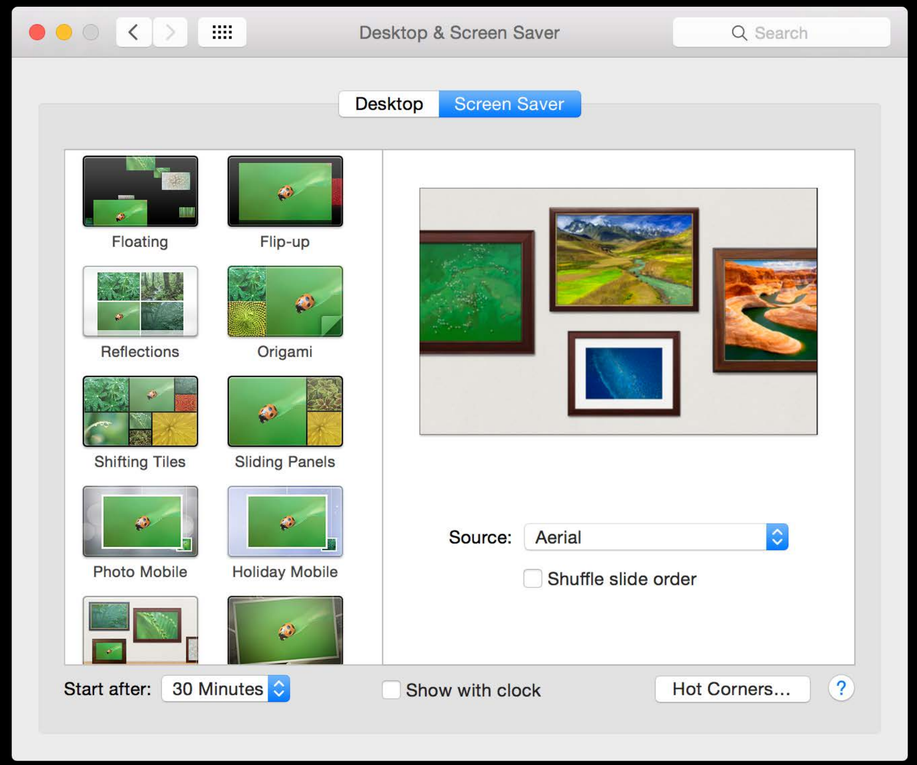
App Frameworks #WWDC15

What's New in NSCollectionView

Session 225

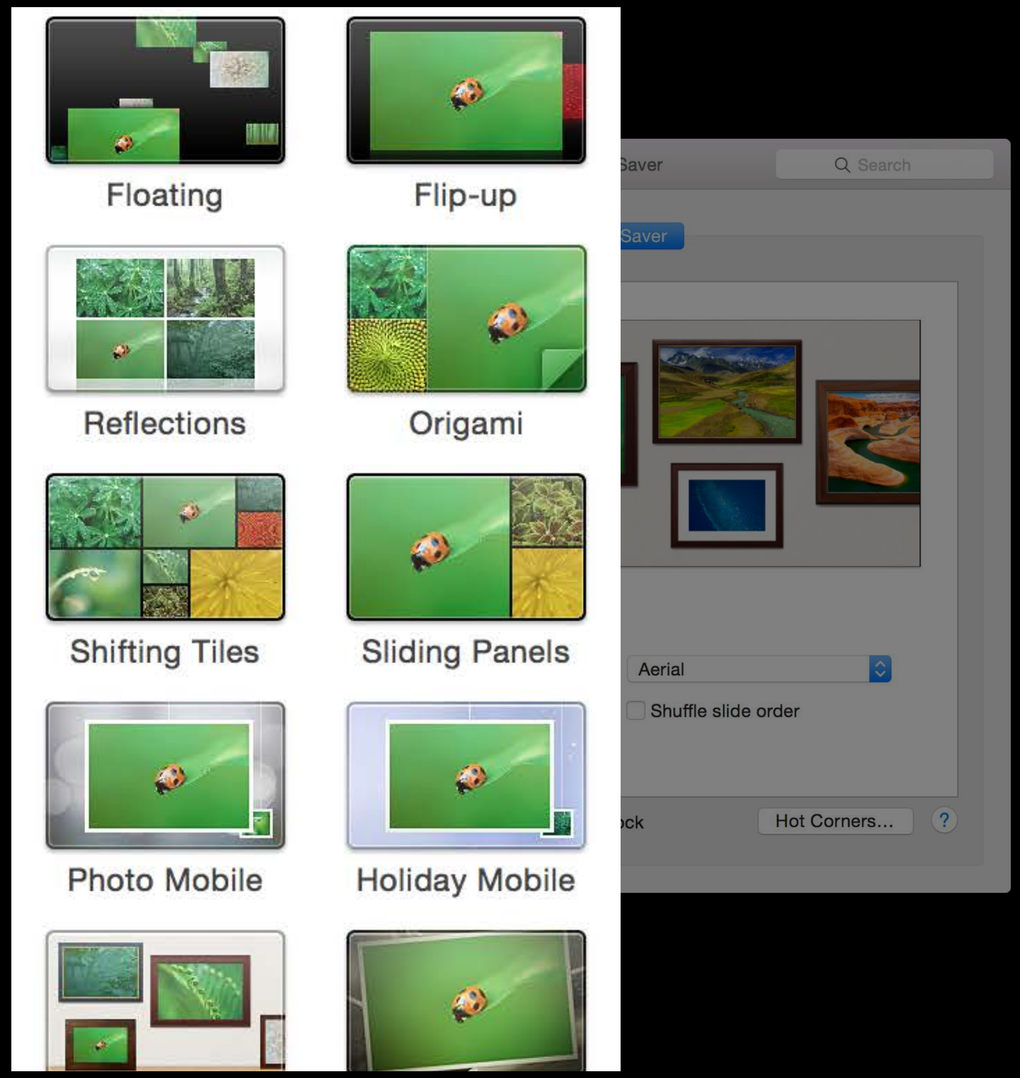
Troy Stephens Application Frameworks Engineer

NSCollectionView



NSCollectionView

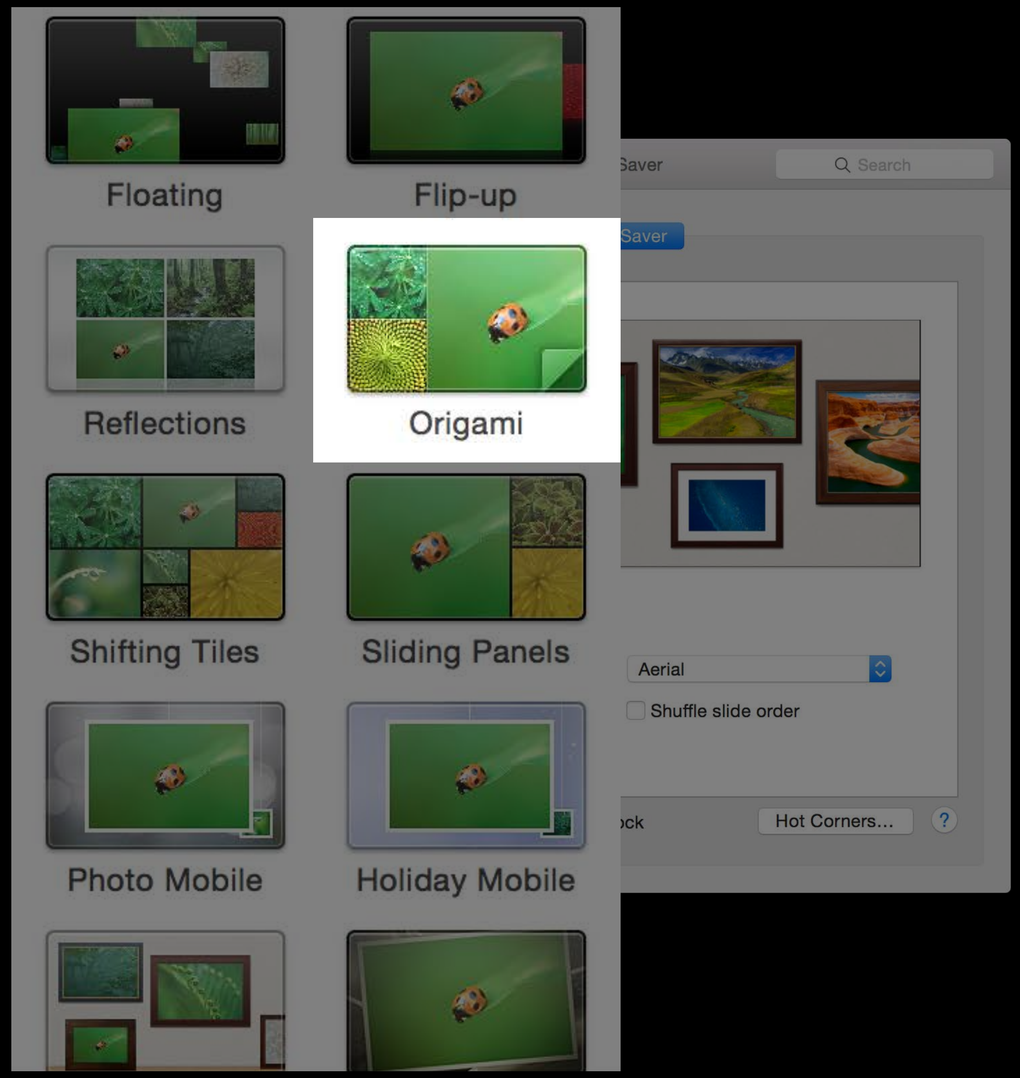
Displays grids of identically sized items



NSCollectionView

Displays grids of identically sized items

Each item cloned from an “itemPrototype”



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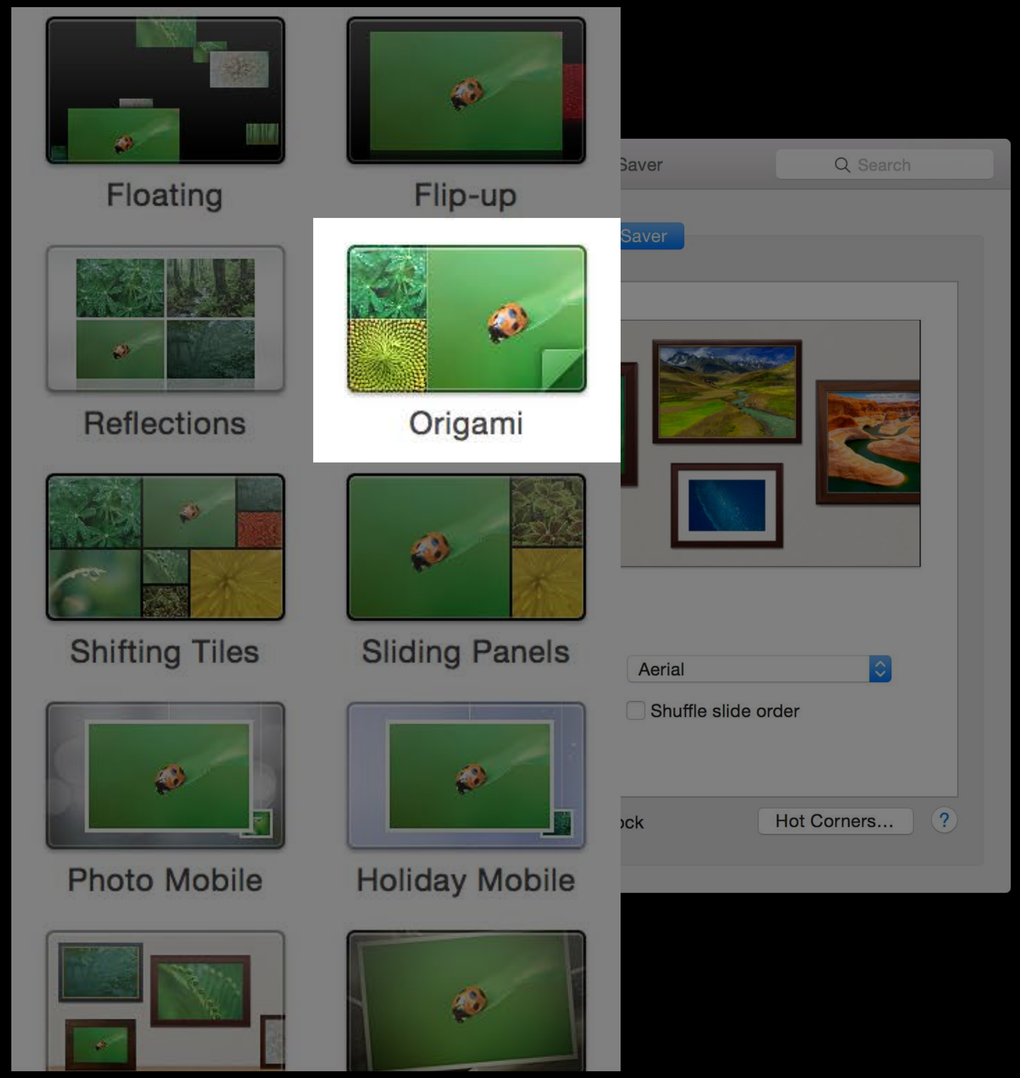
- ViewController + View subtree



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Displays grids of identically sized items

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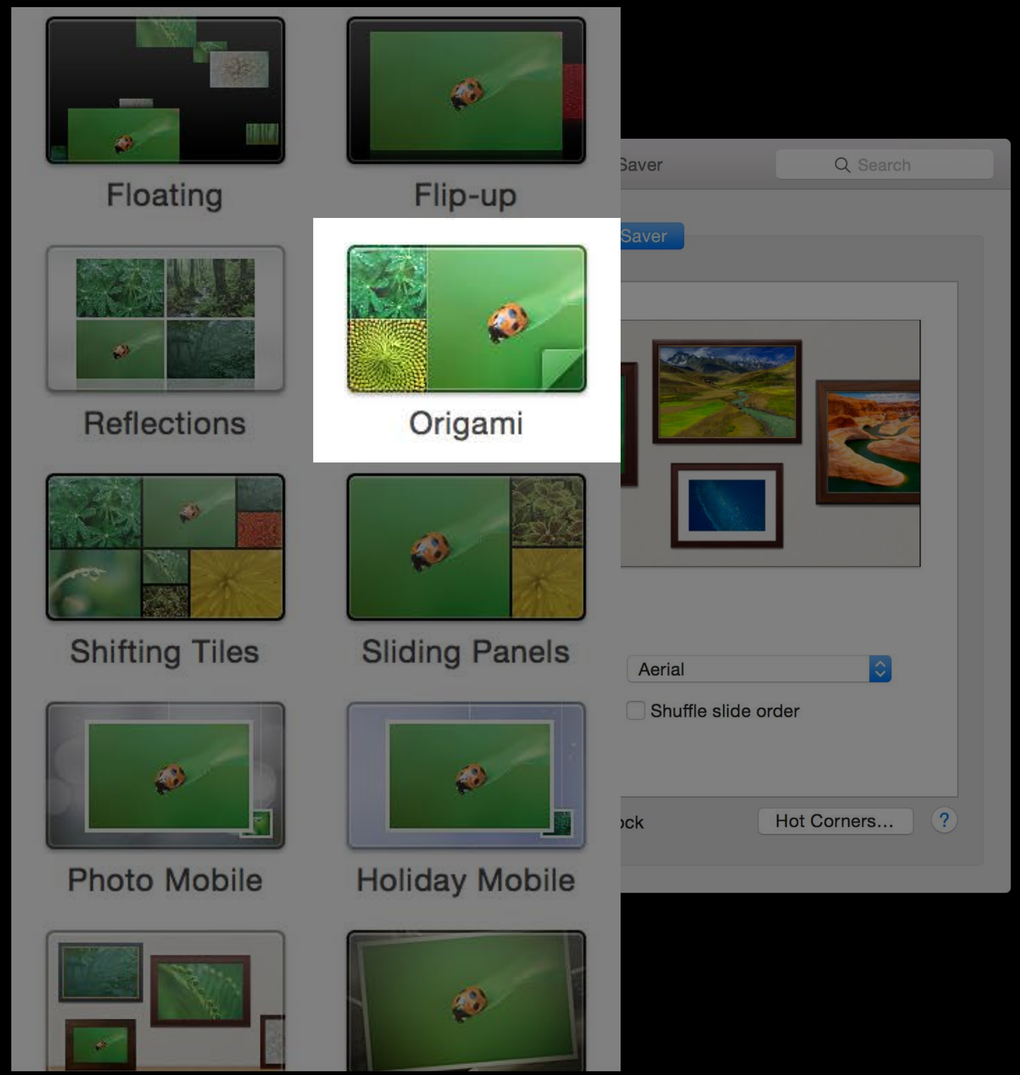
Supports selection, drag-and-drop, animated relayout



iPad 9:41 AM 100%

Edit

World Clock

Cupertino
Today, 3 hours behind

New York
Today

Paris
Today, 6 hours ahead

Beijing
Today, 12 hours ahead

Tokyo
Tomorrow, 13 hours ahead

Moscow
Today, 7 hours ahead

World Clock Alarm Stopwatch Timer

iPad 9:41 AM 100%

Edit

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8:25 AM Cupertino 55°
11:25 AM New York 73°
5:25 PM Paris 64°
6:25 PM Moscow 64°
11:25 PM Beijing 61°
12:25 AM Tokyo 64°

The Weather Channel

World Clock | Alarm | Stopwatch | Timer

UICollectionView

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Displays collections of items

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Each item created from a .nib or view class

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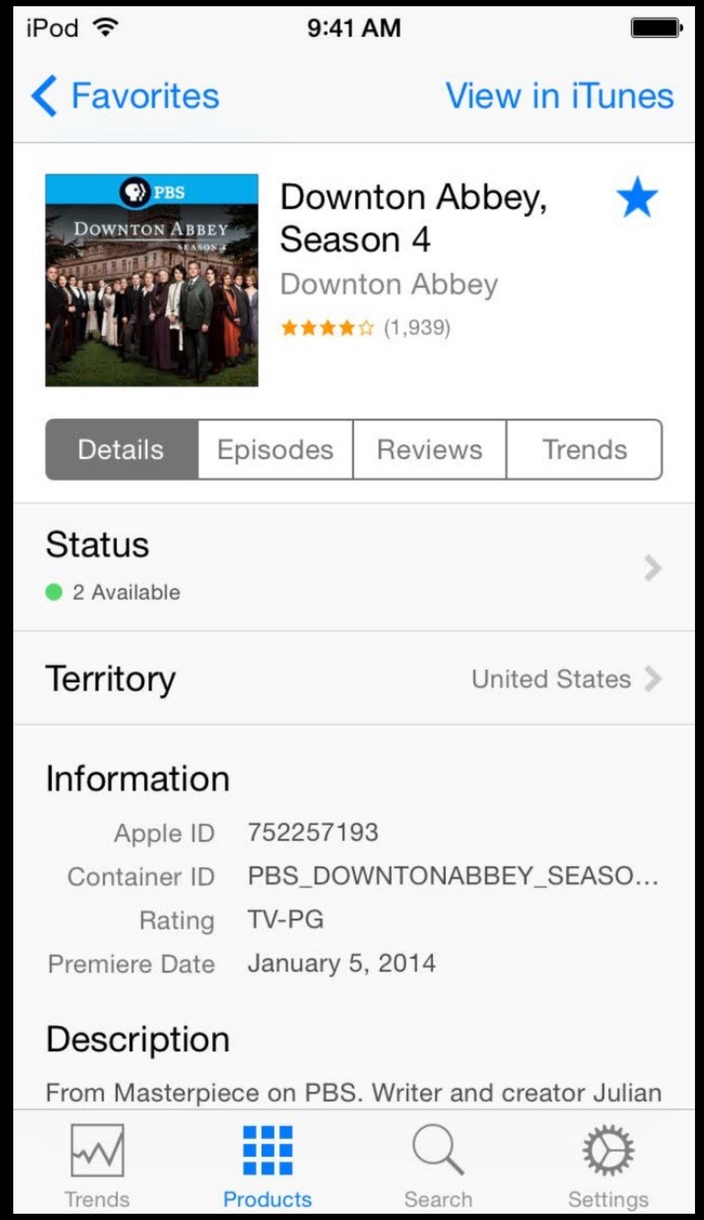
Can mix item types



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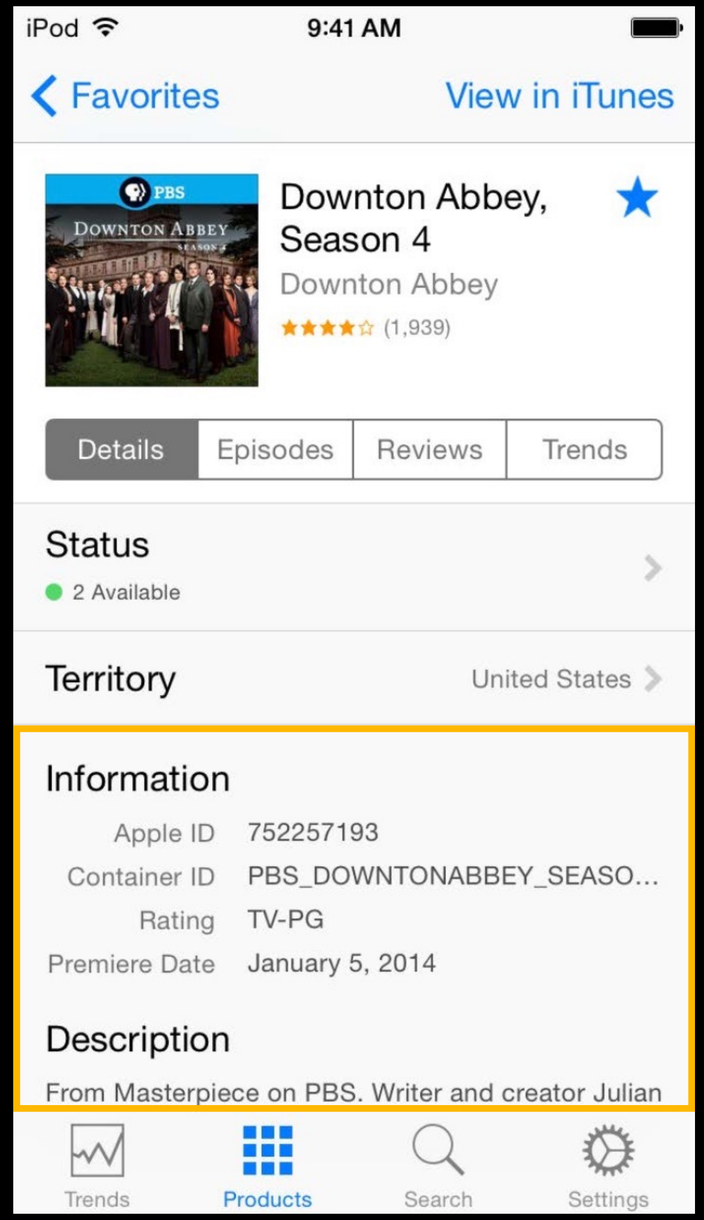

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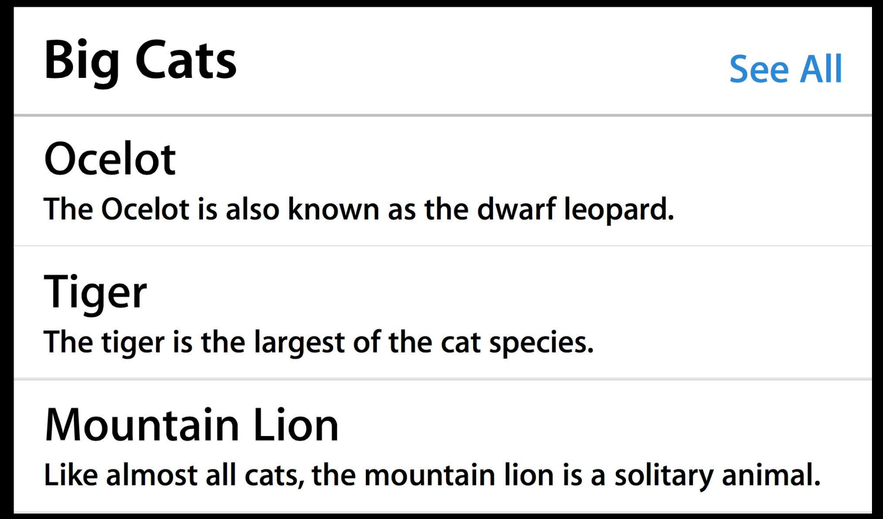
Headers, footers



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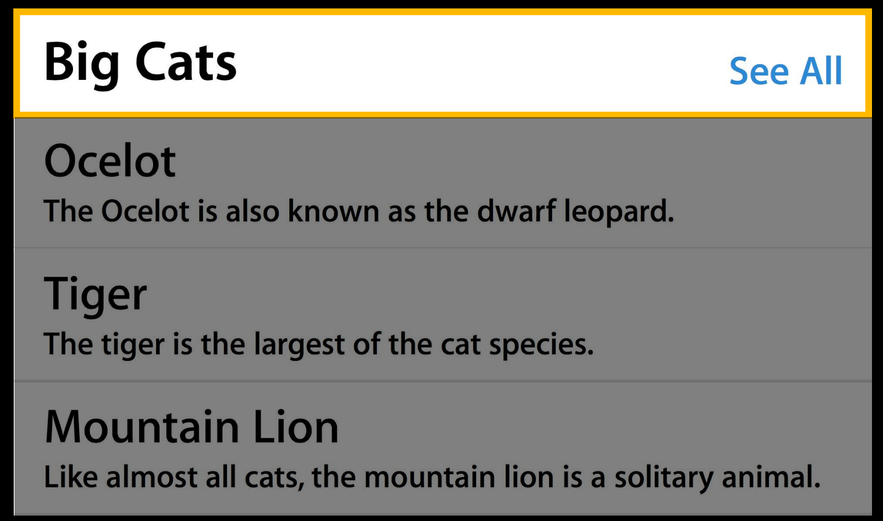

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Headers, footers

Sections

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Flexible, customizable “Flow” layout

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Flexible, customizable “Flow” layout

Developer-definable layouts

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Scalable to large numbers of items

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Headers, footers

Sections

Flexible, customizable “Flow” layout

Developer-definable layouts

Scalable to large numbers of items

Layer-backed

A Better NSCollectionView

NEW

A Better NSCollectionView

NEW

Scalable

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NEW

Scalable

Optional sectioning, with header/footer views

A Better NSCollectionView

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Optional sectioning, with header/footer views

Completely customizable layout

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Optional sectioning, with header/footer views

Completely customizable layout

Heterogeneous and variable-sized items

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Customizable appearance

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Heterogeneous and variable-sized items

Customizable appearance

Animation control

OS X Adaptations

NEW

OS X Adaptations

NEW

Drag and Drop, including Layout-based drop target determination and indication

OS X Adaptations

NEW

Drag and Drop, including Layout-based drop target determination and indication

Rubberband drag-select

OS X Adaptations

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Rubberband drag-select

Bulk selection and highlight notifications

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Items still represented using ViewControllers (NSCollectionViewItem)

OS X Adaptations

NEW

Drag and Drop, including Layout-based drop target determination and indication

Rubberband drag-select

Bulk selection and highlight notifications

Items still represented using ViewControllers (NSCollectionViewItem)

Automatic nib/class finding, via naming conventions

Today's Goals

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Learn how to wire up and use a new NSCollectionView

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Learn what's different on OS X vs. iOS

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A little something for everybody

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- iOS developers bringing companion apps to OS X

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- iOS developers bringing companion apps to OS X
- OS X developers wanting to leverage the new capabilities

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Learn how to wire up and use a new NSCollectionView

Learn what's different on OS X vs. iOS

A little something for everybody

- iOS developers bringing companion apps to OS X
- OS X developers wanting to leverage the new capabilities
- Those new to all of this

The Plan

The Plan

Overview

The Plan

Overview

Nuts and bolts

The Plan

Overview

Nuts and bolts

Conclusion

Overview

Old API

Old API


NSCollectionView
Antelope Canyon
5120 x 2880
Brushes
5120 x 2880
Beach
5120 x 2880
Abstract
5120 x 2880
Bristle Grass
5120 x 2880
Eagle & Waterfall
3200 x 2000
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Wave
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Yosemite 2
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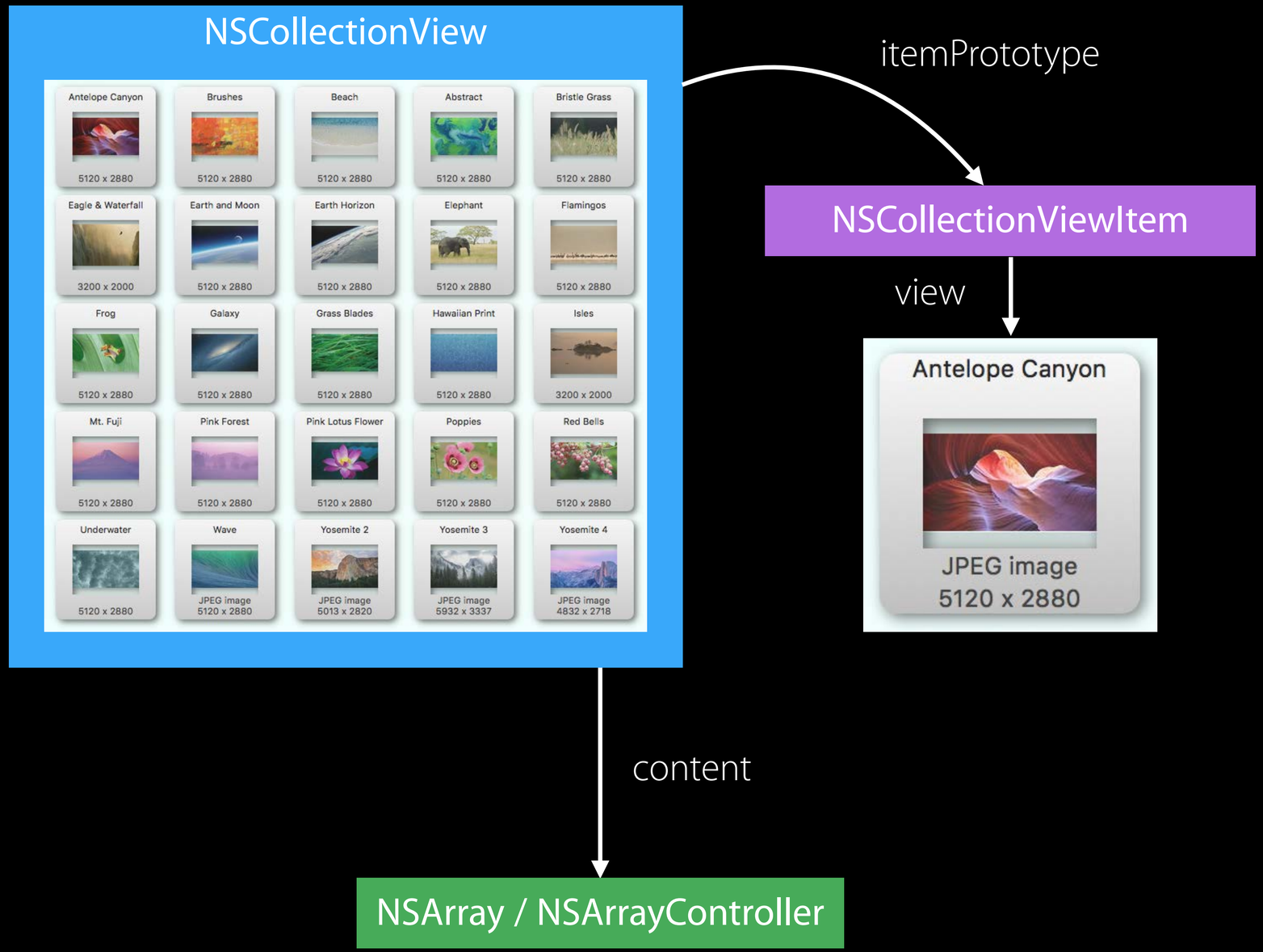
Yosemite 3
JPEG image
5932 x 3337
Yosemite 4
JPEG image
4832 x 2718

Old API

content

NSArray / NSArrayController

Old API


NSCollectionView
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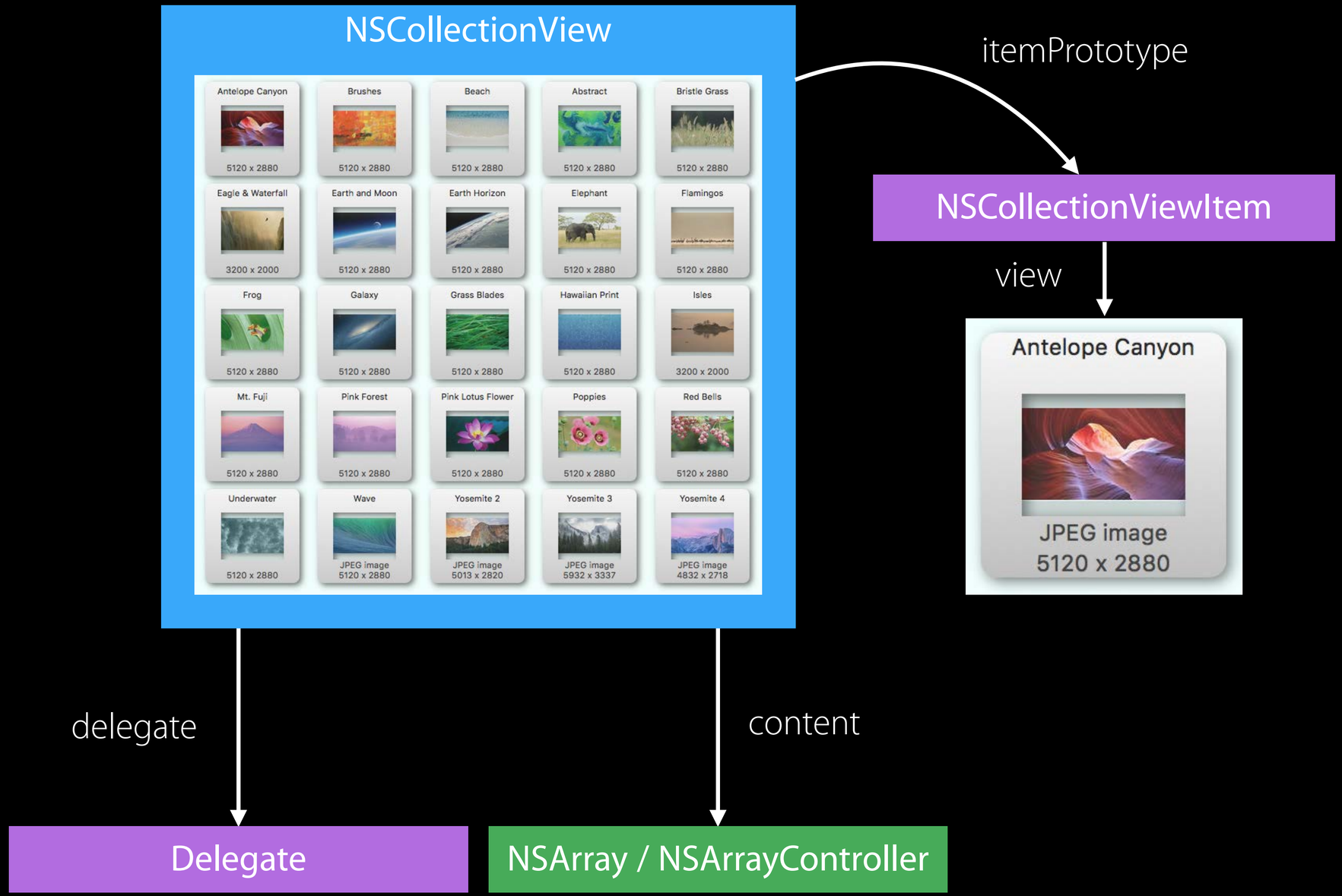
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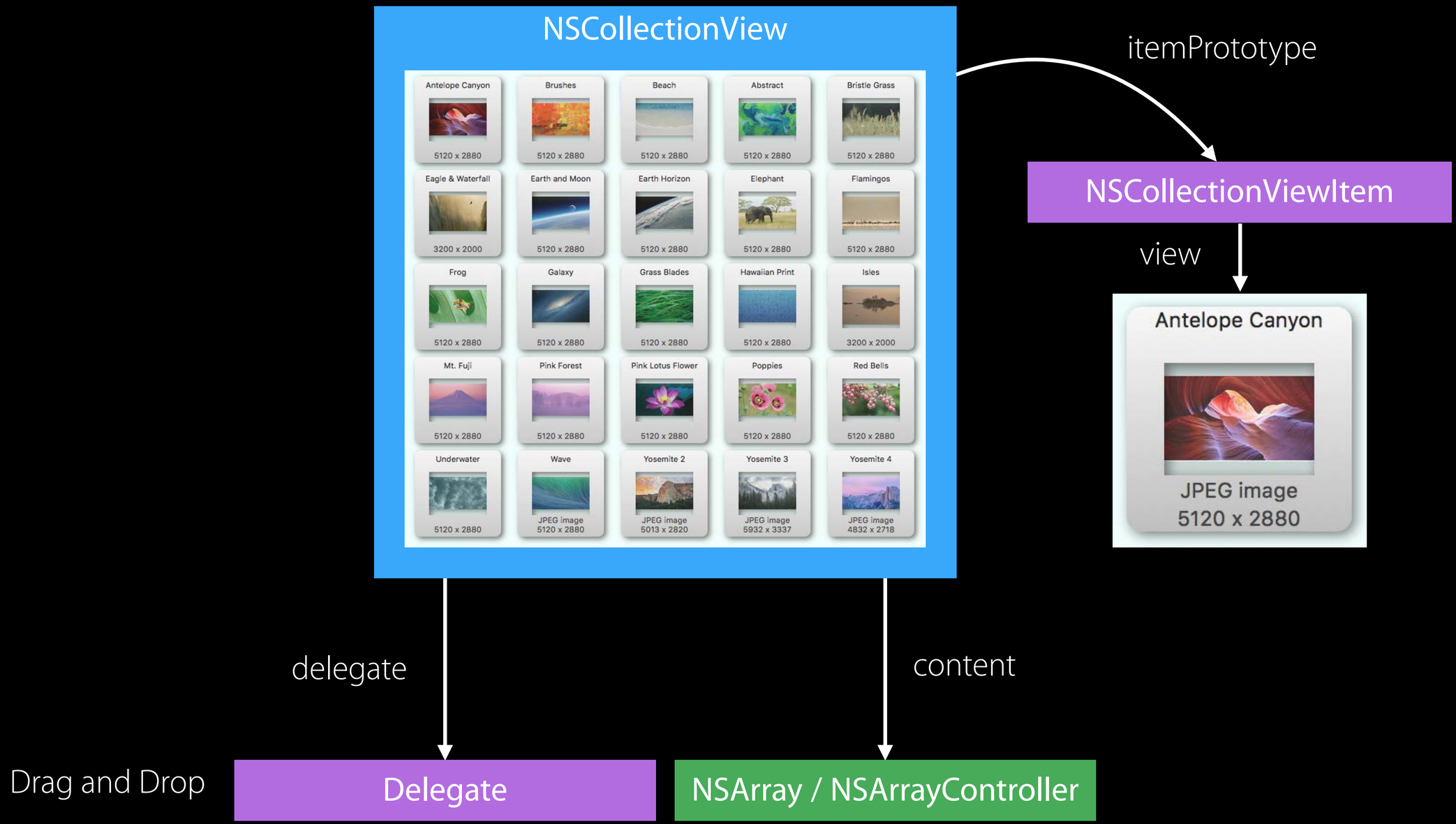
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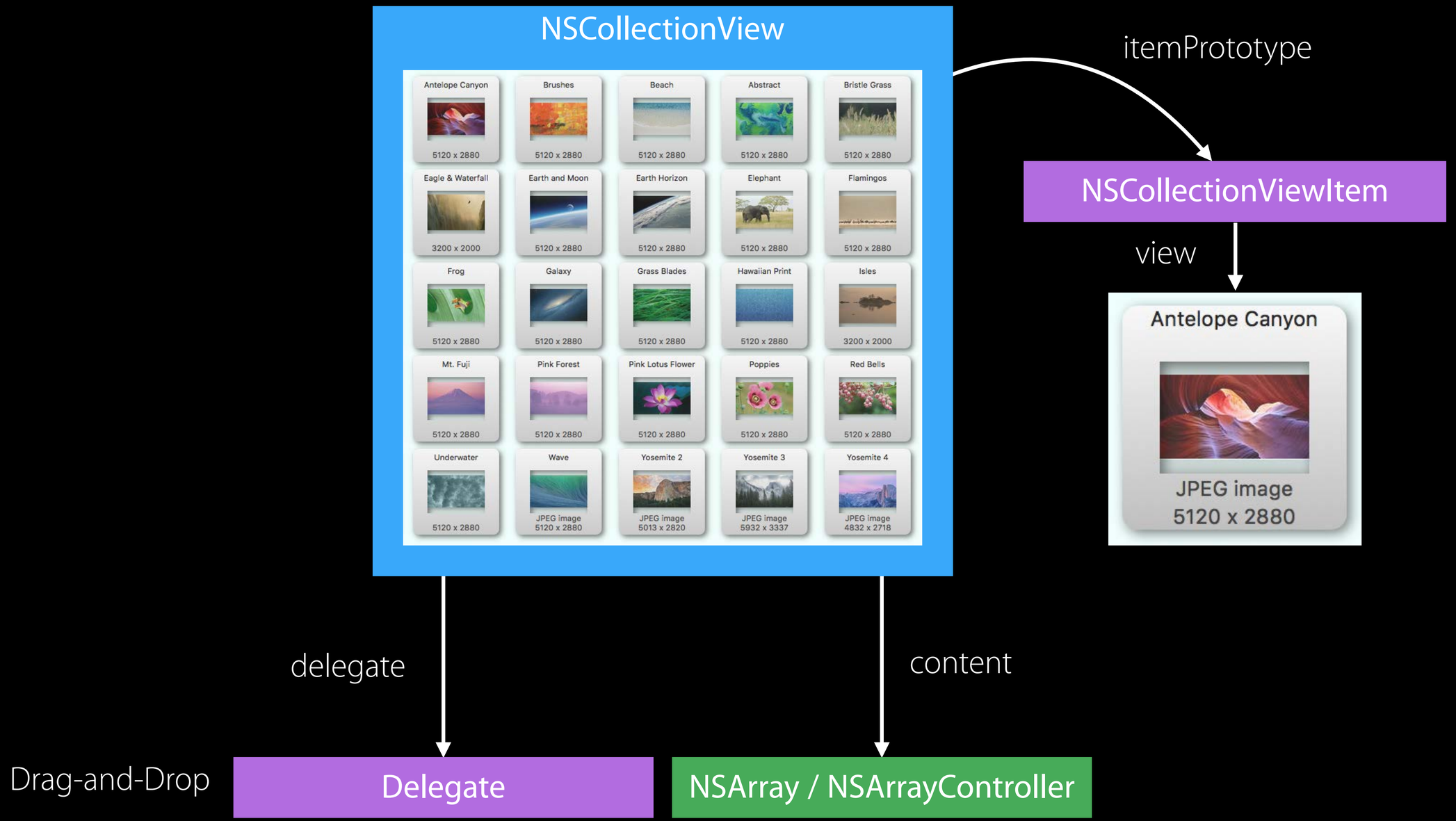
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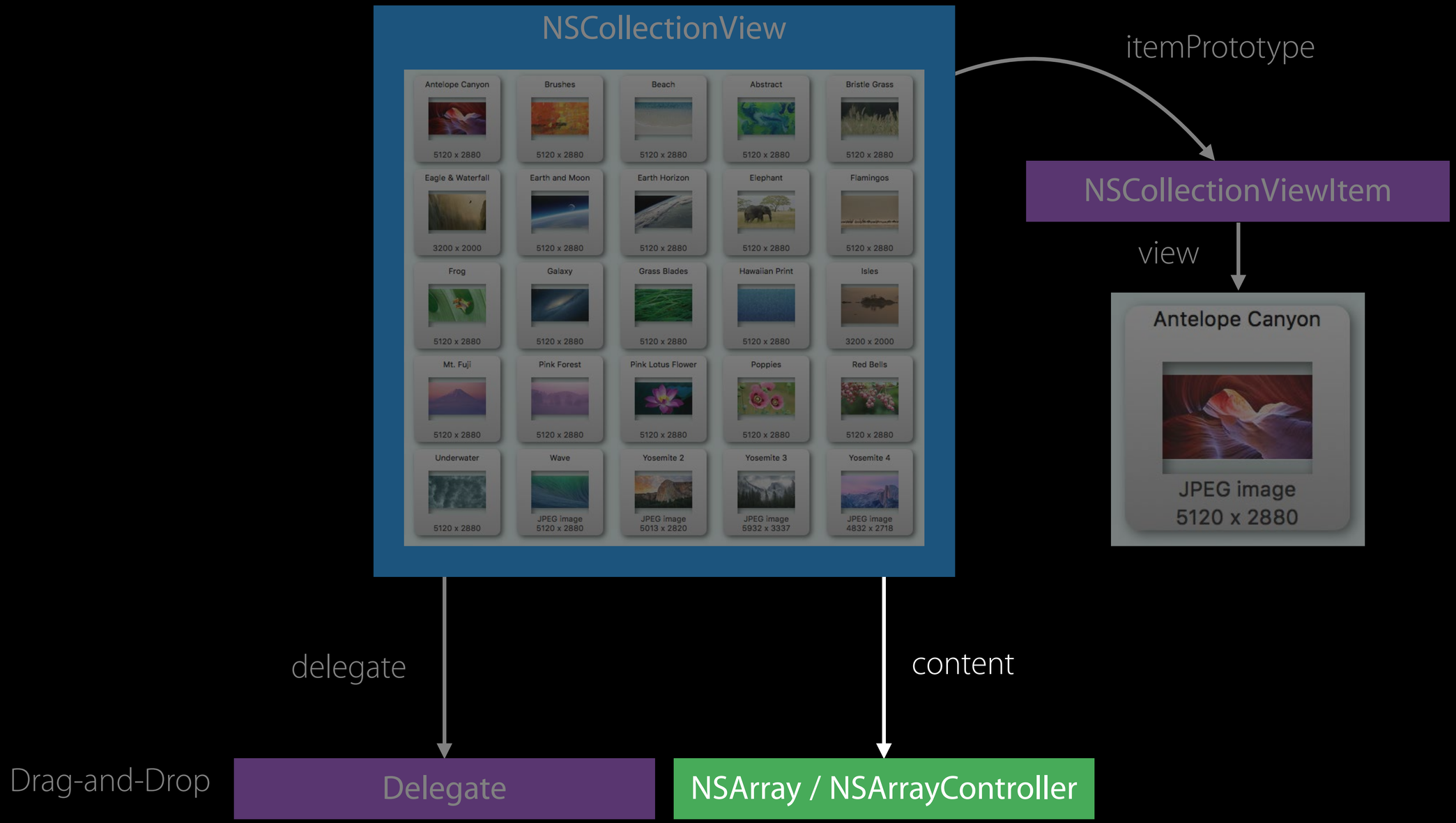
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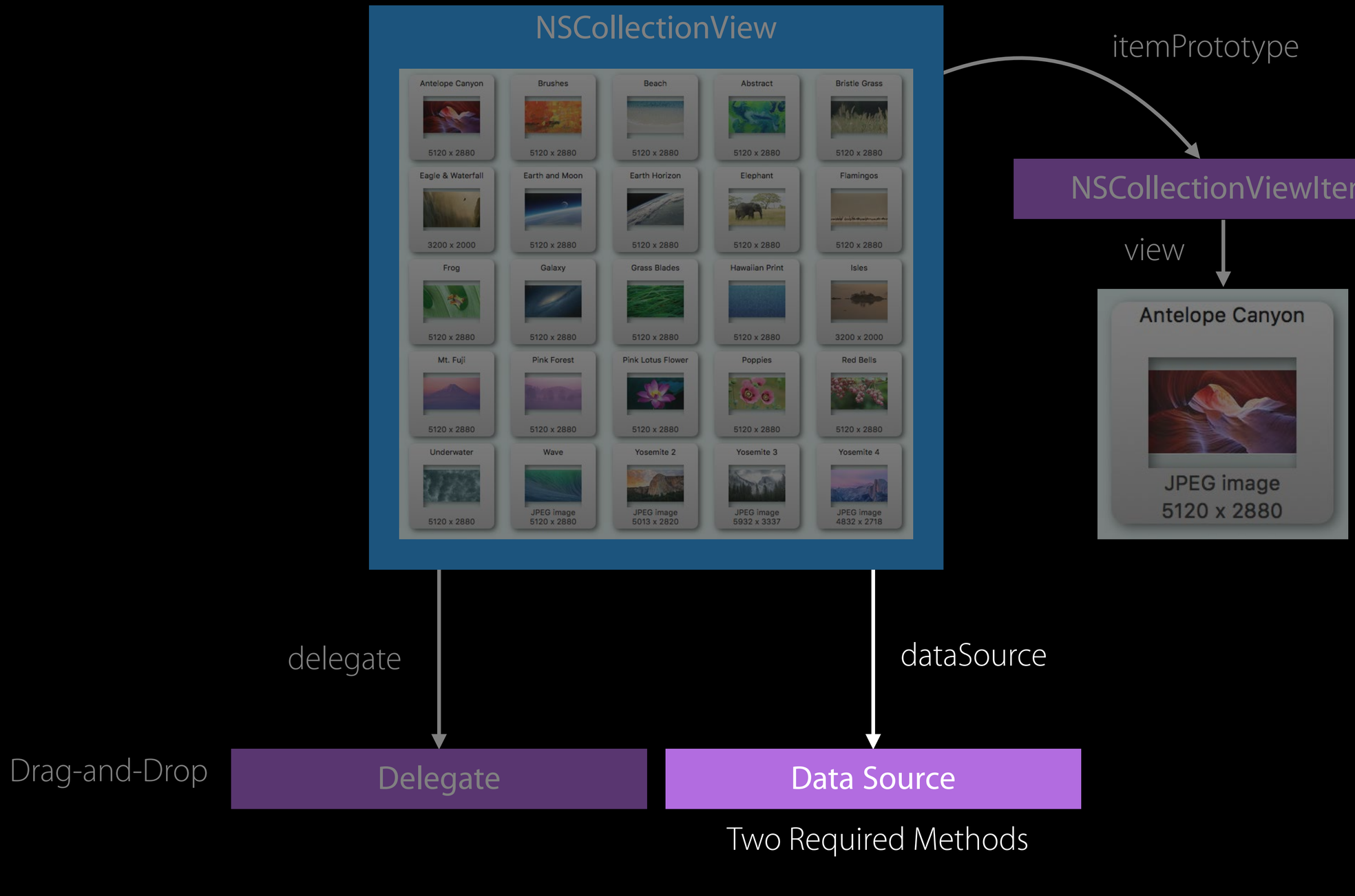
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JPEG image
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delegate
dataSource
Drag-and-Drop
Delegate
Data Source
Two Required Methods

New API

NEW

itemPrototype

NSCollectionViewItem

view

delegate

dataSource

Drag-and-Drop

Selection and Highlighting

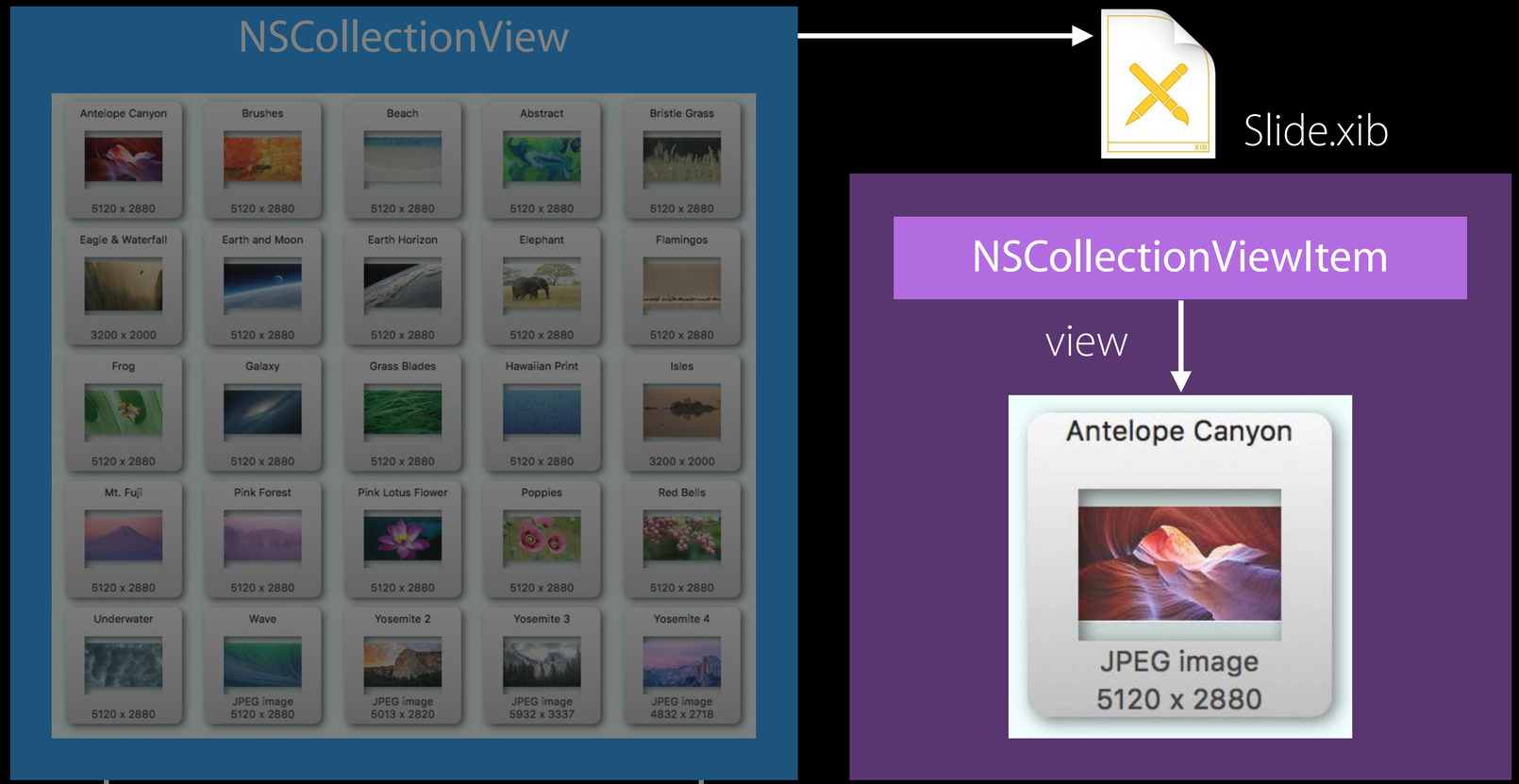
Delegate

Data Source

Two Required Methods

New API

NEW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Slide.xib
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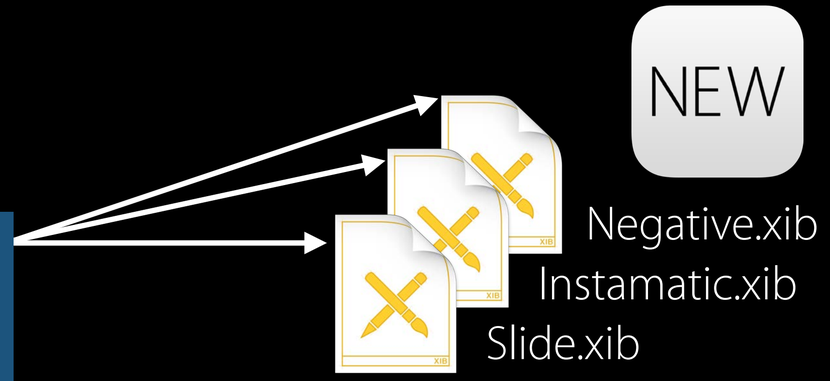
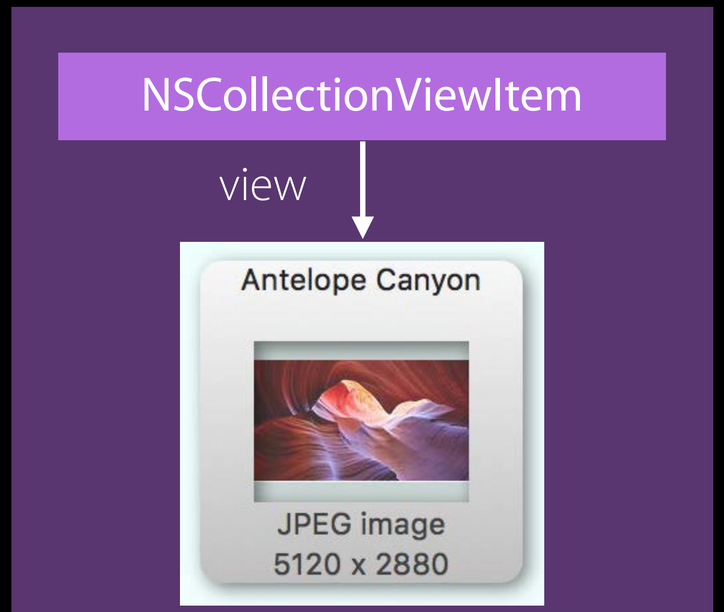




delegate

dataSource

Drag-and-Drop

Selection and Highlighting

Delegate

Data Source

Two Required Methods

New API

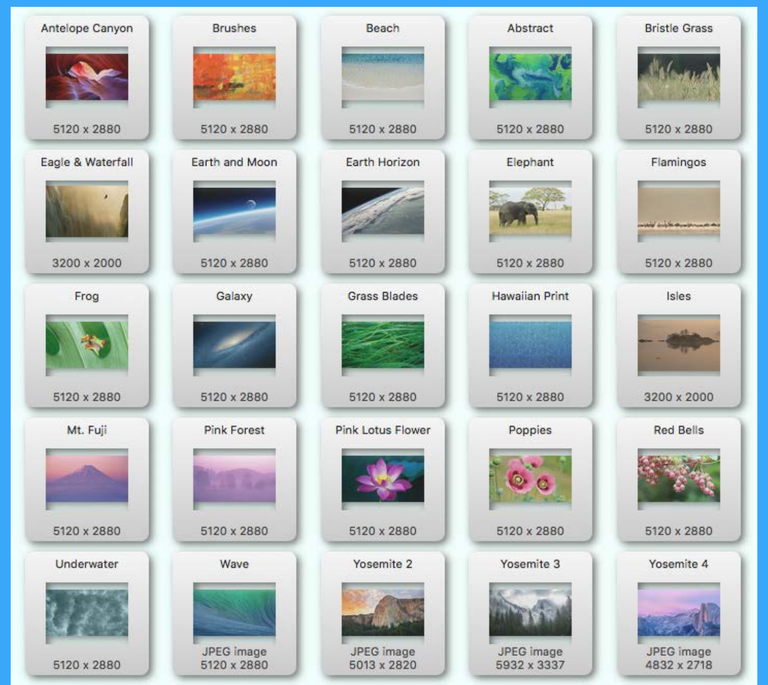
NEW

Negative.xib
Instamatic.xib
Slide.xib

collectionViewLayout

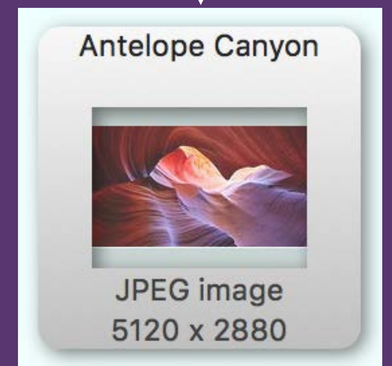
NSCollectionViewLayout

NSCollectionView



NSCollectionViewItem

view



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Drag-and-Drop
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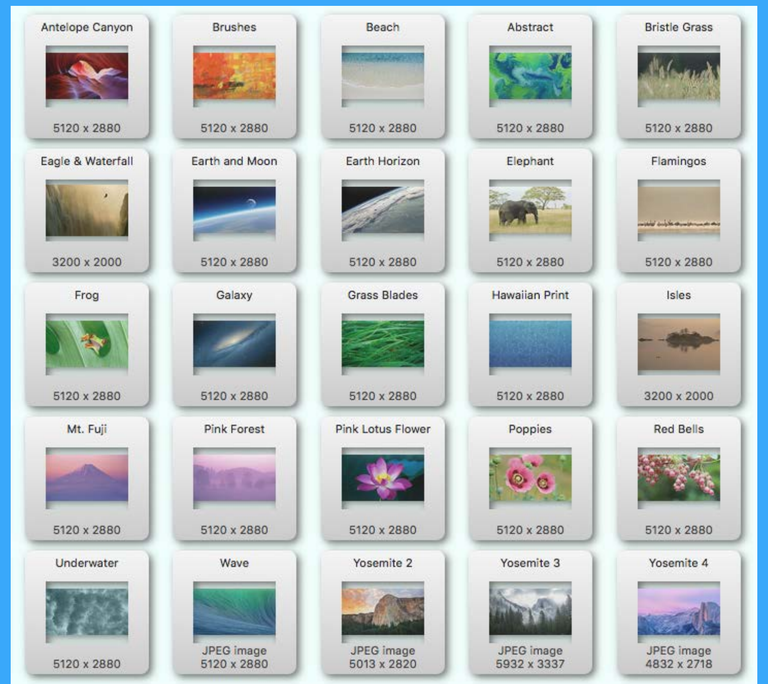
collectionViewLayout

NSCollectionViewLayout

NSCollectionView



NSCollectionViewItem

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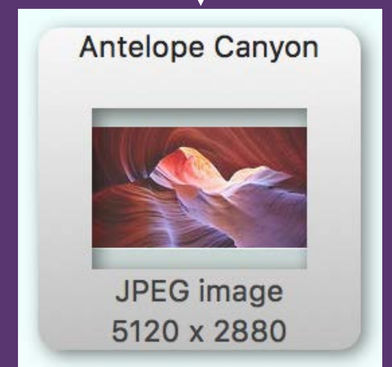


delegate

dataSource

Drag-and-Drop
Selection and Highlighting
Per-Item Layout Adjustments

Delegate

Data Source

Two Required Methods

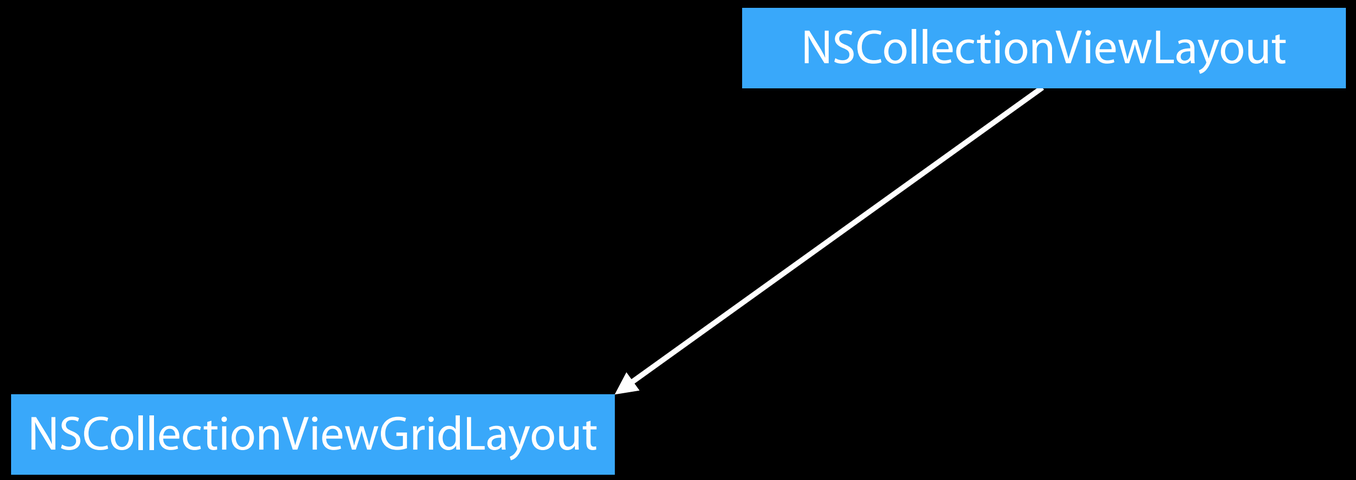
Layouts

Sizing and positioning items

NSCollectionViewLayout

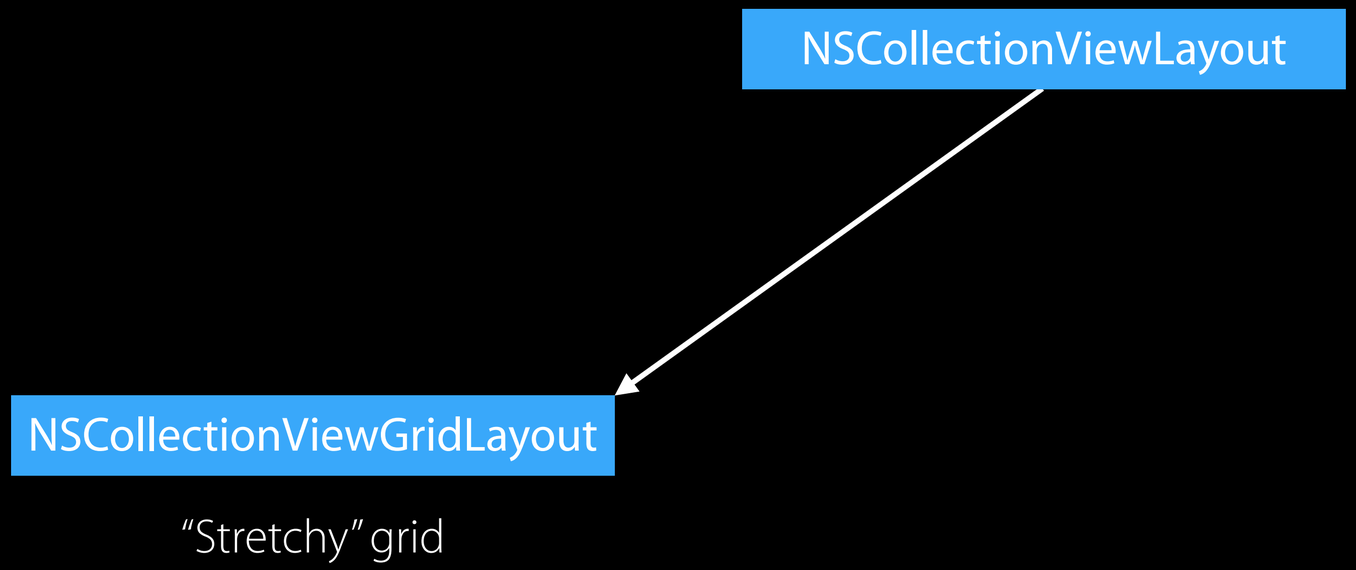
Layouts

Sizing and positioning items



Layouts

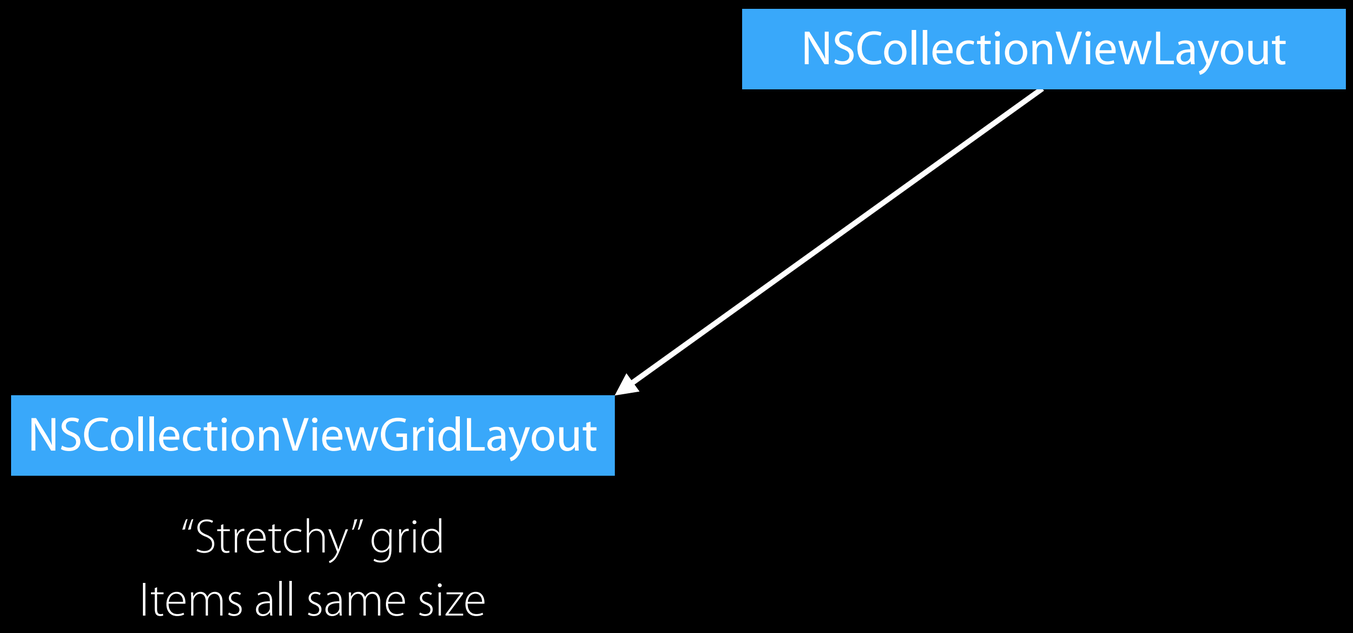
Sizing and positioning items



"Stretchy" grid

Layouts

Sizing and positioning items

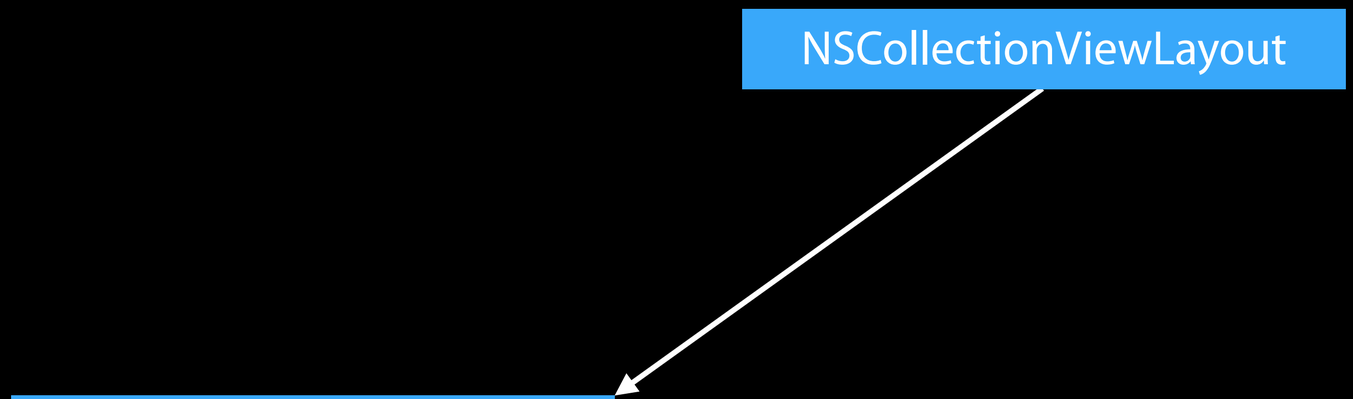


"Stretchy" grid

Items all same size

Layouts

Sizing and positioning items



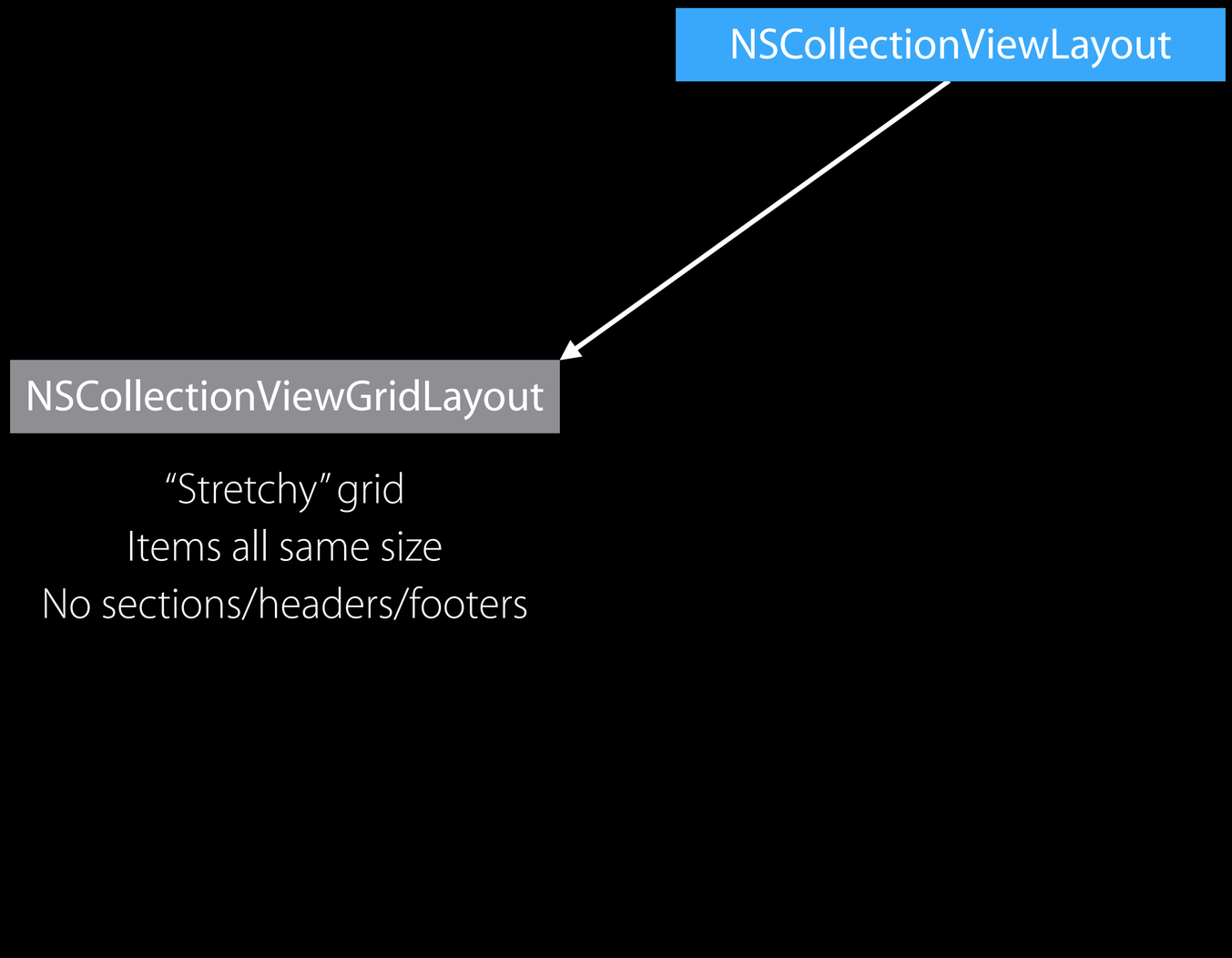
"Stretchy" grid

Items all same size

No sections/headers/footers

Layouts

Sizing and positioning items



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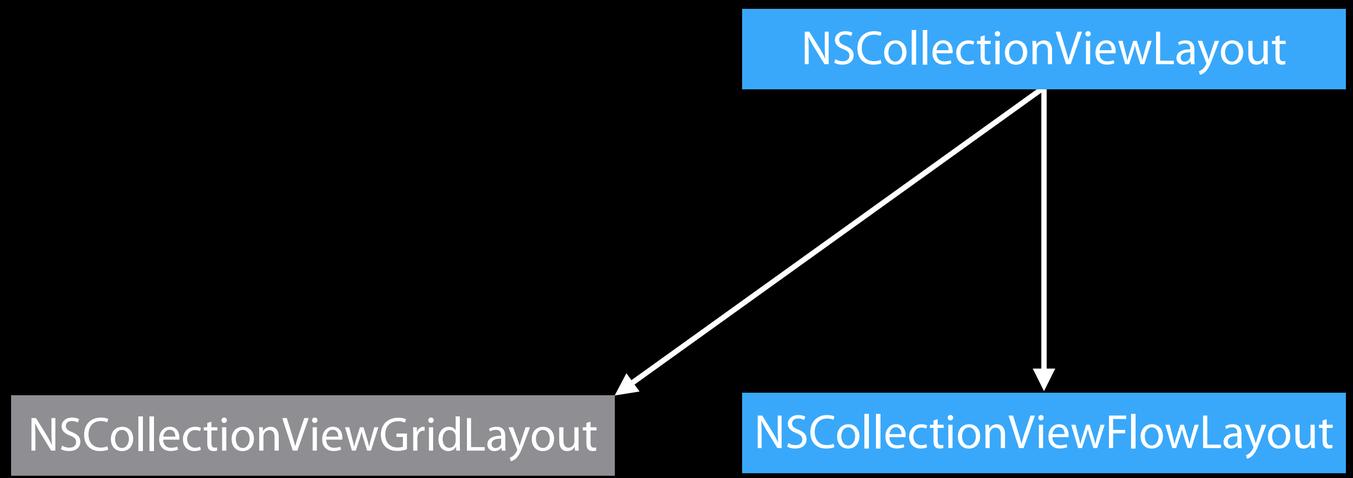

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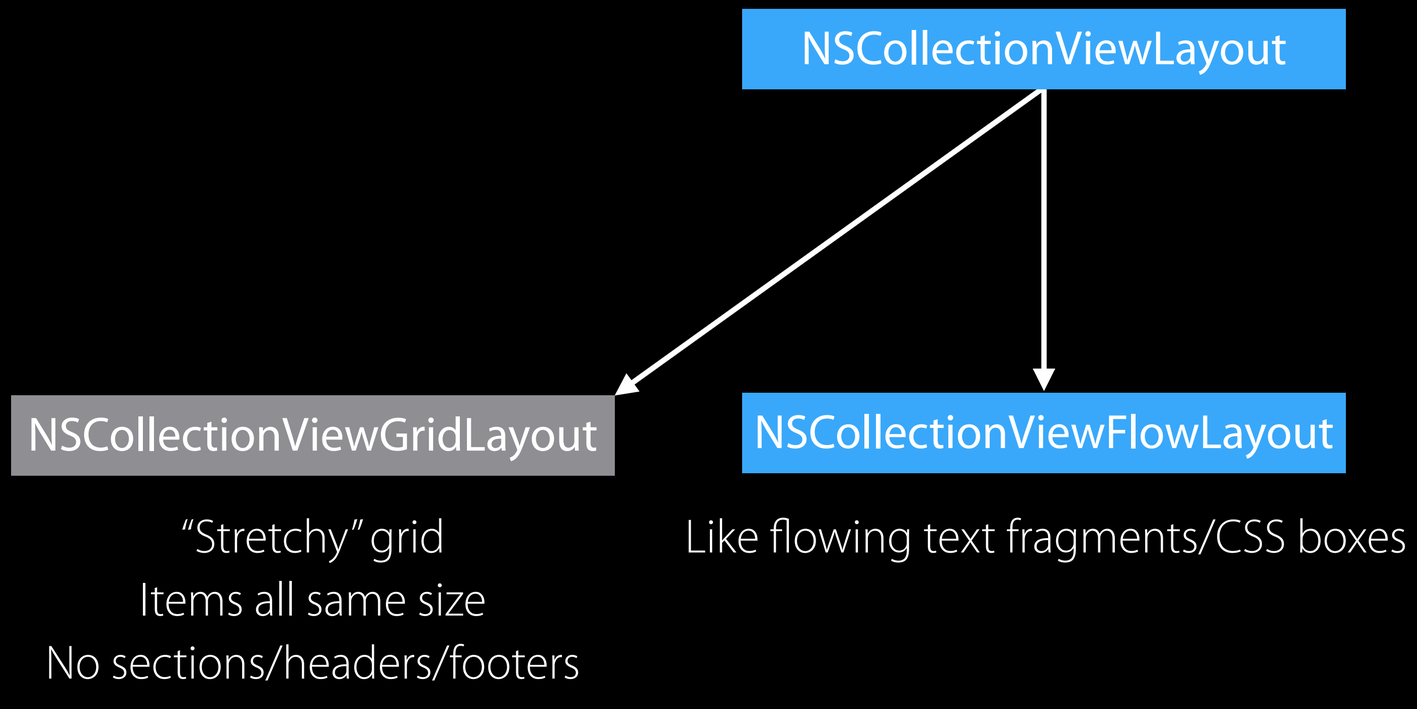
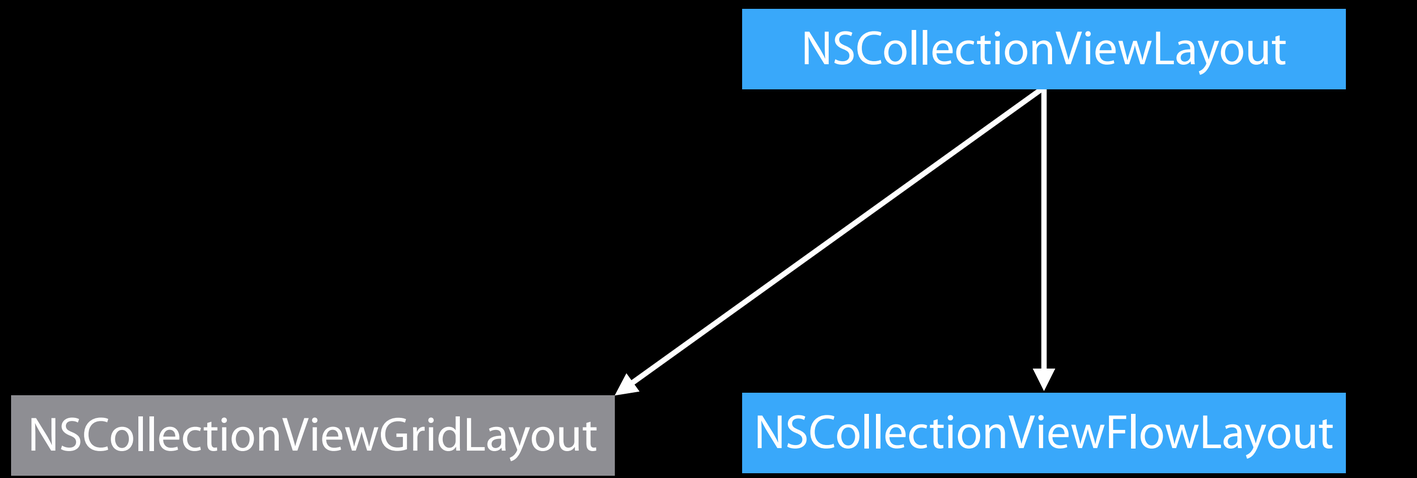


Layouts

Sizing and positioning items

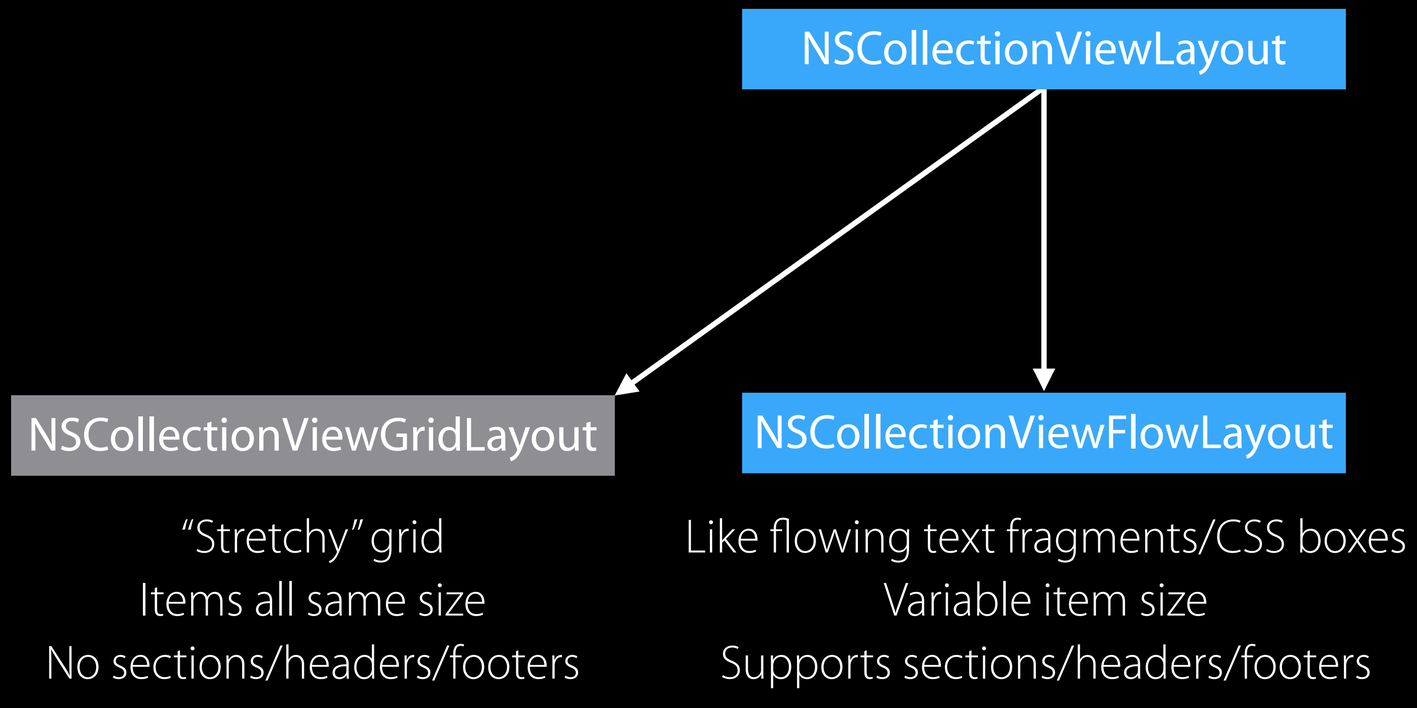


"Stretchy" grid
Items all same size
No sections/headers/footers

Like flowing text fragments/CSS boxes
Variable item size

Layouts

Sizing and positioning items



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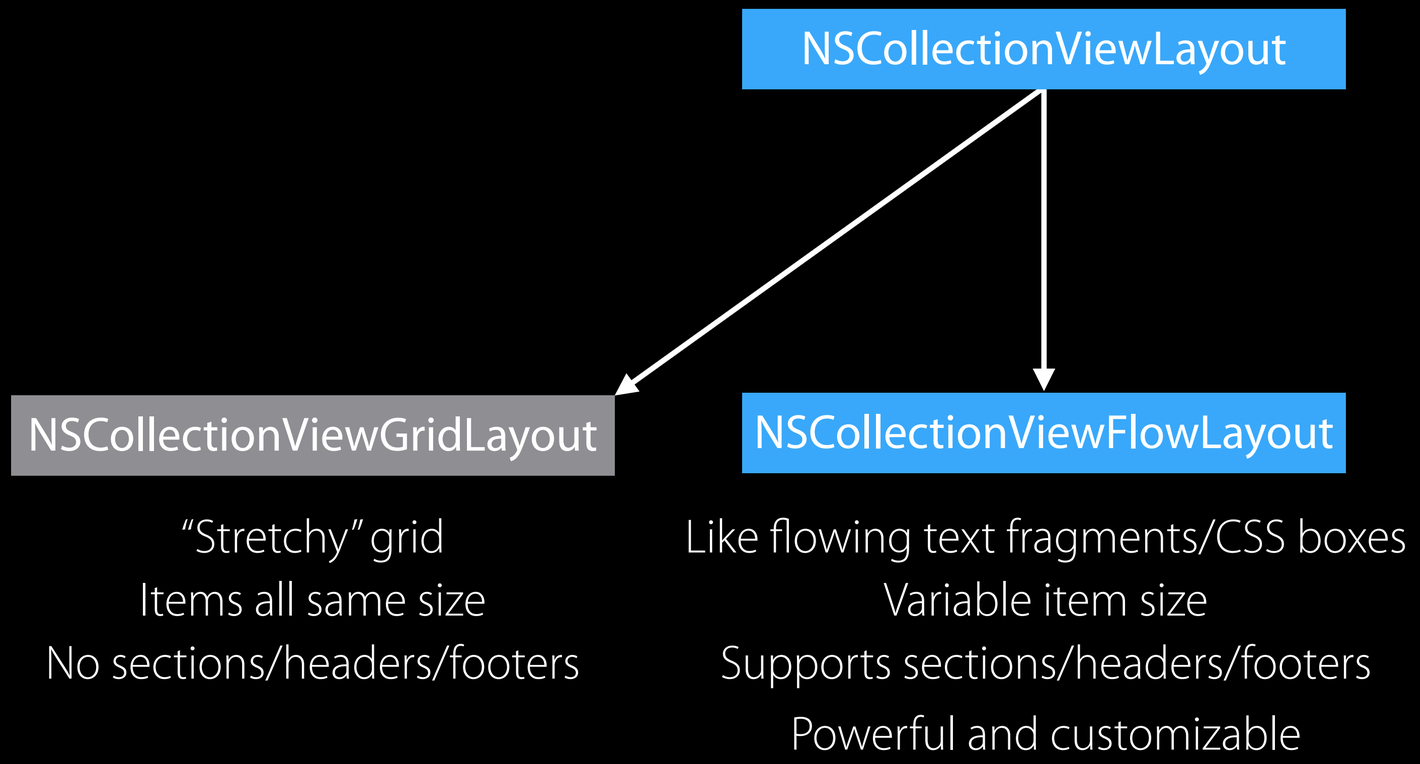

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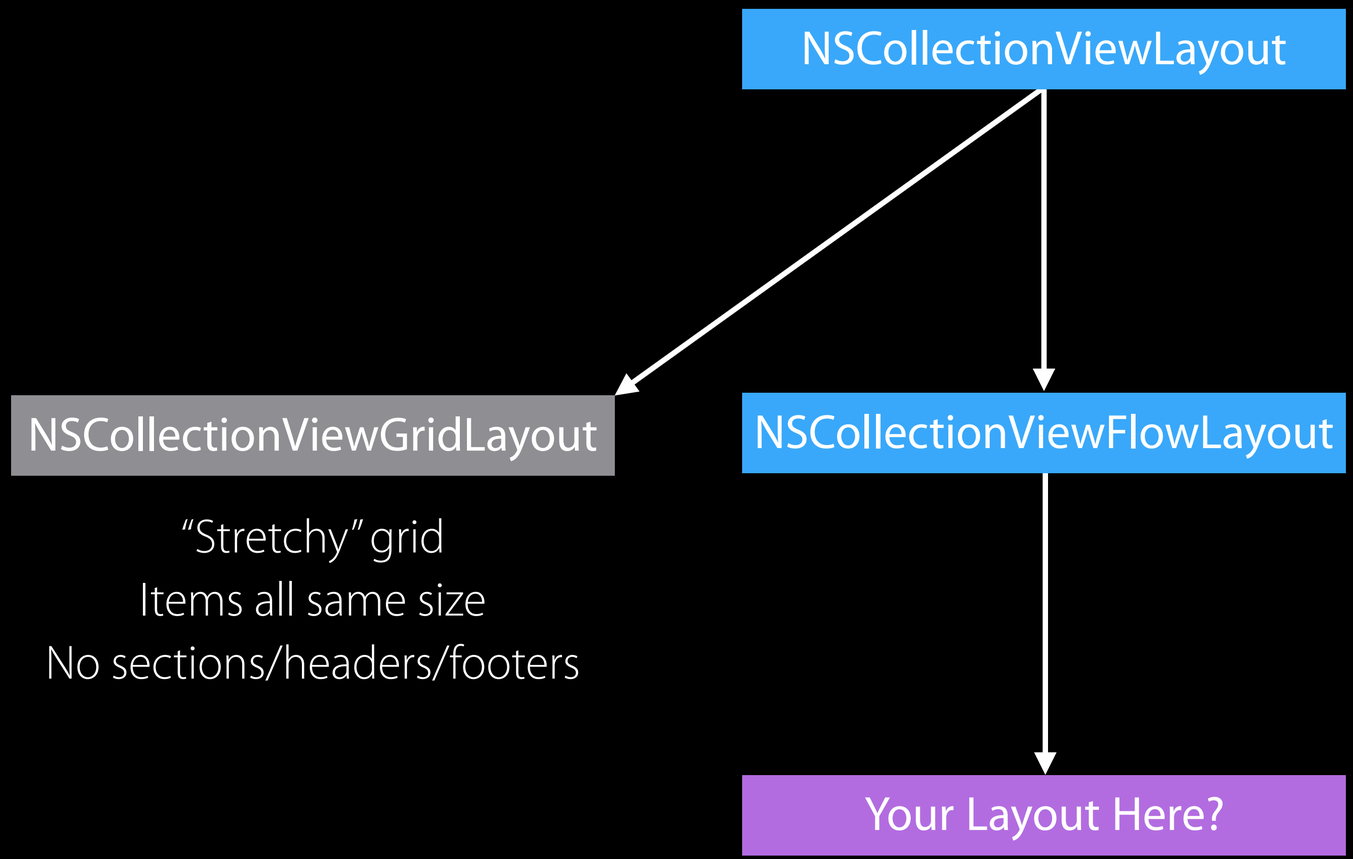

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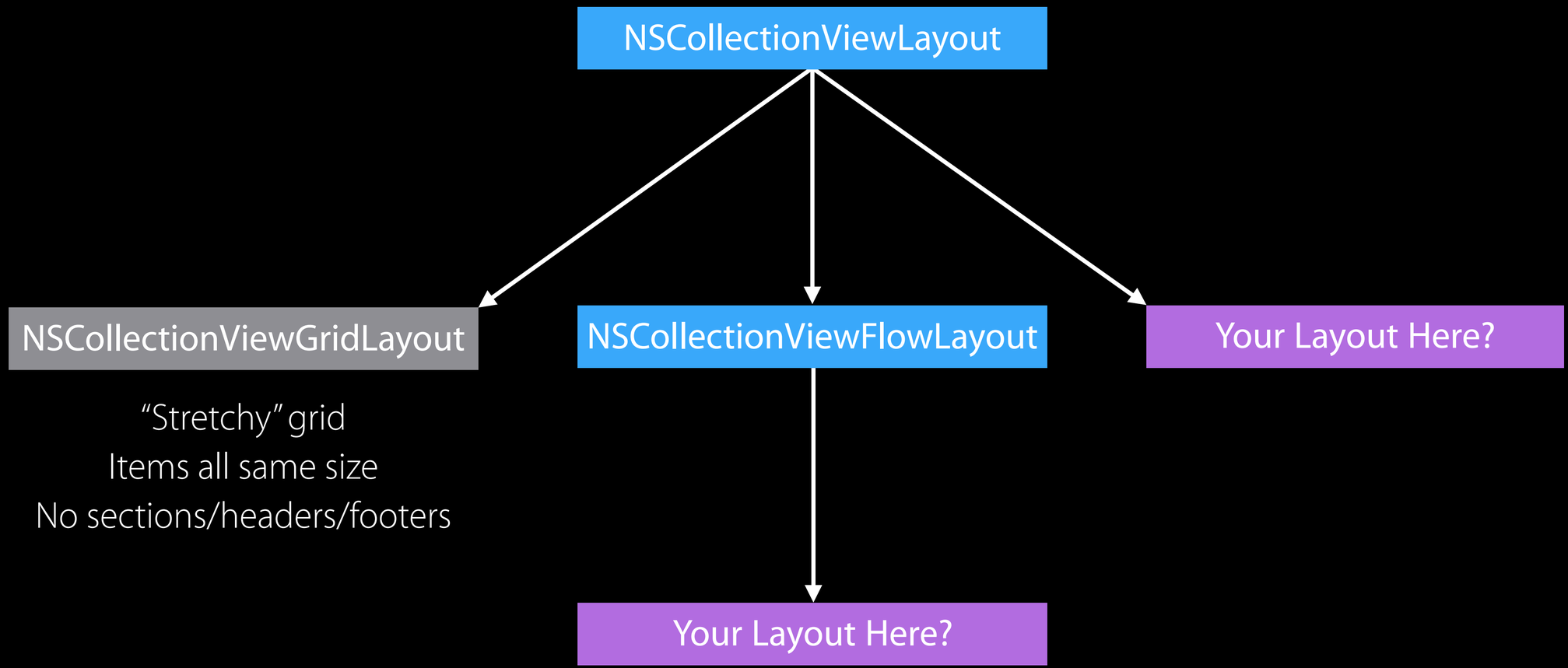

Understanding “Layout Attributes” Objects

NSCollectionViewLayoutAttributes

Understanding “Layout Attributes” Objects

NSCollectionViewLayoutAttributes

Encapsulates `frame`, `alphaValue`, and other states that can be applied to a view

```
class NSCollectionViewLayoutAttributes : NSObject, NSCopying {
    var frame: NSRect
    var size: NSSize
    var alpha: CGFloat
    var zIndex: Int // default is 0
    var hidden: Bool // As an optimization, NSCollectionView might not
create a view for items whose hidden attribute is YES
    var indexPath: NSIndexPath?
```

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Understanding “Layout Attributes” Objects

NSCollectionViewLayoutAttributes

Encapsulates `frame`, `alphaValue`, and other states that can be applied to a view

Enables CollectionView APIs to reason about items not currently instantiated

Applied to items/views at layout time

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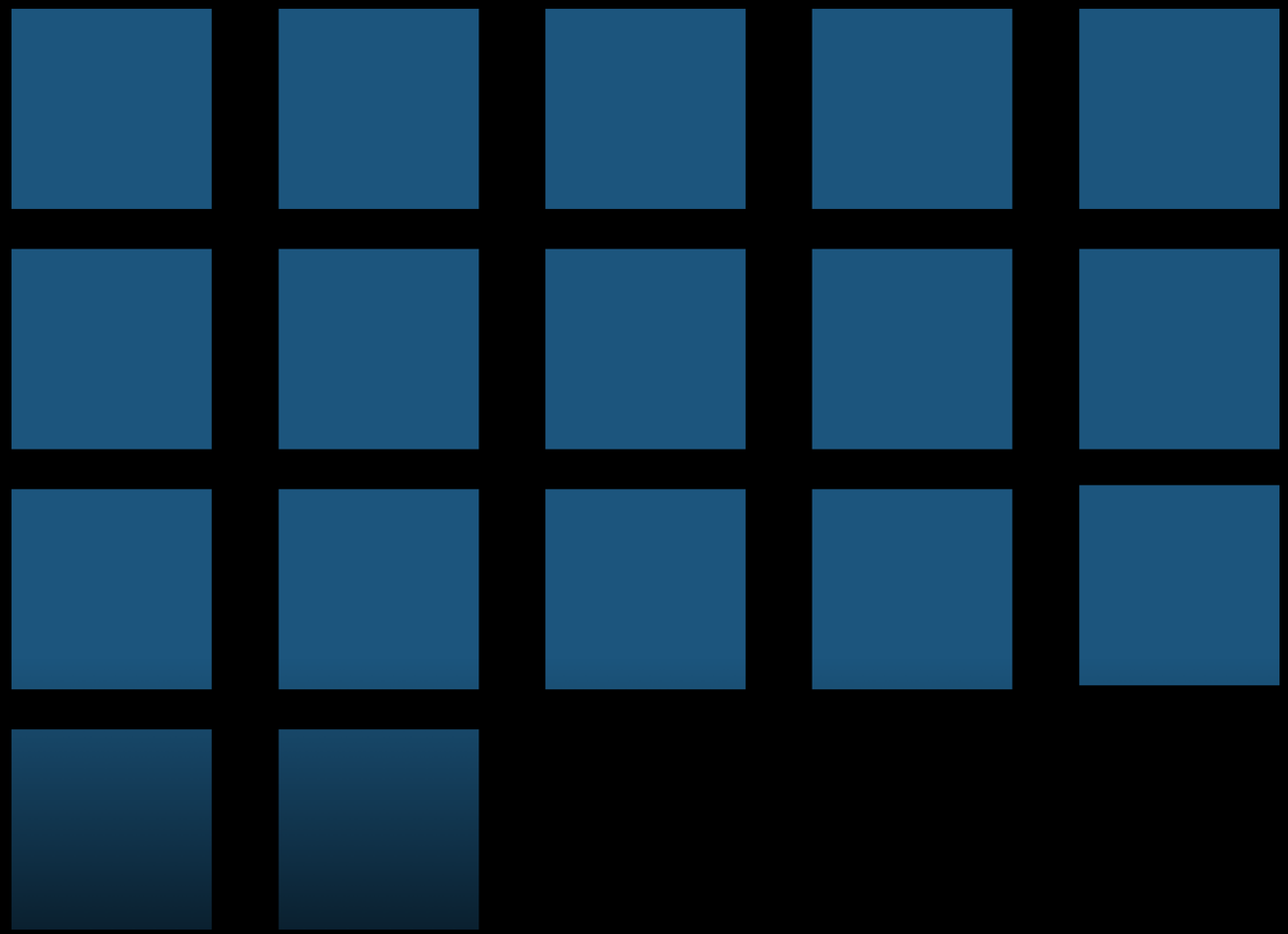
Grouping Items

Using sections



Grouping Items

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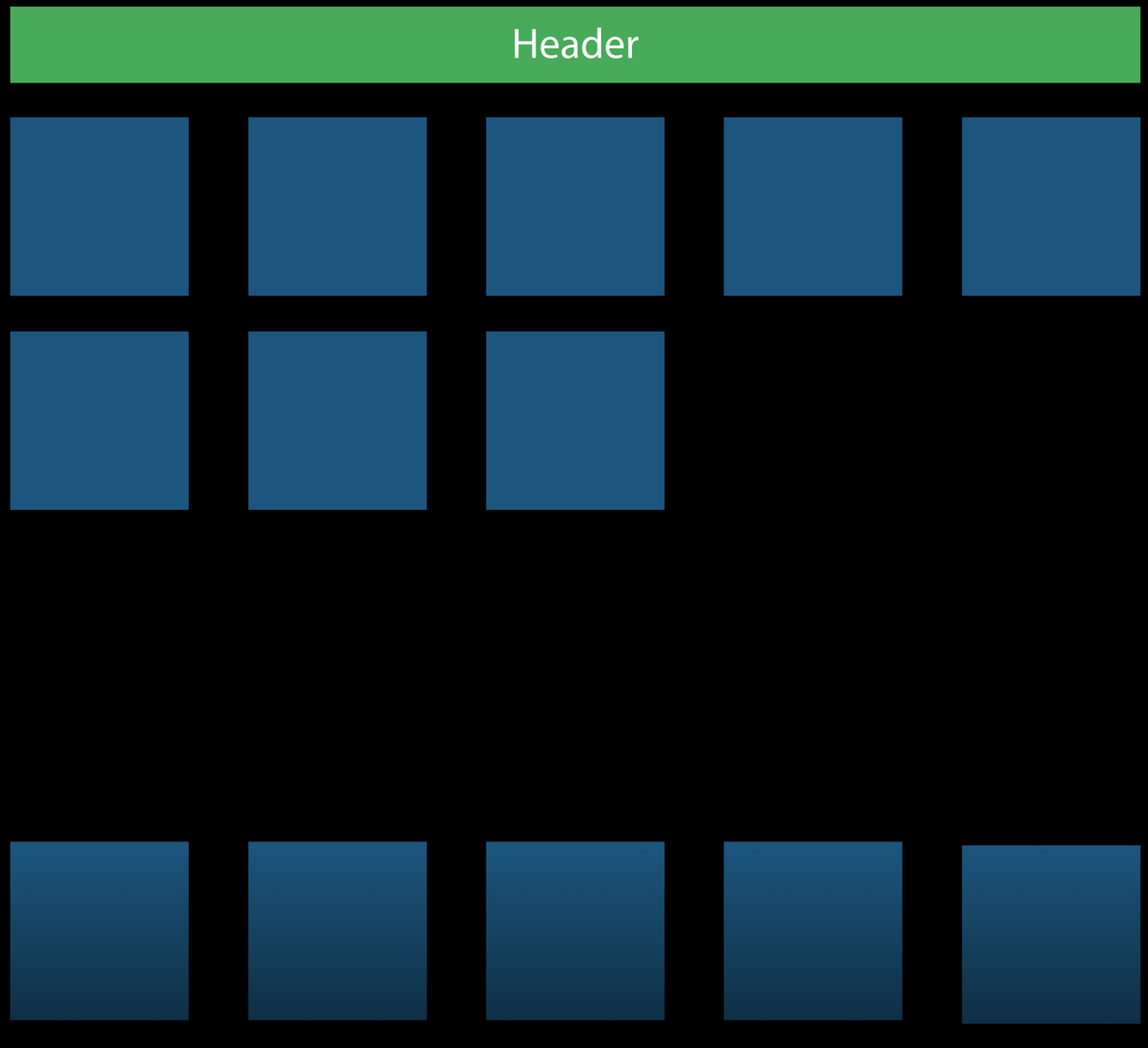

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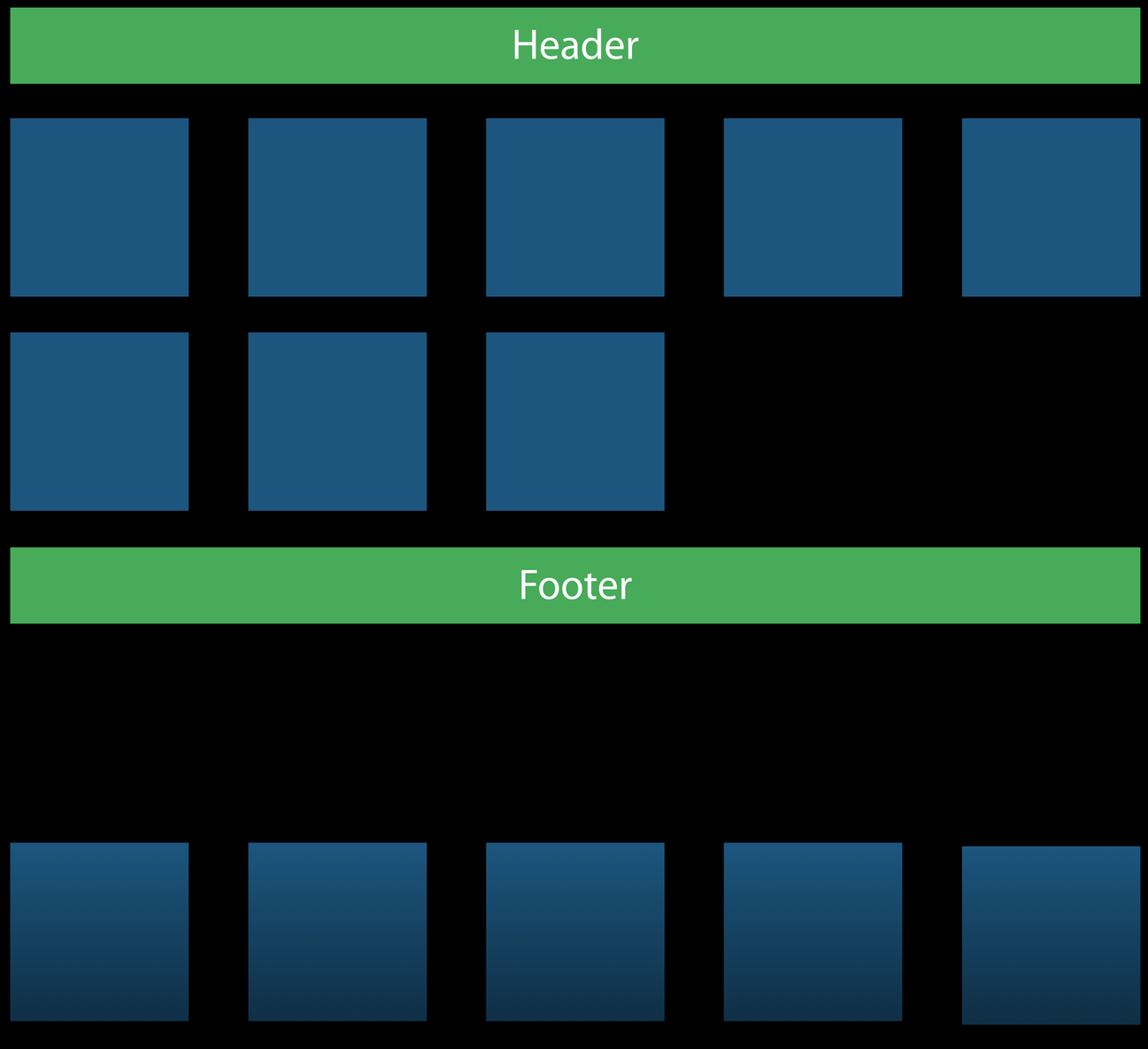

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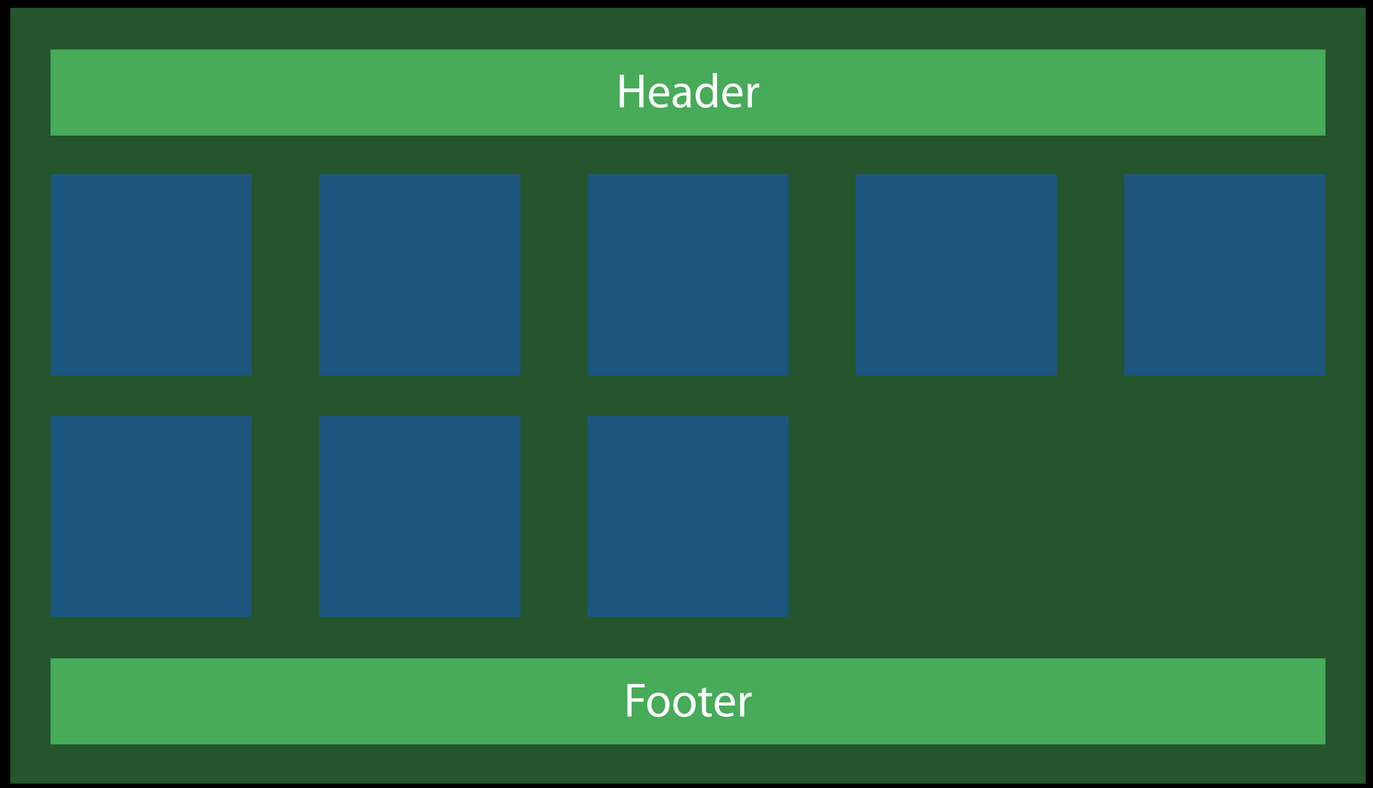

Grouping Items

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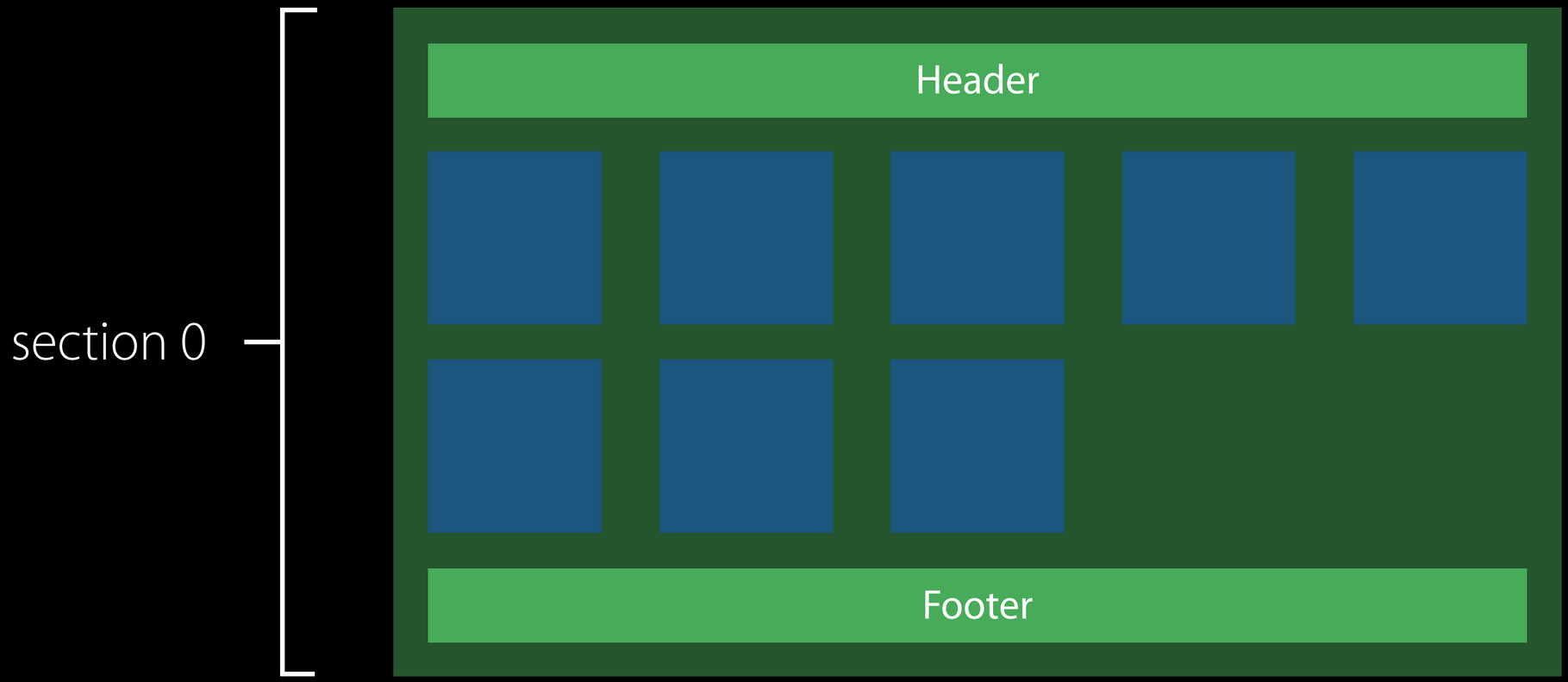

Grouping Items

Using sections

section 0

Header

item 0 | item 1 | item 2 | item 3 | item 4

item 5 | item 6 | item 7

Footer

Grouping Items

Using sections

section 0

Header

item 0 | item 1 | item 2 | item 3 | item 4

item 5 | item 6 | item 7

Footer

Header

Grouping Items

Using sections

section 0

Header

item 0 | item 1 | item 2 | item 3 | item 4

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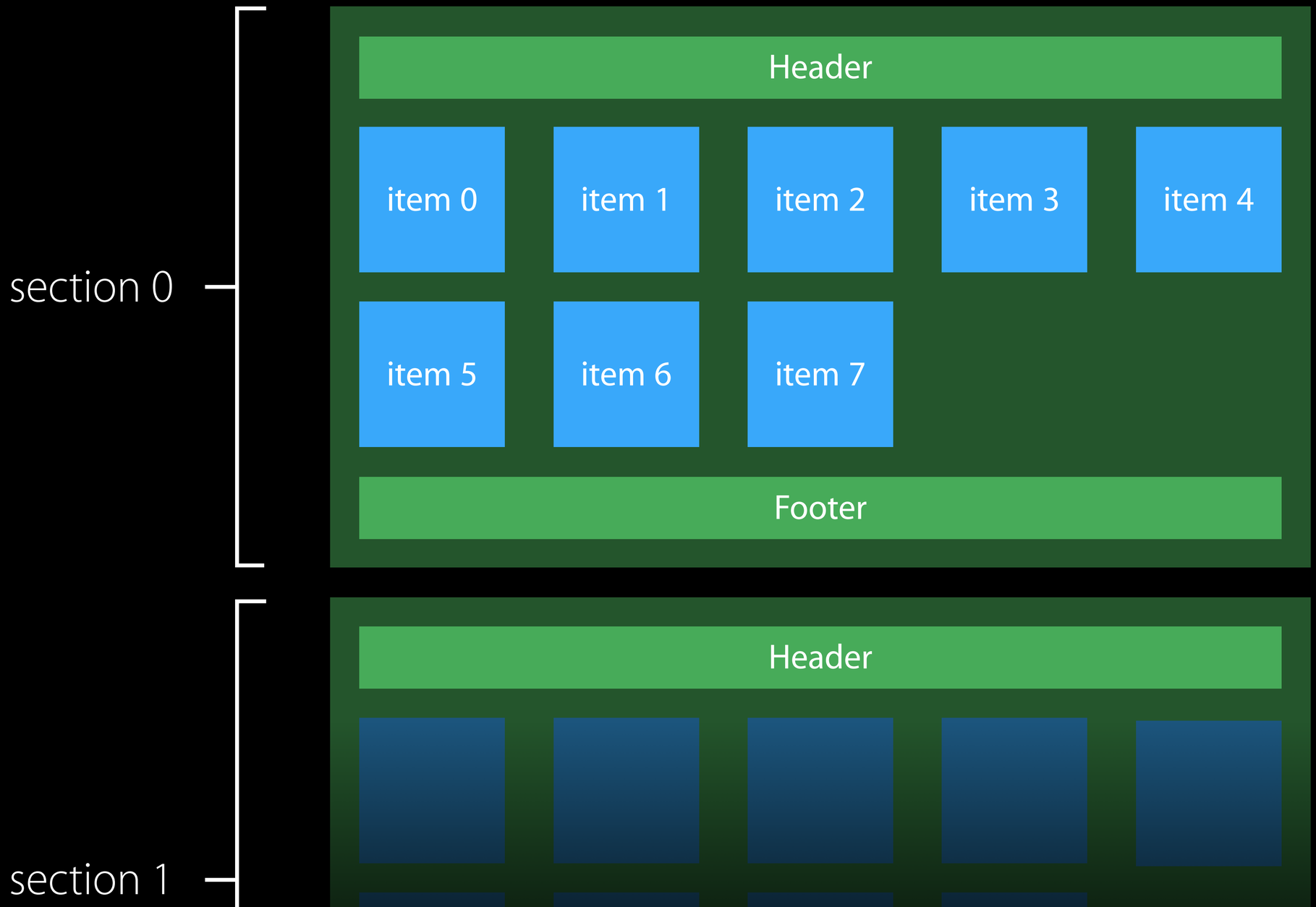
Footer

Header

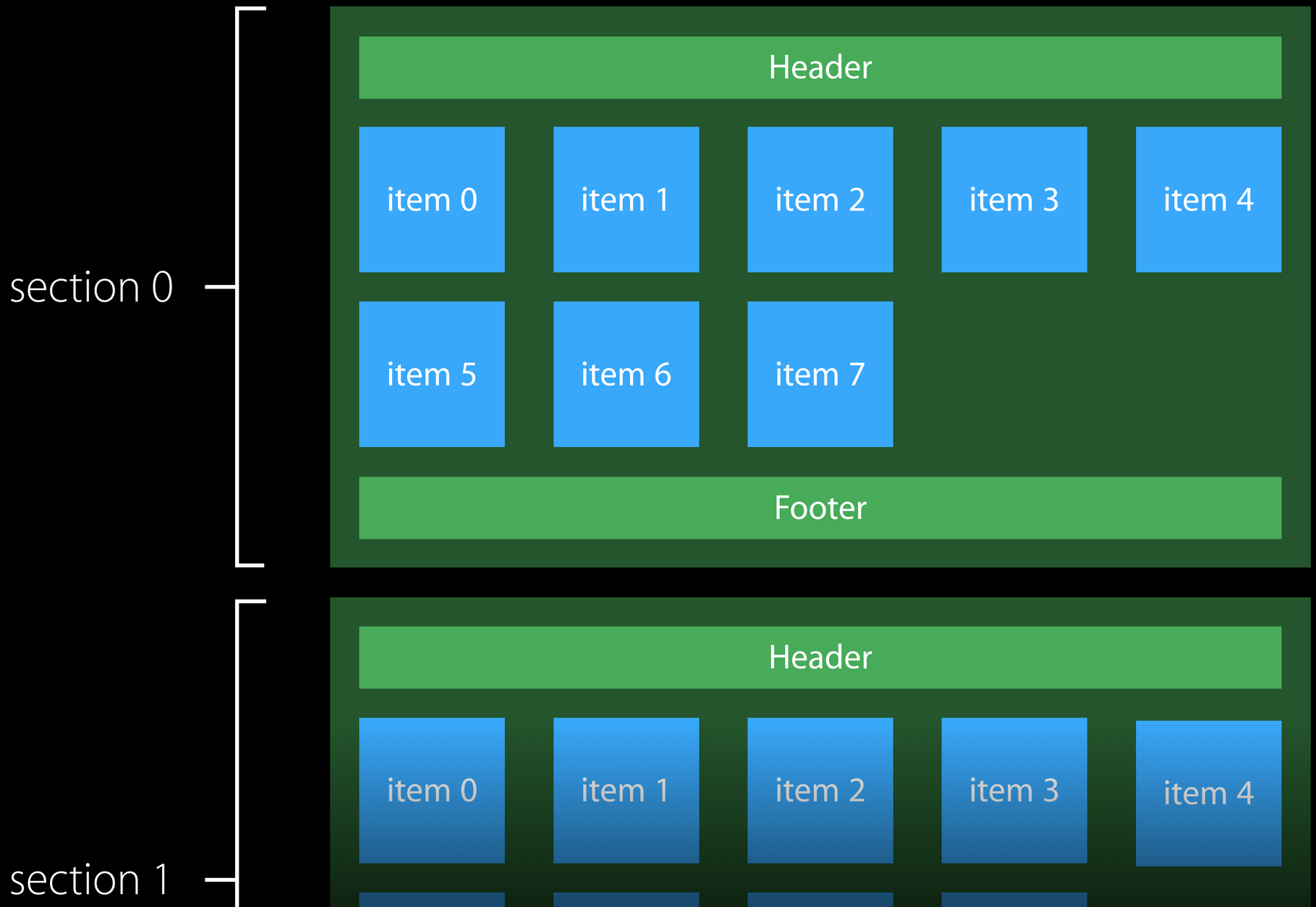
Grouping Items

Using sections



Grouping Items

Using sections



Referencing Items

Allowing for sections

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```
func itemAtIndex(index: Int) -> NSCollectionViewItem?
```

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Referencing Items

Allowing for sections

```
func itemAtIndex(index: Int) -> NSCollectionViewItem?
```

```
itemAtIndexPath(NSIndexPath) -> NSCollectionViewItem?
```

Referencing Items

Allowing for sections

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Referencing Items

Allowing for sections

```
func itemAtIndex(index: Int) -> NSCollectionViewItem?
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```
itemAtIndexPath(NSIndexPath) -> NSCollectionViewItem?
```

(section, item)

Referencing Items

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NSIndexPath

(section, item)

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Allowing for sections

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func itemAtIndex(index: Int) -> NSCollectionViewItem?
```

```
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```

NSIndexPath

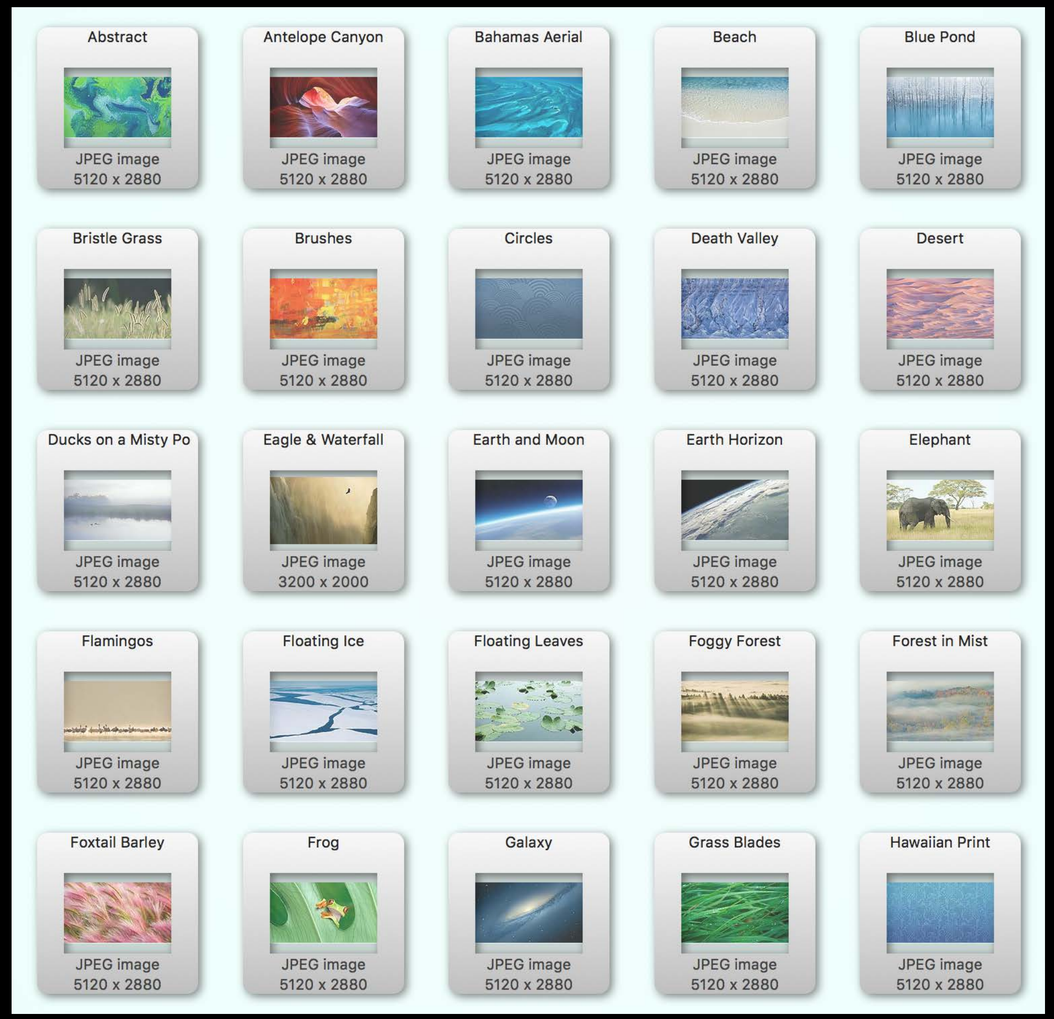
(section, item)

Nuts and Bolts

Putting CollectionView to work

Example

“Cocoa Slide Collection”

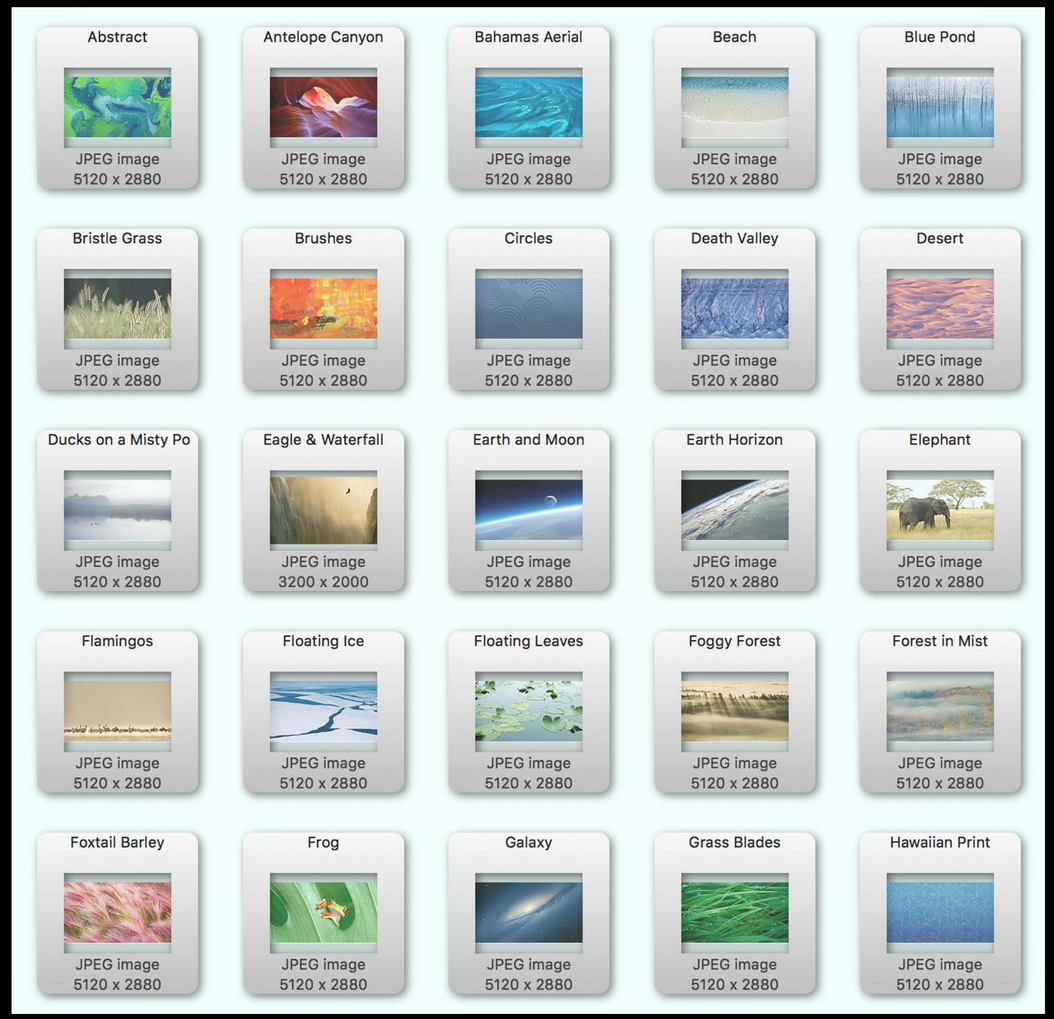


https://developer.apple.com/library/prerelease/mac/samplecode/CocoaSlideCollection

Example

“Cocoa Slide Collection”

Browse a folder of image files



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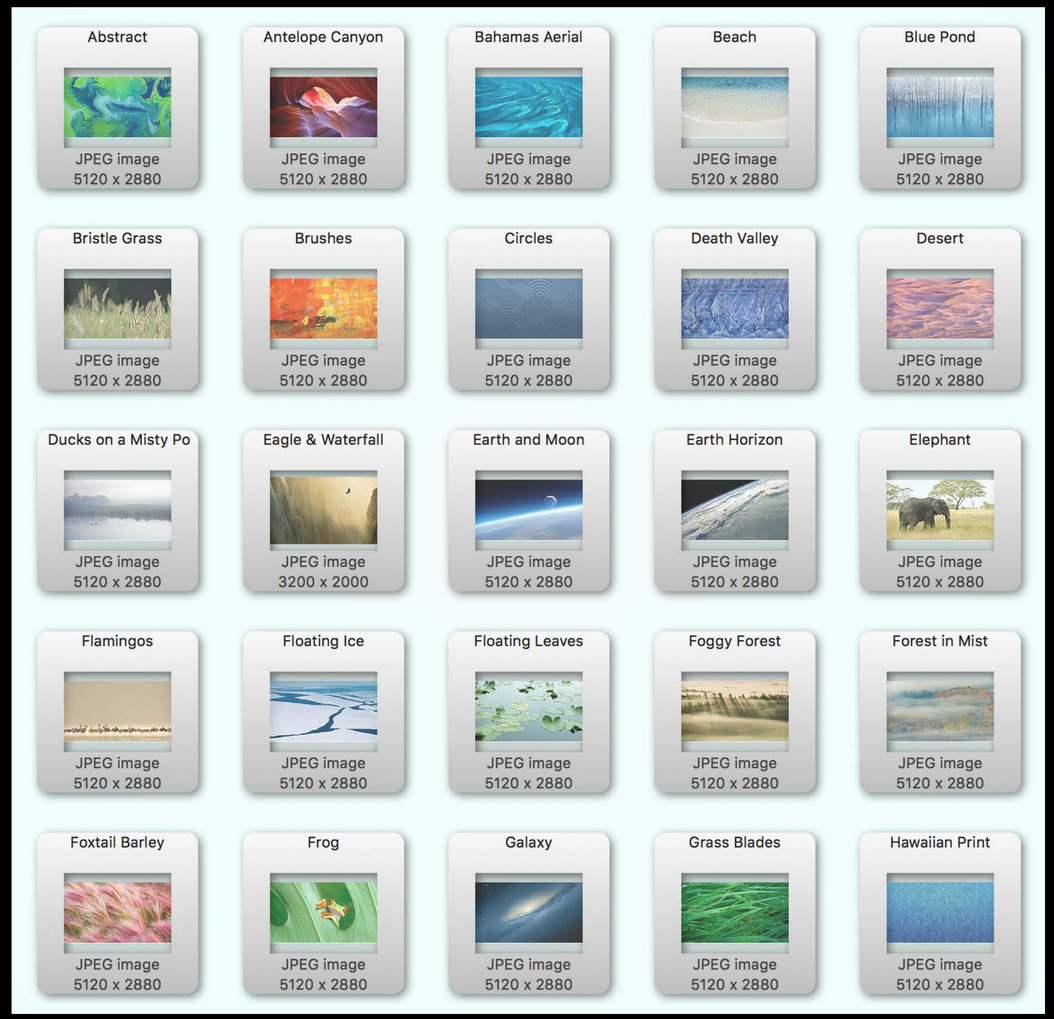
Example

“Cocoa Slide Collection”

Browse a folder of image files

Show thumbnails and image info



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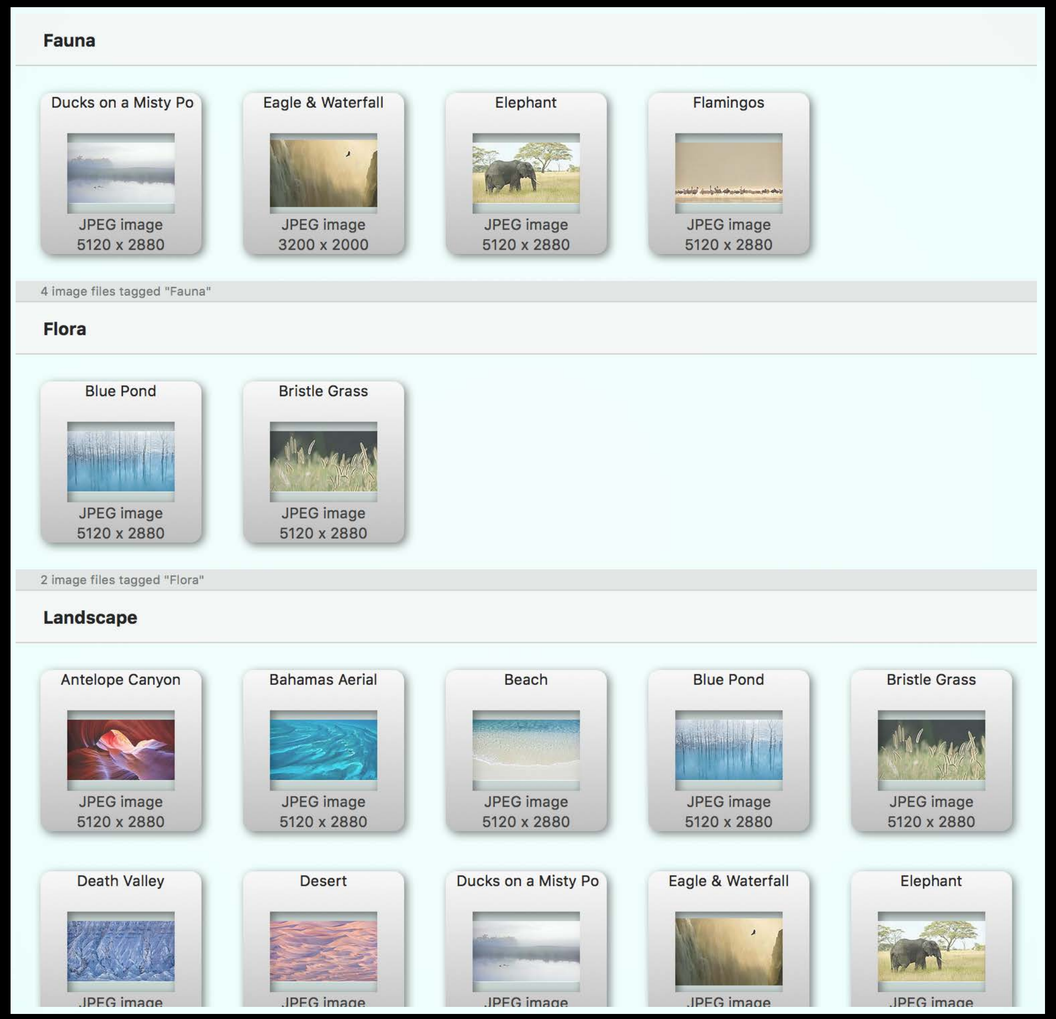
Group images by tag



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Example

“Cocoa Slide Collection”

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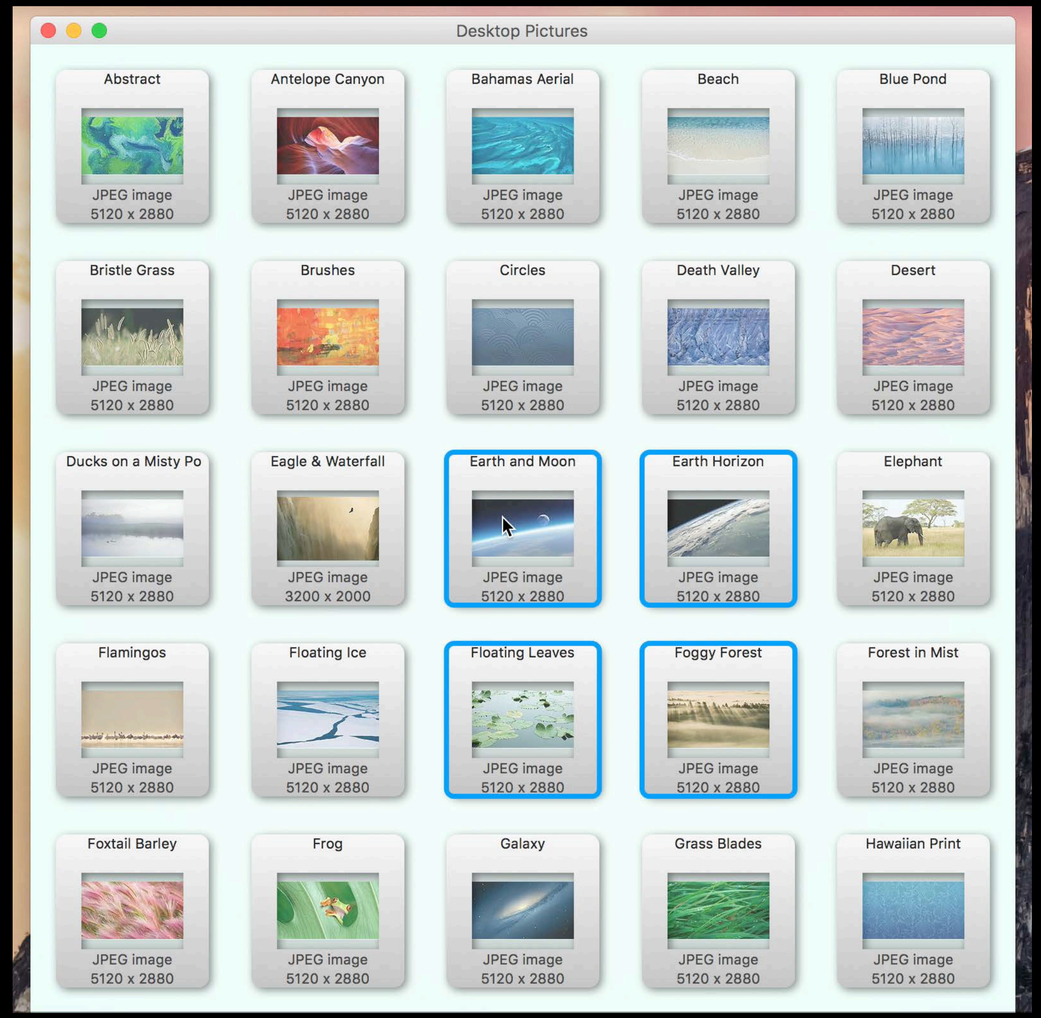
Position using Flow and custom layouts

Group images by tag

Support selection, Drag and Drop



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Roadmap

Roadmap

Make items appear

Roadmap

Make items appear

Group items into sections

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Update when model changes

Roadmap

Make items appear

Group items into sections

Update when model changes

Handle selection and highlighting

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Handle Drag and Drop

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Handle Drag and Drop

Customize layout

Roadmap

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Group items into sections

Update when model changes

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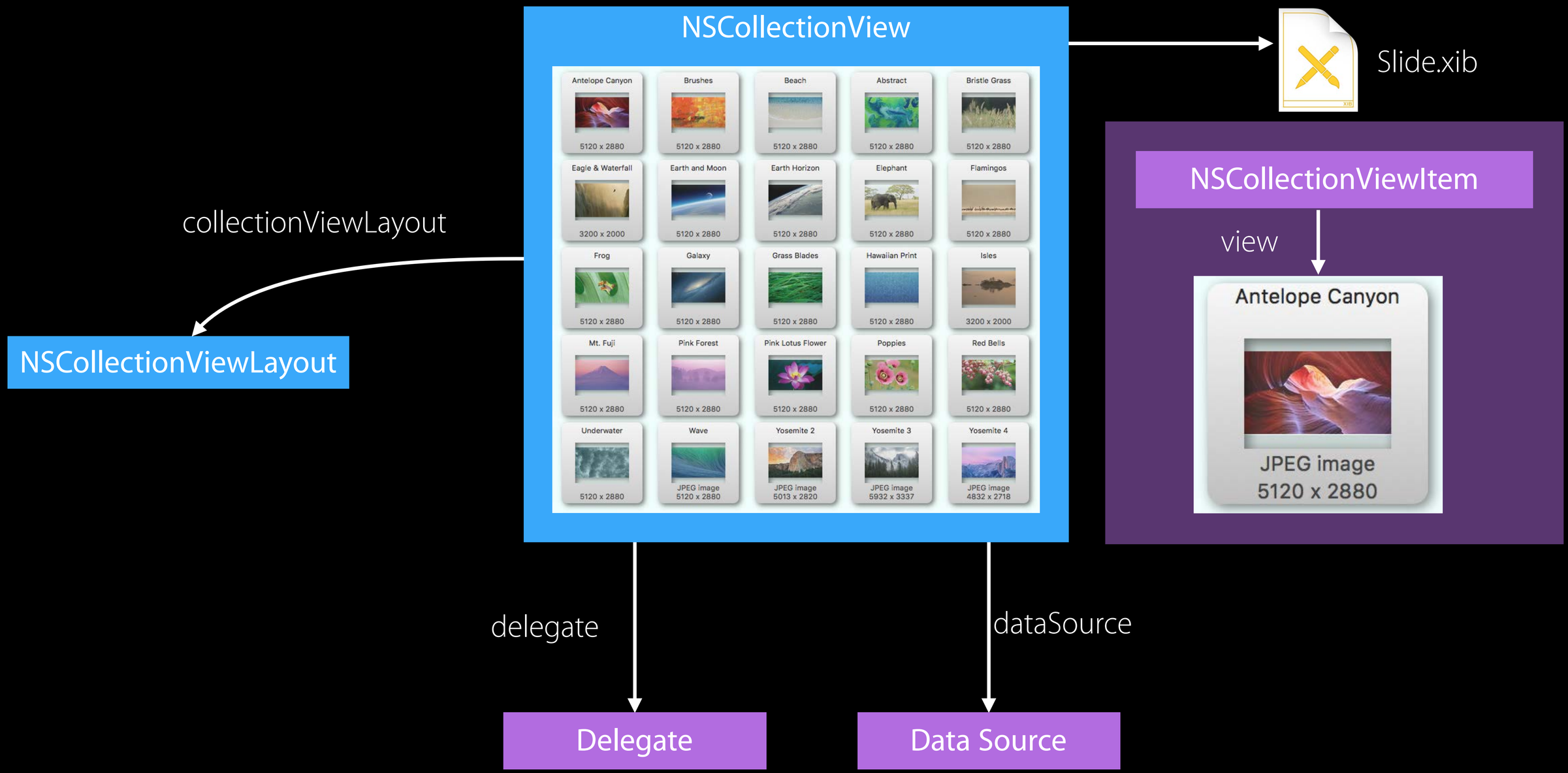
Handle Drag-and-Drop

Customize Layout

Make Items Appear



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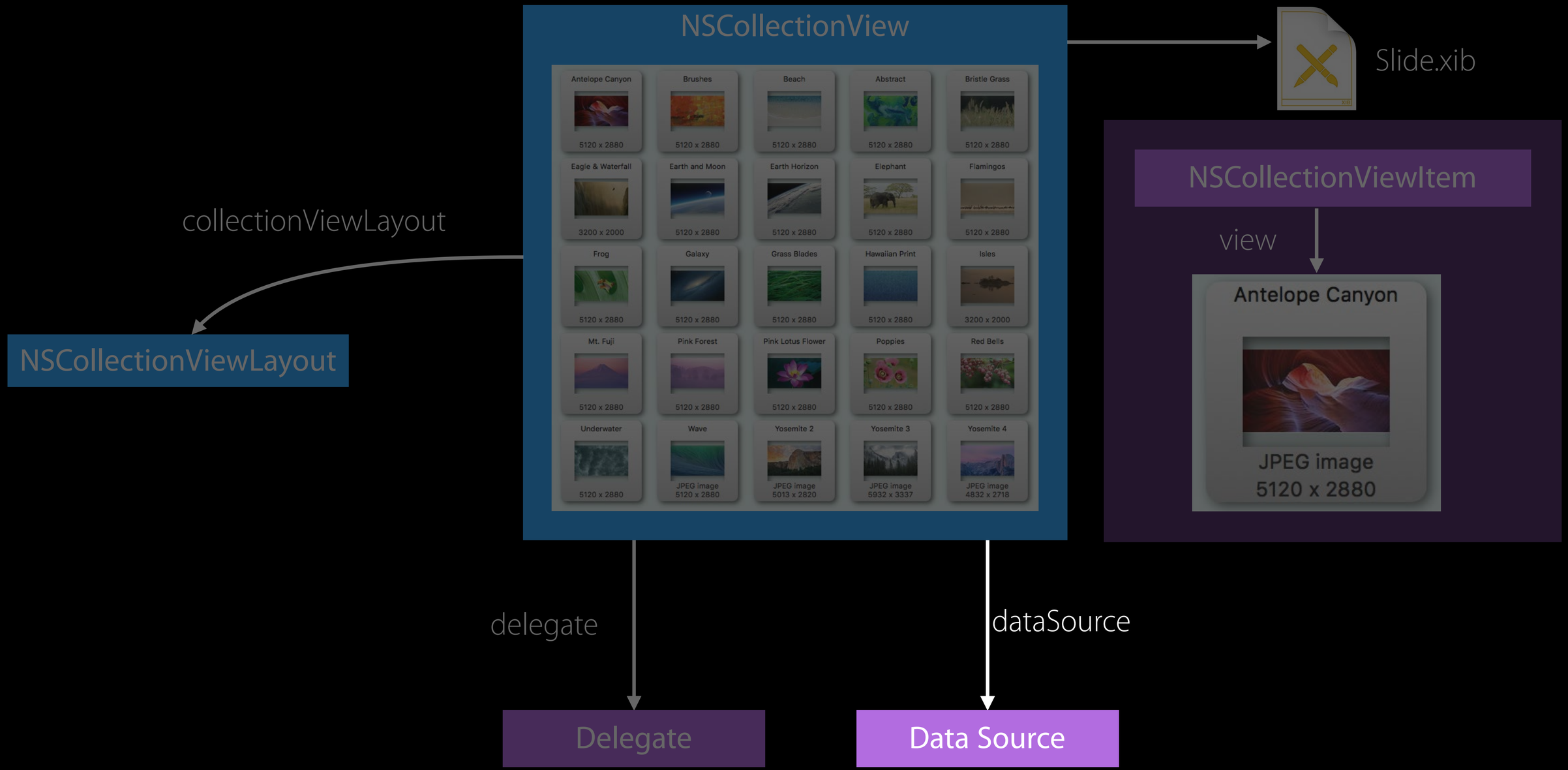

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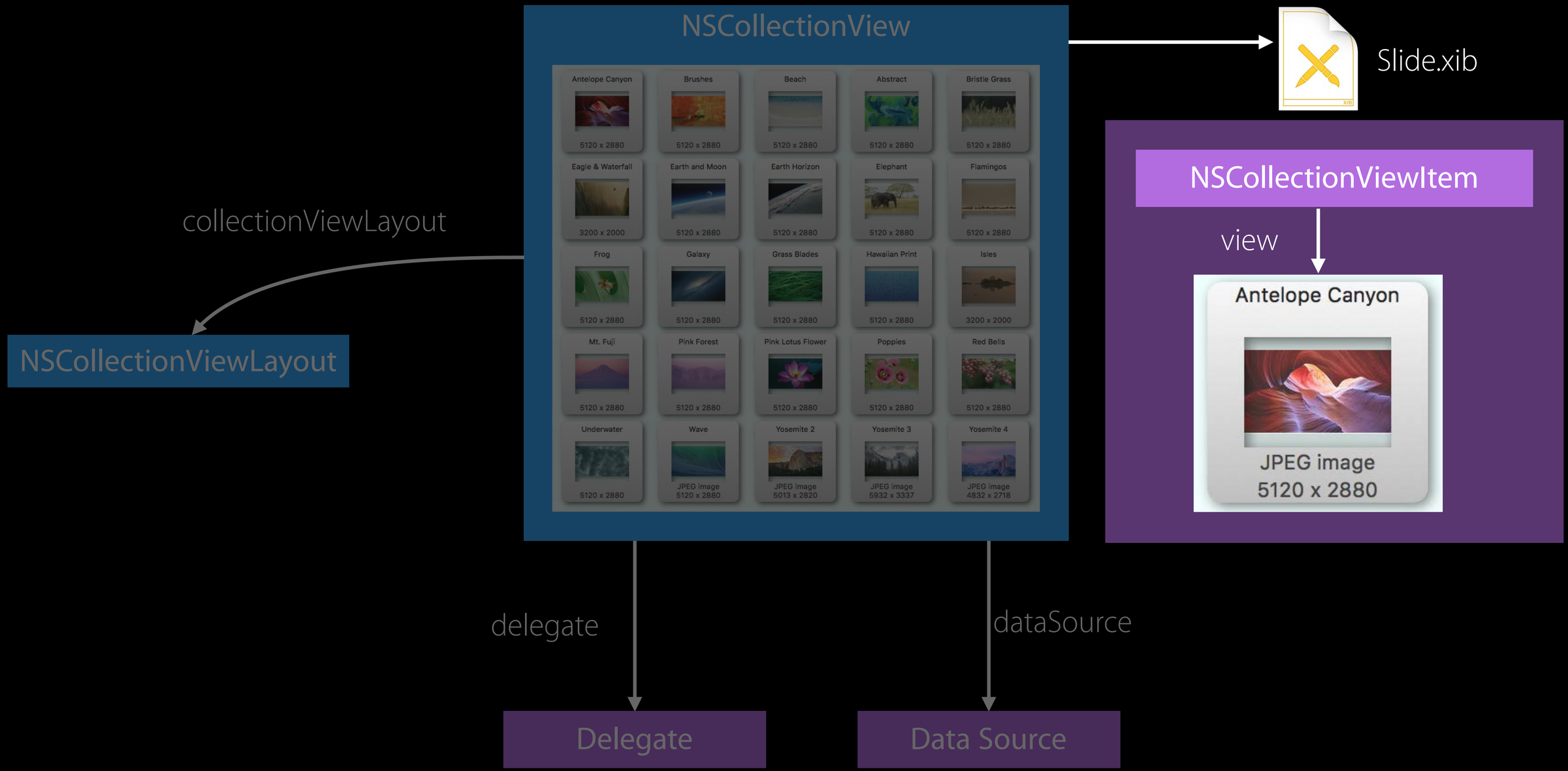

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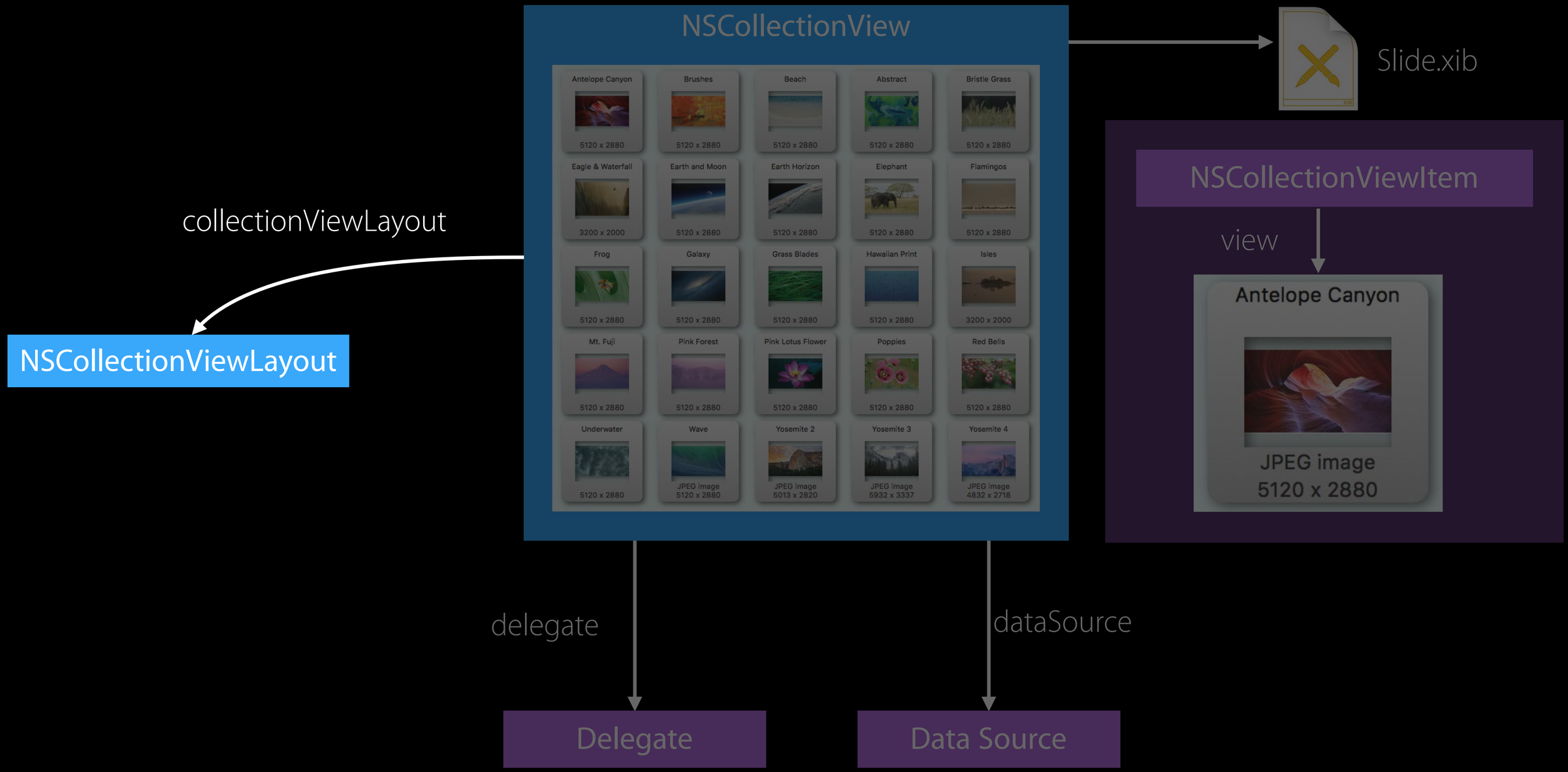

NSCollectionViewDataSource

Two required methods

NSCollectionViewDataSource

Two required methods

```
func numberOfItemsInSection(Int) -> Int

func collectionView(NSCollectionView,
     itemForRepresentedObjectAtIndexPath: NSIndexPath) ->
                                                NSCollectionViewItem
```

Example

"Cocoa Slide Collection"

Example

“Cocoa Slide Collection”

ImageFile–our Model object

Example

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- `url` (includes filename)

Example

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Example

“Cocoa Slide Collection”

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- `pixelsWide`

Example

“Cocoa Slide Collection”

ImageFile–our Model object

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- `pixelsWide`
- pixelsHigh

Example

“Cocoa Slide Collection”

ImageFile–our Model object

- `url` (includes filename)
- `fileType` (UTI)
- `pixelsWide`
- pixelsHigh
- previewImage

Demo

Making items appear

Roadmap

Make items appear

Group items into sections

Update when model changes

Handle selection and highlighting

Handle Drag-and-Drop

Customize Layout

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- A header or footer is considered a "supplementary view"
- Implement `NSCollectionViewDataSource`'s `collectionView(_:viewForSupplementaryElementOfKind:indexPath:)`

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Keeping Model and View in Sync

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Basic operations: Insert, delete, move, reload

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Similar approach to View-based NSOutlineView

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Applicable to both items and sections

Similar approach to View-based NSOutlineView

- When model changes, dataSource must notify CollectionView, describing the change

By default, changes appear instantly

```
collectionView.insertItemsAtIndexPaths(insertionIndexPaths)
```

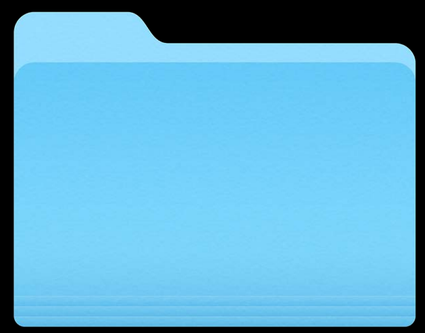
To animate a change, message through the CollectionView's animator (inherited from NSView)

```
collectionView.animator.insertItemsAtIndexPaths(insertionIndexPaths)
```

In CocoaSlideCollection

In CocoaSlideCollection

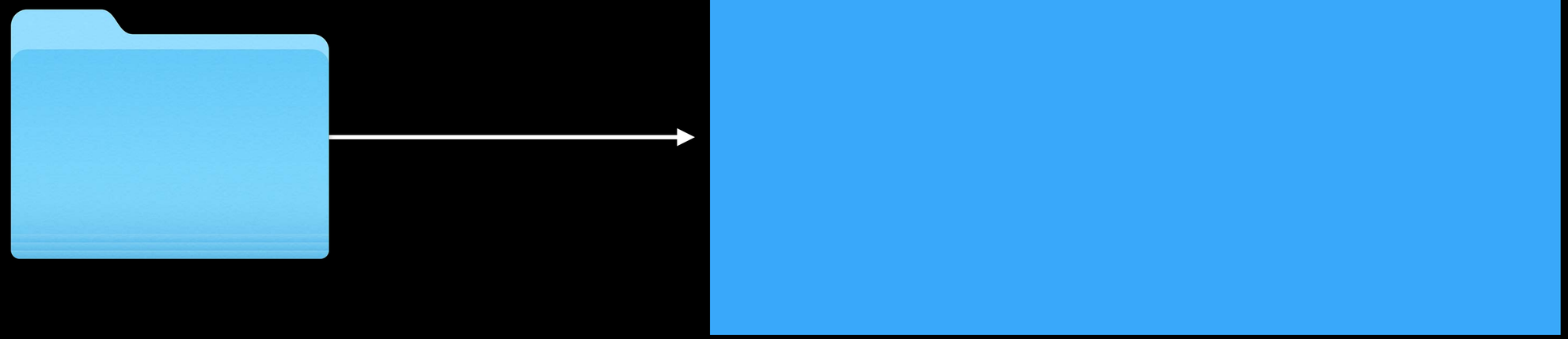
Watch image folder for changes



In CocoaSlideCollection

Watch image folder for changes

Update our CollectionView to match

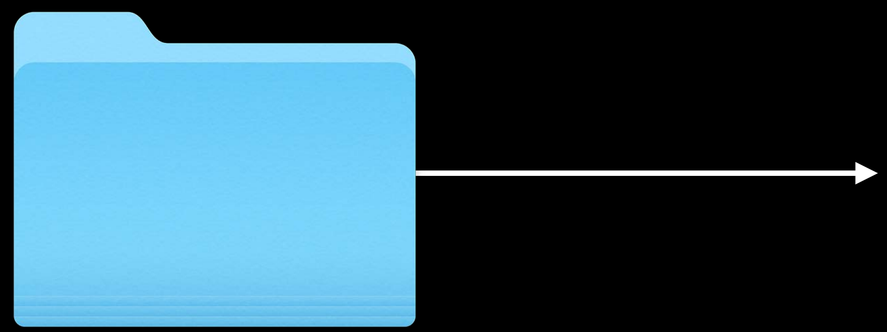


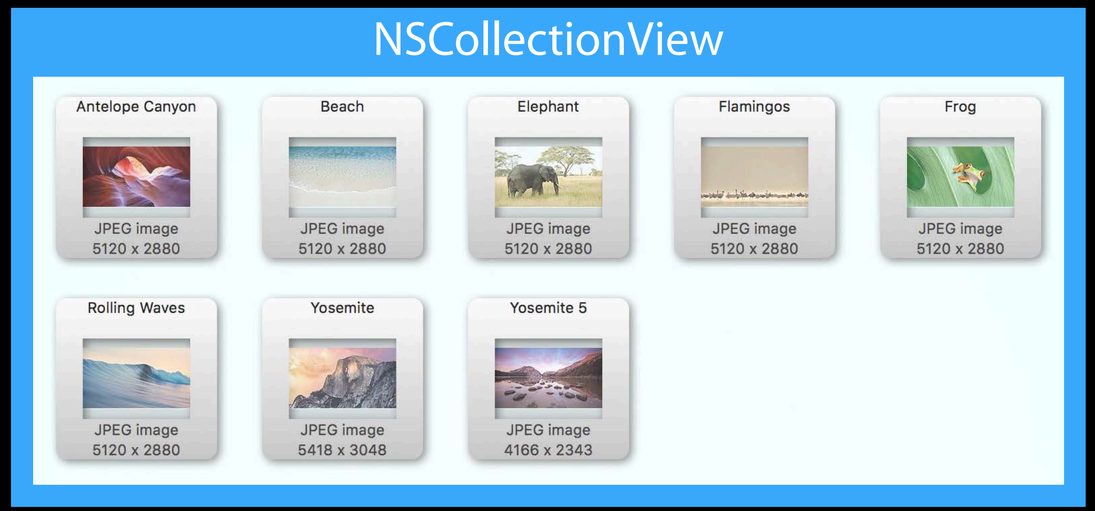
In CocoaSlideCollection

Watch image folder for changes

Update our CollectionView to match

ImageFiles may be added, deleted, or changed





In CocoaSlideCollection

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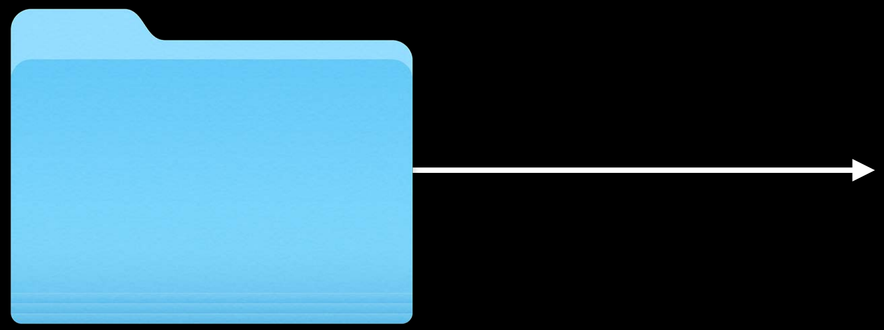
ImageFiles may be added, deleted, or changed

Key-Value Observing (KVO) is our friend



Demo

Keeping model and view in sync

Roadmap

Make items appear

Group items into sections

Update when model changes

Handle selection and highlighting

Handle Drag-and-Drop

Customize Layout

Roadmap

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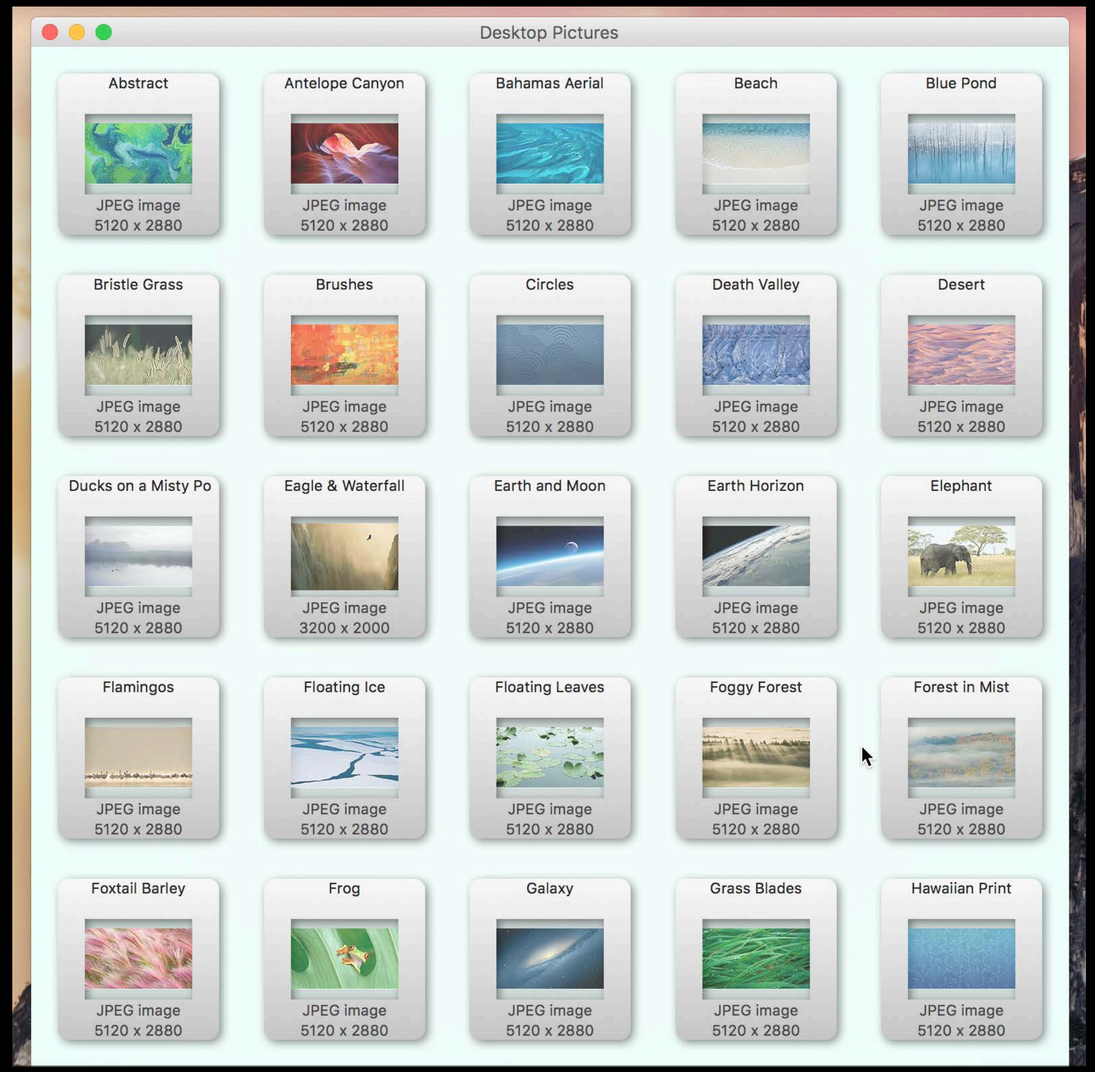
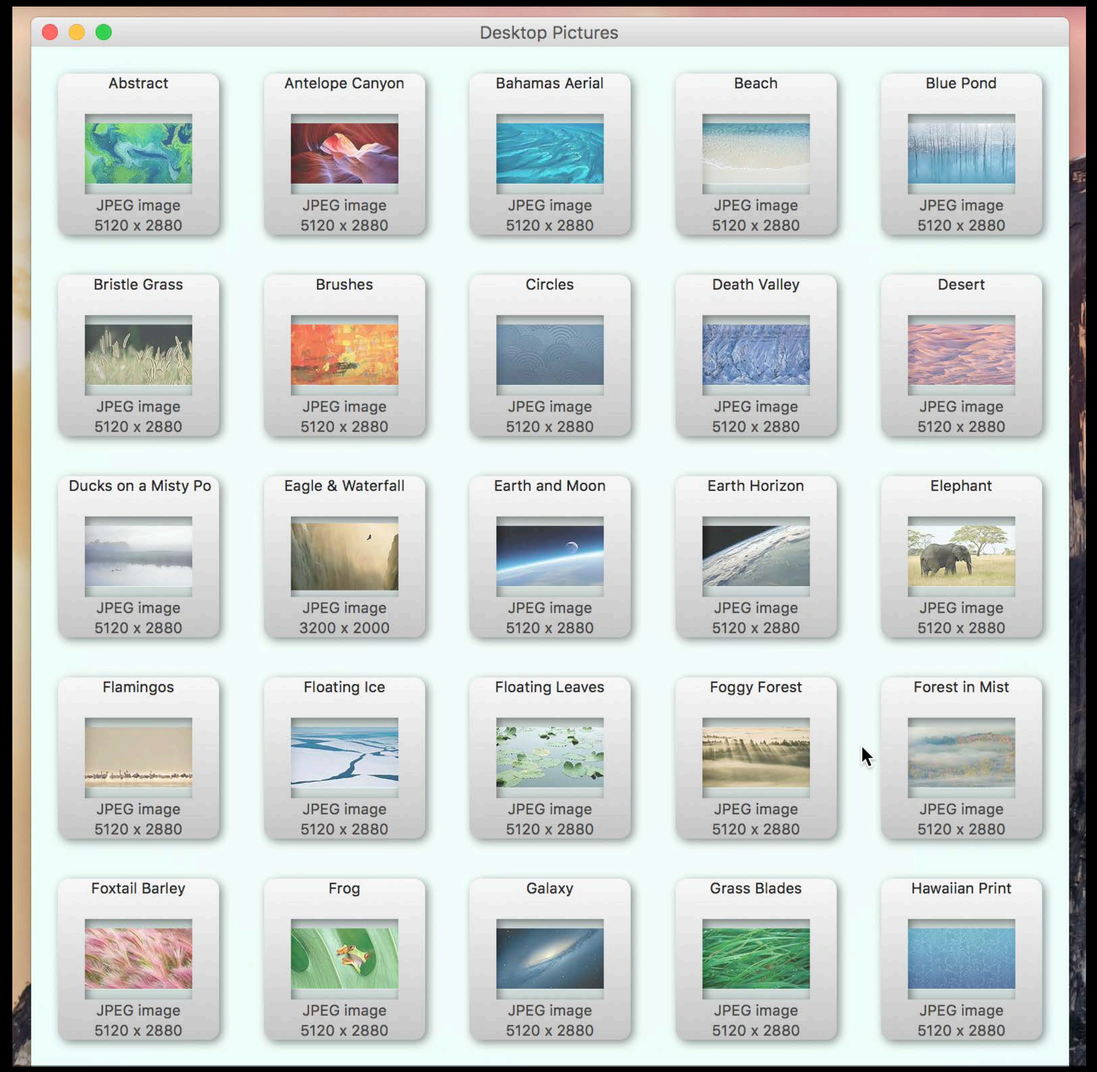
Selection and Highlighting



Selection and Highlighting

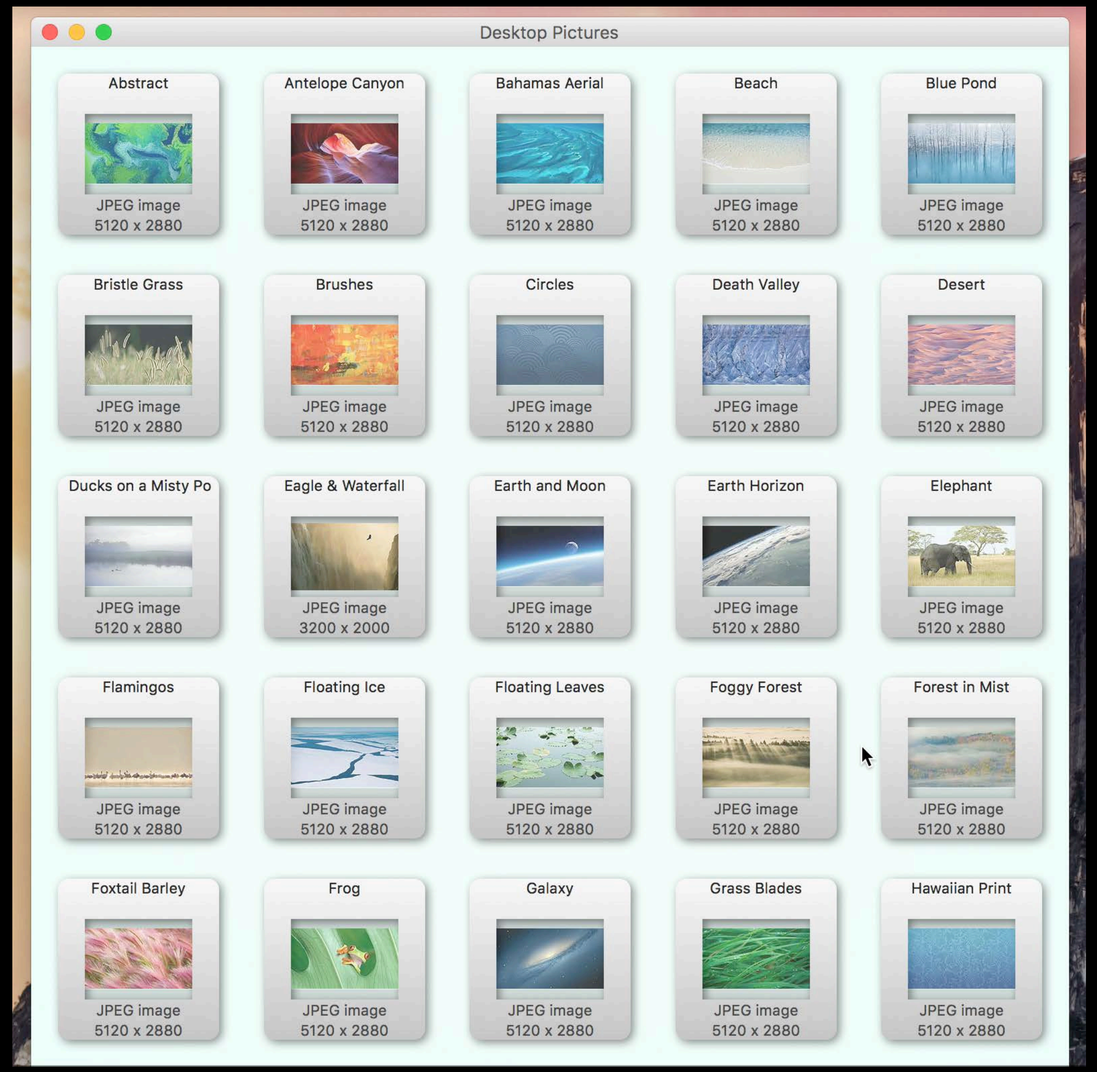
Visually indicated states



Selection and Highlighting

Visually indicated states

Highlighting precedes selection



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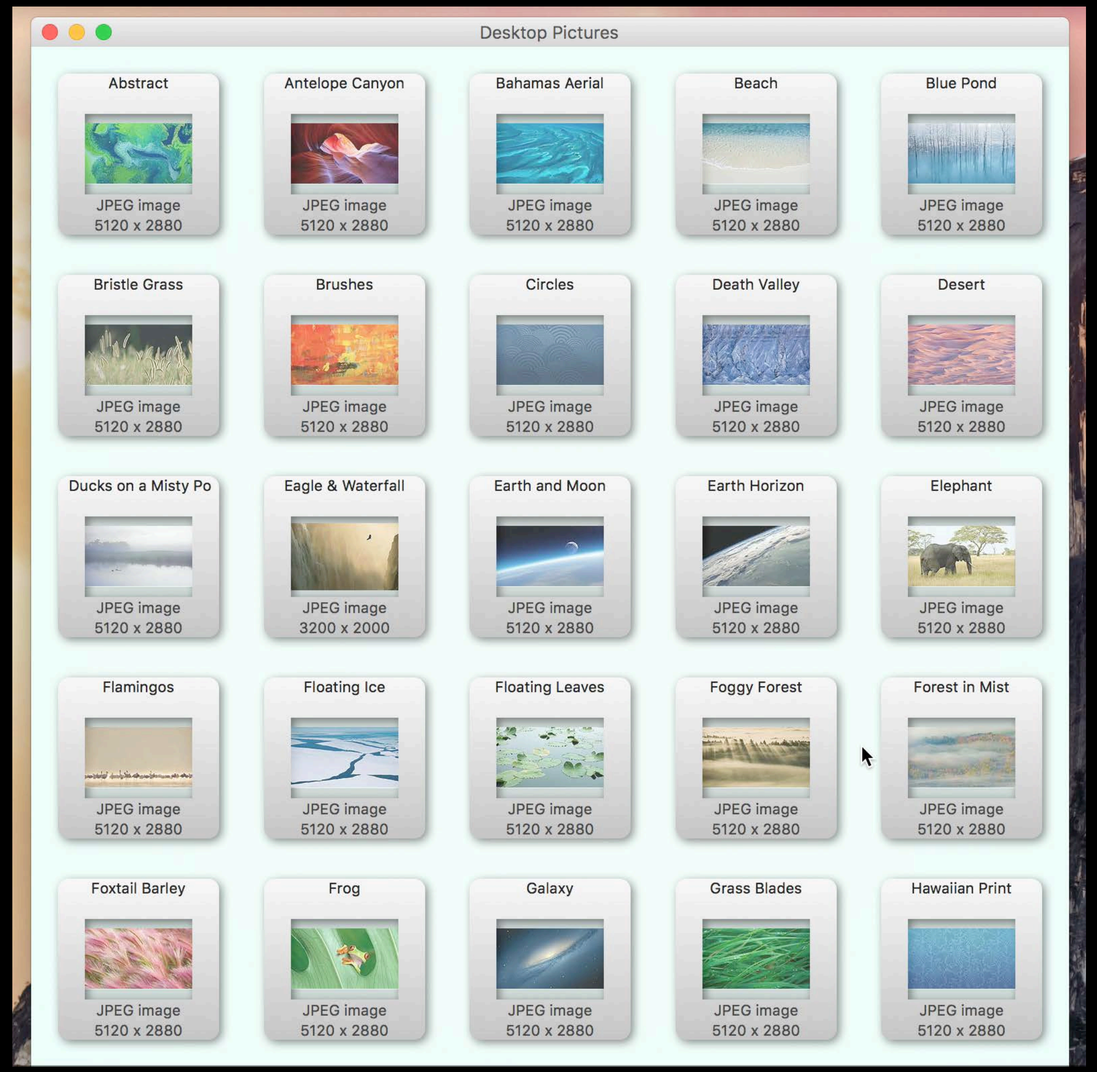

Highlighting

NEW

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NEW

`item.highlightState` indicates proposed selection, deselection, or drop target status

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```
class NSCollectionViewItem {
    var highlightState: NSCollectionViewItemHighlightState
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```

```
enum NSCollectionViewItemHighlightState : Int {

    case     None,       ForSelection,  ForDeselection,  AsDropTarget
}
```

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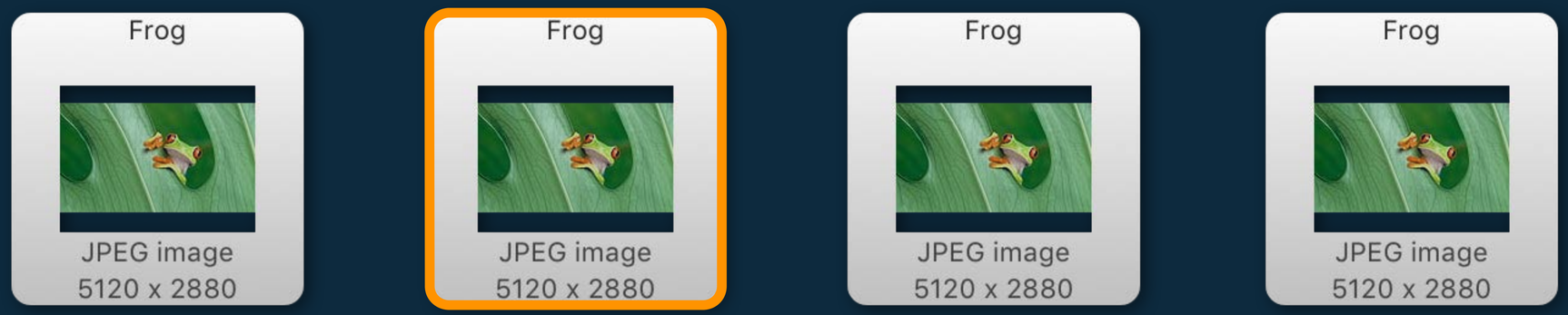


```
    case None, ForSelection, ForDeselection, AsDropTarget
}
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NEW

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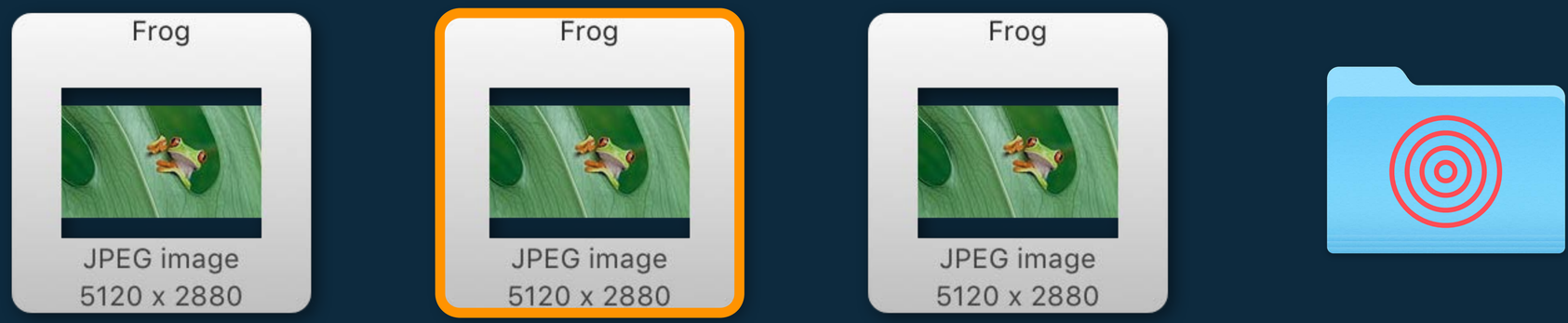


```
    case None, ForSelection, ForDeselection, AsDropTarget
}
```

Highlighting Using Layer Properties

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New NSCollectionViews always layer-backed

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Can use layer properties to easily change item appearance without redraw

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- `backgroundColor`, `borderColor`, `borderWidth`, `cornerRadius`

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New NSCollectionViews always layer-backed

Can use layer properties to easily change item appearance without redraw

- `backgroundColor`, `borderColor`, `borderWidth`, `cornerRadius`

```
item.view.layer.backgroundColor = brightColor
```

Highlighting Using Layer Properties

New NSCollectionViews always layer-backed

Can use layer properties to easily change item appearance without redraw

- `backgroundColor`, `borderColor`, `borderWidth`, `cornerRadius`

```
item.view.layer.backgroundColor = brightColor
item.view.layer.cornerRadius = 8
```

When to Apply Highlighting

When to Apply Highlighting

When "`highlightState`" changes

When to Apply Highlighting

When "highlightState" changes

```
class MyItem : NSCollectionViewItem {
    override var highlightState: NSCollectionViewItemHighlightState {
        didSet {
            // Update this item's appearance accordingly.
        }
    }
}
```

Selection

Selection

Items can be selected

Selection

Items can be selected

NSCollectionView supports single or multiple selection

Selection

Items can be selected

NSCollectionView supports single or multiple selection

```
var selectable: Bool
```

Selection

Items can be selected

NSCollectionView supports single or multiple selection

```
var selectable: Bool

var allowsMultipleSelection: Bool
```

Selection

Items can be selected

NSCollectionView supports single or multiple selection

```
var selectable: Bool

var allowsMultipleSelection: Bool

var allowsEmptySelection: Bool
```

Tracking the Selection

Tracking the Selection

`selectionIndexPaths` tracks the set of selected items

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`selectionIndexPaths` tracks the set of selected items

```
var selectionIndexPaths: Set<NSIndexPath>
```

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```
var selectionIndexPaths: Set<NSIndexPath>
```

An item knows whether it is part of the selection

Tracking the Selection

`selectionIndexPaths` tracks the set of selected items

```
var selectionIndexPaths: Set<NSIndexPath>
```

An item knows whether it is part of the selection

```
var selected: Bool
```

Programmatic Selection

```
var selectionIndexPaths: Set<NSIndexPath>
```

Programmatic Selection

```
var selectionIndexPaths: Set<NSIndexPath>
```

Programmatic Selection

```
var selectionIndexPaths: Set<NSIndexPath>

func selectItemsAtIndexPaths(Set<NSIndexPath>,
  scrollPosition: NSCollectionViewScrollPosition)

func deselectItemsAtIndexPaths(Set<NSIndexPath>)
```

User Selection

User Selection

Delegate can approve selection and deselection

User Selection

Delegate can approve selection and deselection

```
optional func collectionView(NSCollectionView,
             shouldSelectItemsAtIndexPaths: Set<NSIndexPath>)
             -> Set<NSIndexPath>

optional func collectionView(NSCollectionView,
             shouldDeselectItemsAtIndexPaths: Set<NSIndexPath>)
             -> Set<NSIndexPath>
```

User Selection

Delegate can approve selection and deselection

Return a different set of NSIndexPaths to override the proposed change

```
optional func collectionView(NSCollectionView,
             shouldSelectItemsAtIndexPaths: Set<NSIndexPath>)
             -> Set<NSIndexPath>

optional func collectionView(NSCollectionView,
             shouldDeselectItemsAtIndexPaths: Set<NSIndexPath>)
             -> Set<NSIndexPath>
```

User Selection

Delegate is notified of selection and deselection

```
optional func collectionView(NSCollectionView,
             didSelectItemsAtIndexPaths: Set<NSIndexPath>)

optional func collectionView(NSCollectionView,
             didDeselectItemsAtIndexPaths: Set<NSIndexPath>)
```

Highlighting

Highlighting

Delegate can also approve `highlightState` changes

Highlighting

Delegate can also approve `highlightState` changes

```
optional func collectionView(NSCollectionView,
             shouldChangeItemsAtIndexPaths: Set<NSIndexPath>,
             toHighlightState: NSCollectionViewItemHighlightState)
             -> Set<NSIndexPath>

optional func collectionView(NSCollectionView,
             didChangeItemsAtIndexPaths: Set<NSIndexPath>,
             toHighlightState: NSCollectionViewItemHighlightState)
```

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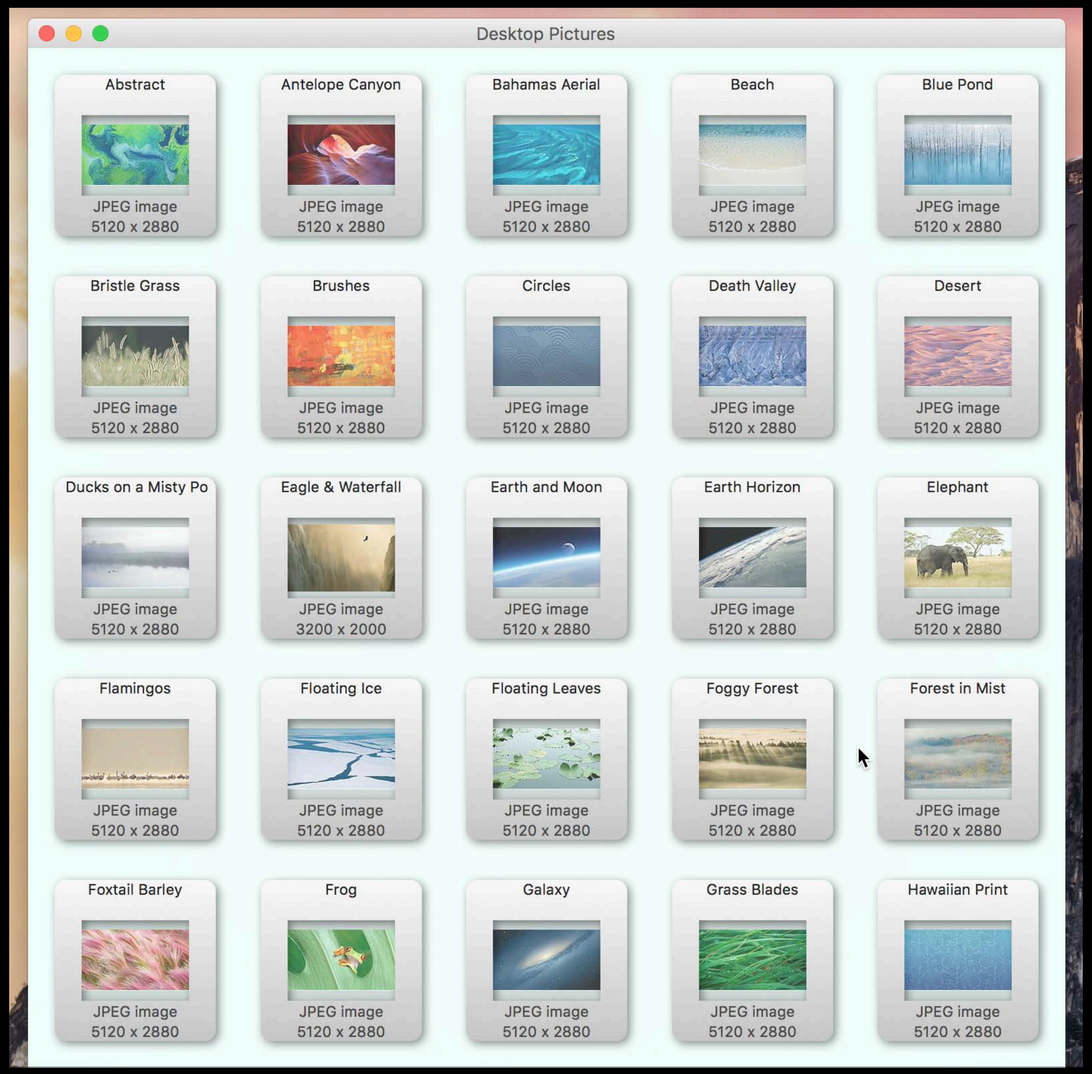
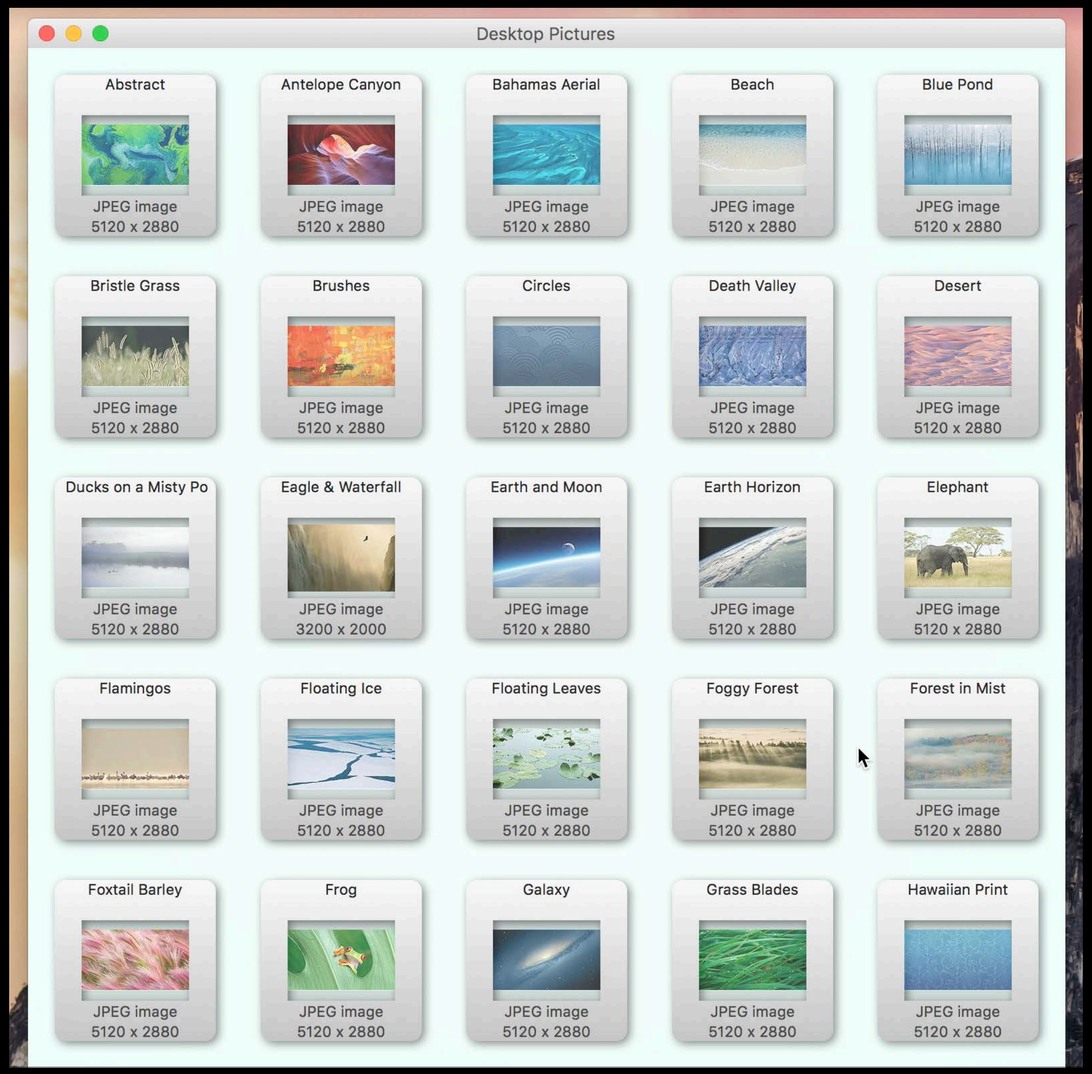
Handling Drag and Drop



Handling Drag and Drop



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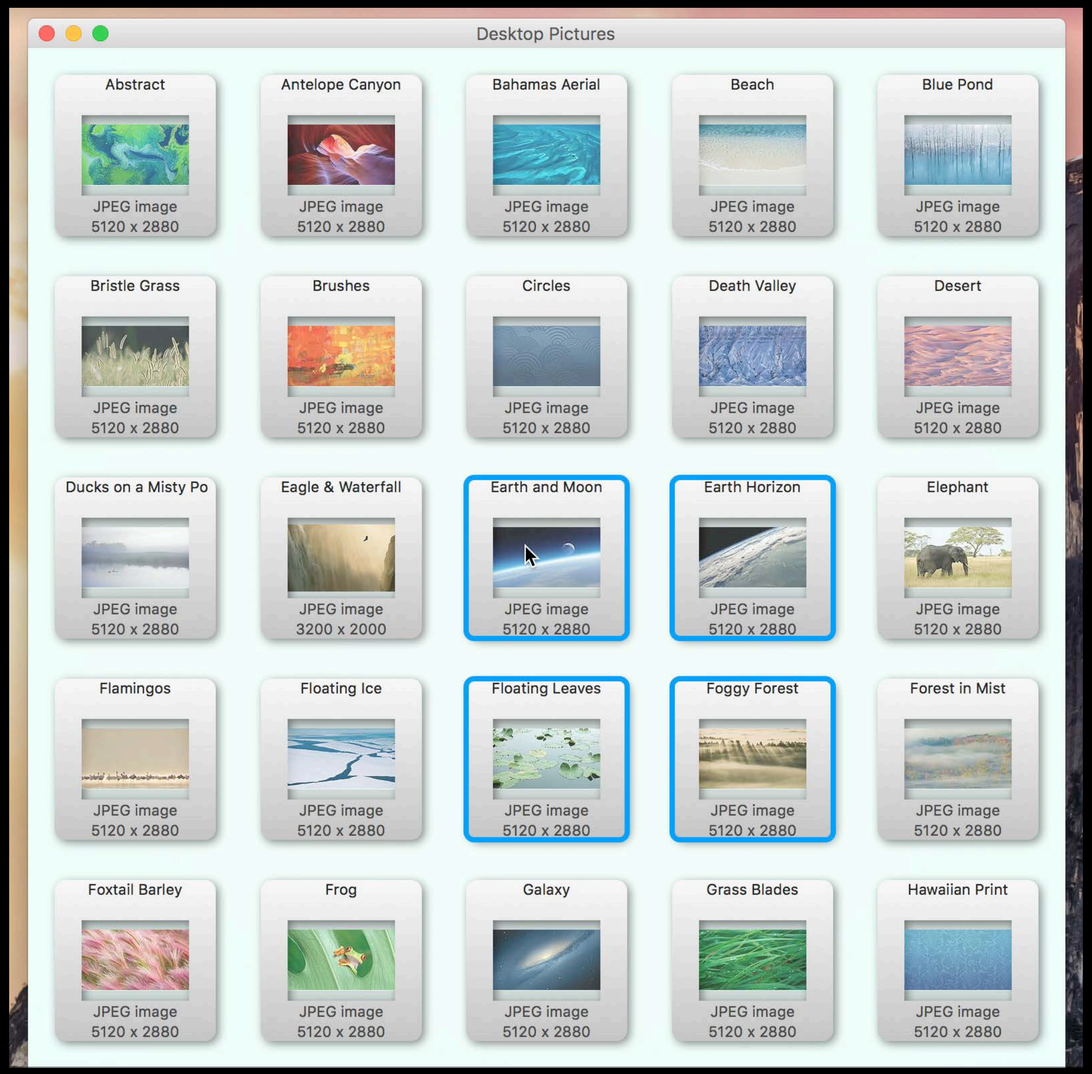

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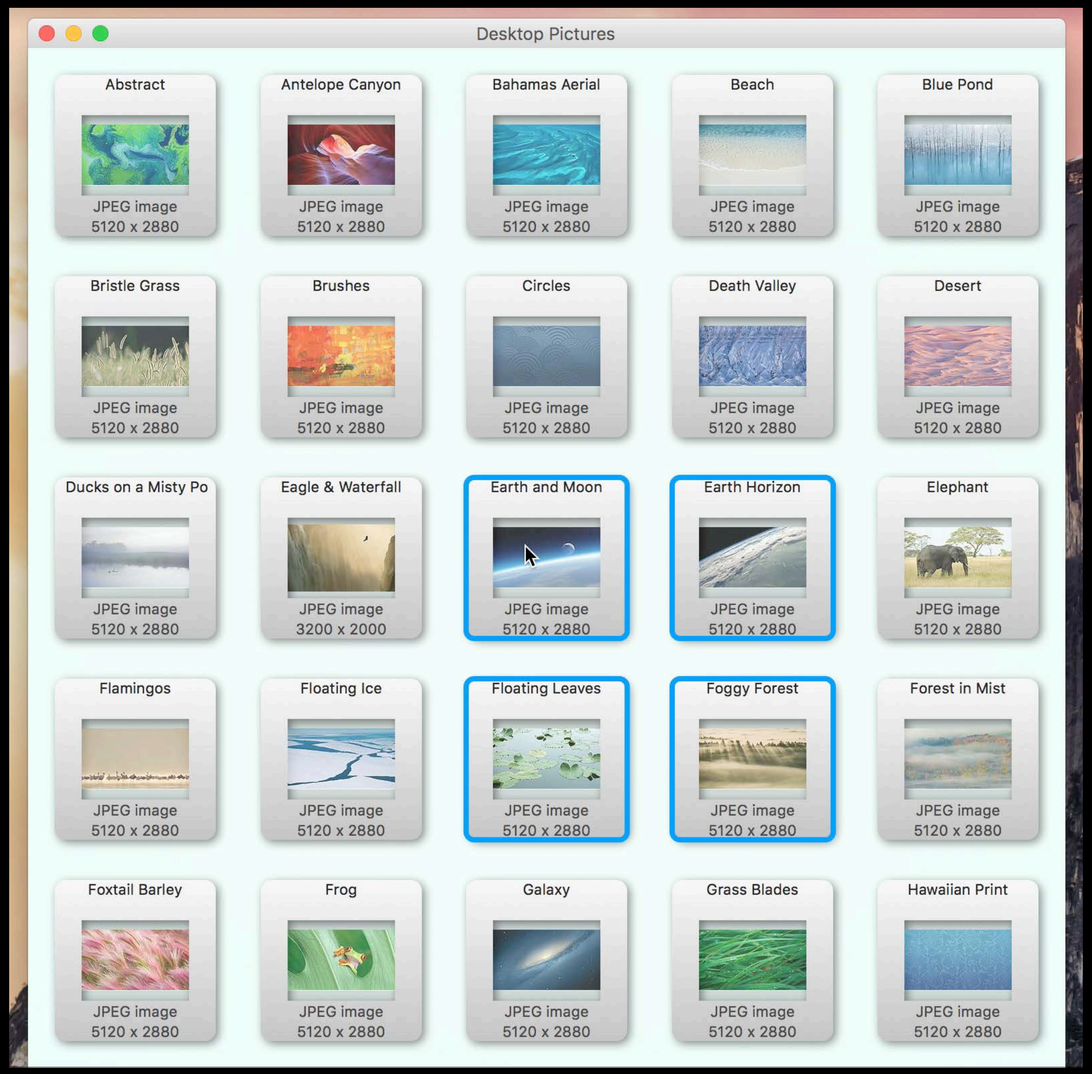

Handling Drag and Drop

NSCollectionView's `delegate` implements Drag-and-Drop response

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Similar to NSOutlineView's API (c.f., "DragAndDropOutlineView")

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- Put items on pasteboard when requested

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Dragging Destination

Handling Drag and Drop

NSCollectionView's `delegate` implements Drag-and-Drop response

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Dragging Source

- Put items on pasteboard when requested

Dragging Destination

- Assess proposed drop objects, target position, and operation; optionally override

Handling Drag and Drop

NSCollectionView's `delegate` implements Drag-and-Drop response

Similar to NSOutlineView's API (c.f., "DragAndDropOutlineView")

Dragging Source

- Put items on pasteboard when requested

Dragging Destination

- Assess proposed drop objects, target position, and operation; optionally override
- Implement drop acceptance

Drag-and-Drop Requirements

Drag-and-Drop Requirements

```
registerForDraggedTypes(_:)
```

Drag-and-Drop Requirements

```
registerForDraggedTypes(_:)
setDraggingSourceOperationMask(_:forLocal:)
```

Drag-and-Drop Requirements

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Implement the required delegate methods

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- Source
  - `collectionView(_:pasteboardWriterForItemAtIndexPath:)`, or

Drag-and-Drop Requirements

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- Source
  - `collectionView(_:pasteboardWriterForItemAtIndexPath:)`, or
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  - `collectionView(_:pasteboardWriterForItemAtIndexPath:)`, or
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- Destination

Drag-and-Drop Requirements

`registerForDraggedTypes(_:)`

`setDraggingSourceOperationMask(_:forLocal:)`

Implement the required delegate methods

- Source
  - `collectionView(_:pasteboardWriterForItemAtIndexPath:)`, or
  - `collectionView(_:writeItemsAtIndexPaths:toPasteboard:)`
- Destination
  - `collectionView(_:validateDrop:proposedIndexPath:dropOperation:)`

Drag-and-Drop Requirements

`registerForDraggedTypes(_:)`

`setDraggingSourceOperationMask(_:forLocal:)`

Implement the required delegate methods

- Source
  - `collectionView(_:pasteboardWriterForItemAtIndexPath:)`, or
  - `collectionView(_:writeItemsAtIndexPaths:toPasteboard:)`
- Destination
  - `collectionView(_:validateDrop:proposedIndexPath:dropOperation:)`
  - `collectionView(_:acceptDrop:indexPath:dropOperation:)`

Drag-and-Drop Tips

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It’s worth handling drag within your CollectionView specially

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This lets you *move* items, rather than *remove* and re*insert*

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It's worth handling drag within your CollectionView specially

This lets you *move* items, rather than *remove* and re*insert*

Stash indexPaths being dragged to know drag came from same CollectionView

```
collectionView(_:draggingSession:willBeginAtPoint:forItemsAtIndexPaths:)
```

Roadmap

Make items appear

Group items into sections

Update when model changes

Handle selection and highlighting

Handle Drag and Drop

Customize Layout

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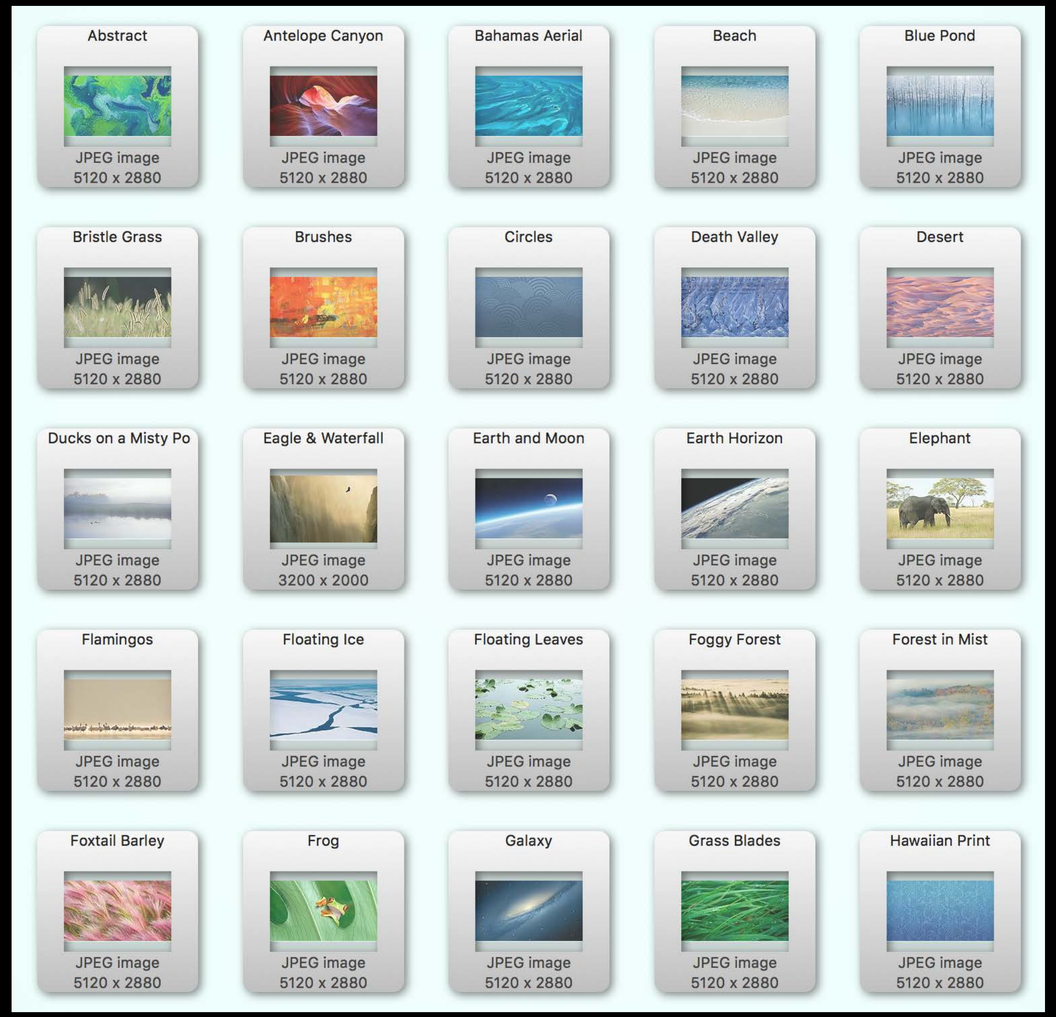
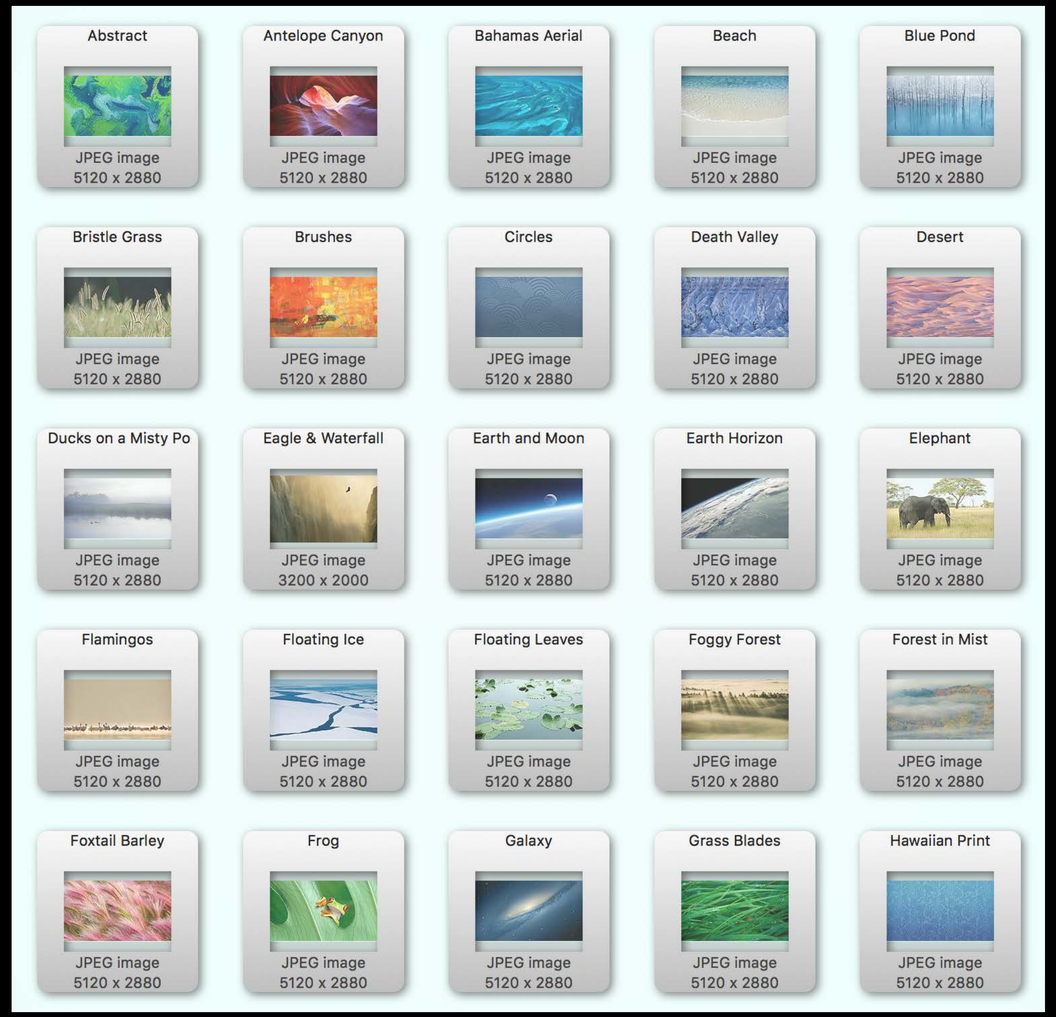
Customizing Layout



Customizing Layout

Adjust an existing layout



Customizing Layout

Adjust an existing layout

Implement a completely new layout

Adjust an Existing Layout

Adjust an Existing Layout

Subclass `NSCollectionViewFlowLayout` to adjust item positioning

Adjust an Existing Layout

Subclass `NSCollectionViewFlowLayout` to adjust item positioning

Override

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- `func layoutAttributesForElementsInRect(rect: NSRect) -> [NSCollectionViewLayoutAttributes]`

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Adjust an Existing Layout

Subclass `NSCollectionViewFlowLayout` to adjust item positioning

Override

- `func layoutAttributesForElementsInRect(rect: NSRect) -> [NSCollectionViewLayoutAttributes]`
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- `func invalidateLayoutWithContext(context: NSCollectionViewLayoutInvalidationContext)`

Adjust an Existing Layout

Subclass `NSCollectionViewFlowLayout` to adjust item positioning

Override

- `func layoutAttributesForElementsInRect(rect: NSRect) -> [NSCollectionViewLayoutAttributes]`
- `func layoutAttributesForItemAtIndexPath(indexPath: NSIndexPath) -> NSCollectionViewLayoutAttributes?`
- `func invalidateLayoutWithContext(context: NSCollectionViewLayoutInvalidationContext)`

Examine and adjust super-proposed item frames

Completely Custom Layouts

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- `func collectionViewContentSize() -> NSSize`

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Can subclass `NSCollectionViewLayout` directly

Implement same methods as for customizing Flow, plus

- `func collectionViewContentSize() -> NSSize`
- `func shouldInvalidateLayoutForBoundsChange(newBounds: NSRect) -> Bool`

Hit-Testing for a Drop Target

NEW

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NEW

```
func layoutAttributesForDropTargetAtPoint(pointInCollectionView: NSPoint)
                                                -> NSCollectionViewLayoutAttributes?
```

Hit-Testing for a Drop Target

NEW

```
func layoutAttributesForDropTargetAtPoint(pointInCollectionView: NSPoint)
                                                -> NSCollectionViewLayoutAttributes?
```

Target is an item

Hit-Testing for a Drop Target

NEW

```
func layoutAttributesForDropTargetAtPoint(pointInCollectionView: NSPoint)
                                                -> NSCollectionViewLayoutAttributes?
```

Target is an item

```
attributes.representedElementCategory = .Item
```

Hit-Testing for a Drop Target

NEW

```
func layoutAttributesForDropTargetAtPoint(pointInCollectionView: NSPoint)
                                                -> NSCollectionViewLayoutAttributes?
```

Target is an item

```
attributes.representedElementCategory = .Item

attributes.indexPath = /* NSIndexPath of the item we’re dropping onto */
```

Hit-Testing for a Drop Target

NEW

```
func layoutAttributesForDropTargetAtPoint(pointInCollectionView: NSPoint)
                                                -> NSCollectionViewLayoutAttributes?
```

Target is an item

```
attributes.representedElementCategory = .Item
attributes.indexPath = /* NSIndexPath of the item we're dropping onto */
attributes.frame = /* NSRect item frame */
```

Hit-Testing for a Drop Target

NEW

```
func layoutAttributesForDropTargetAtPoint(pointInCollectionView: NSPoint)
                                                -> NSCollectionViewLayoutAttributes?
```

Target is an item

```
attributes.representedElementCategory = .Item
attributes.indexPath = /* NSIndexPath of the item we're dropping onto */
attributes.frame = /* NSRect item frame */
```

Target is a gap between items

```

```

Hit-Testing for a Drop Target

NEW

```
func layoutAttributesForDropTargetAtPoint(pointInCollectionView: NSPoint)
                                                -> NSCollectionViewLayoutAttributes?
```

Target is an item

```
attributes.representedElementCategory = .Item
attributes.indexPath = /* NSIndexPath of the item we're dropping onto */
attributes.frame = /* NSRect item frame */
```

Target is a gap between items

```
attributes.representedElementCategory = .InterItemGap
```

Hit-Testing for a Drop Target

NEW

```
func layoutAttributesForDropTargetAtPoint(pointInCollectionView: NSPoint)
                                                -> NSCollectionViewLayoutAttributes?
```

Target is an item

```
attributes.representedElementCategory = .Item
attributes.indexPath = /* NSIndexPath of the item we're dropping onto */
attributes.frame = /* NSRect item frame */
```

Target is a gap between items

```
attributes.representedElementCategory = .InterItemGap
attributes.indexPath = /* NSIndexPath of the item we're dropping before */
```

Hit-Testing for a Drop Target

NEW

```
func layoutAttributesForDropTargetAtPoint(pointInCollectionView: NSPoint)
                                                -> NSCollectionViewLayoutAttributes?
```

Target is an item

```
attributes.representedElementCategory = .Item
attributes.indexPath = /* NSIndexPath of the item we're dropping onto */
attributes.frame = /* NSRect item frame */
```

Target is a gap between items

```
attributes.representedElementCategory = .InterItemGap
attributes.indexPath = /* NSIndexPath of the item we're dropping before */
attributes.frame = /* NSRect gap frame */
```

Finding Inter-Item Gaps by NSIndexPath

NEW

Finding Inter-Item Gaps by NSIndexPath

NEW

```
func layoutAttributesForInterItemGapBeforeIndexPath(indexPath: NSIndexPath)
                                                    -> NSCollectionViewLayoutAttributes?
```

Finding Inter-Item Gaps by NSIndexPath

NEW

```
func layoutAttributesForInterItemGapBeforeIndexPath(indexPath: NSIndexPath)
                                                    -> NSCollectionViewLayoutAttributes?
```

Result

Finding Inter-Item Gaps by NSIndexPath

NEW

```
func layoutAttributesForInterItemGapBeforeIndexPath(indexPath: NSIndexPath)
                                                    -> NSCollectionViewLayoutAttributes?
```

Result

```
attributes.representedElementCategory = .InterItemGap
```

Finding Inter-Item Gaps by NSIndexPath

NEW

```
func layoutAttributesForInterItemGapBeforeIndexPath(indexPath: NSIndexPath)
                                                    -> NSCollectionViewLayoutAttributes?
```

Result

```
attributes.representedElementCategory = .InterItemGap

attributes.representedElementKind = .InterItemGapIndicator
```

Finding Inter-Item Gaps by NSIndexPath

NEW

```
func layoutAttributesForInterItemGapBeforeIndexPath(indexPath: NSIndexPath)
                                                    -> NSCollectionViewLayoutAttributes?
```

Result

```
attributes.representedElementCategory = .InterItemGap
attributes.representedElementKind = .InterItemGapIndicator
attributes.indexPath = /* NSIndexPath of the item gap comes before */
```

Finding Inter-Item Gaps by NSIndexPath

NEW

```
func layoutAttributesForInterItemGapBeforeIndexPath(indexPath: NSIndexPath)
                                                    -> NSCollectionViewLayoutAttributes?
```

Result

```
attributes.representedElementCategory = .InterItemGap
attributes.representedElementKind = .InterItemGapIndicator
attributes.indexPath = /* NSIndexPath of the item gap comes before */
attributes.frame = /* NSRect gap frame */
```

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Conclusion

New NSCollectionView is Ready!

…to handle your toughest projects!

Coming Up

Need help or guidance? Come to our lab!

Cocoa and NSCollectionView Lab	Frameworks Lab B	Friday 9:00AM

More Information

Documentation
http://developer.apple.com/library/mac

Technical Support
App Developer Forums
http://developer.apple.com/forums

General Inquiries
Paul Marcos, App Frameworks Evangelist
pmarcos@apple.com

Related Sessions

What's New in Cocoa	Presidio	Tuesday 1:30PM
Mysteries of Auto Layout, Part 1	Presidio	Thursday 11:00AM
Mysteries of Auto Layout, Part 2	Presidio	Thursday 1:30PM

WWDC15