy lifting for you

- File coordination
- Background queues
- Multiple high-level APIs for every purpose

Document Access—Best Practices

Example—reading a document from disk

Highest level—we read the file, you get an NSData or NSFileWrapper object

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- loadFromContents:ofType:error:
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`– loadFromContents:ofType:error:`

Intermediate level—we coordinate, you get an NSURL

`– readFromURL:error:`

Lowest level—provided for hooking

`– openWithCompletionHandler:`

Asynchronous File Coordination

New File Coordination APIs

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Existing File Coordination APIs were synchronous

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Discovering and Listing Documents

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Discovering new and existing documents

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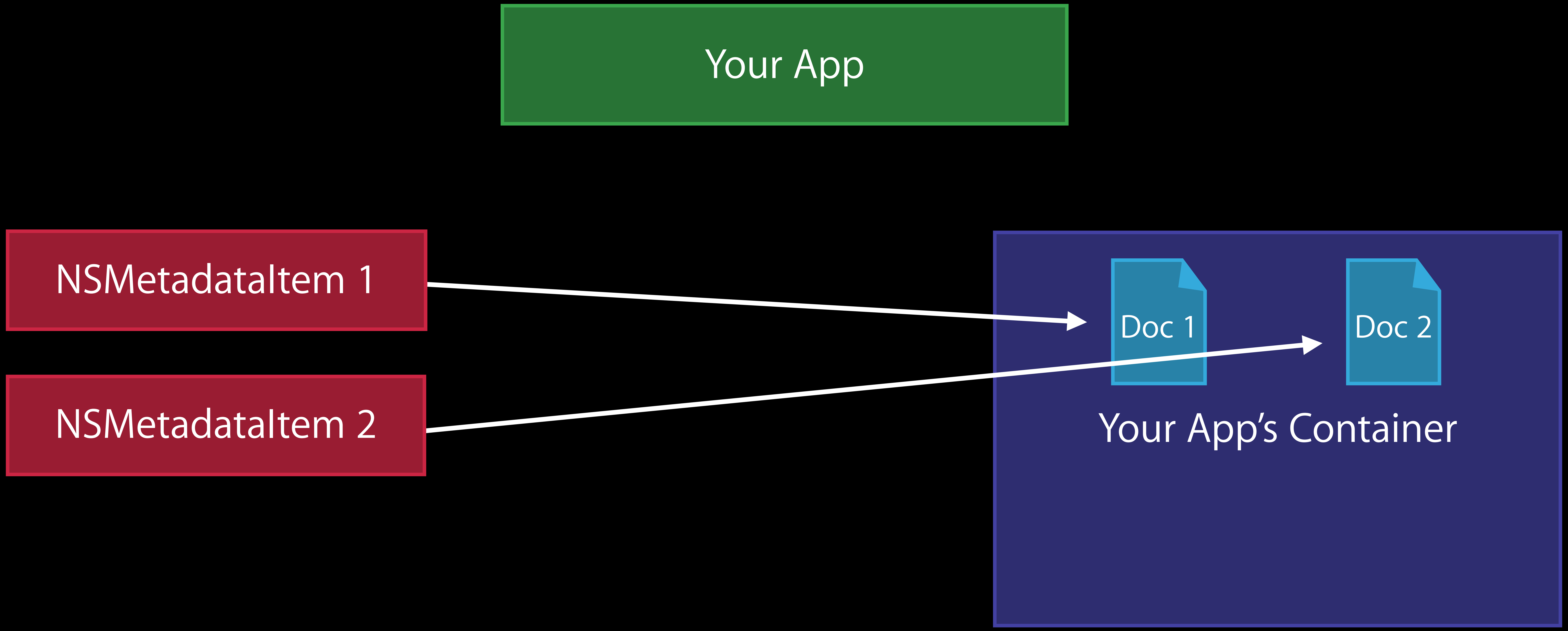

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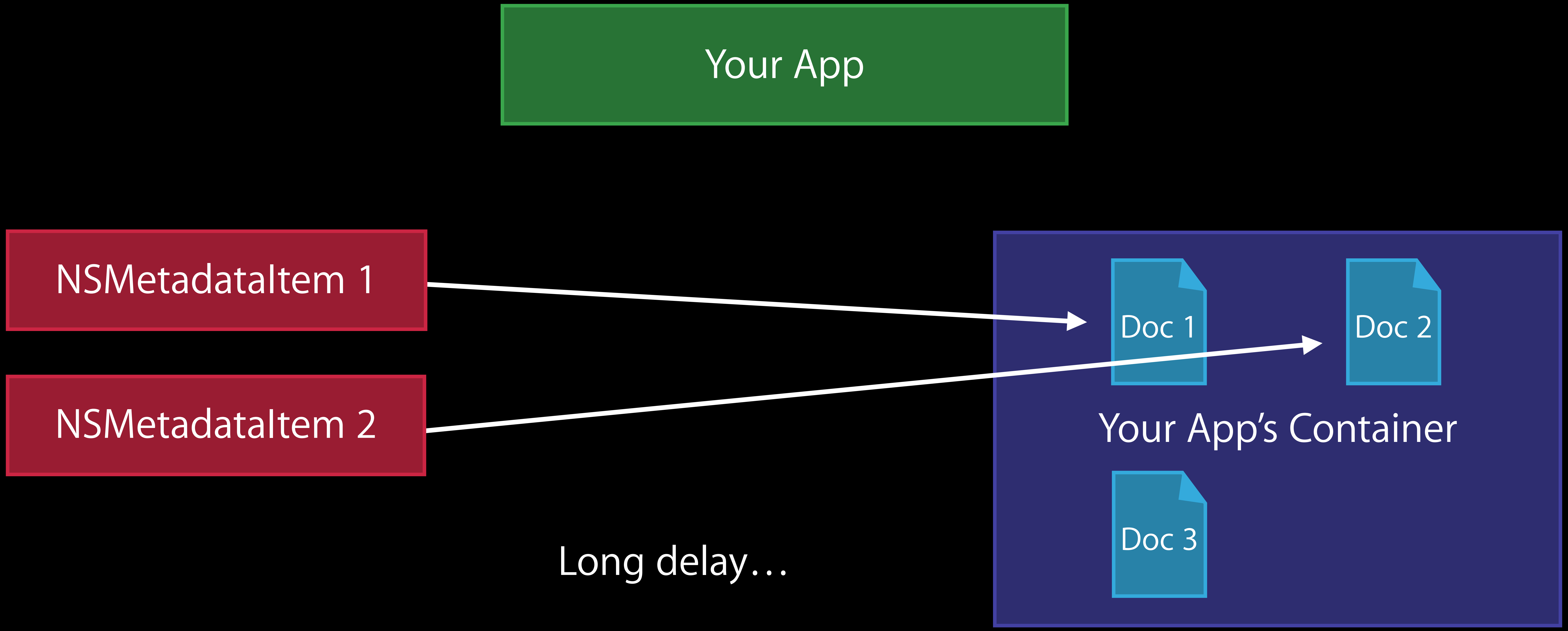

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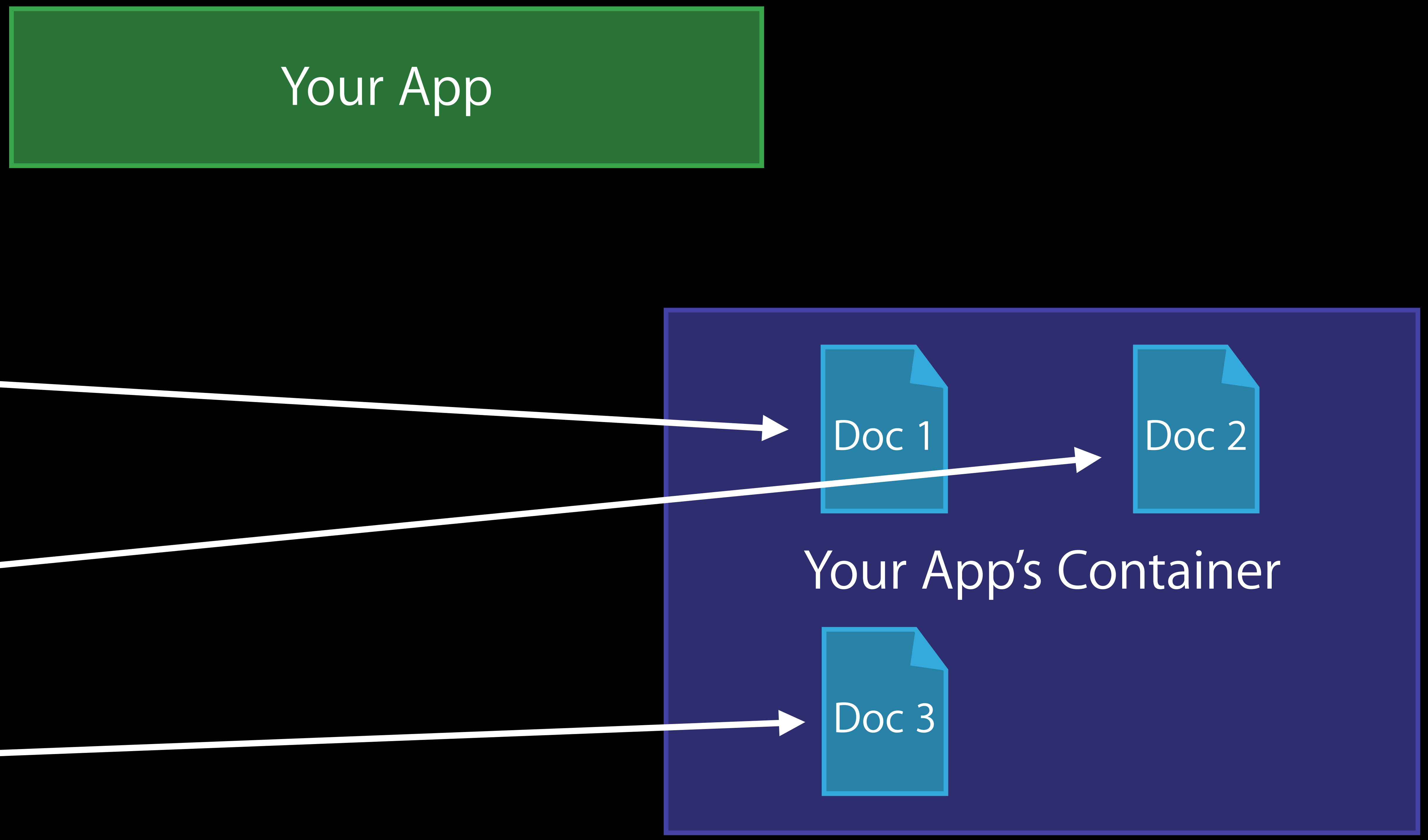

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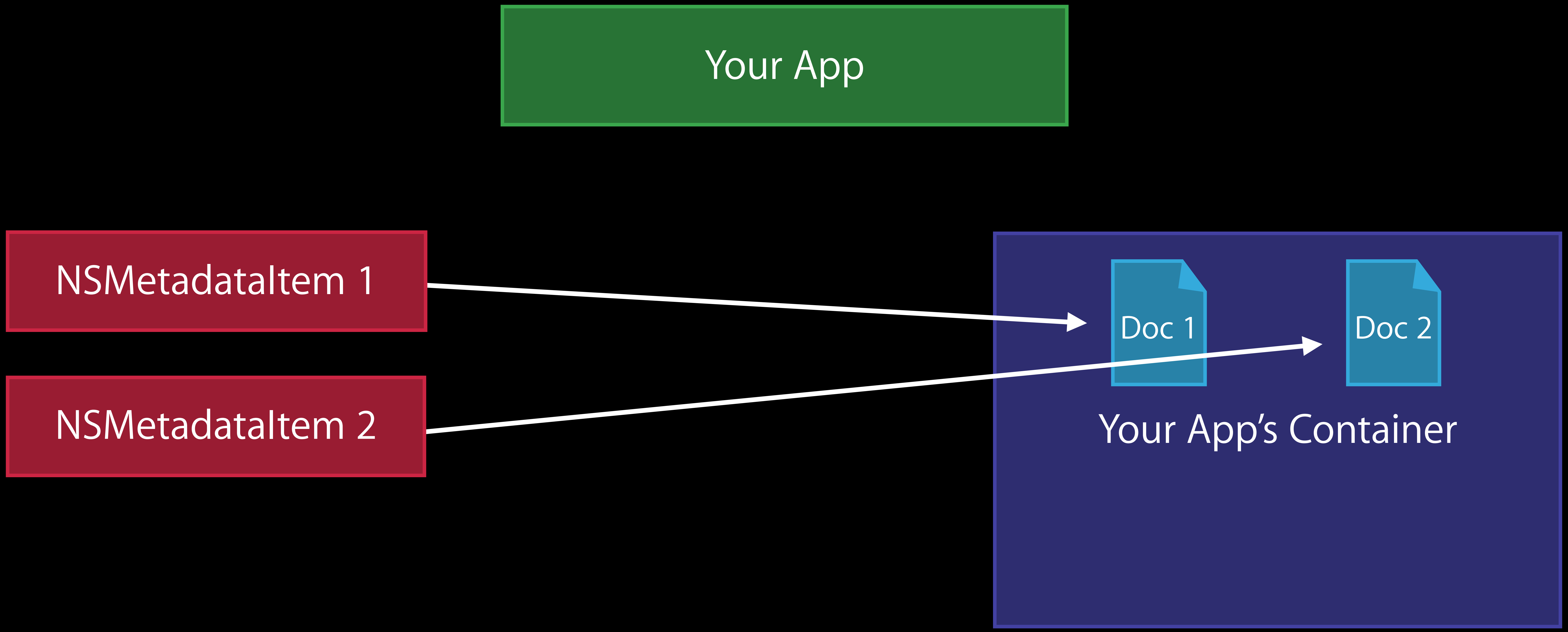

Document Discovery

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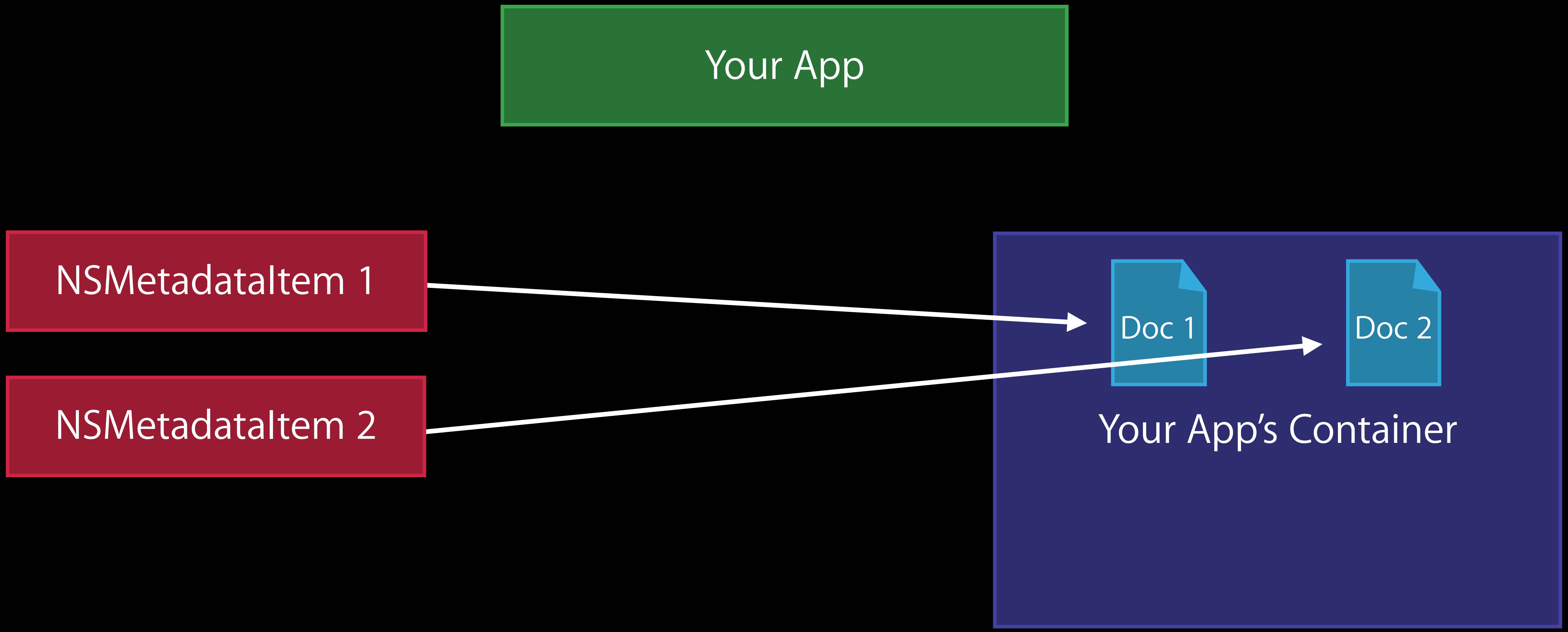
NSMetadataQuery APIs easier to use directly with “stitching”



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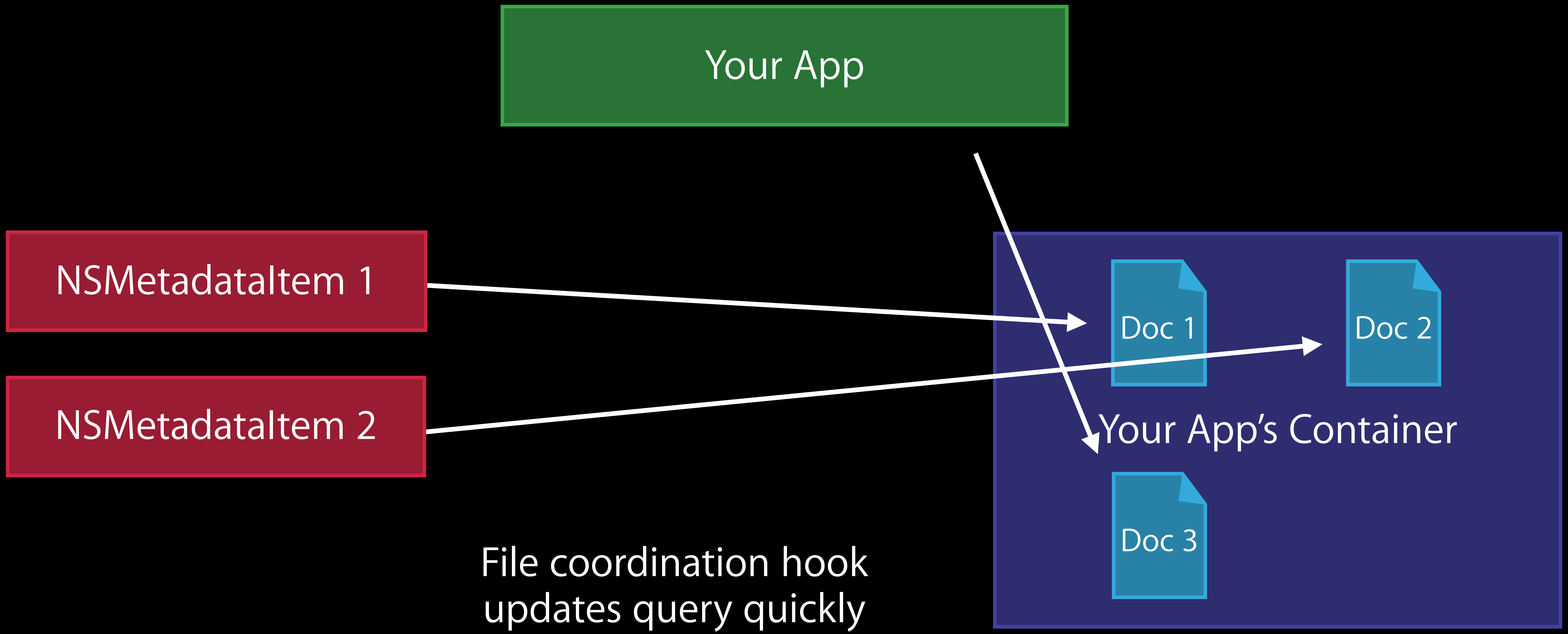

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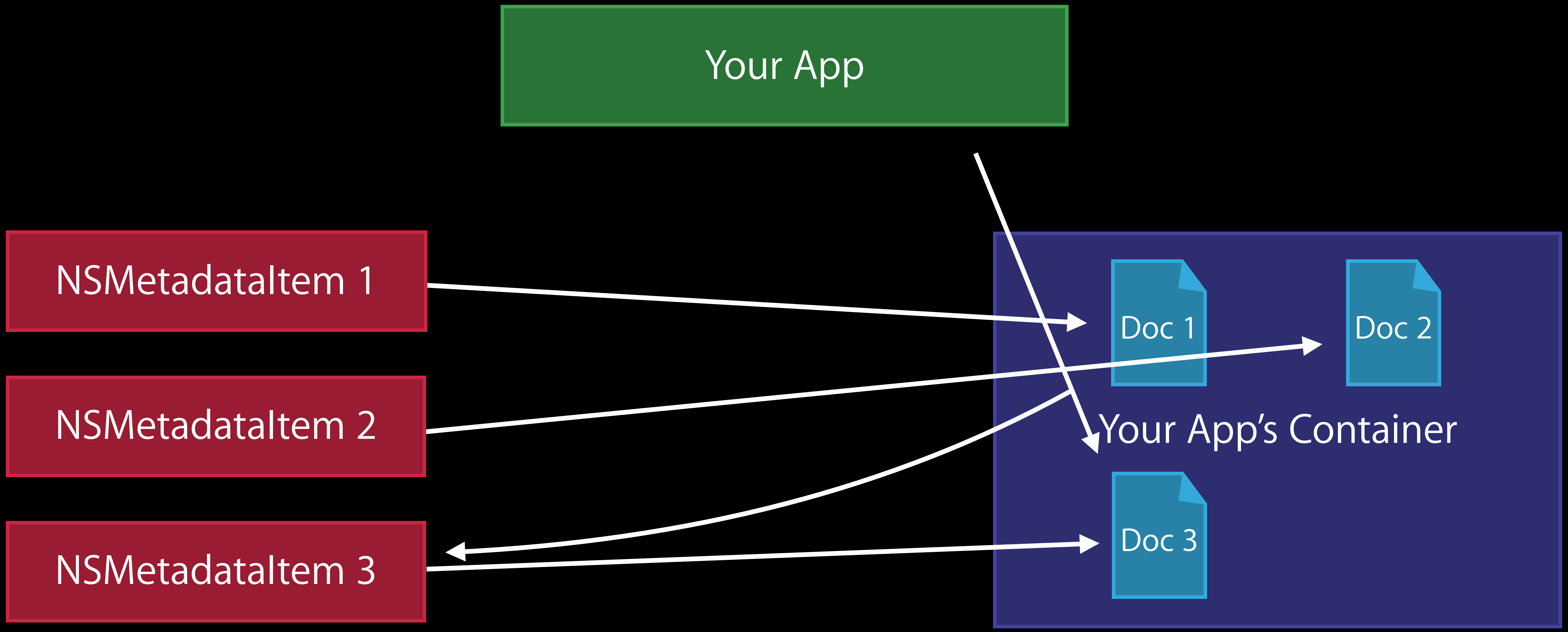

Document Discovery

Discovering new and existing documents

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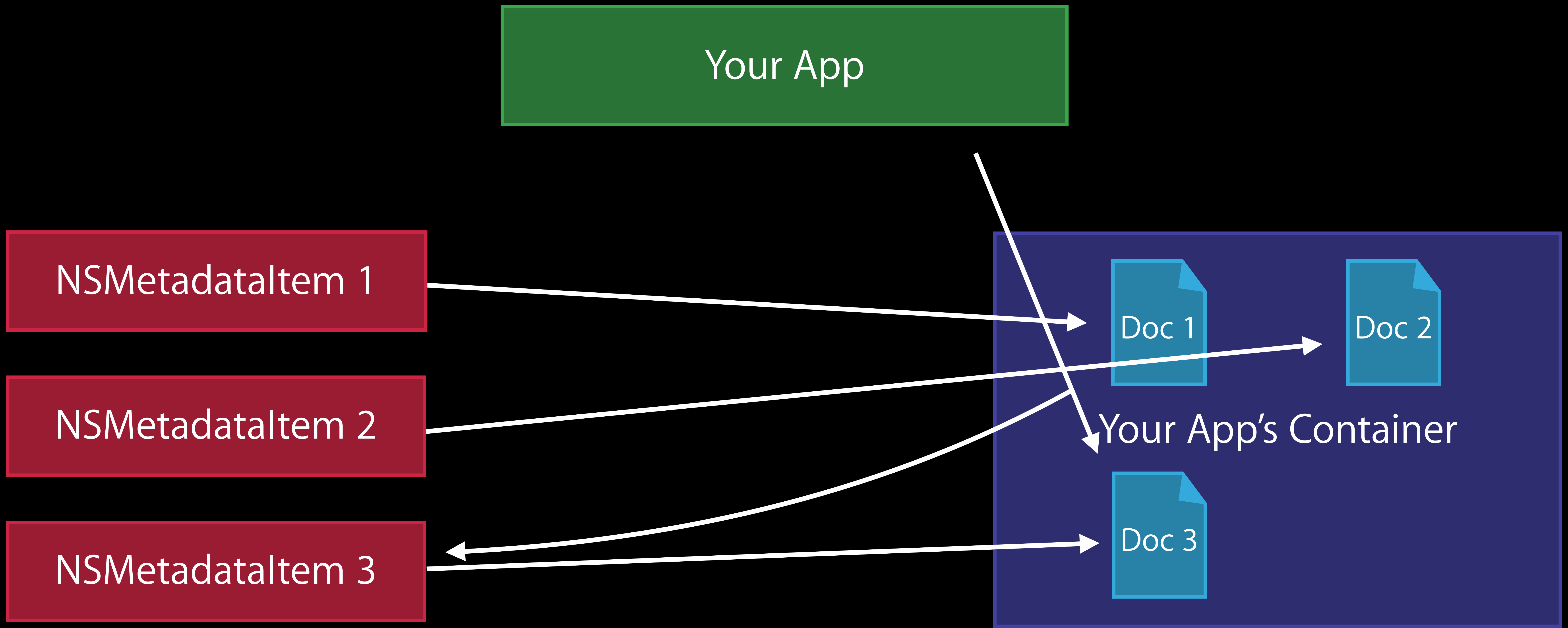
NSMetadataQuery APIs easier to use directly with “stitching”

No file coordination required when listing documents



Document Discovery

Accessing metadata on documents

NSMetadataQuery can list non-local documents

New APIs to access metadata on those documents

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– getPromisedItemResourceValue:forKey:error:
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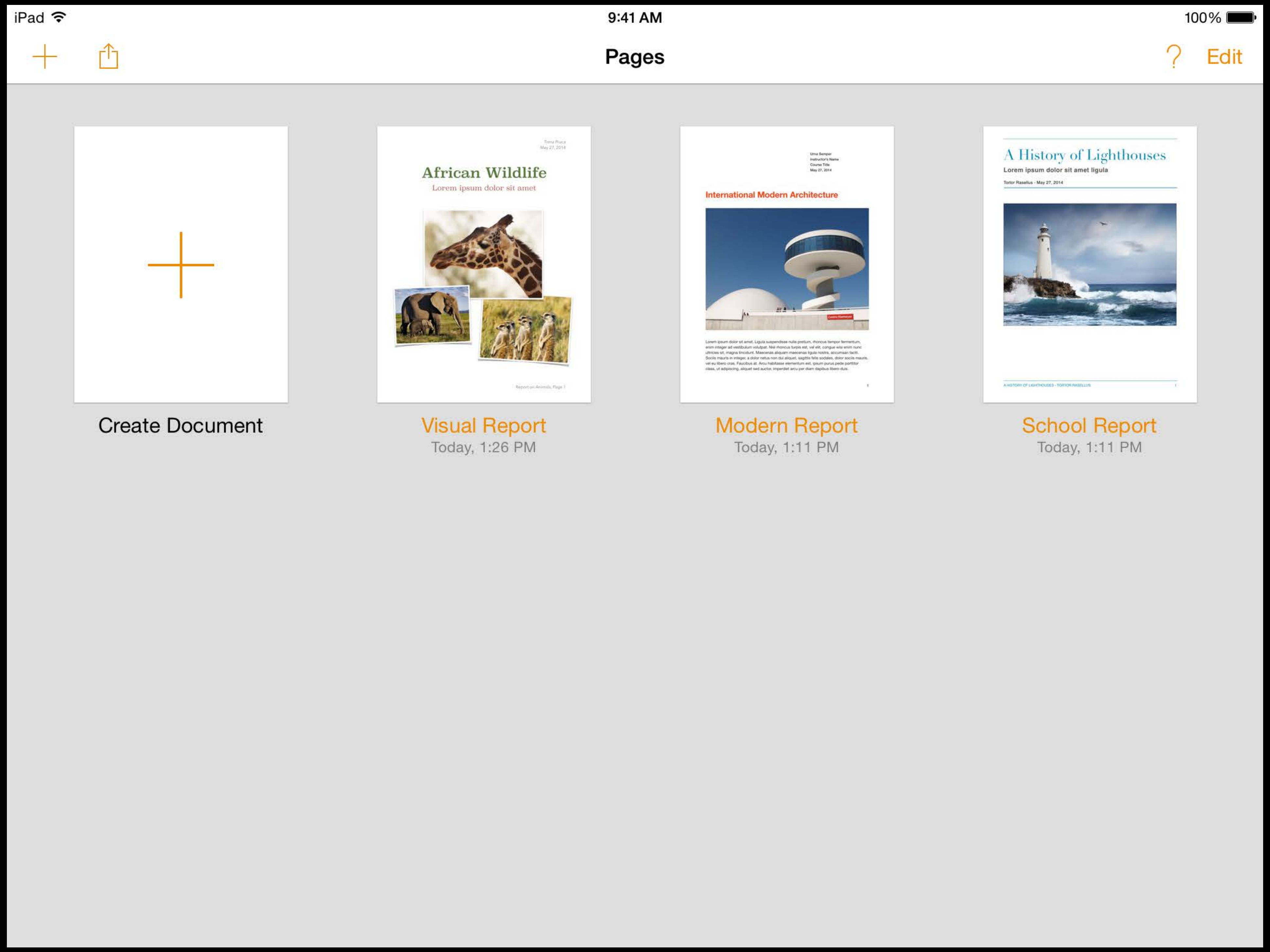
New file coordinator flags for dealing with metadata

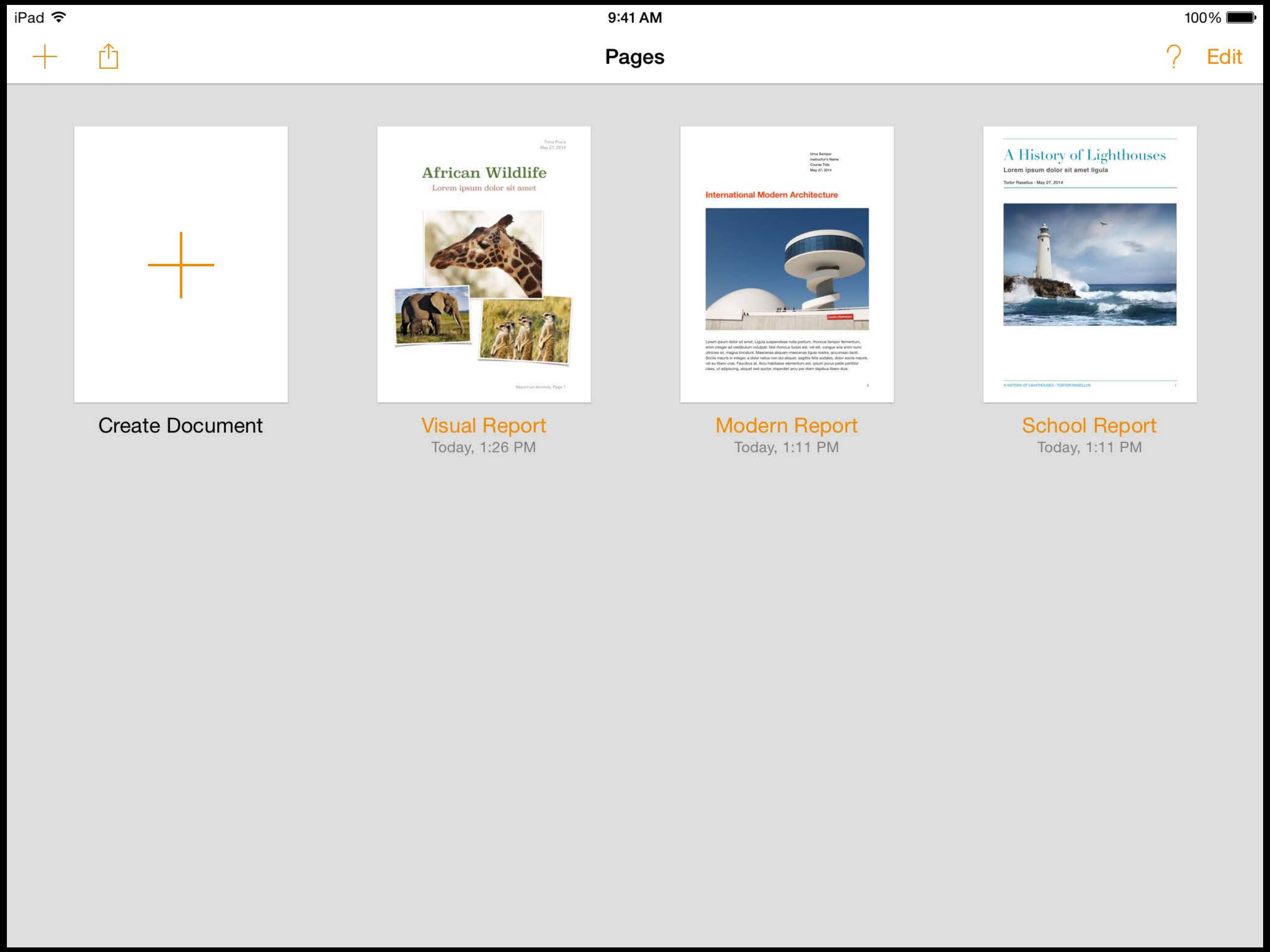
```
    NSFileCoordinatorReadingImmediatelyAvailableMetadataOnly
    NSFileCoordinatorWritingContentIndependentMetadataOnly
```

Document Thumbnails



Document Thumbnails

Best user experience when listing documents is to show previews



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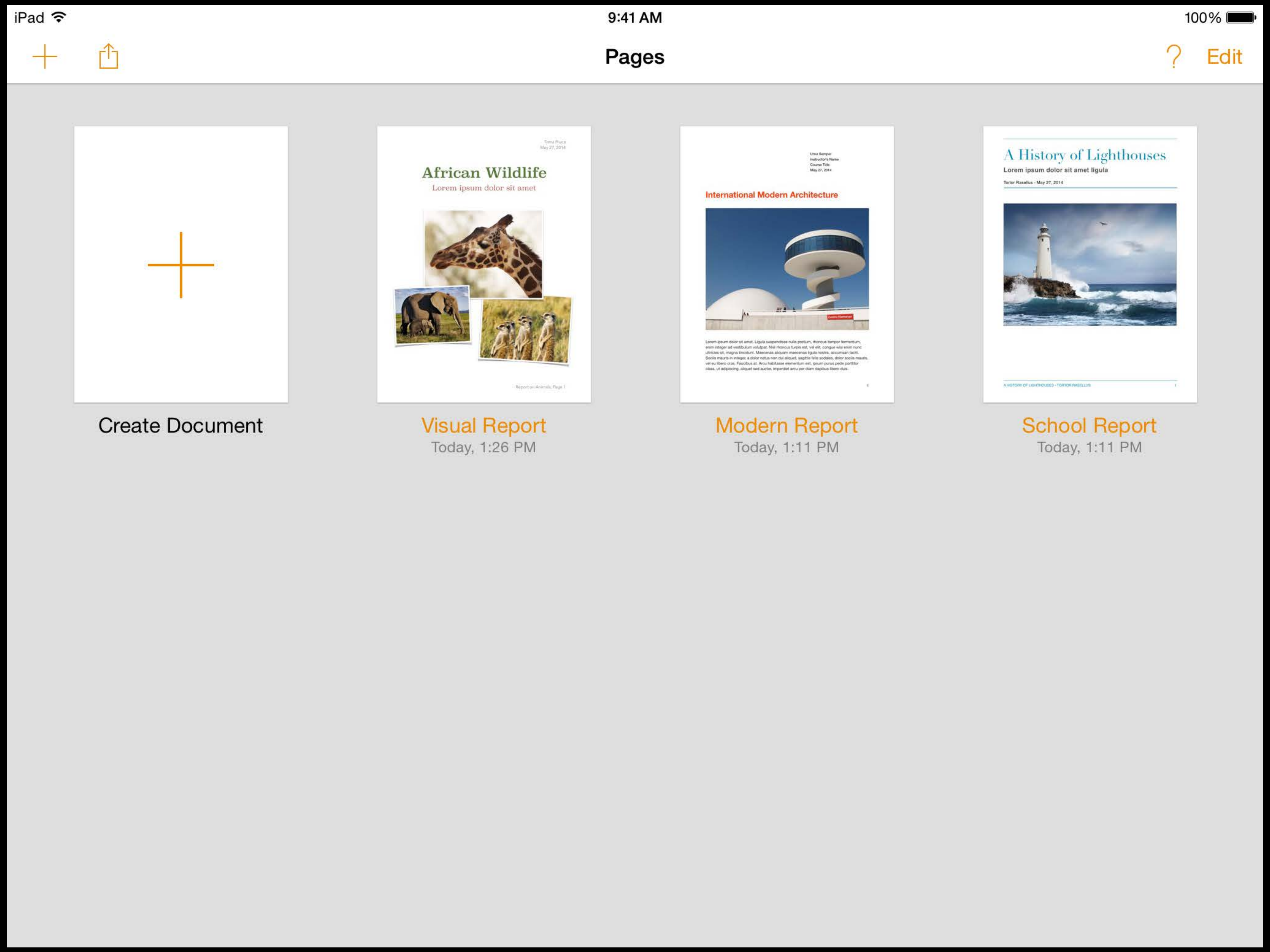
Possible previously but required custom implementation



Document Thumbnails

Displaying thumbnails in your UI

NEW

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New thumbnail keys available!

- NSURLThumbnailDictionaryKey – NSDictionary
  - NSThumbnail1024x1024SizeKey – UIImage / NSImage
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Easiest way to get thumbnails to display in UI

```
– getPromisedItemResourceValue:forKey:error:
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Document Thumbnails

Saving thumbnails

Easiest way to save thumbnails is through UIDocument

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Or you can set thumbnails manually

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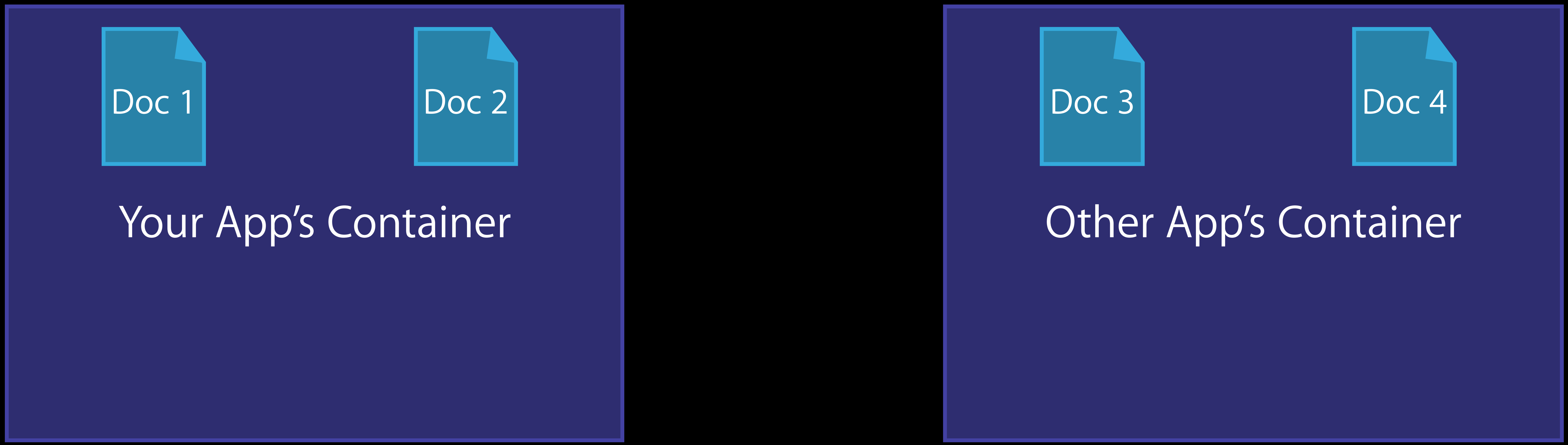
OS X generates thumbnails automatically using your Quick Look plug-in

Discover Documents Outside Your Container

Document Discovery Not Always Easy

Difficult to access documents from another app



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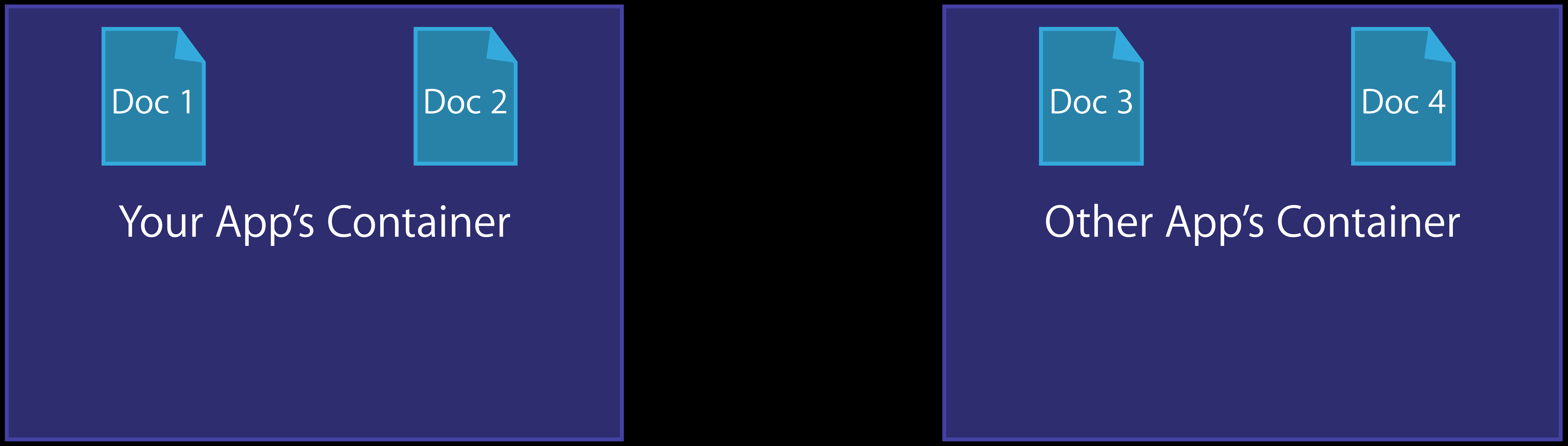

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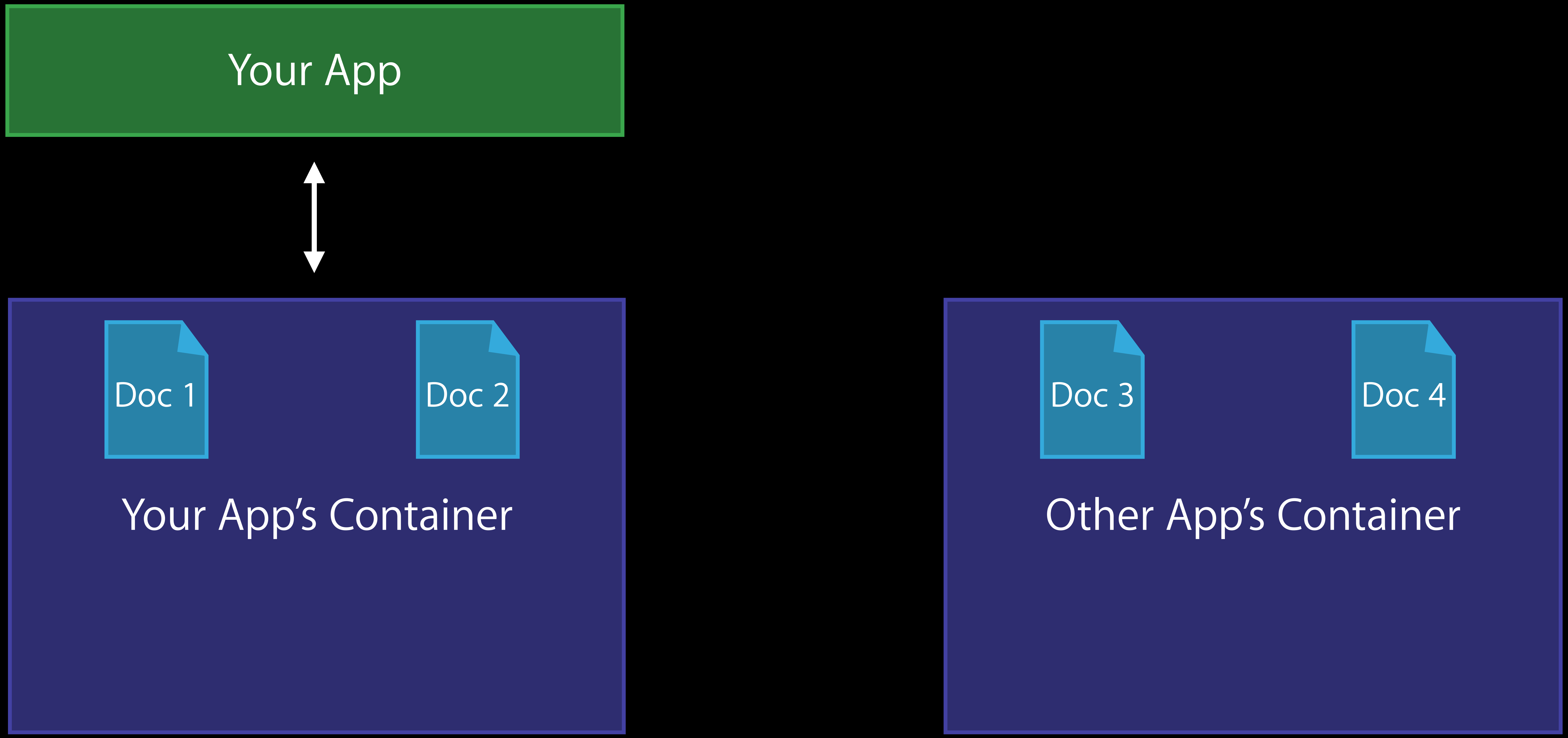

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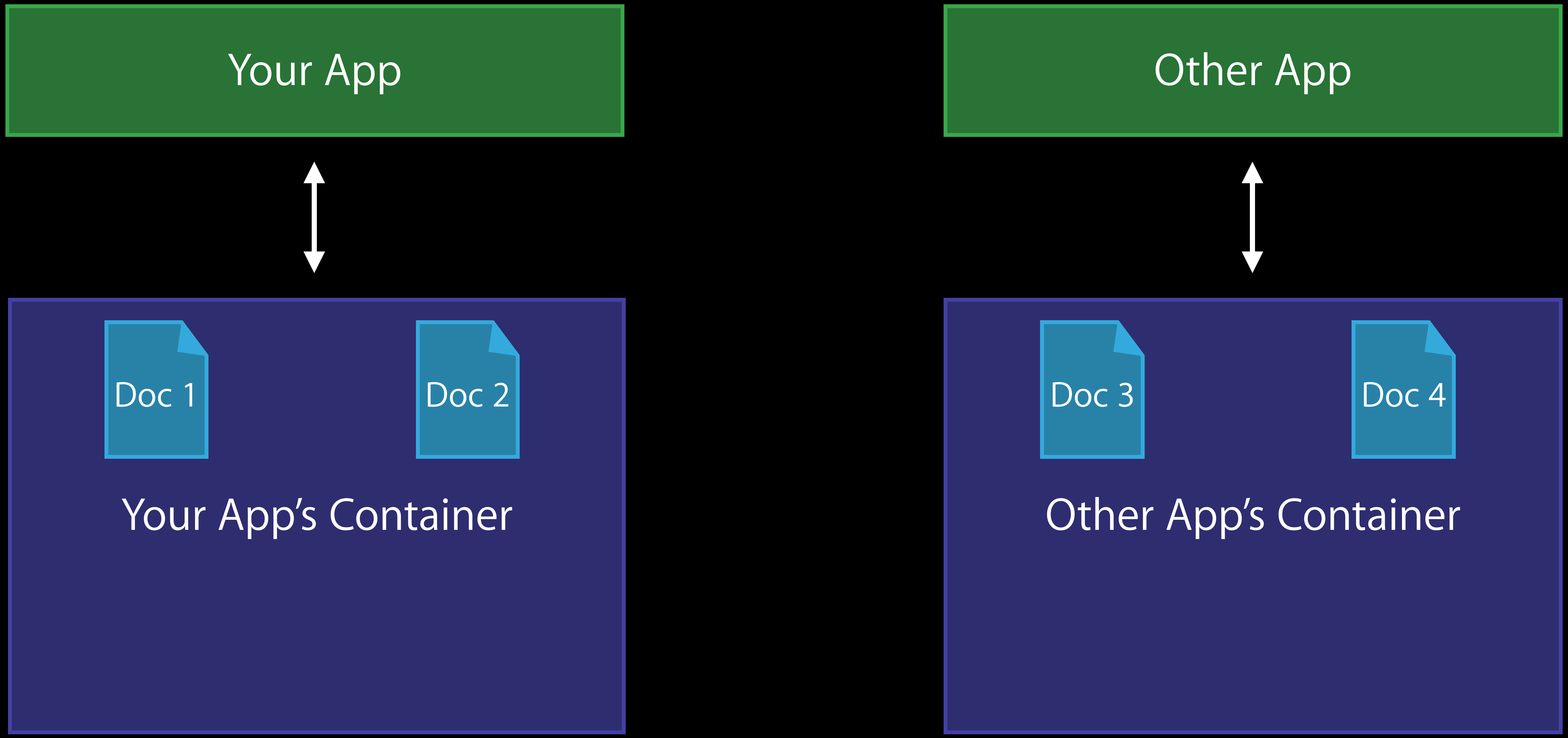

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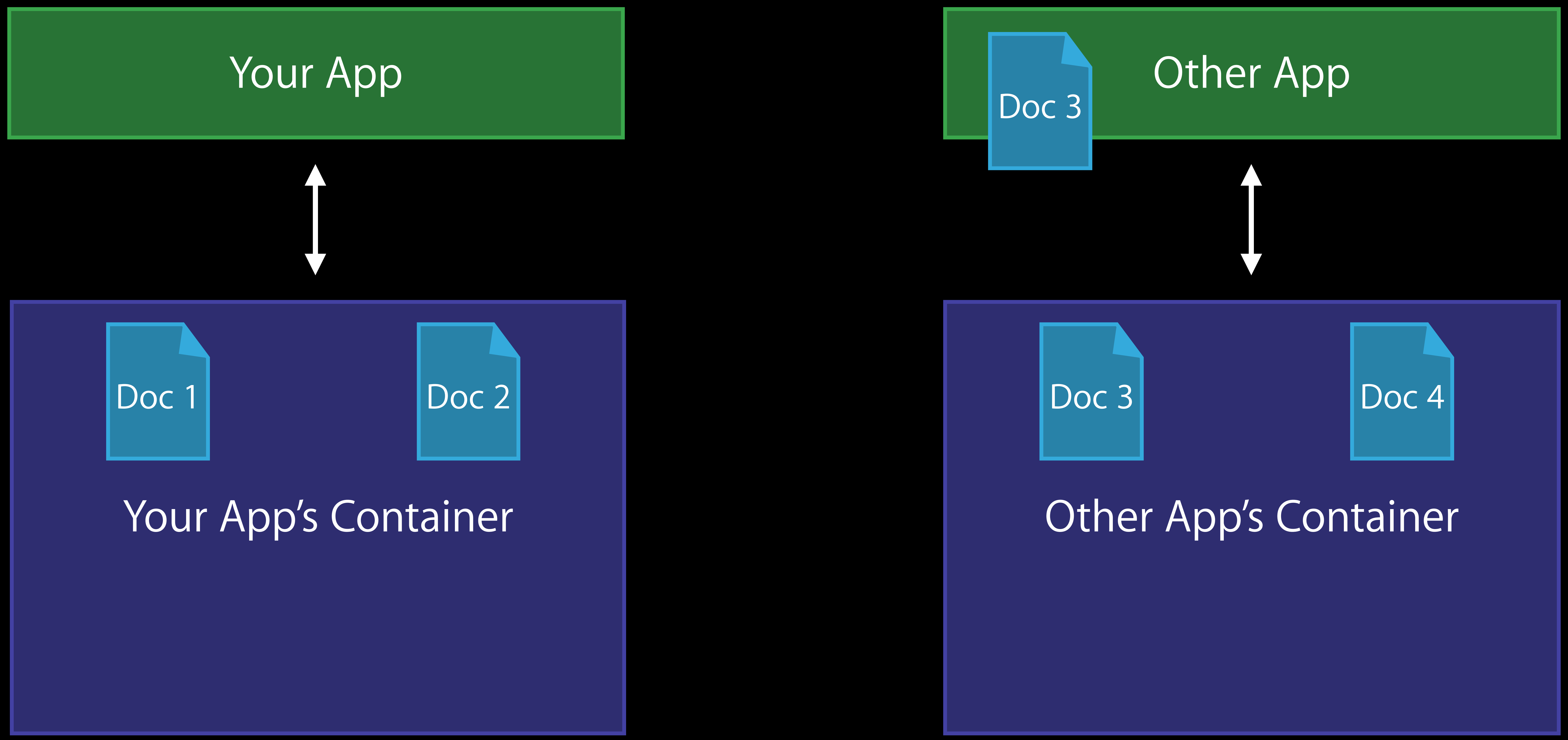

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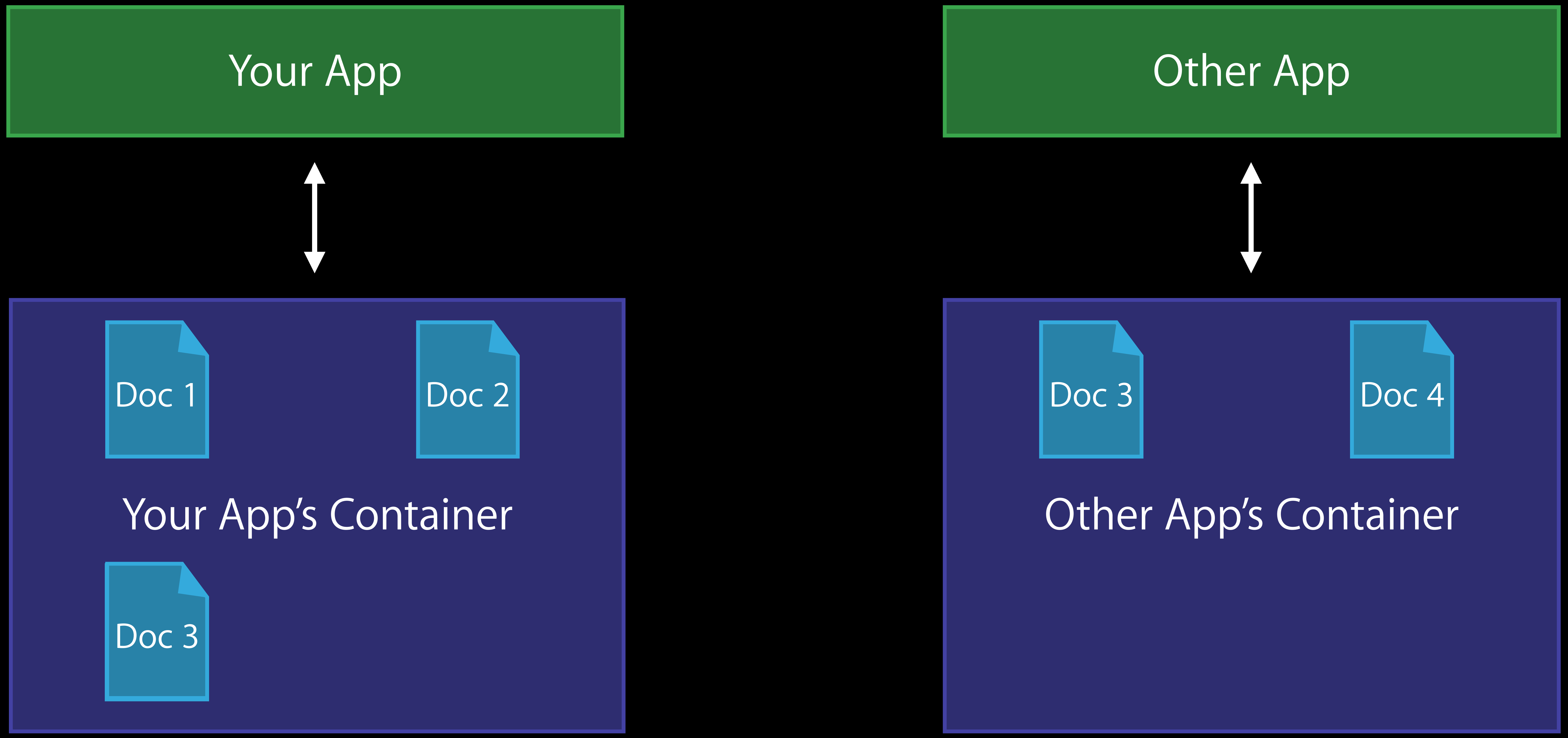

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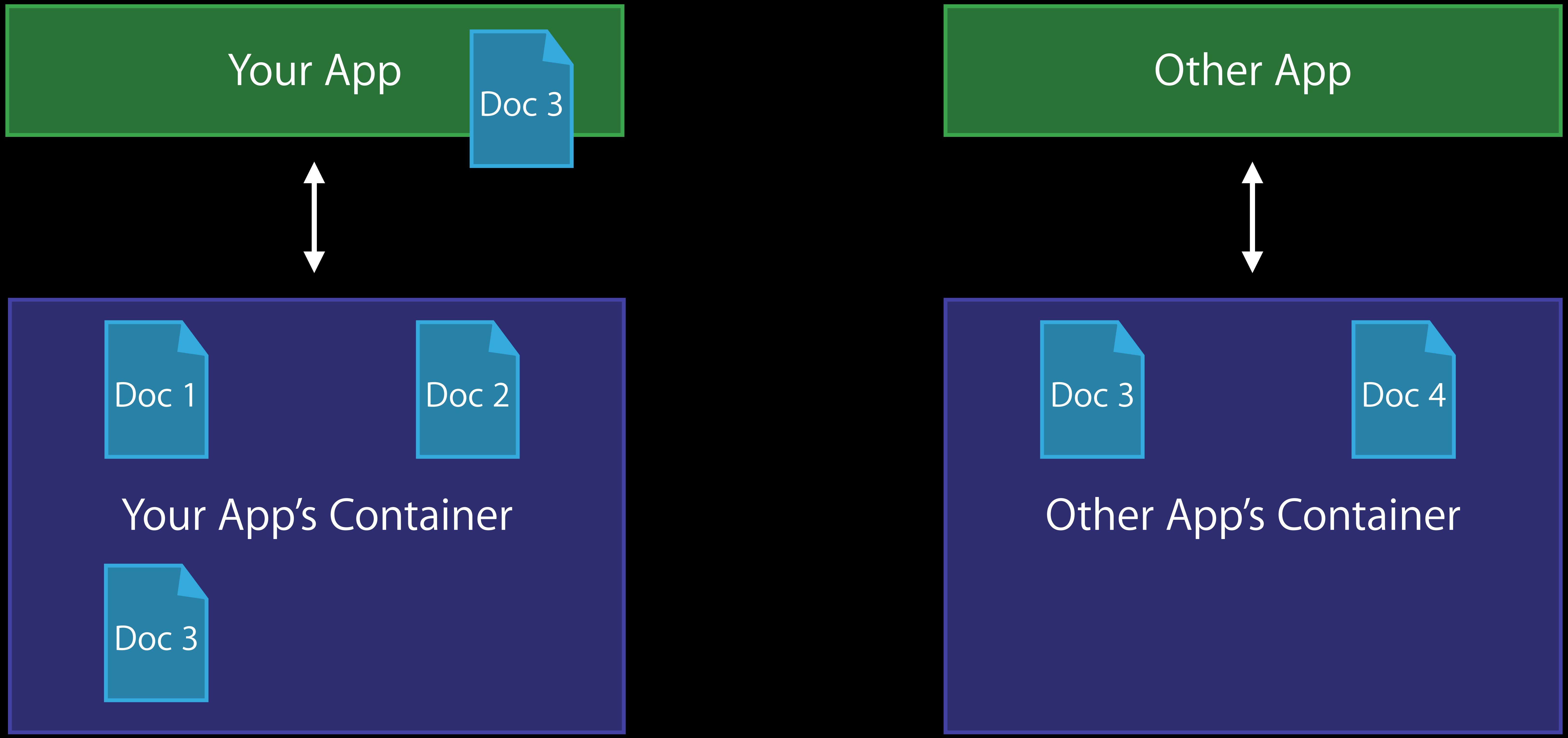
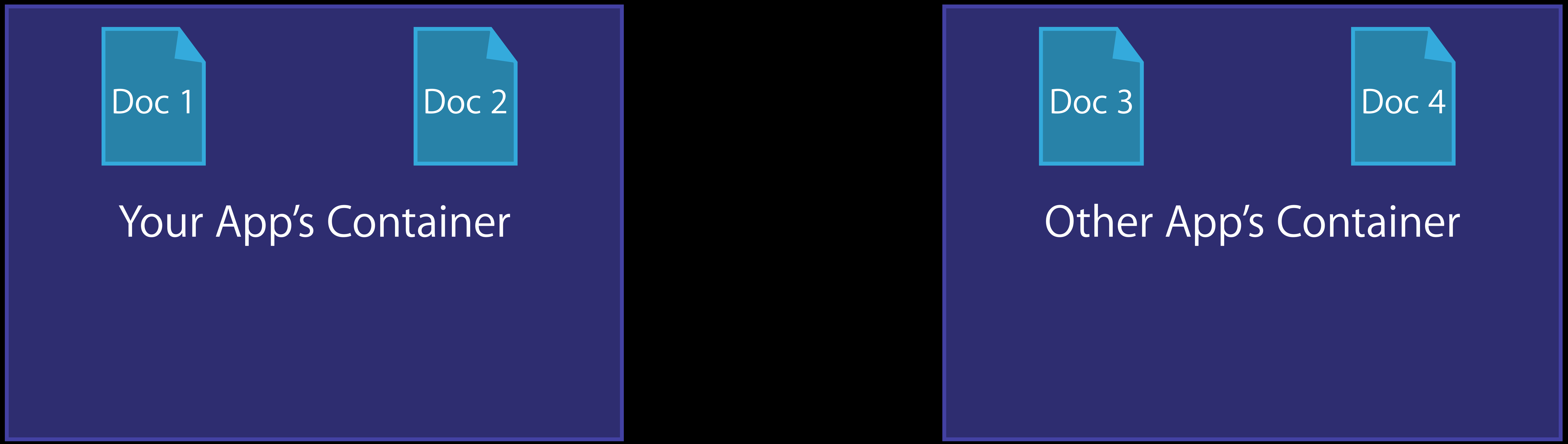


Document Discovery Made Easier

Accessing documents directly



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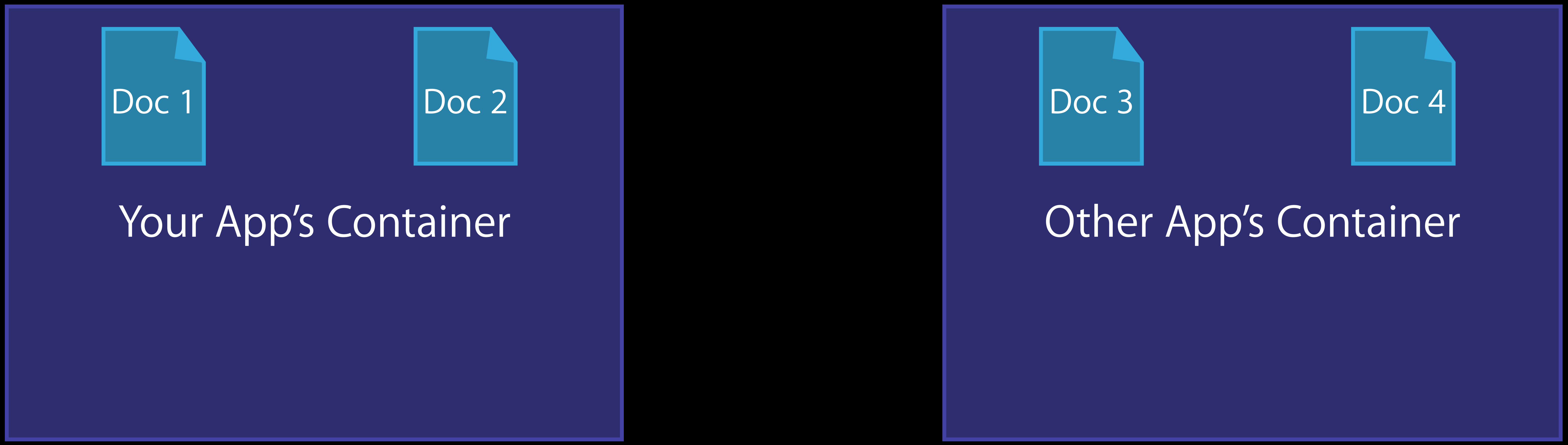
Better user experience to open documents directly



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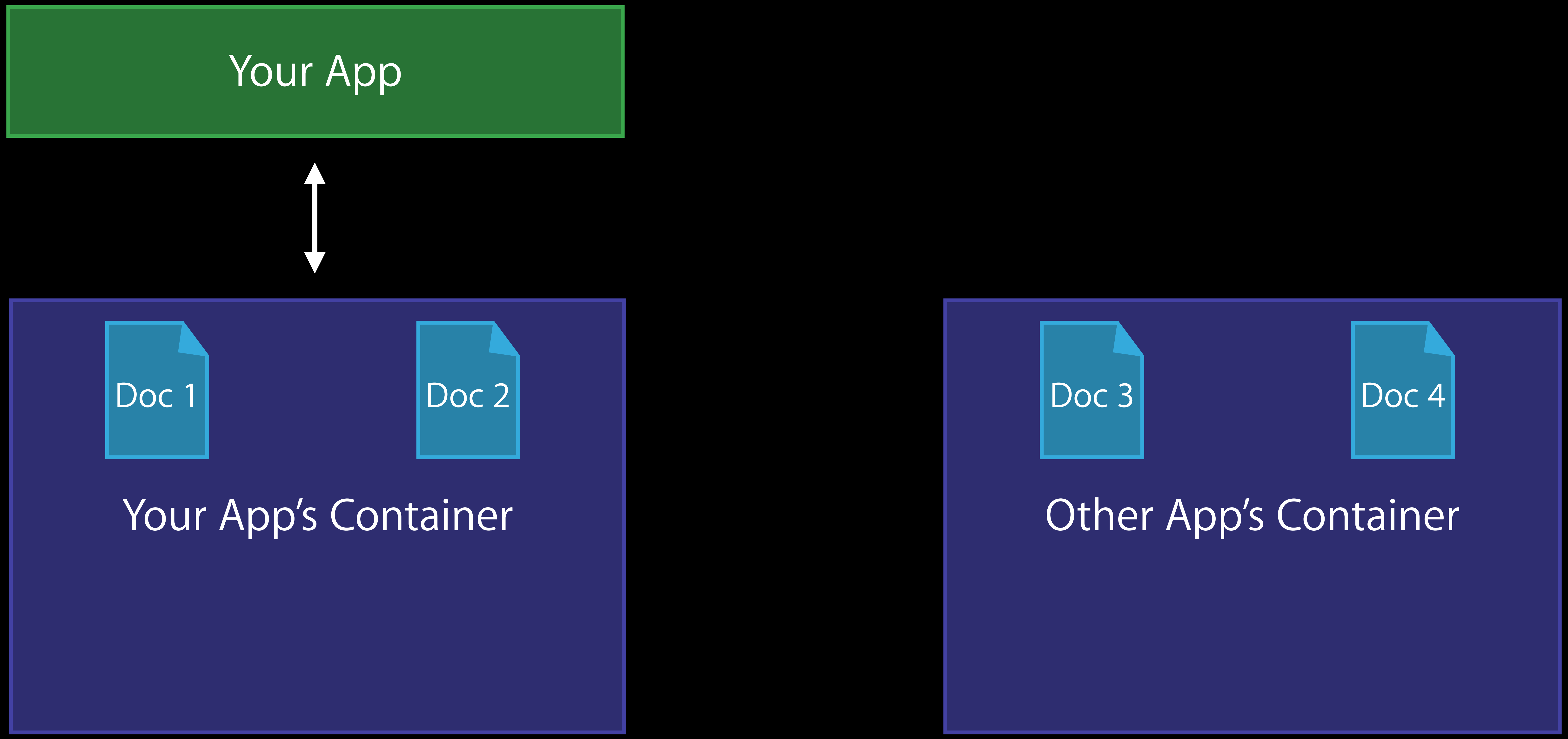

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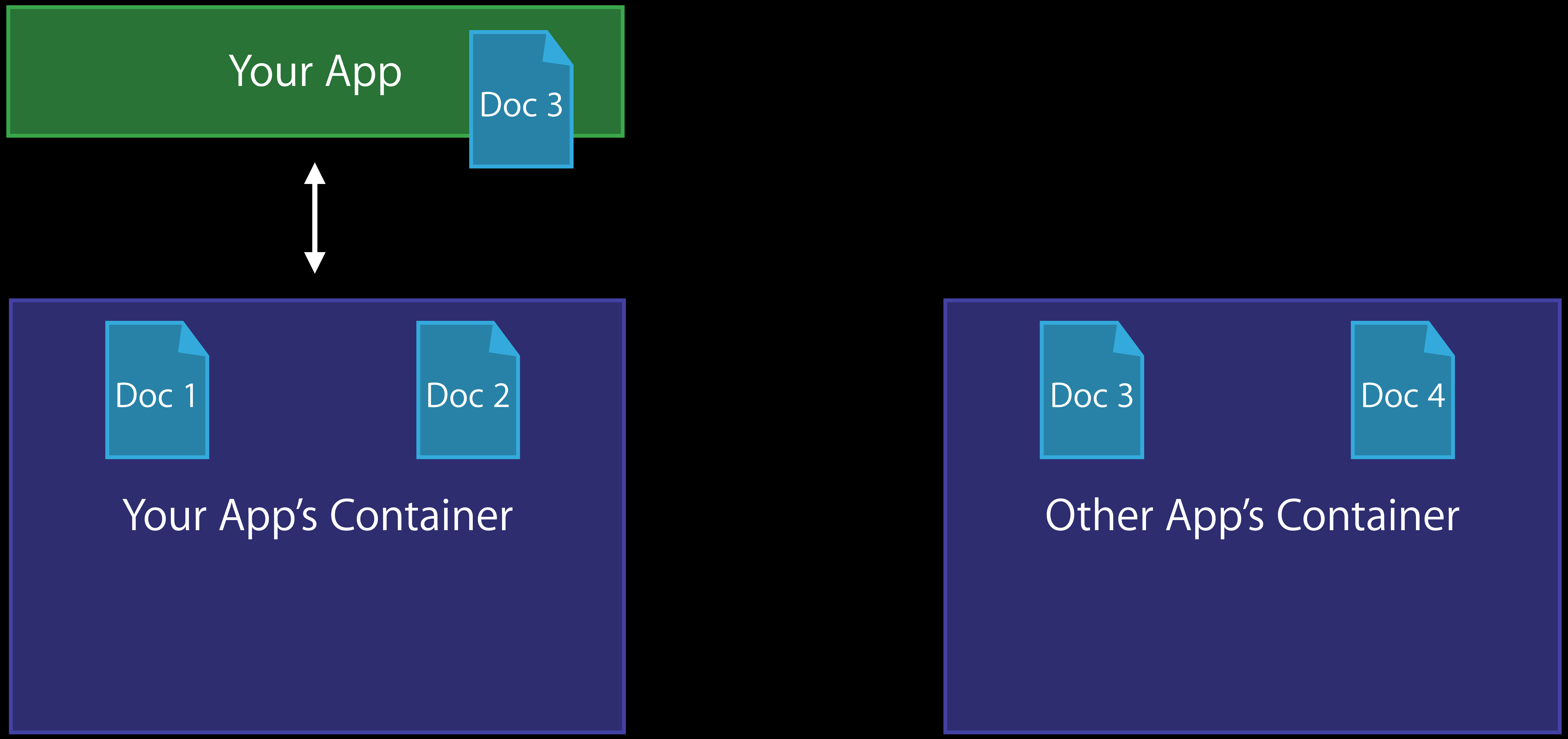

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UIDocumentPickerViewController allows your users to

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- Grant your app permissions to access and edit the discovered documents

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Must opt-in to have documents displayed

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Great new UI which you display in your app

Demo

Using the document picker in a simple application

Summary

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Easy to display UIDocumentPickerViewController

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Easy to display UIDocumentPickerViewController

Users can now select documents from other apps' containers

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Easy to display UIDocumentPickerViewController

Users can now select documents from other apps' containers

Easy to make your container show up in UIDocumentPickerViewController

Managing External Documents

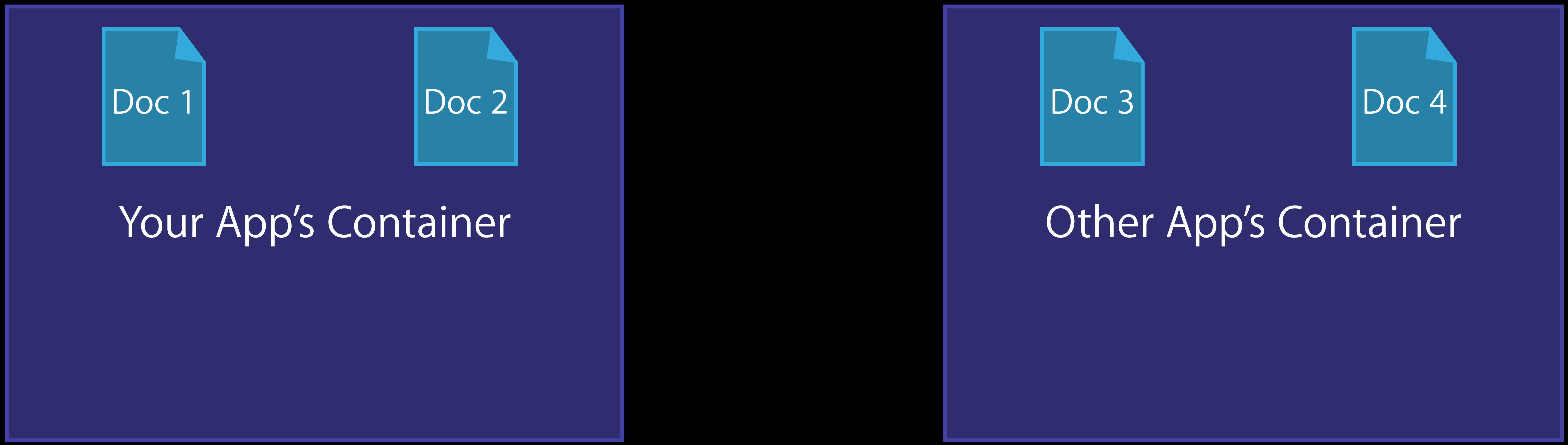
Document references, scoped access, and bookmarks

Johannes Fortmann
Software Engineer

Managing Document References

Document references in your container

NEW

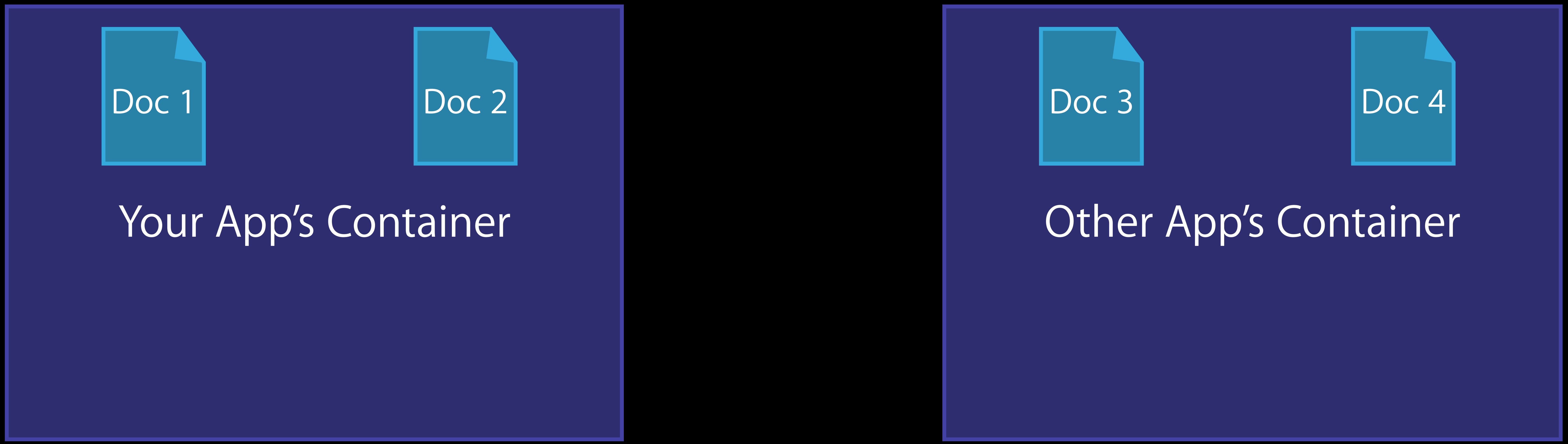


Managing Document References

NEW

Document references in your container

Your app always has access to its own container



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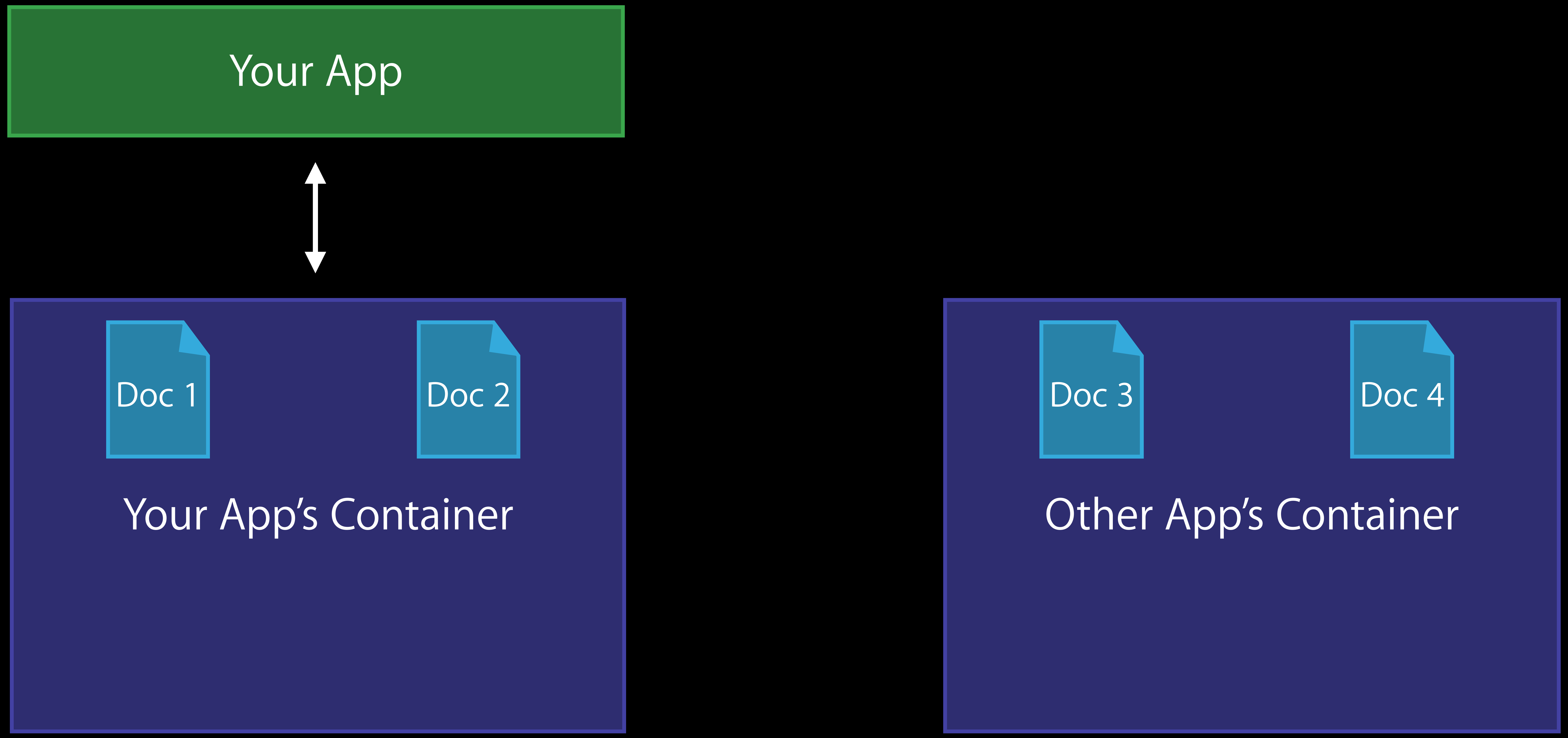

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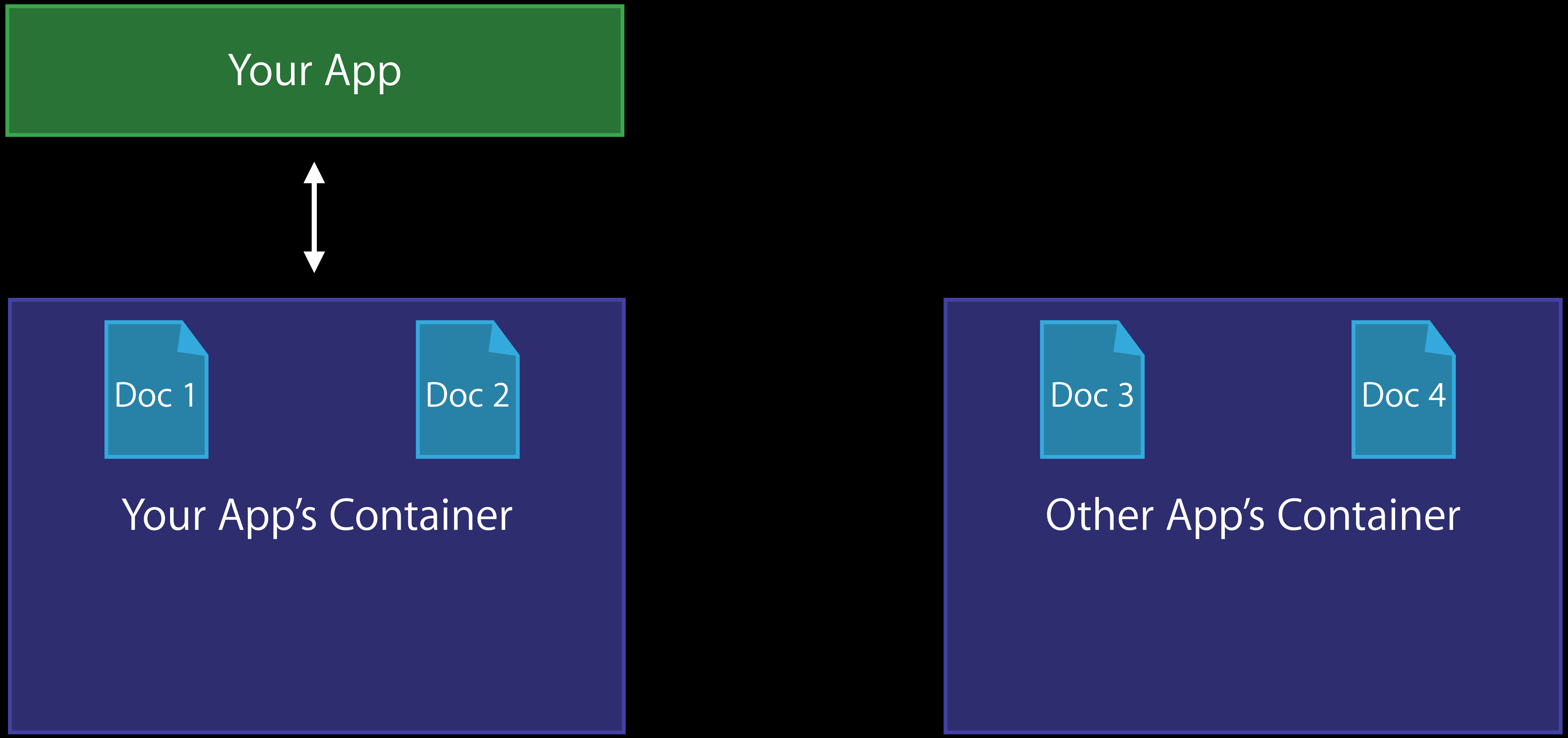

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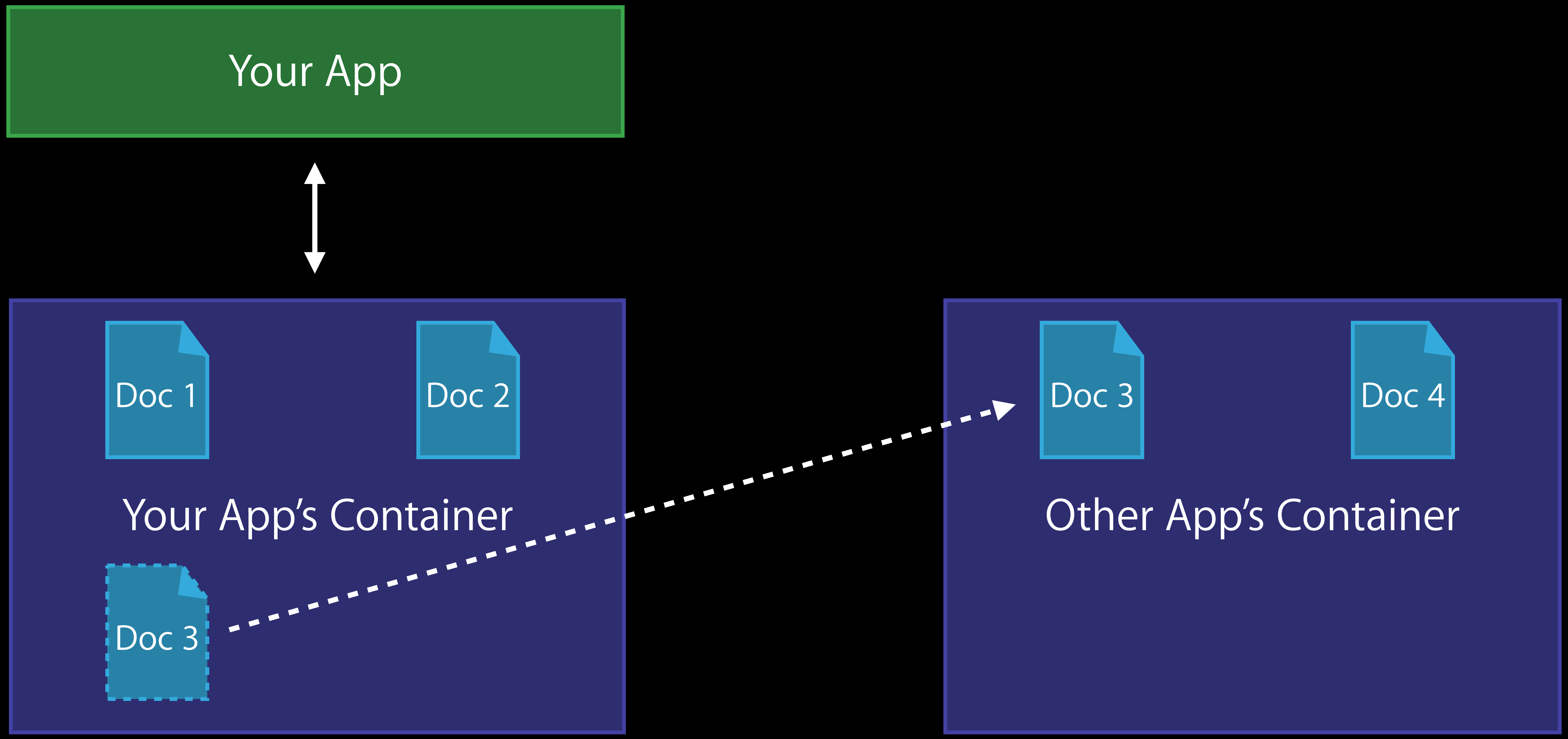
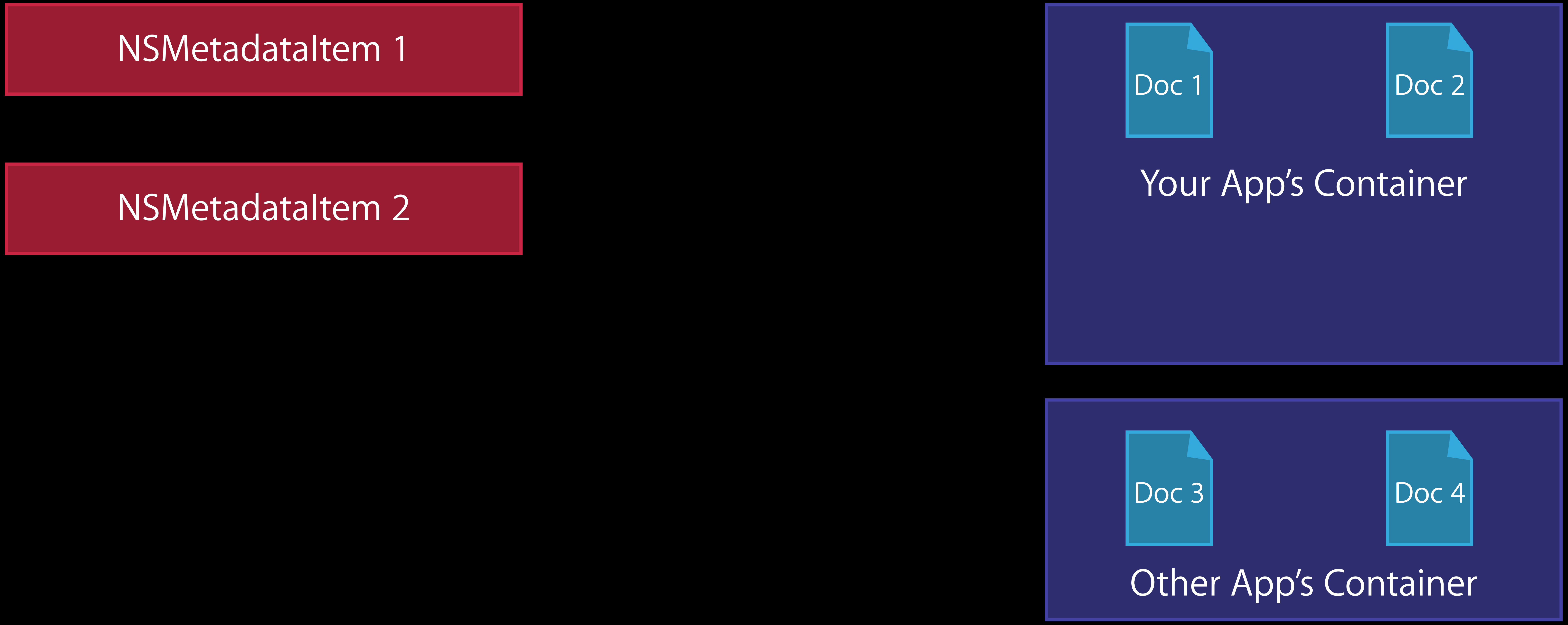


Managing Document References

New attributes

NEW

`NSMetadataQueryUbiquitousDocumentsScope`



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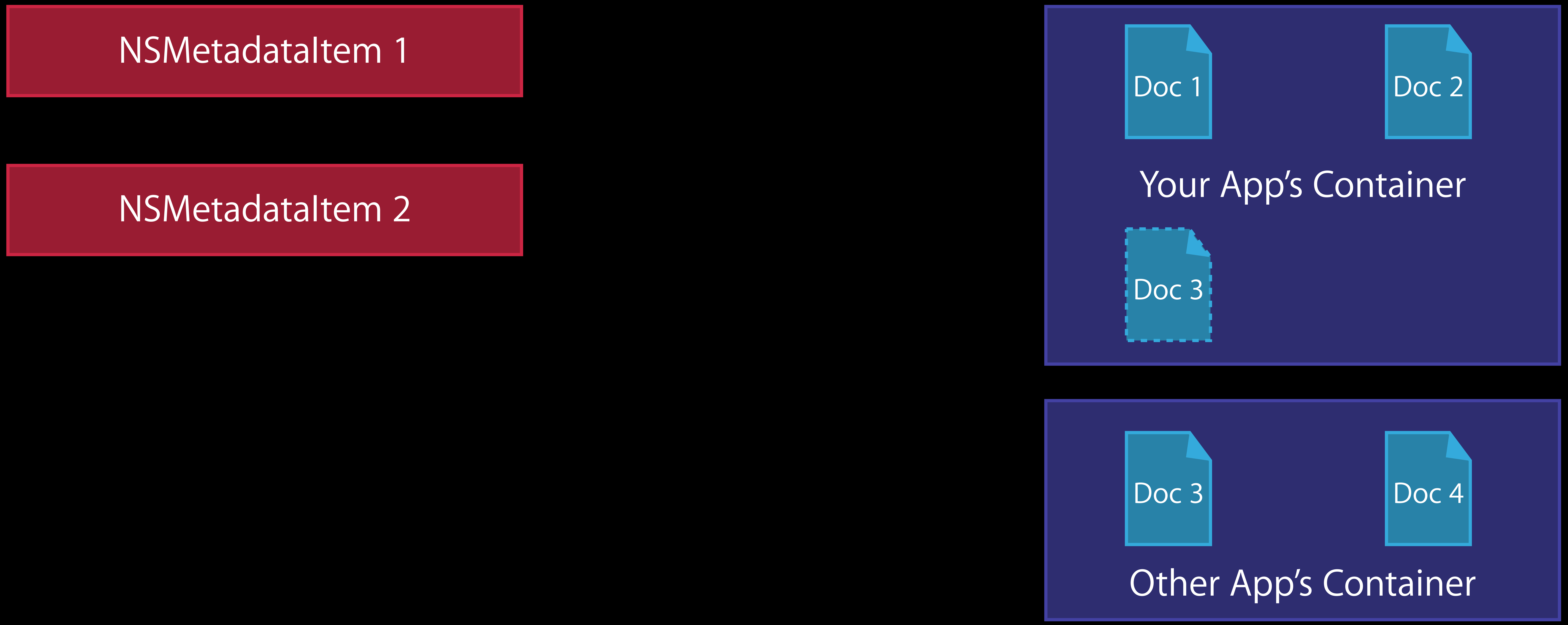

Managing Document References

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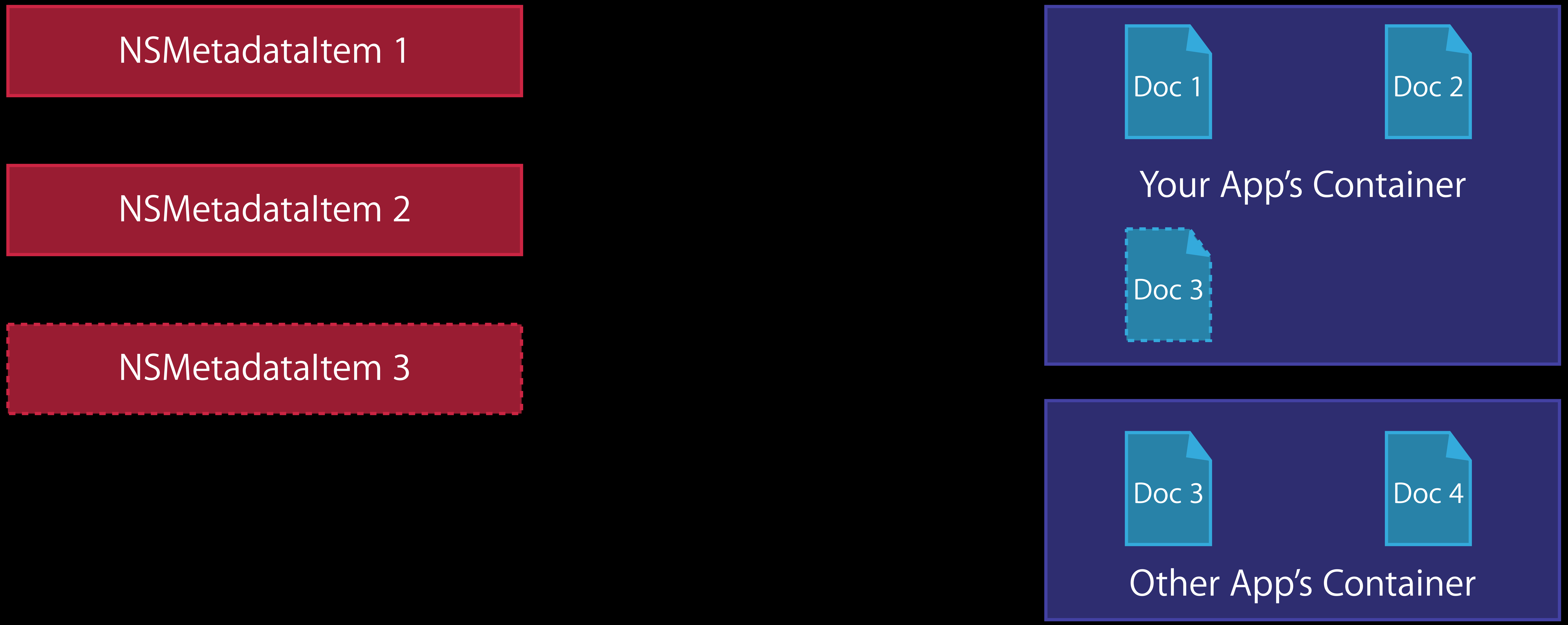
```
NSMetadataQueryUbiquitousDocumentsScope
NSMetadataQueryAccessibleUbiquitousExternalDocumentsScope
```



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```
NSMetadataQueryUbiquitousDocumentsScope
NSMetadataQueryAccessibleUbiquitousExternalDocumentsScope
NSMetadataItemURLKey
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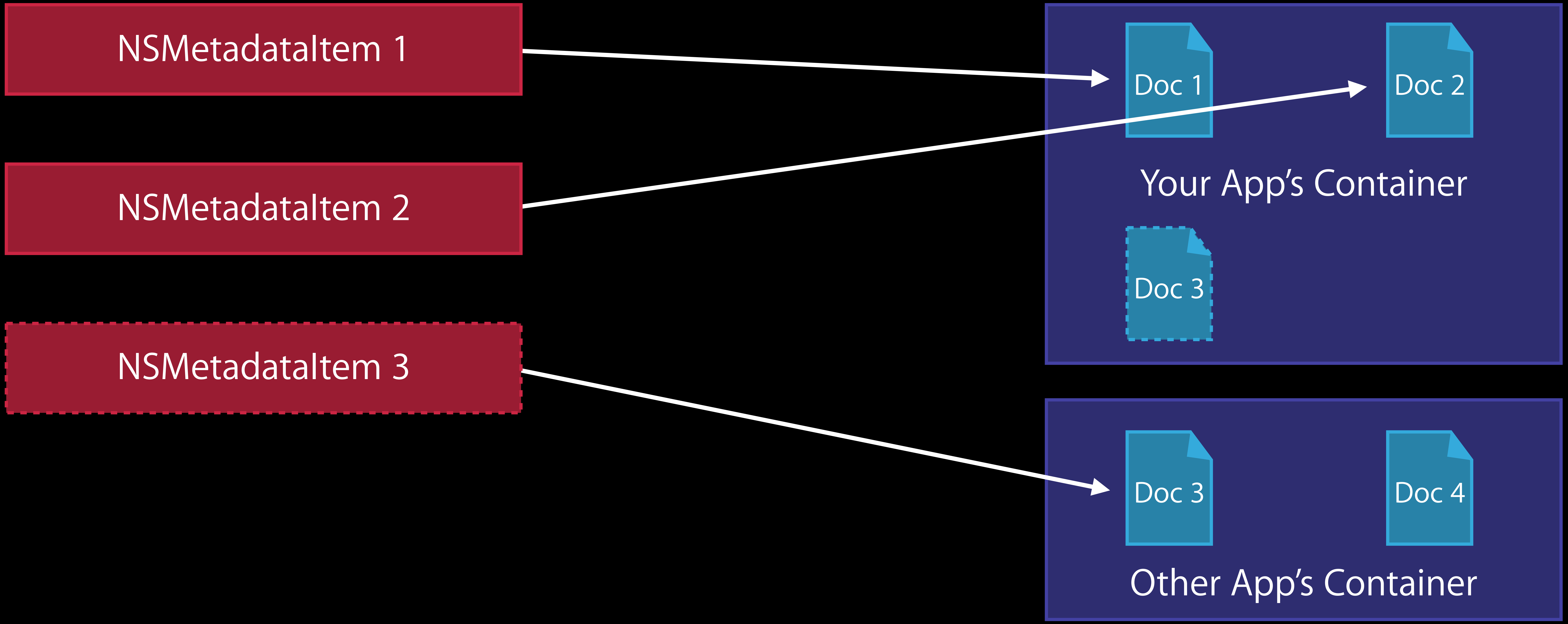

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NSMetadataQueryUbiquitousDocumentsScope
NSMetadataQueryAccessibleUbiquitousExternalDocumentsScope
NSMetadataUbiquitousItemURLInLocalContainerKey
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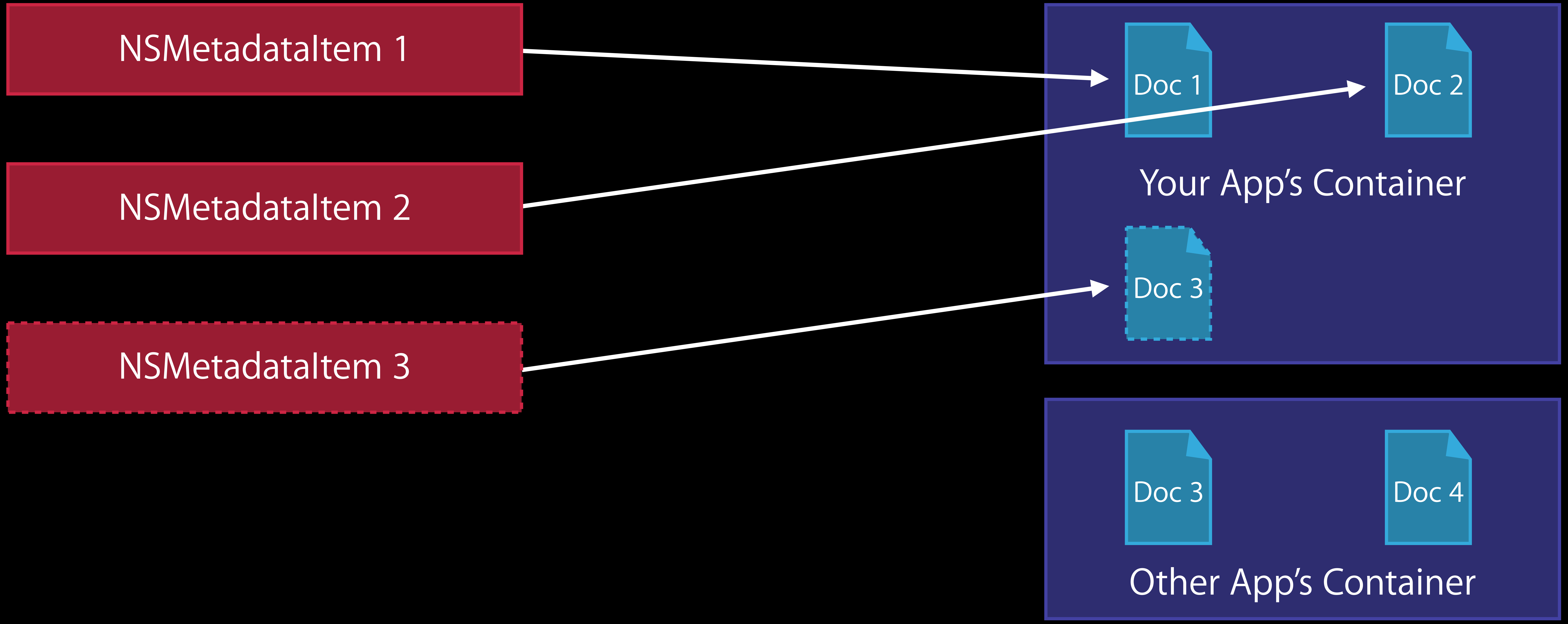

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NSMetadataQueryUbiquitousDocumentsScope
NSMetadataQueryAccessibleUbiquitousExternalDocumentsScope
NSMetadataUbiquitousItemIsExternalDocumentKey
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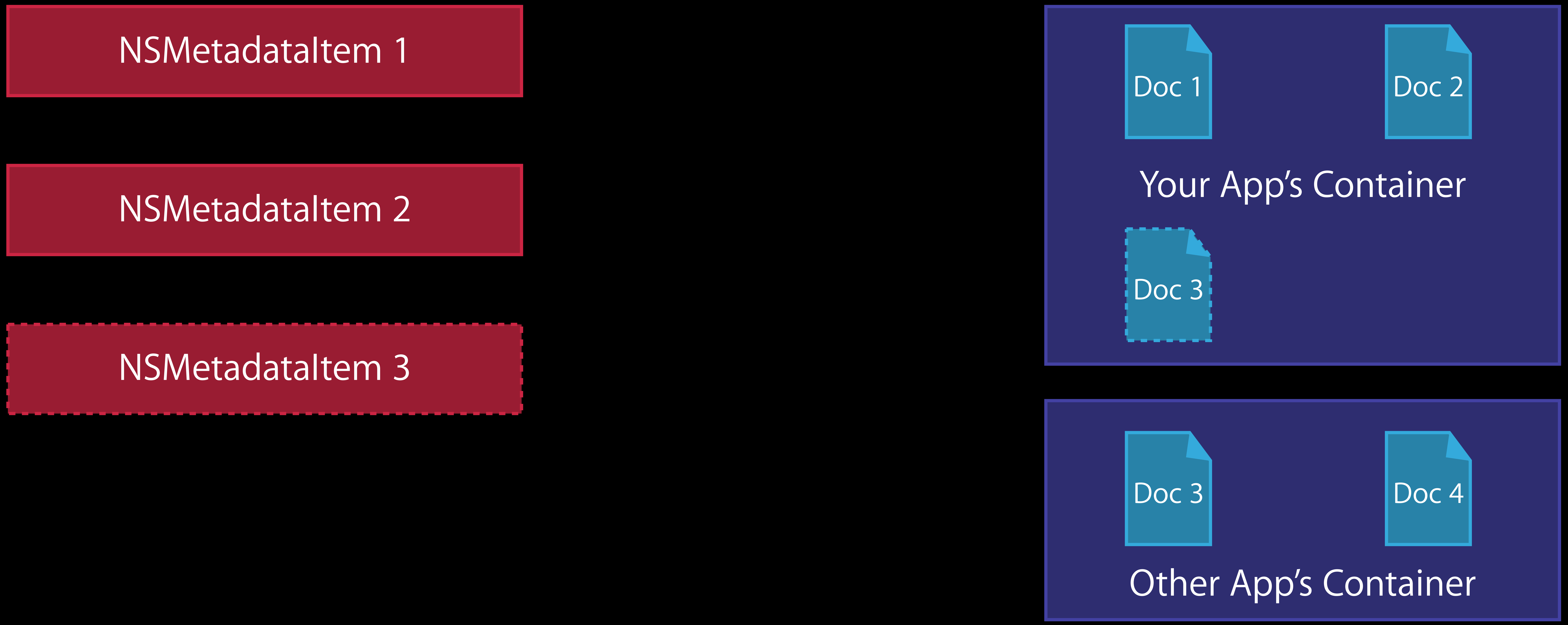

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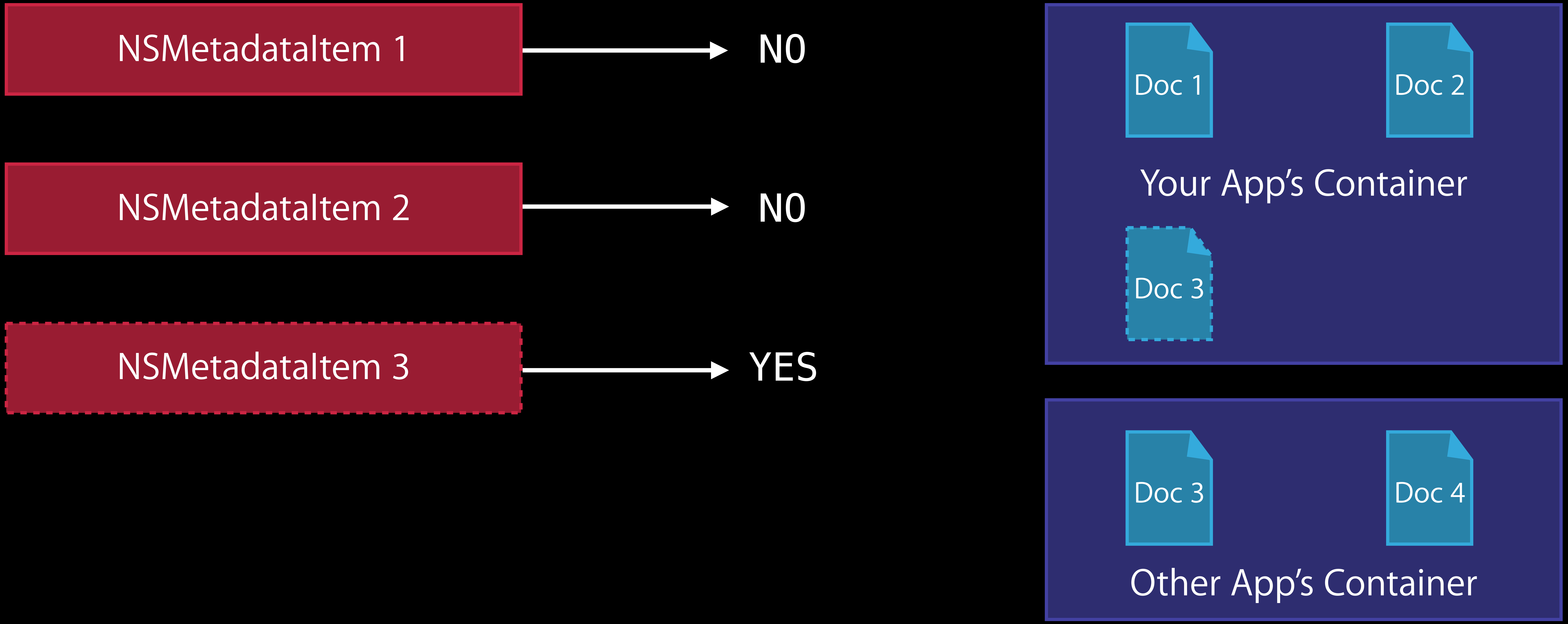
NSMetadataUbiquitousItemIsExternalDocumentKey
```

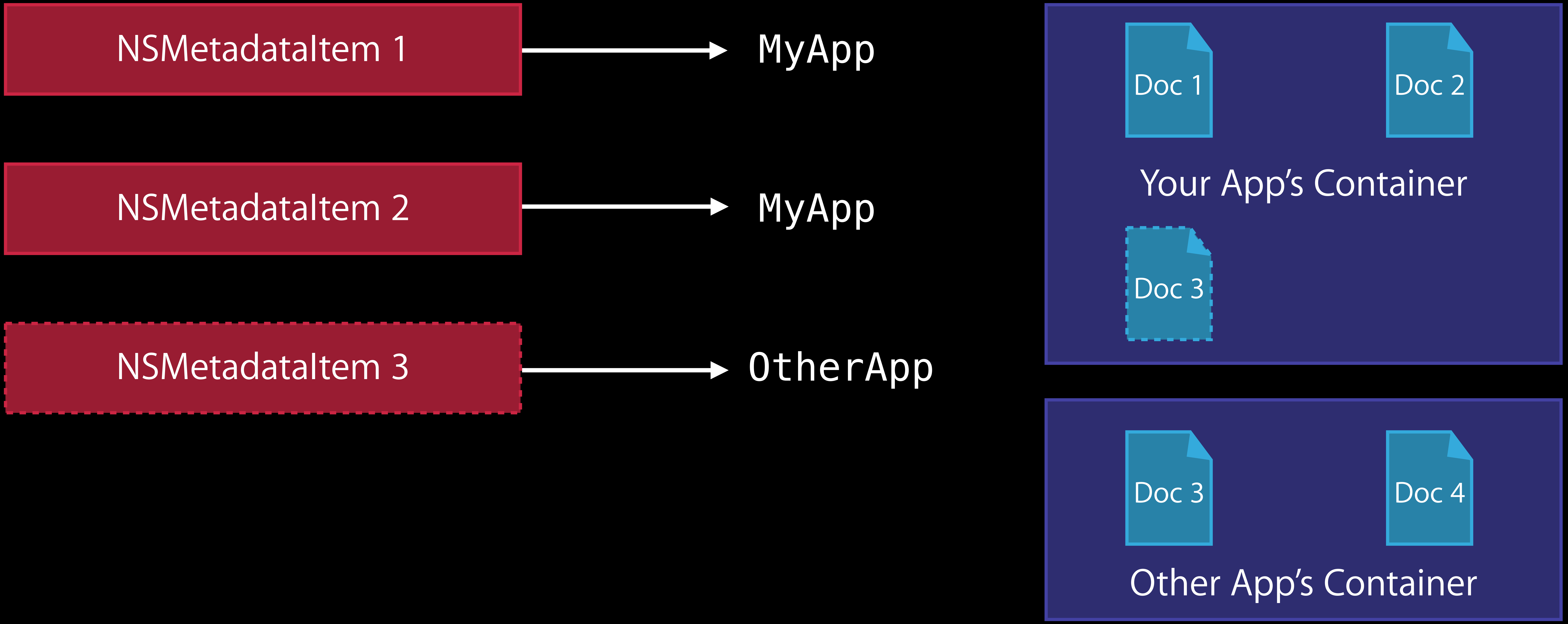


Managing Document References

New attributes

NEW

```
NSMetadataQueryUbiquitousDocumentsScope
NSMetadataQueryAccessibleUbiquitousExternalDocumentsScope
NSMetadataUbiquitousItemContainerDisplayNameKey
```



Managing Document References

Why do you need the document reference?

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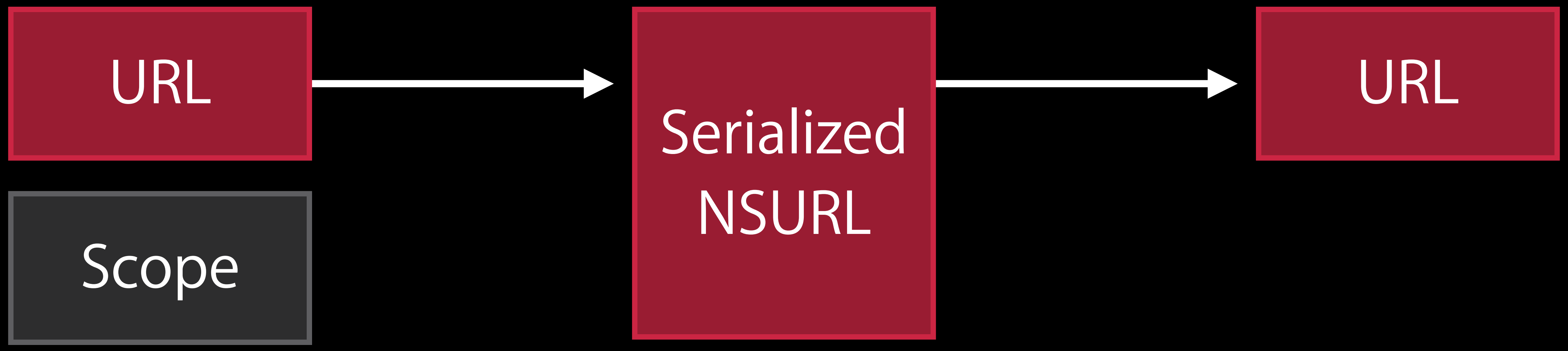
The only way to get a document outside your container is by using the picker

URL returned by the picker is security scoped



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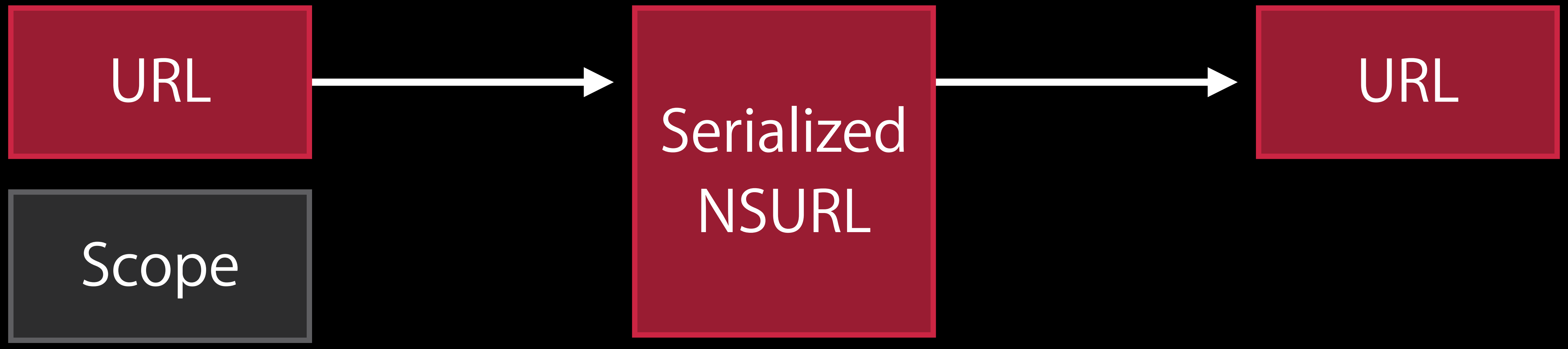

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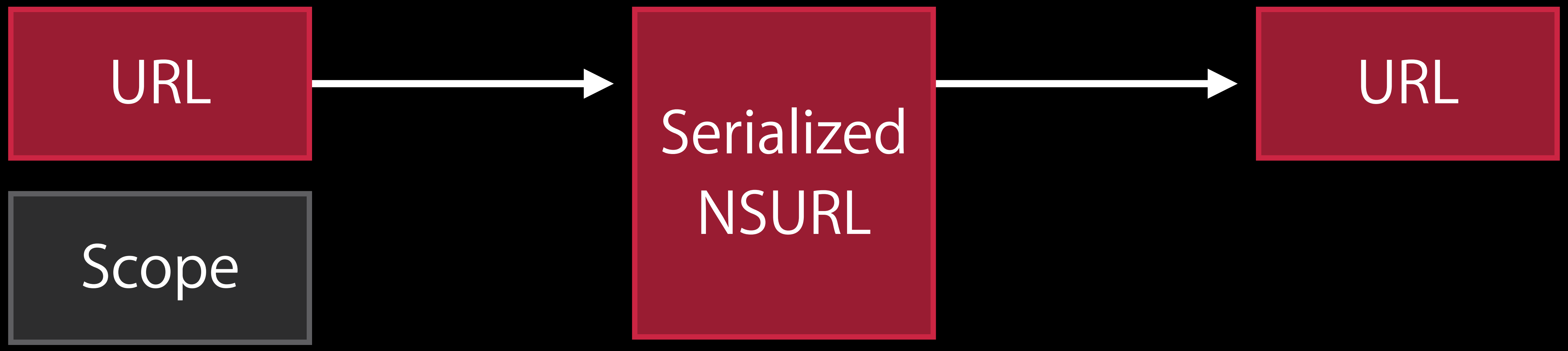

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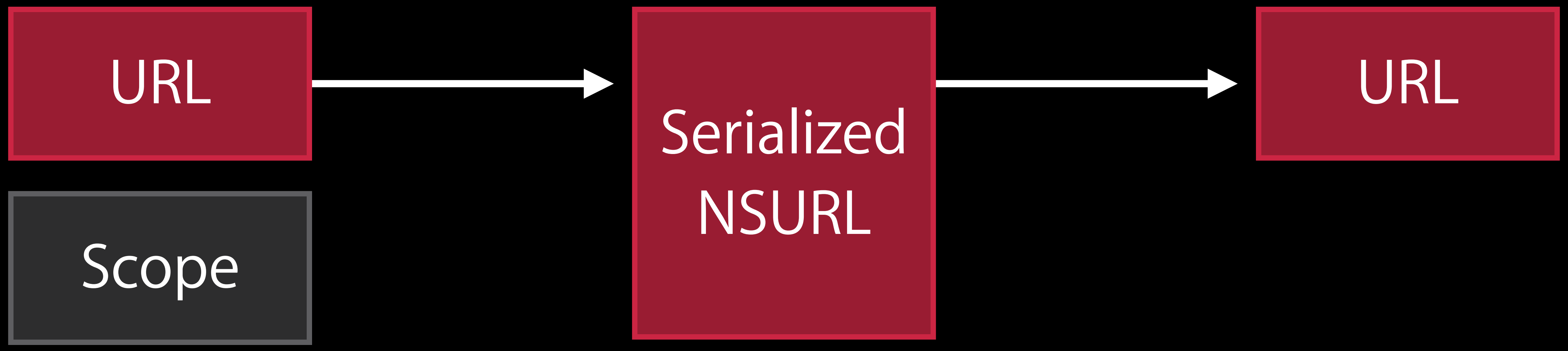
Document references come with scope pre-attached



Managing Document References

Bookmarks for state restoration

Managing Document References

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Sometimes enumerating documents is not the right choice

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- E.g., you want to restore a previously opened document immediately

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Bookmarks for state restoration

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Creating a bookmark encodes a portable reference to a document

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Bookmarks for state restoration

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Creating a bookmark encodes a portable reference to a document

Includes the security scope

Managing Document References

Bookmarks for state restoration

Bookmark creation via API

```
-bookmarkDataWithOptions:
```

Managing Document References

Bookmarks for state restoration

Bookmark creation via API

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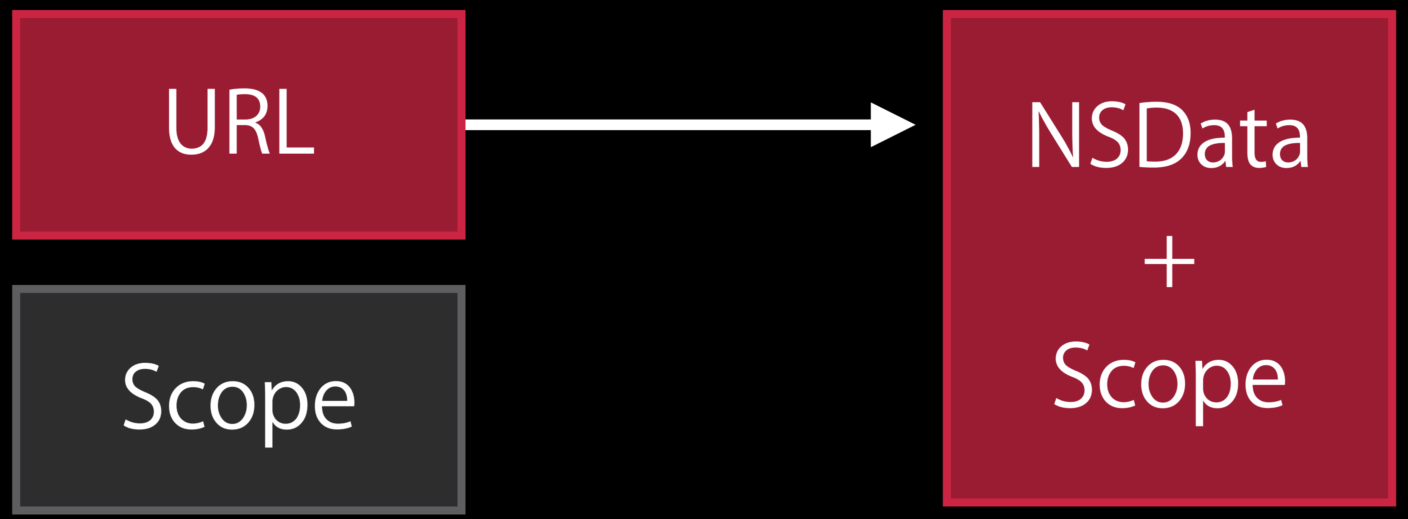


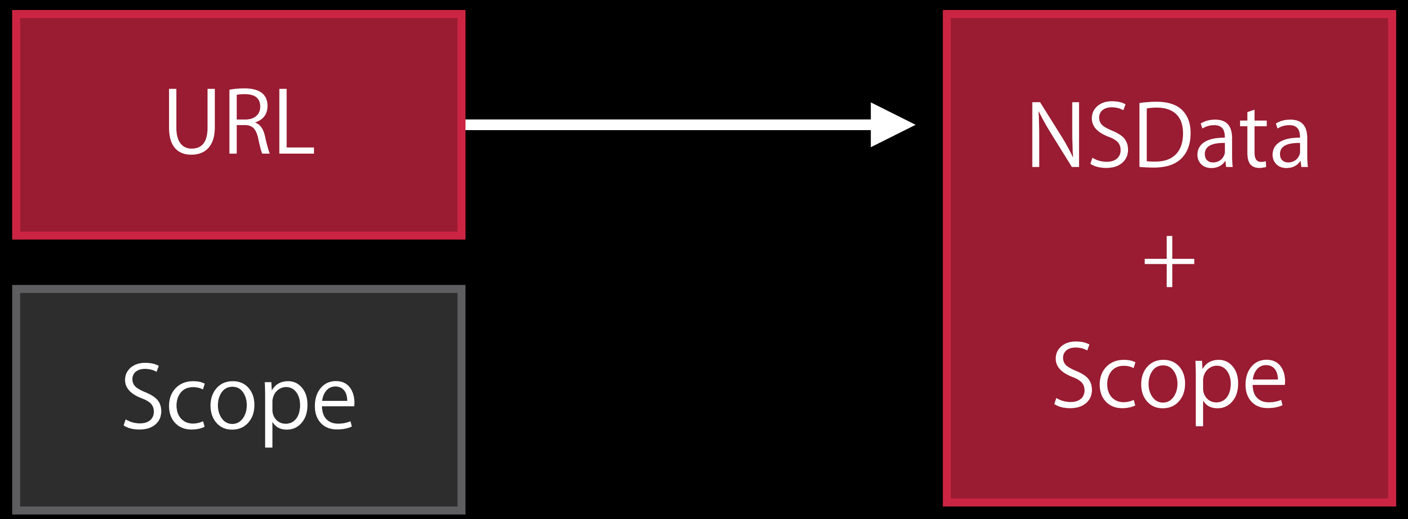
Managing Document References

Bookmarks for state restoration

Bookmark creation via API

```
-bookmarkDataWithOptions:

+URLByResolvingBookmarkData:savedBookmarkData
```



Managing Document References

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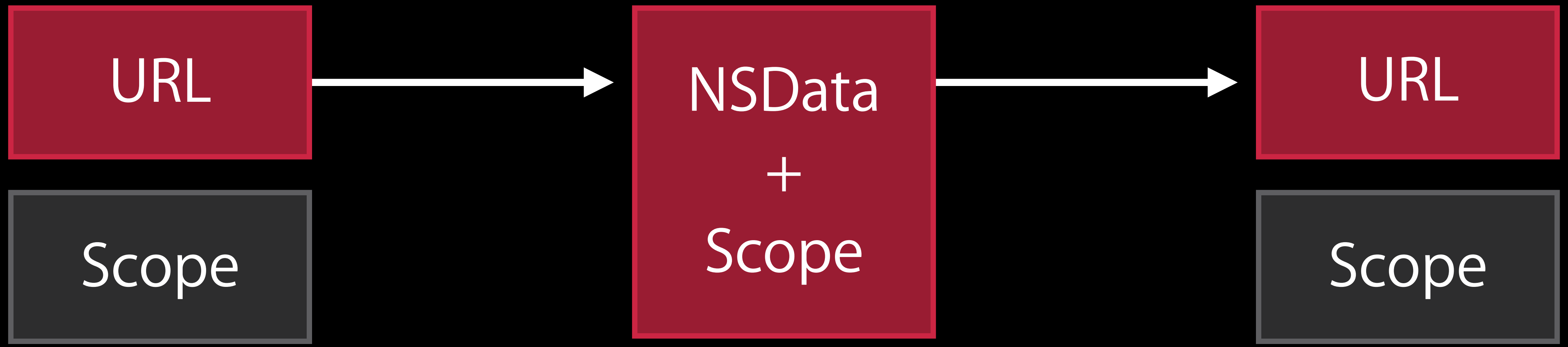


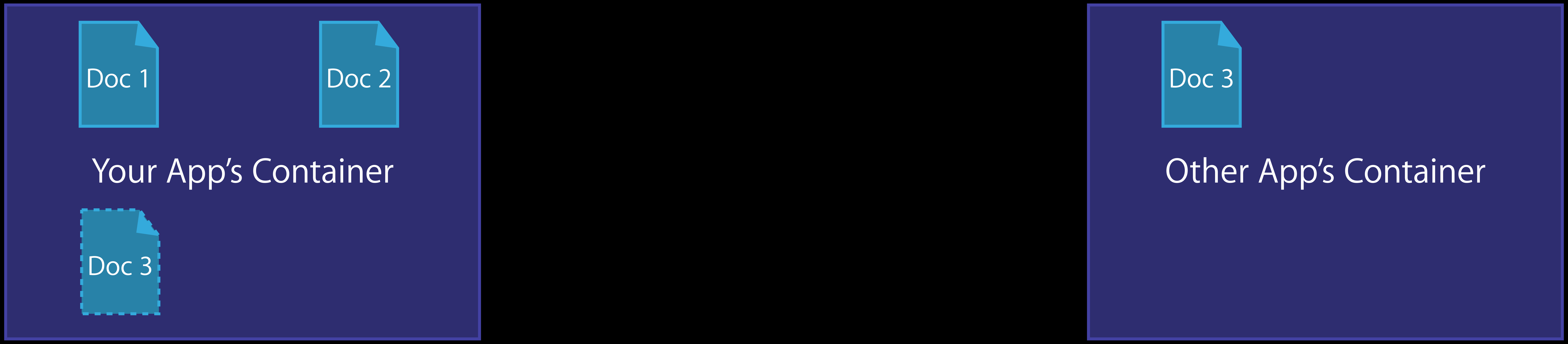
Document References and the Picker

UIDocumentPickerMode—Import vs. Open

Document References and the Picker

UIDocumentPickerMode—Import vs. Open

Open mode will create a bookmark and a security-scoped URL



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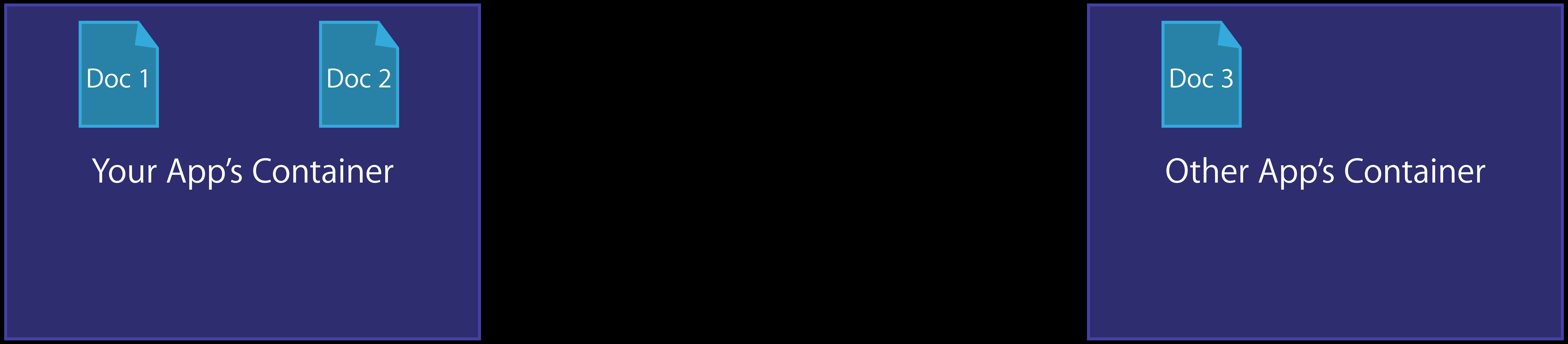

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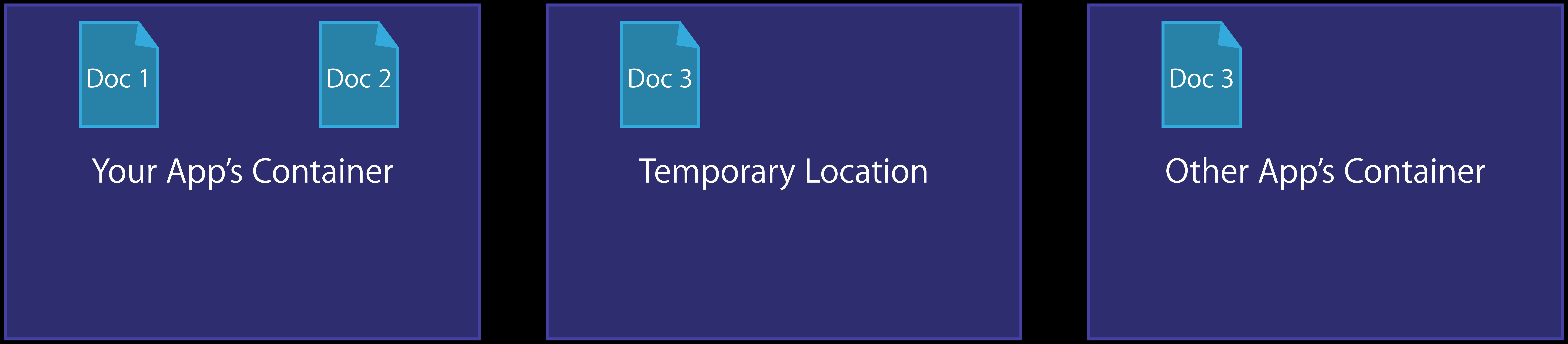

Document References and the Picker

UIDocumentPickerMode—Import vs. Open

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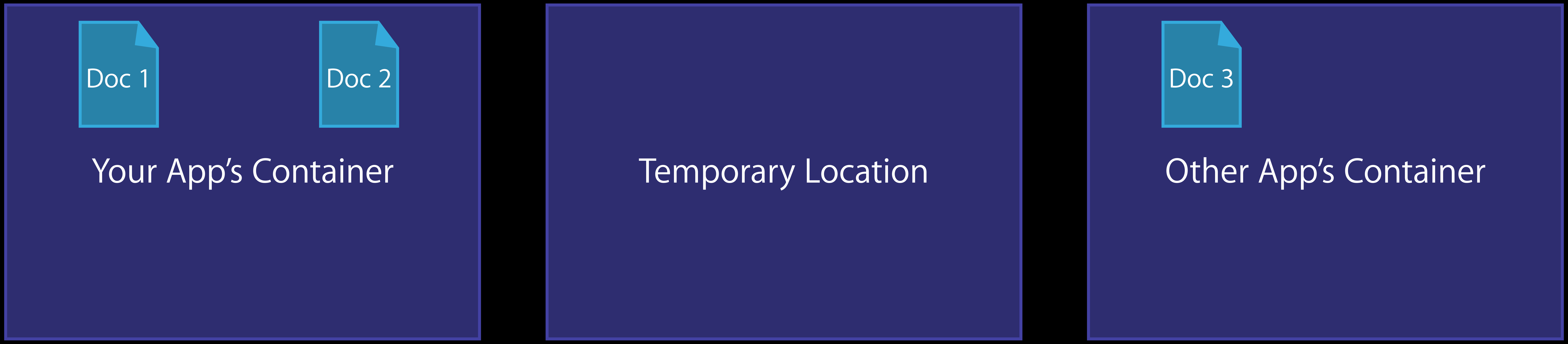
Make a copy soon if you want to hang on to it



How to Create a New Document

No write access except in your sandbox

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Write in your own container locally or in a temporary location

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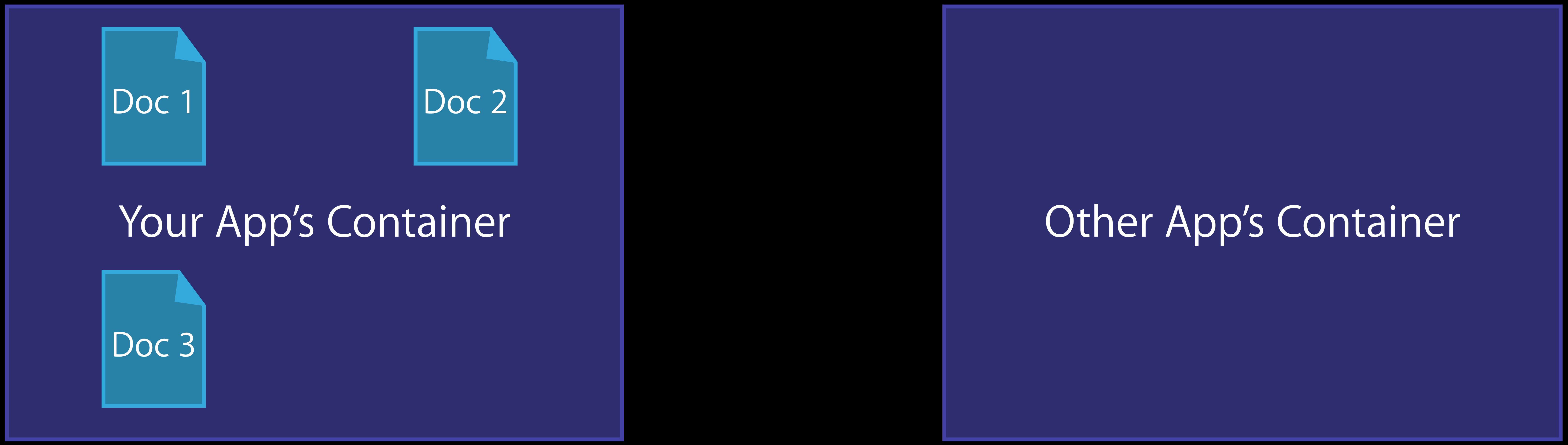
Write in your own container locally or in a temporary location

Afterwards, you can move the document

Existing Documents

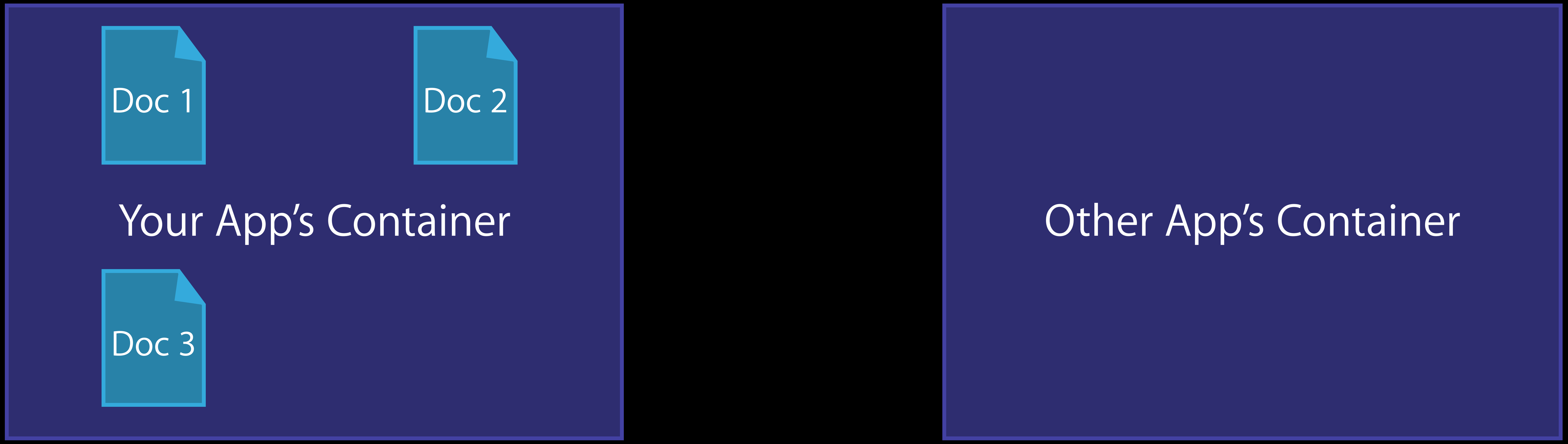
Moving a document



Existing Documents

Moving a document

Use UIDocumentPicker -initWithURL: and your existing document



Existing Documents

Moving a document

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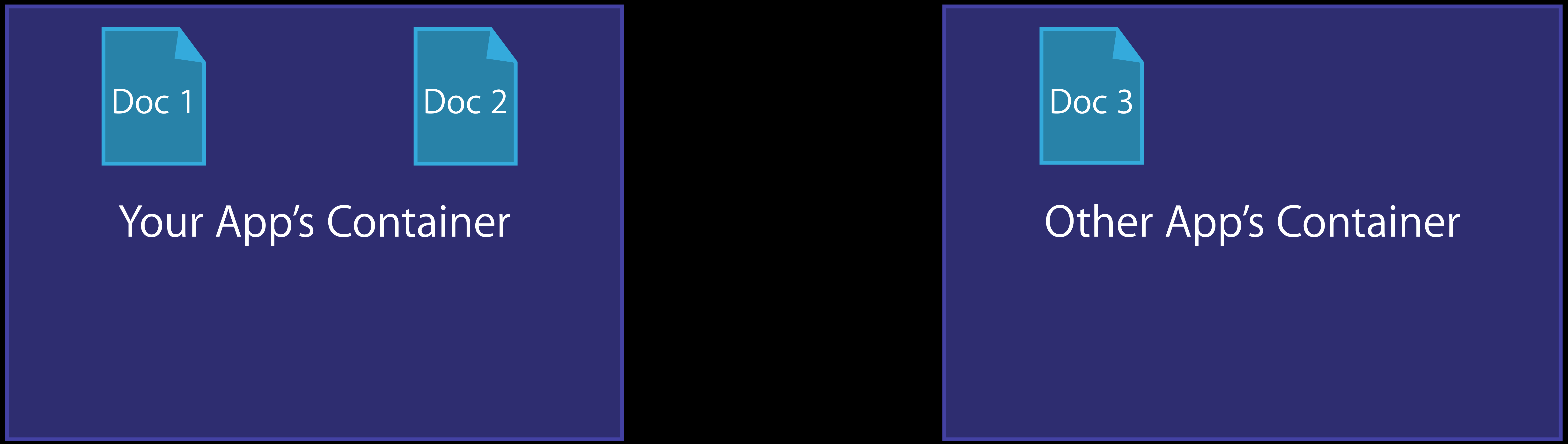
The file will be moved to the location the user picks



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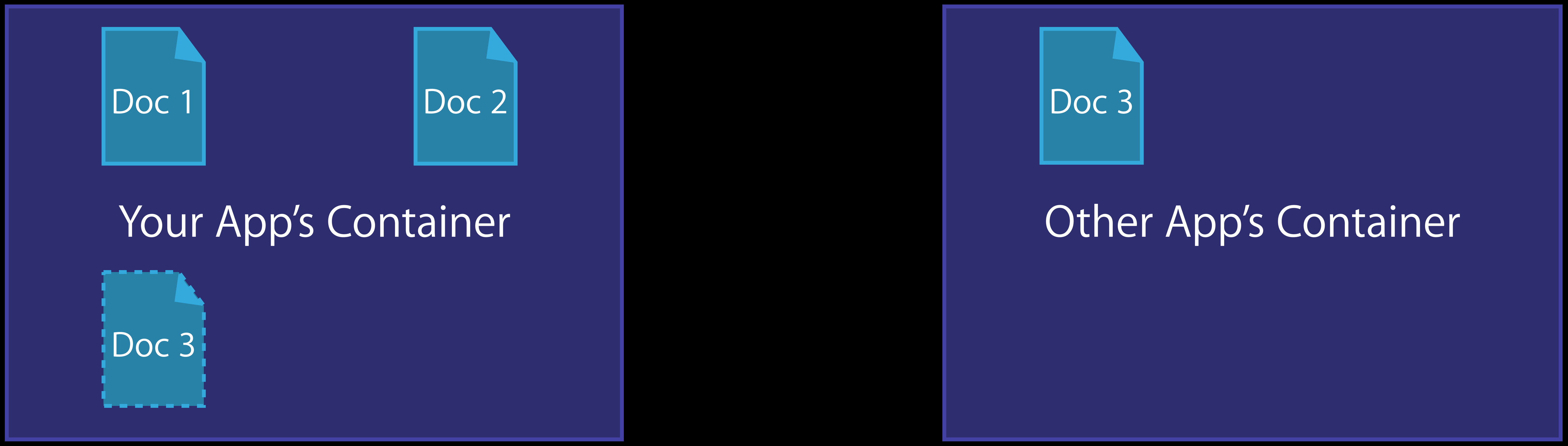

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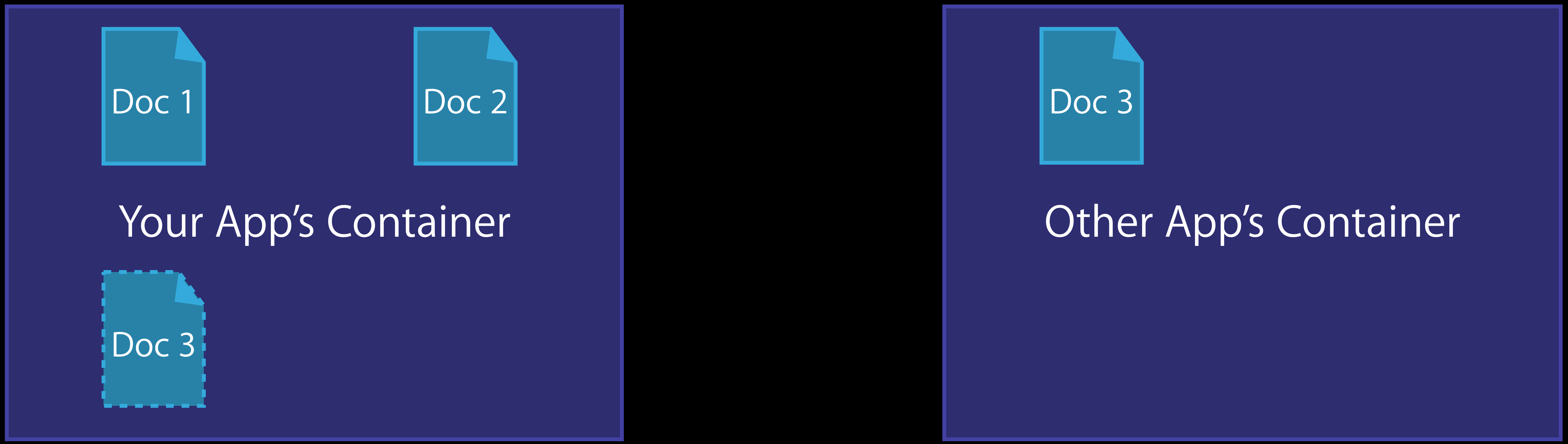
The URL behaves like the one returned by Open



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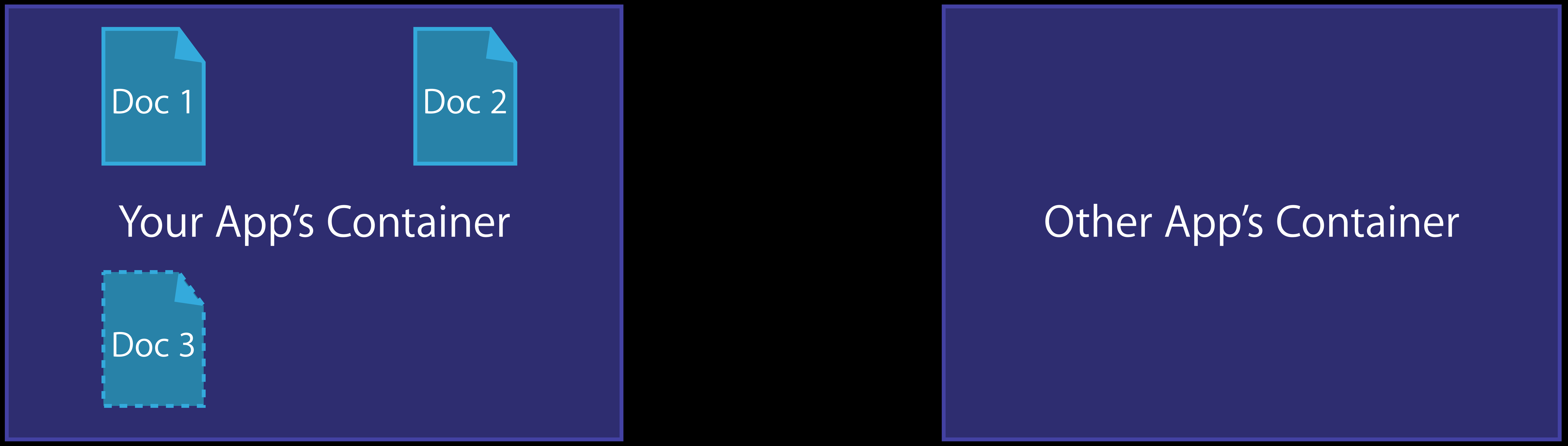

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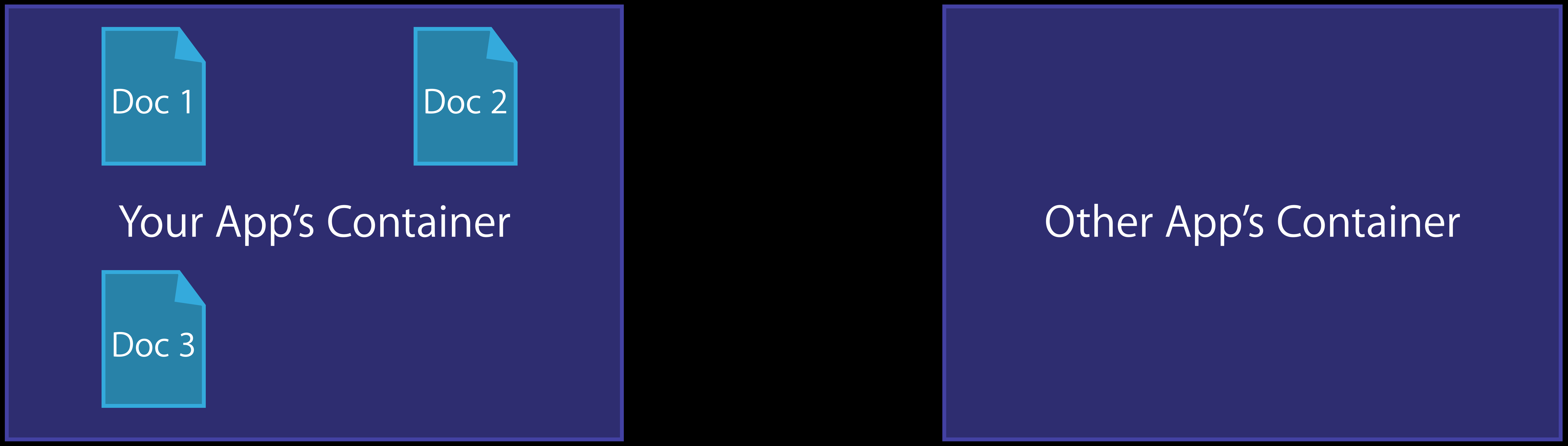
Export mode if you don't want to hang on to the reference



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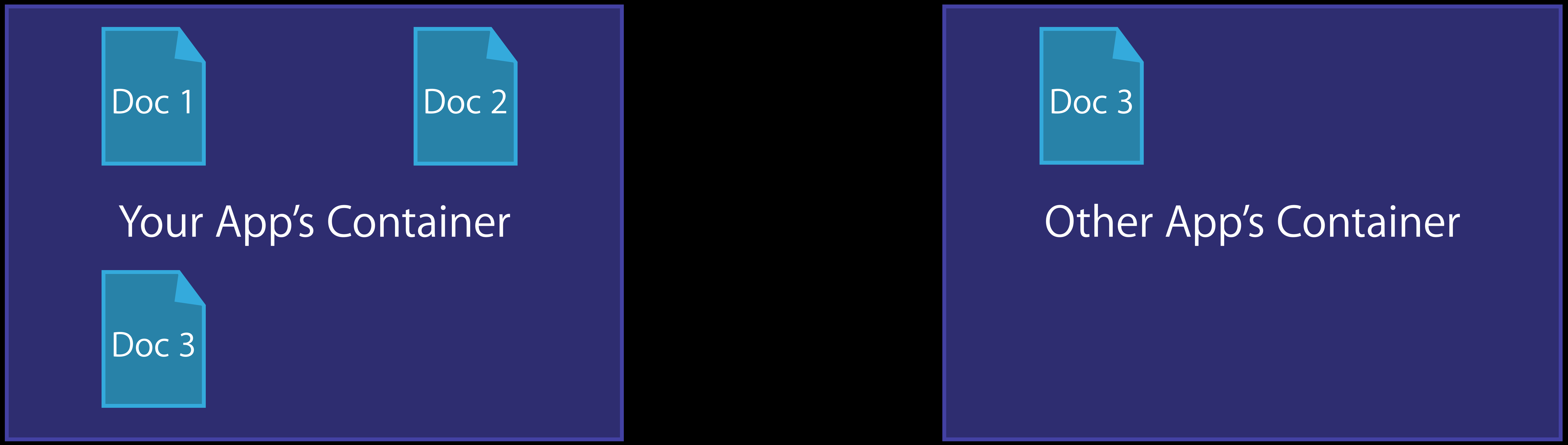

Document Management

Summary

Document Management

Summary

Document references for enumerating picked documents

Document Management

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Document references for enumerating picked documents

Bookmarks for state restoration

Document Management

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Modes for Import, Open, Export, Move

Document Management

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Document references for enumerating picked documents

Bookmarks for state restoration

Modes for Import, Open, Export, Move

Allows the user to access all their iCloud documents

Document Provider Extensions

Providing document storage to other apps

What Is a Document Provider?

Alternative storage locations

What Is a Document Provider?

Alternative storage locations

NEW

Alternative way for a third-party to provide document storage

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Alternative storage locations

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Same perspective from the host app’s point of view

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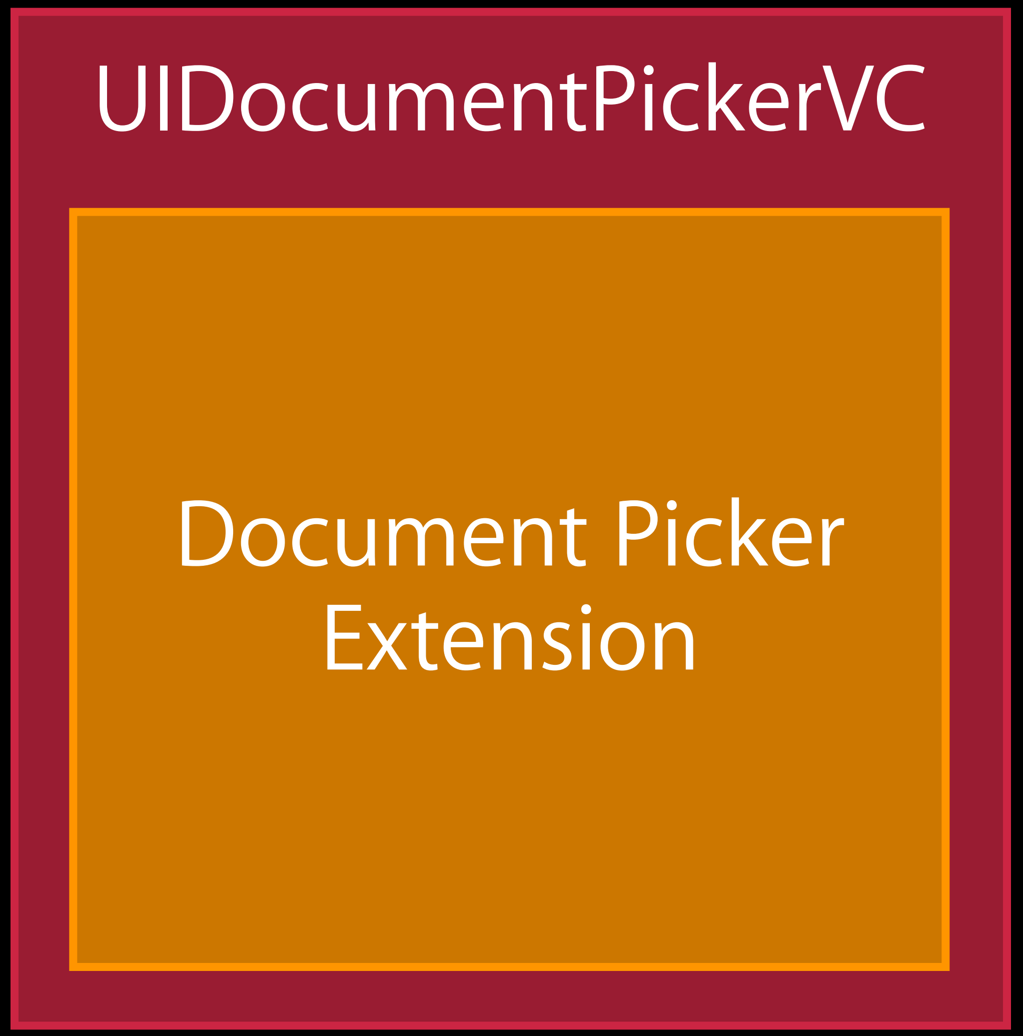

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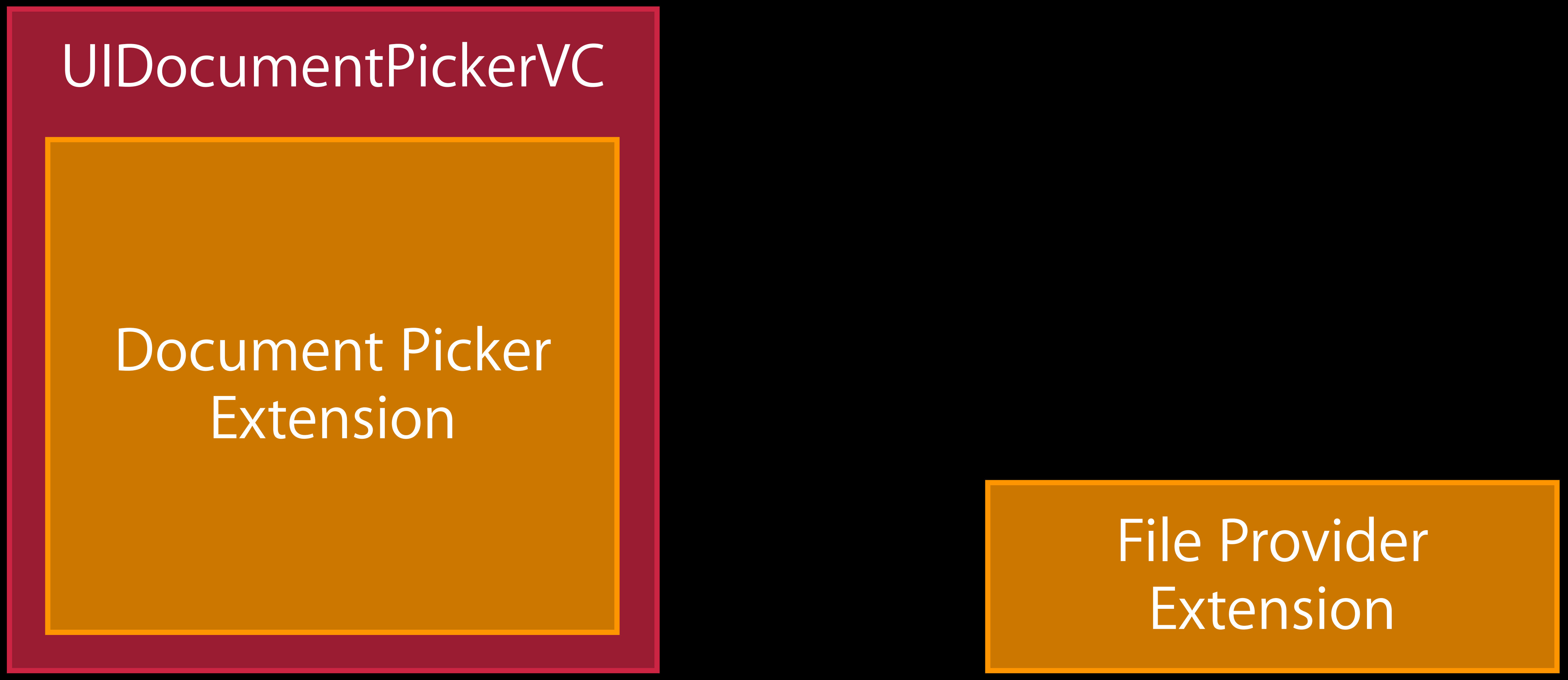

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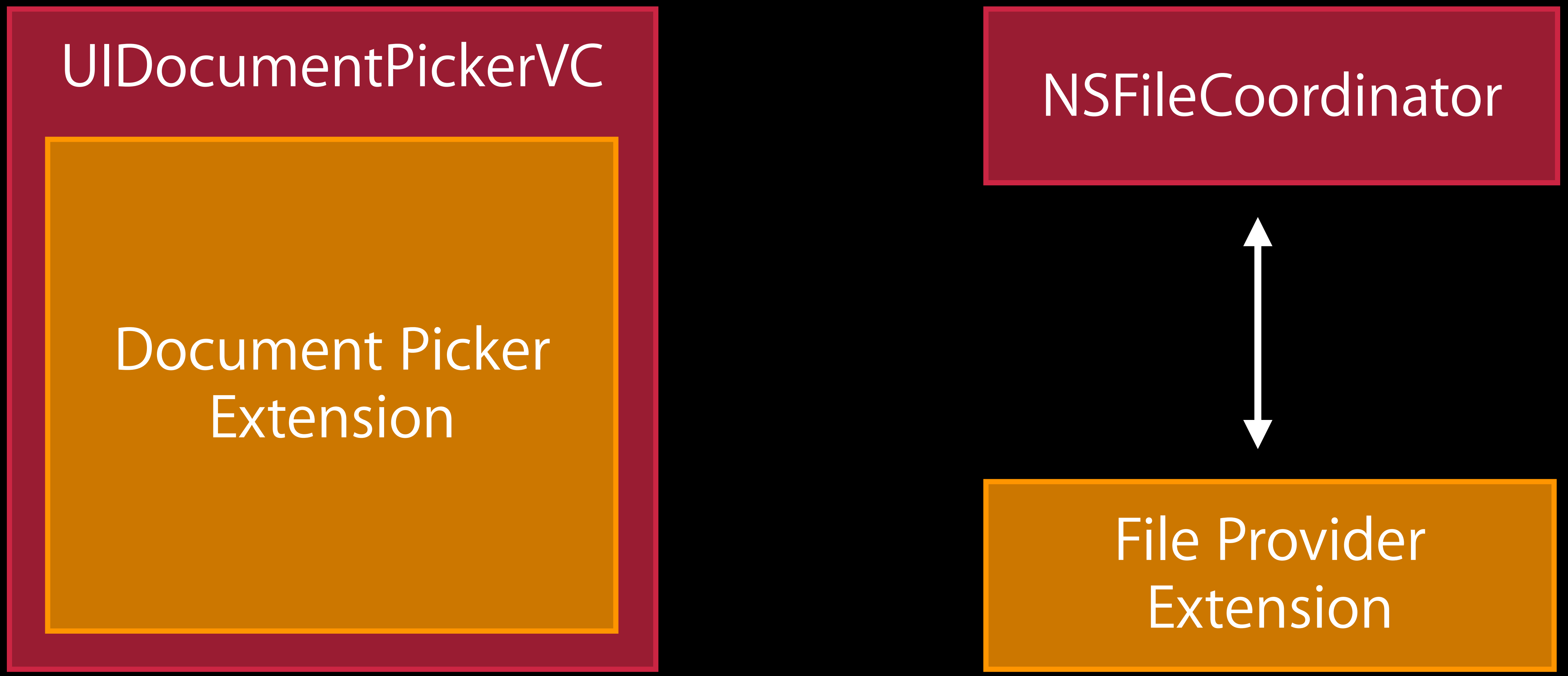
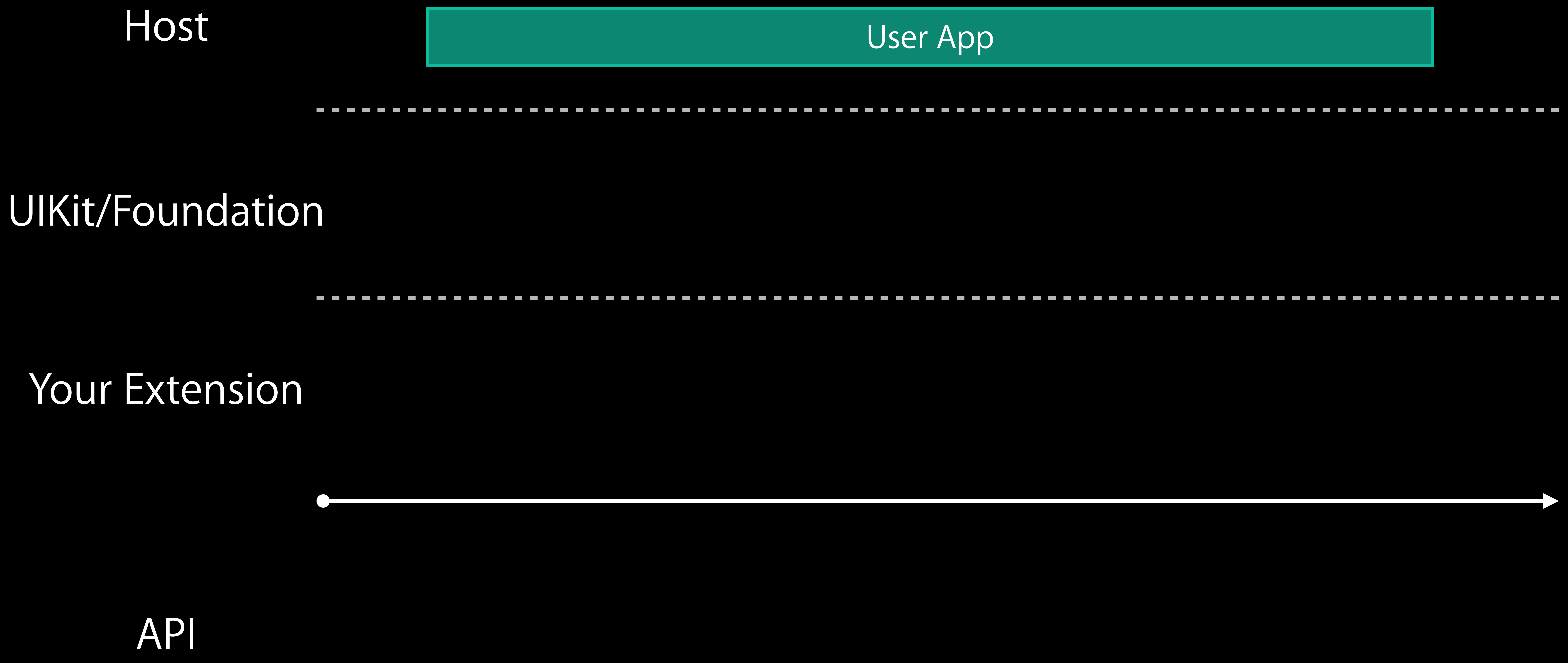


Document Provider Extensions

Data flow for selection and read access



Document Provider Extensions

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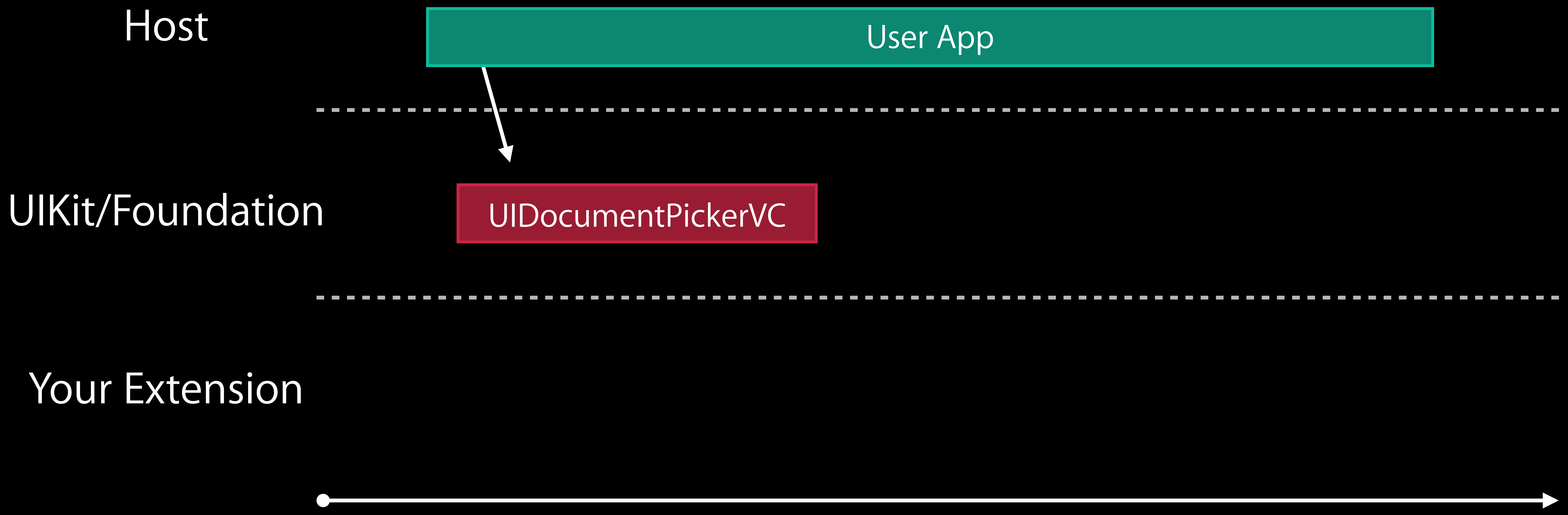
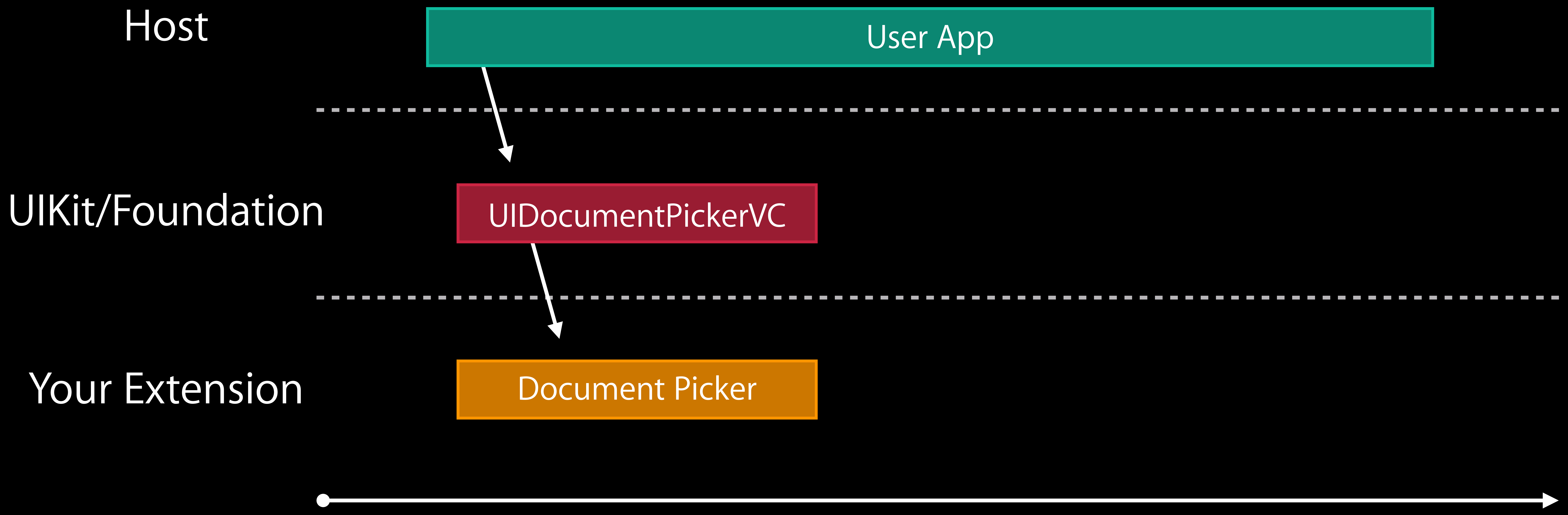


API `initWithDocumentTypes:inMode:`

Document Provider Extensions

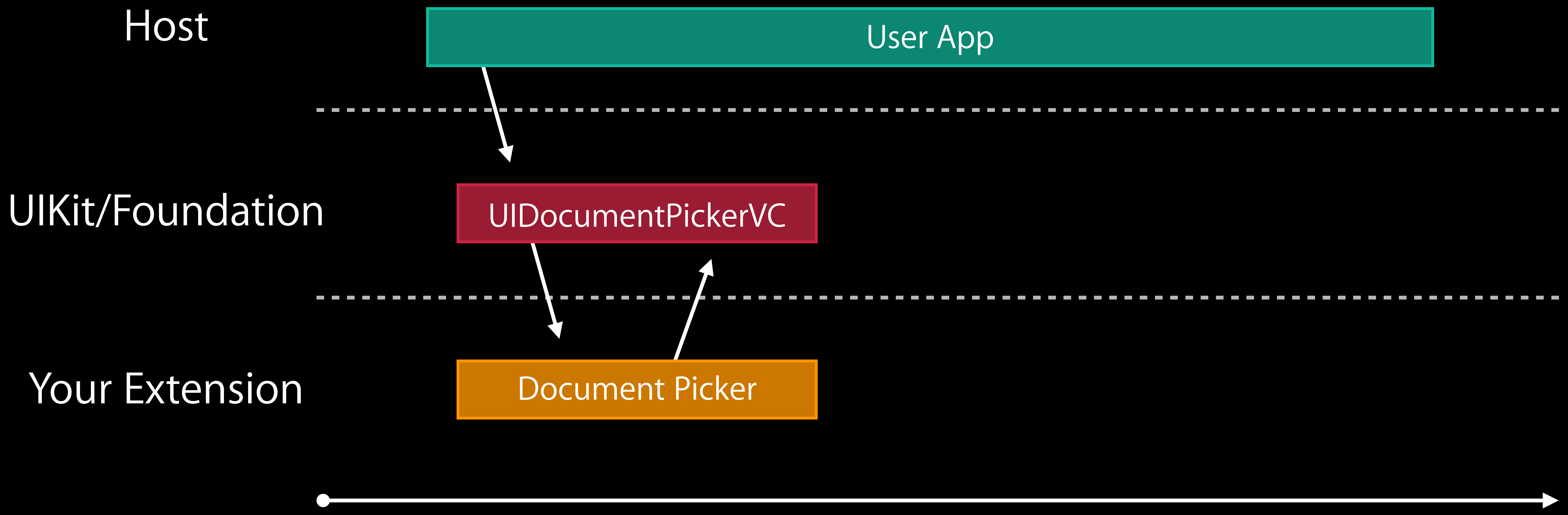
Data flow for selection and read access



API `prepareForPresentationInMode:`

Document Provider Extensions

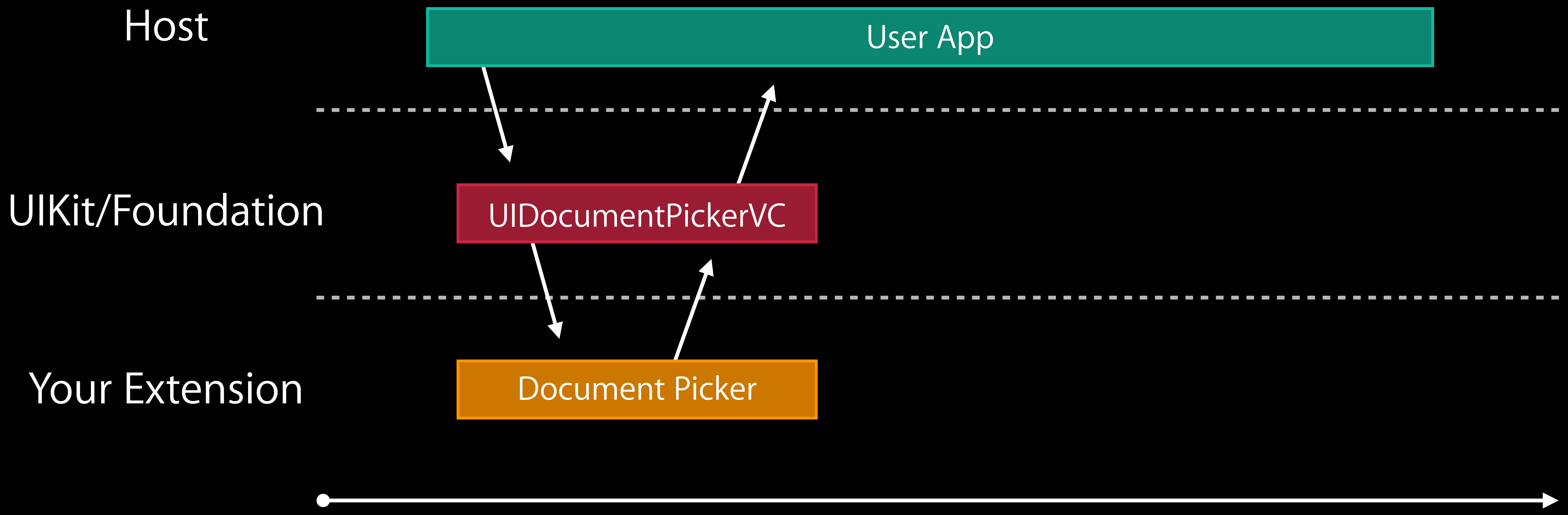
Data flow for selection and read access



API `dismissGrantingAccessToURL:`

Document Provider Extensions

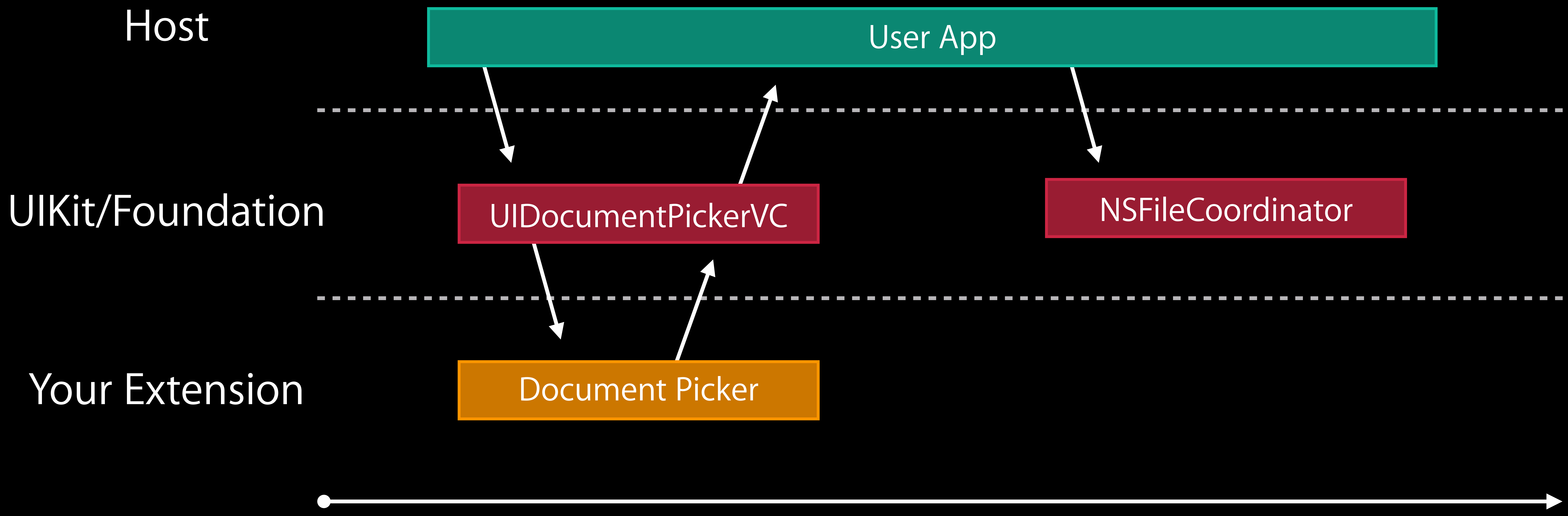
Data flow for selection and read access



API `documentPicker:didPickDocumentAtURL:`

Document Provider Extensions

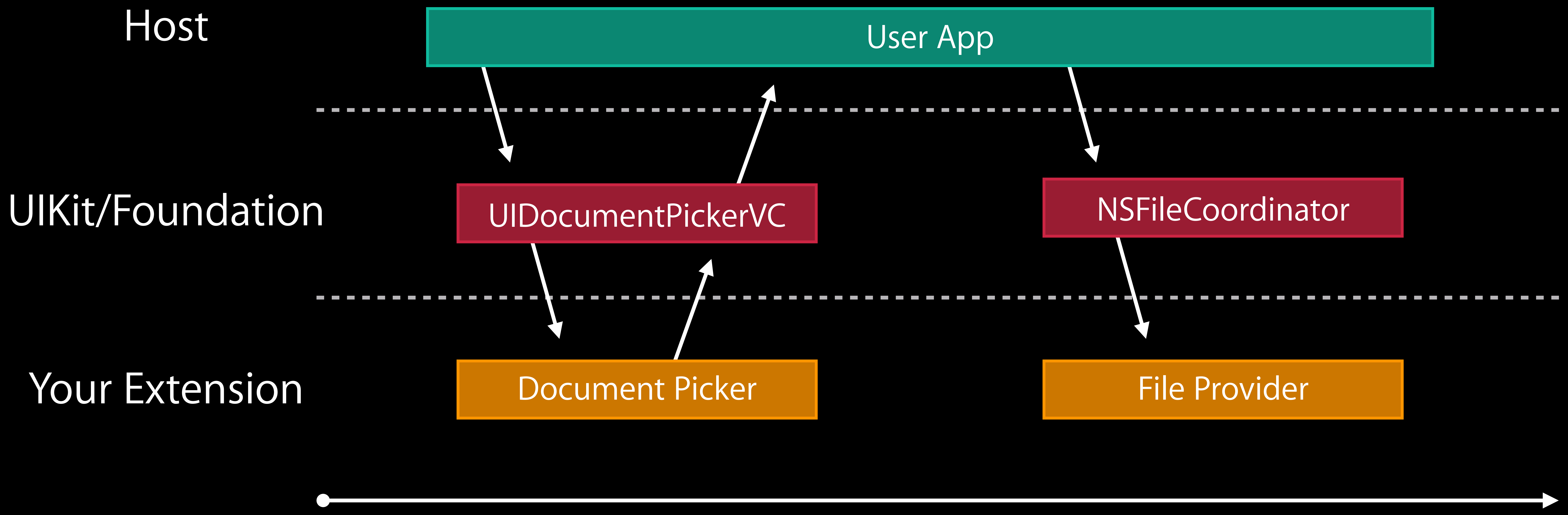
Data flow for selection and read access



API `coordinateReadingItemAtURL:`

Document Provider Extensions

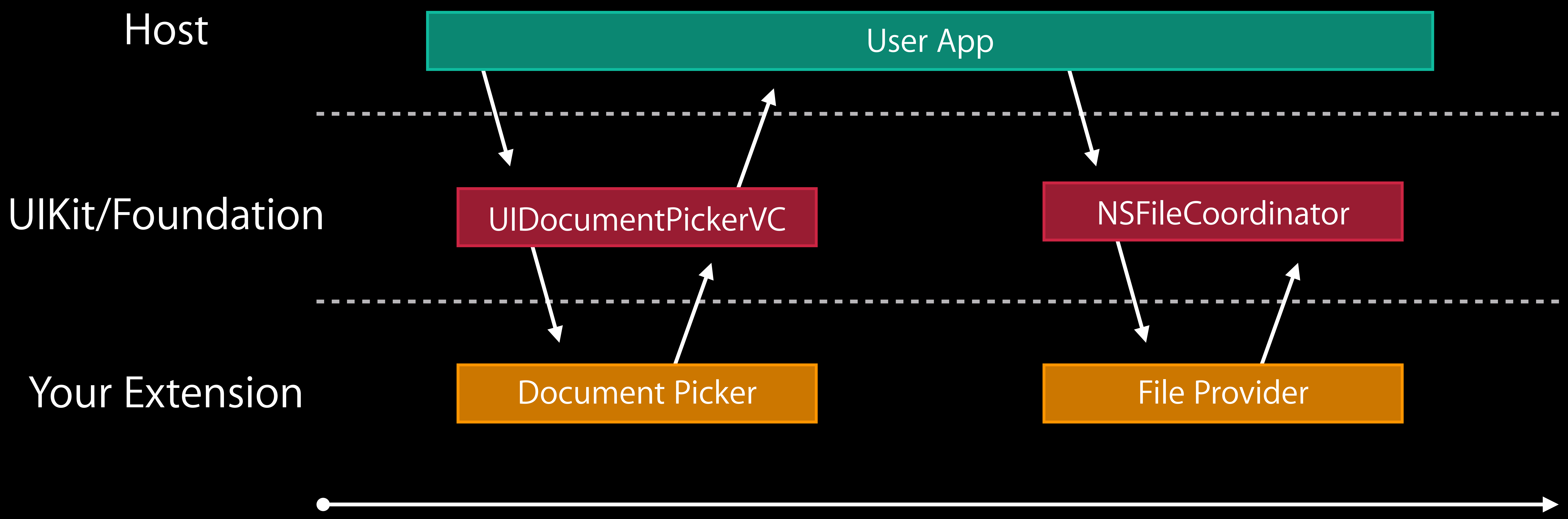
Data flow for selection and read access



API `startProvidingItemAtURL:`

Document Provider Extensions

Data flow for selection and read access

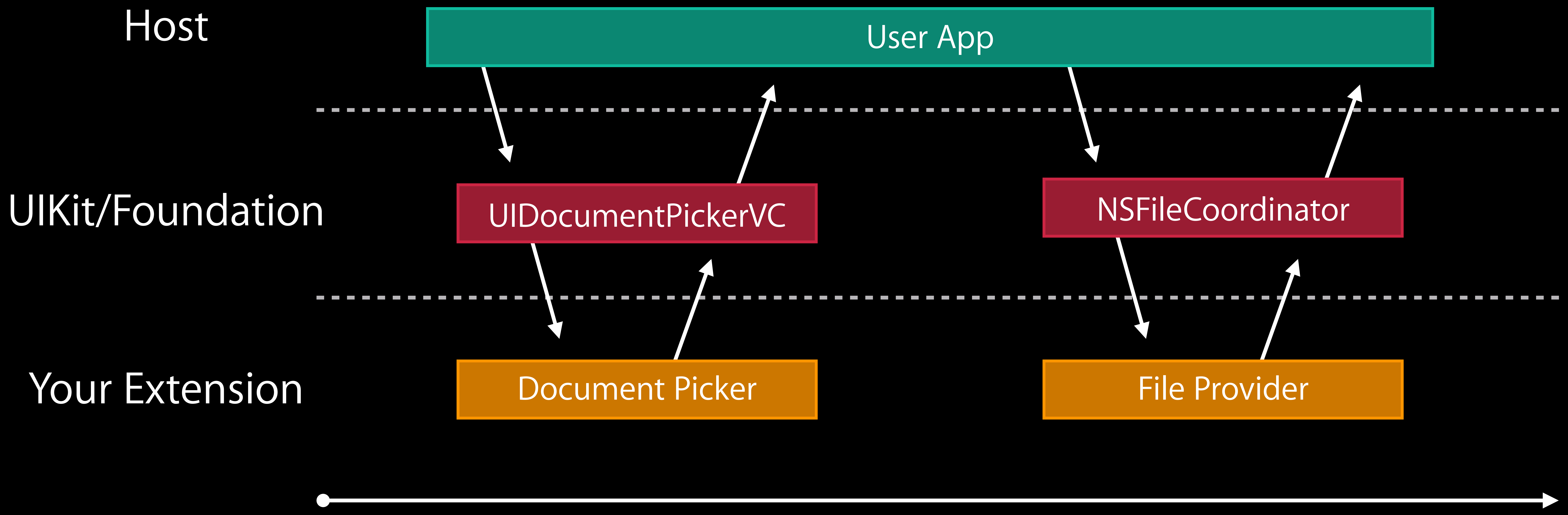


API

```
completion()
```

Document Provider Extensions

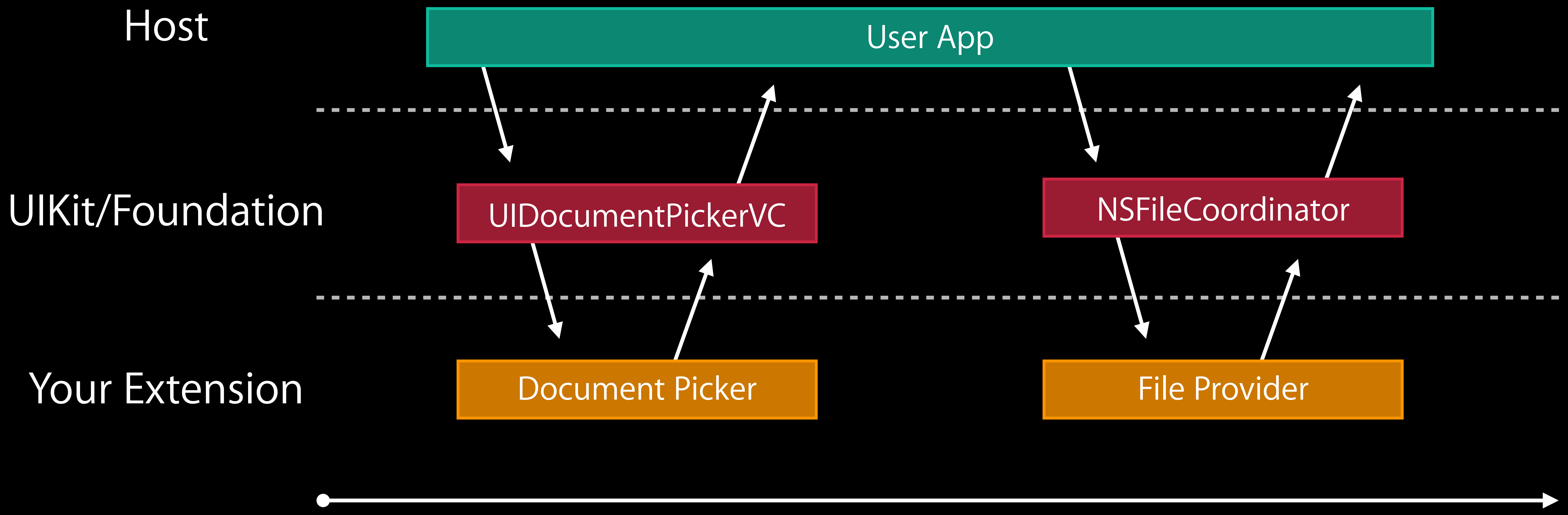
Data flow for selection and read access



API `accessorBlock()`

Document Provider Extensions

Data flow for selection and read access



API `dataWithContentsOfURL:`

Document Provider Extensions

Security and bookmarks

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Document provider extensions don’t take part in document reference mechanism

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Document provider extensions don’t take part in document reference mechanism

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File provider returns/resolves an identifier

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Document provider extensions don’t take part in document reference mechanism

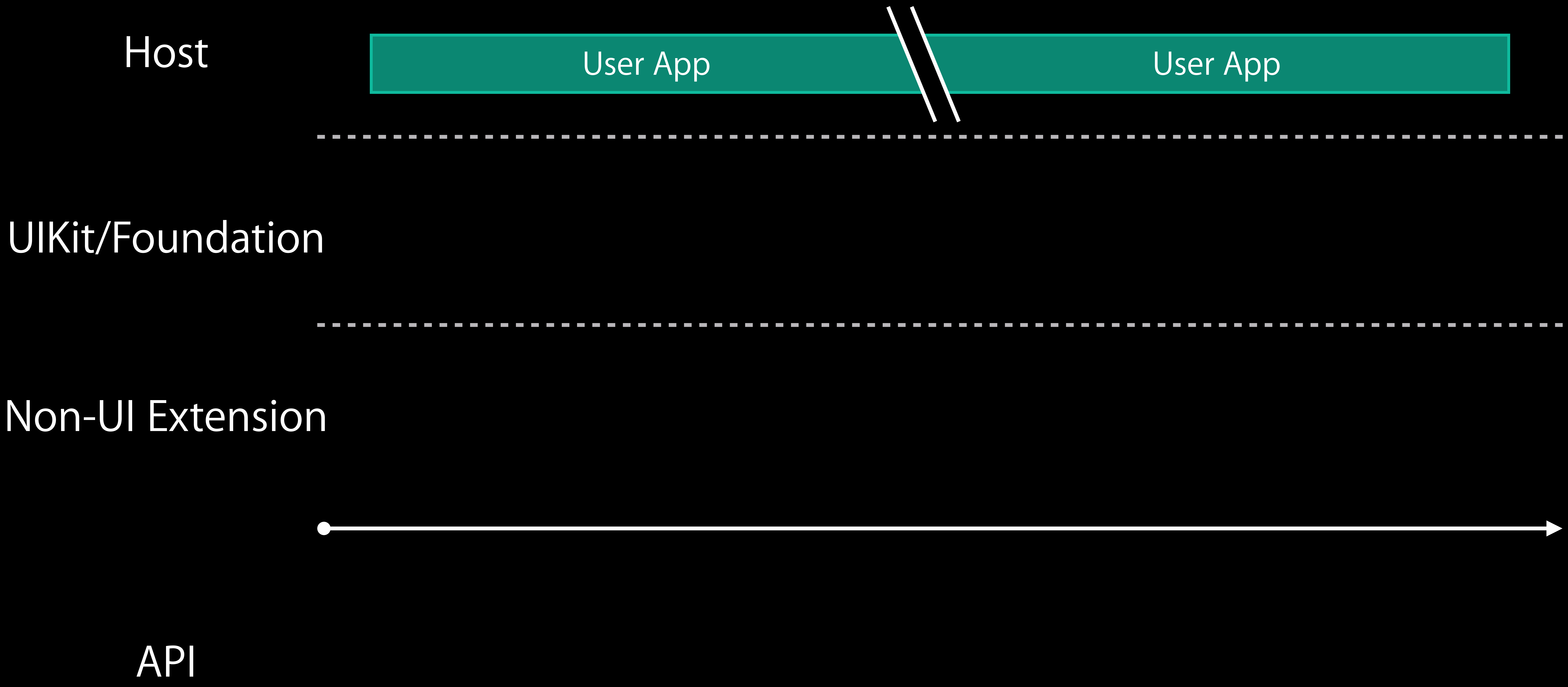
But bookmarks still work

File provider returns/resolves an identifier

Access is controlled by isolation layer

Document Provider Extensions

Bookmark data flow



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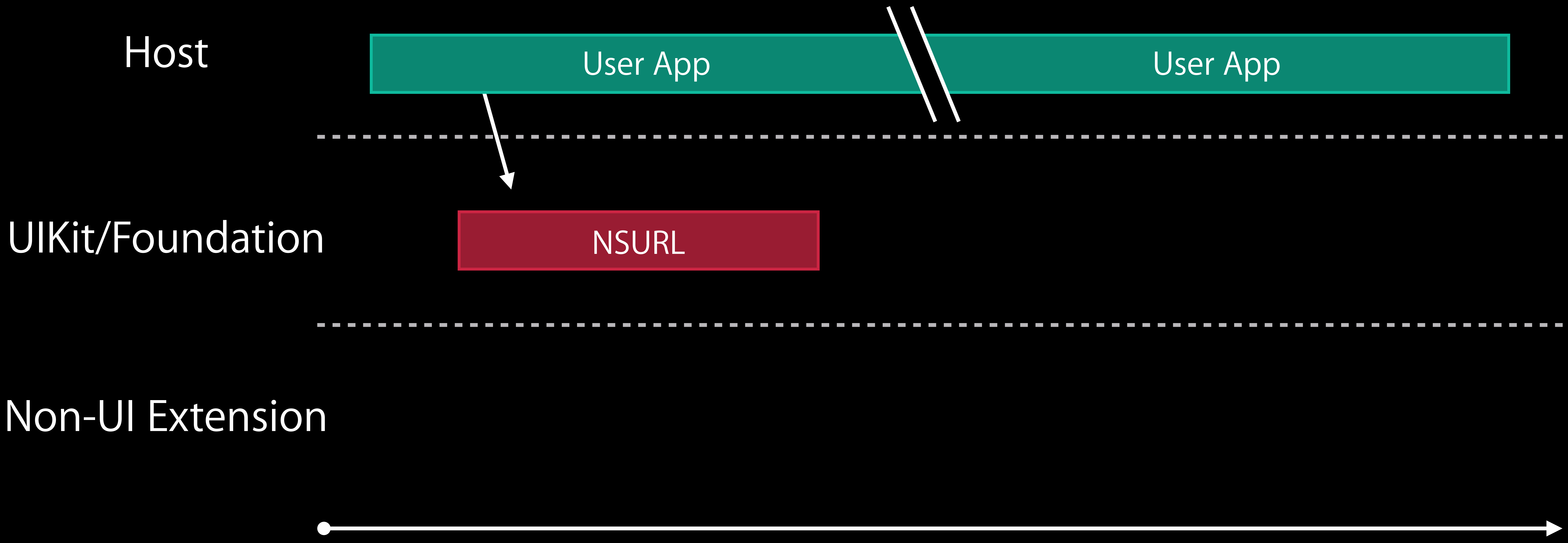
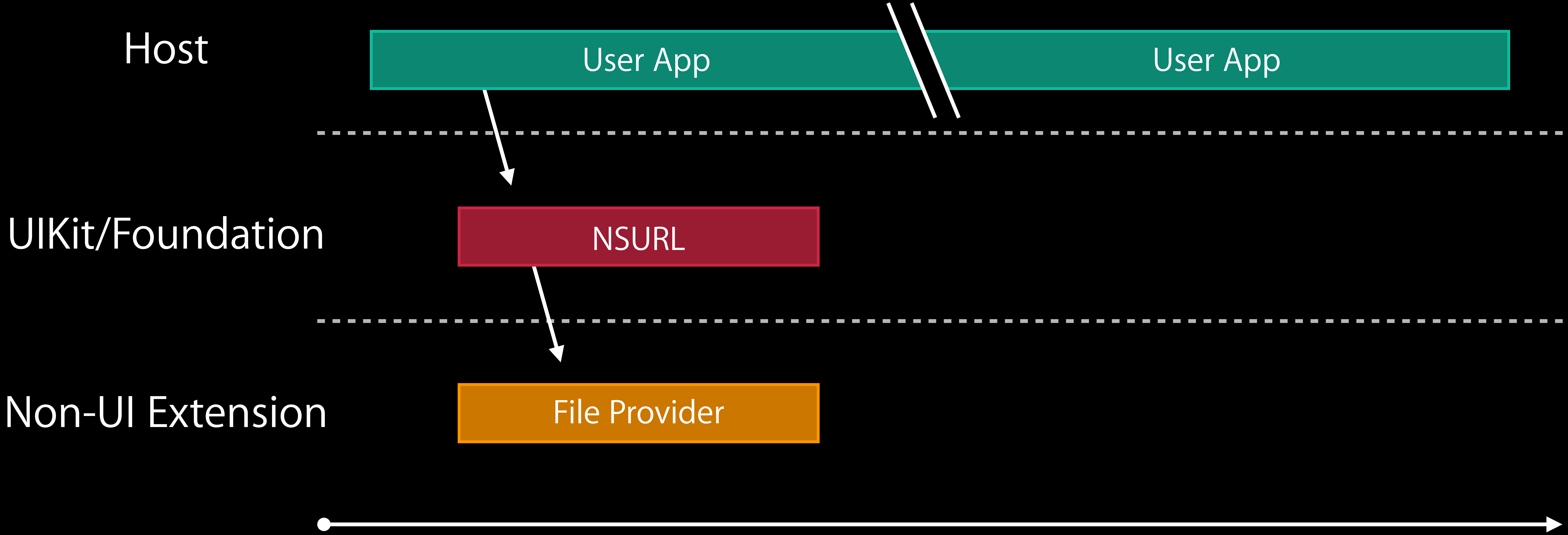
Bookmark data flow



API `bookmarkDataWithOptions:`

Document Provider Extensions

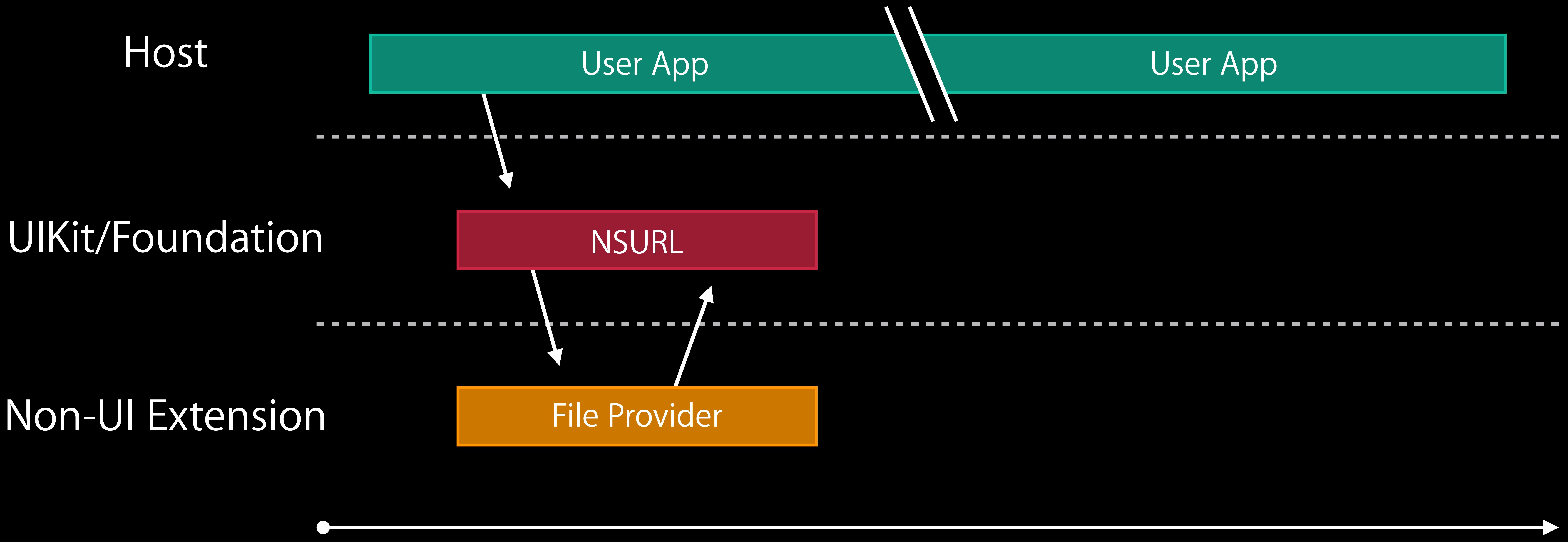
Bookmark data flow



API `persistentIdentifierForItemAtURL:`

Document Provider Extensions

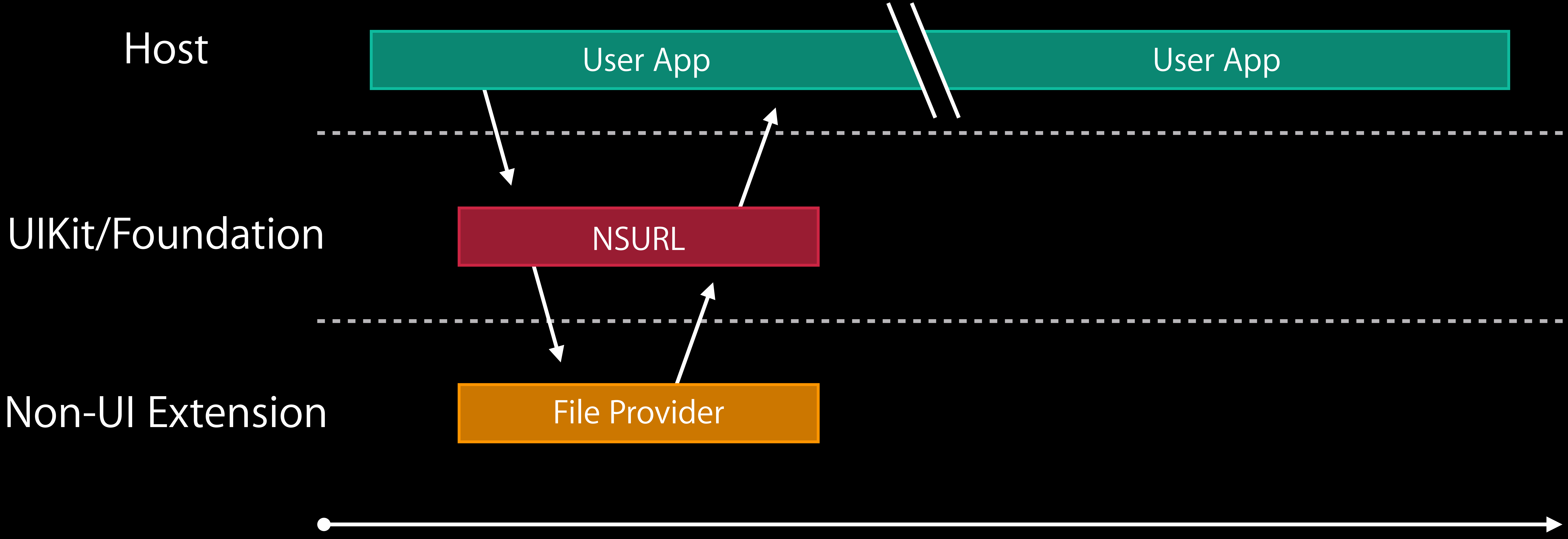
Bookmark data flow



API `NSString *identifier`

Document Provider Extensions

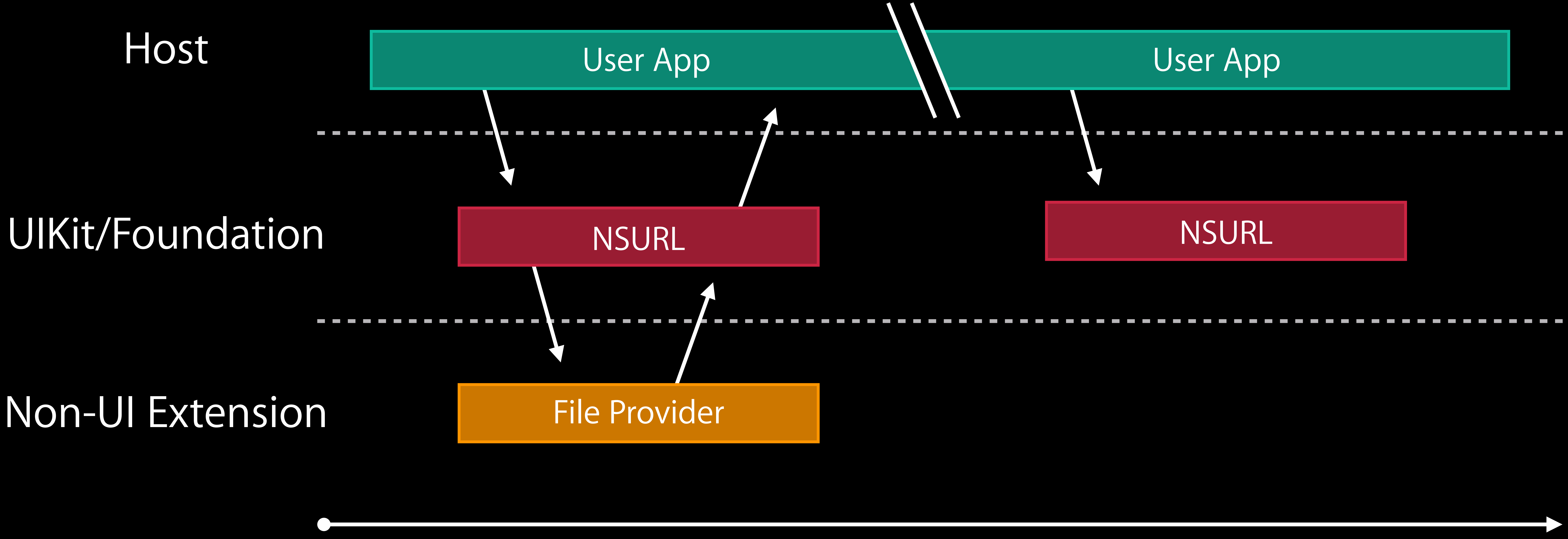
Bookmark data flow



API `NSData *bookmarkData`

Document Provider Extensions

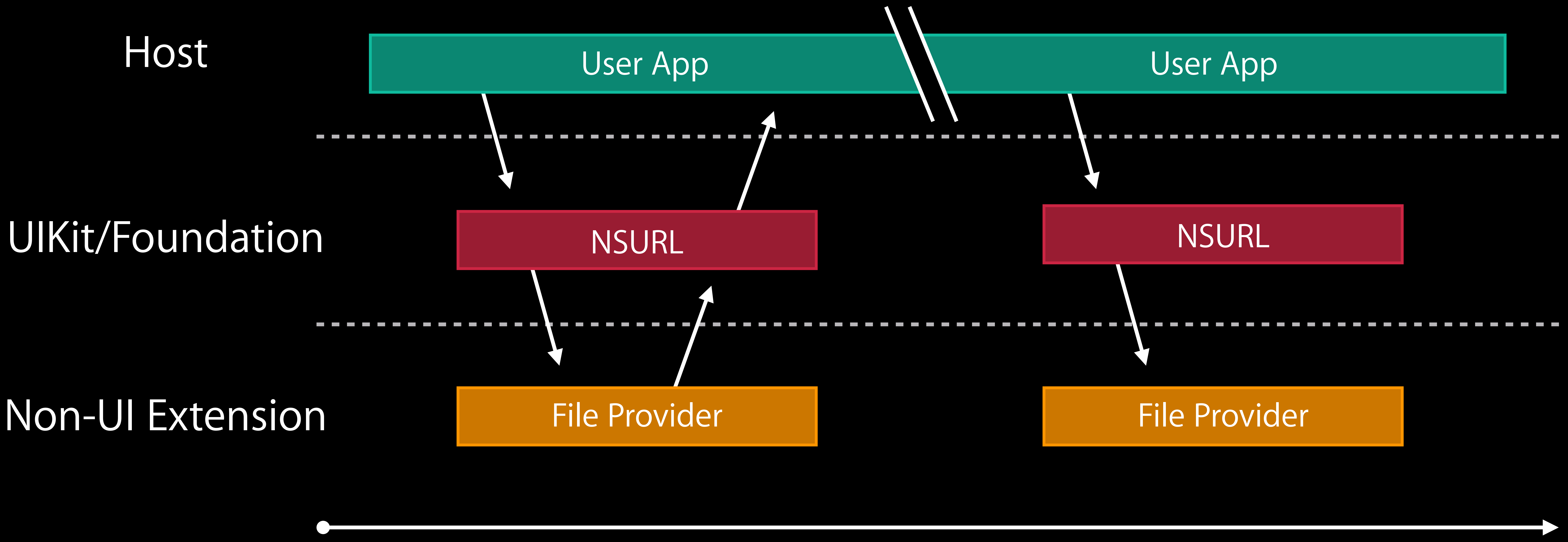
Bookmark data flow



API `URLByResolvingBookmarkData:`

Document Provider Extensions

Bookmark data flow

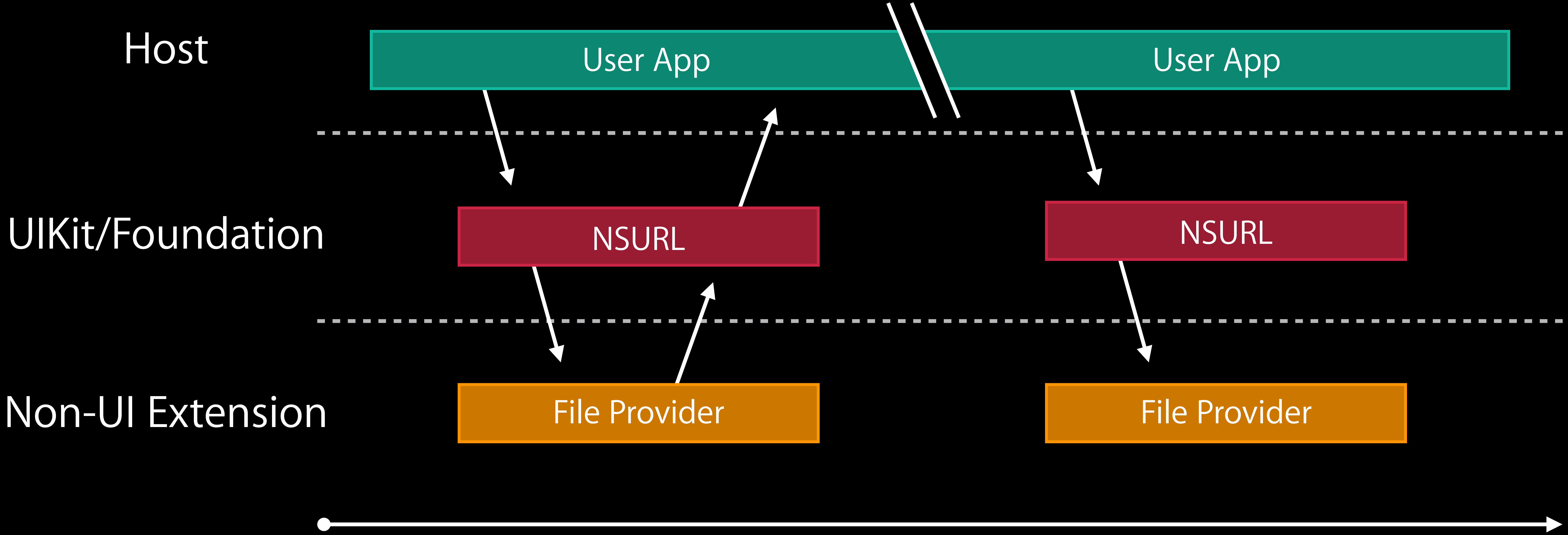


API

```
URLForItemWithPersistentIdentifier:
providePlaceholderAtURL:
```

Document Provider Extensions

Bookmark data flow



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URLForItemWithPersistentIdentifier:
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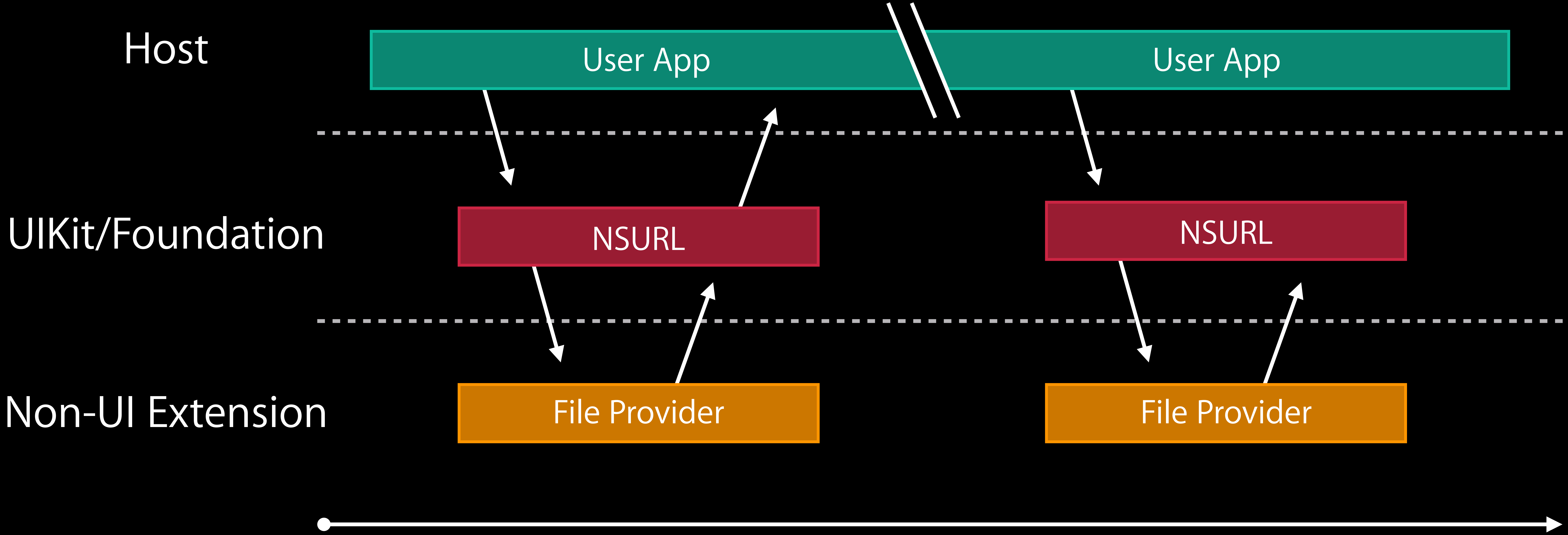
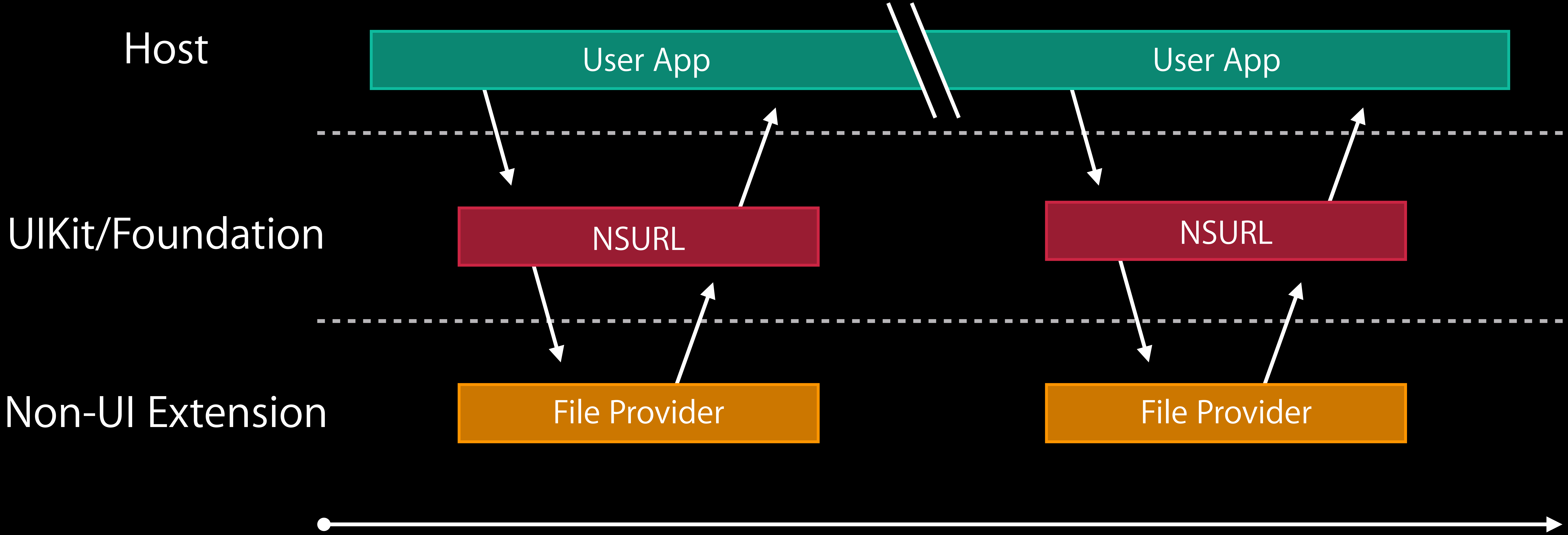


API `NSURL *url`

Document Provider Extensions

Bookmark data flow



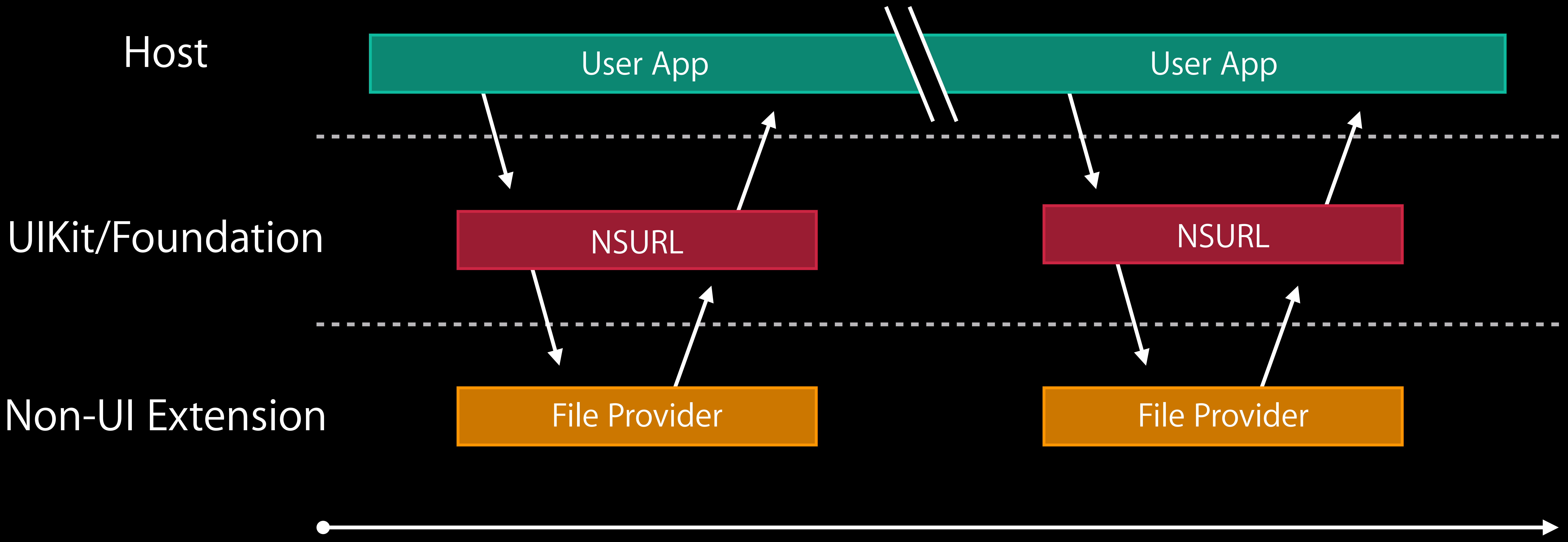
API

`getPromisedItemResourceValue:`

`NSFileCoordinator API`

Document Provider Extensions

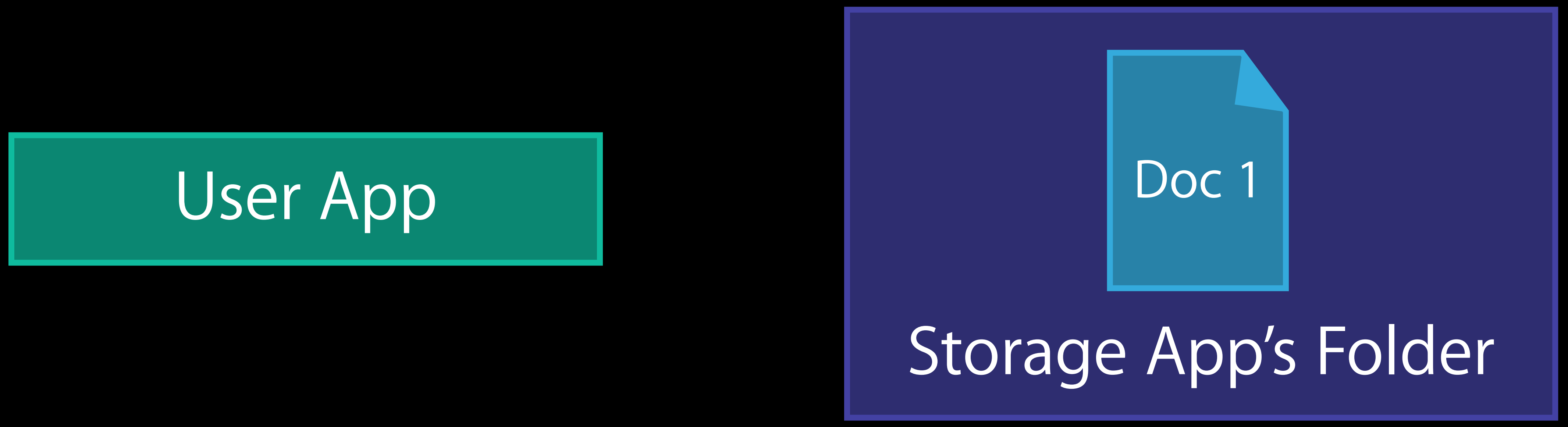
Bookmark data flow



API `getPromisedItemResourceValue:`
`NSFileCoordinator API`

Document Provider Extensions

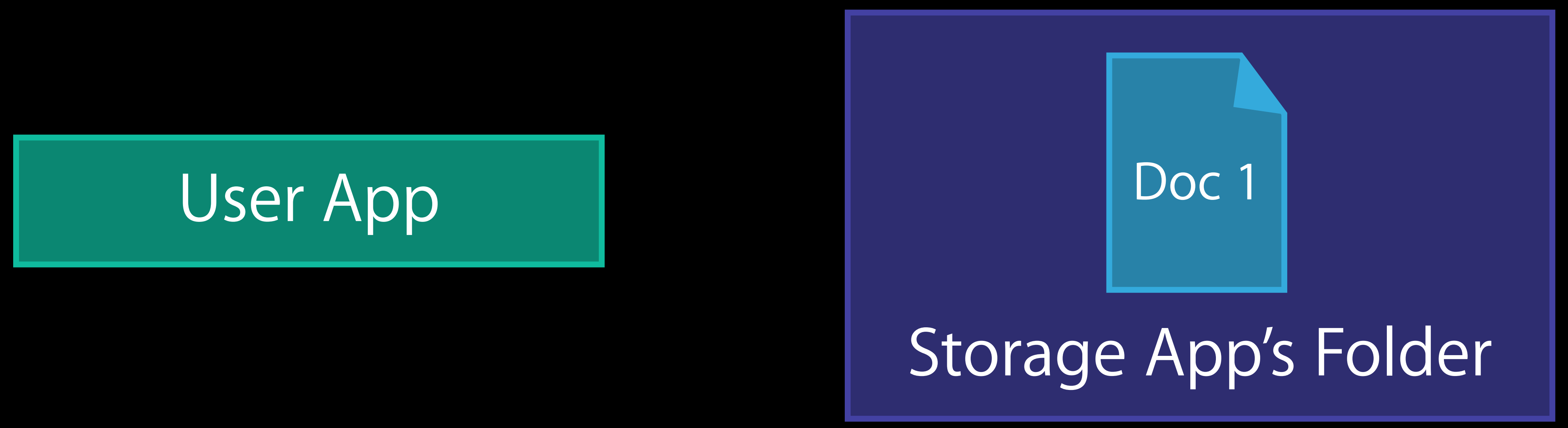
Writing files



Document Provider Extensions

Writing files

Host app uses file coordination to write file



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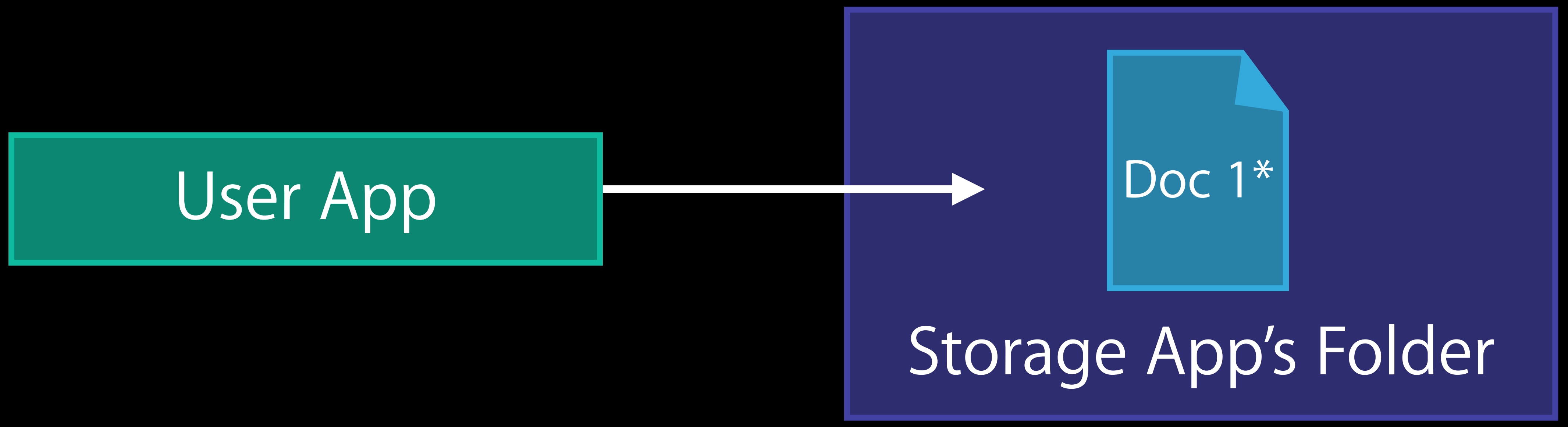
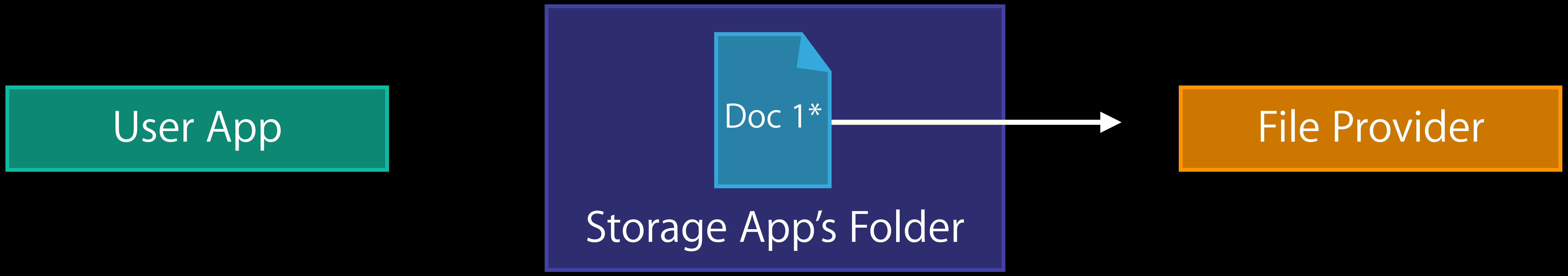


Document Provider Extensions

Writing files

Host app uses file coordination to write file

Soon after, itemChangedAtURL: is called on the file provider



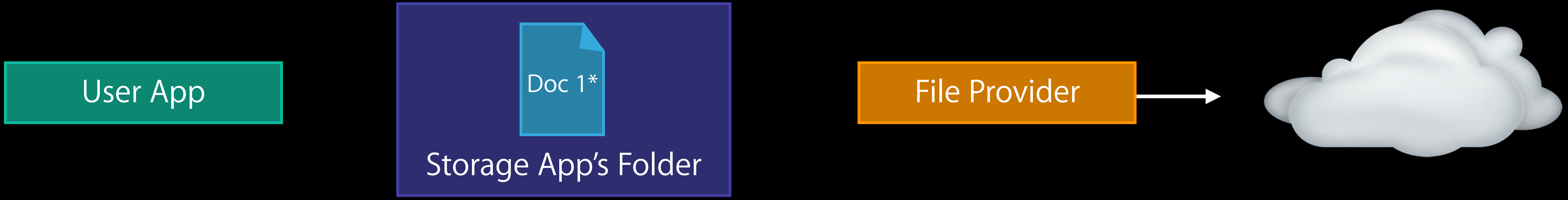
Document Provider Extensions

Writing files

Host app uses file coordination to write file

Soon after, itemChangedAtURL: is called on the file provider

File provider can e.g., initiate an upload



Demo

Building a simple Document Provider

Summary

Summary

Xcode template to get you started with a Document Provider

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Xcode template to get you started with a Document Provider

Document Provider shows up next to iCloud picker

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Xcode template to get you started with a Document Provider

Document Provider shows up next to iCloud picker

Sample code is available to display each of the picker modes

From Documents in the Cloud to iCloud Drive

For users

From Documents in the Cloud to iCloud Drive

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On iOS 8, users can choose to continue using iCloud Documents or migrate to iCloud Drive

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After an account is migrated to iCloud Drive, only devices using iCloud Drive will propagate changes to each other

From Documents in the Cloud to iCloud Drive

For developers

From Documents in the Cloud to iCloud Drive

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The OS X Yosemite Developer Preview and the iOS 8 Beta use iCloud Drive

From Documents in the Cloud to iCloud Drive

For developers

The OS X Yosemite Developer Preview and the iOS 8 Beta use iCloud Drive

New features are only available in iCloud Drive

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File coordination for document access

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Discovery and display of files

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Using UIDocumentPicker to access files outside your container

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Using UIDocumentPicker to access files outside your container

Document Provider extensions to support third-party providers

More Information

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More Information

Documentation
iCloud for Developers
http://developer.apple.com/icloud

Document Picker Programming Guide
http://developer.apple.com

Apple Developer Forums
http://devforums.apple.com

Related Sessions

Introducing CloudKit	Mission	Tuesday 3:15PM
Creating Extensions for iOS and OS X, Part 1	Mission	Tuesday 2:00PM
Creating Extensions for iOS and OS X, Part 2	Mission	Wednesday 11:30AM

Labs

● Extensions Lab	Frameworks Lab B Thursday 2:00PM

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