

Building Document Based Apps

Session 234

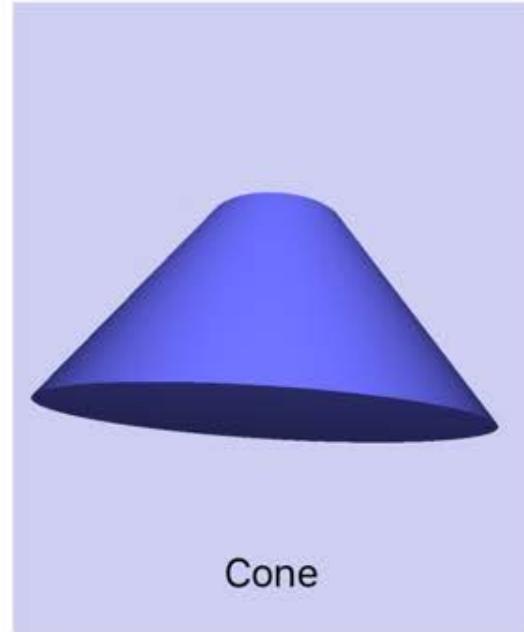
Mike Hess Software Engineer

Johannes Fortmann Senior Software Engineer

My Favorite Shapes & Colors



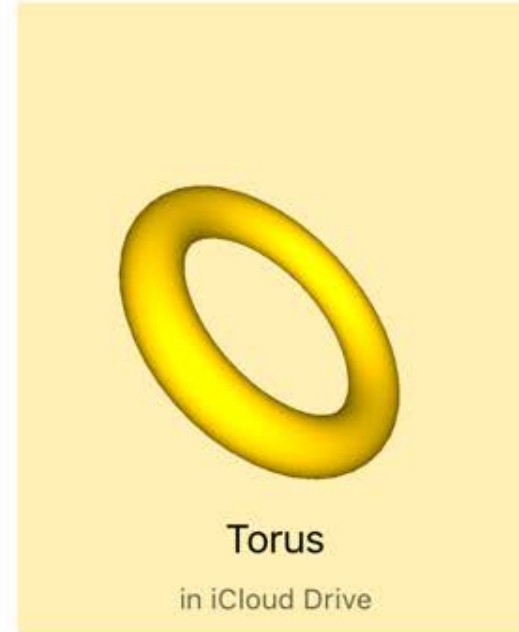
Recently Viewed



Cone

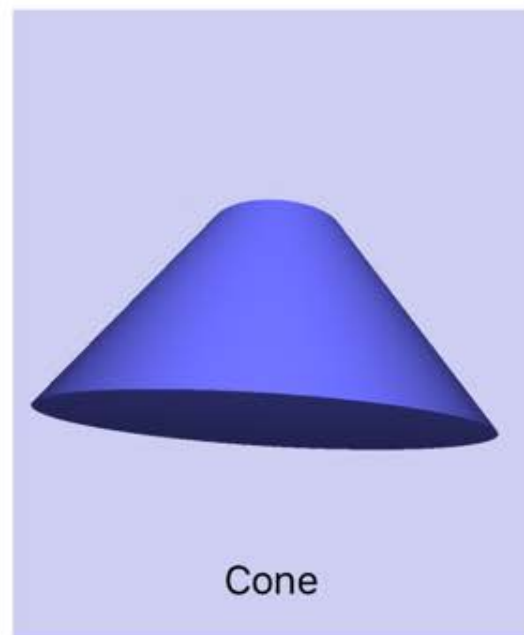


Pyramid

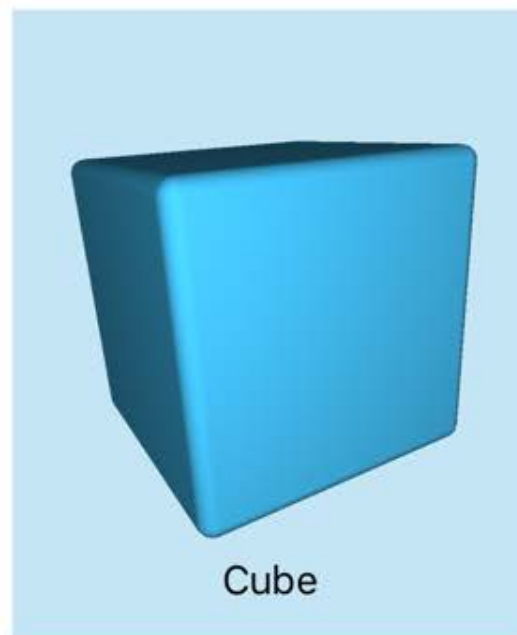


Torus
in iCloud Drive

All Shapes



Cone



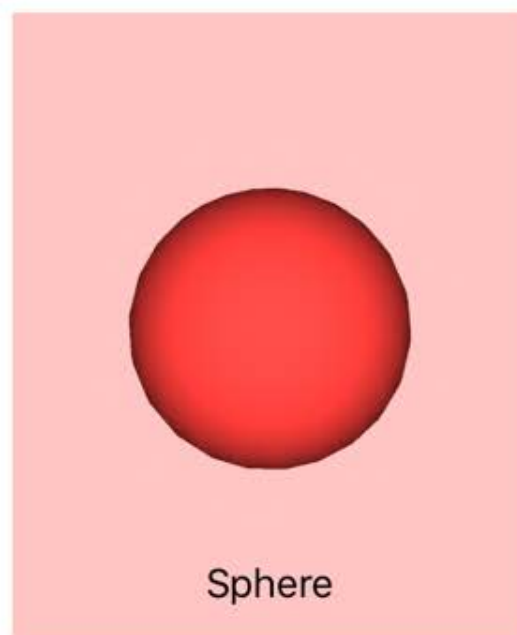
Cube



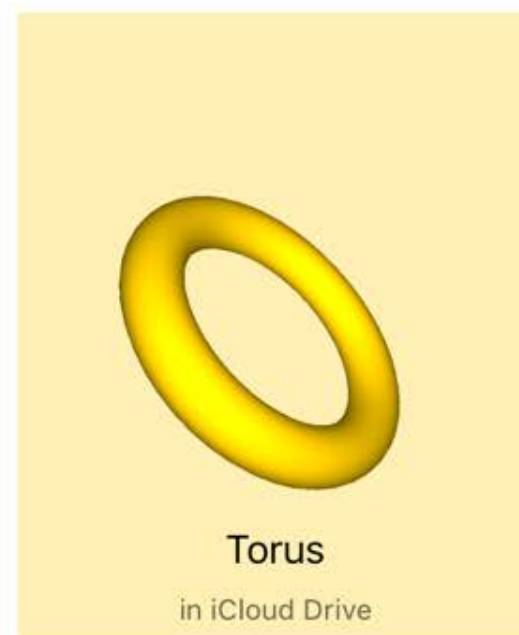
Cylinder



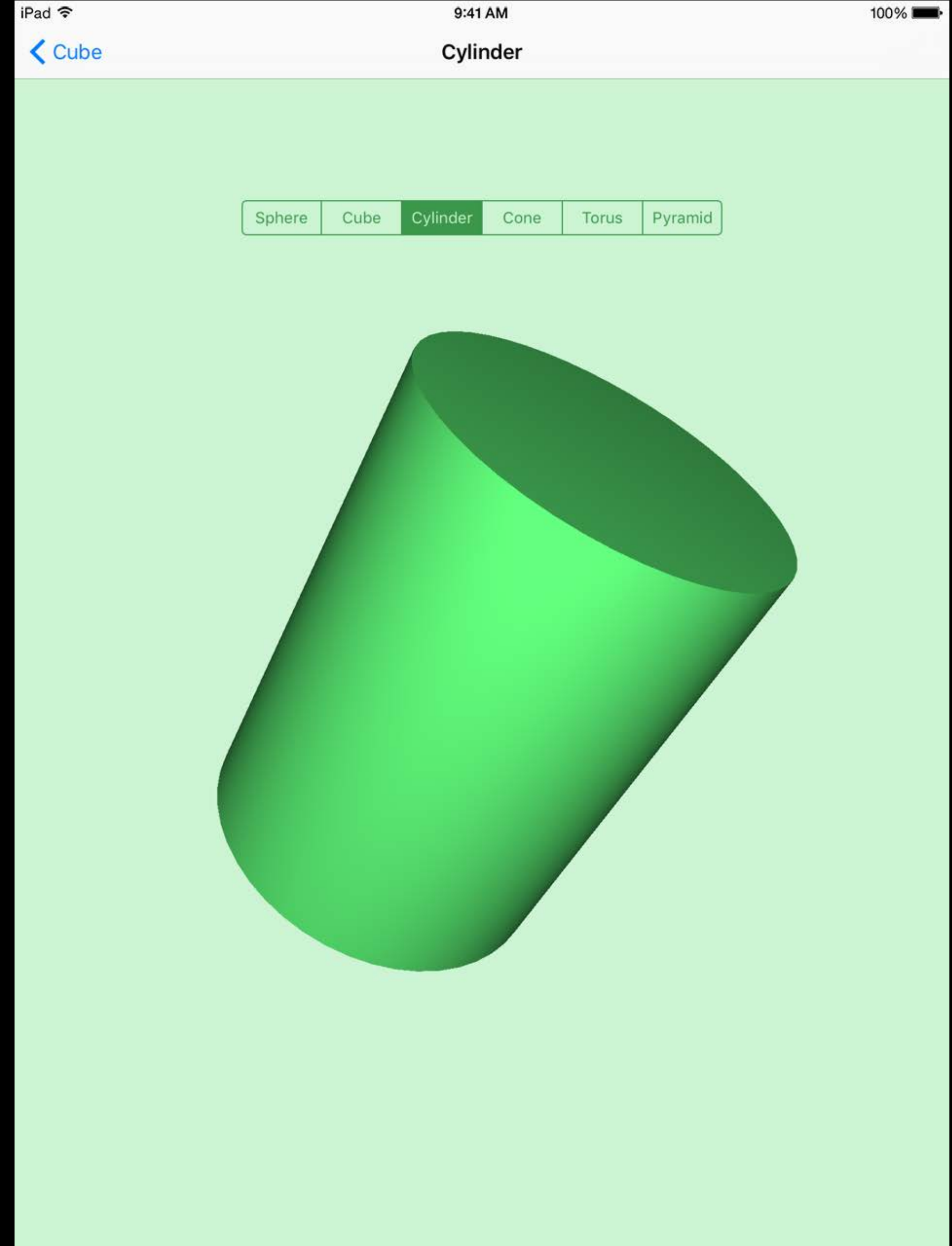
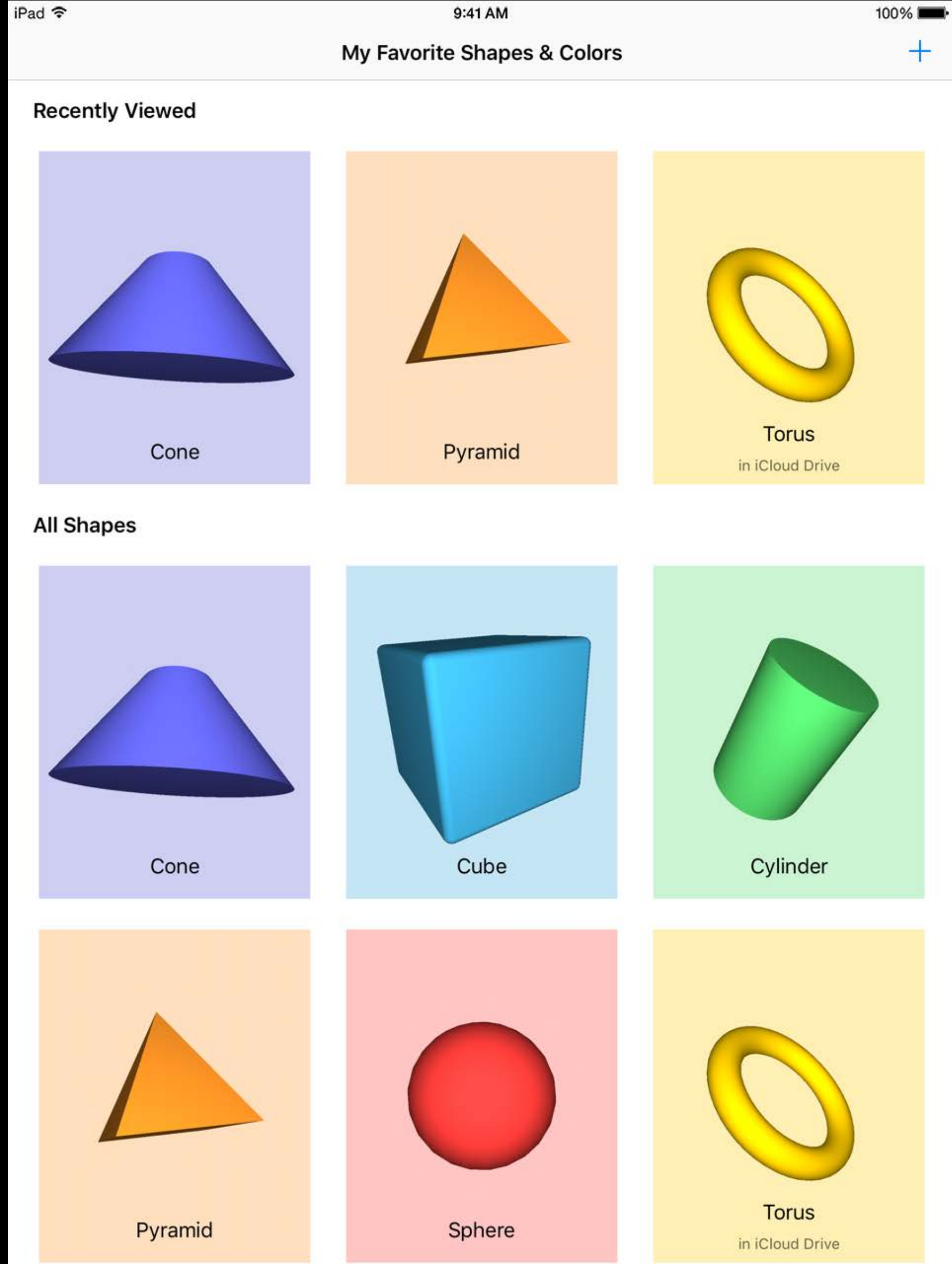
Pyramid

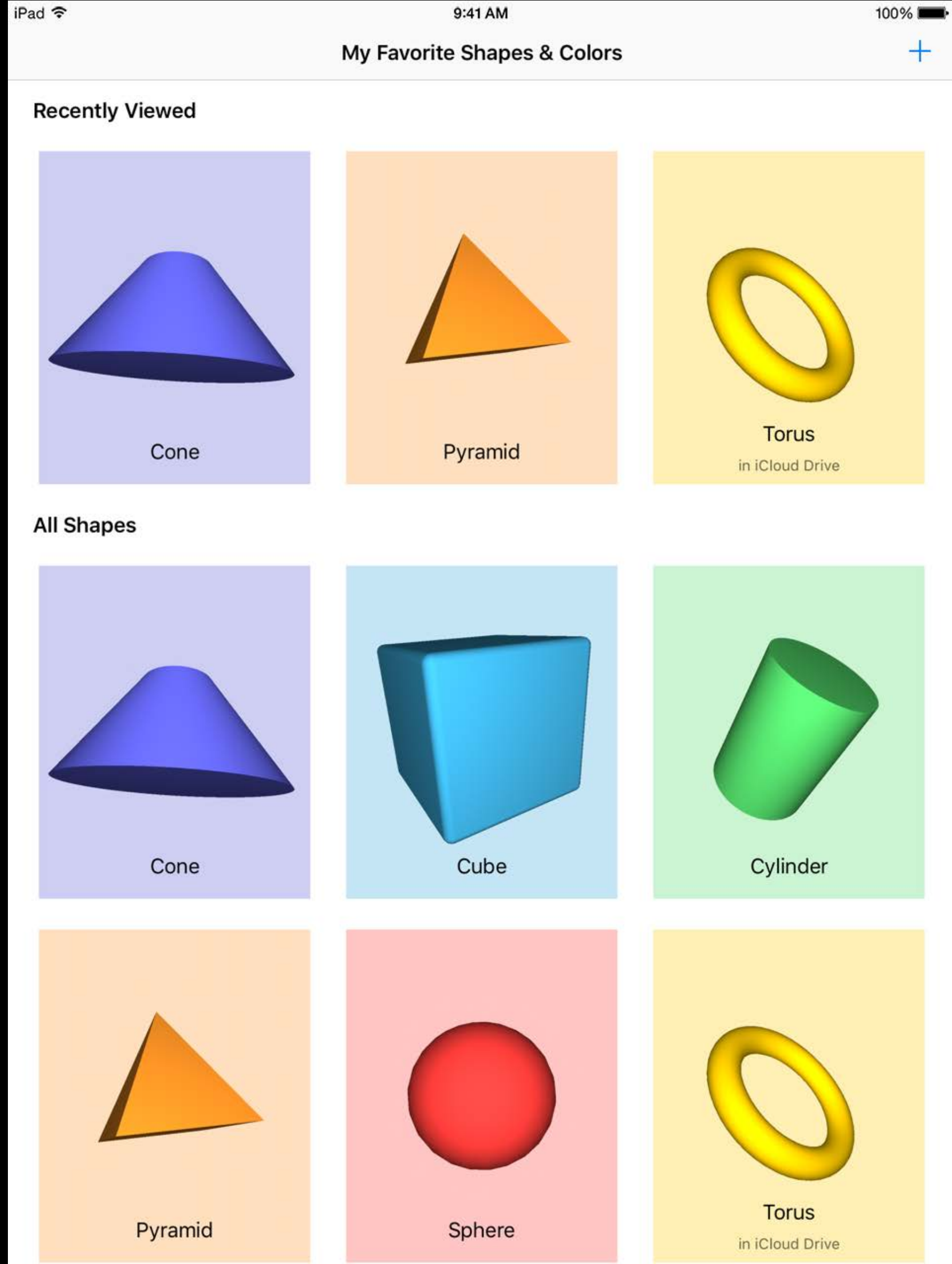


Sphere



Torus
in iCloud Drive





What's a Document Based App?

General characteristics

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Document is a single standalone entity

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Document based app manages a list of documents

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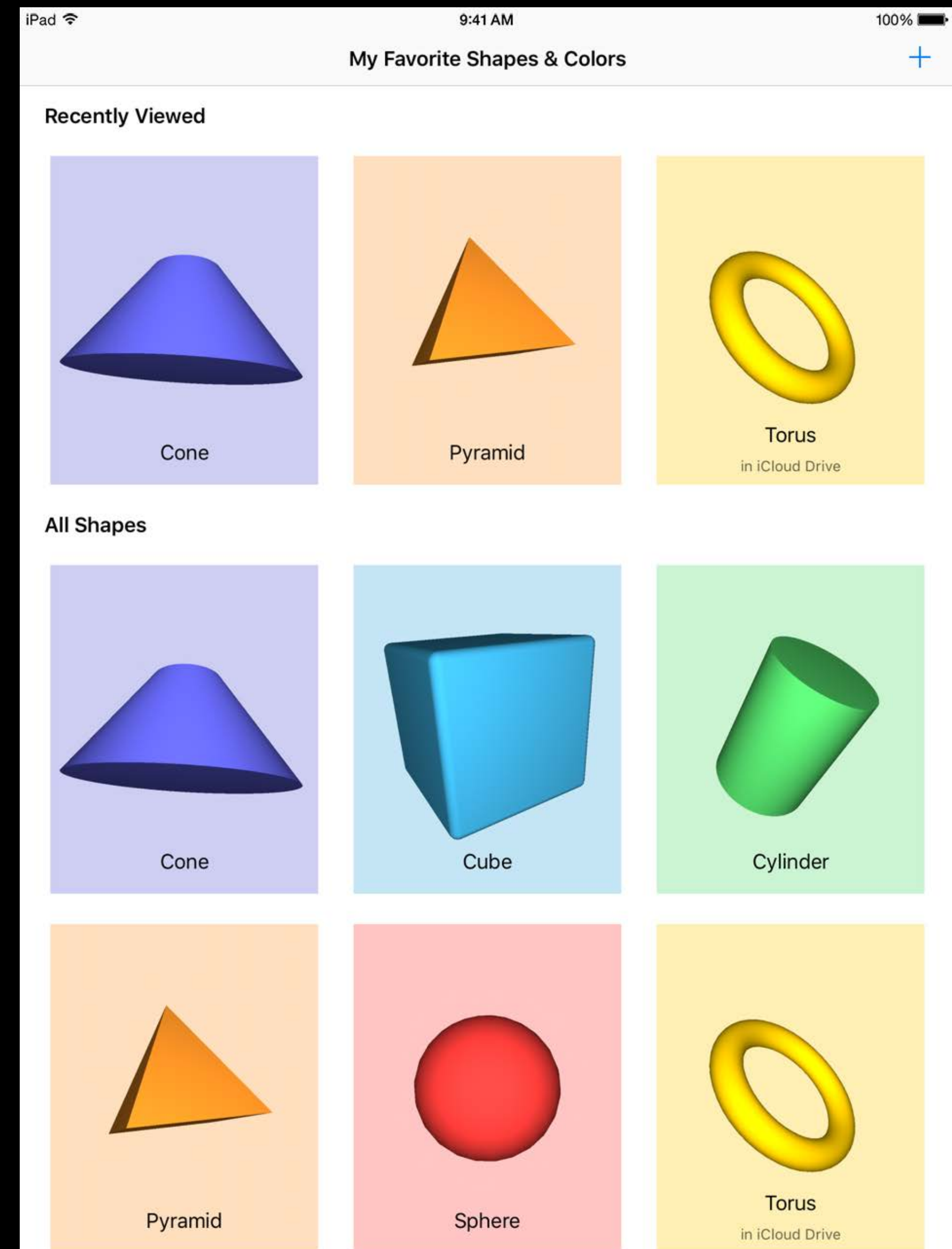
Presents to user to edit etc



Building a Document Browser

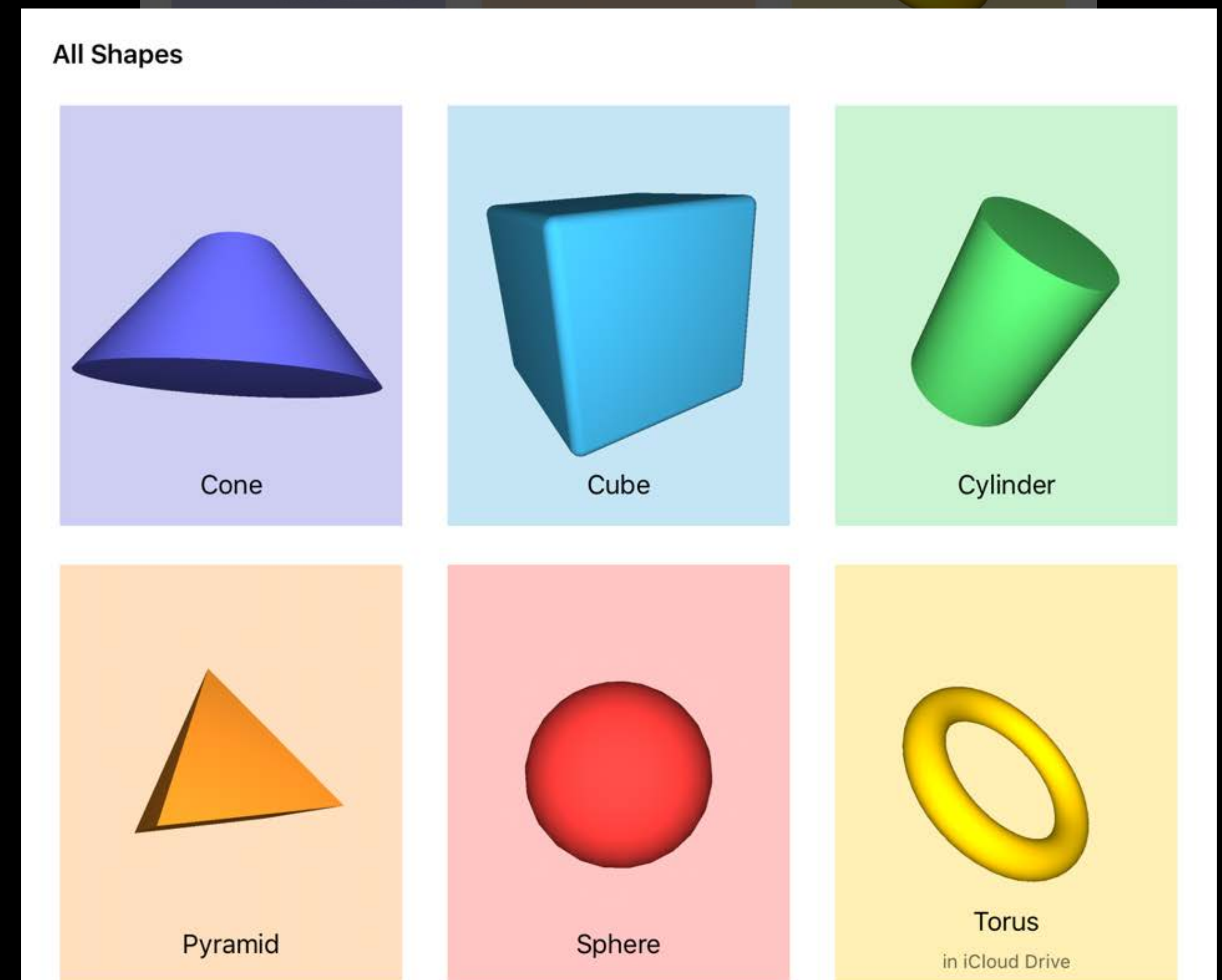
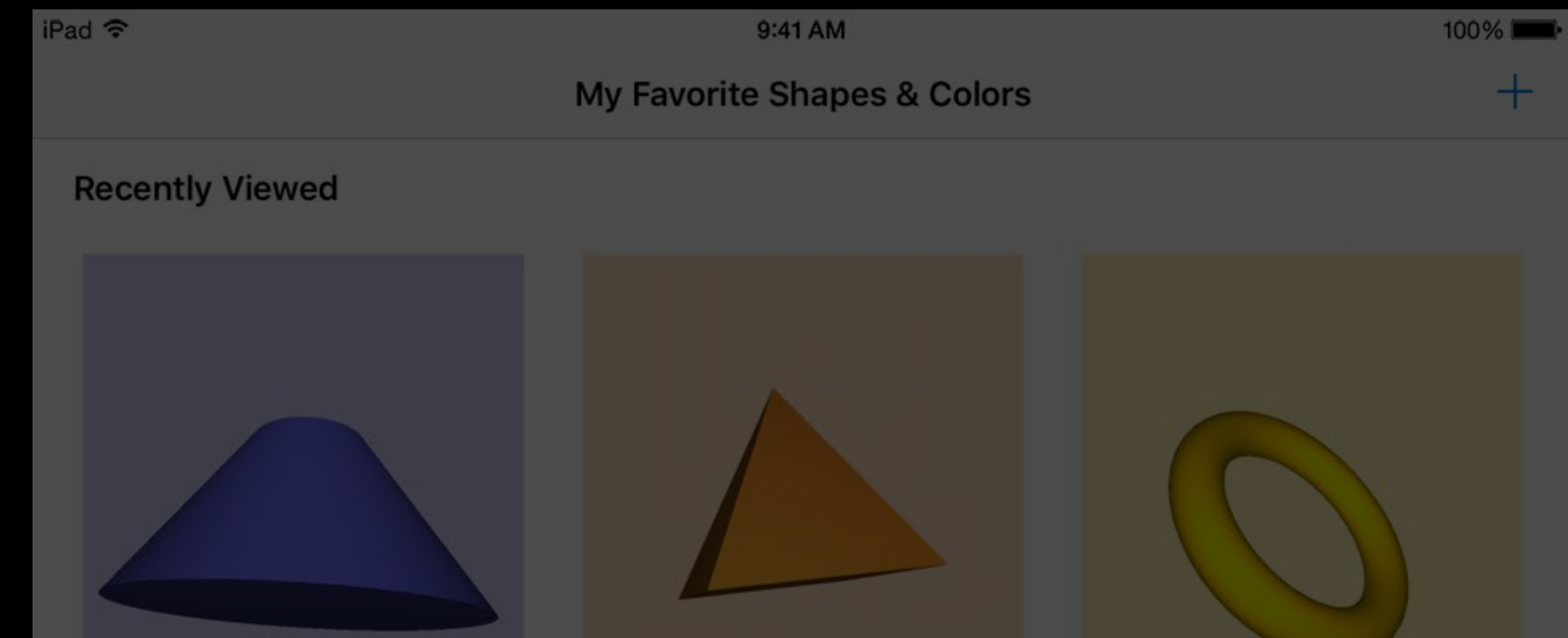
Document Browser

Components



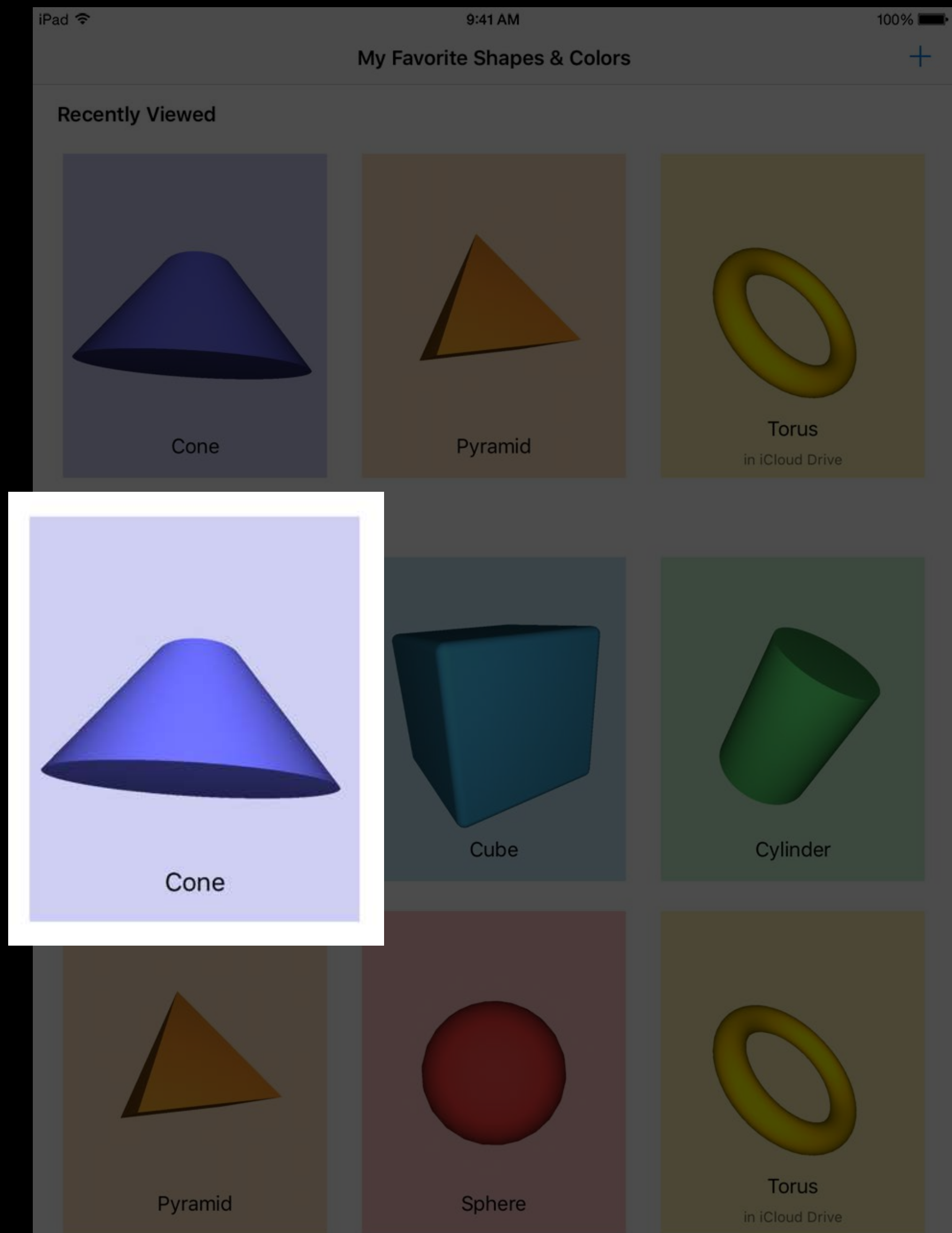
Document Browser Components

List documents in a meaningful way



Document Browser Components

List documents in a meaningful way
Use thumbnails for document visibility

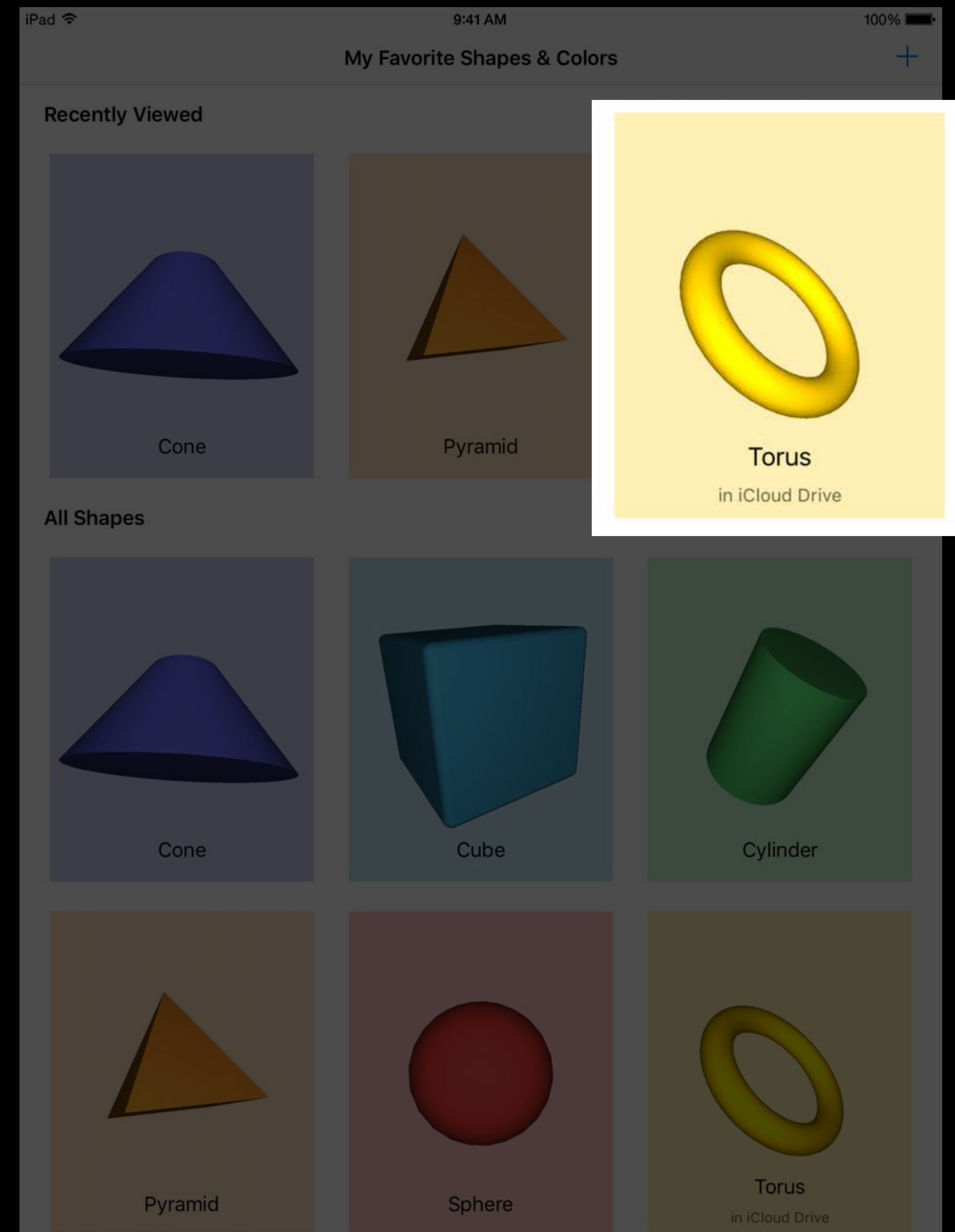


Document Browser Components

List documents in a meaningful way

Use thumbnails for document visibility

Show external documents



Document Browser

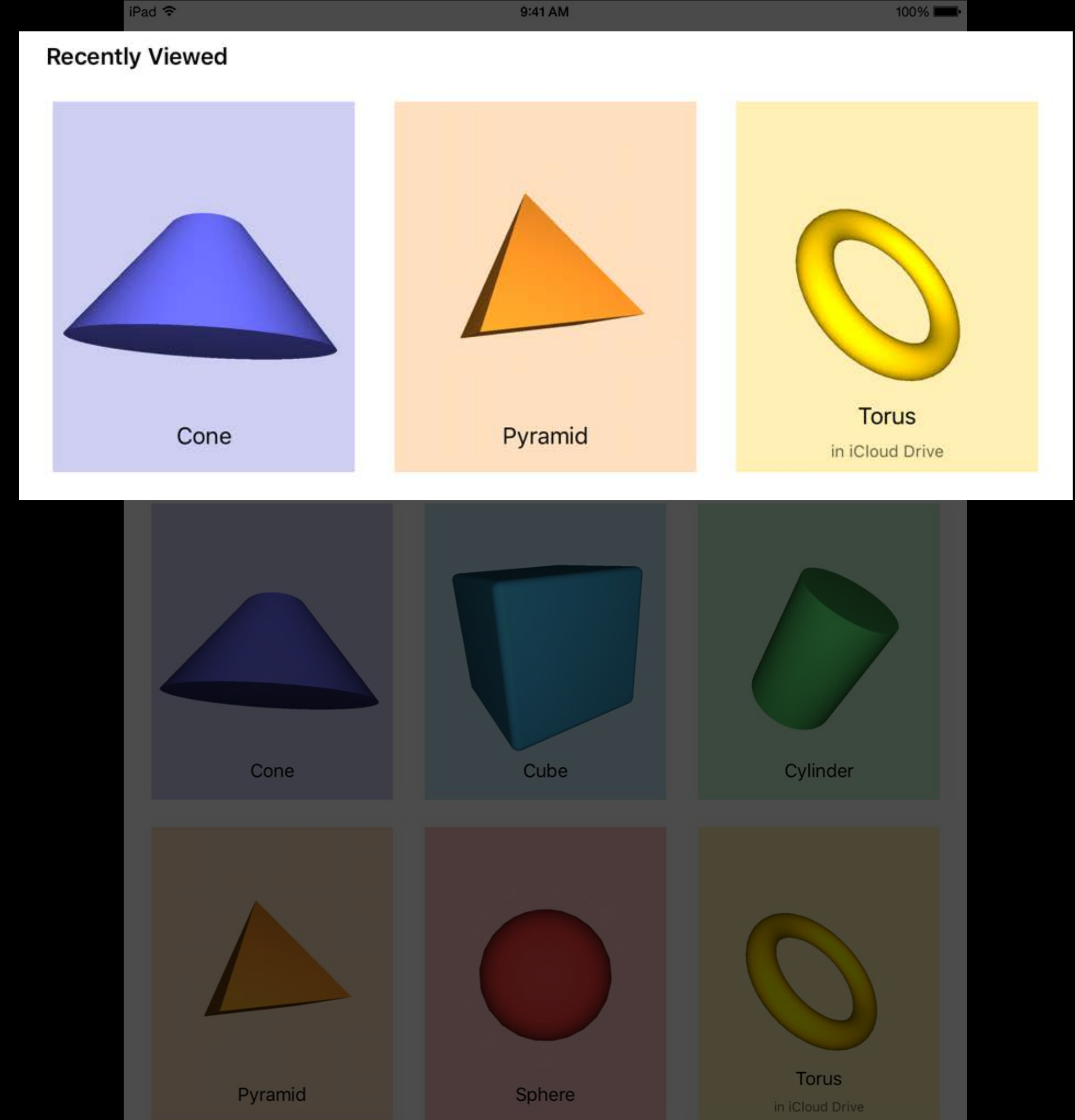
Components

List documents in a meaningful way

Use thumbnails for document visibility

Show external documents

Store recently accessed documents



Discovering Documents

Document Browser

Discovering documents

Document Browser

Discovering documents

NSFileManager results are incomplete

Document Browser

Discovering documents

NSFileManager results are incomplete

- iCloud content isn't always available locally

Document Browser

Discovering documents

NSFileManager results are incomplete

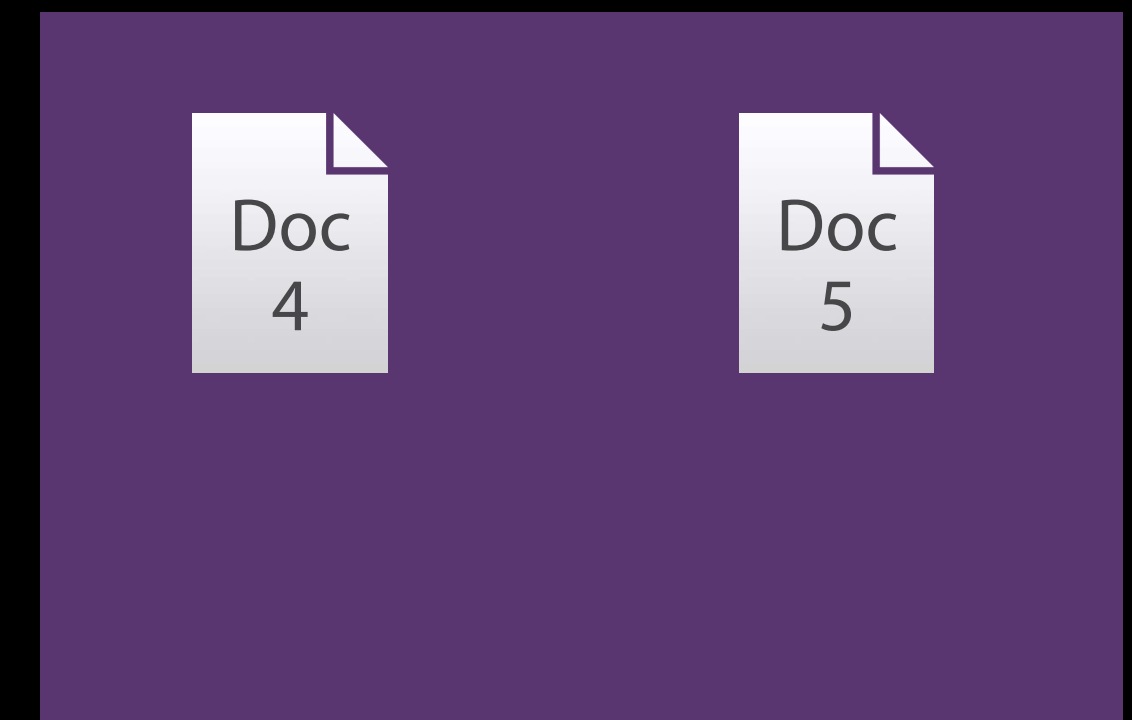
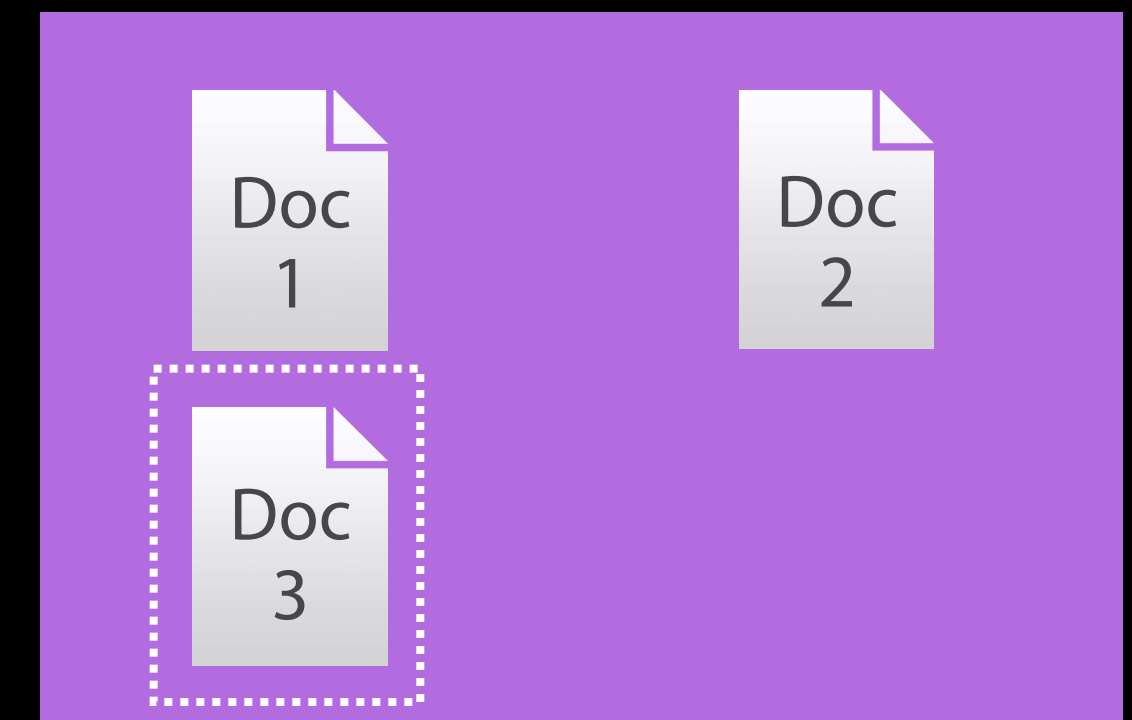
- iCloud content isn't always available locally
- External documents not included

Document Browser

Discovering documents



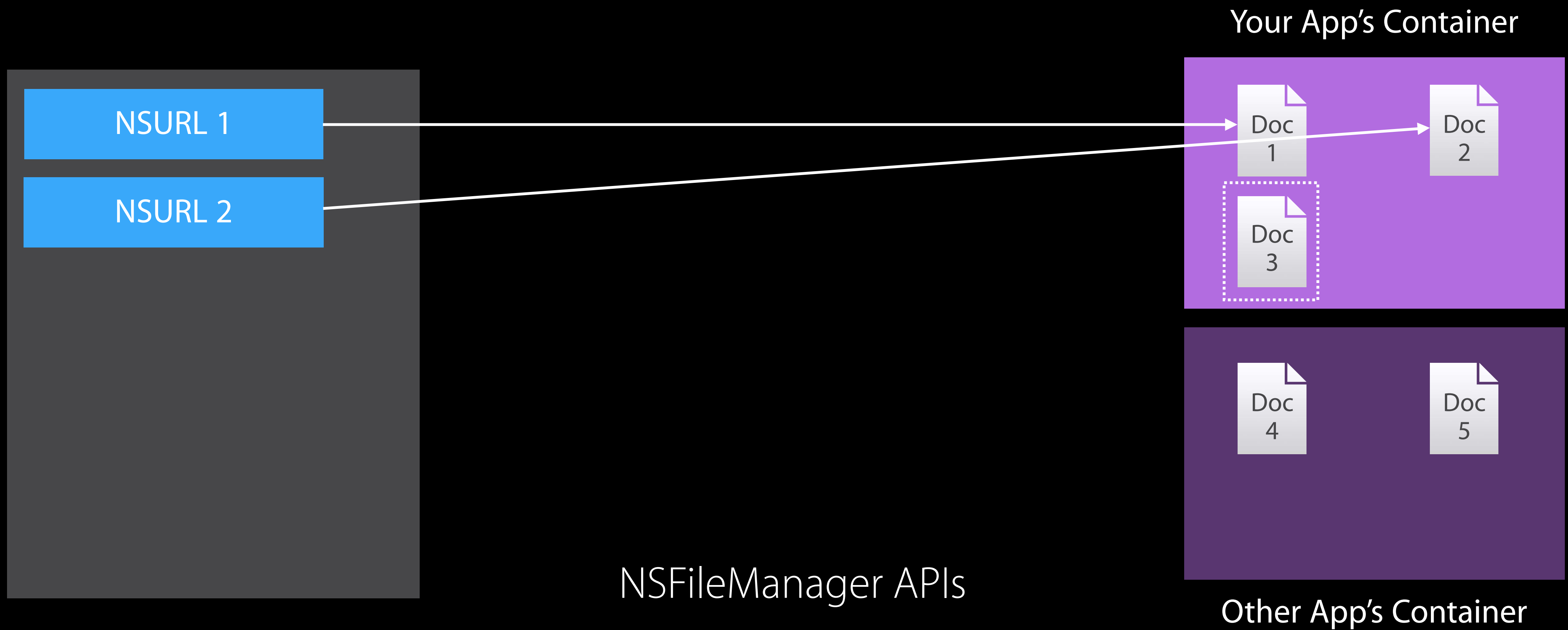
Your App's Container



Other App's Container

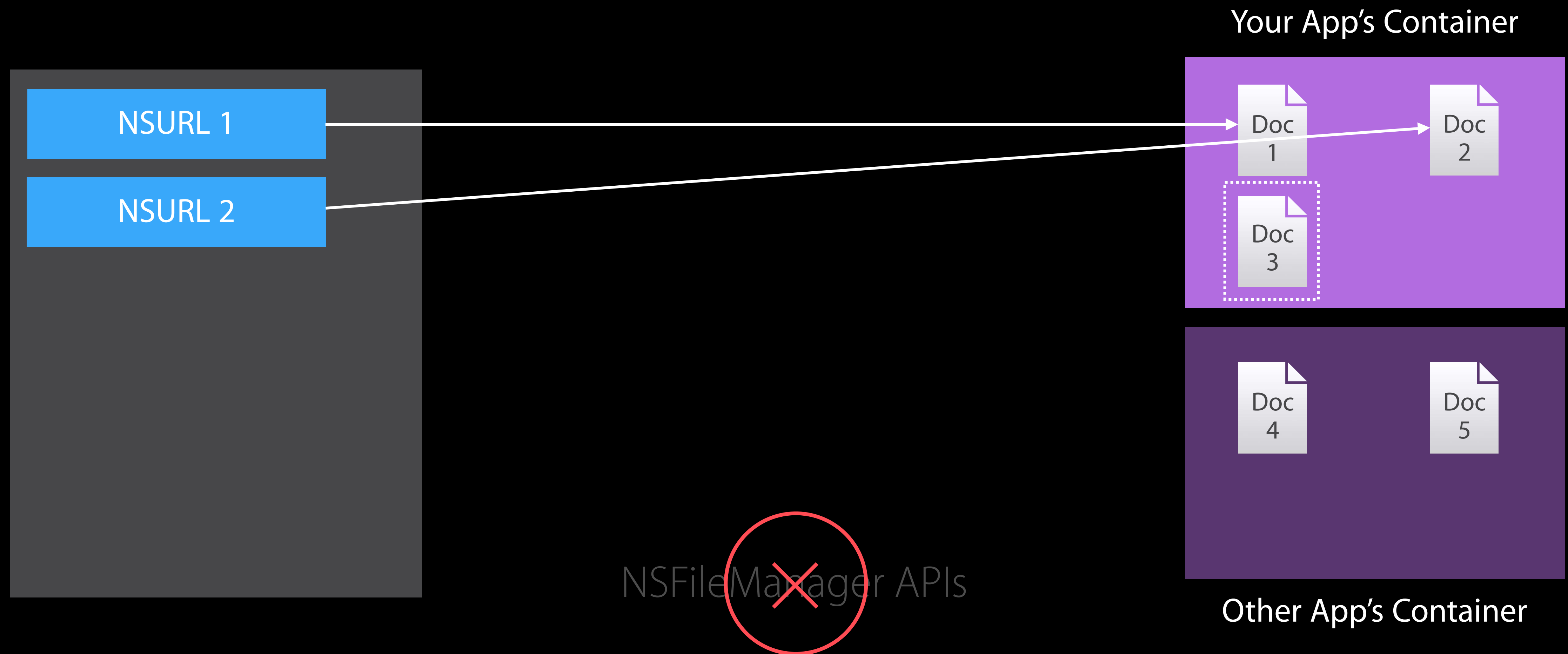
Document Browser

Discovering documents



Document Browser

Discovering documents

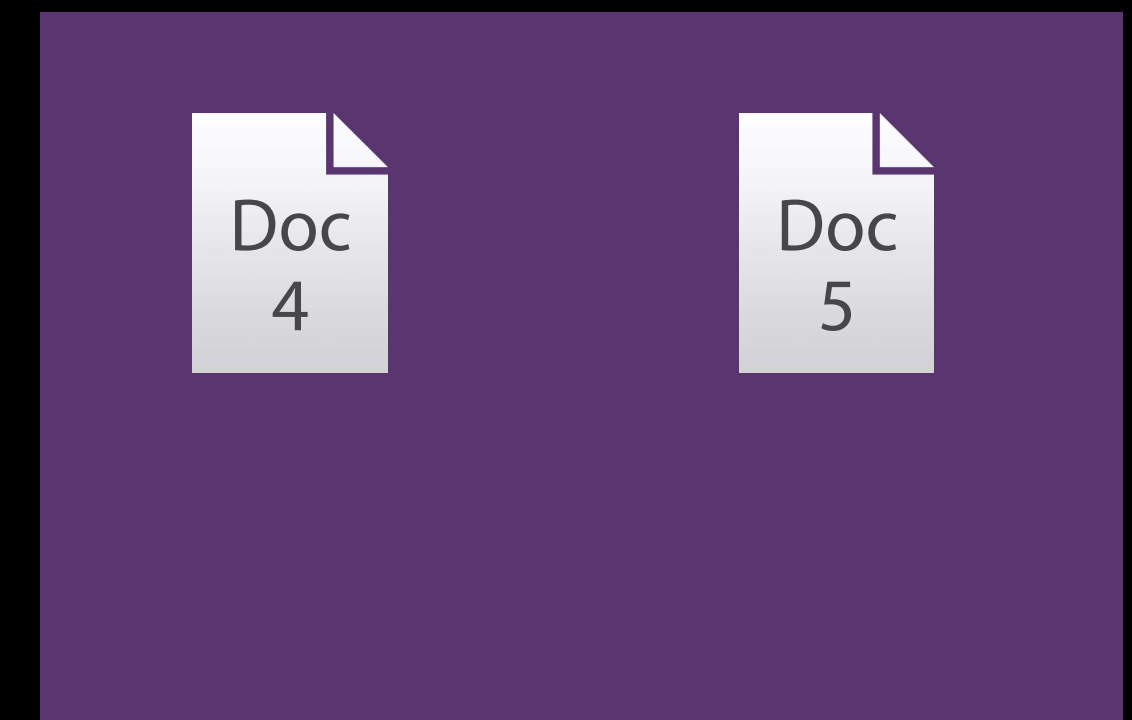
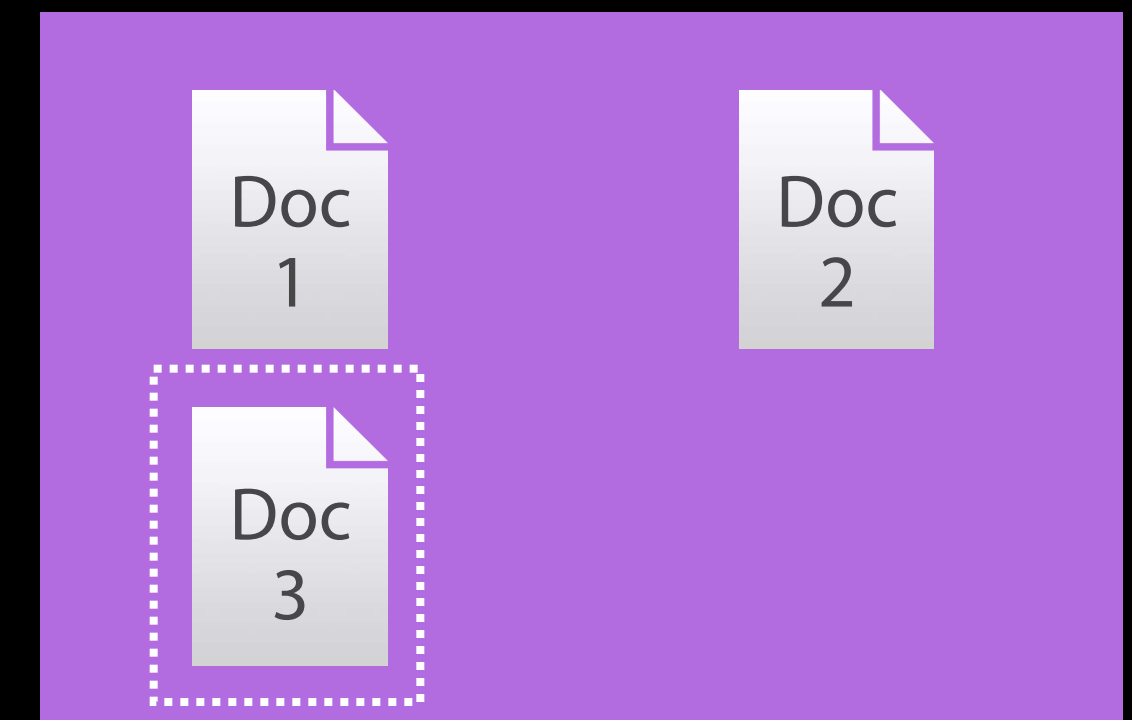


Document Browser

Discover documents with NSMetadataQuery



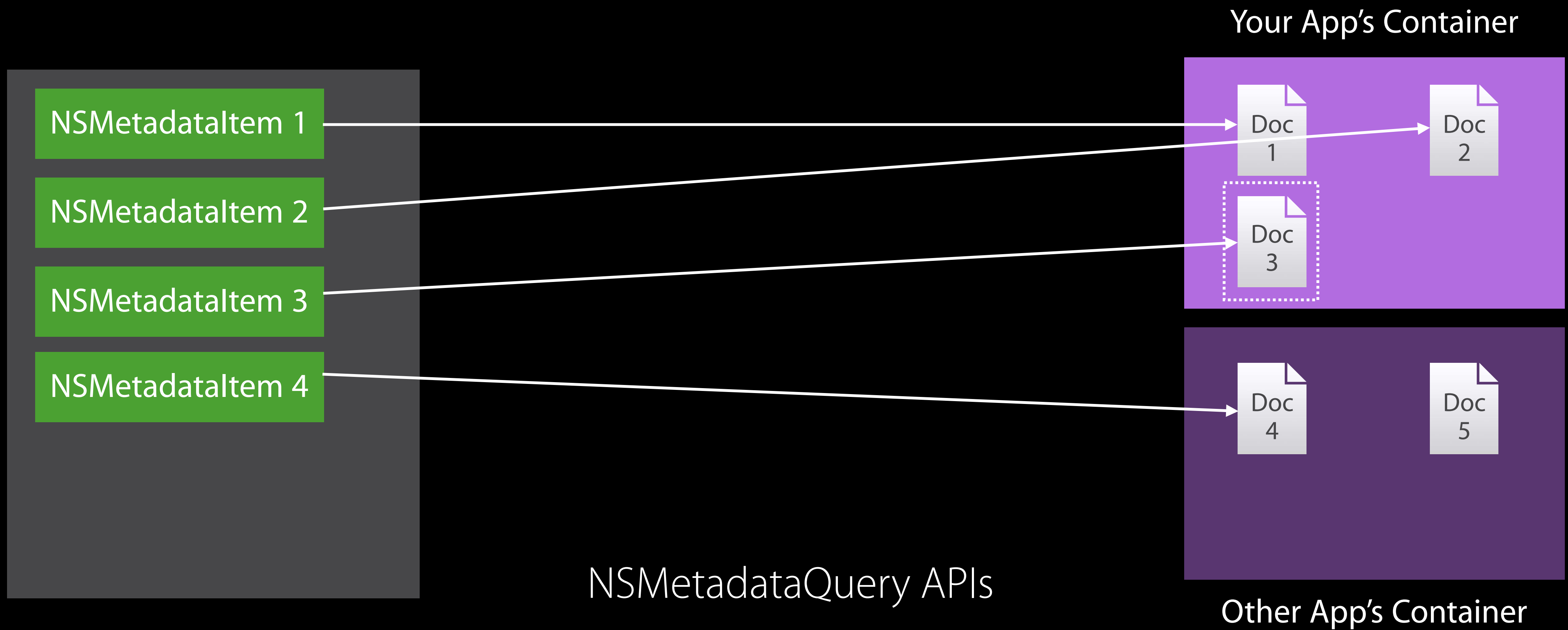
Your App's Container



Other App's Container

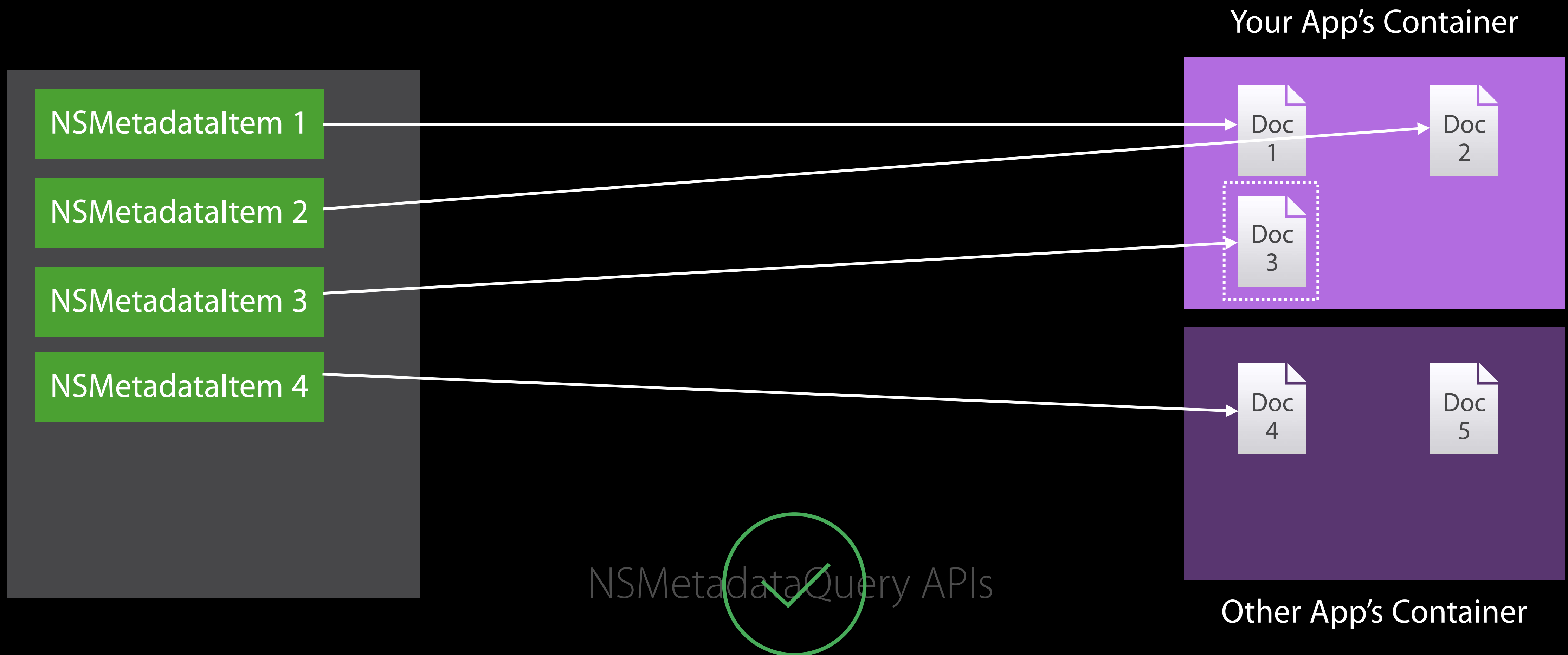
Document Browser

Discover documents with NSMetadataQuery



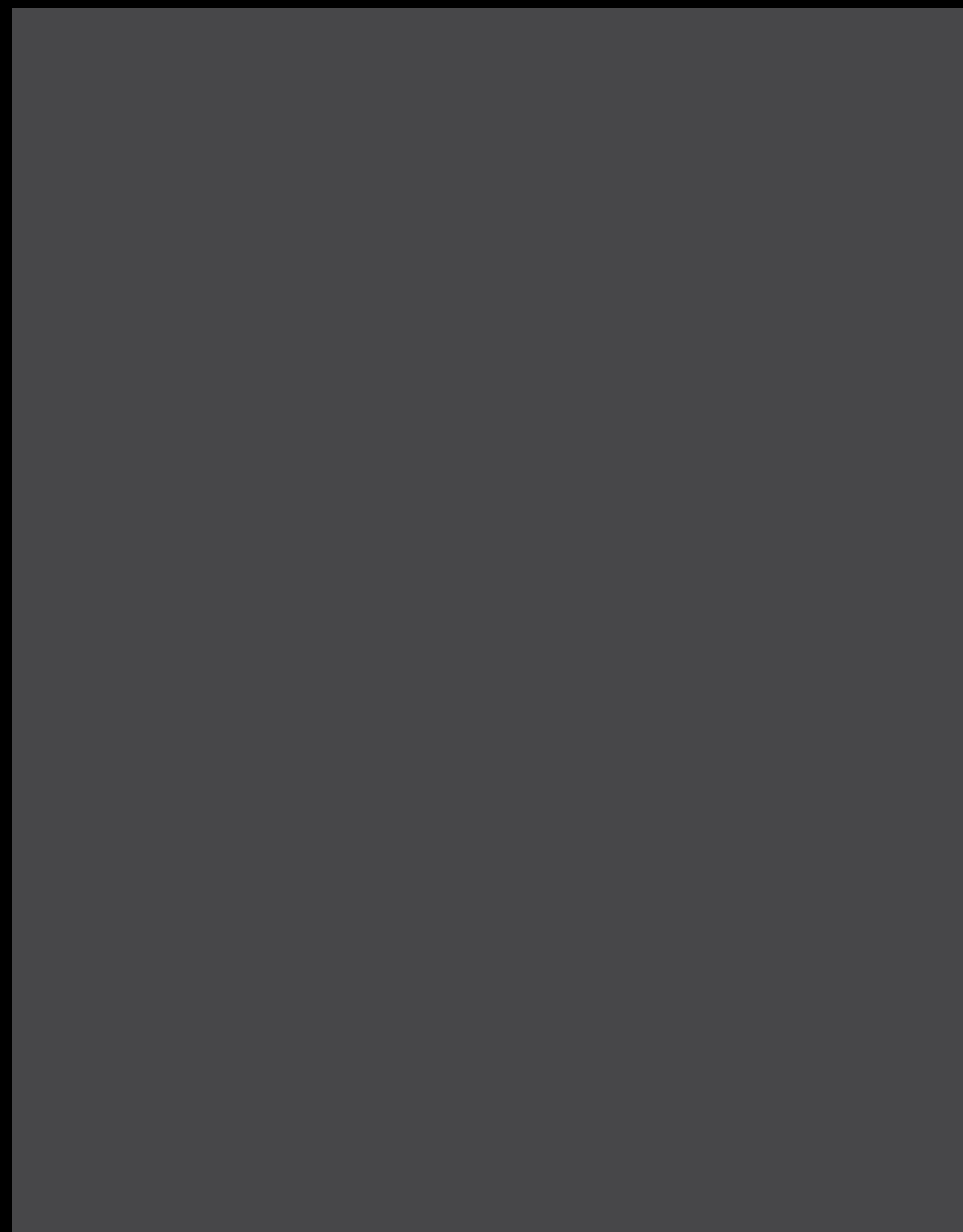
Document Browser

Discover documents with NSMetadataQuery

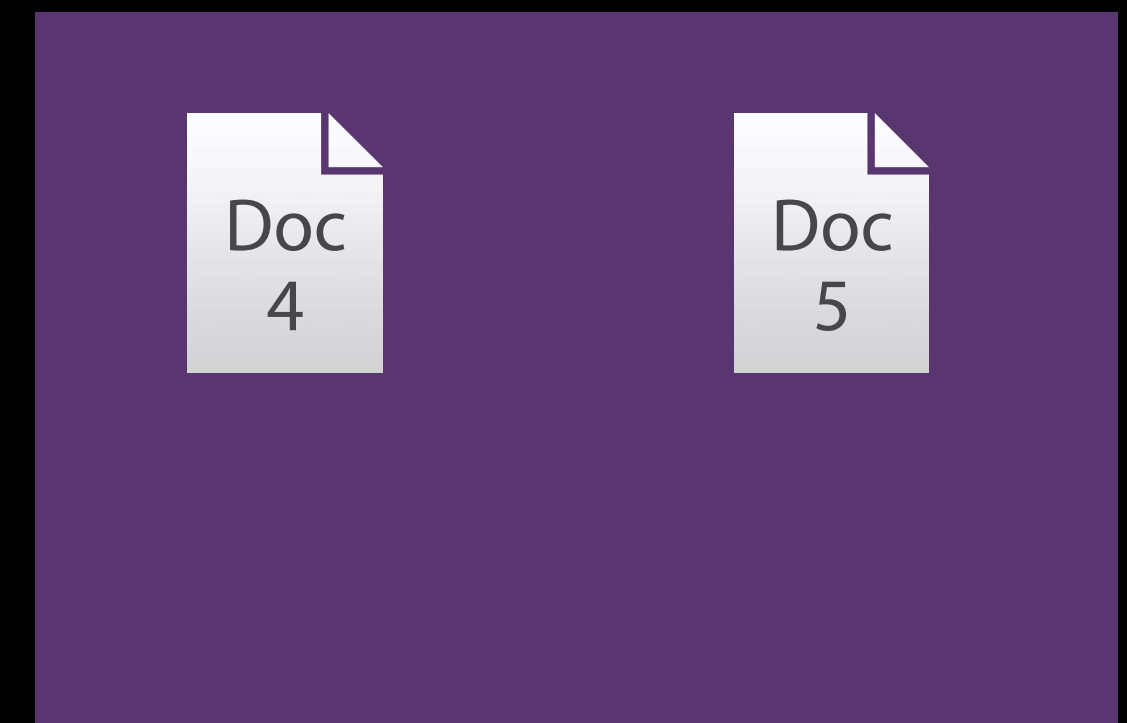
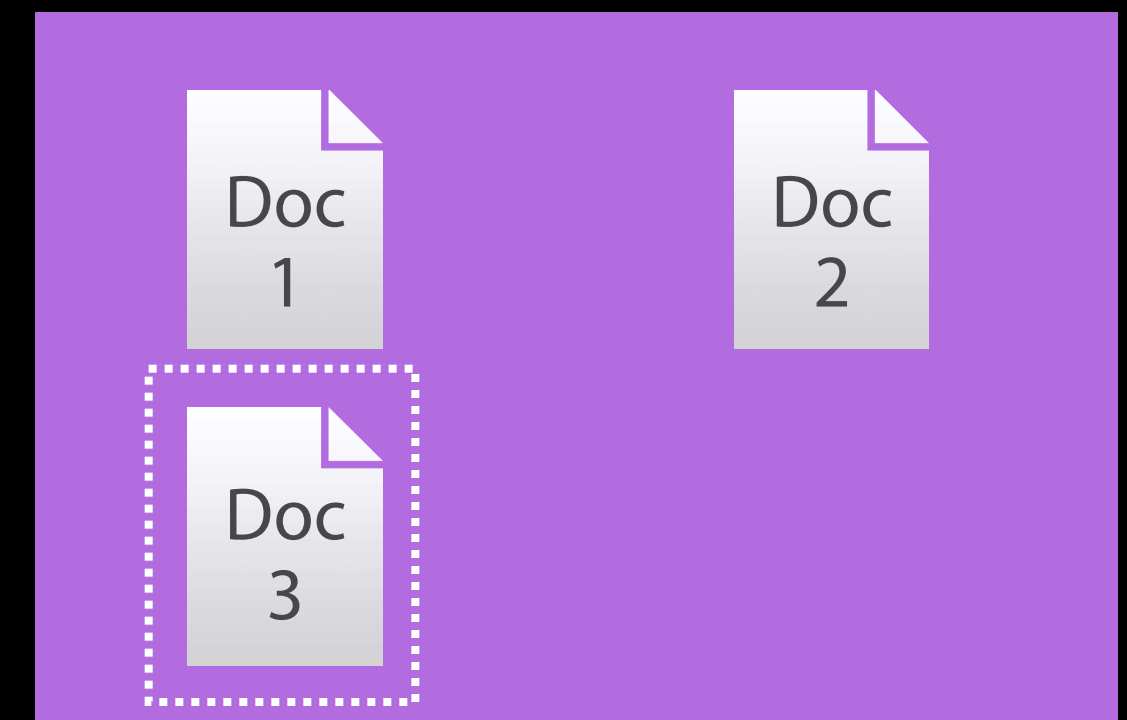


Document Browser

NSMetadataQuery



Your App's Container



Other App's Container

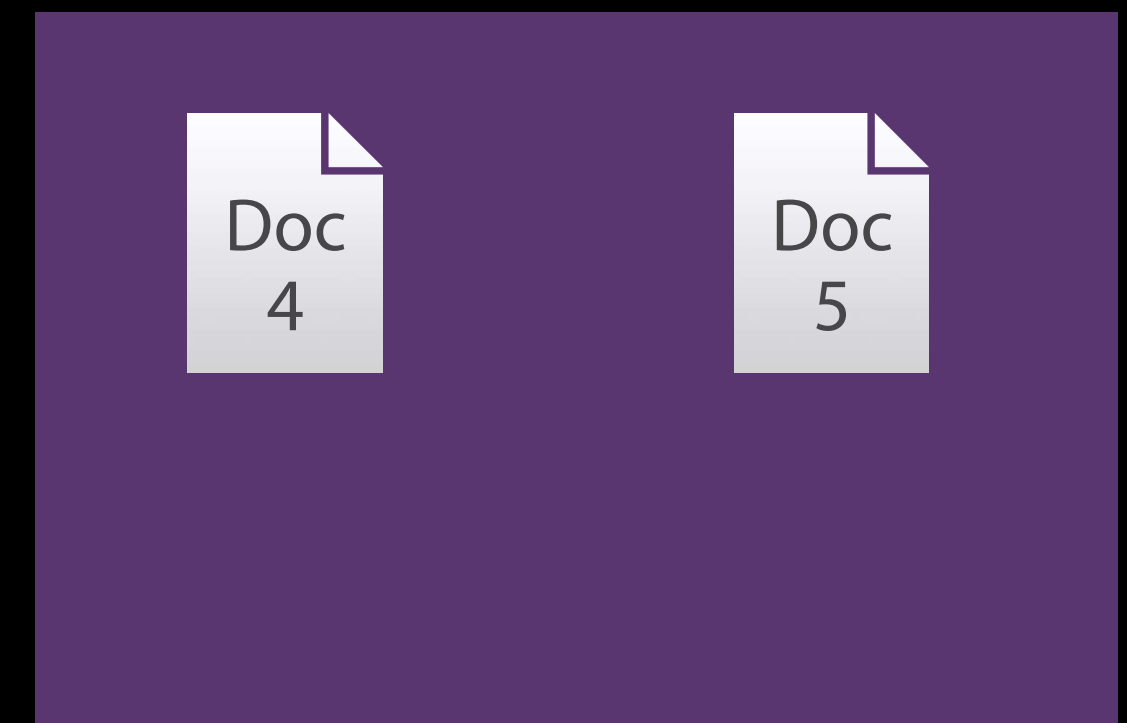
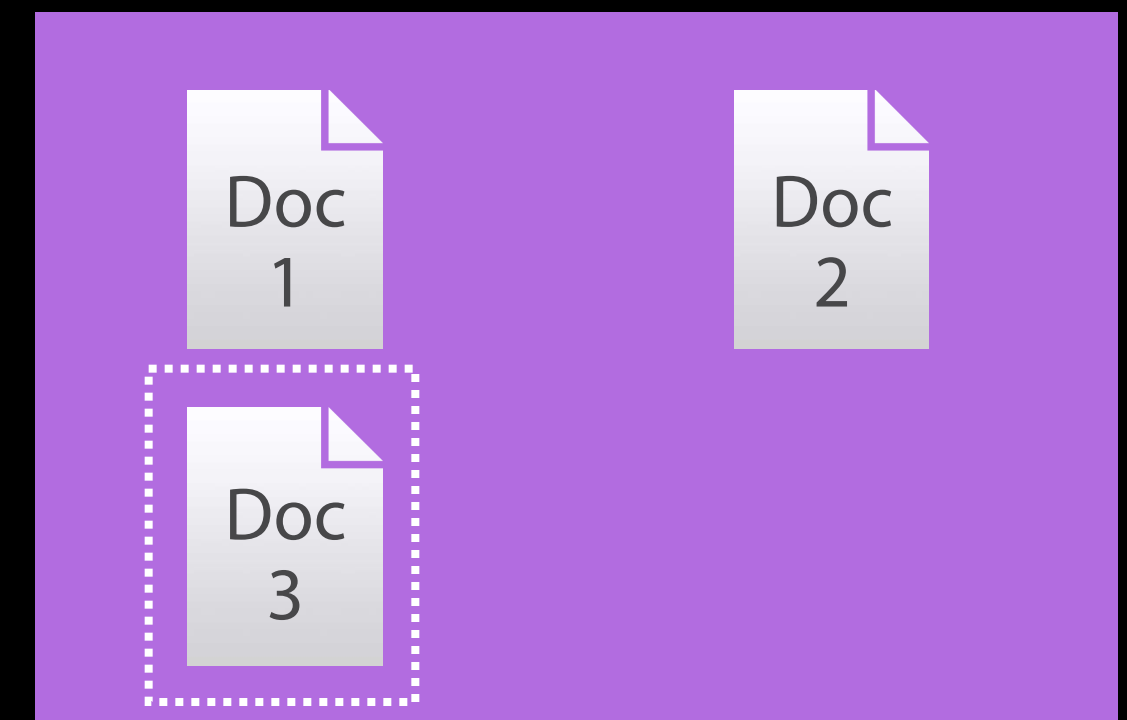
Document Browser

NSMetadataQuery



Create NSMetadataQuery

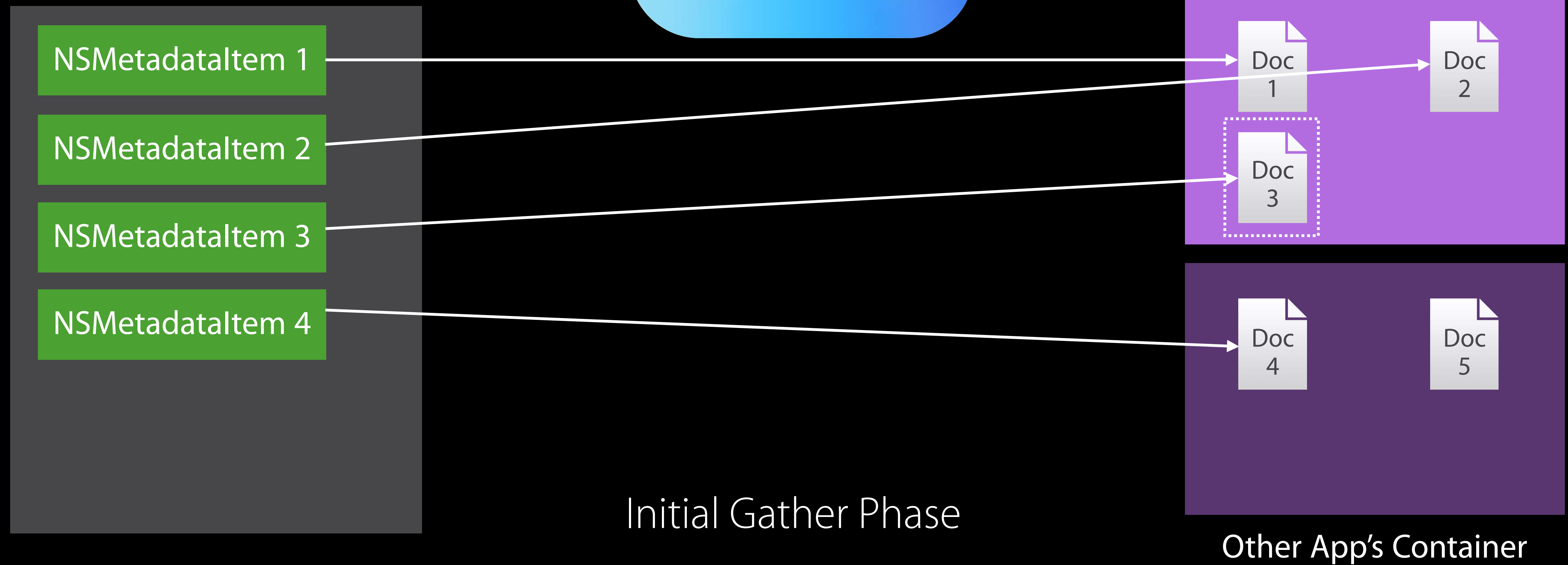
Your App's Container



Other App's Container

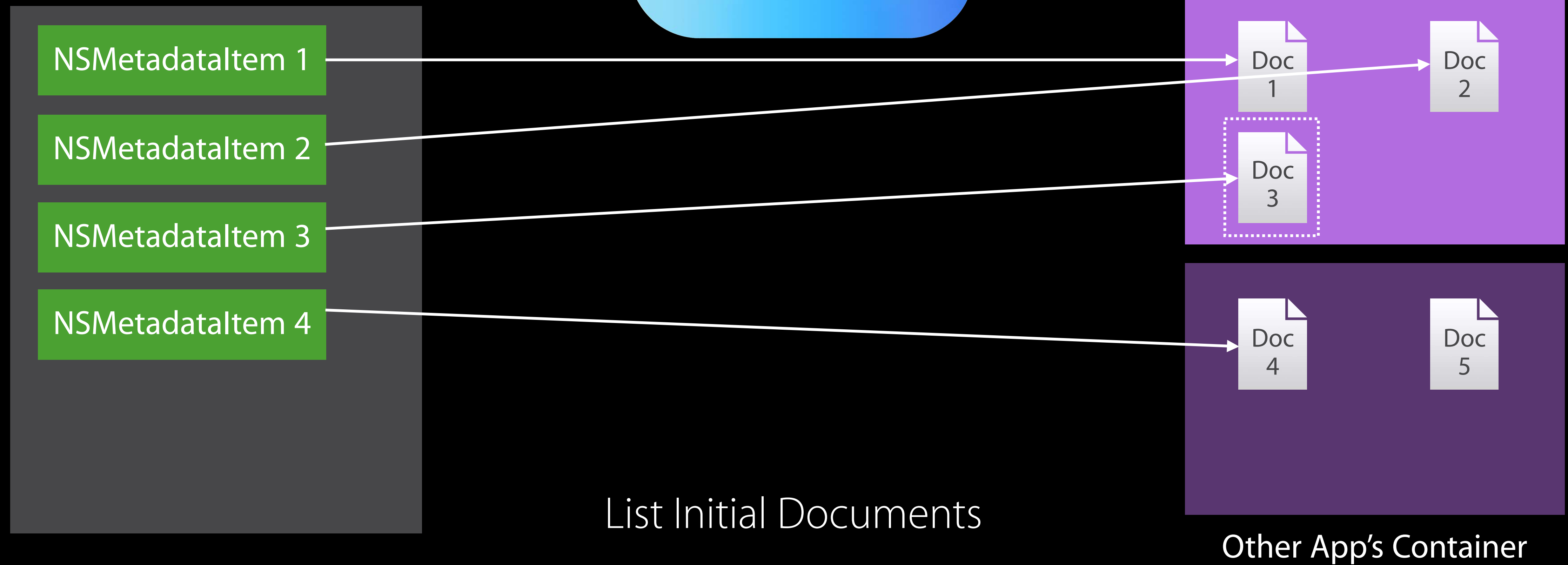
Document Browser

NSMetadataQuery



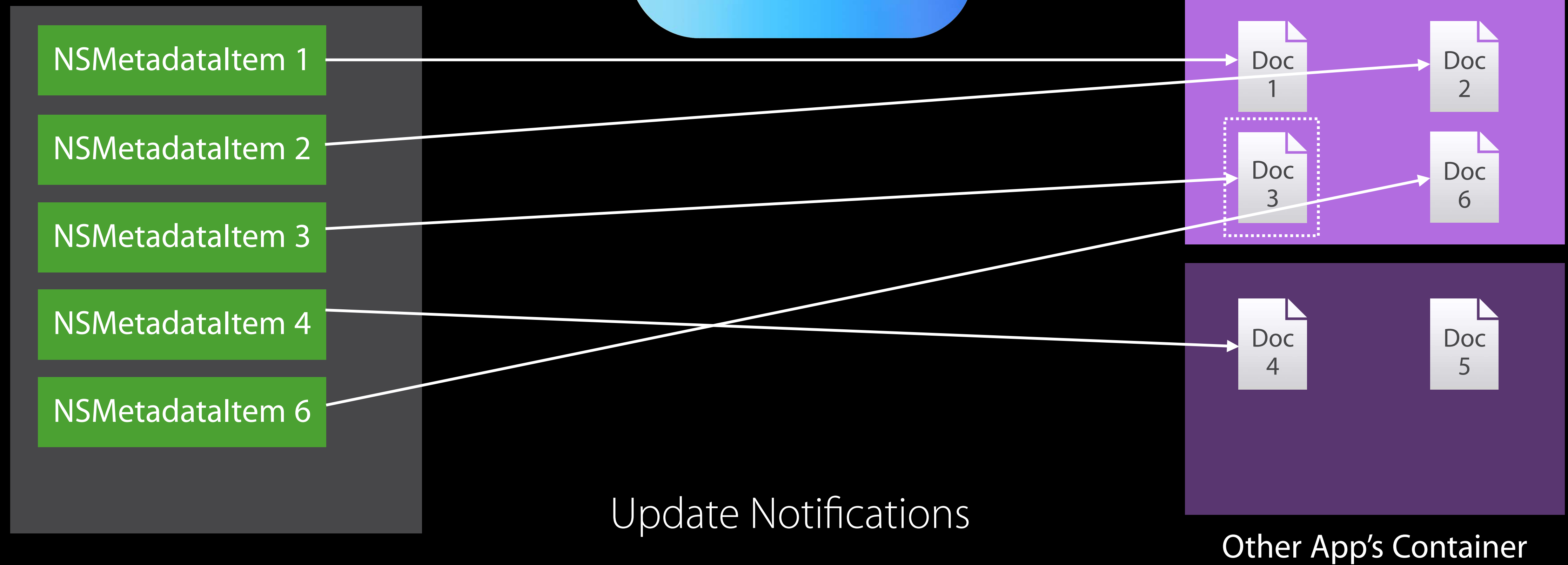
Document Browser

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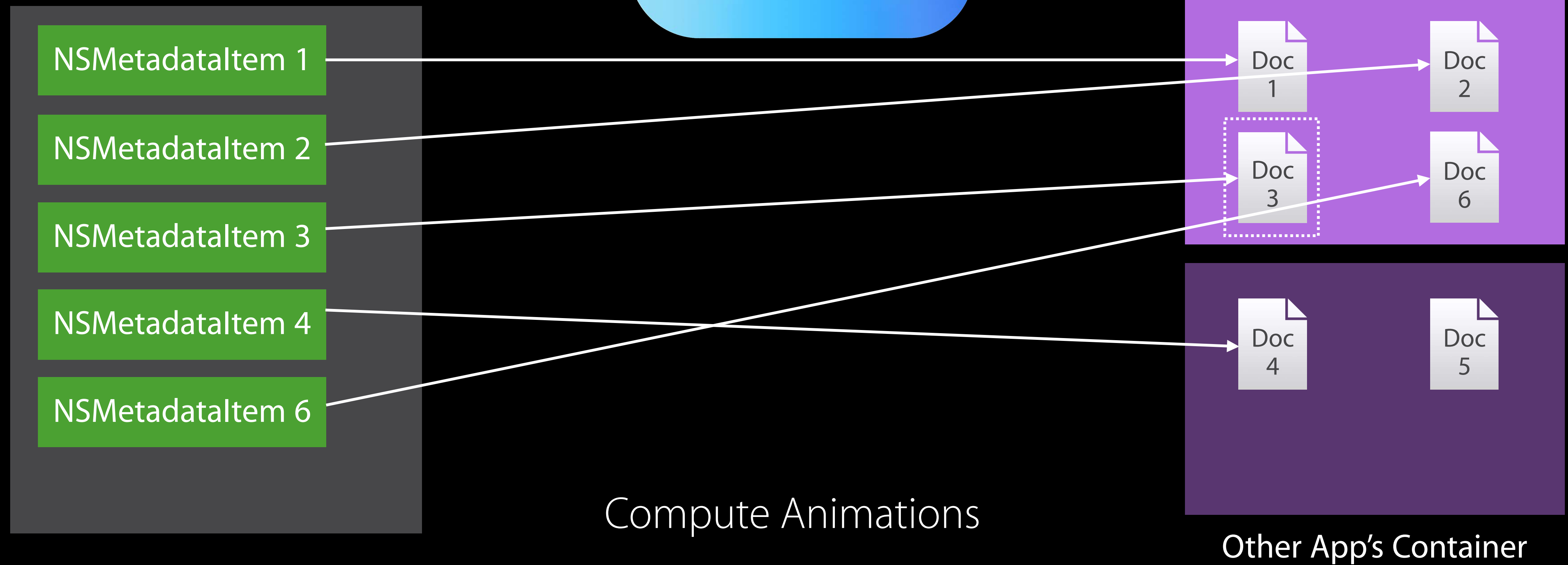
Document Browser

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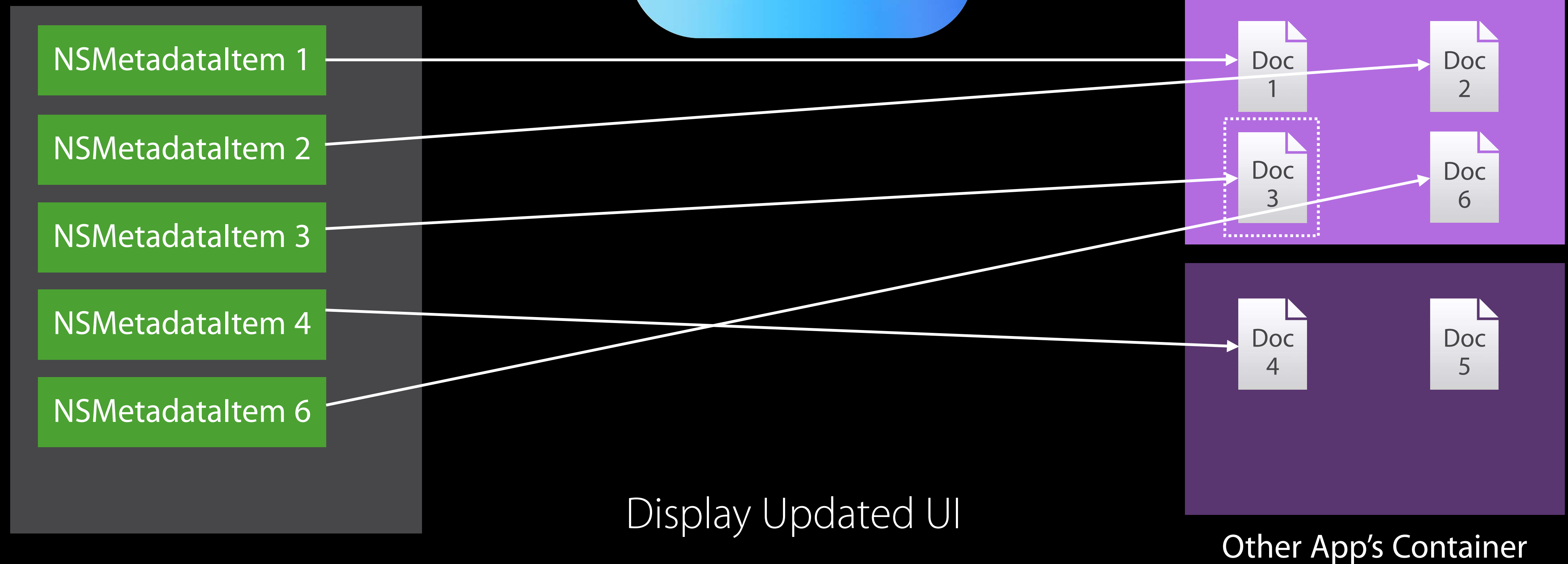
Document Browser

NSMetadataQuery



Document Browser

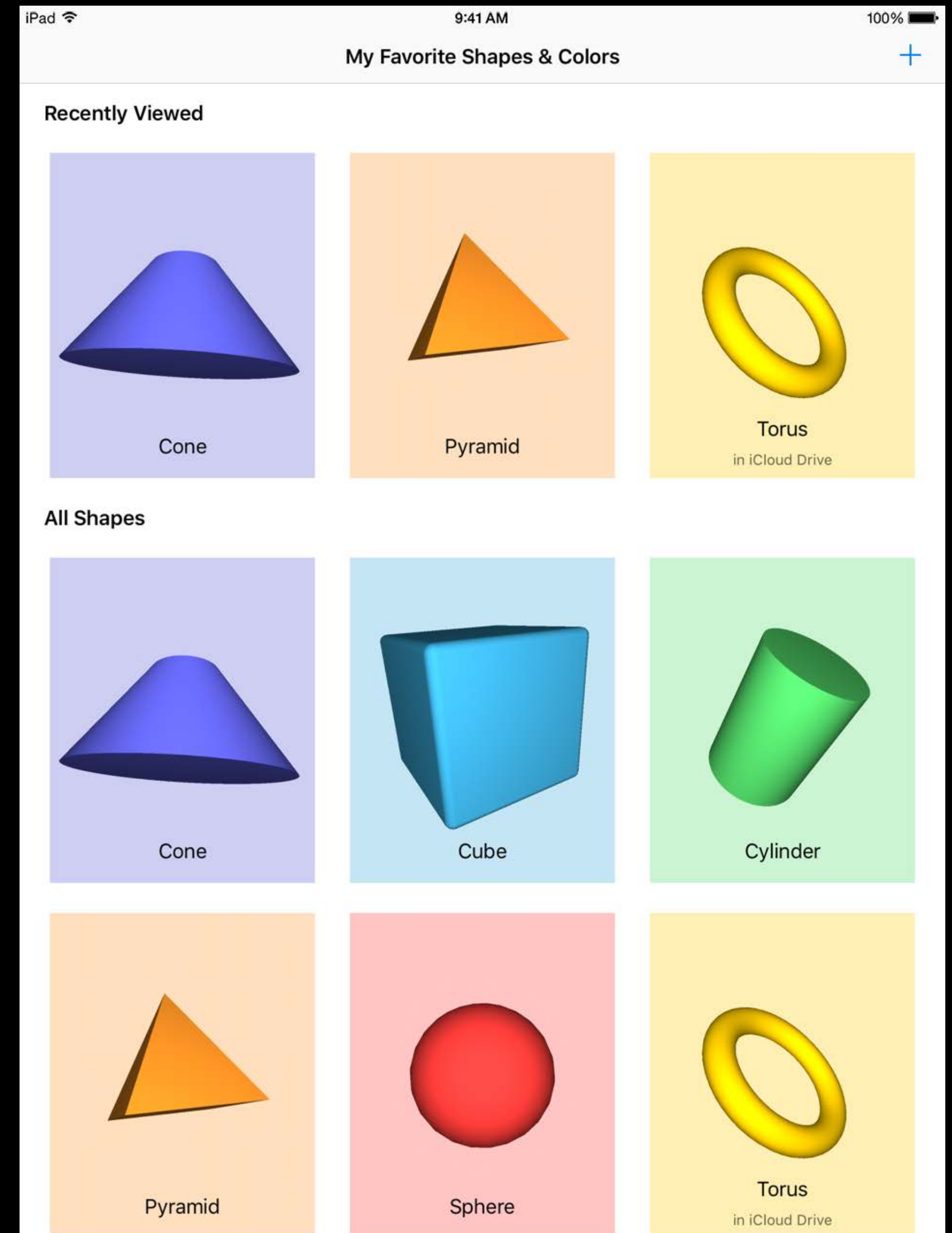
NSMetadataQuery



Loading Thumbnails

Document Browser

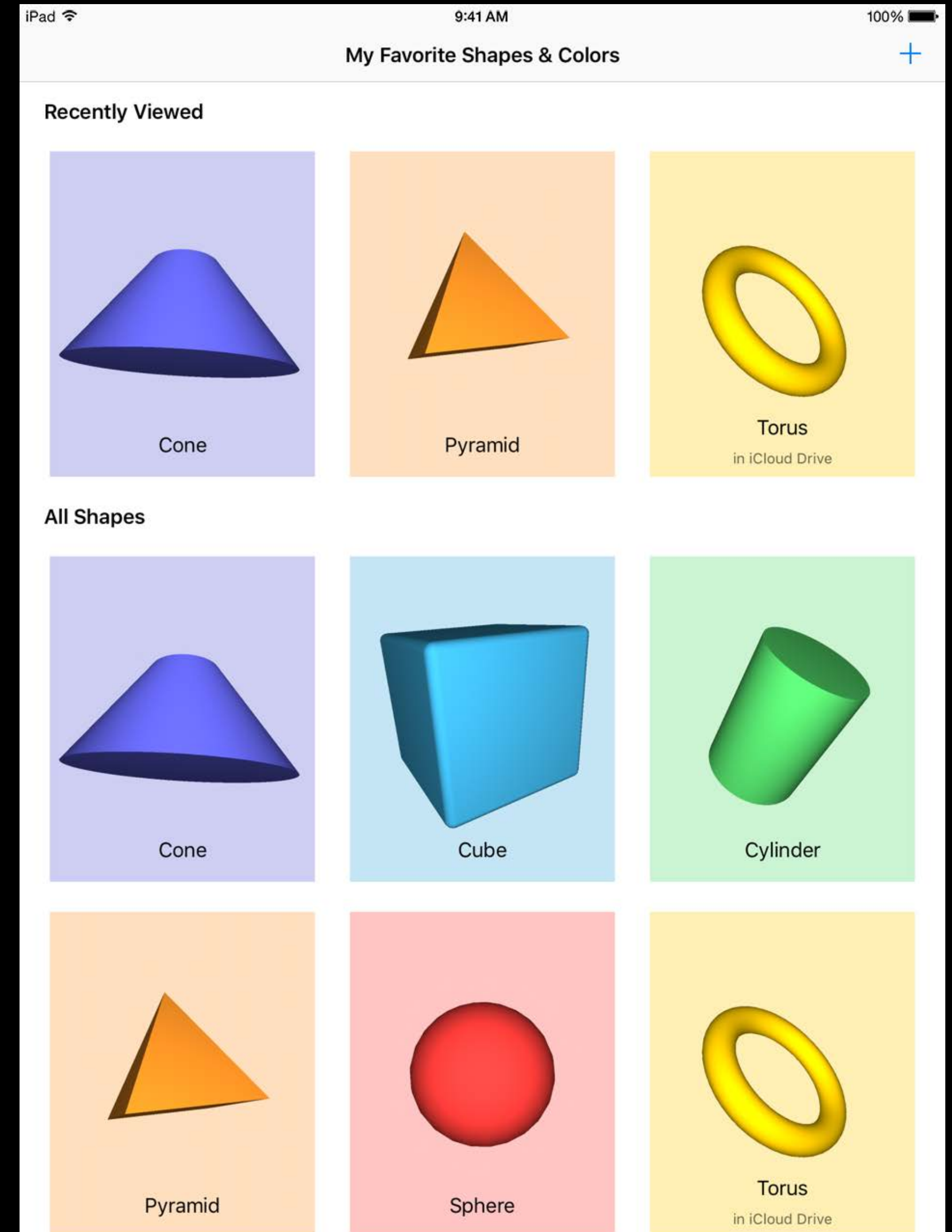
Thumbnails



Document Browser

Thumbnails

Gives visual context to users



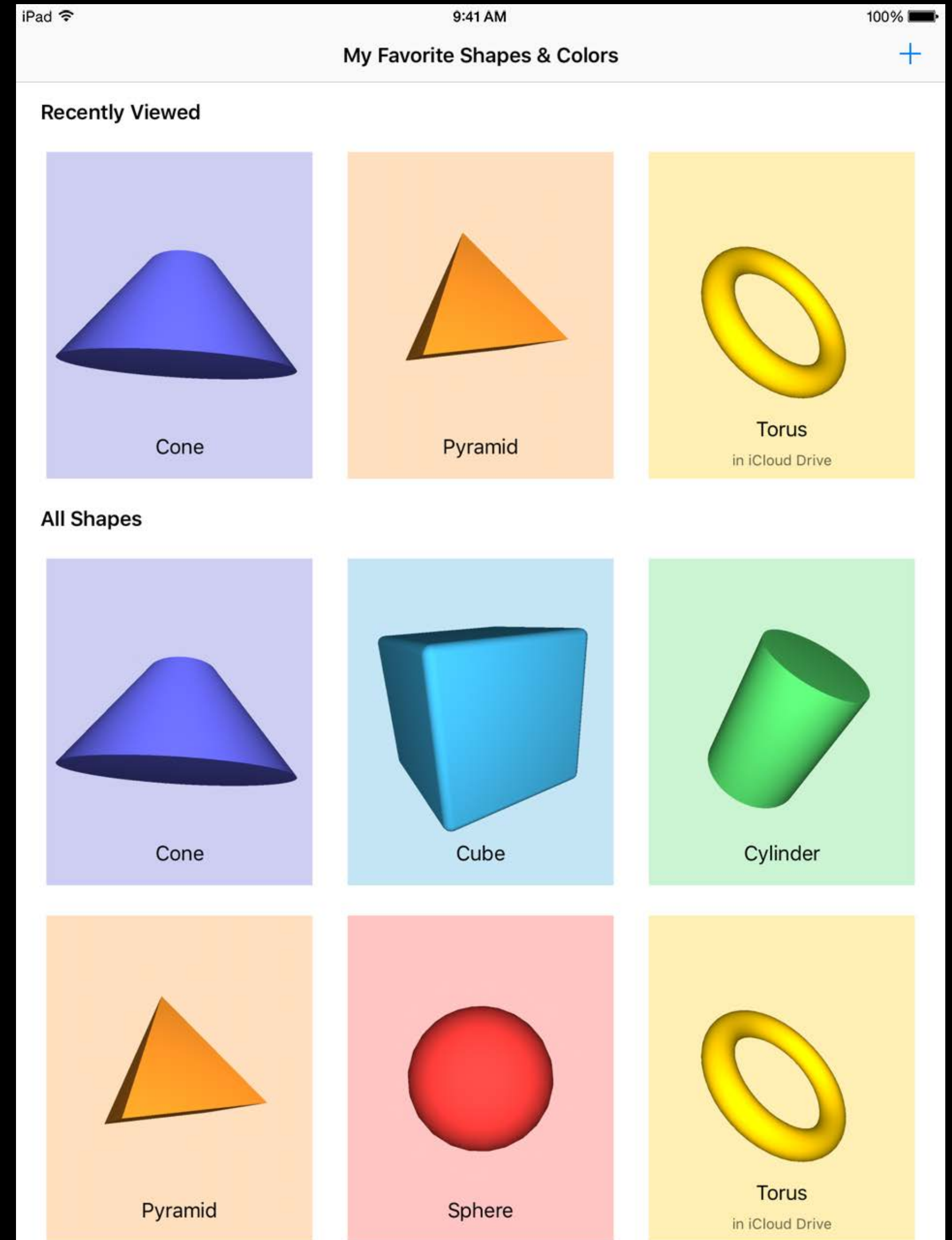
Document Browser

Thumbnails

Gives visual context to users

Generated automatically for certain documents

NEW

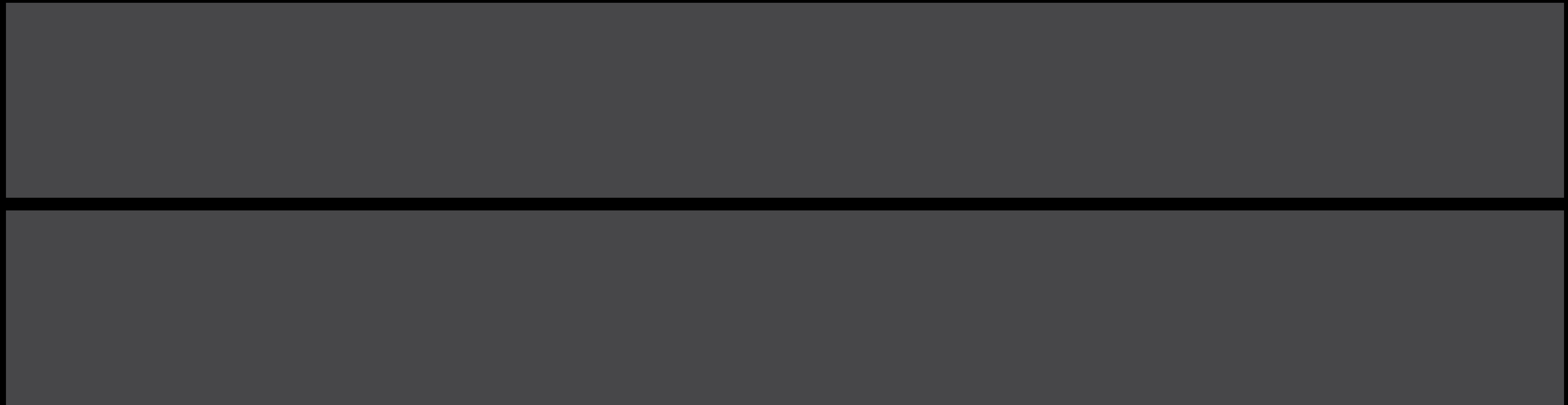


Document Browser

Loading thumbnails for display

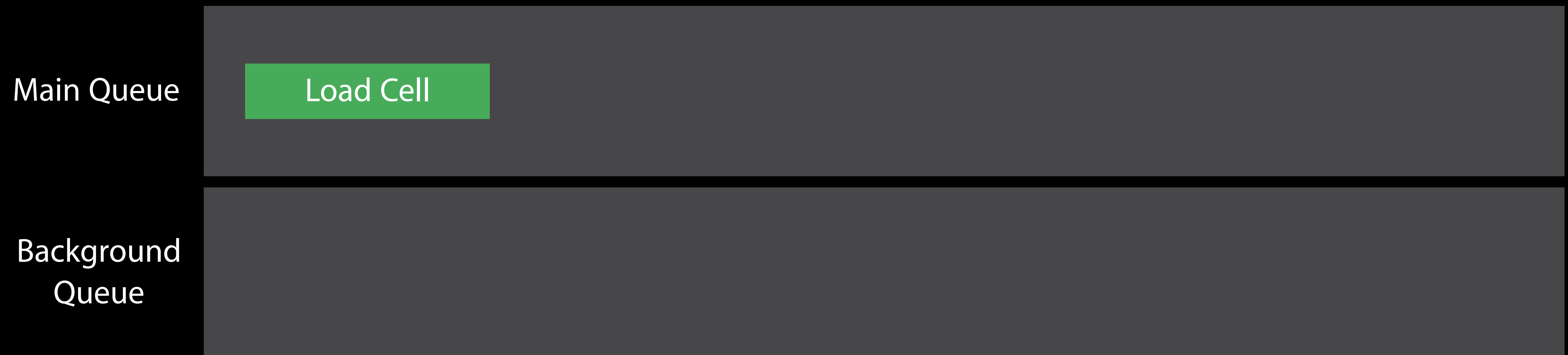
Main Queue

Background
Queue



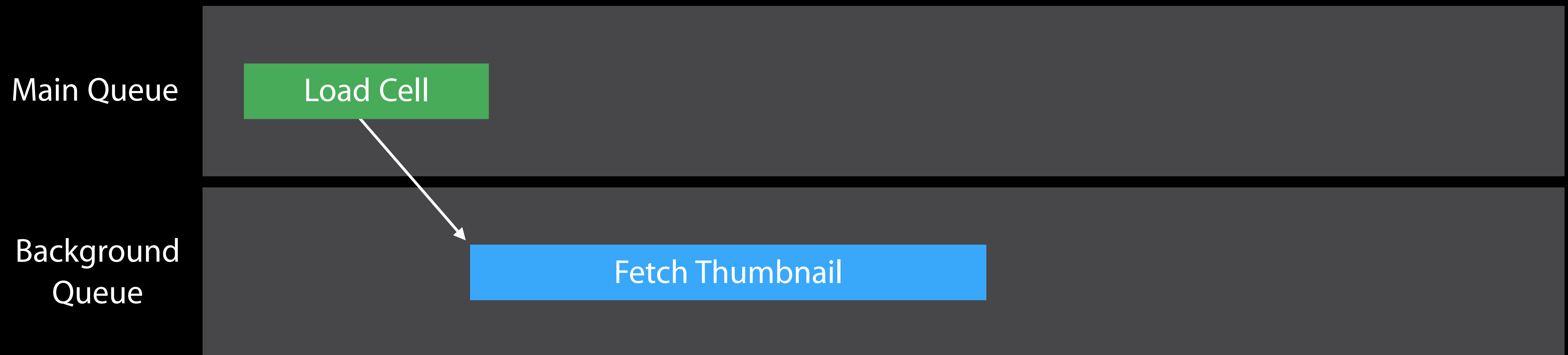
Document Browser

Loading thumbnails for display



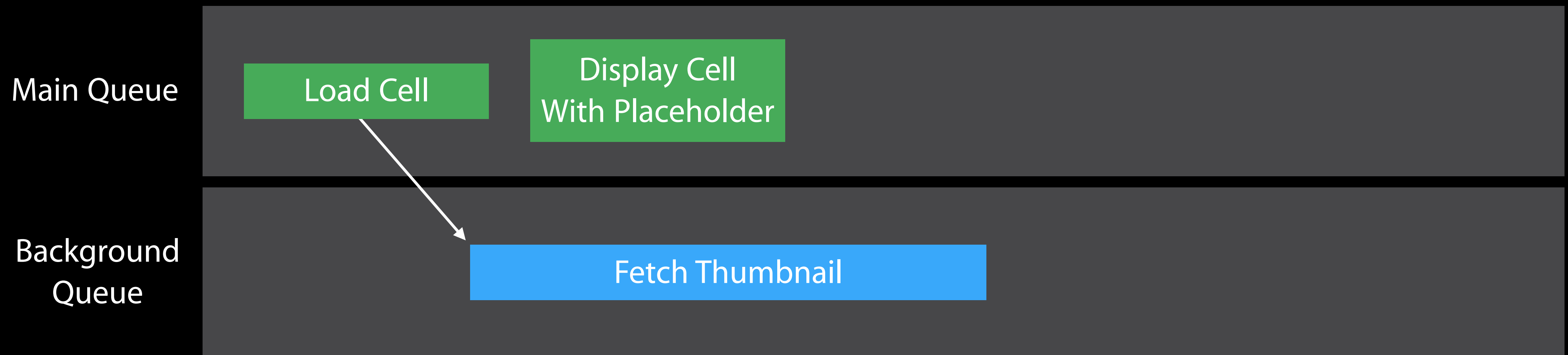
Document Browser

Loading thumbnails for display



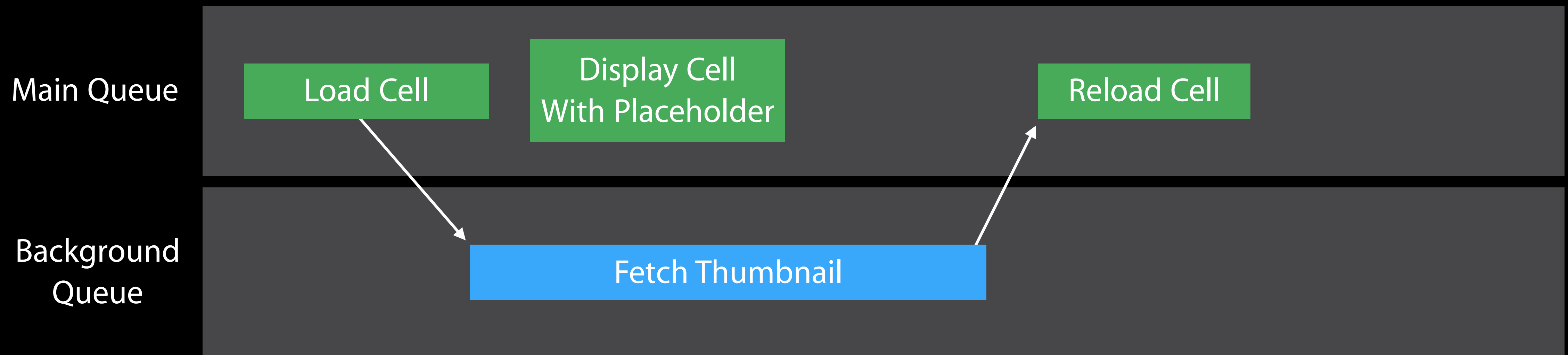
Document Browser

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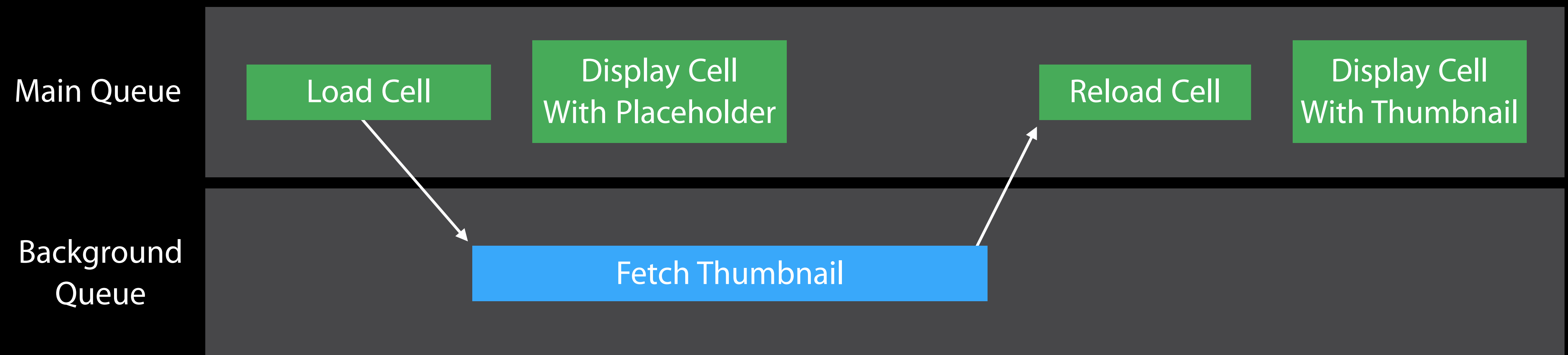
Document Browser

Loading thumbnails for display



Document Browser

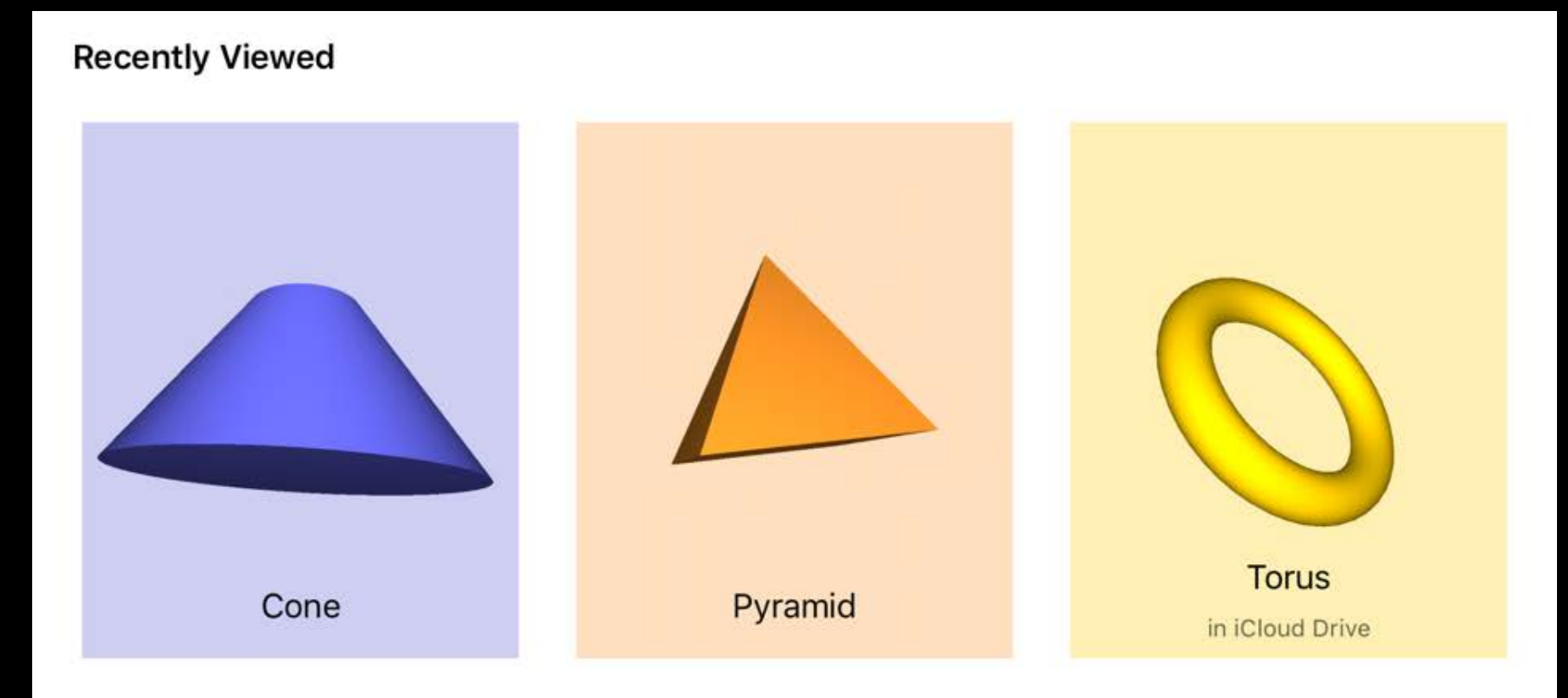
Loading thumbnails for display



Managing a Recents List

Recents List

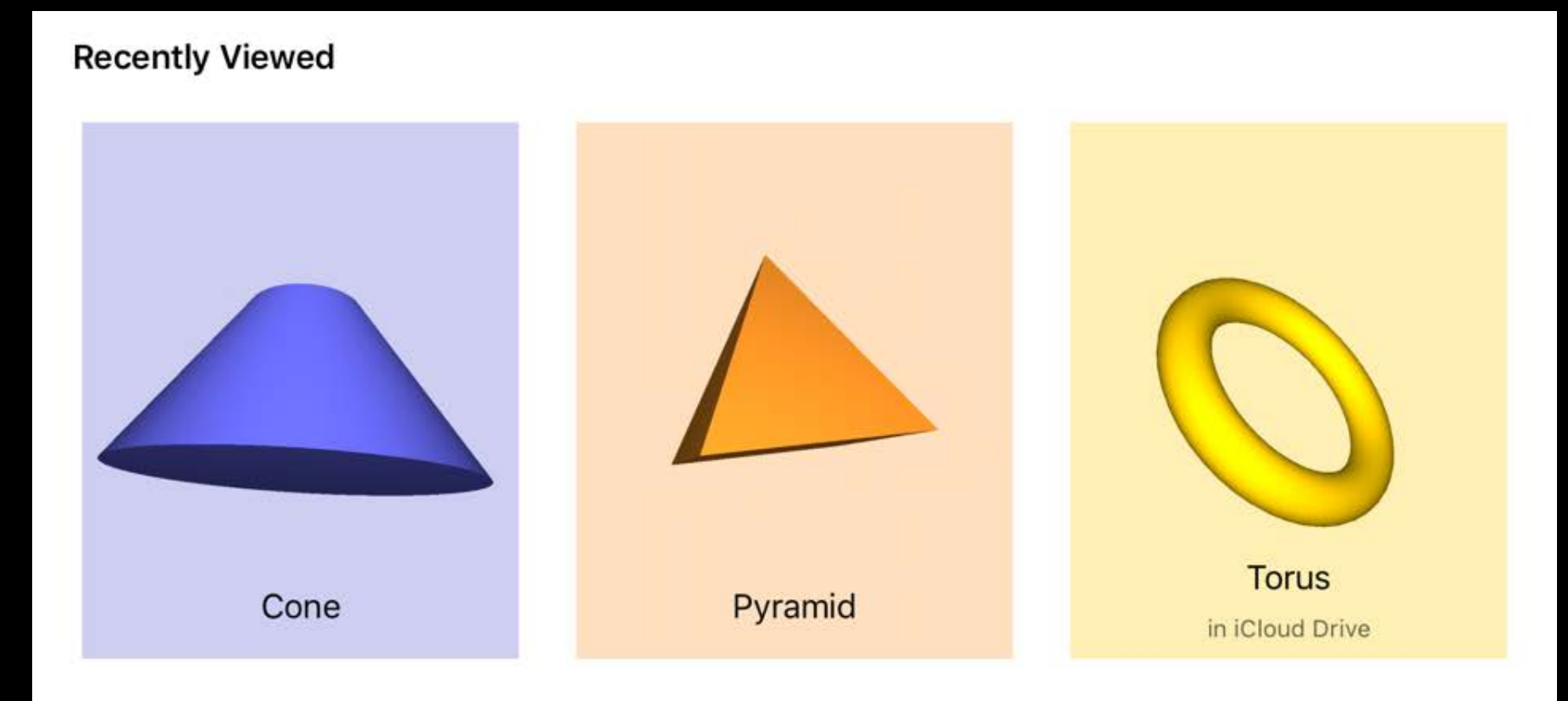
Storing recently-used items list



Recents List

Storing recently-used items list

Give easy access to recently used documents

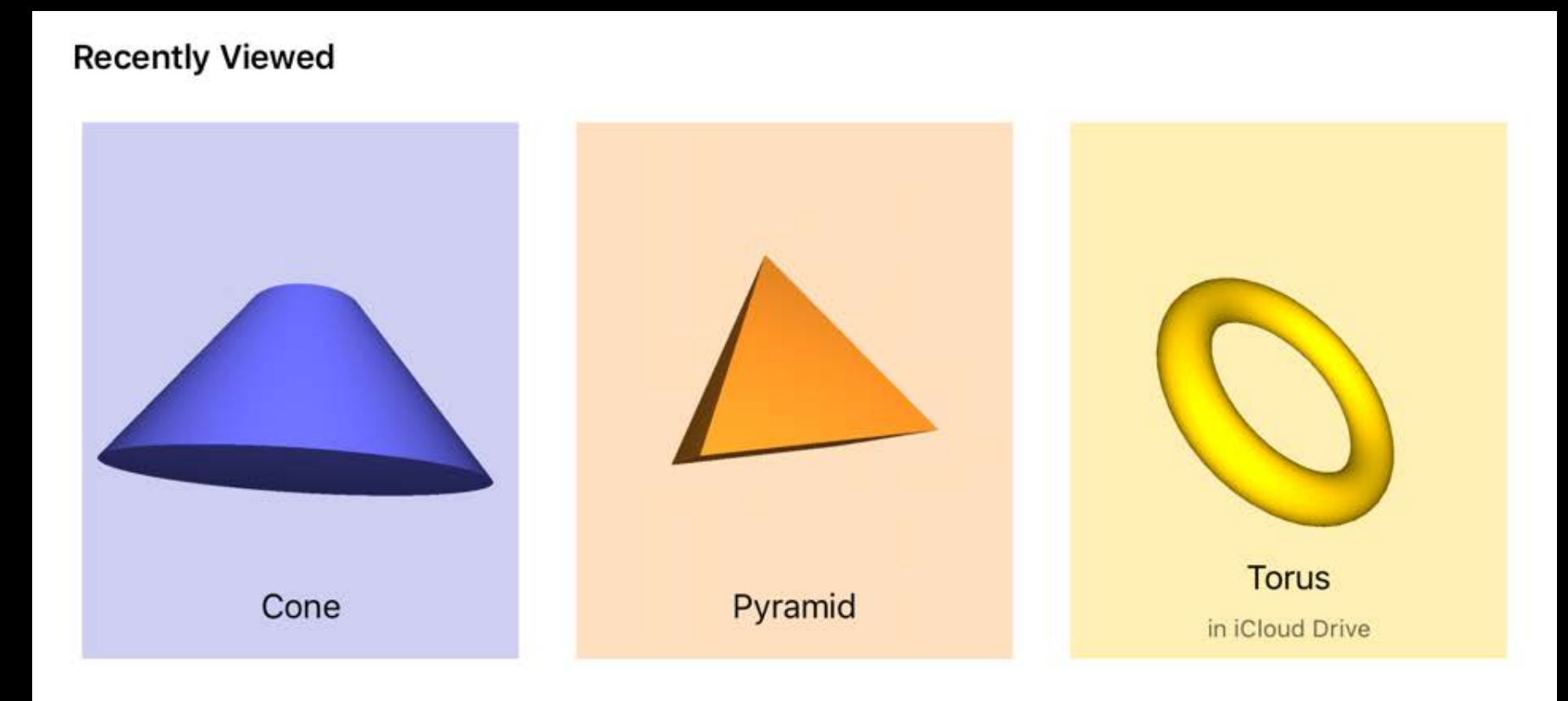


Recents List

Storing recently-used items list

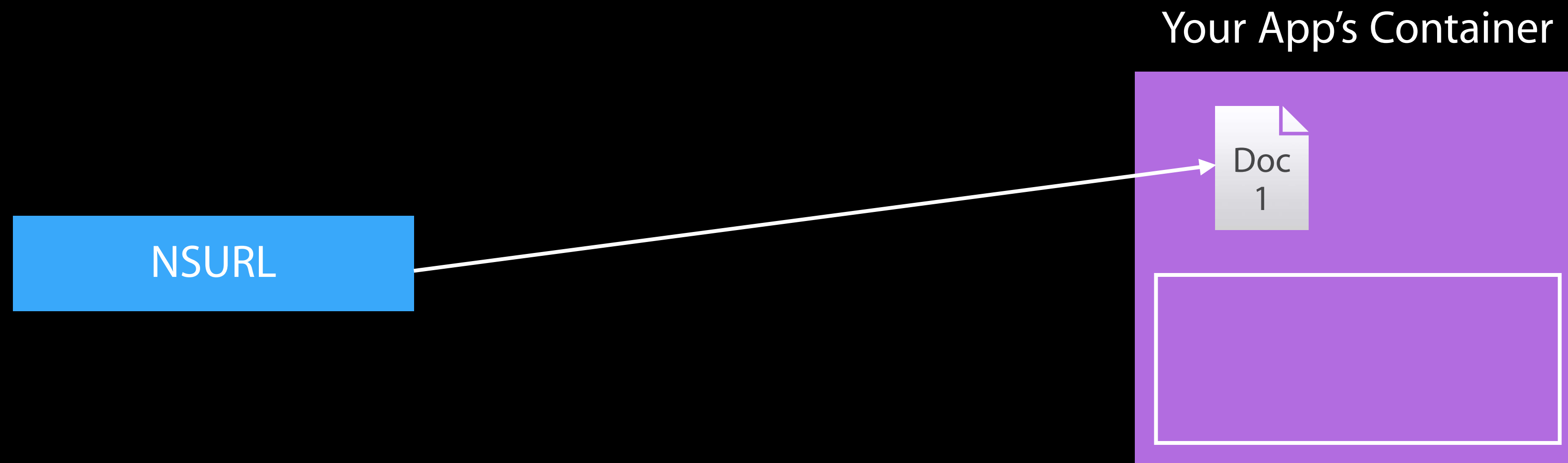
Give easy access to recently used documents

Storing NSURLs isn't robust



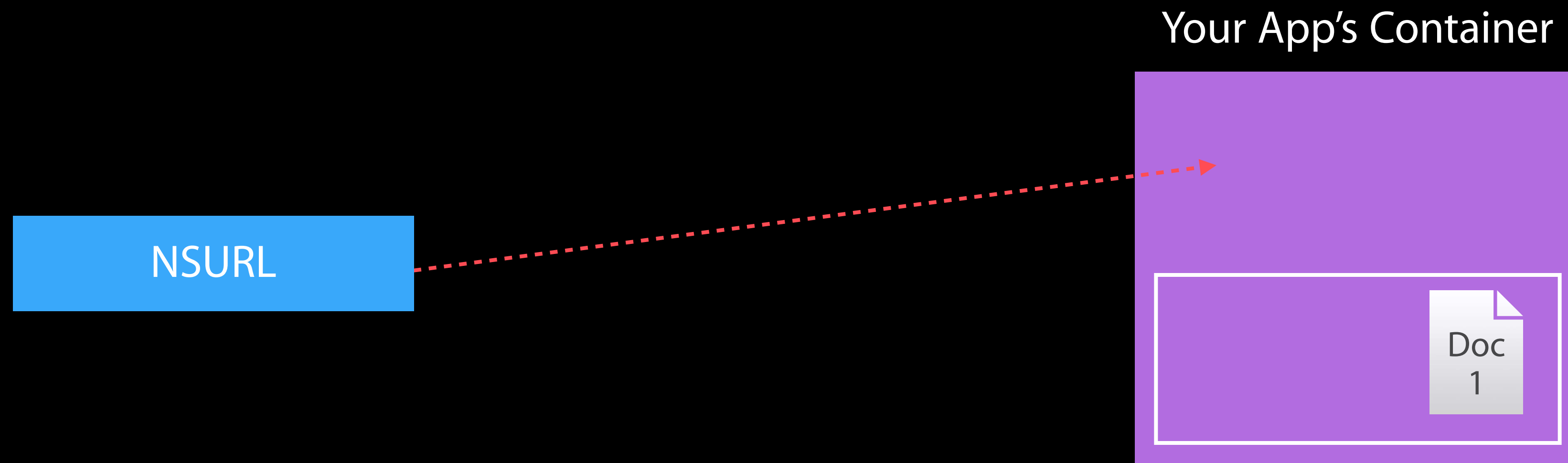
Recents List

Storing recently-used items list



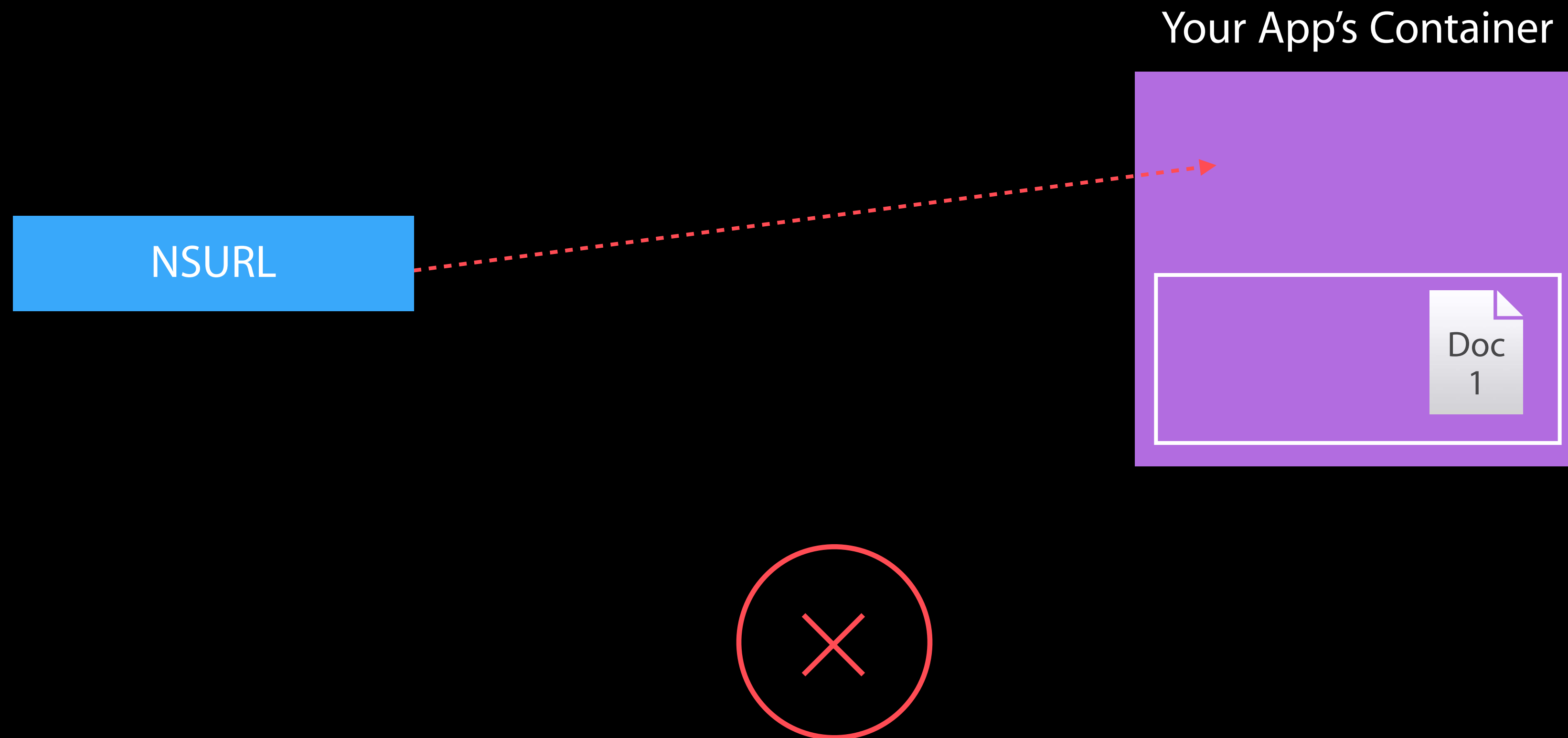
Recents List

Storing recently-used items list



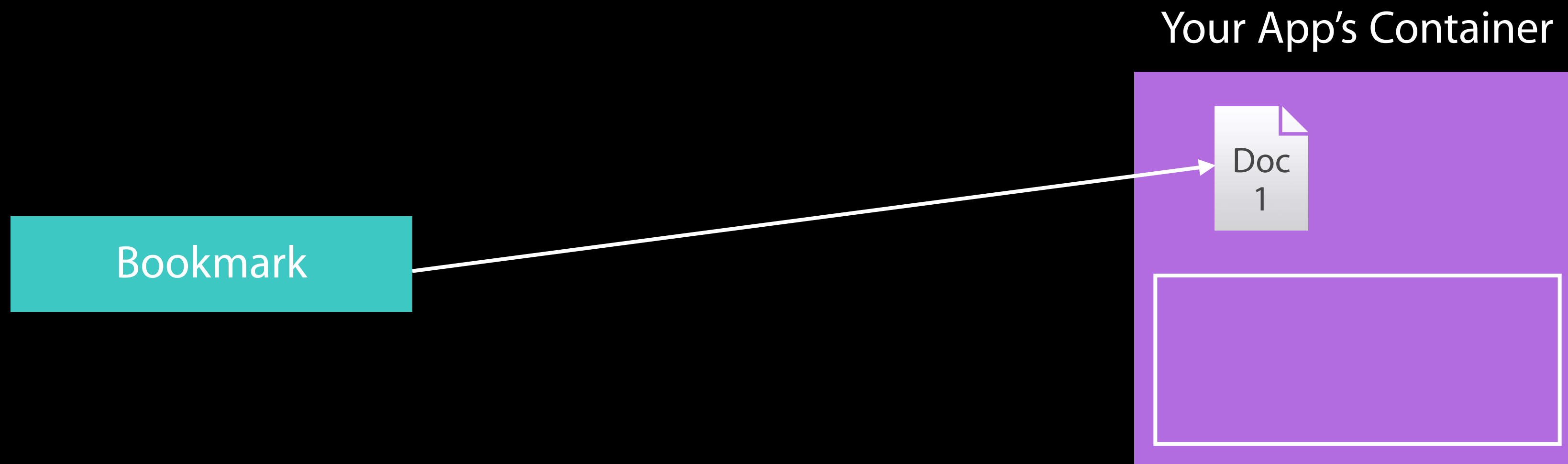
Recents List

Storing recently-used items list



Recents List

Use security scoped bookmarks



Recents List

Use security scoped bookmarks



Recents List

Use security scoped bookmarks



Demo

Document Browser Summary

Document Browser Summary

Discover documents using NSMetadataQuery

Document Browser Summary

Discover documents using NSMetadataQuery

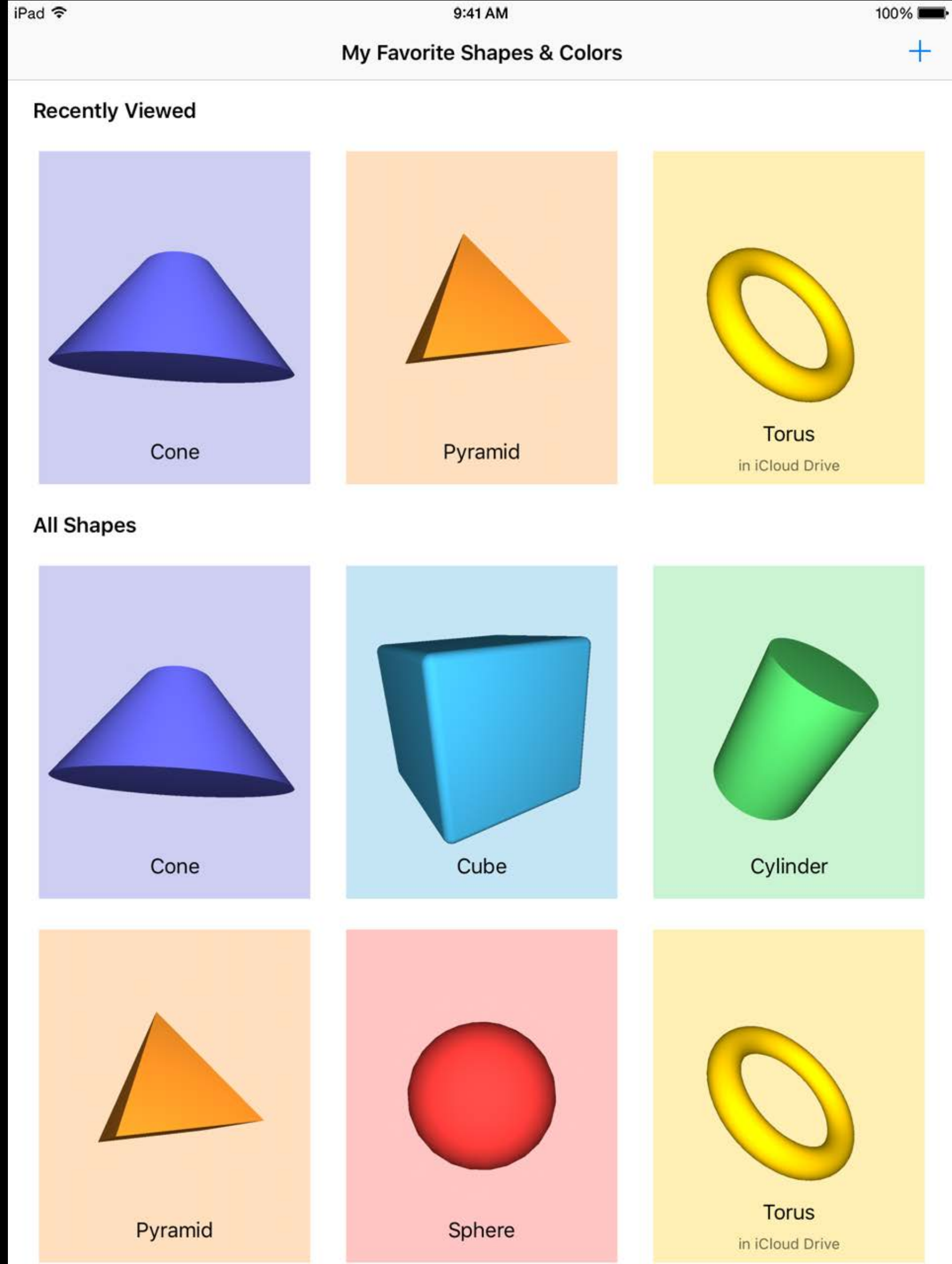
Display thumbnails

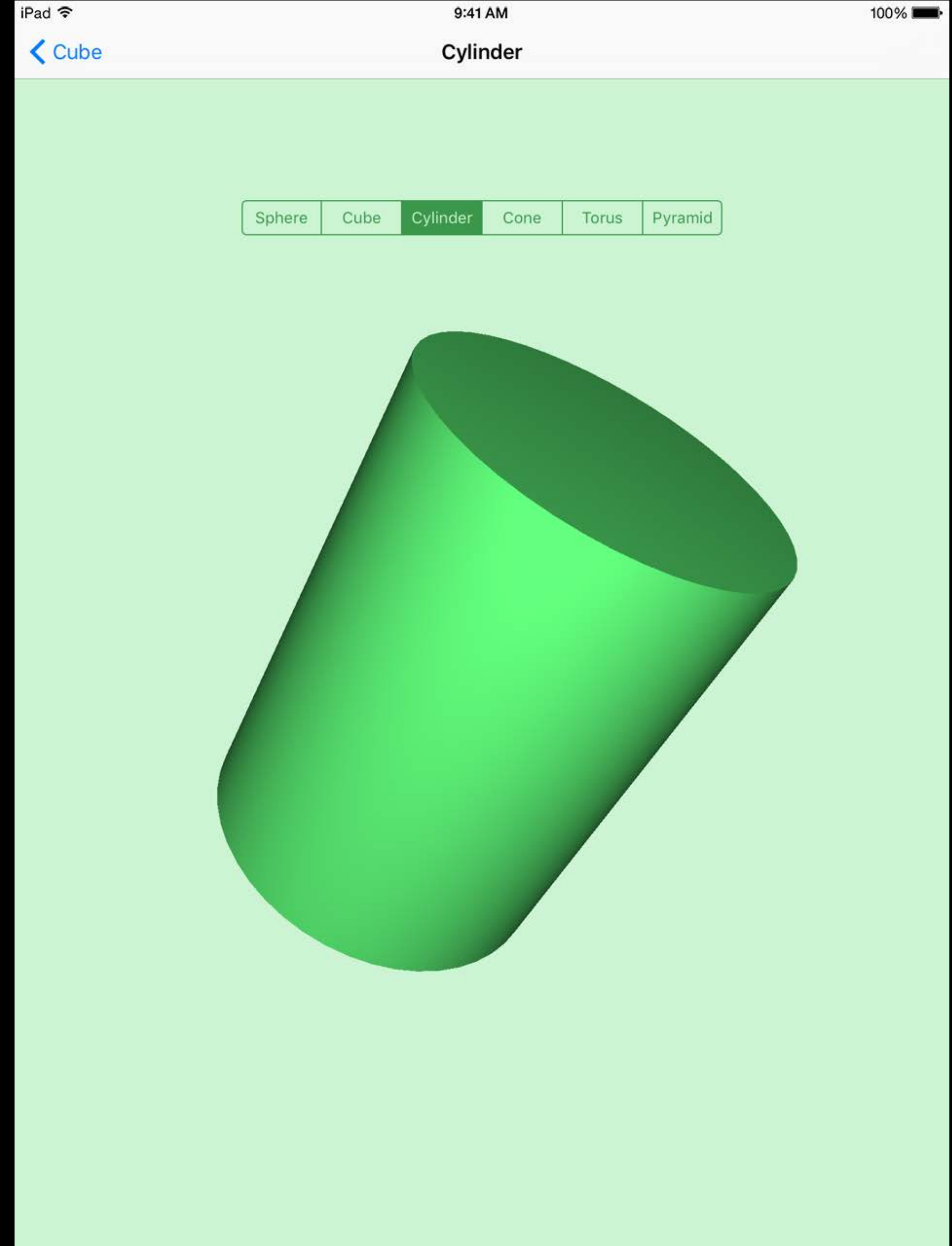
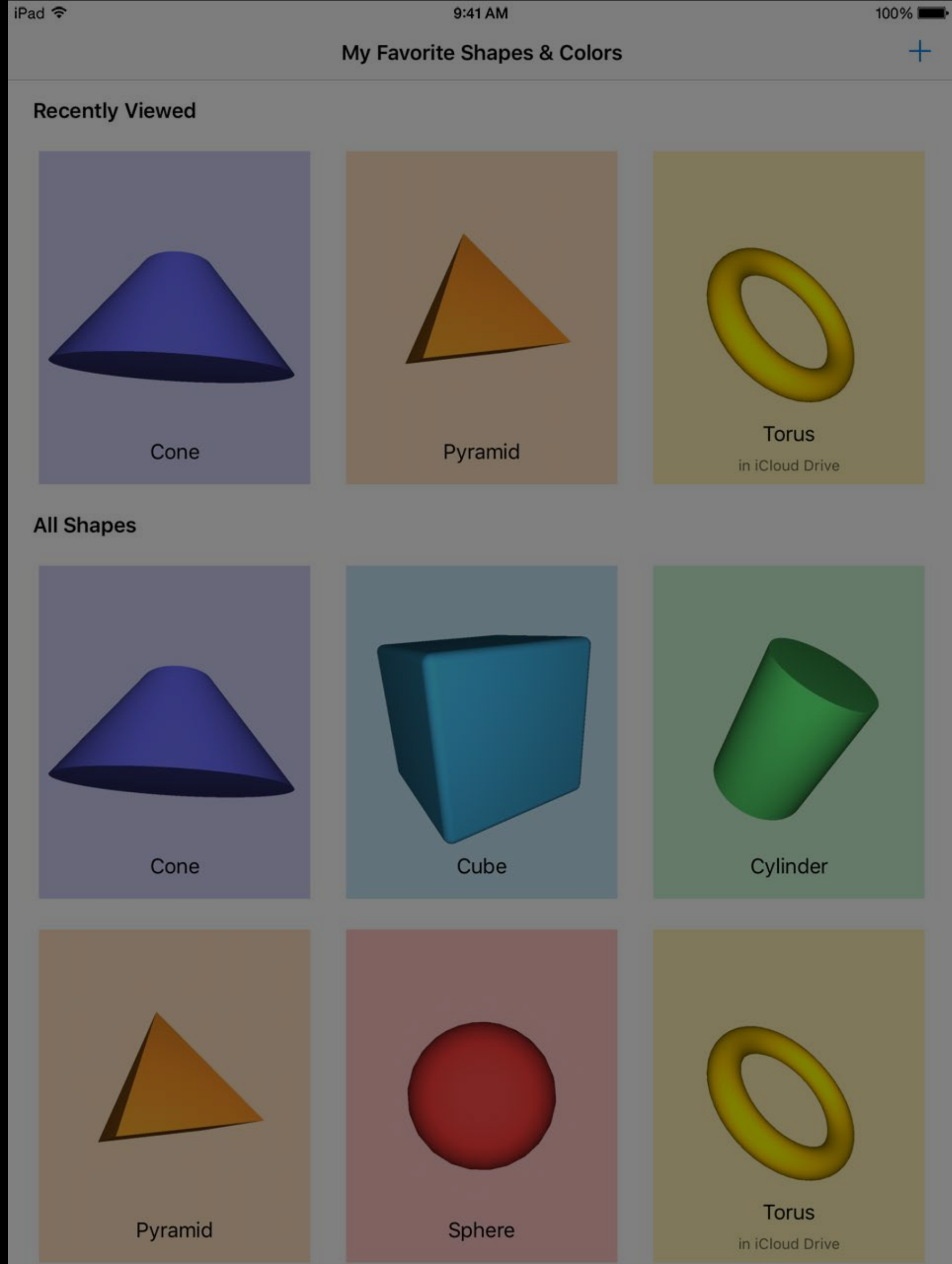
Document Browser Summary

Discover documents using NSMetadataQuery

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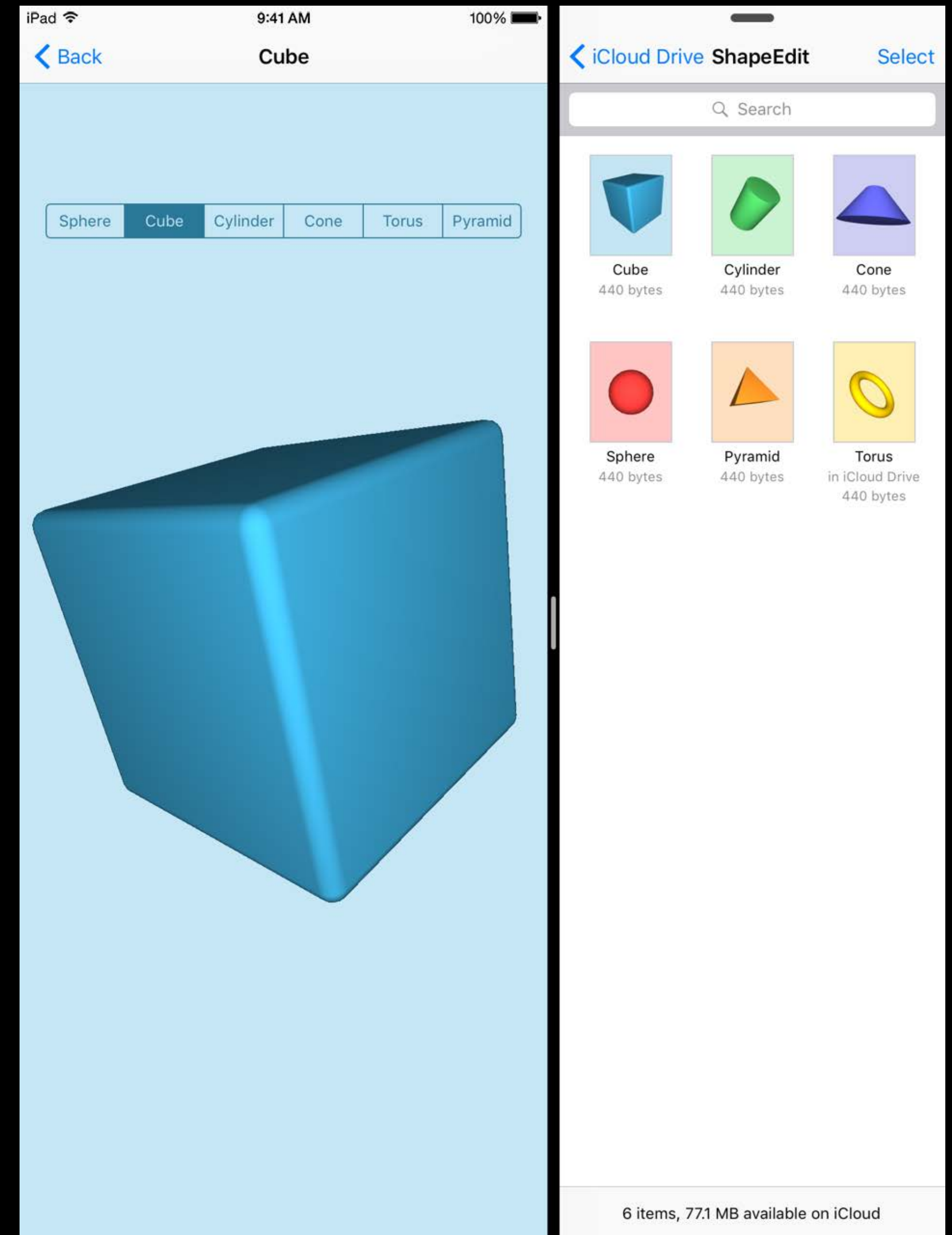
Store recent list using bookmarks





Document Access

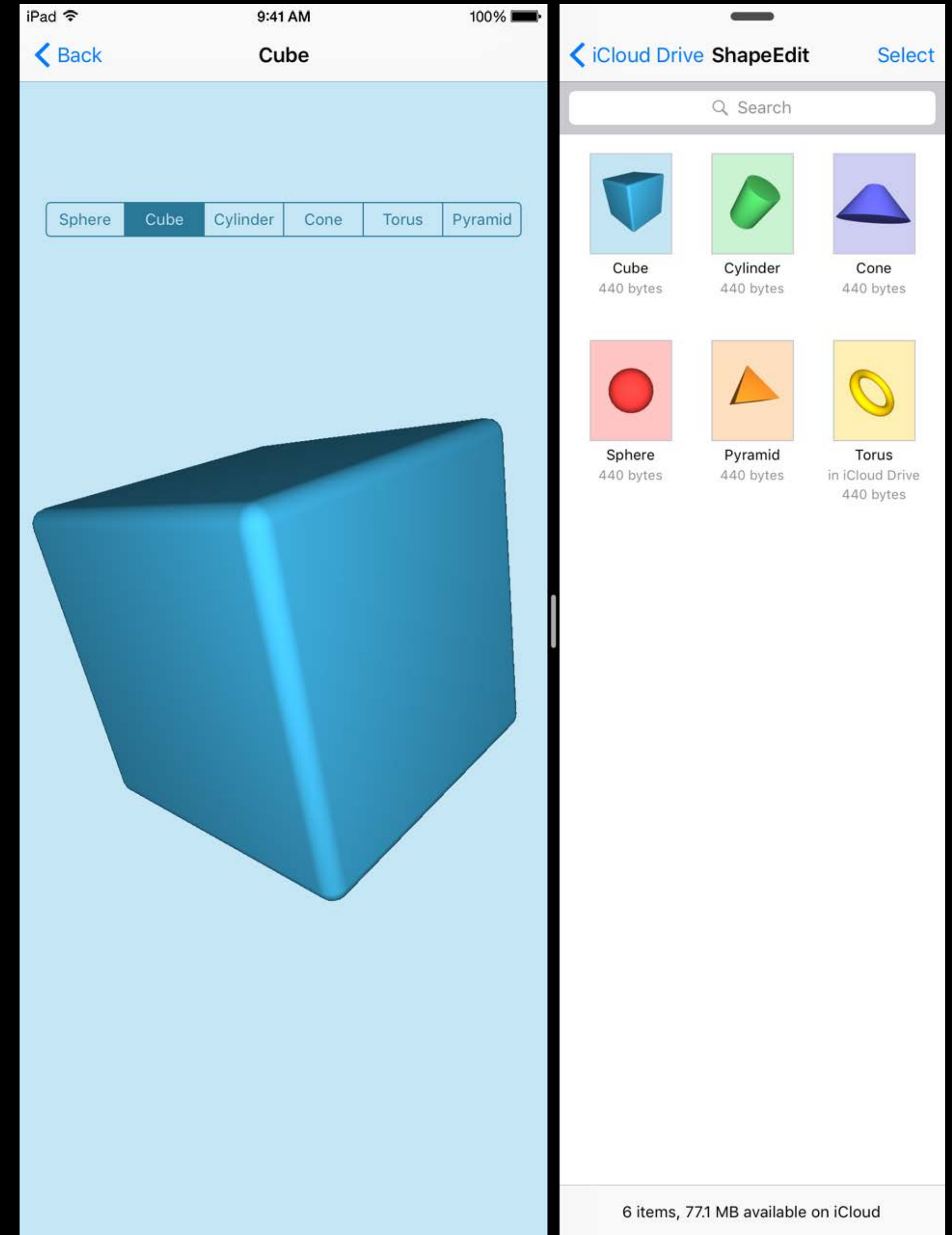
File coordination and presentation



Document Access

File coordination and presentation

Multiple applications can read or write documents

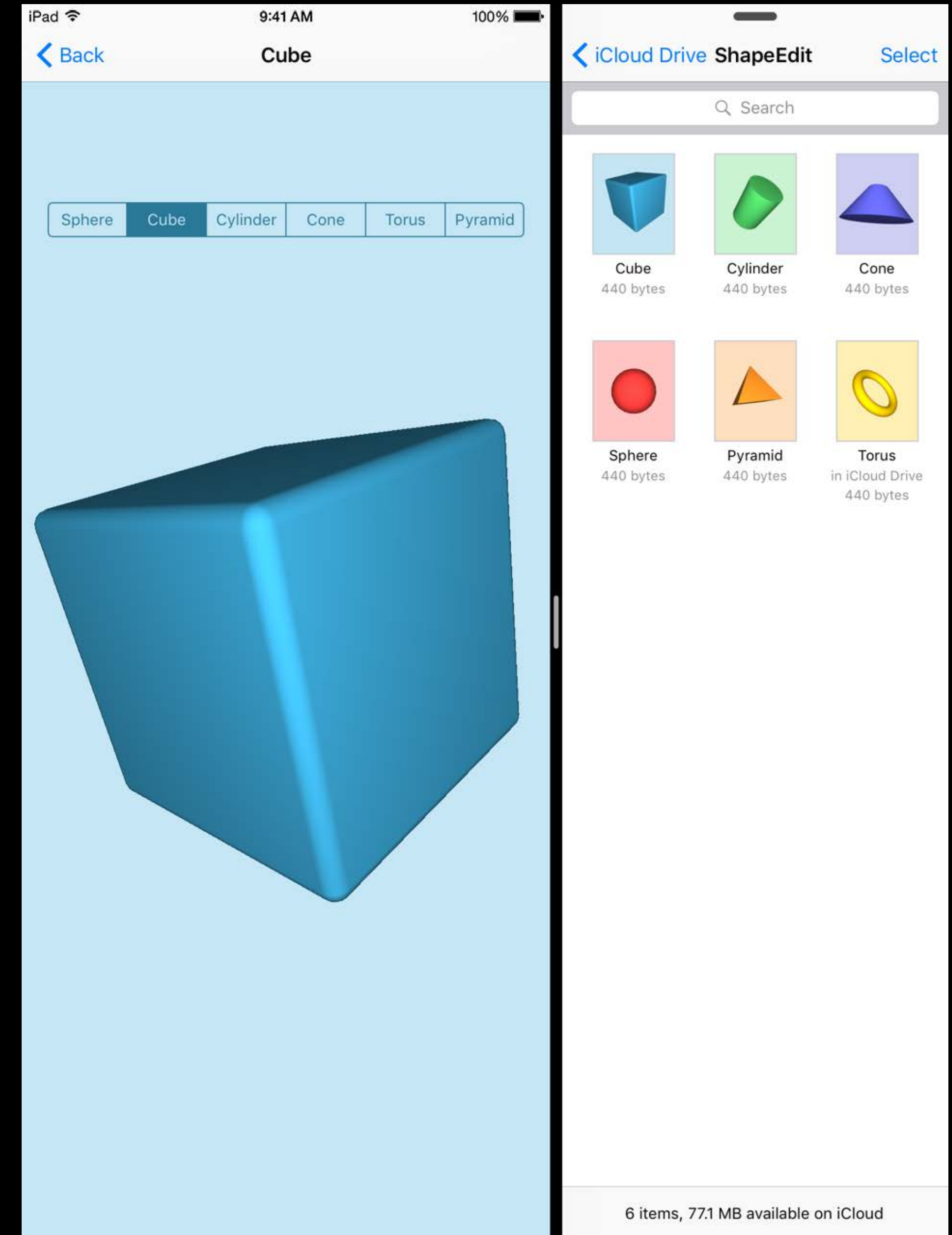


Document Access

File coordination and presentation

Multiple applications can read or write documents

- Your app, other apps, iCloud Drive...



Document Access

File coordination and presentation

Document Access

File coordination and presentation

Your App



Document Access

File coordination and presentation

Your App



Write

Document Access

File coordination and presentation



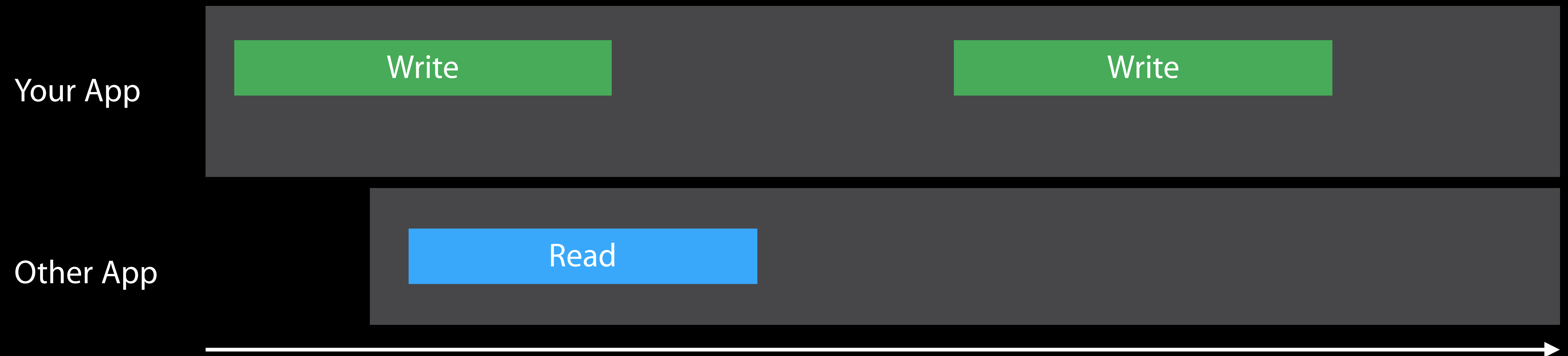
Document Access

File coordination and presentation



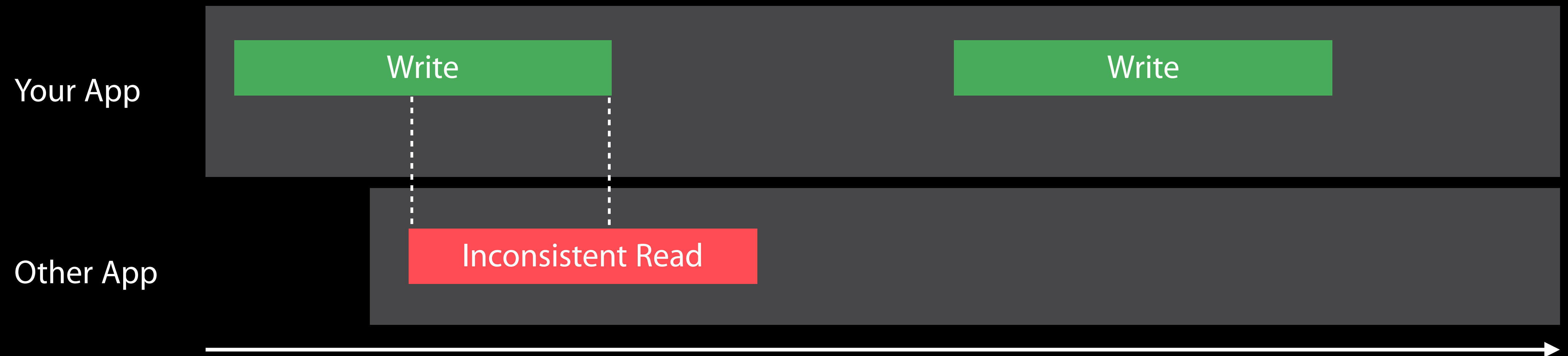
Document Access

File coordination and presentation



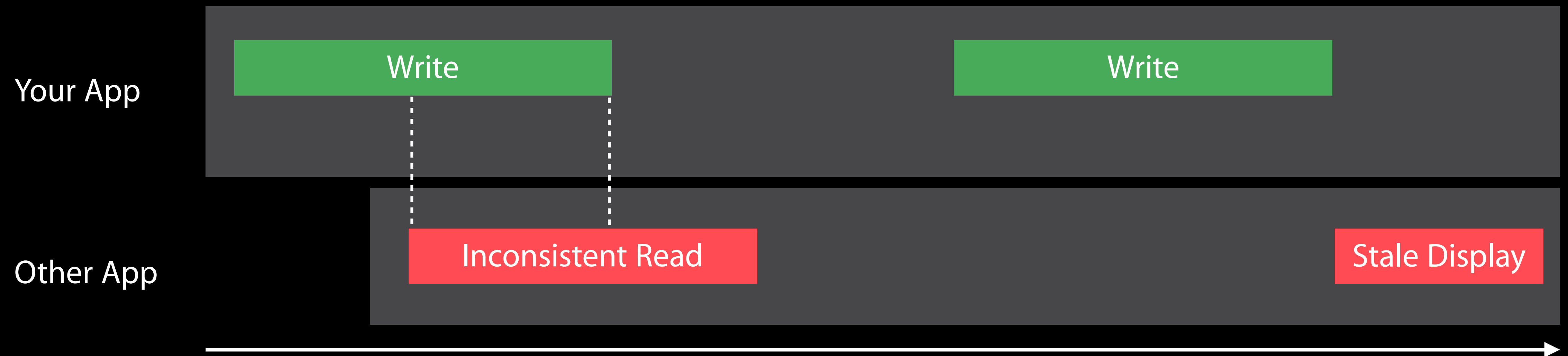
Document Access

File coordination and presentation



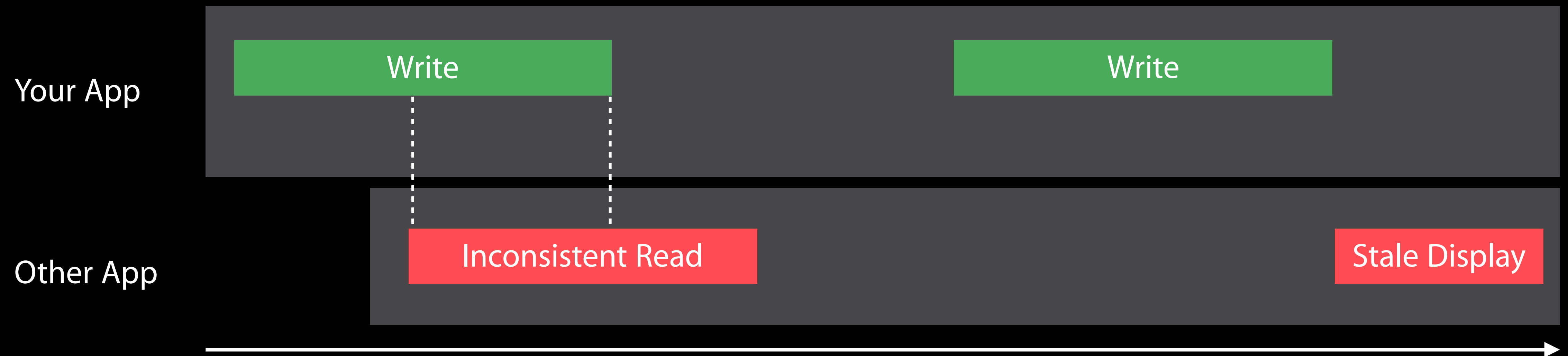
Document Access

File coordination and presentation



Document Access

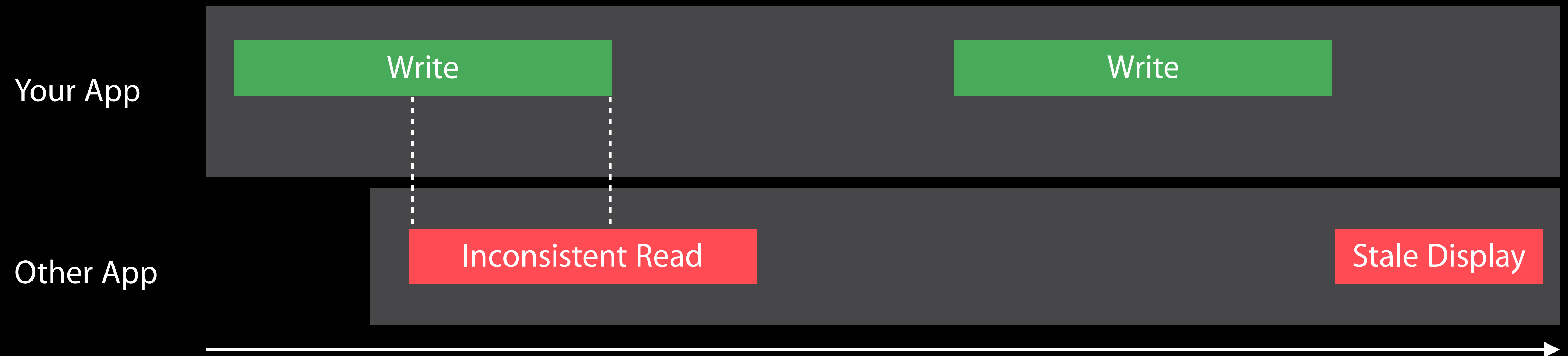
File coordination and presentation



Document Access

File coordination and presentation

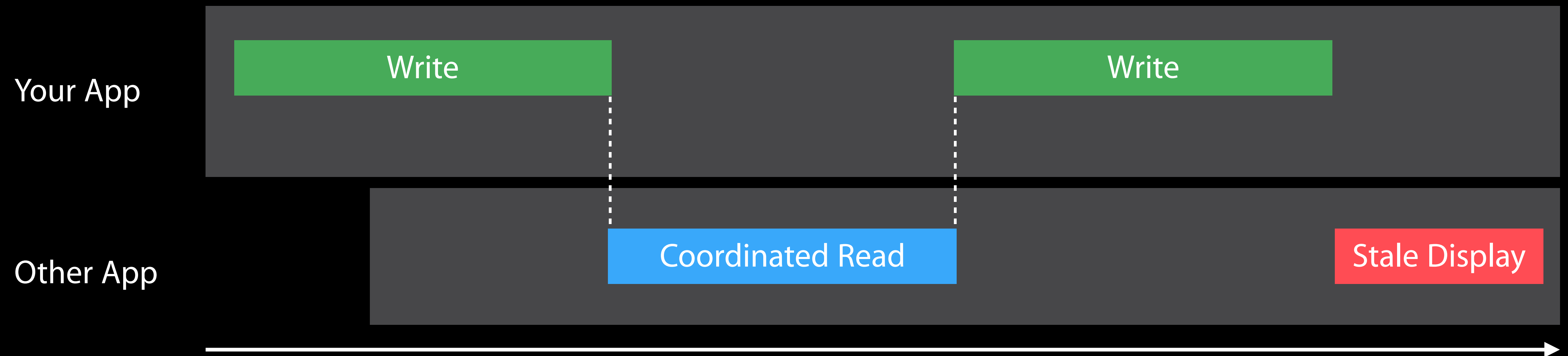
NSFileCoordination: Reader/writer lock



Document Access

File coordination and presentation

NSFileCoordination: Reader/writer lock

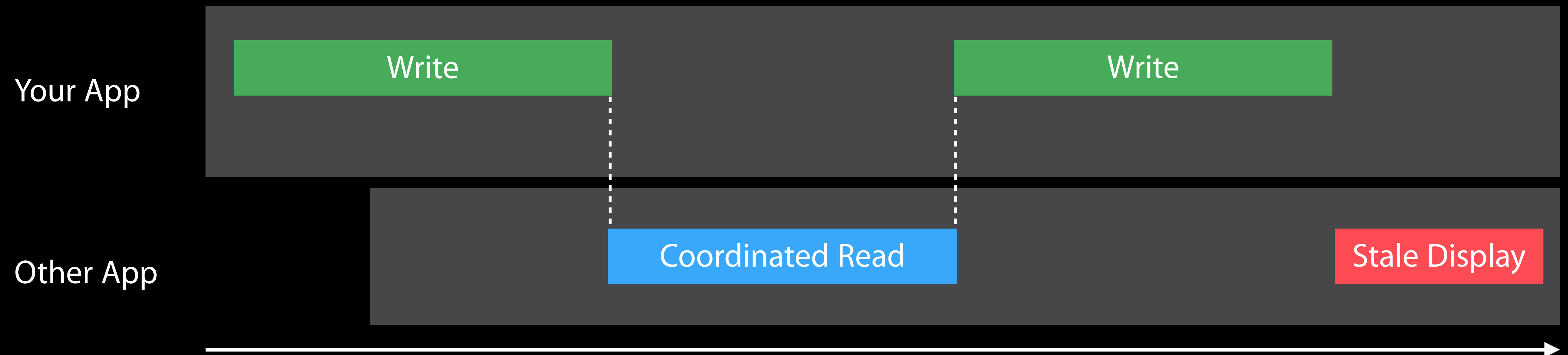


Document Access

File coordination and presentation

NSFileCoordination: Reader/writer lock

NSFilePresenter: Notification mechanism

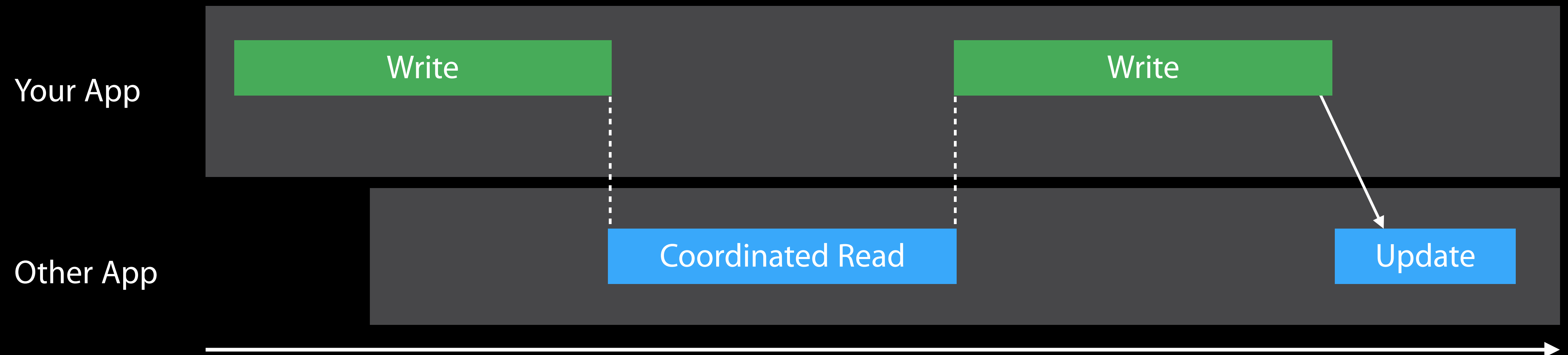


Document Access

File coordination and presentation

NSFileCoordination: Reader/writer lock

NSFilePresenter: Notification mechanism



Document Management

Creating new documents

Document Management

Creating new documents

Goals

Document Management

Creating new documents

Goals

- Consistent

Document Management

Creating new documents

Goals

- Consistent
- Up-to-date

Document Management

Creating new documents

Goals

- Consistent
- Up-to-date

Your App



Document Management

Creating new documents

Goals

- Consistent
- Up-to-date

Your App



Document Creation

The diagram consists of a large dark gray rectangular area representing 'Your App'. Inside this area, on the left side, is a smaller green rectangular box labeled 'Document Creation'. Below the dark gray area is a white horizontal arrow pointing to the right, indicating a process or flow.

Document Management

Creating new documents

Goals

- Consistent
- Up-to-date

Your App

Document Creation

Display in UI



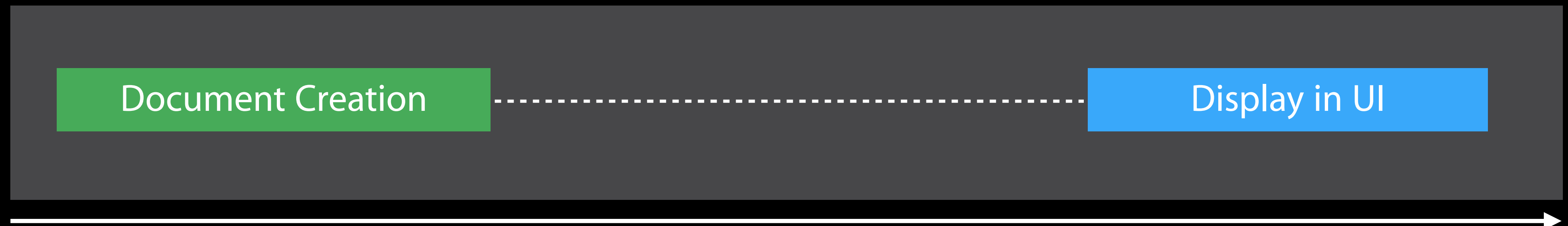
Document Management

Creating new documents

Goals

- Consistent
- Up-to-date

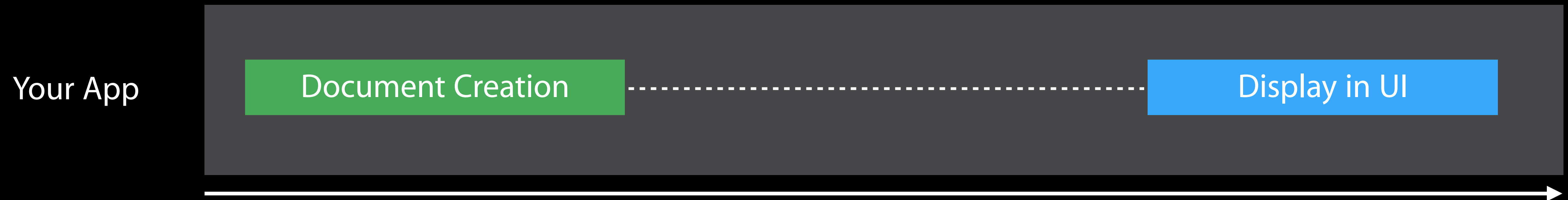
Your App



Document Management

Creating new documents

Coordinated operations update directly!



Document Management

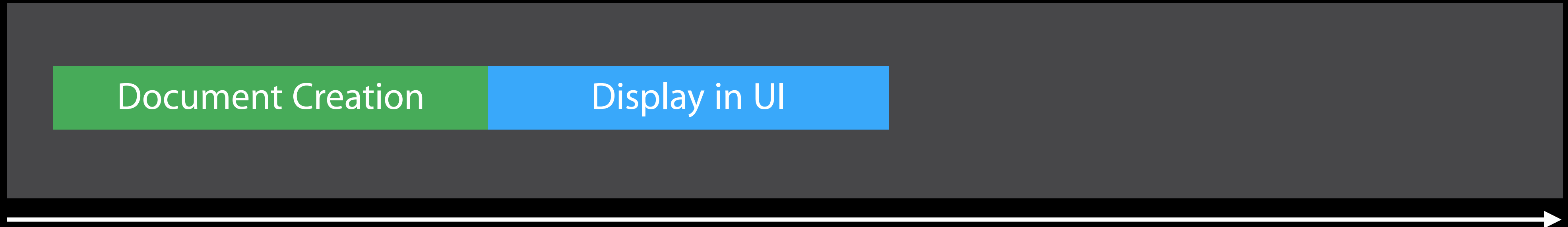
Creating new documents

Coordinated operations update directly!

Your App

Document Creation

Display in UI



Document Management

Creating new documents

Main
thread

Document Creation

Document Management

Creating new documents

Main
thread

Document Creation

Main Thread Blocked



Document Management

Creating new documents

Coordinated operations can block

Main
thread

Document Creation

Main Thread Blocked



Document Management

Creating new documents

Coordinated operations can block

Use background queue

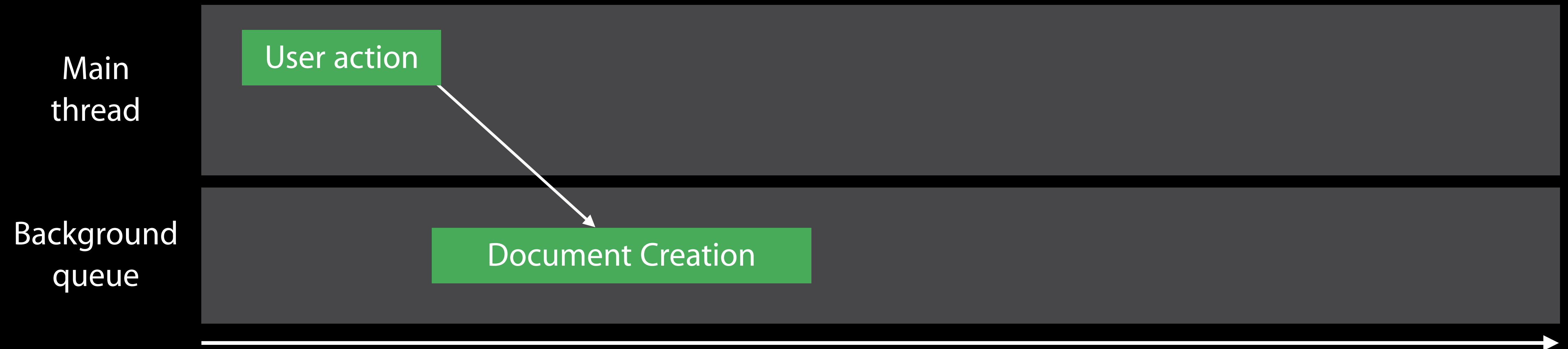


Document Management

Creating new documents

Coordinated operations can block

Use background queue

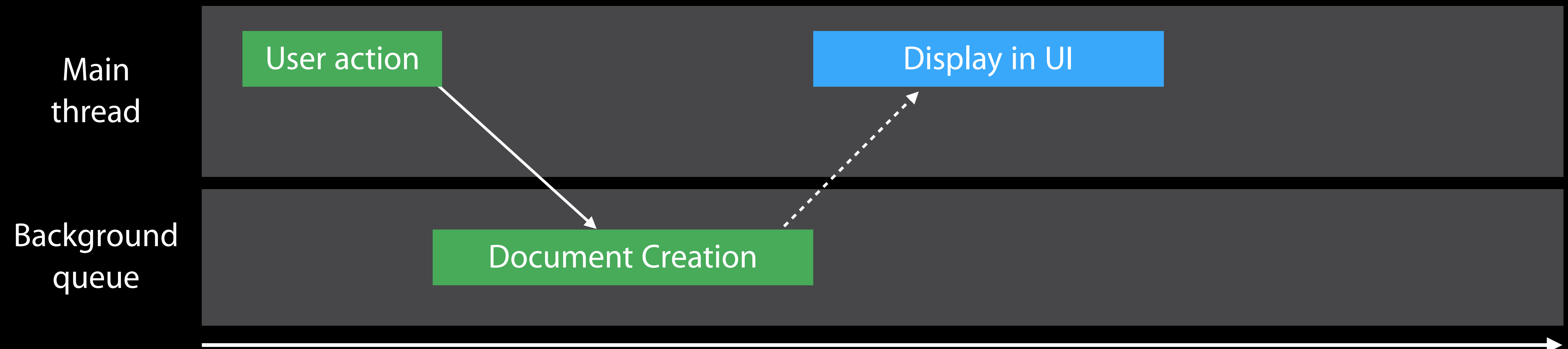


Document Management

Creating new documents

Coordinated operations can block

Use background queue



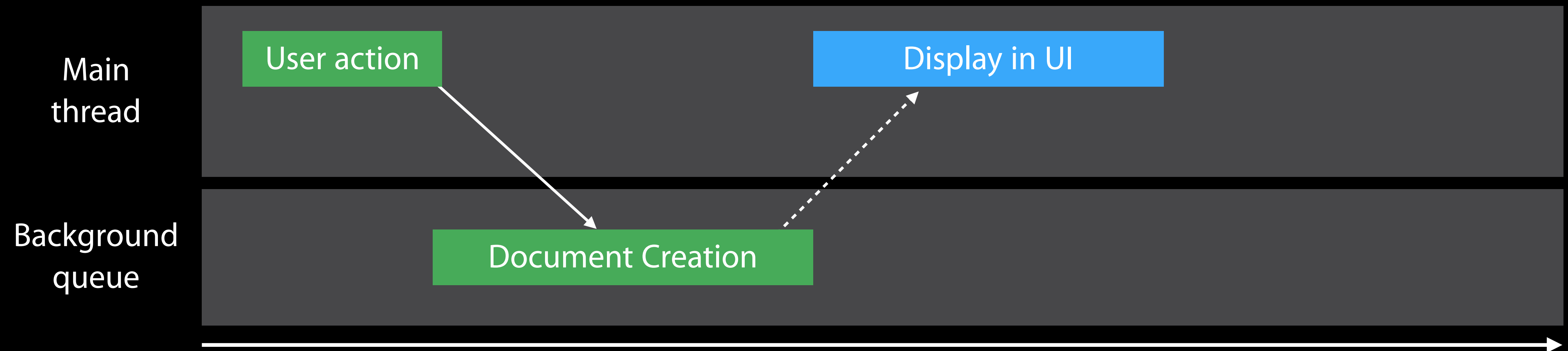
Document Management

Creating new documents

Coordinated operations can block

Use background queue

Deletion same



Loading and Displaying

Reading documents

UIDocument for reading and writing



Loading and Displaying

Reading documents

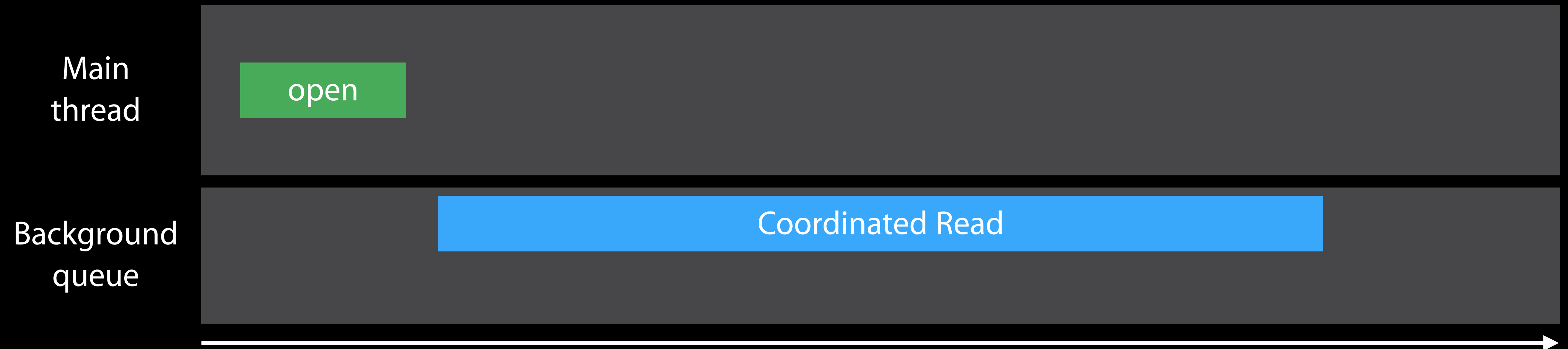
UIDocument for reading and writing



Loading and Displaying

Reading documents

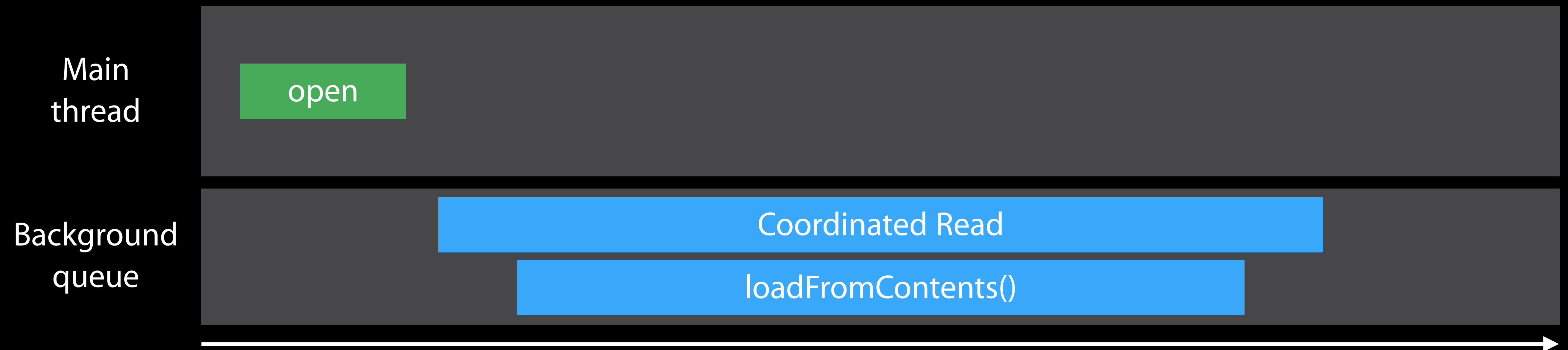
UIDocument for reading and writing



Loading and Displaying

Reading documents

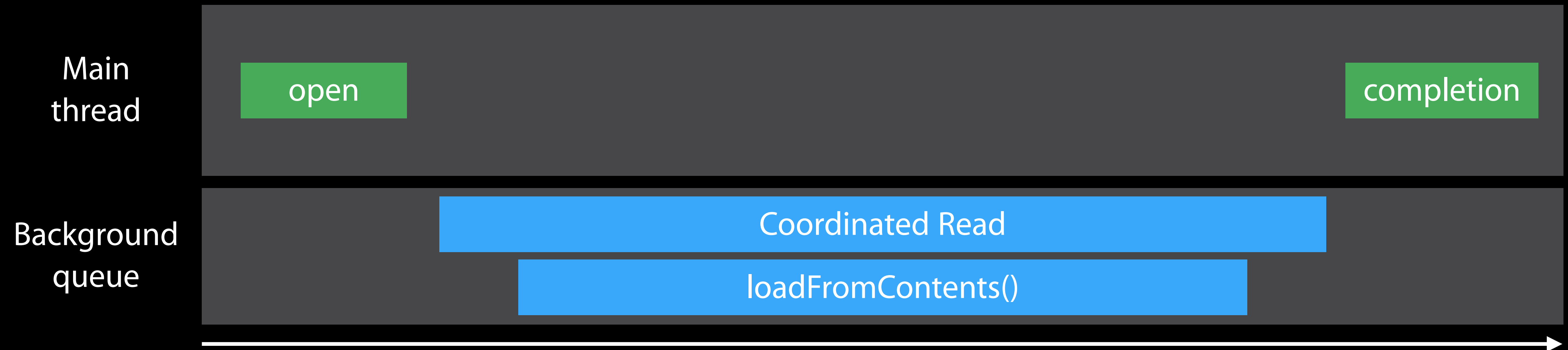
UIDocument for reading and writing



Loading and Displaying

Reading documents

UIDocument for reading and writing



Loading and Displaying

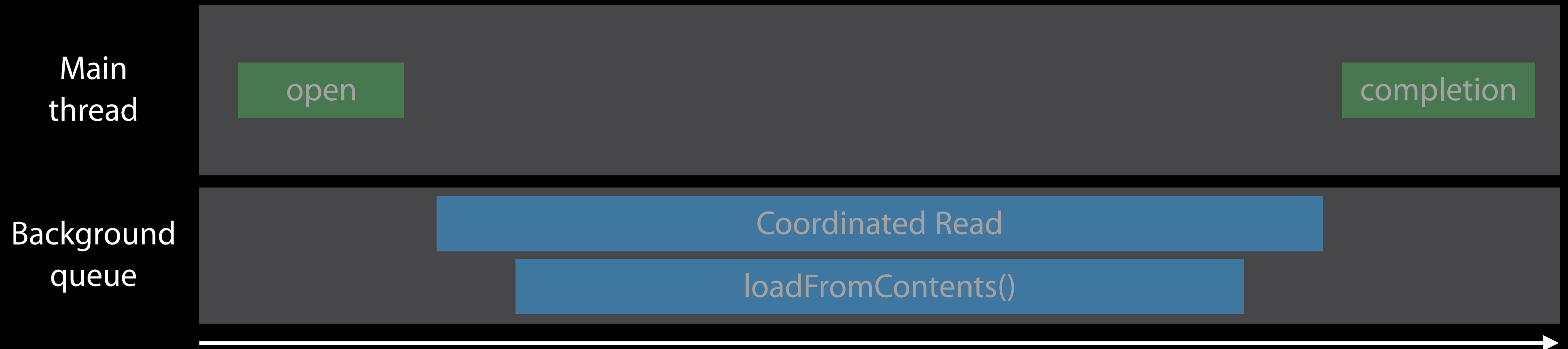
Reading documents



Loading and Displaying

Reading documents

Reading may trigger a download



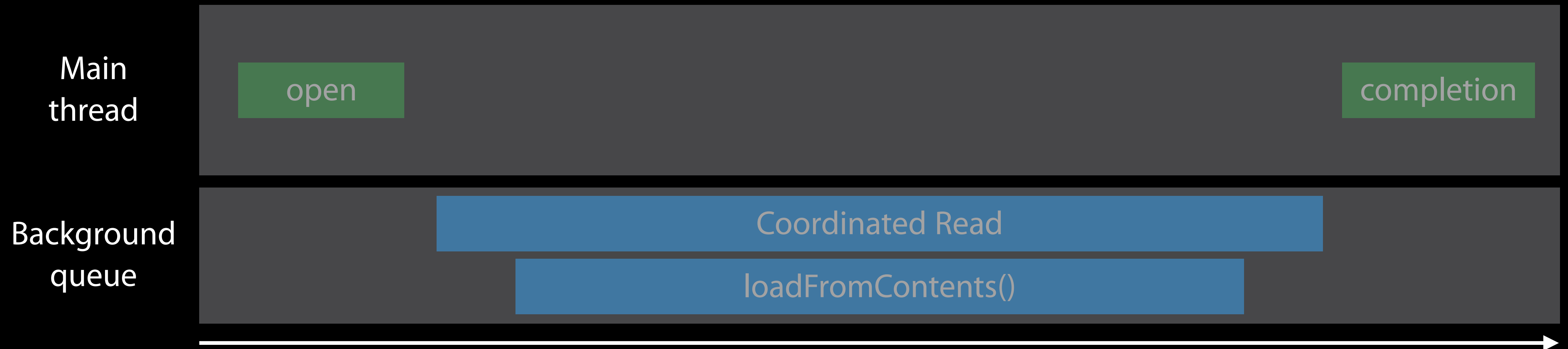
Loading and Displaying

NEW

Reading documents

Reading may trigger a download

NSProgressReporting



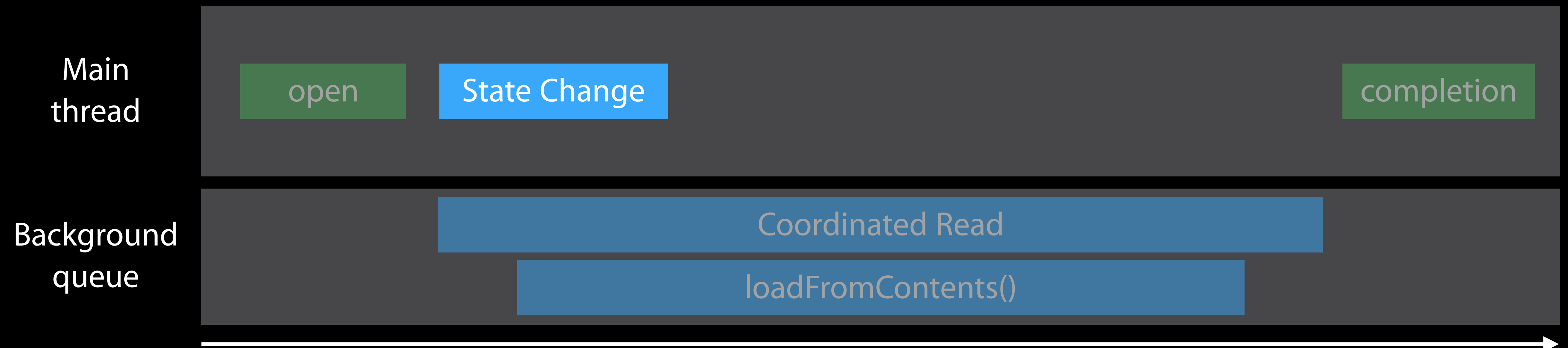
Loading and Displaying

NEW

Reading documents

Reading may trigger a download

NSProgressReporting



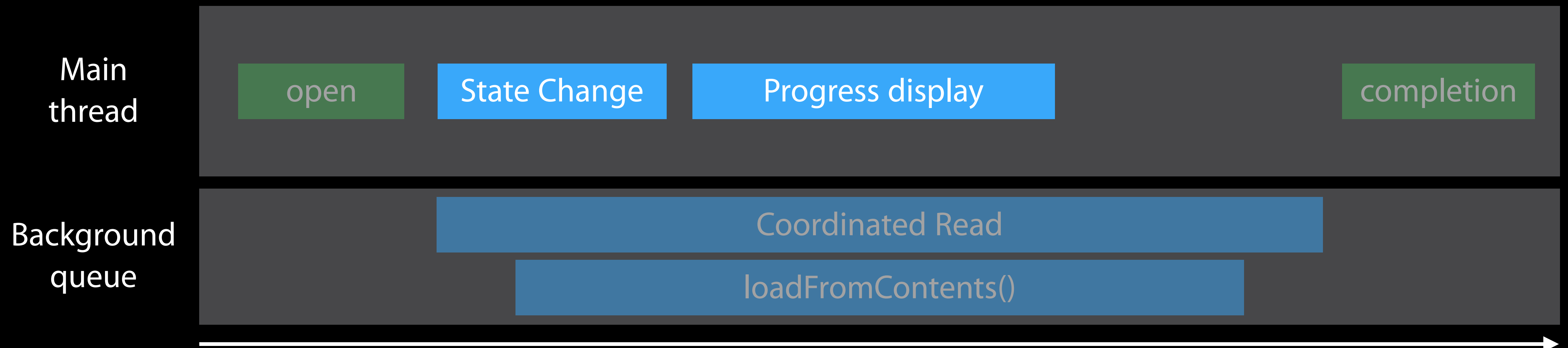
Loading and Displaying

NEW

Reading documents

Reading may trigger a download

NSProgressReporting



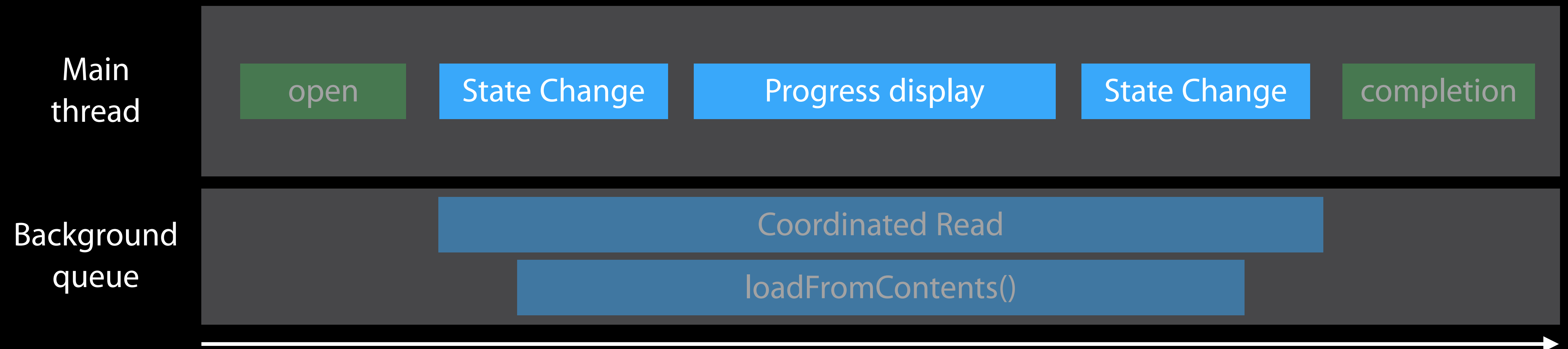
Loading and Displaying

NEW

Reading documents

Reading may trigger a download

NSProgressReporting



Loading and Displaying

Writing documents

Background
queue

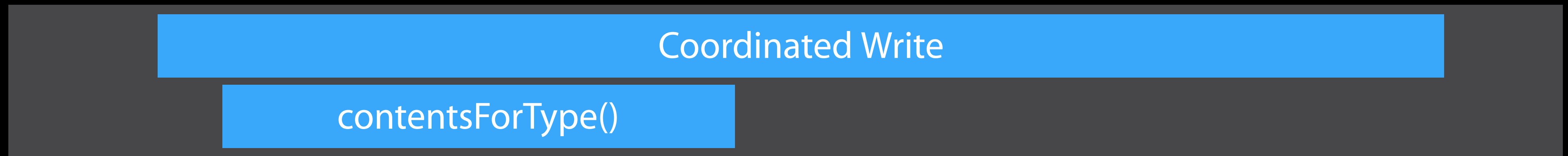


Loading and Displaying

Writing documents

Like reading: File coordination, background queue

Background
queue



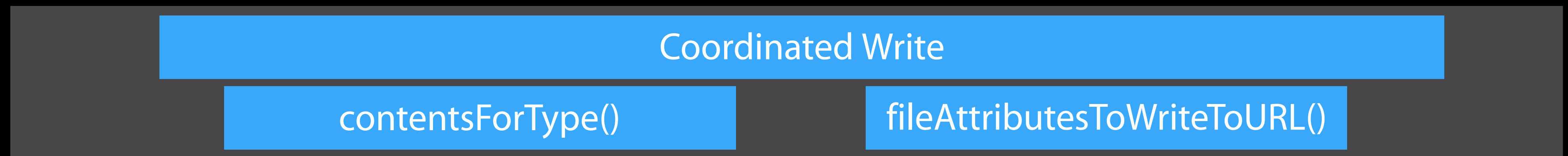
Loading and Displaying

Writing documents

Like reading: File coordination, background queue

Thumbnails

Background
queue



Loading and Displaying

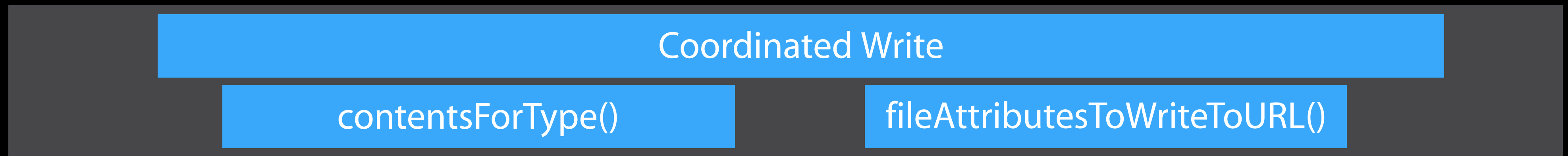
Writing documents

Like reading: File coordination, background queue

Thumbnails

Called on a background queue!

Background
queue



Loading and Displaying

Writing documents

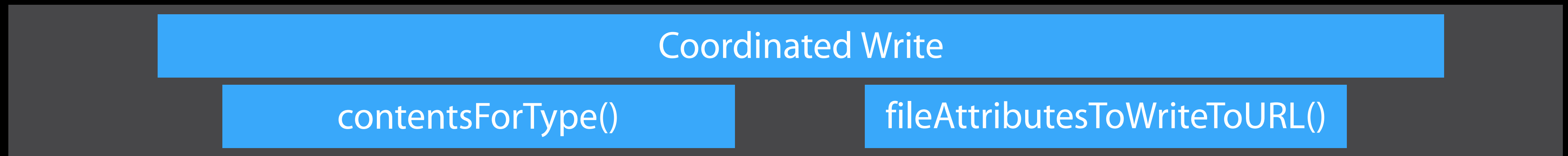
Like reading: File coordination, background queue

Thumbnails

Called on a background queue!

- No UIViews!

Background
queue



Opening from Other Apps

iOS 8—Open by copy

Opening from Other Apps

iOS 8—Open by copy

Apps don't have access to each others documents

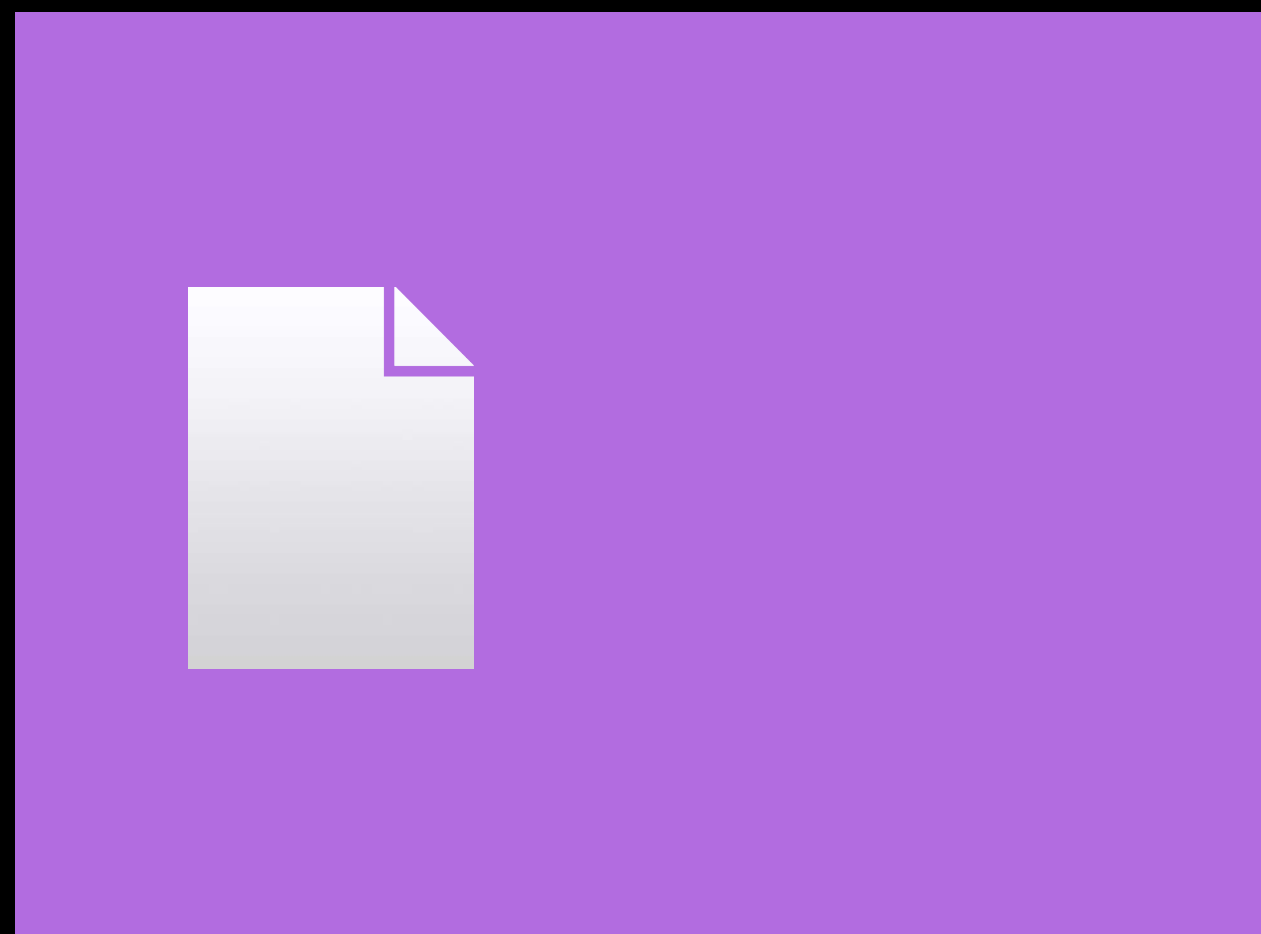
Opening from Other Apps

iOS 8—Open by copy

Apps don't have access to each others documents

- Opening using the `UIDocumentInteractionController` causes a copy

Your App's Container



Other App's Container



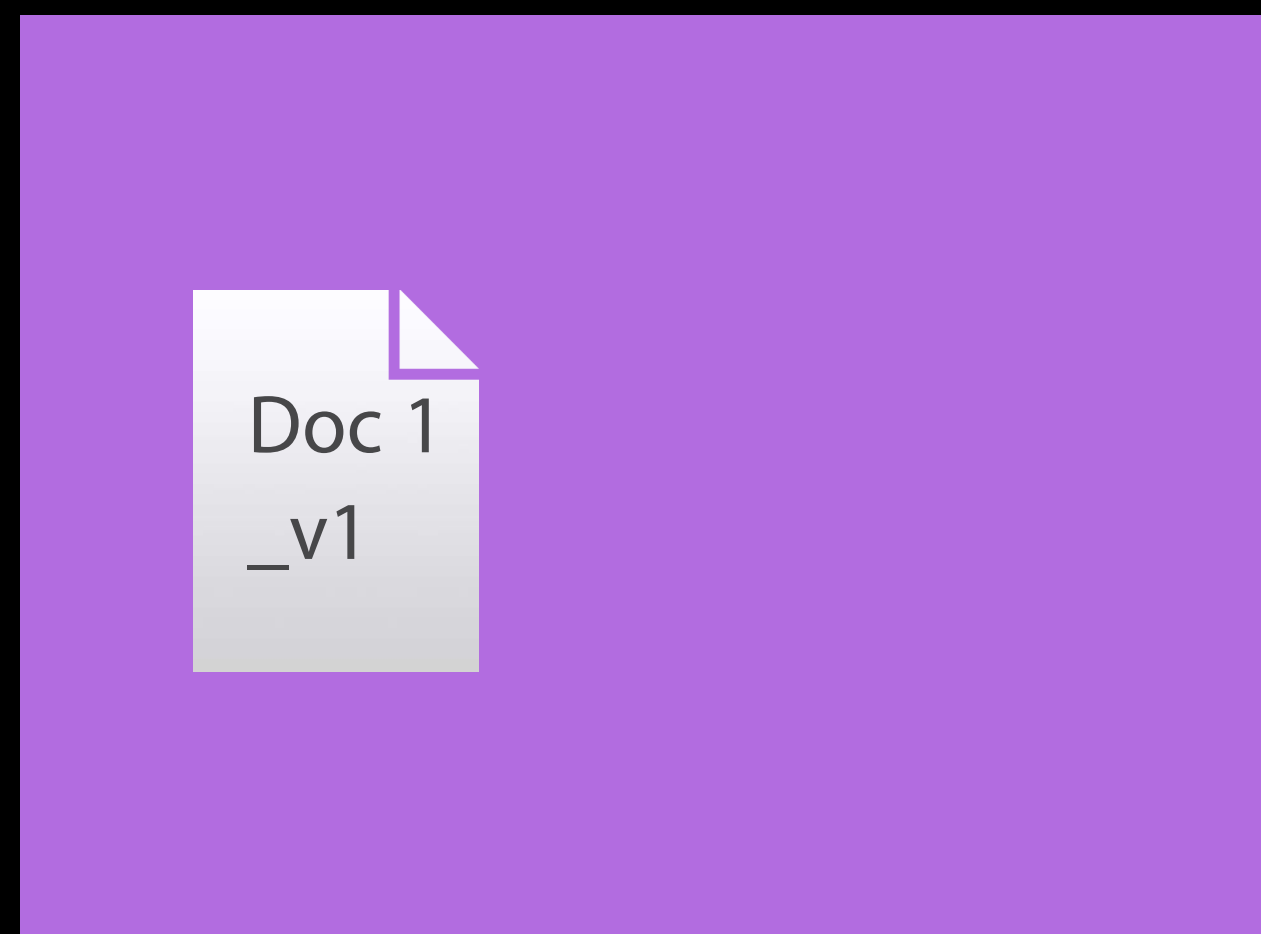
Opening from Other Apps

iOS 8—Open by copy

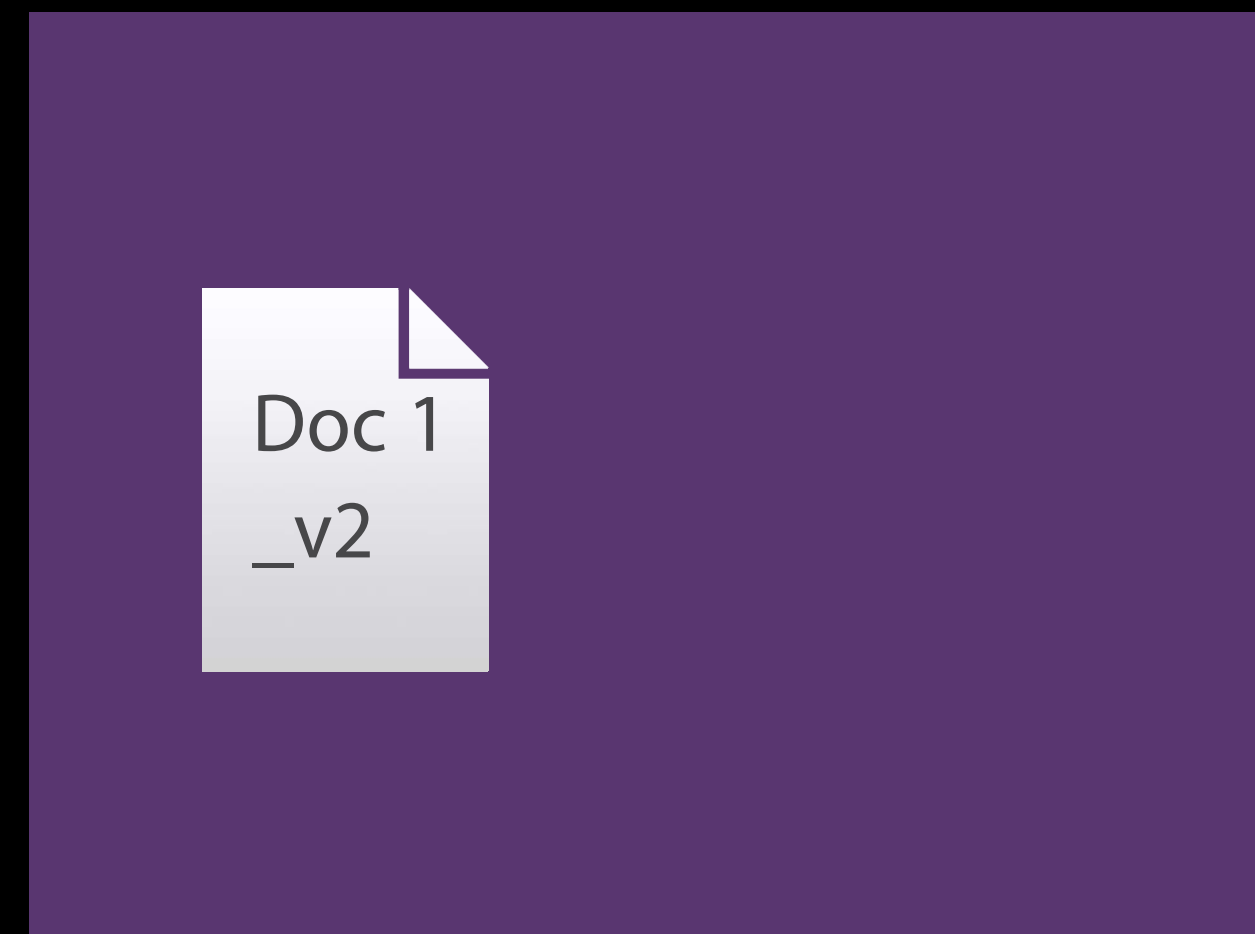
Apps don't have access to each others documents

- Opening using the `UIDocumentInteractionController` causes a copy

Your App's Container



Other App's Container



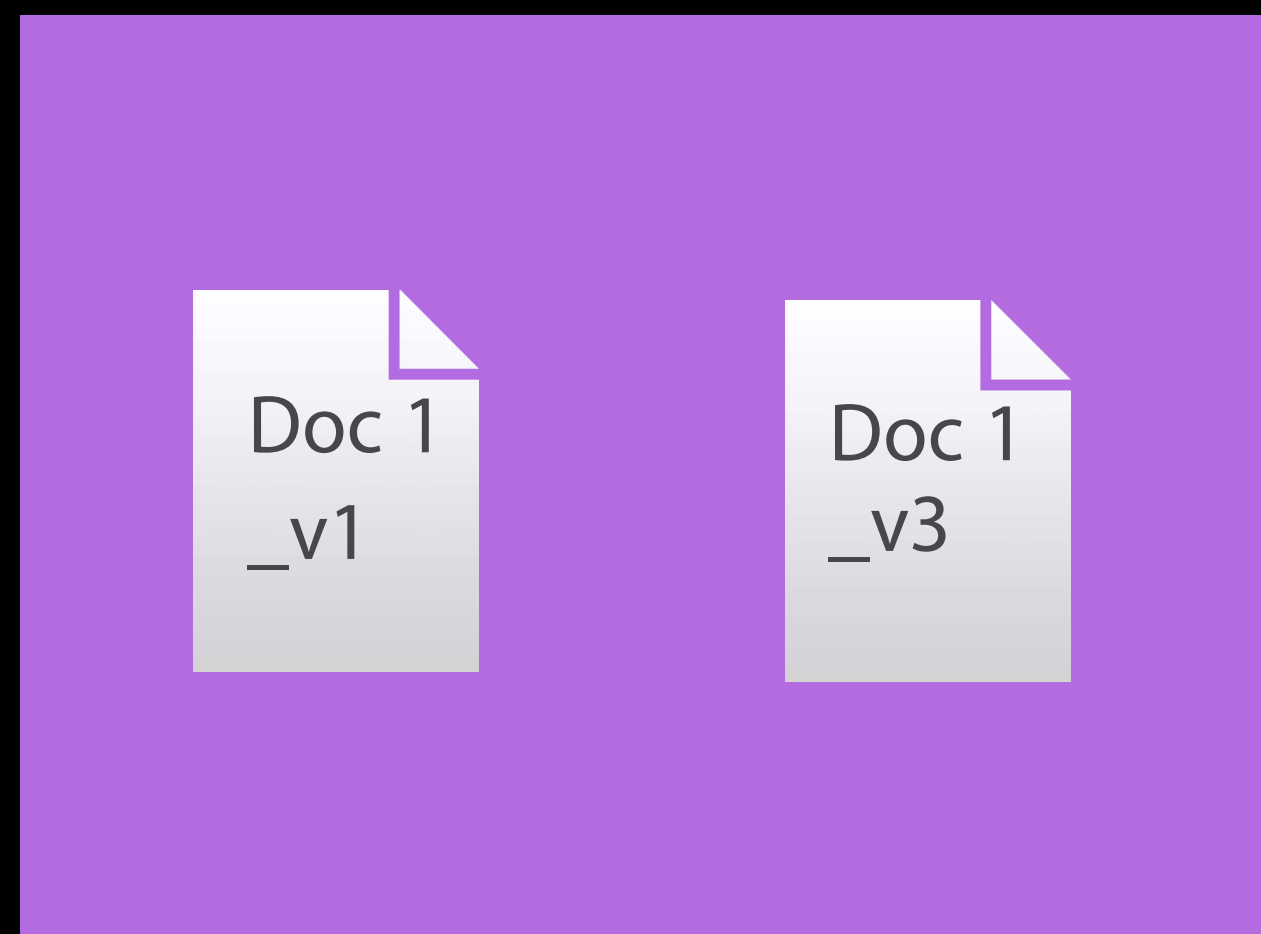
Opening from Other Apps

iOS 8—Open by copy

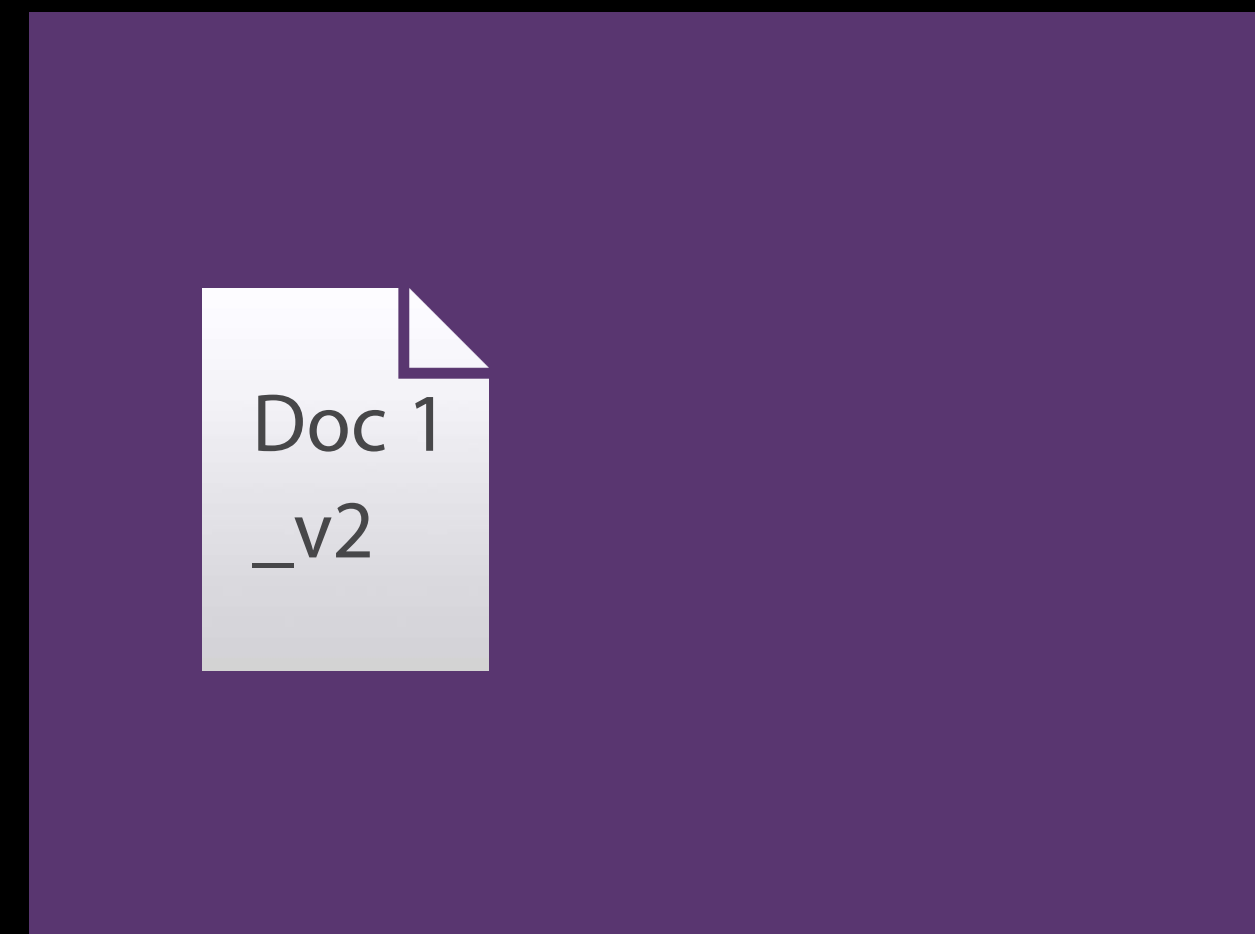
Apps don't have access to each others documents

- Opening using the `UIDocumentInteractionController` causes a copy
- Proliferation of copies

Your App's Container



Other App's Container



Opening from Other Apps

iOS 9—Open in place

NEW

Your App's Container



Other App's Container



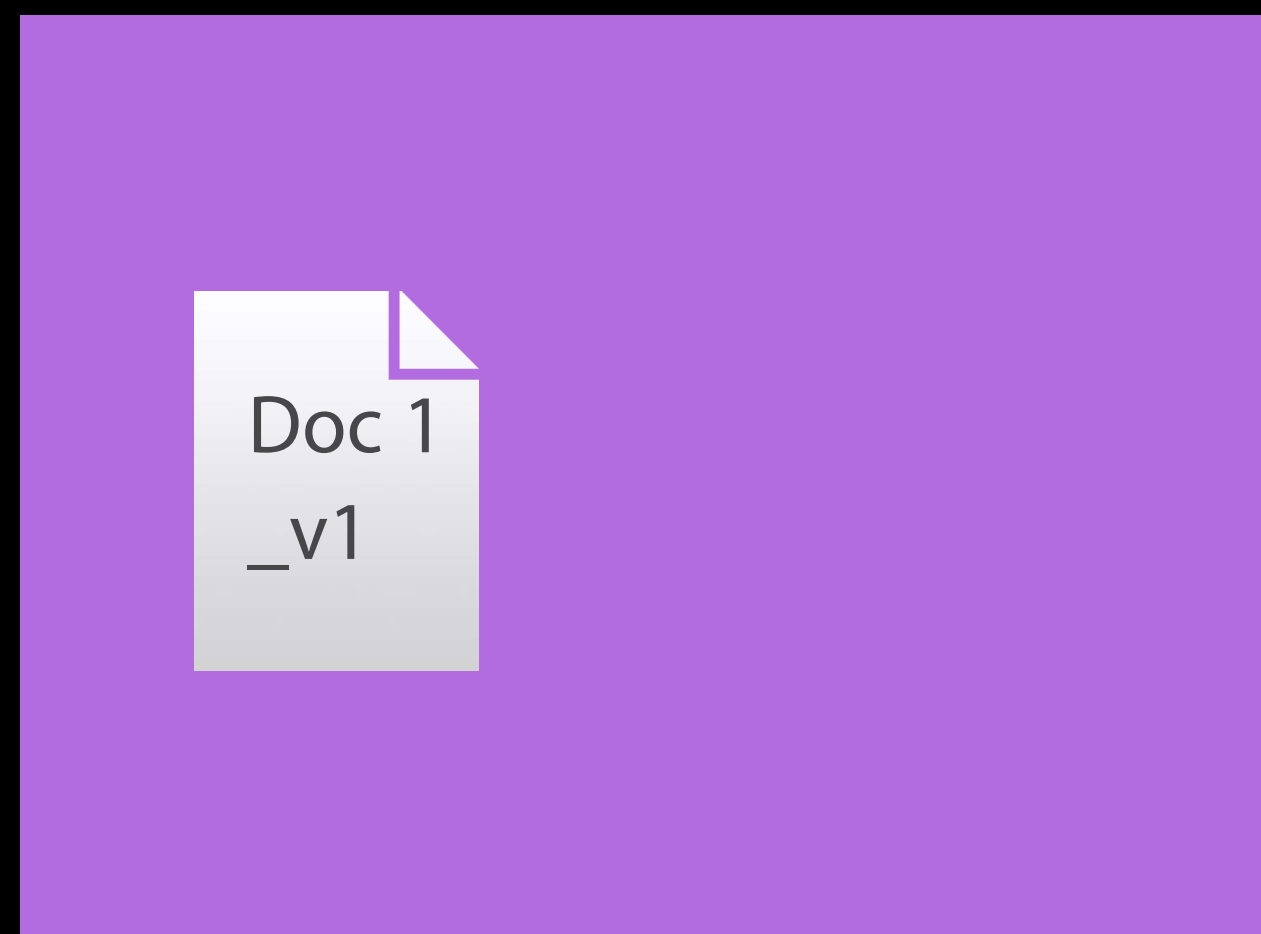
Opening from Other Apps

iOS 9—Open in place

NEW

Access to other app's containers granted by document interaction controller

Your App's Container



Other App's Container



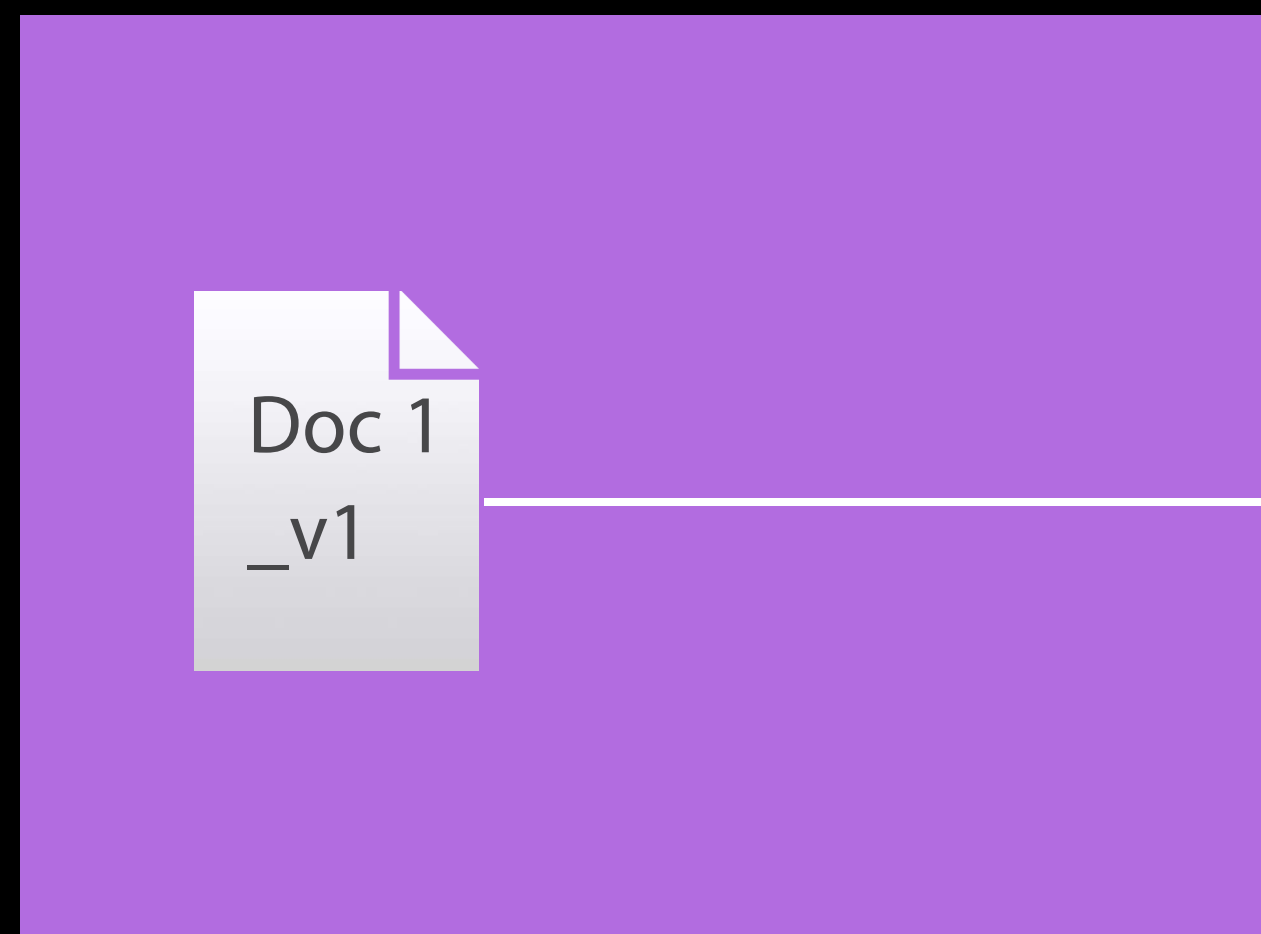
Opening from Other Apps

iOS 9—Open in place

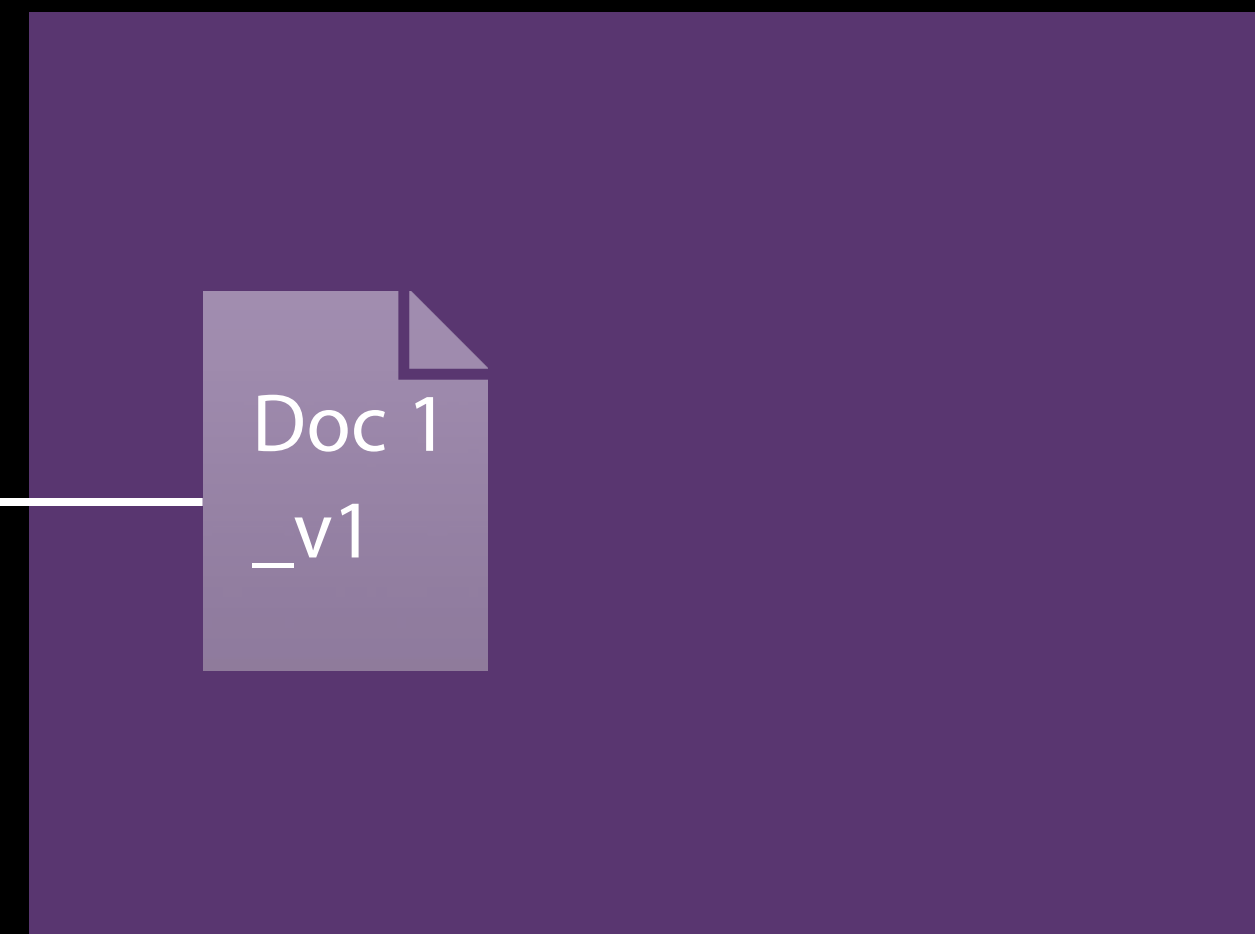
NEW

Access to other app's containers granted by document interaction controller

Your App's Container



Other App's Container



Opening from Other Apps

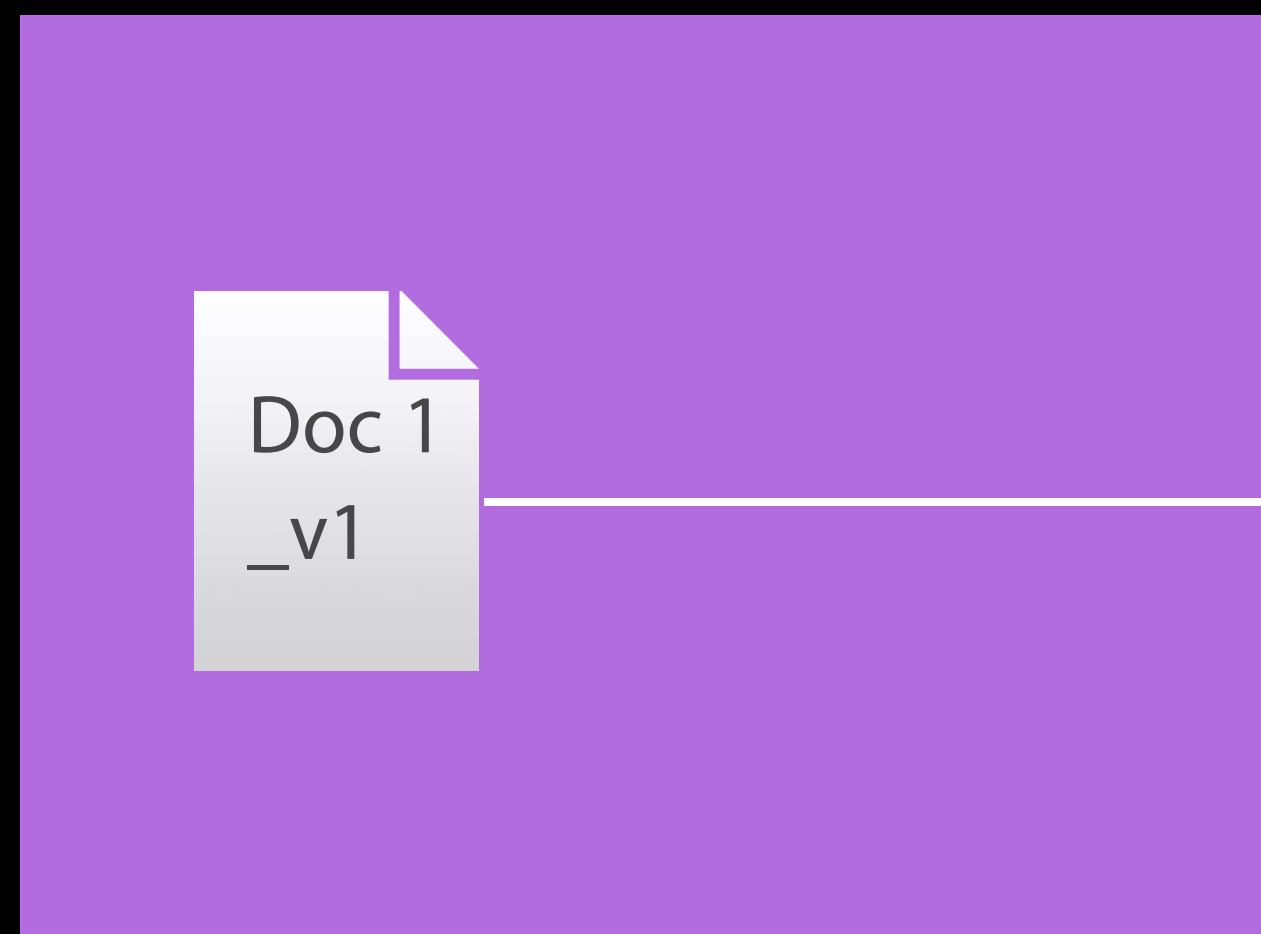
NEW

iOS 9—Open in place

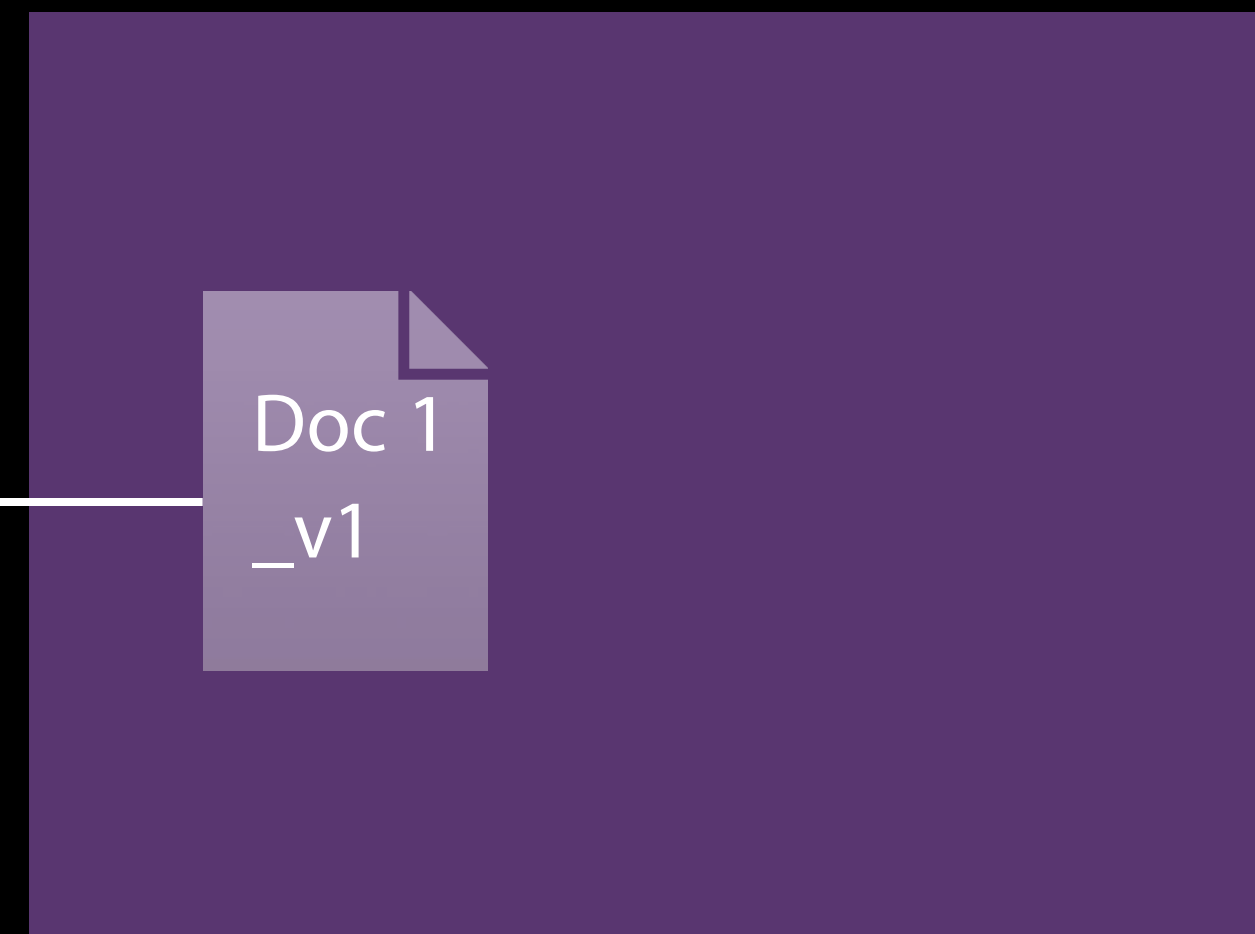
Access to other app's containers granted by document interaction controller

- Includes files opened from the iCloud Drive app and Spotlight

Your App's Container



Other App's Container



Opening from Other Apps

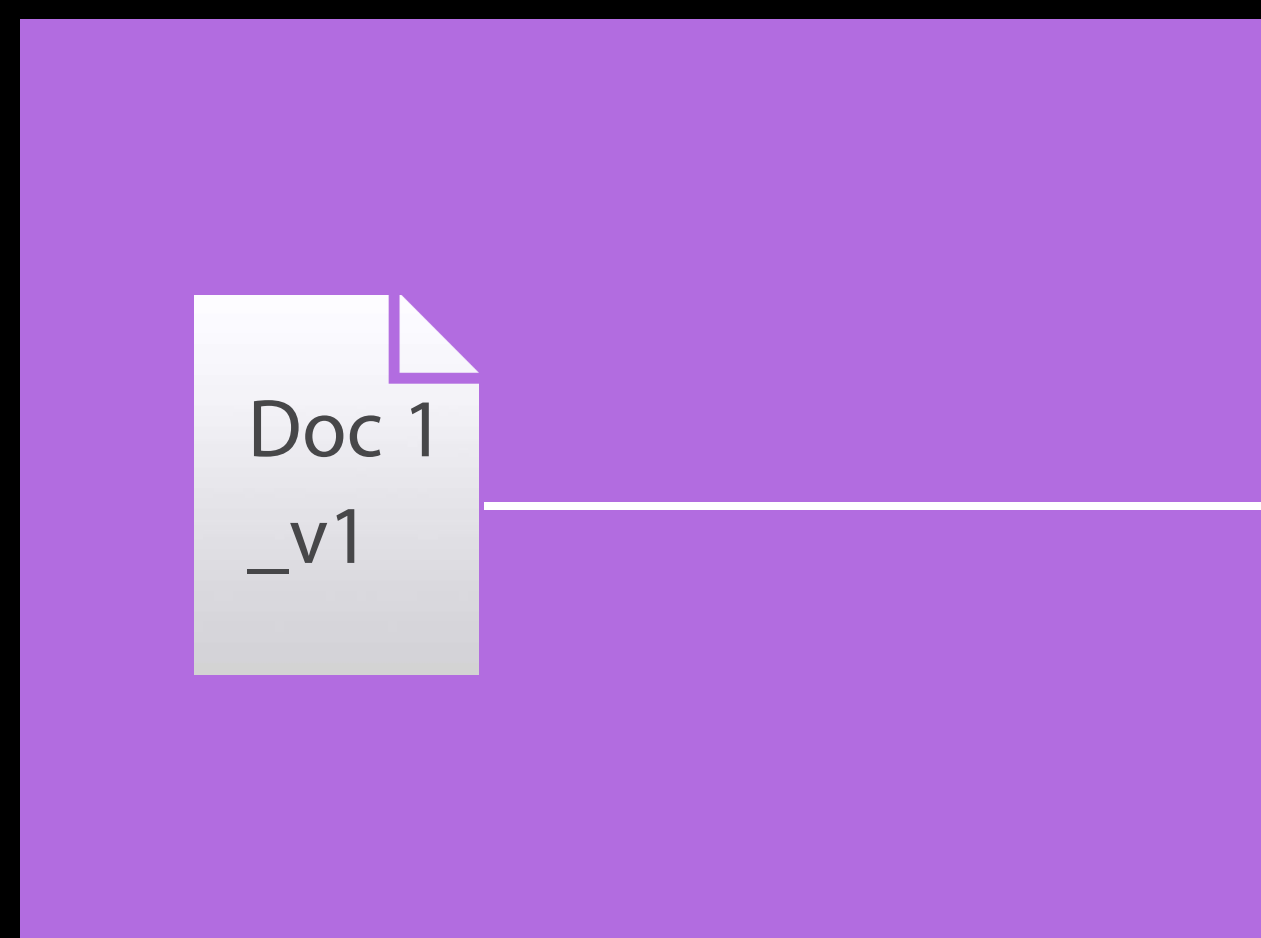
NEW

iOS 9—Open in place

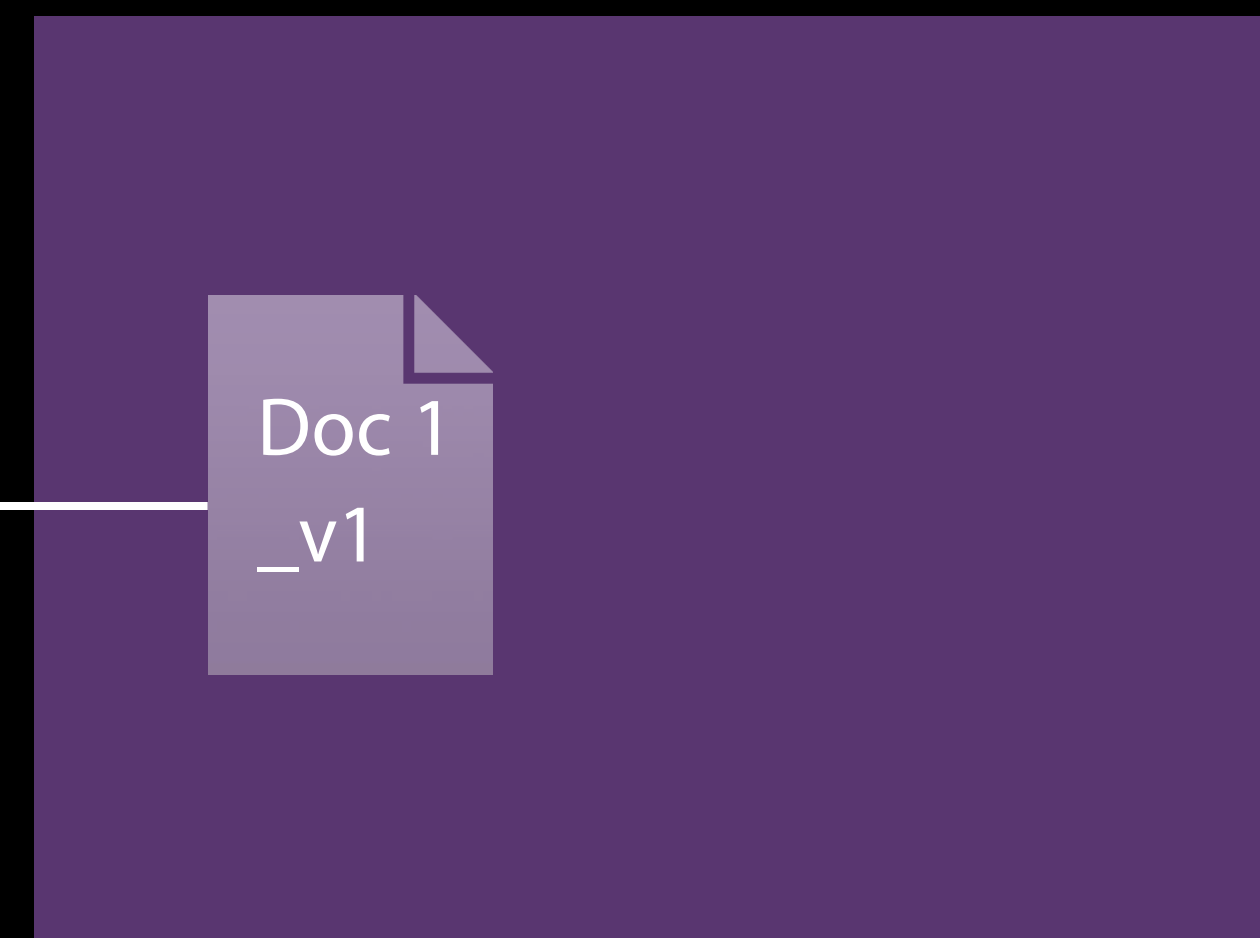
Access to other app's containers granted by document interaction controller

- Includes files opened from the iCloud Drive app and Spotlight
- UIDocumentMenuViewController, UIDocument

Your App's Container



Other App's Container



Opening from Other Apps

Supporting open in place

NEW

Opening from Other Apps

Supporting open in place

Support is simple

NEW

Opening from Other Apps

Supporting open in place

NEW

Support is simple

- `LSSupportsOpeningDocumentsInPlace` key in Info.plist

Opening from Other Apps

Supporting open in place

NEW

Support is simple

- LSSupportsOpeningDocumentsInPlace key in Info.plist
- Adopt new delegate method

Opening from Other Apps

NEW

Handling open in place versus copy

```
func application(app: UIApplication, openURL url: NSURL,
sourceApplication: String?, annotation: AnyObject) -> Bool {
    let newURL = copyFileToContainer(url)
    documentBrowser.openDocumentAtURL(newURL)
    return true
}
```

Opening from Other Apps

NEW

Handling open in place versus copy

```
func application(app: UIApplication, openURL url: NSURL, options: [String:
AnyObject]) -> Bool {
    let newURL = copyFileToContainer(url)
    documentBrowser.openDocumentAtURL(newURL)
    return true
}
```

Opening from Other Apps

NEW

Handling open in place versus copy

```
func application(app: UIApplication, openURL url: NSURL, options: [String:
AnyObject]) -> Bool {
    guard let shouldOpenInPlace =
options[UIApplicationOpenURLOptionsOpenInPlaceKey] as? Bool else {
        return false
    }

    let newURL = copyFileToContainer(url)
    documentBrowser.openDocumentAtURL(newURL)

    return true
}
```


Opening from Other Apps

NEW

Handling open in place versus copy

```
func application(app: UIApplication, openURL url: NSURL, options: [String:
AnyObject]) -> Bool {
    guard let shouldOpenInPlace =
options[UIApplicationOpenURLOptionsOpenInPlaceKey] as? Bool else {
        return false
    }

    let newURL = shouldOpenInPlace ? url : copyFileToContainer(url)
    documentBrowser.openDocumentAtURL(newURL)

    return true
}
```

Opening from Other Apps

NEW

Handling open in place versus copy

```
func application(app: UIApplication, openURL url: NSURL, options: [String:
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options[UIApplicationOpenURLOptionsOpenInPlaceKey] as? Bool else {
        return false
    }

    let newURL = shouldOpenInPlace ? url : copyFileToContainer(url)
    documentBrowser.openDocumentAtURL(newURL)

    return true
}
```

Summary

Summary

Make your app performant, responsive, and beautiful

Summary

Make your app performant, responsive, and beautiful

- NSMetadataQuery

Summary

Make your app performant, responsive, and beautiful

- NSMetadataQuery
- Bookmarks

Summary

Make your app performant, responsive, and beautiful

- NSMetadataQuery
- Bookmarks
- Progress

Summary

Make your app performant, responsive, and beautiful

- NSMetadataQuery
- Bookmarks
- Progress
- Open-in-place

More Information

Sample Code

<http://developer.apple.com/library/prerelease/ios/samplecode/ShapeEdit>

Technical Support

Apple Developer Forums

<http://developer.apple.com/forums>

iCloud Documentation

<http://developer.apple.com/icloud>

Related Sessions

Building a Document Based App

Session 234

WWDC14

 WWDC 15