Frameworks

#WWDC14

# What's New in Table and Collection Views

Session 226

Luke Hiesterman
UI Kit Engineer

Olivier Gutknecht
iOS Engineering Manager

# Agenda

# Agenda

Table view

# Agenda

Table view

- Dynamic Type adoption

# Agenda

Table view

- Dynamic Type adoption
- Self-sizing cells

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Table view

- Dynamic Type adoption
- Self-sizing cells

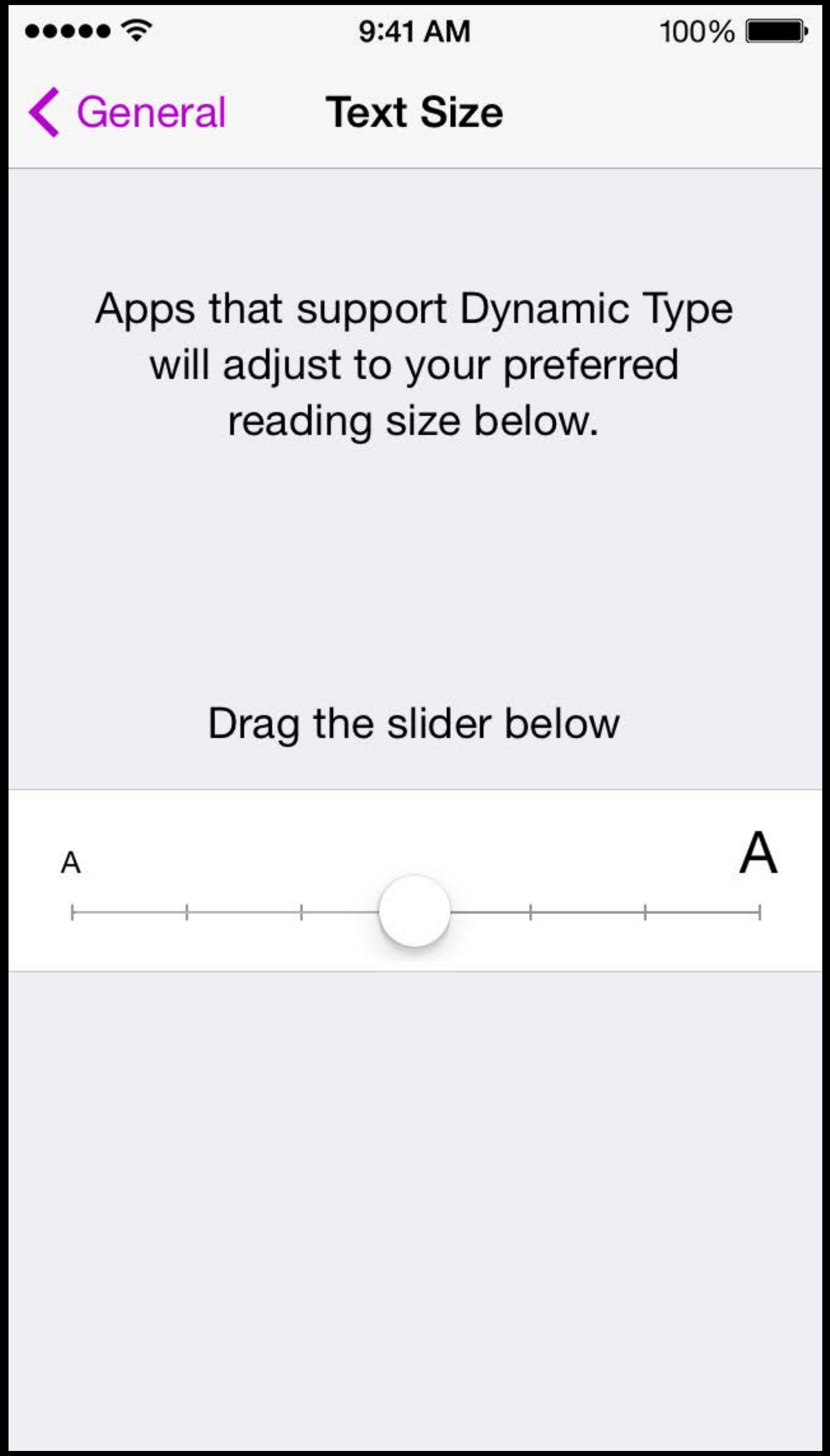
Collection view

- Self-sizing cells
- Smart invalidation

# Table View

Adopting dynamic type

# Dynamic Type



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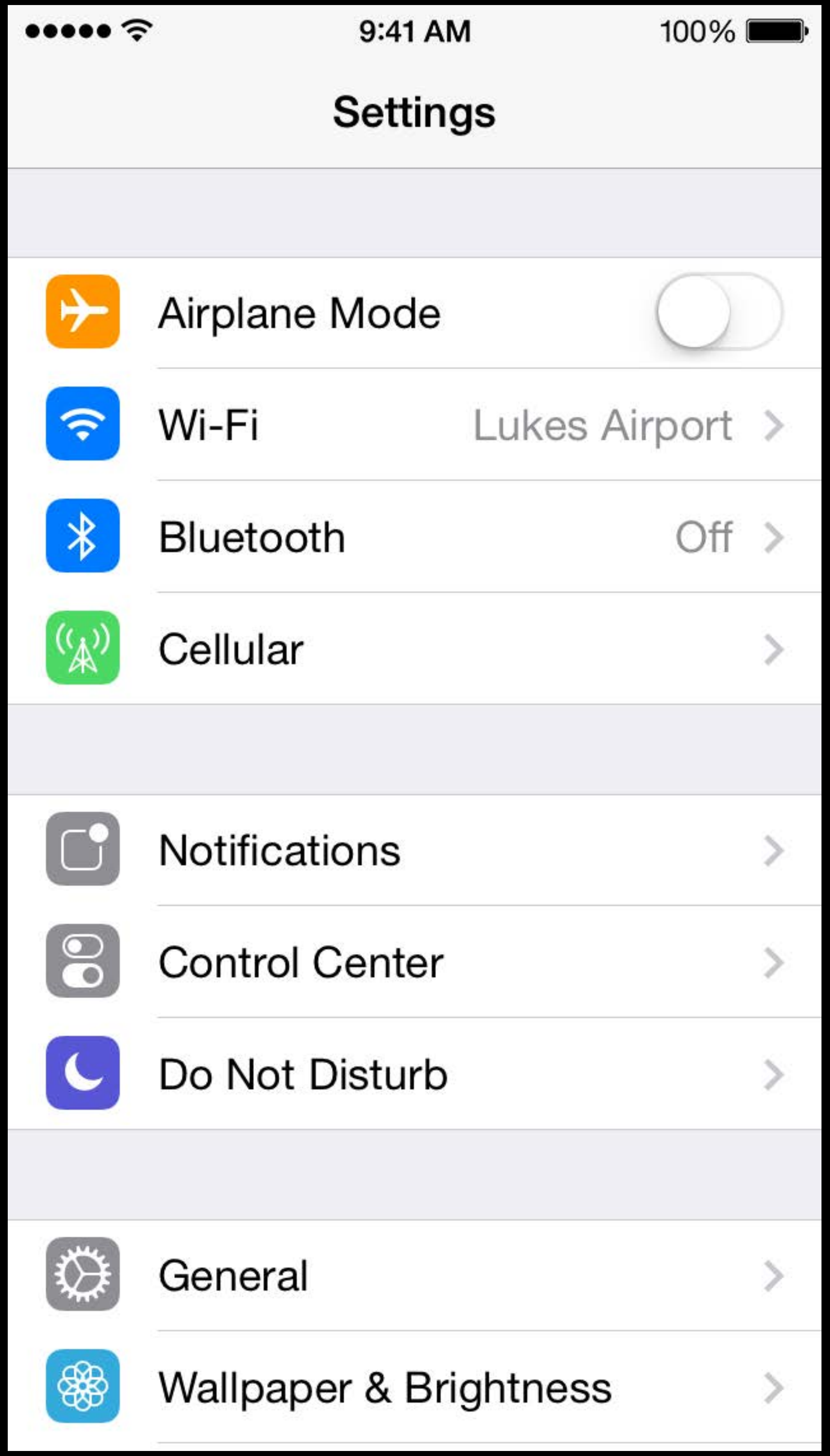
‹ General **Text Size**

Apps that support Dynamic Type will adjust to your preferred reading size below.

Drag the slider below



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**Settings**

Airplane Mode

Wi-Fi Lukes Airport ›

Bluetooth Off ›

Cellular ›

Notifications ›

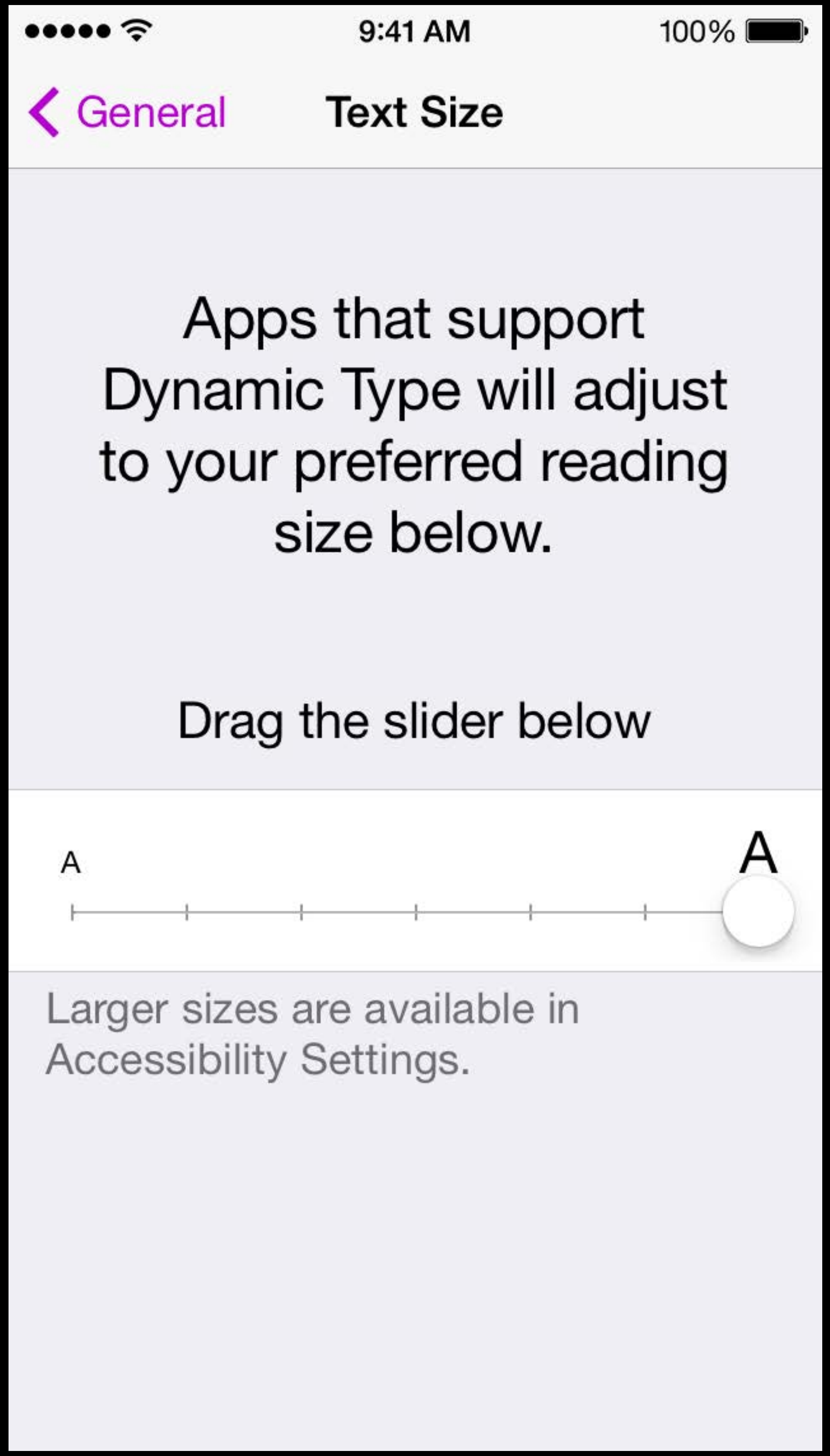
Control Center ›

Do Not Disturb ›

General ›

Wallpaper & Brightness ›

# Dynamic Type



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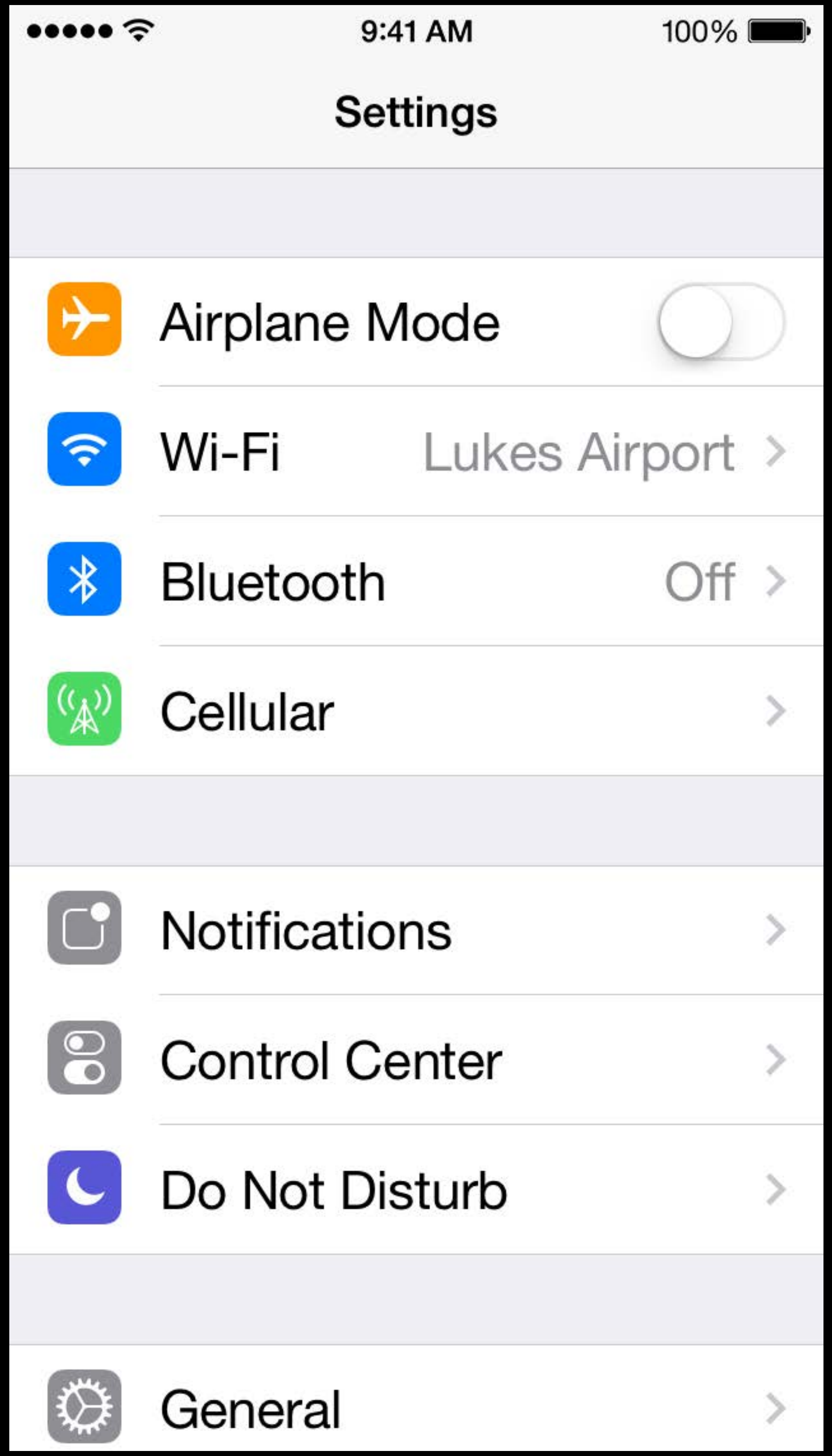
Larger sizes are available in Accessibility Settings.



9:41 AM 100%

Settings

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Cellular >

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General >

# Adopting Dynamic Type

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Comes free with built-in labels

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Comes free with built-in labels

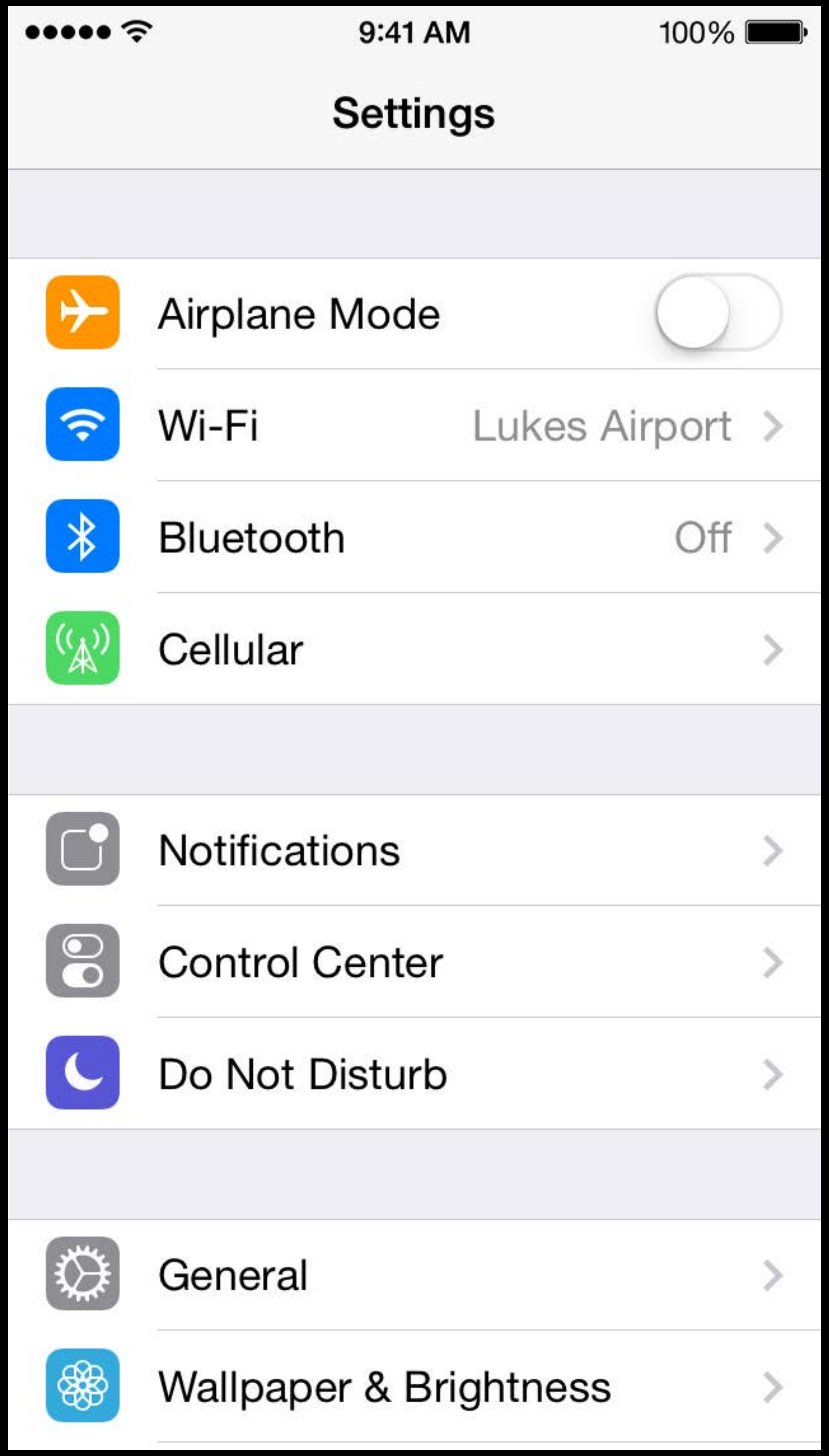
`+[UIFont preferredFontForTextStyle:]` for custom labels

# Dynamic Row Heights

Everything is dynamic

# Dynamic Row Heights

## Everything is dynamic



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# Dynamic Row Heights

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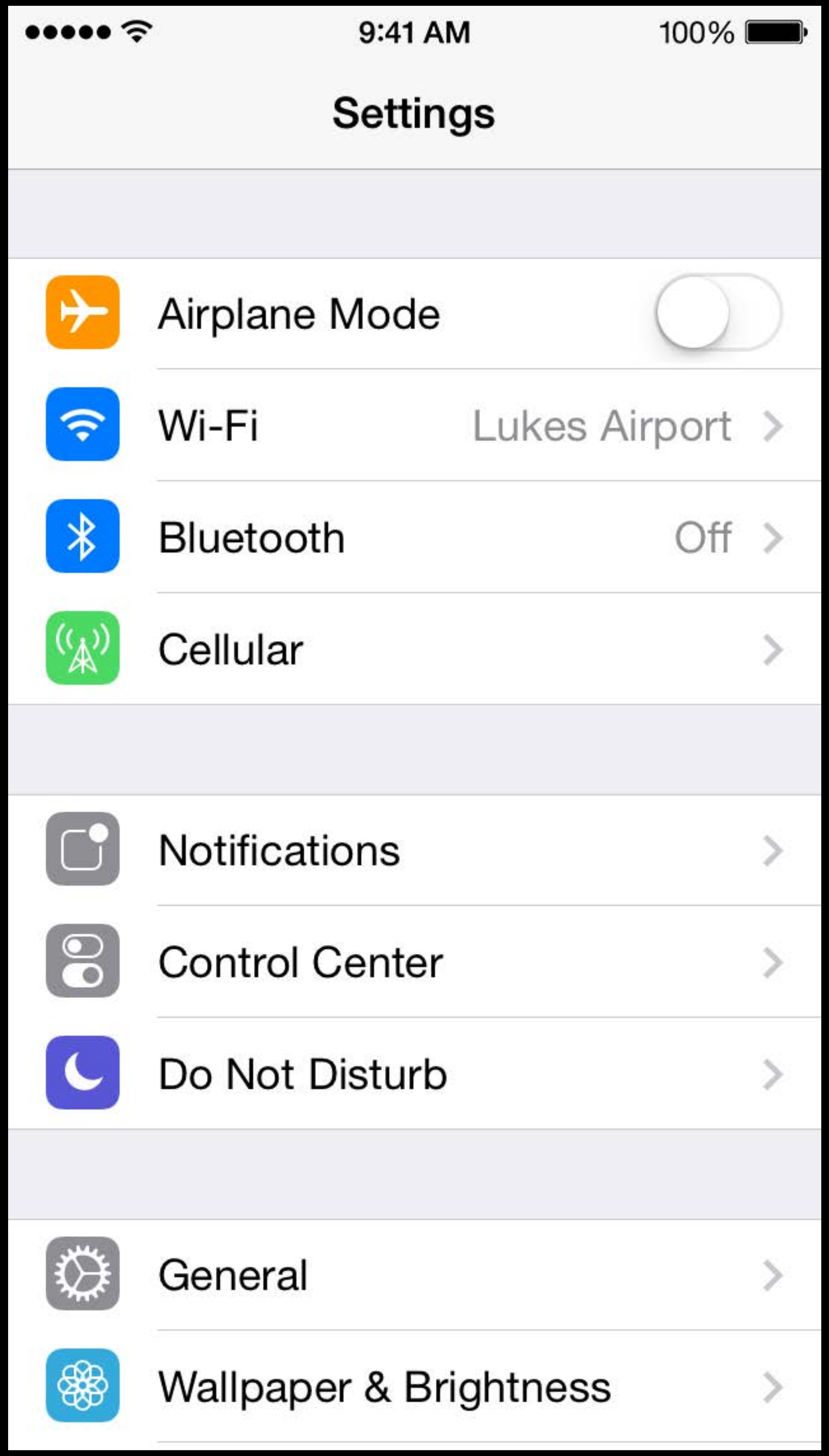

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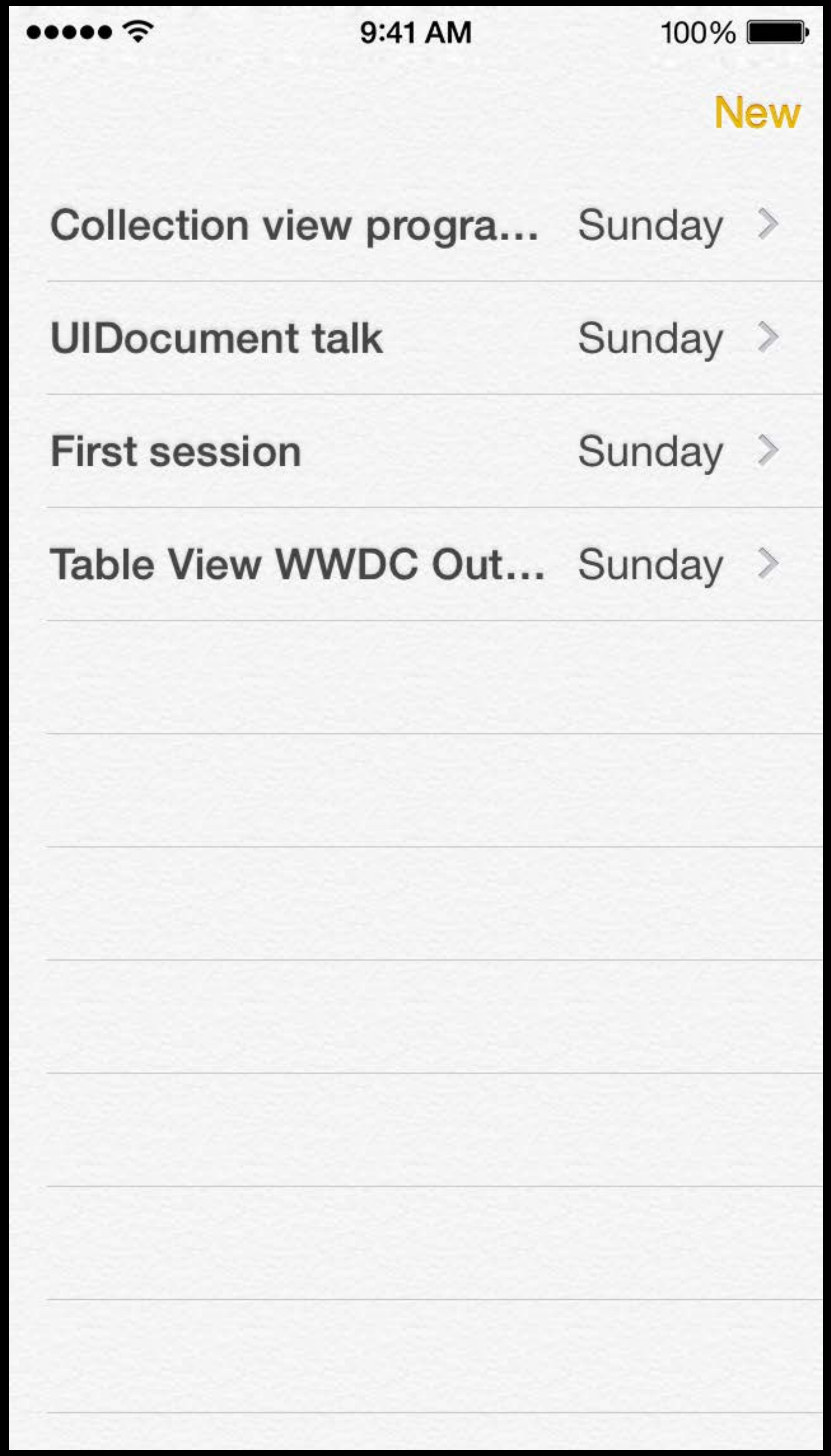

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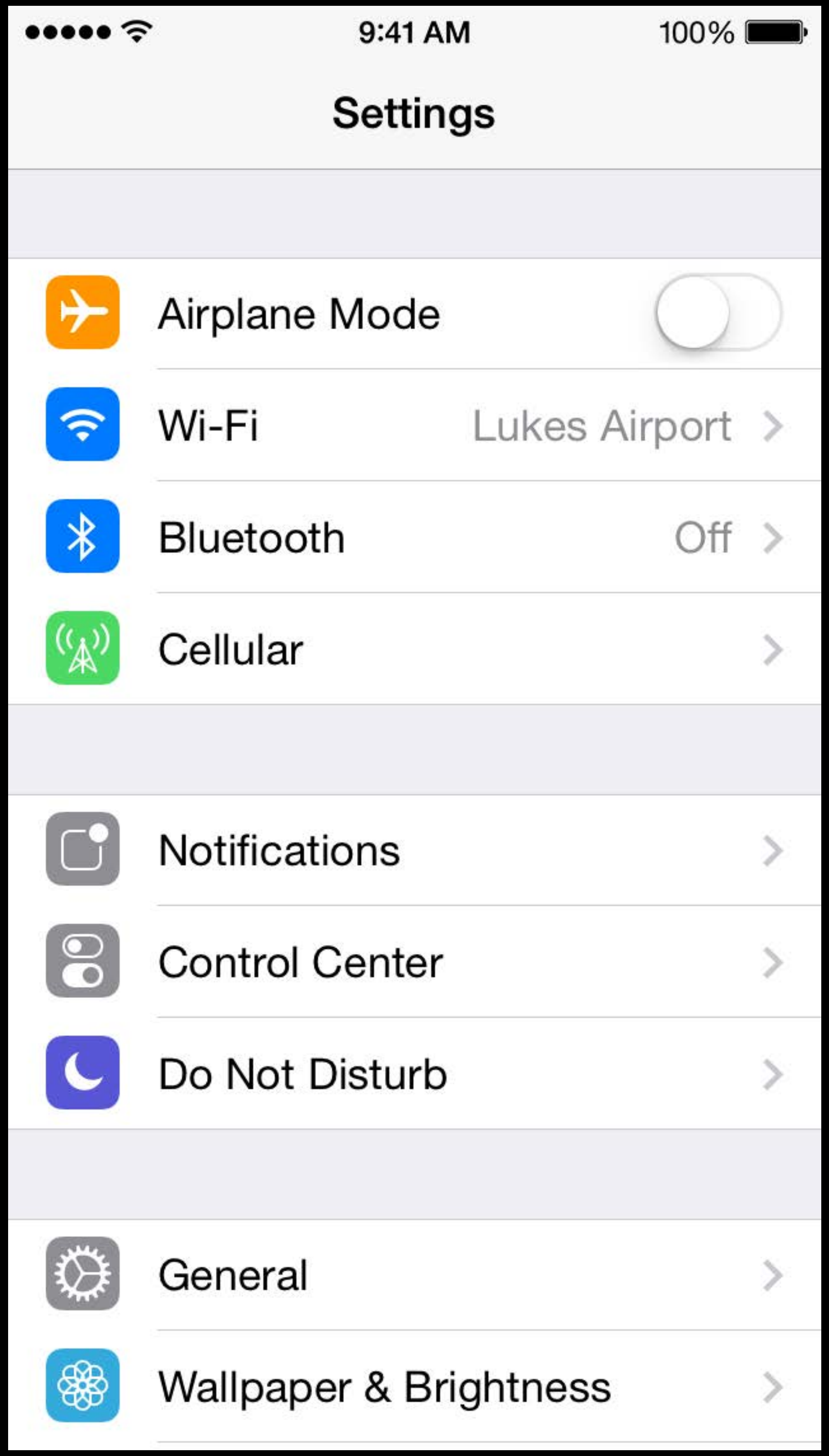
New

| | |
|---|---|
| Collection view progra... | Sunday > |
| UIDocument talk | Sunday > |
| First session | Sunday > |
| Table View WWDC Out... | Sunday > |

# Dynamic Row Heights

## Everything is dynamic



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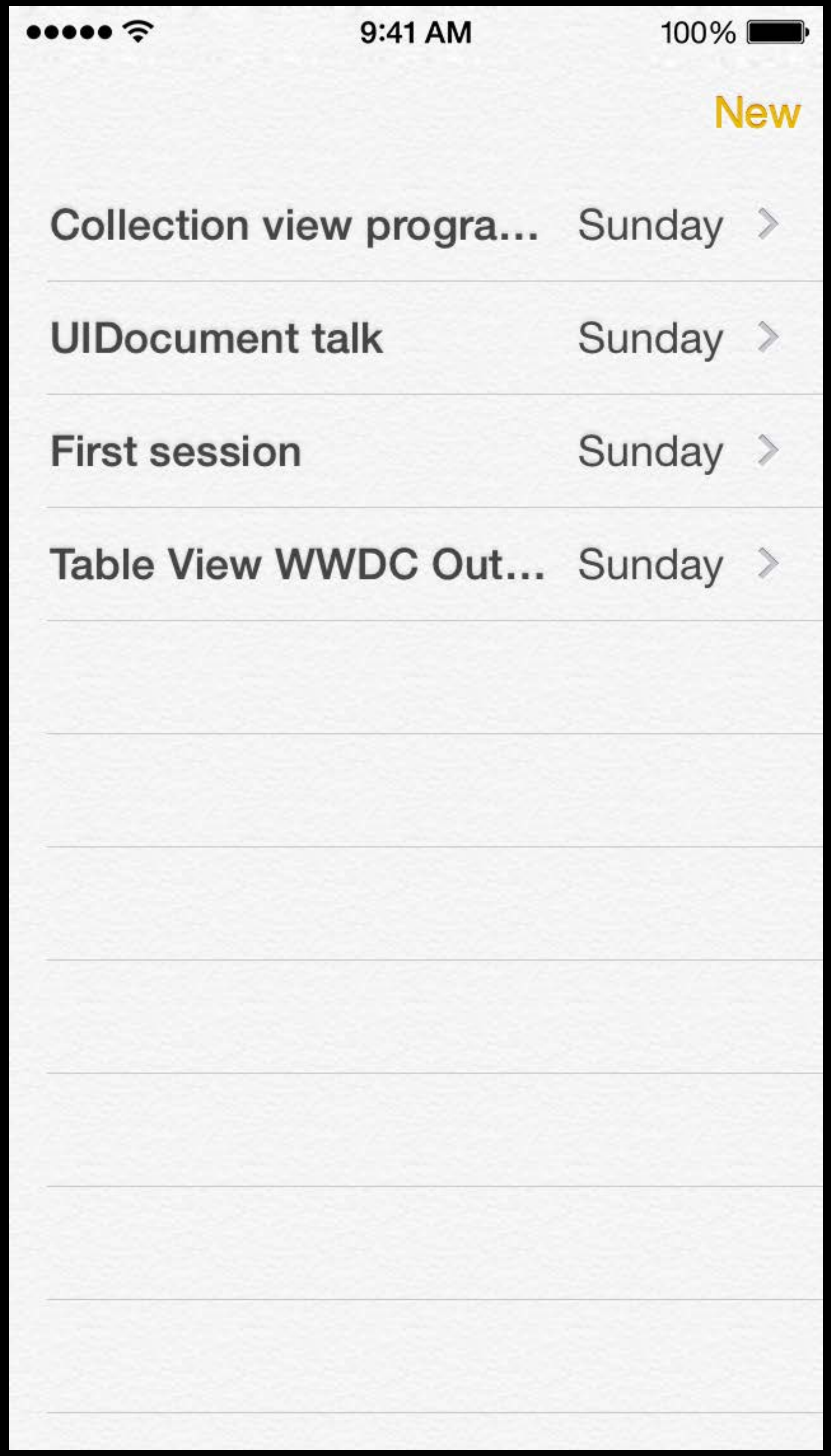

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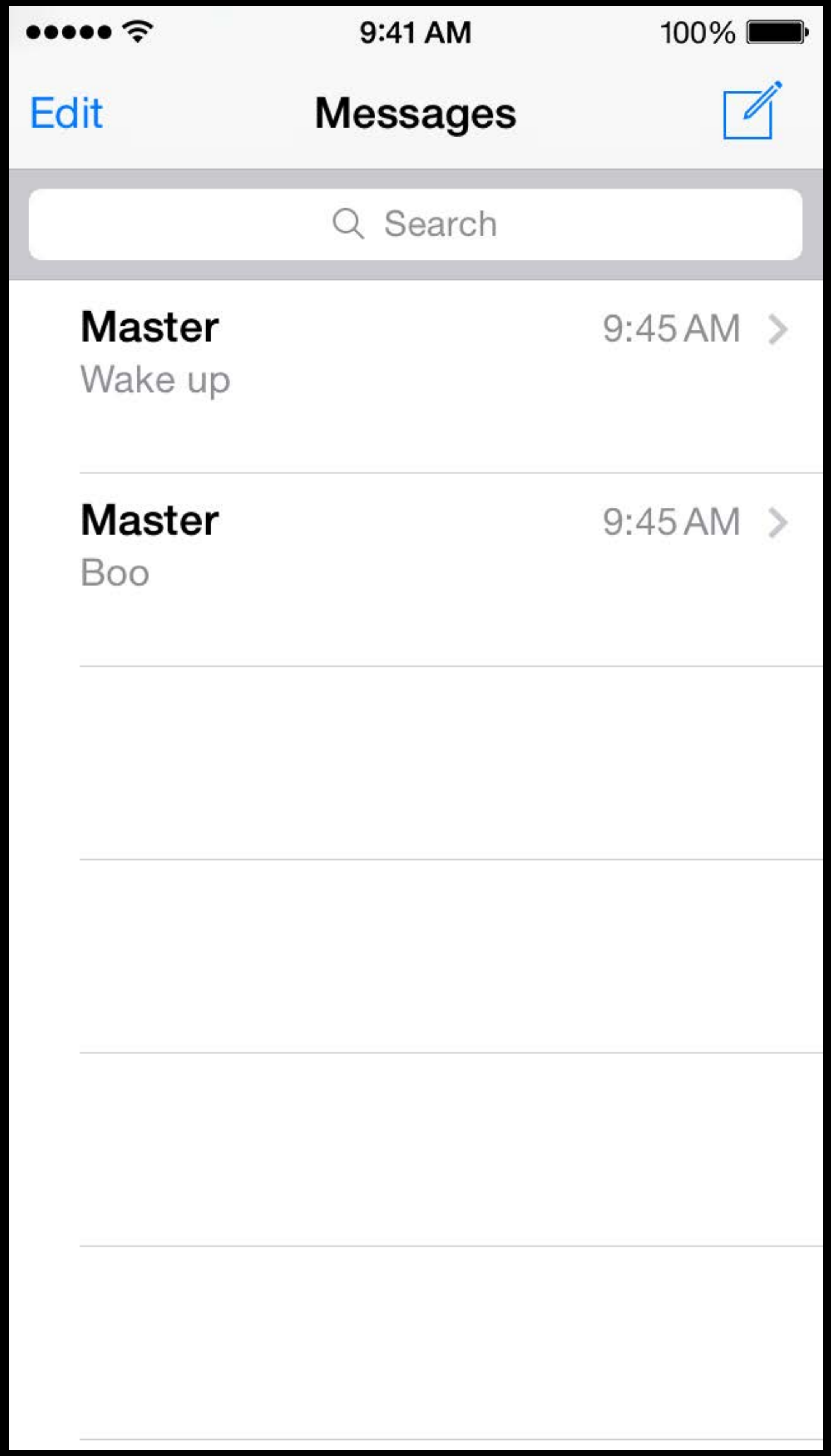


9:41 AM 100%

Edit Messages

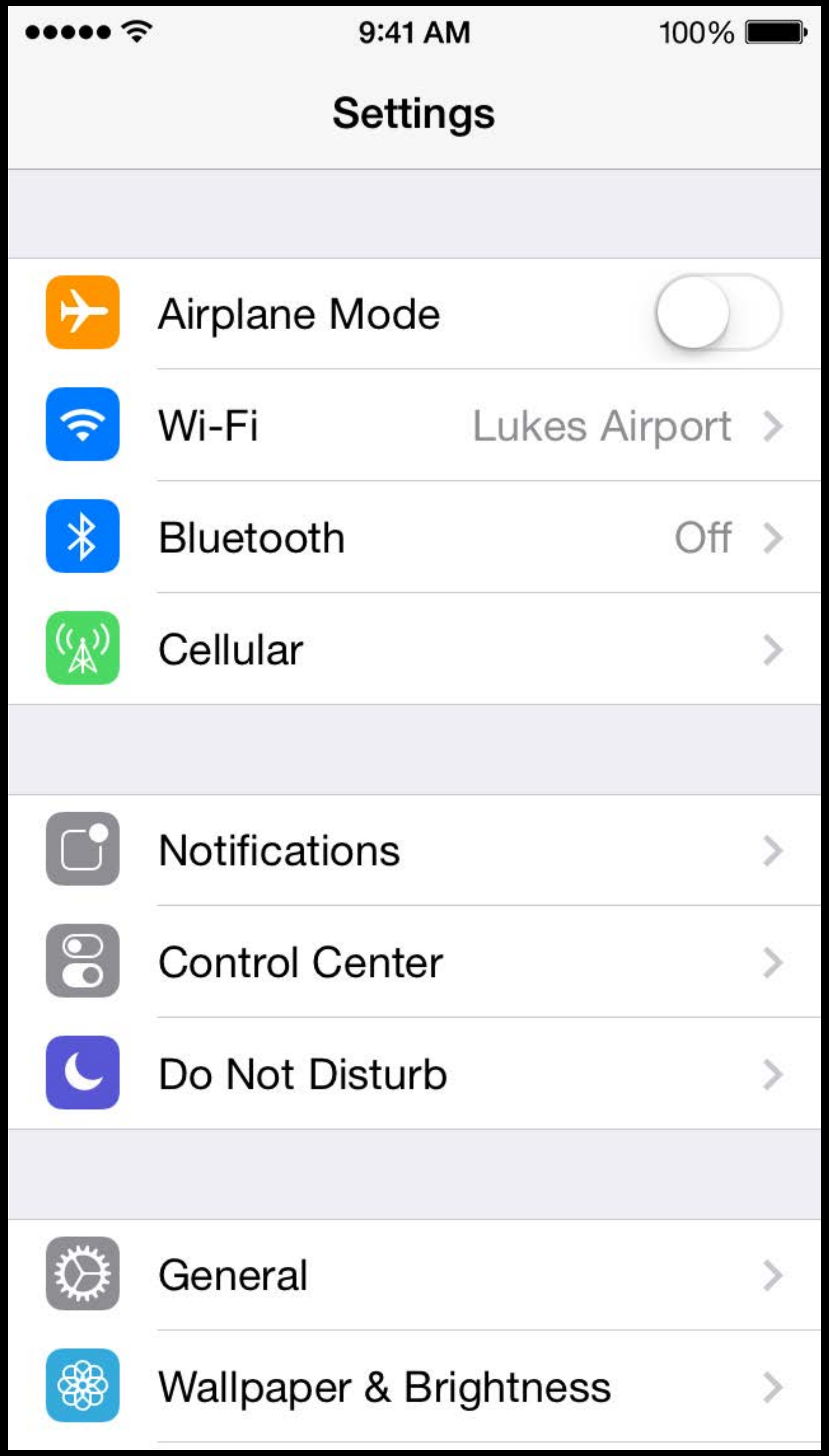
Search

**Master** 9:45 AM
Wake up

**Master** 9:45 AM
Boo

# Dynamic Row Heights

## Everything is dynamic



Settings

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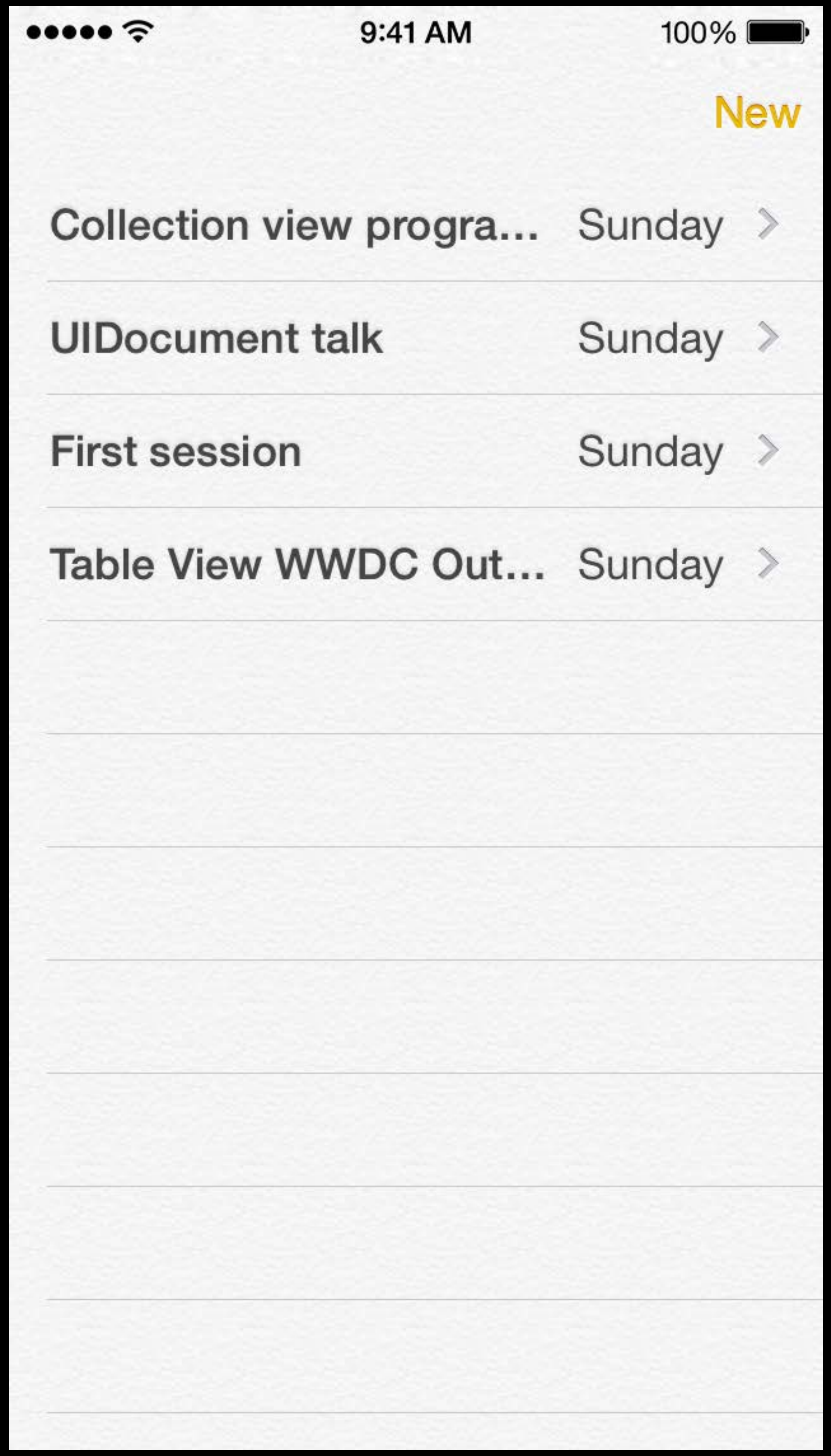
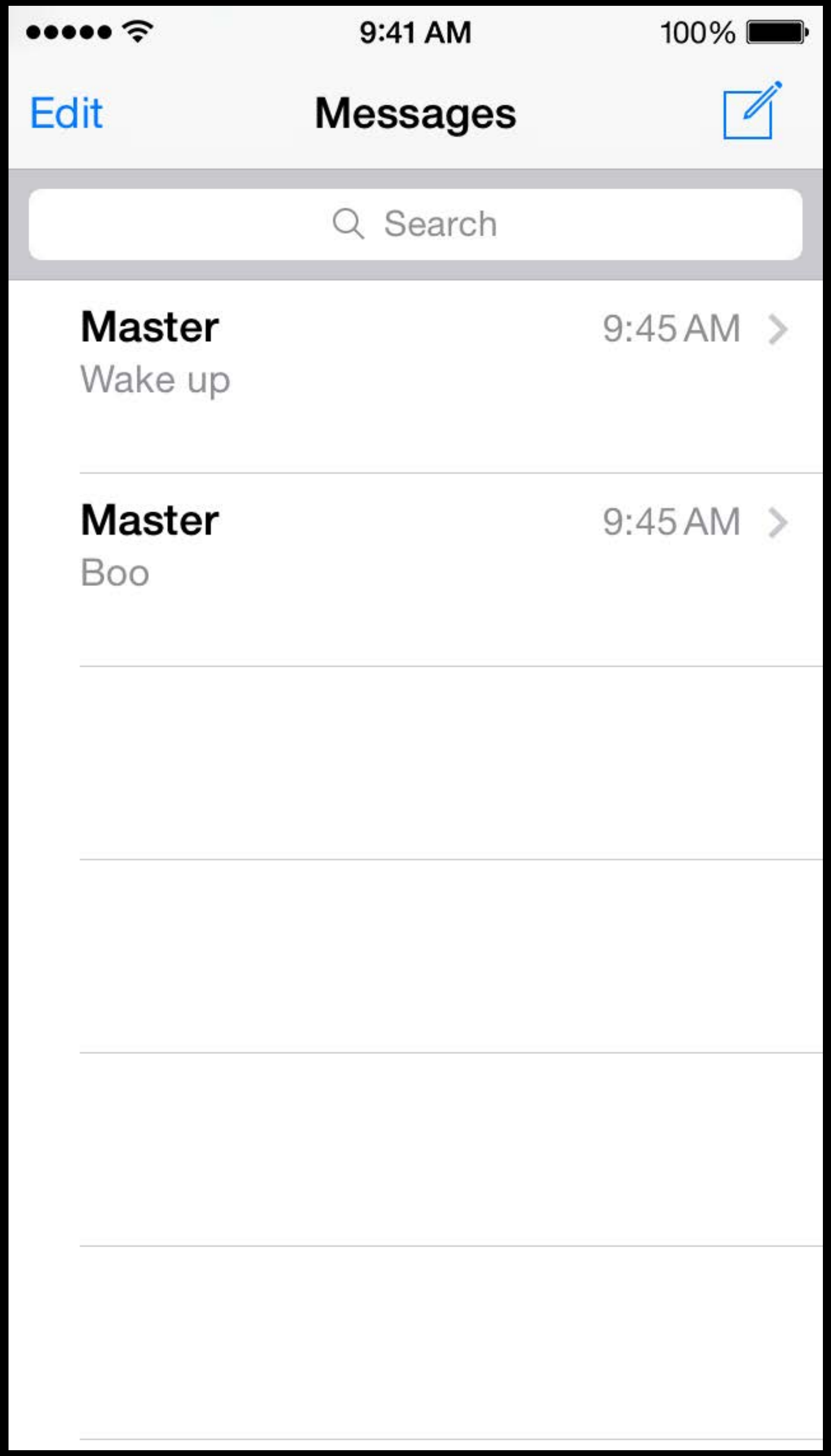


Collection view progra... Sunday

UIDocument talk Sunday

First session Sunday

Table View WWDC Out... Sunday



Messages

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Wake up

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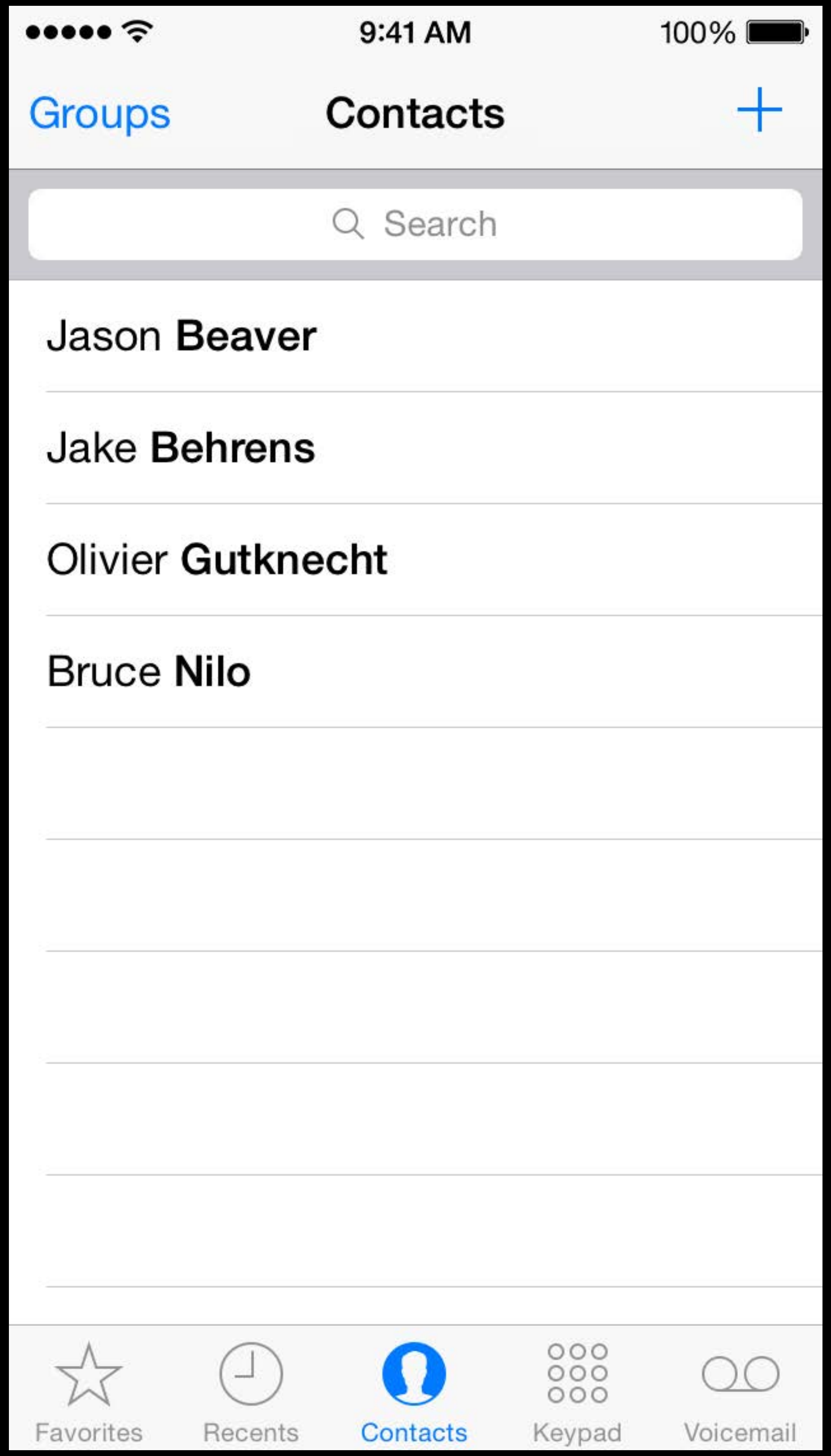


Contacts

Jason **Beaver**

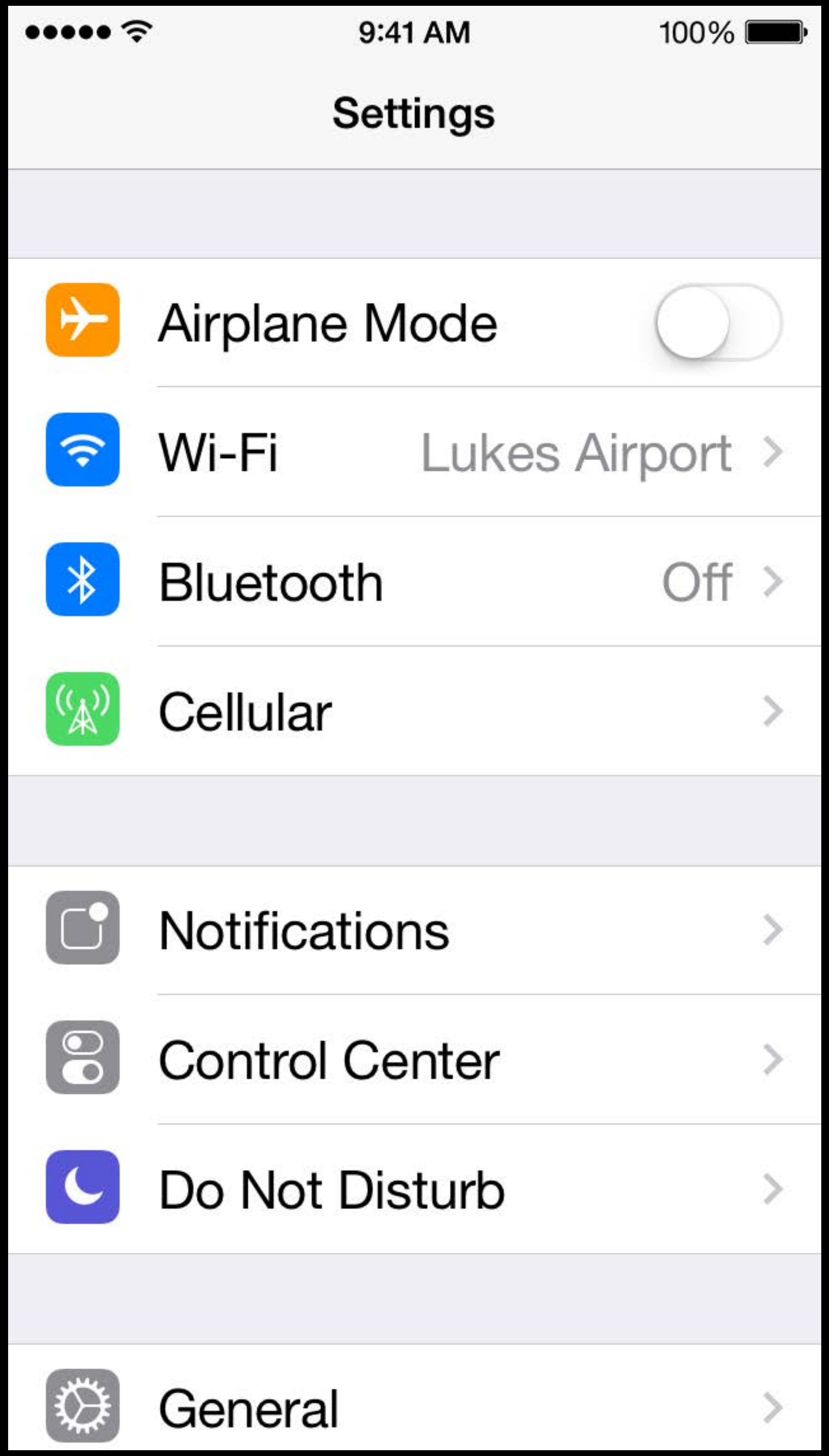
Jake **Behrens**

Olivier **Gutknecht**

Bruce **Nilo**

# Dynamic Row Heights

## Everything is dynamic



Settings

- Airplane Mode
- Wi-Fi Lukes Airport
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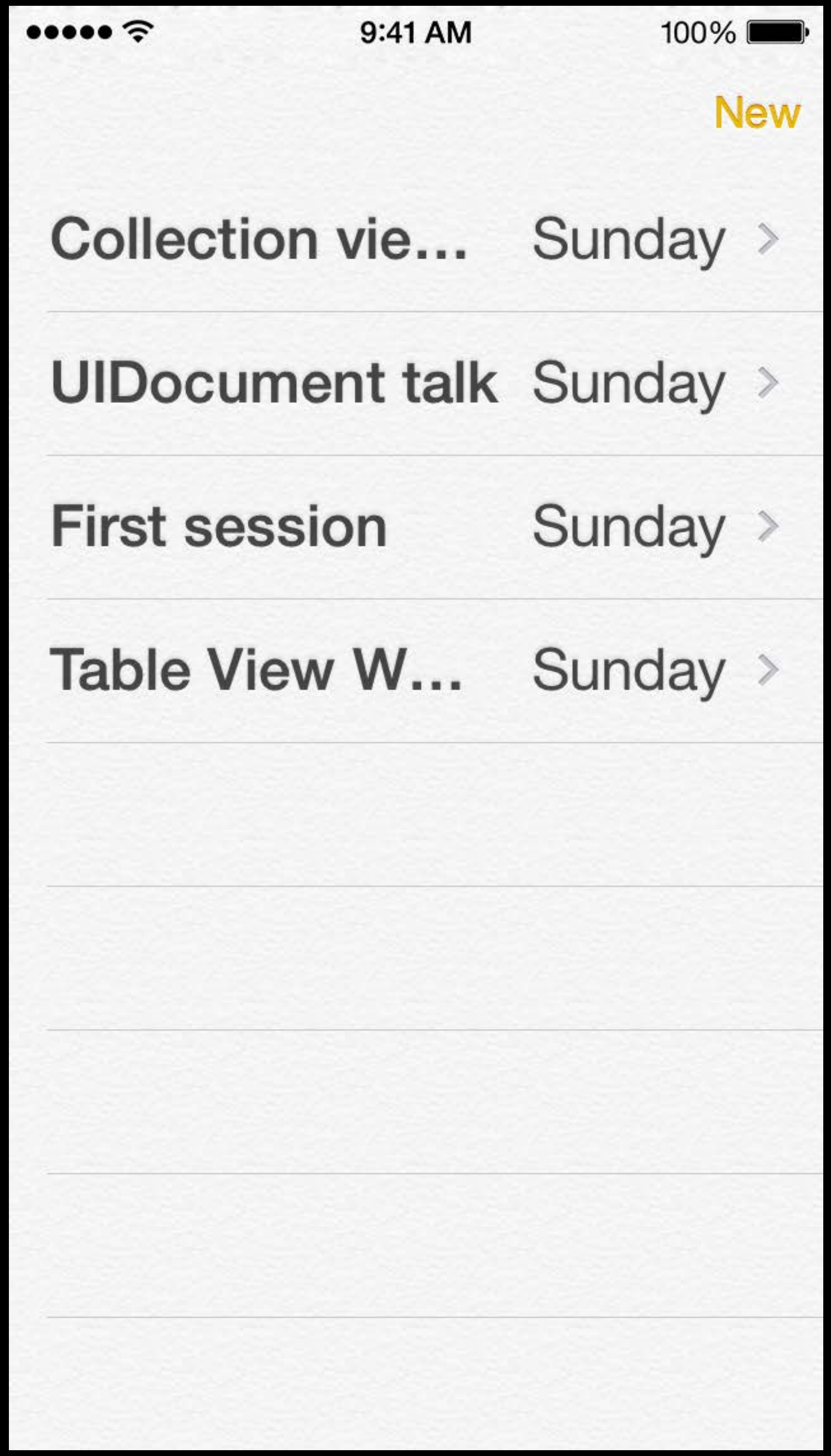
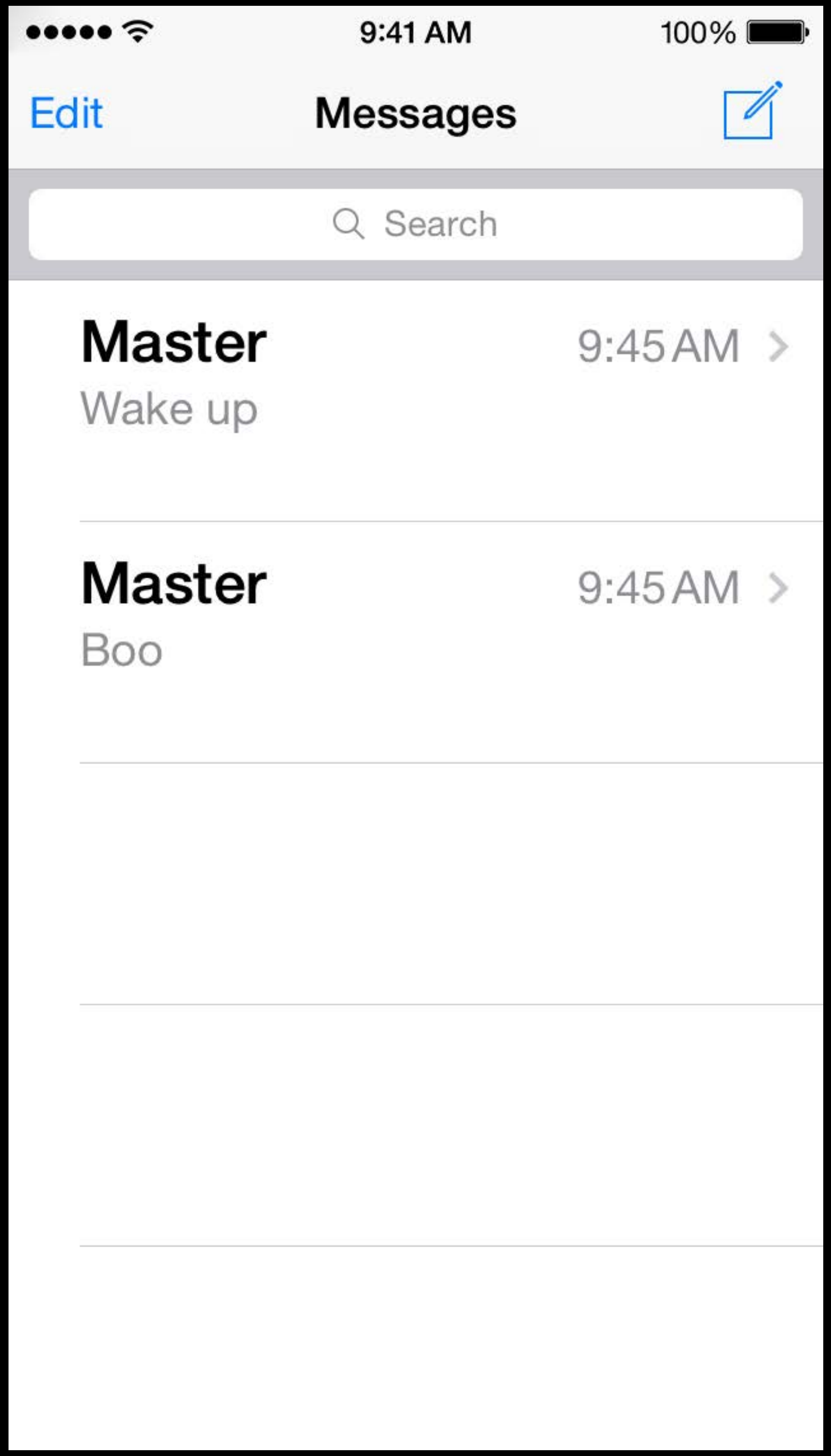


- Collection vie… Sunday
- UIDocument talk Sunday
- First session Sunday
- Table View W… Sunday



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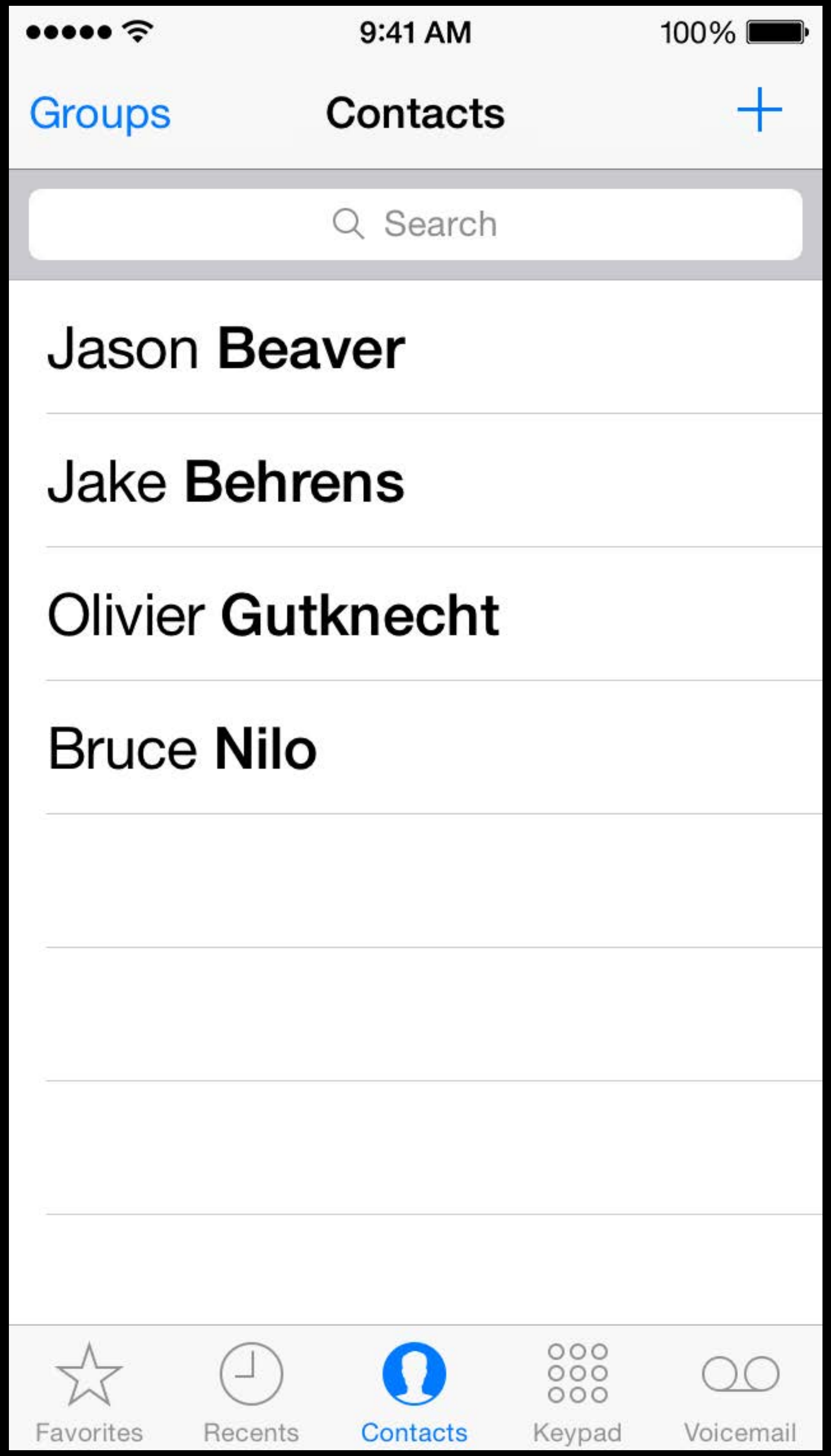

Contacts

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- Olivier **Gutknecht**
- Bruce **Nilo**

# Dynamic Row Heights

## Strategies

# Dynamic Row Heights

## Strategies

Property — `rowHeight`

# Dynamic Row Heights

## Strategies

Property—`rowHeight`

Delegate—`tableView:heightForRowAtIndexPath:`

# Dynamic Row Heights

## Strategies

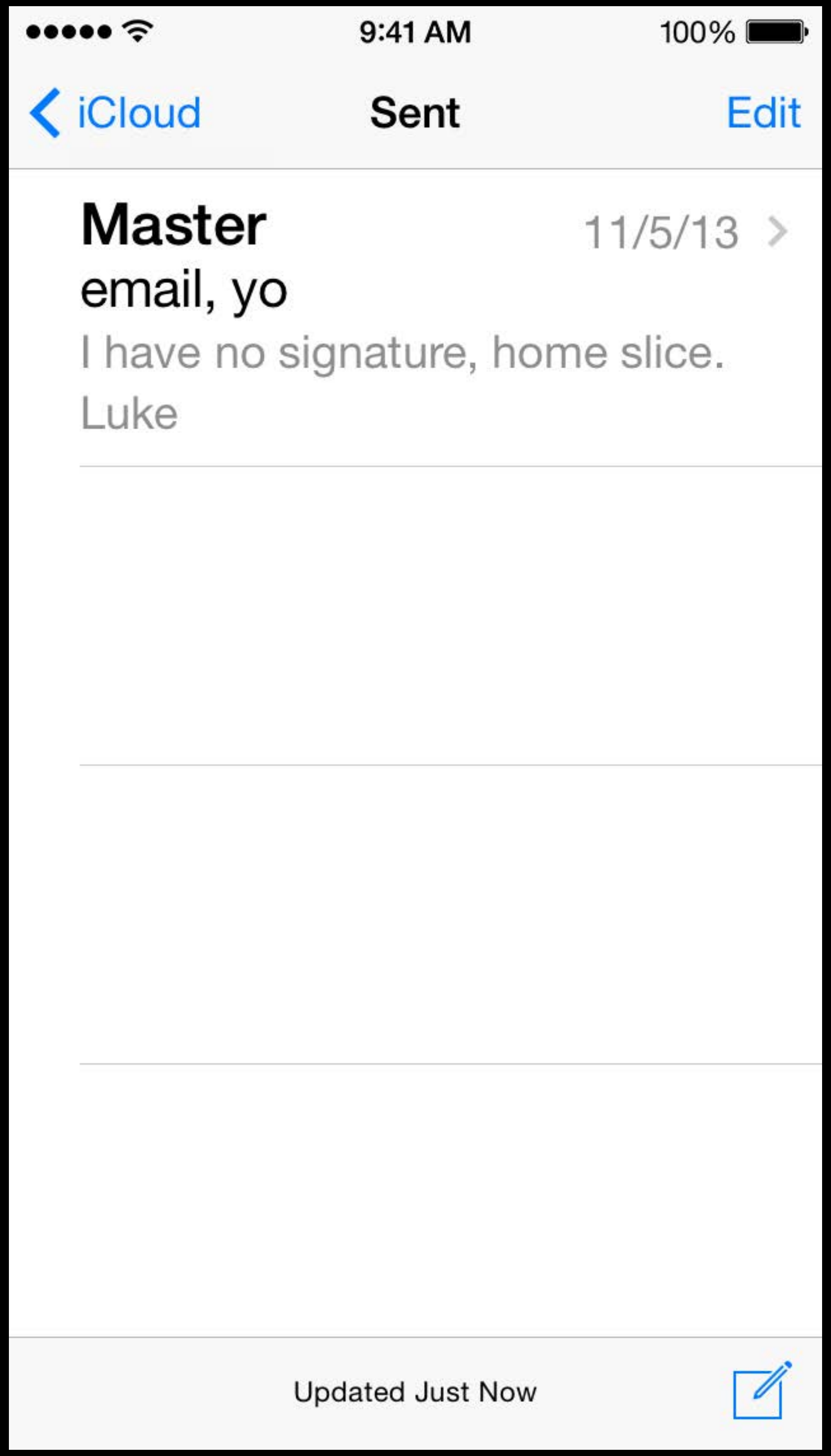
Property—`rowHeight`

Delegate—`tableView:heightForRowAtIndexPath:`

Cell—self-sizing cells

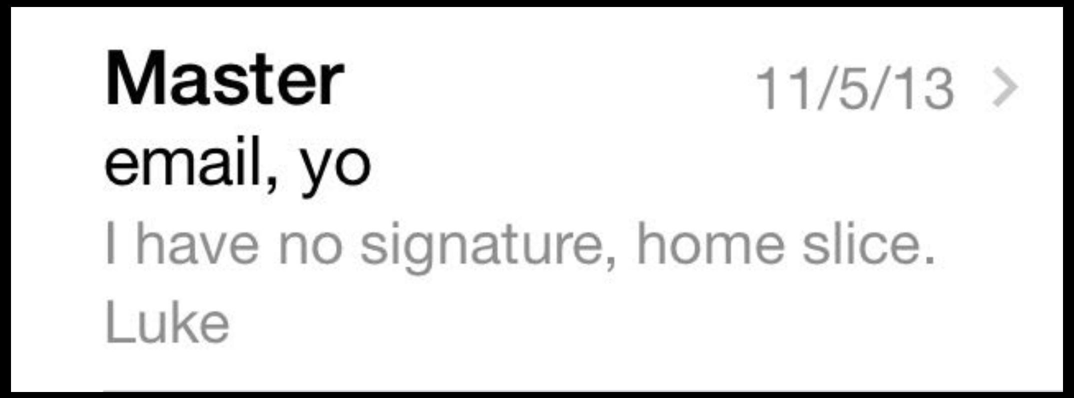
# Self-sizing Table Cells

# Cell Sizing



**Master** 11/5/13
email, yo
I have no signature, home slice.
Luke

# Cell Sizing



**Master** 11/5/13 >

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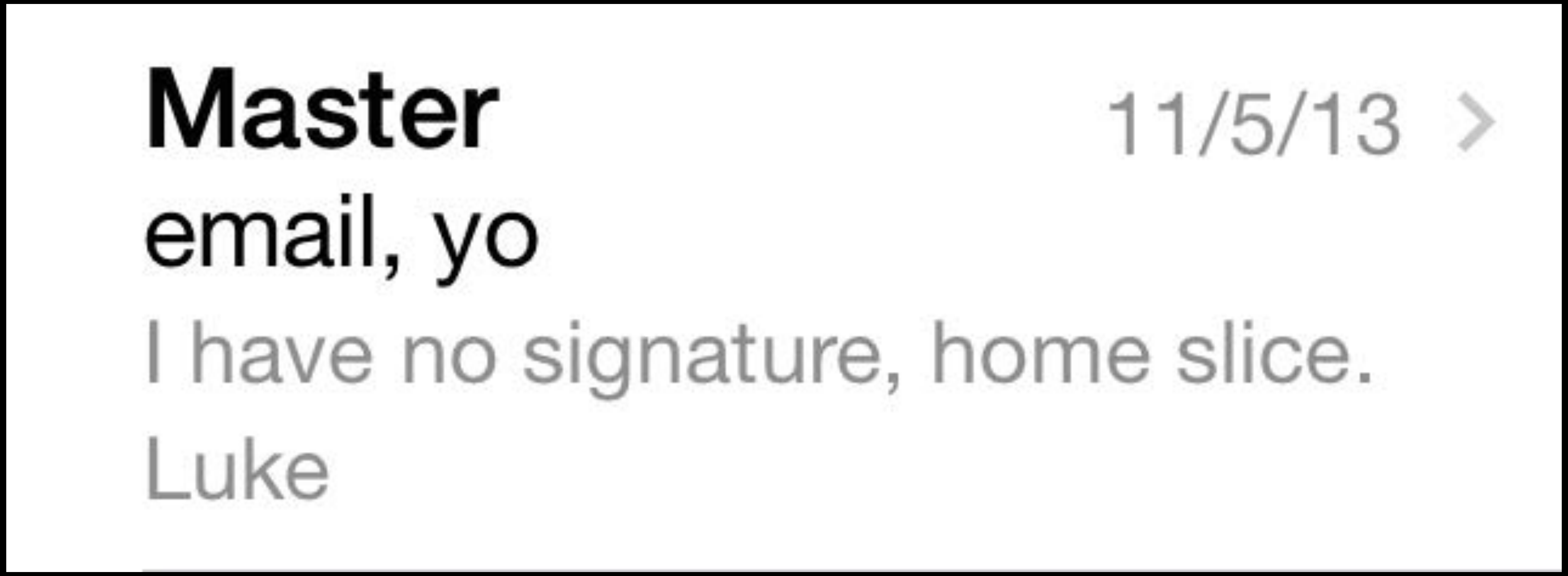

**Master** 11/5/13 >

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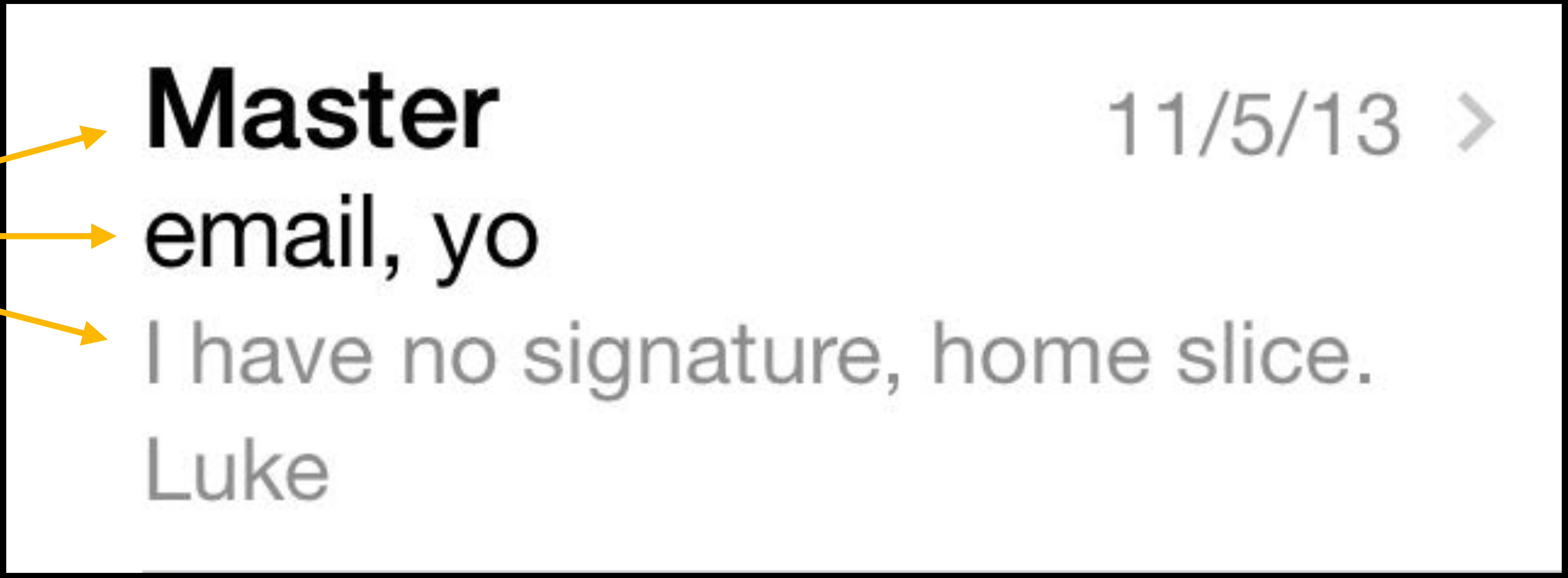
# Cell Sizing

Fonts



**Master** 11/5/13 >

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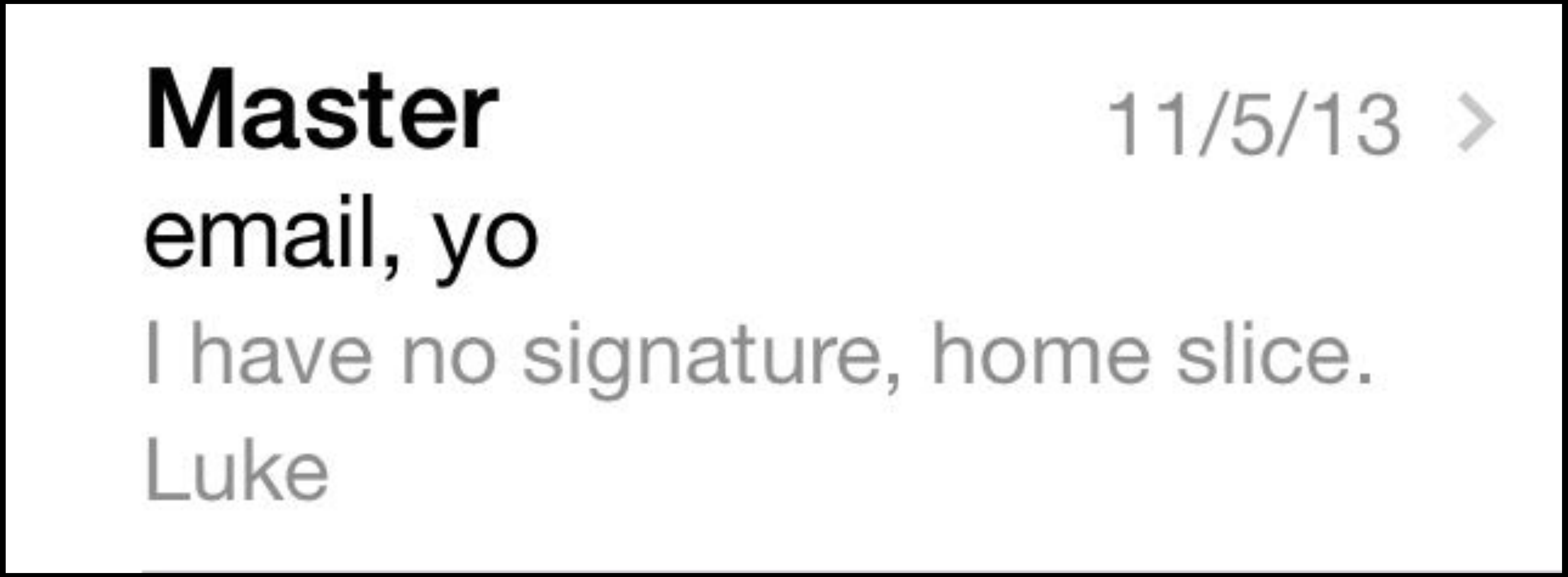

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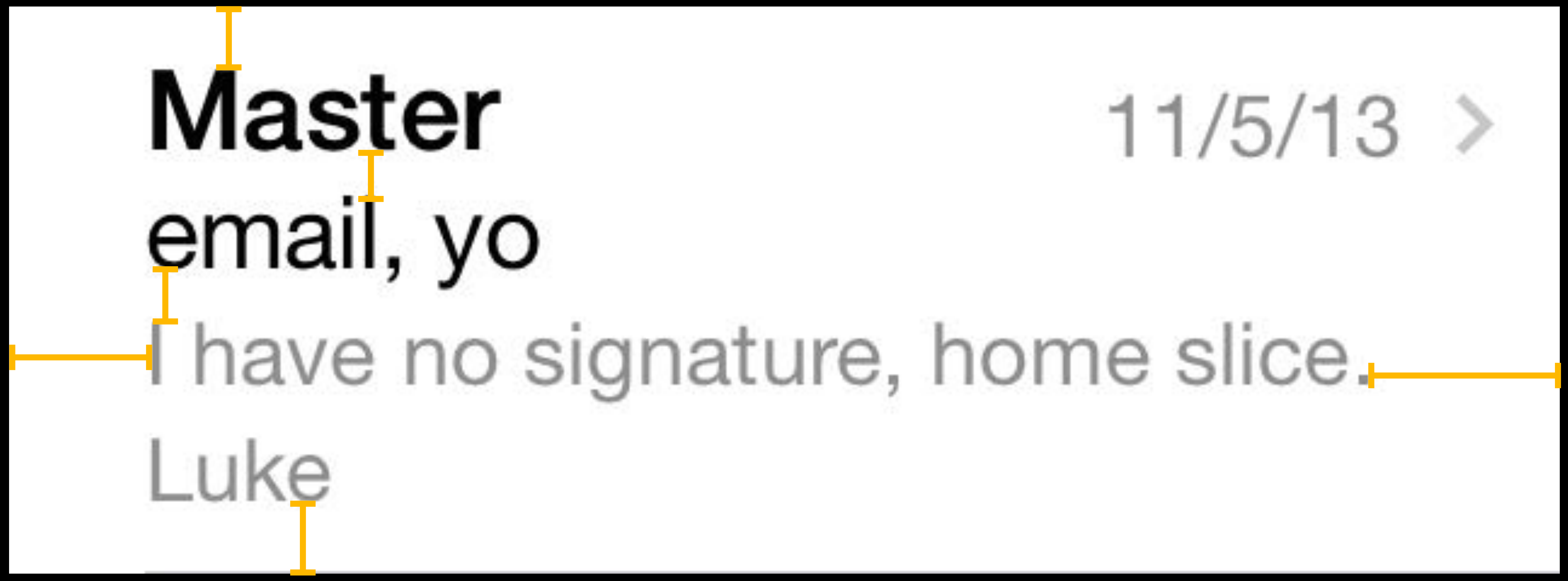
# Cell Sizing



Master

11/5/13

email, yo

I have no signature, home slice.

Luke

Margins

# iOS 8 Sizing Flow

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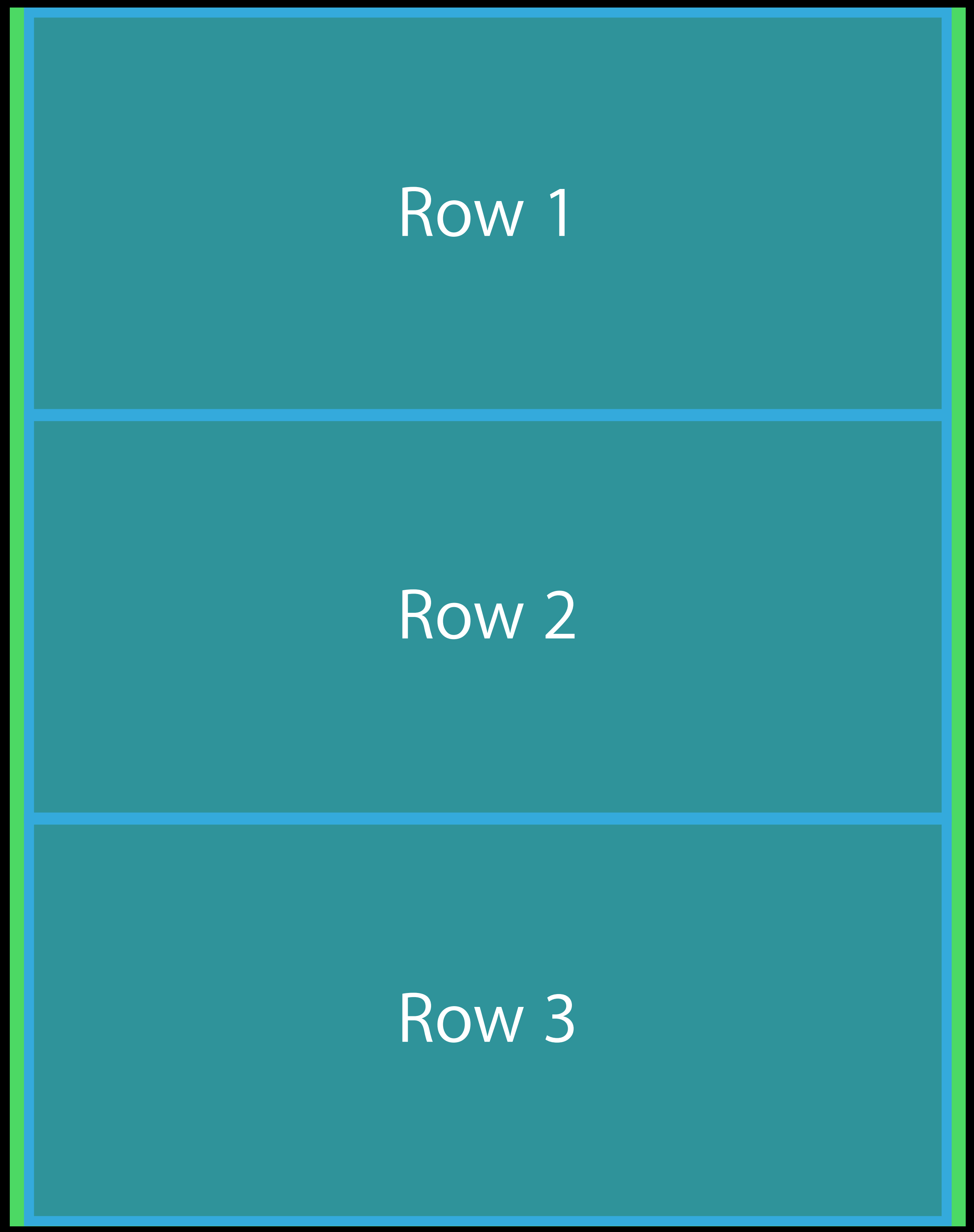
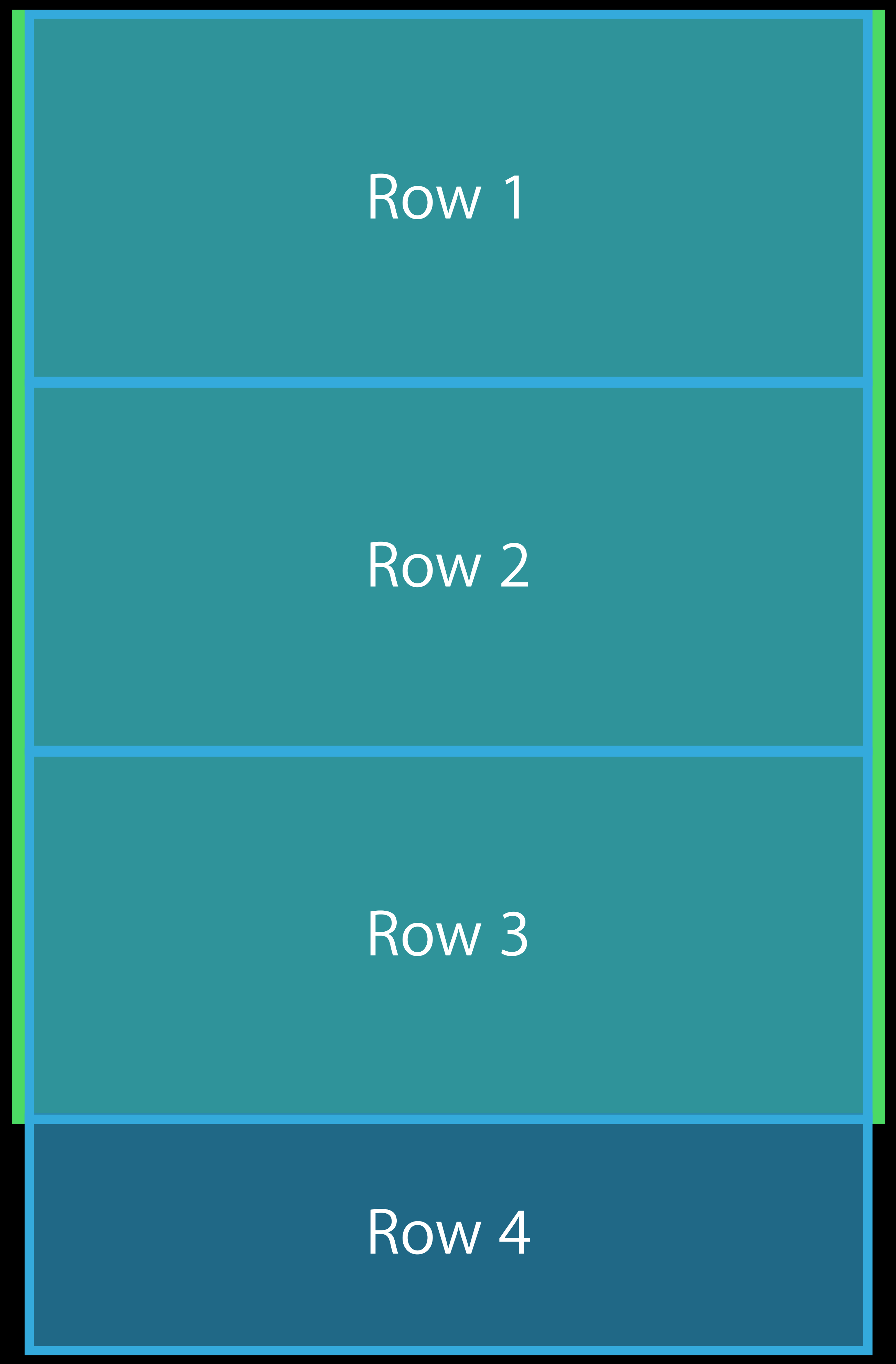


Row 1

Row 2

Row 3

# iOS 8 Sizing Flow



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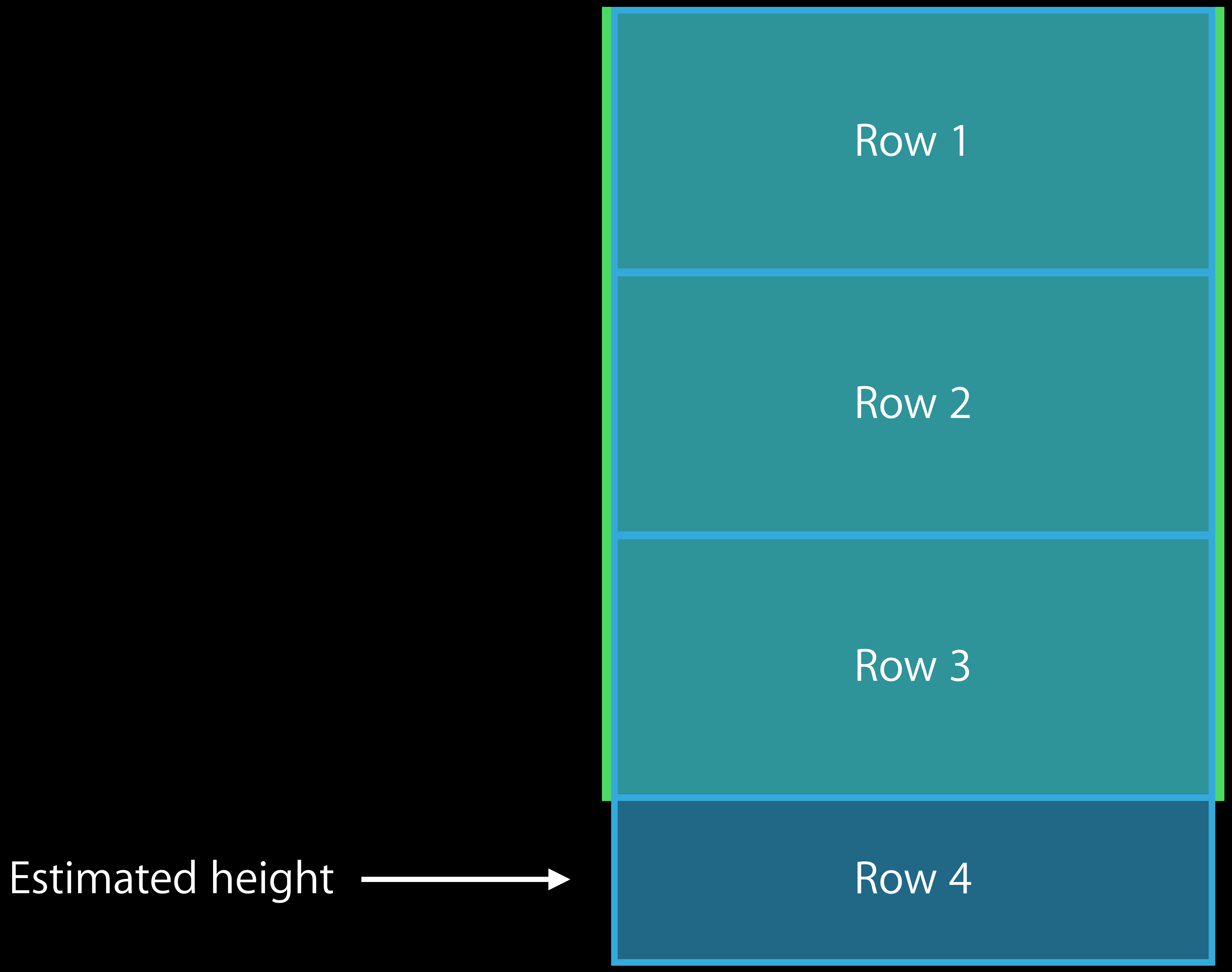

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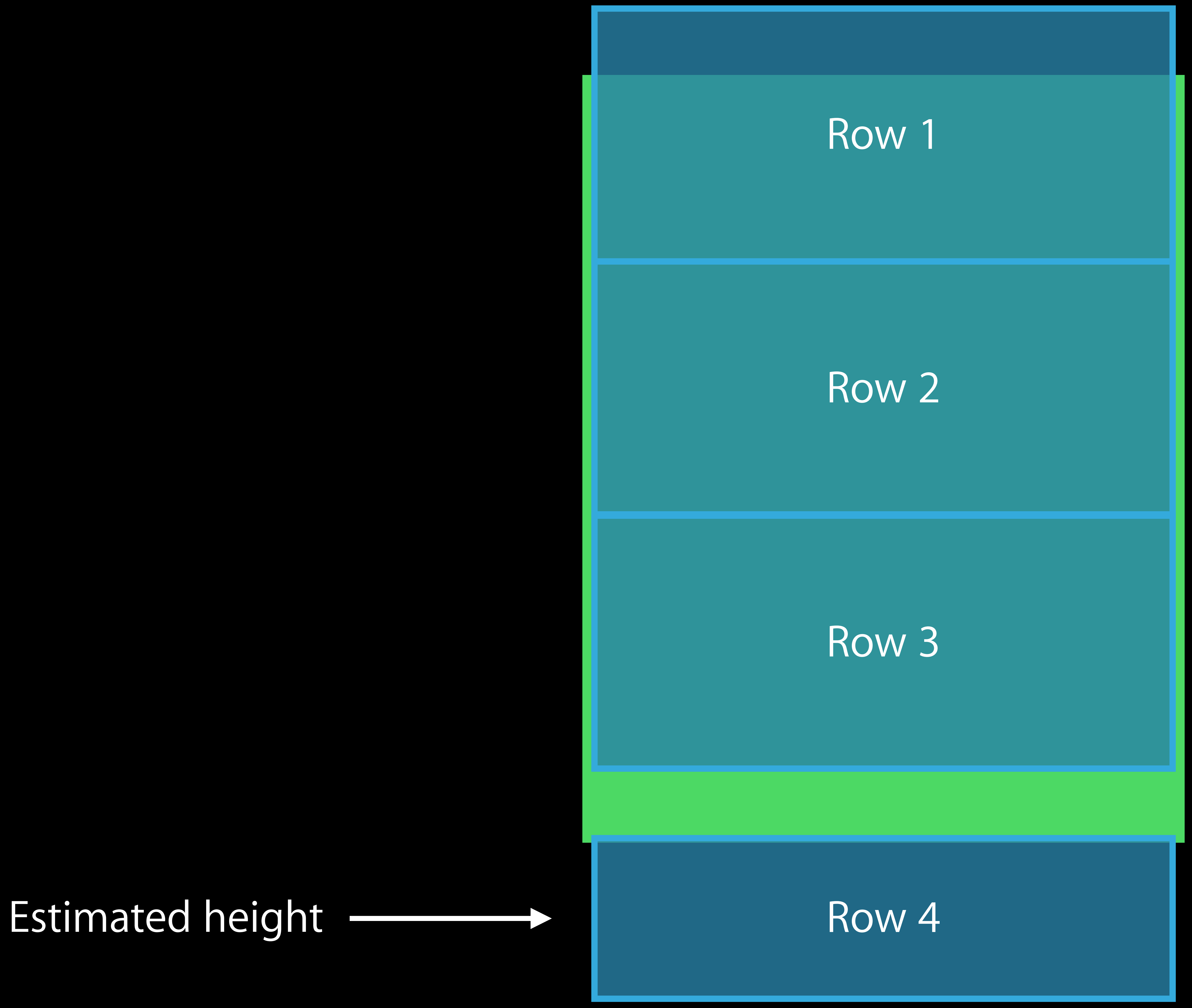

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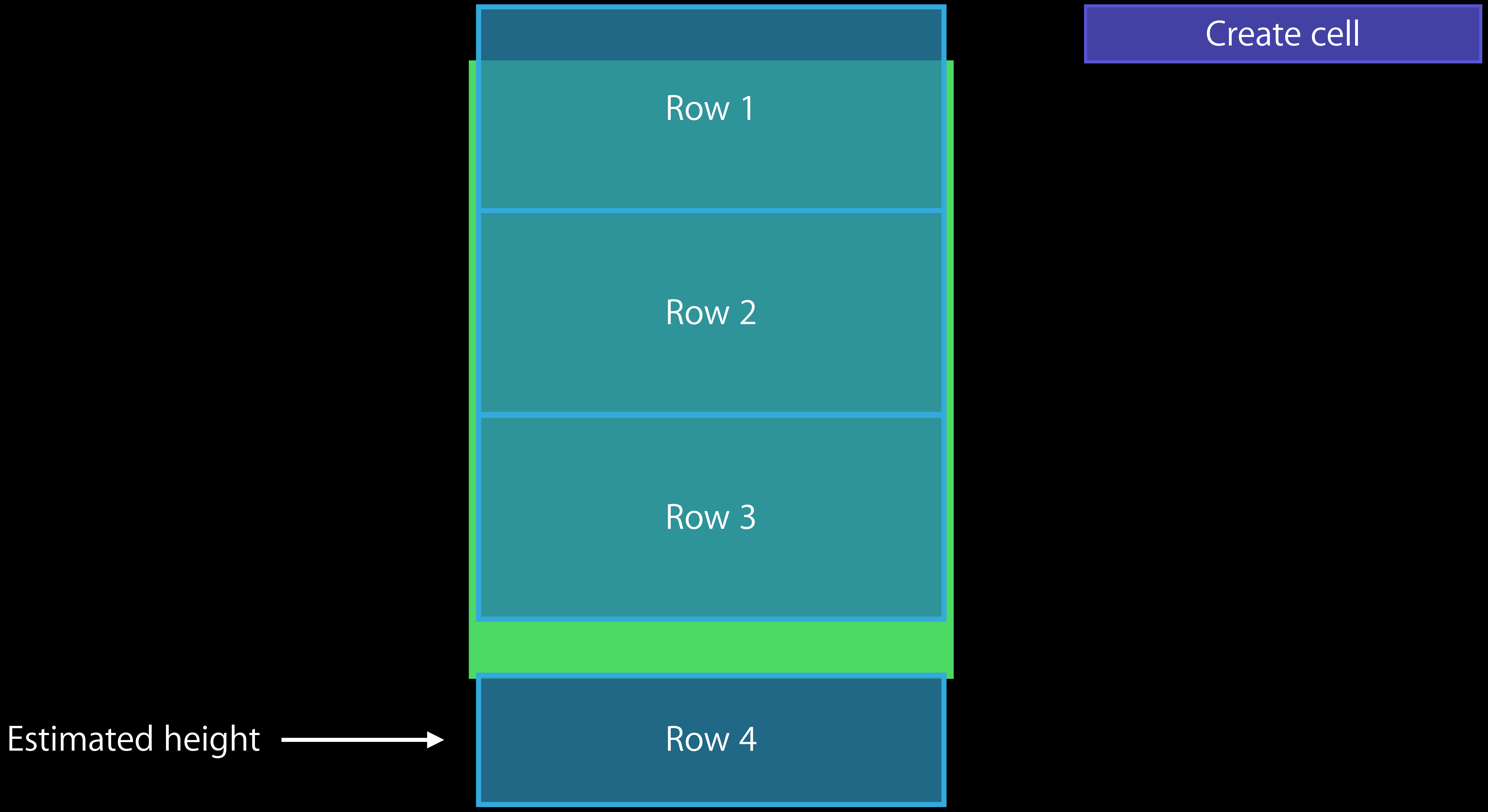

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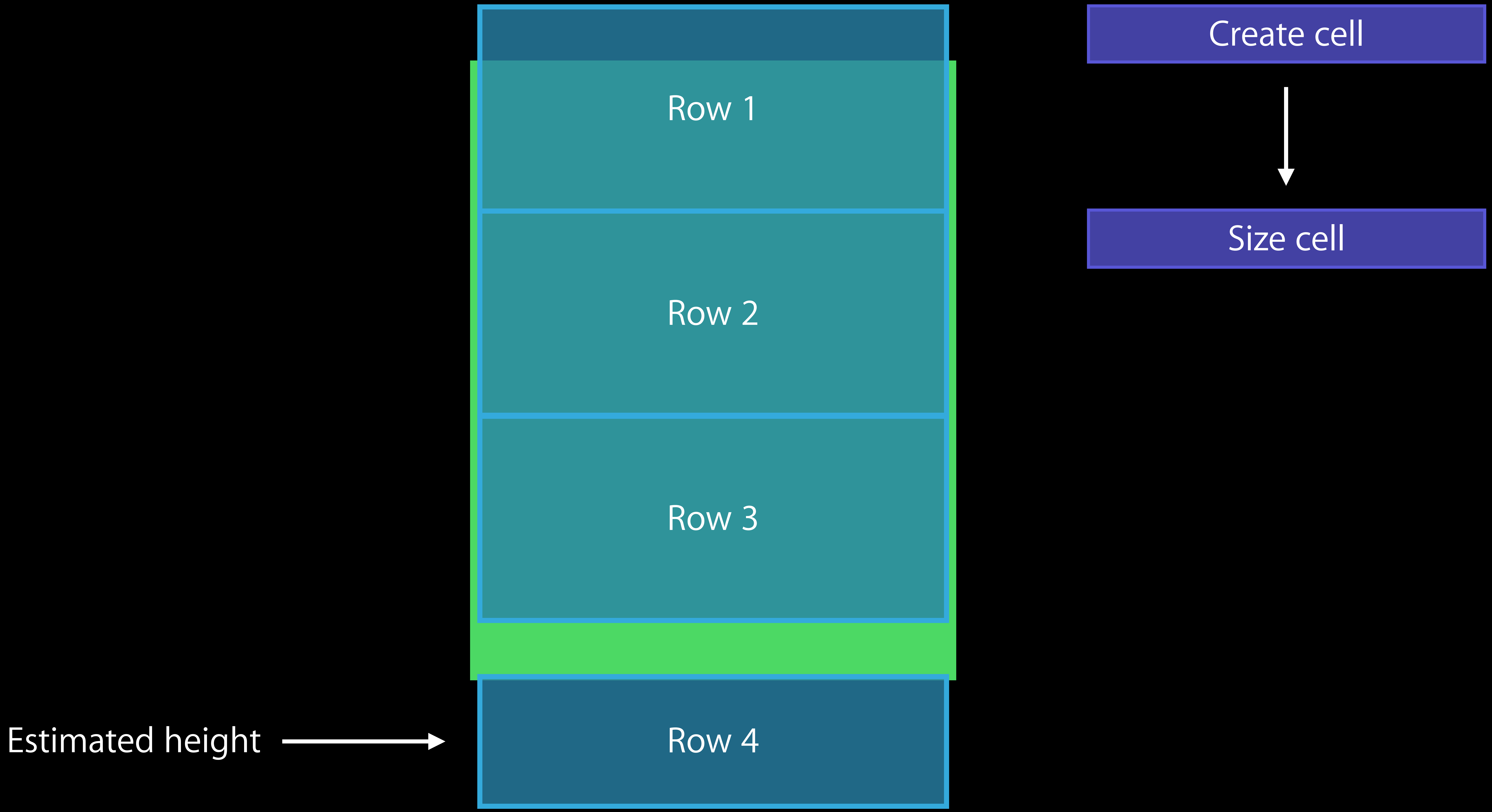

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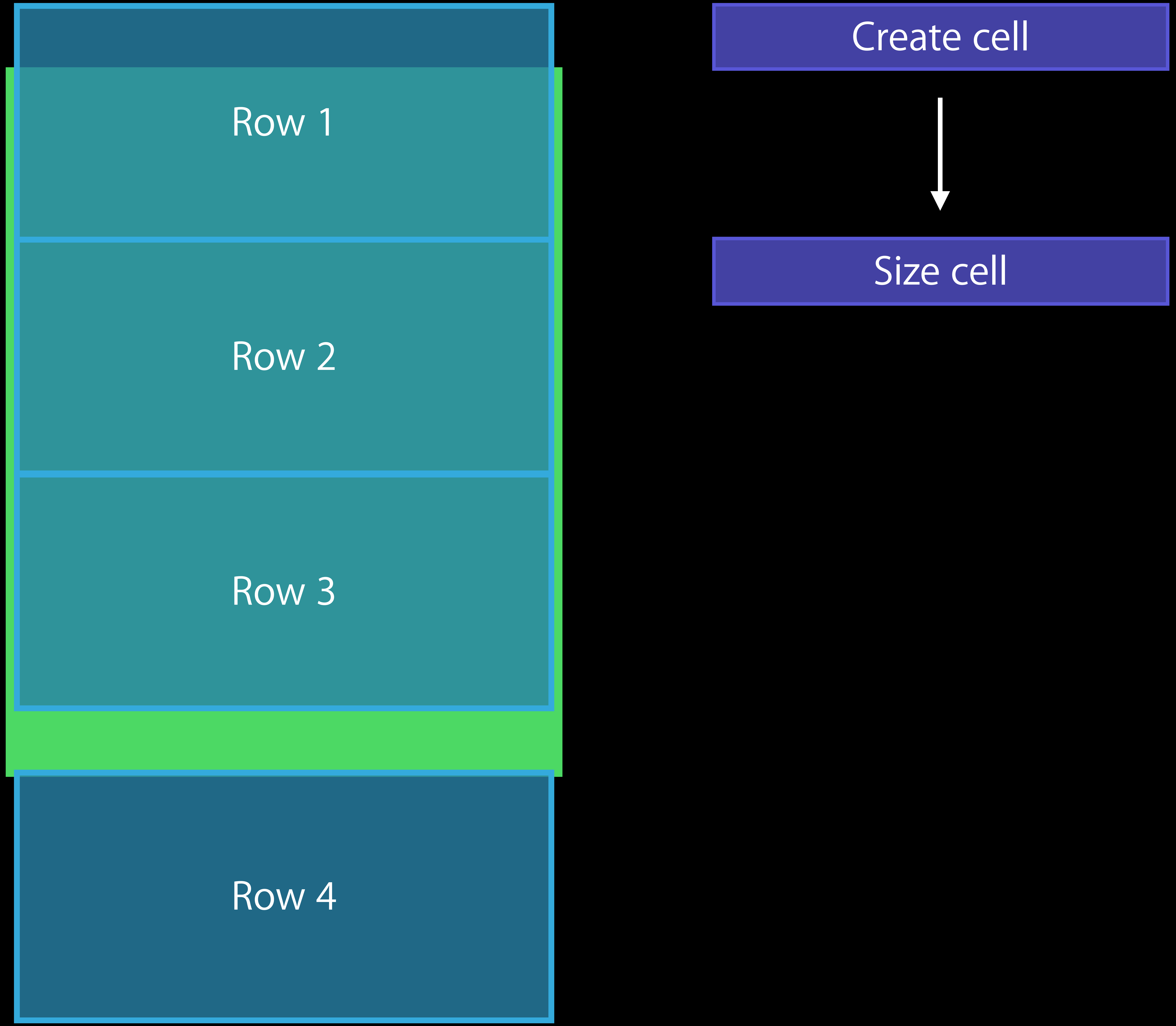

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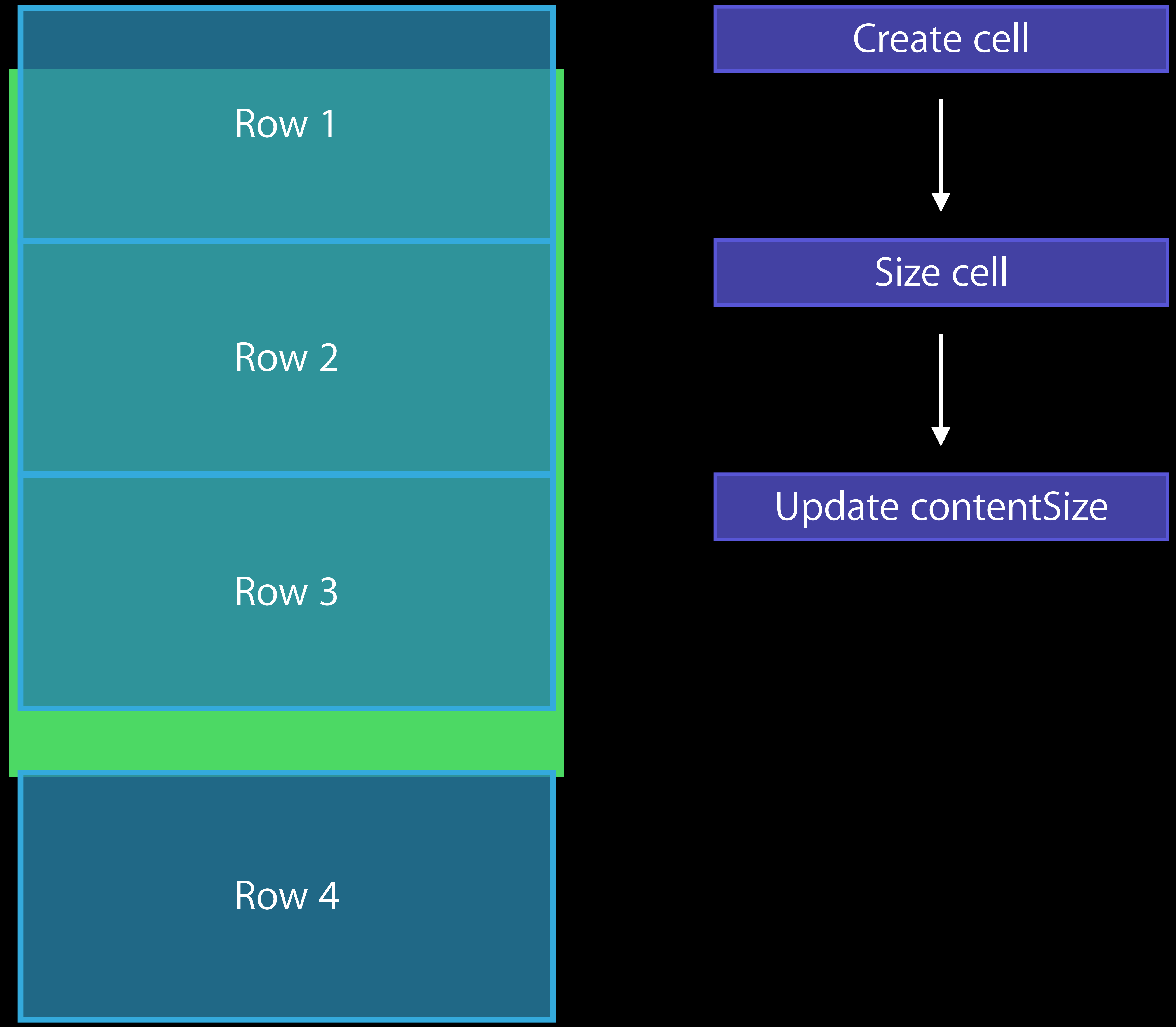
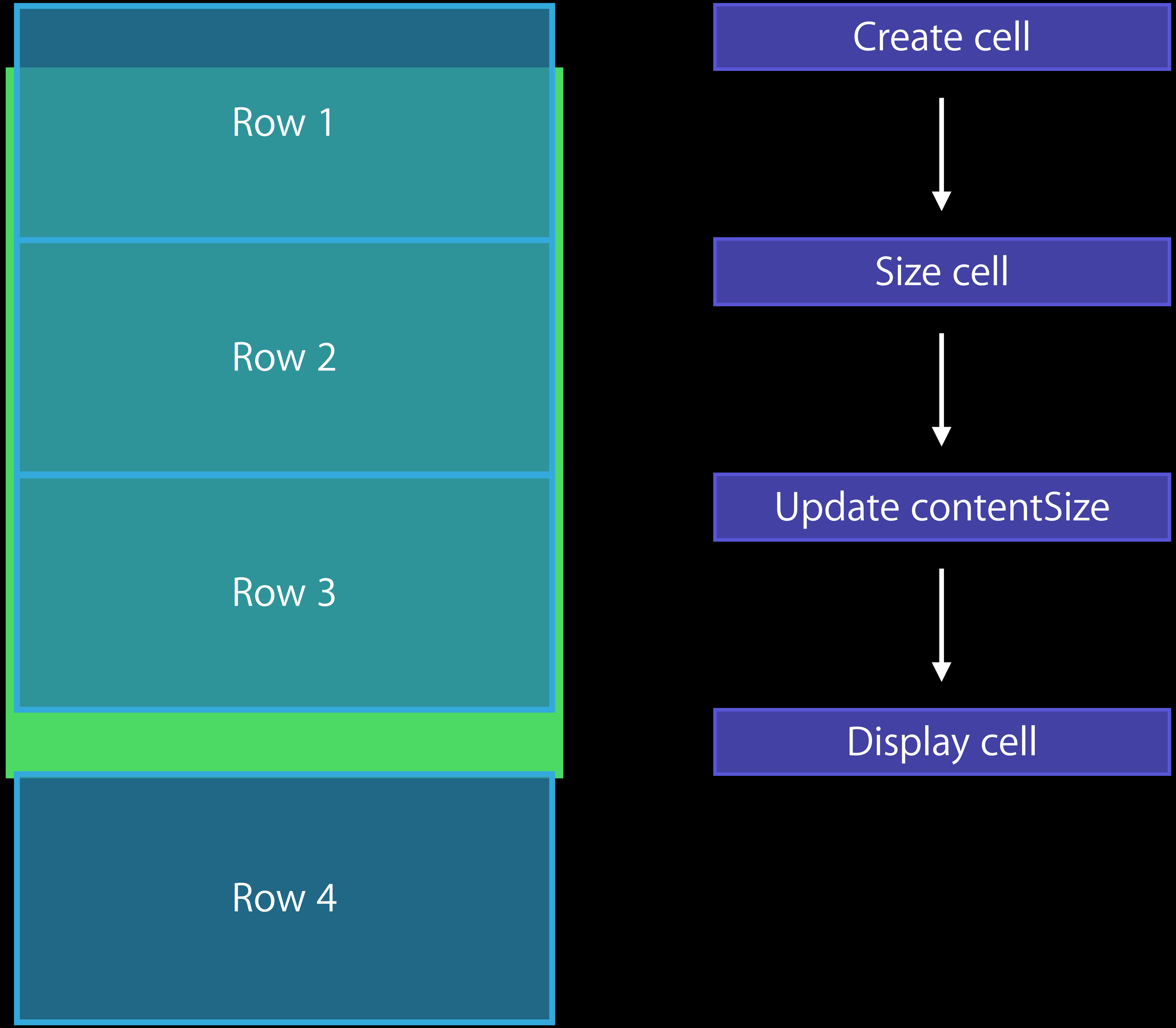


Create cell

Size cell

Update contentSize

# iOS 8 Sizing Flow



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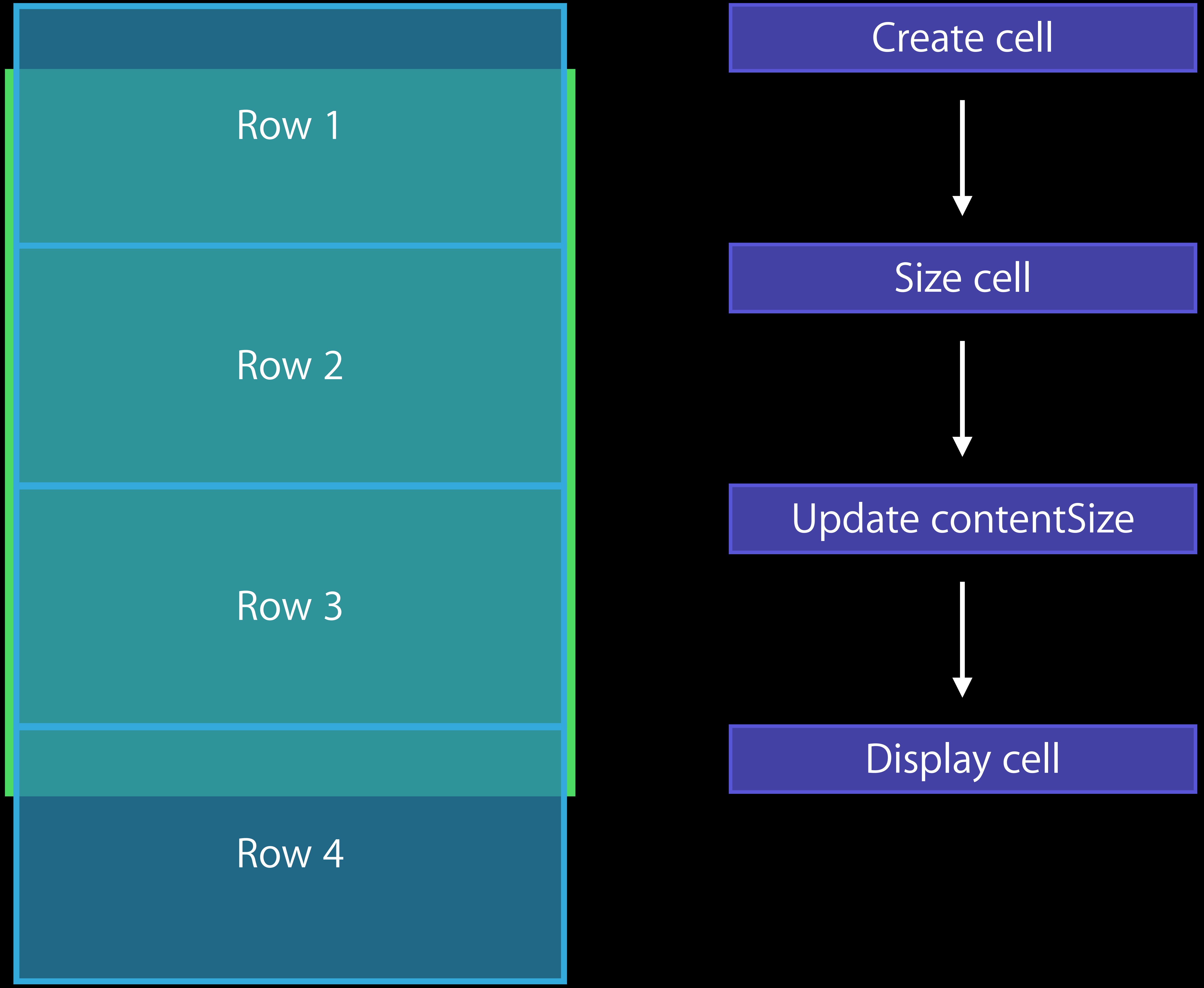

# Self-sizing Cells

Two ways to cut the cake

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## Two ways to cut the cake

Autolayout sizing

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Autolayout sizing

- Add constraints to `cell.contentView`

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Manual-sizing code

# Self-sizing Cells

## Two ways to cut the cake

Autolayout sizing

- Add constraints to `cell.contentView`

Manual-sizing code

- Override `–sizeThatFits:`

# *Demo*

Dynamic Type and self-sizing cells

# Collection View

Olivier Gutknecht
iOS Engineering Manager

# Today

# Today

Self-sizing cells

# Today

Self-sizing cells

Smart invalidation

# Self-sizing Cells

# Self-sizing Cells

New major feature

# Self-sizing Cells

New major feature

Available in flow layout

# Self-sizing Cells

New major feature

Available in flow layout

Ready for custom layouts!

# *Demo*

Self-sizing cells

# Cell Sizing Strategies

| | |
|---|---|
| Classic | All cell sizes are computed by a collection view layout |

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| Self-sizing Cells | Use constraints on the collection view cell content view,<br>or override `sizeThatFits:` |

# Cell Sizing Strategies

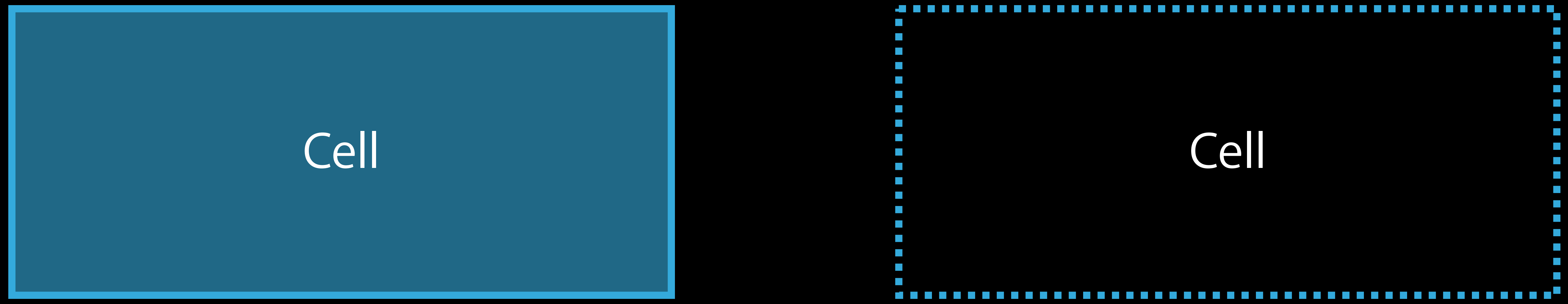
| | |
|---|---|
| Classic | All cell sizes are computed by a collection view layout |
| Self-sizing Cells | Use constraints on the collection view cell content view,<br>or override `sizeThatFits:` |
| Full Control | Use `preferredLayoutAttributesFittingAttributes:`<br>to change other attributes properties or use custom-sizing code |

# Cell-sizing Strategies

# Cell-sizing Strategies

Layout-driven attributes

# Cell-sizing Strategies



Cell

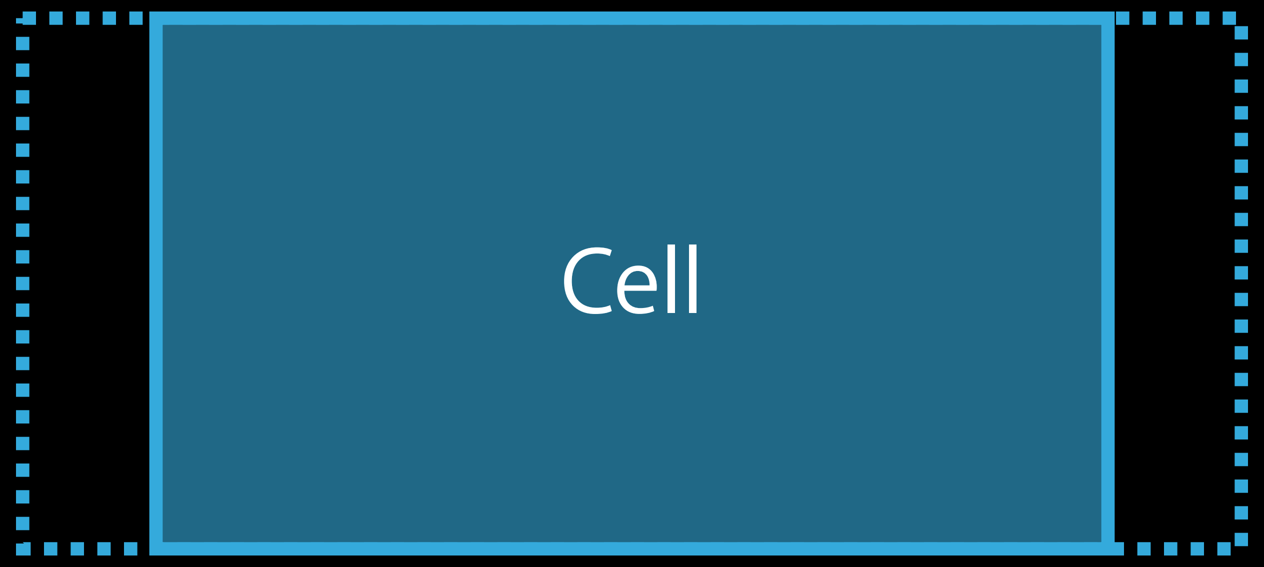
Cell

Layout-driven attributes

Layout-estimated attributes

# Cell-sizing Strategies

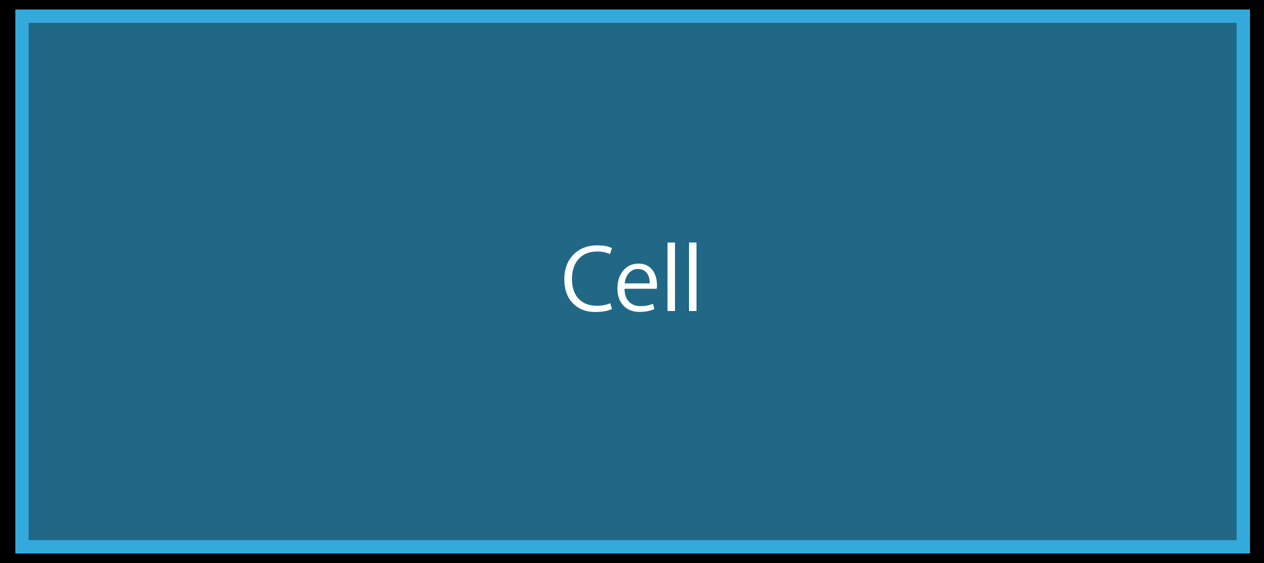
Layout-driven attributes



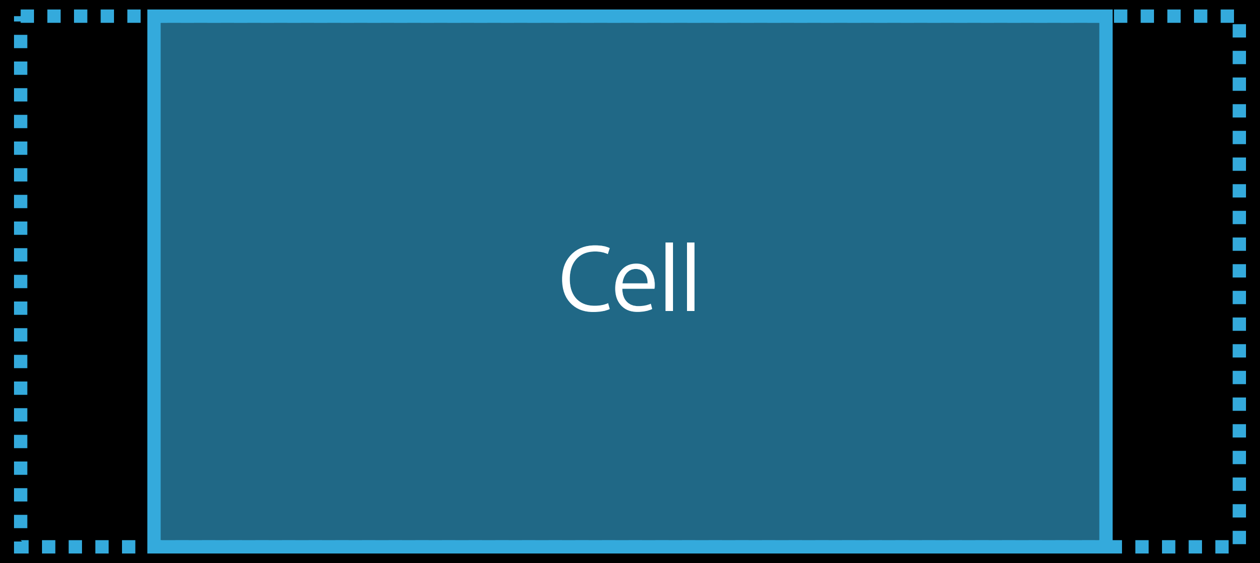
Layout-estimated attributes

Self-sizing cell

# Cell-sizing Strategies

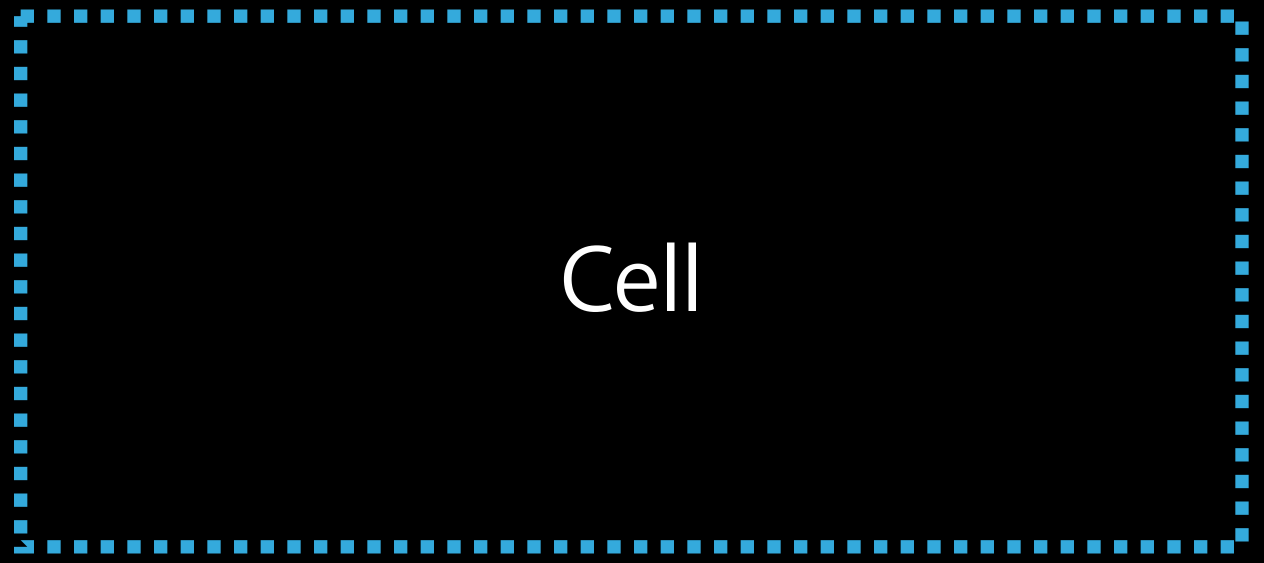


Layout-driven attributes



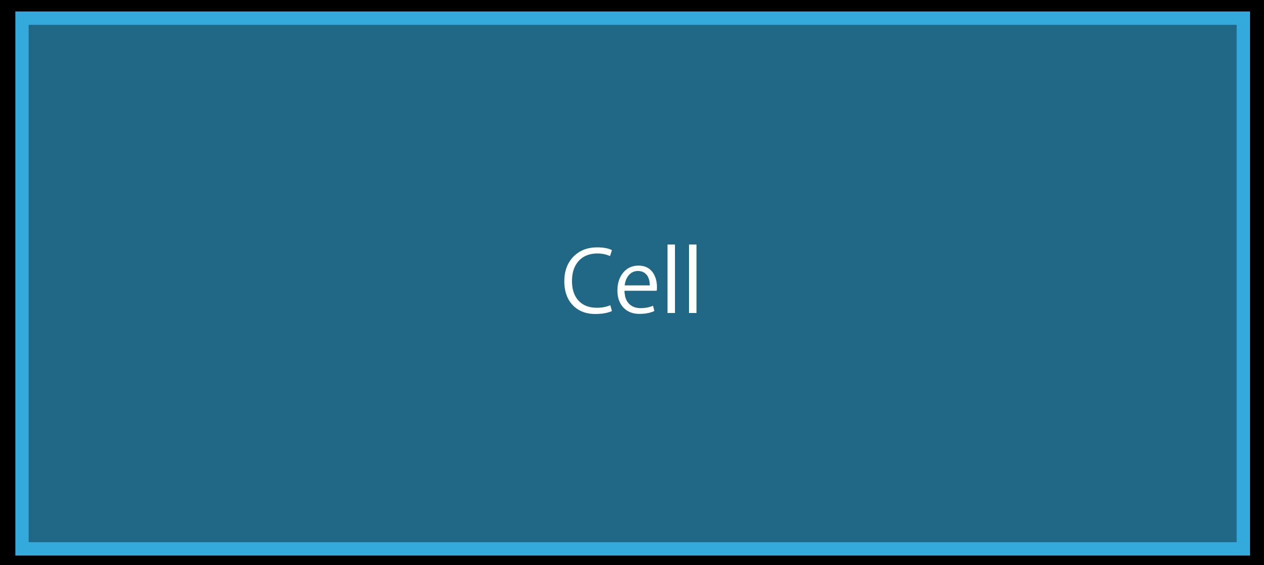
Layout-estimated attributes

Self-sizing cell

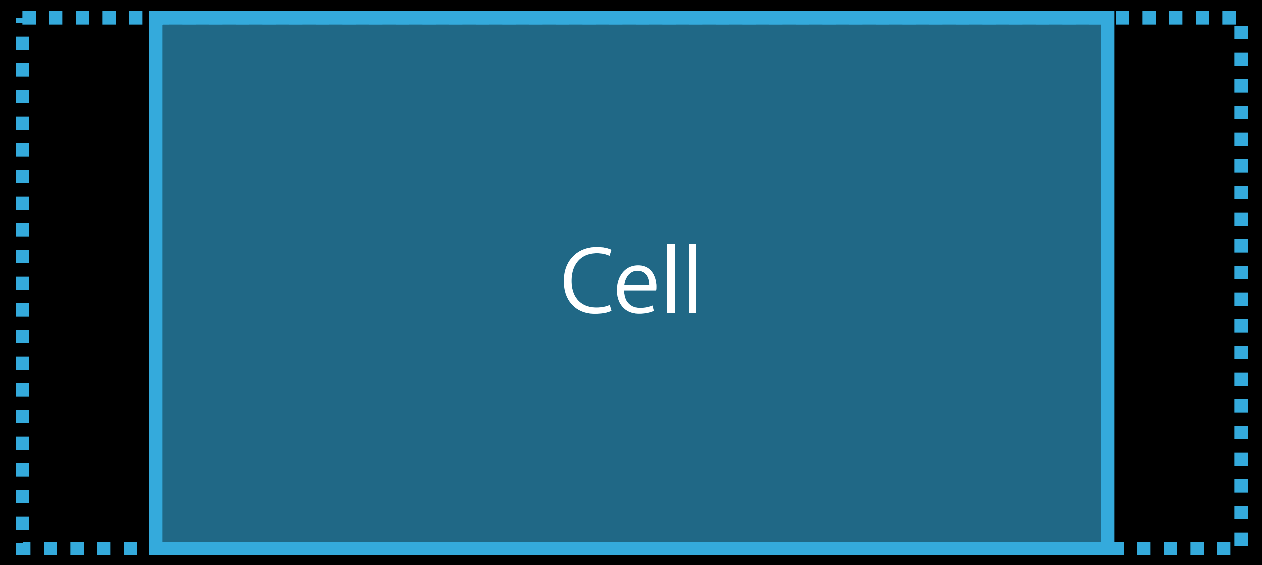


Layout-estimated attributes

# Cell-sizing Strategies

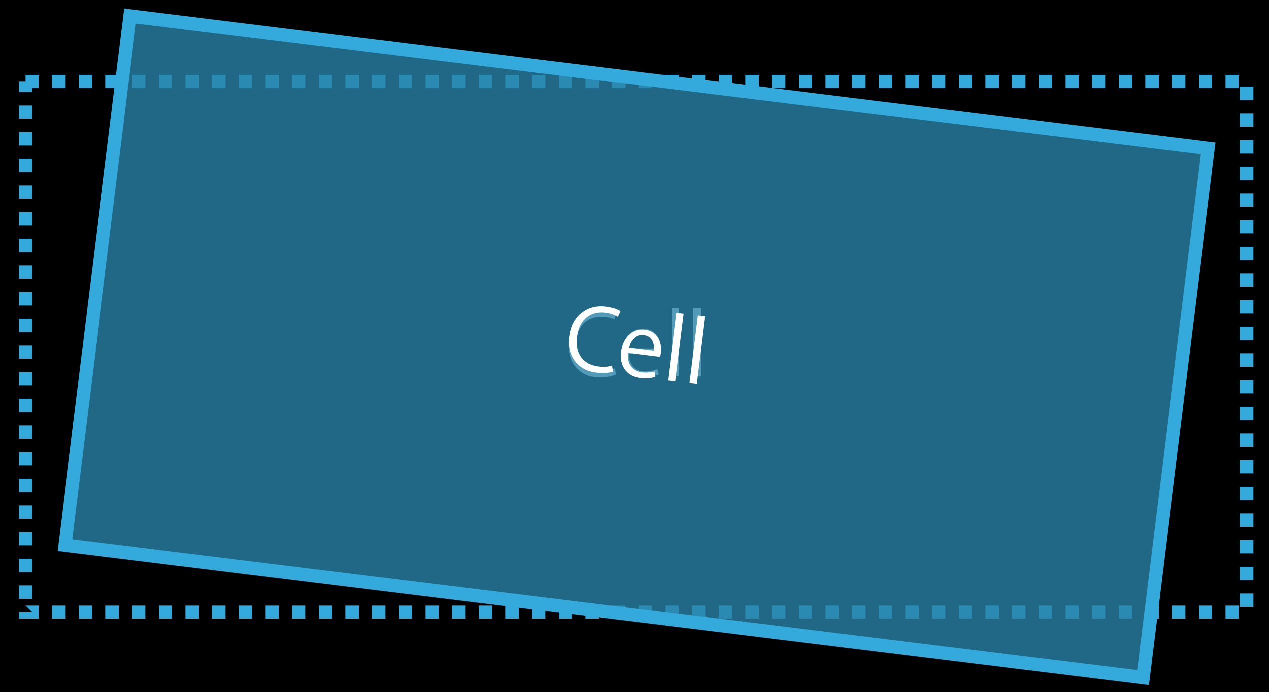


Layout-driven attributes



Layout-estimated attributes

Self-sizing cell



Layout-estimated attributes

Preferred attributes
fitting attributes

# Flow Layout Support

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```
@property (nonatomic) CGSize estimatedItemSize;
```

# Flow Layout Support

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@property (nonatomic) CGSize estimatedItemSize;
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Equivalent to estimated row height in table views

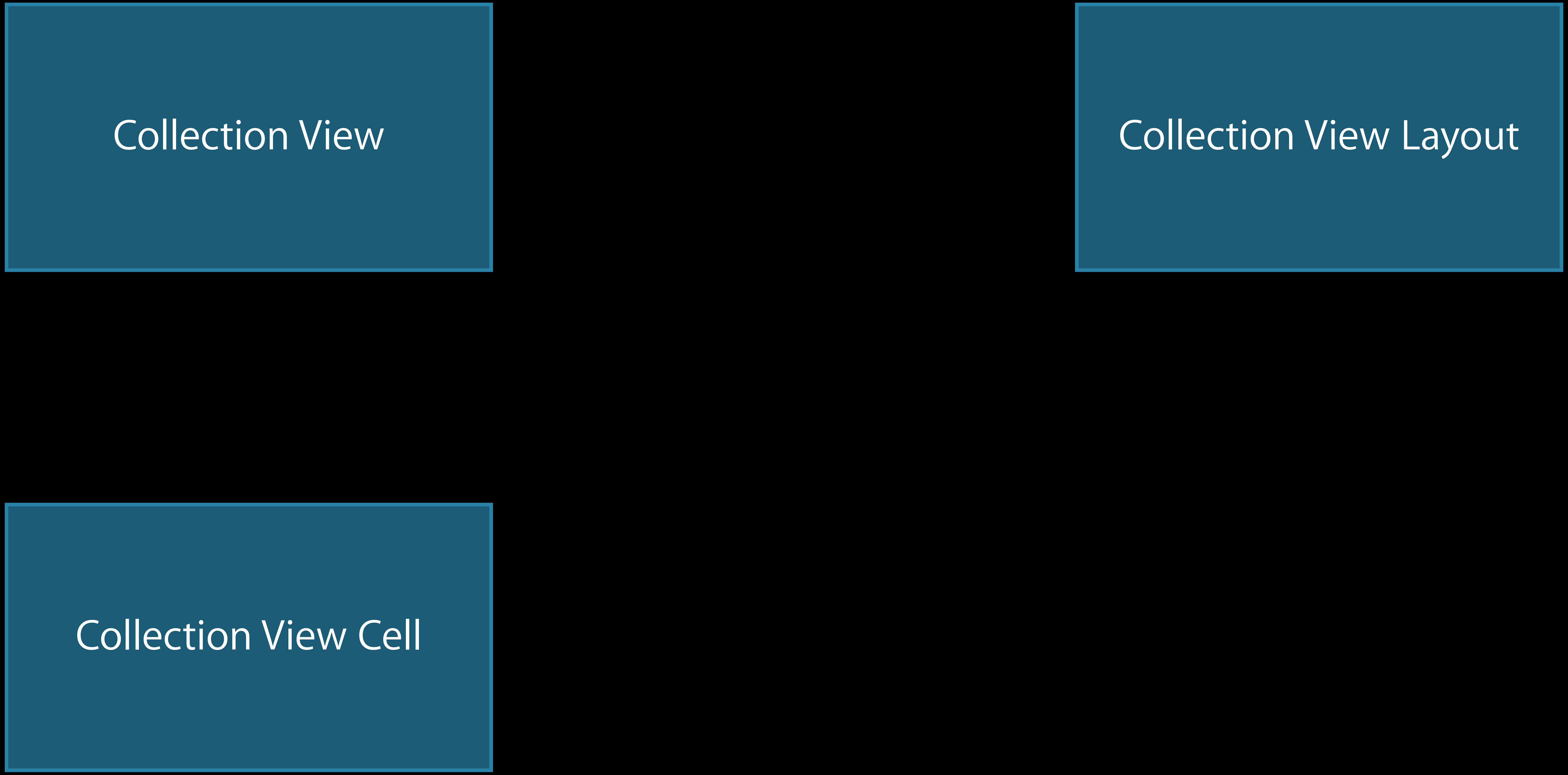
# Flow Layout Support

```
@property (nonatomic) CGSize estimatedItemSize;
```

Equivalent to estimated row height in table views

Set it to a non-zero CGSize

# Self-sizing Cells in Flow Layout

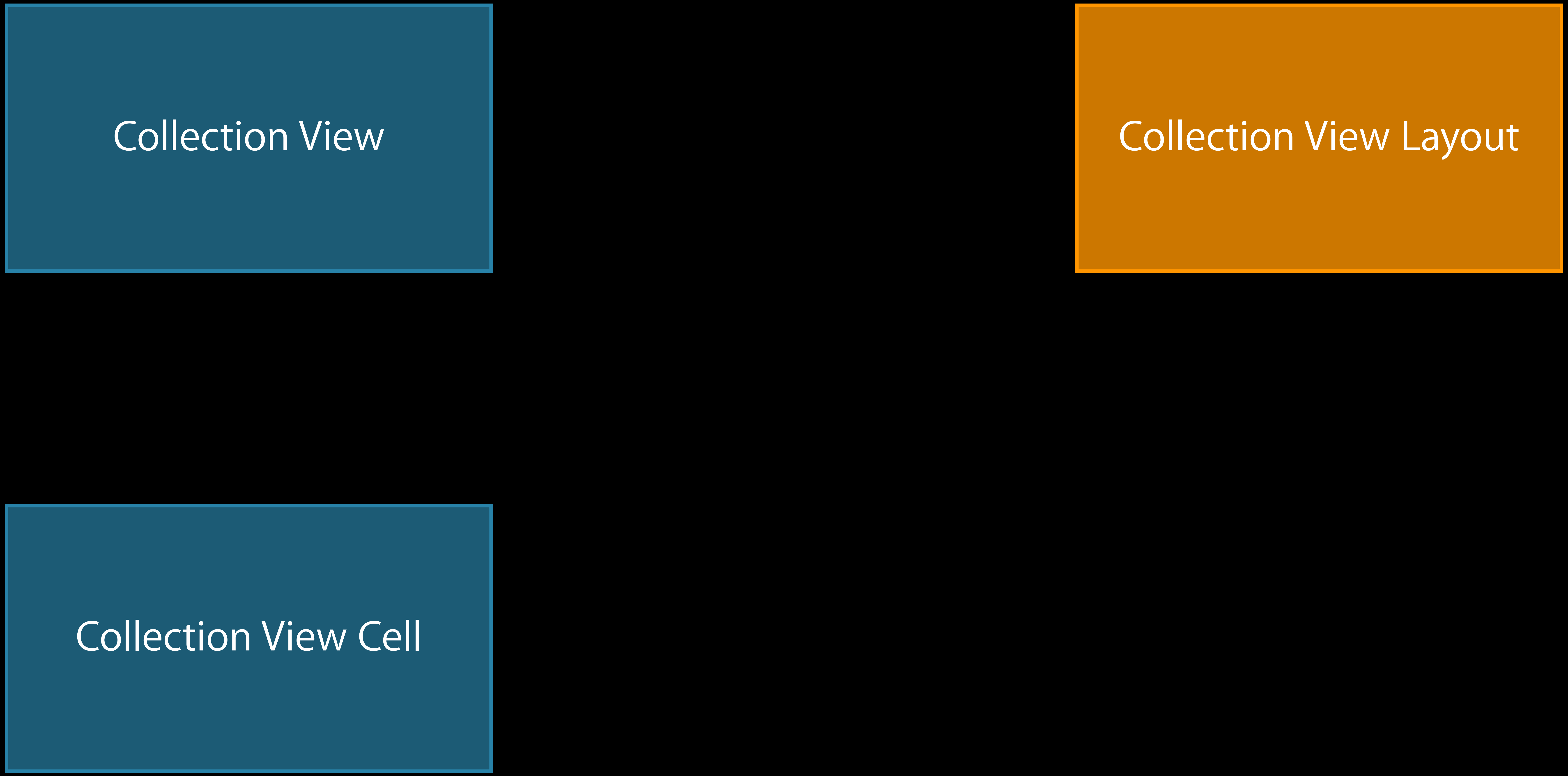


Collection View

Collection View Layout

Collection View Cell

# Self-sizing Cells in Flow Layout



Collection View

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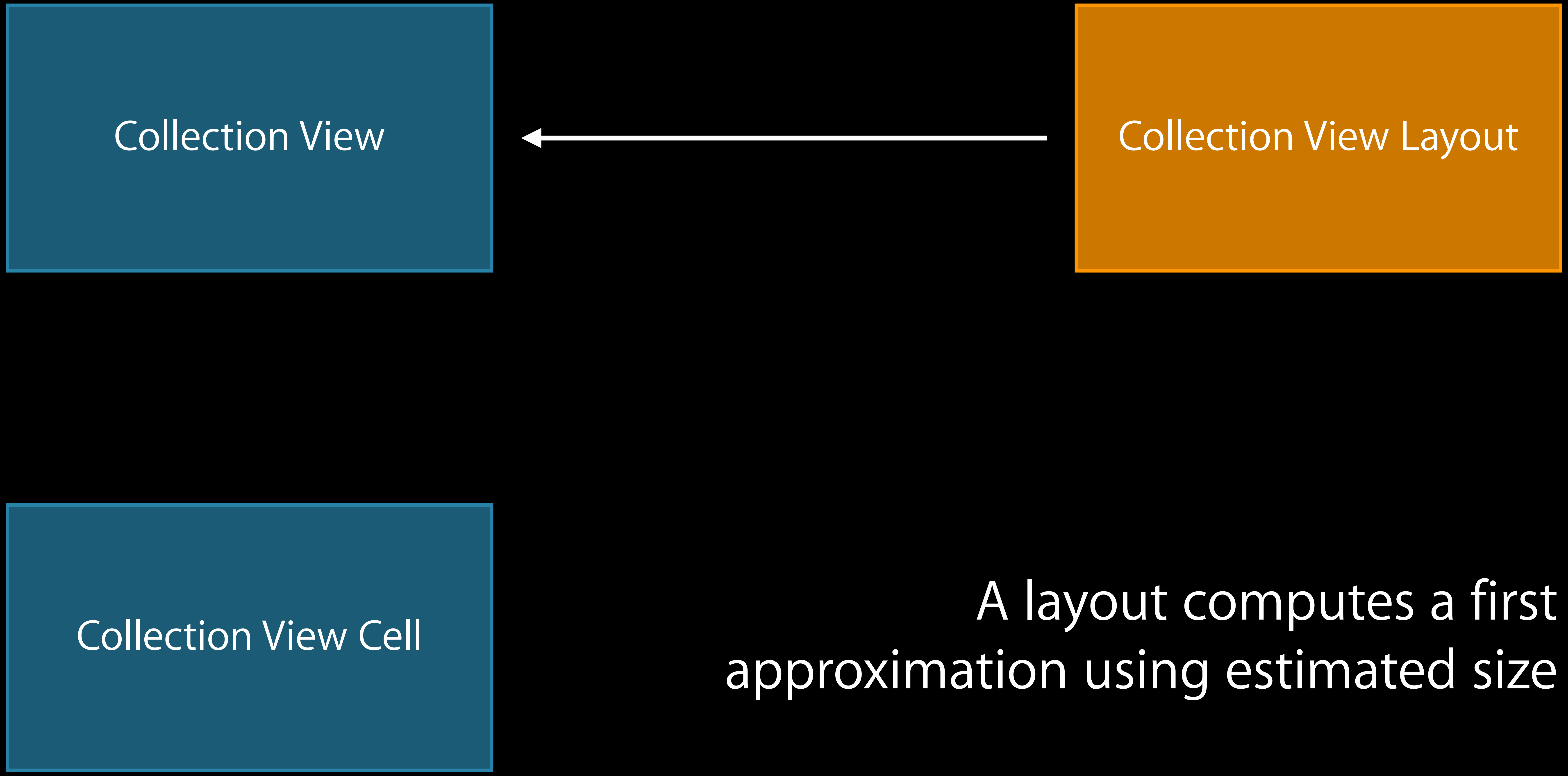
Collection View Cell

# Self-sizing Cells in Flow Layout



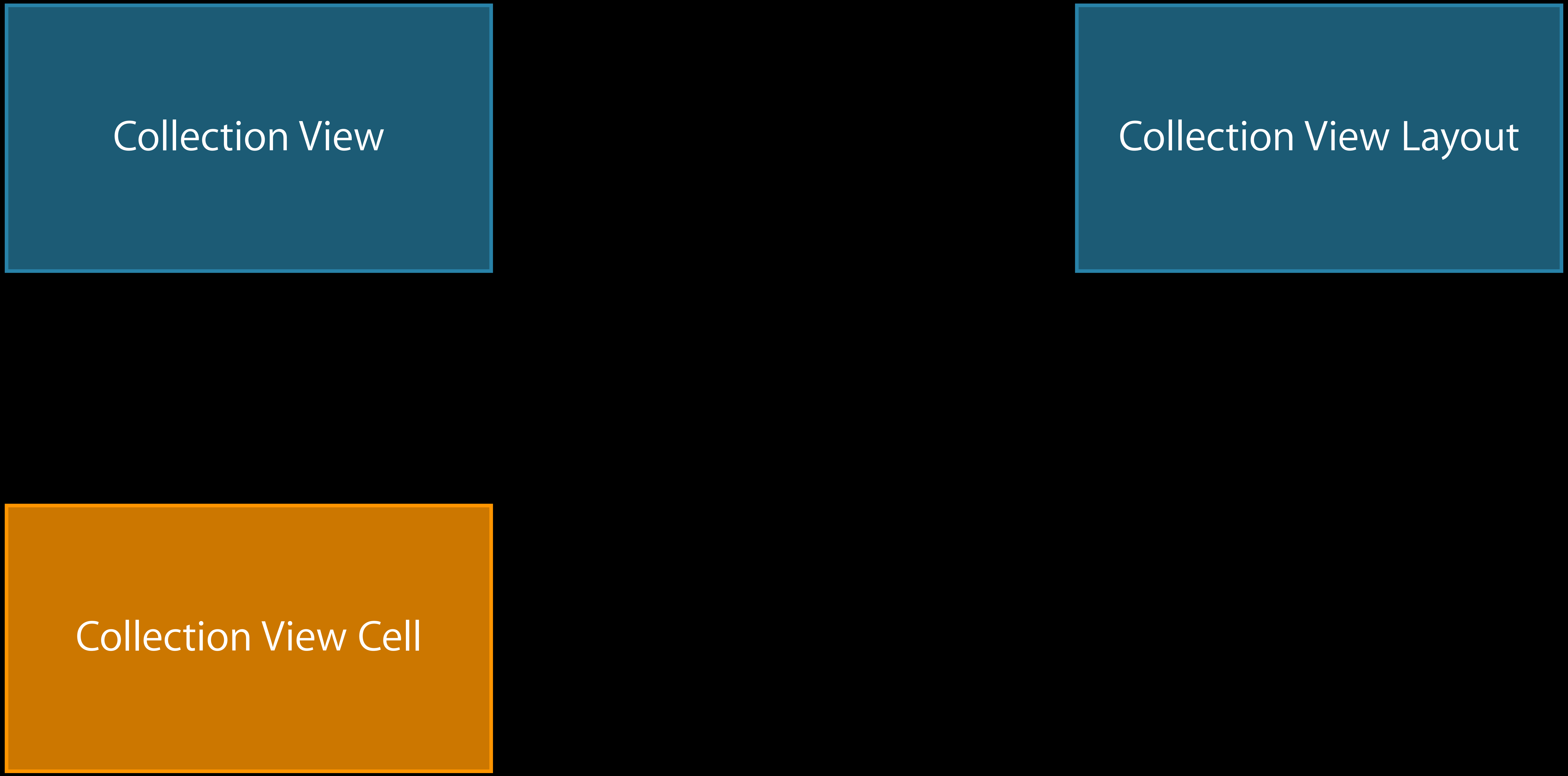
Collection View

Collection View Layout

Collection View Cell

A layout computes a first approximation using estimated size

# Self-sizing Cells in Flow Layout

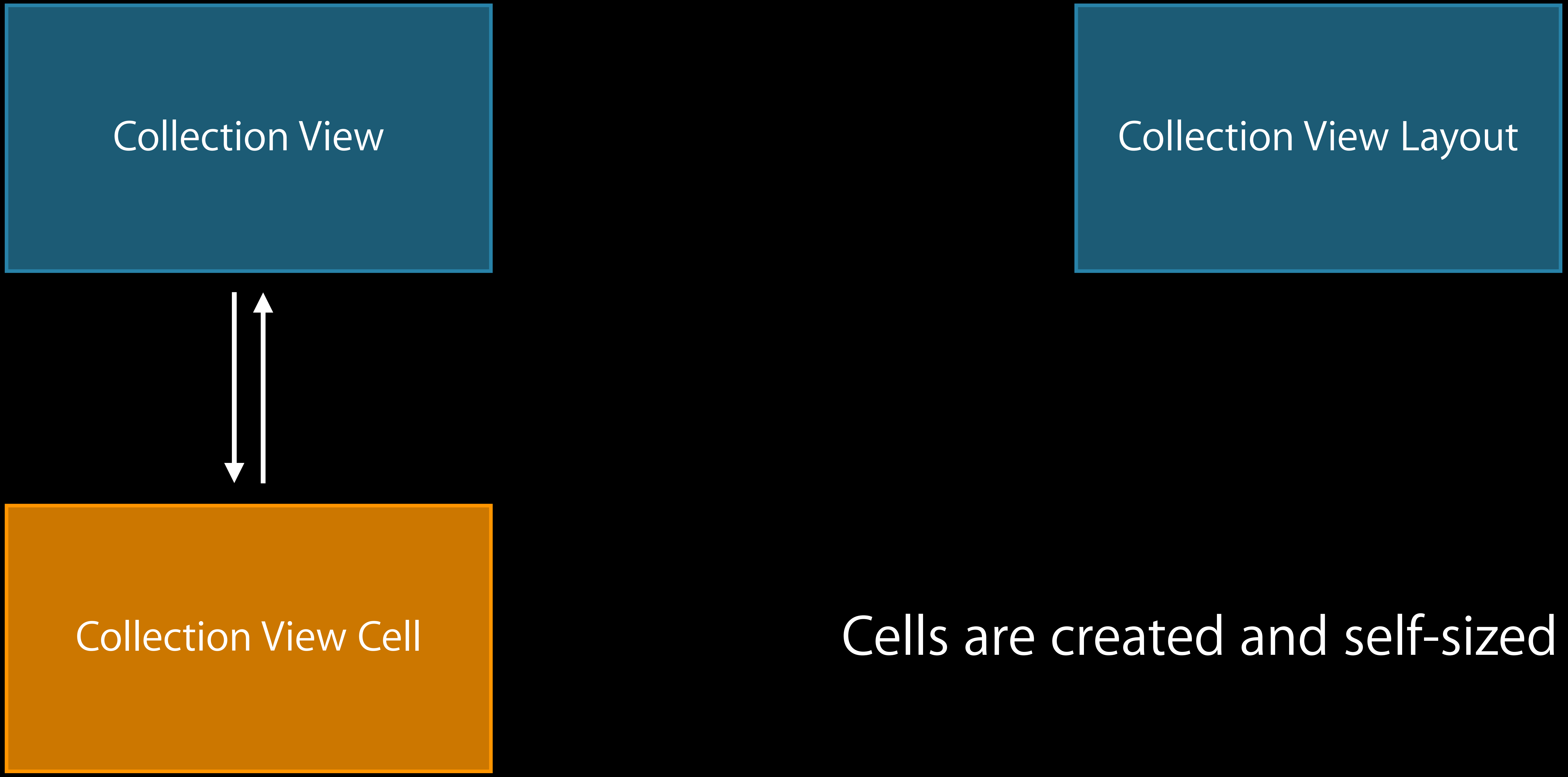


Collection View

Collection View Layout

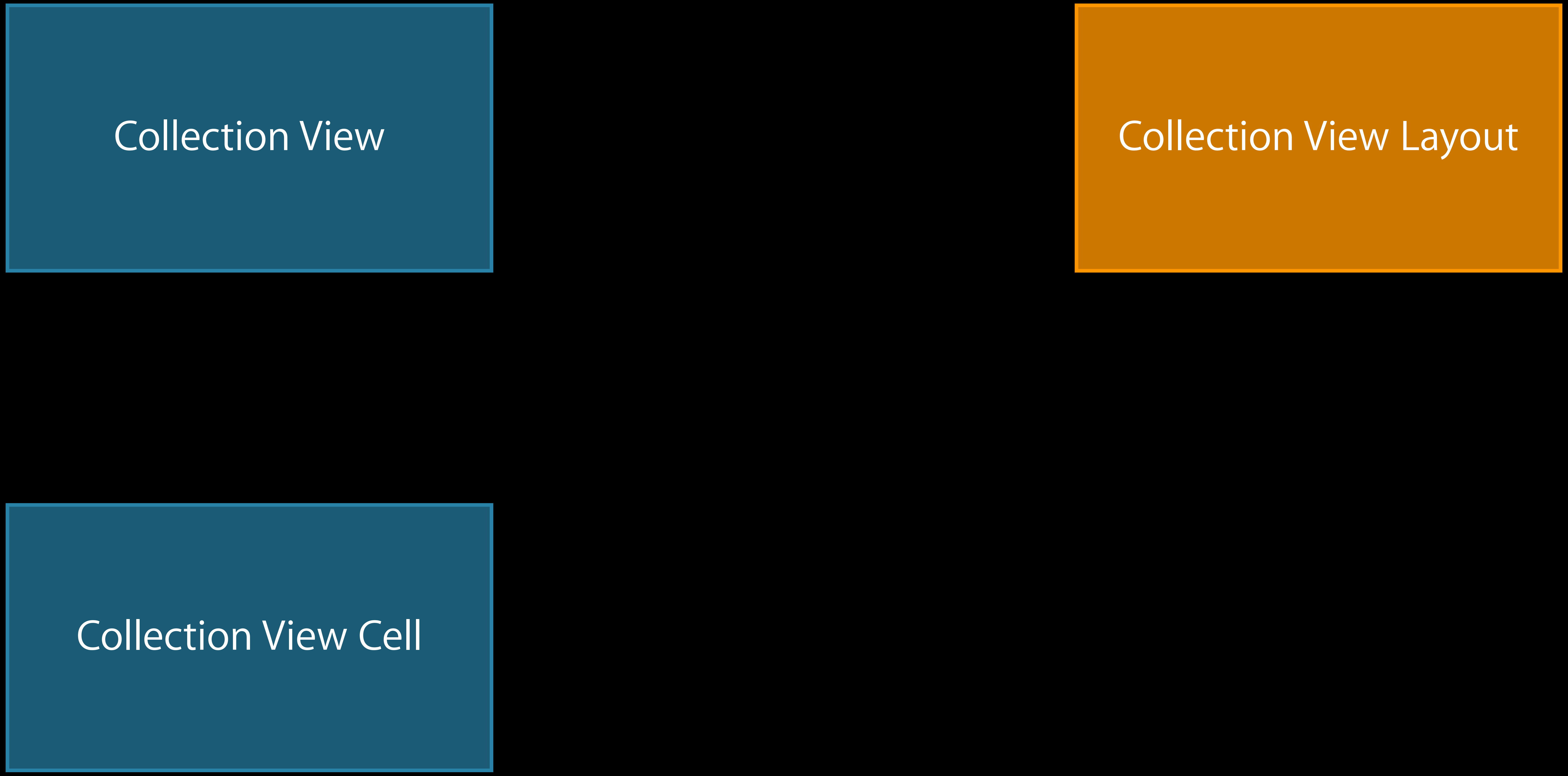
Collection View Cell

# Self-sizing Cells in Flow Layout



Cells are created and self-sized

# Self-sizing Cells in Flow Layout

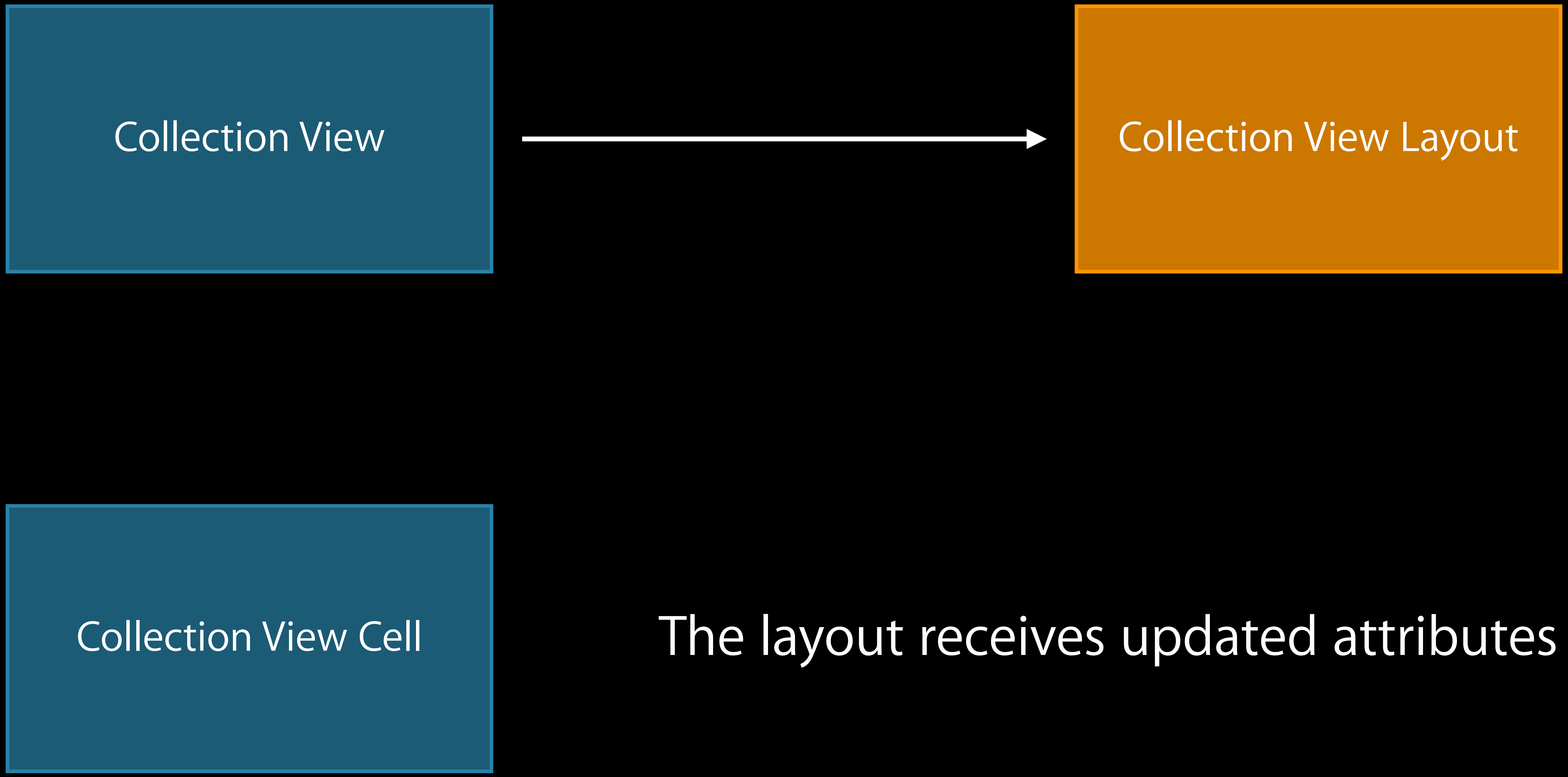


Collection View

Collection View Layout

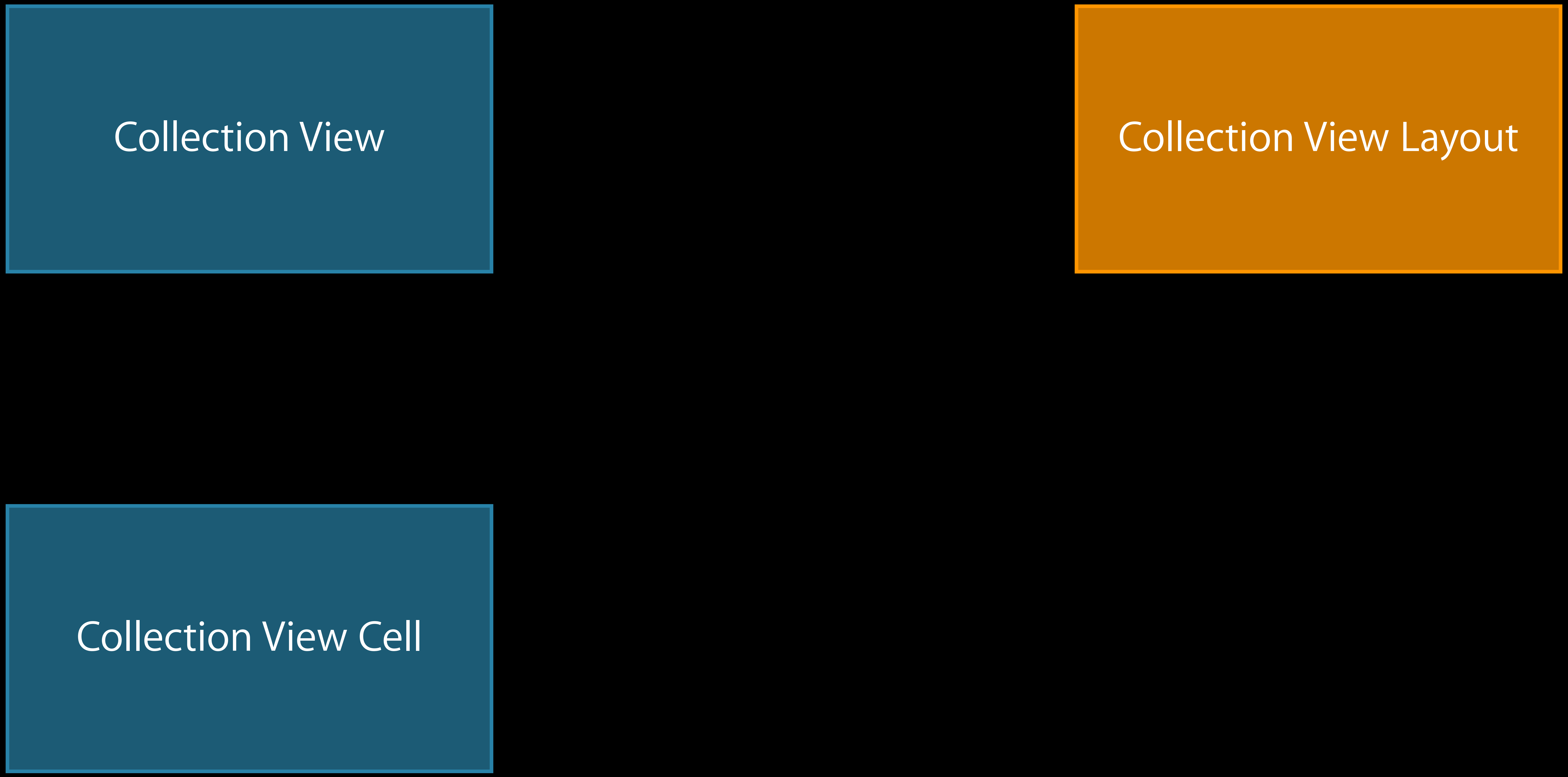
Collection View Cell

# Self-sizing Cells in Flow Layout



The layout receives updated attributes

# Self-sizing Cells in Flow Layout

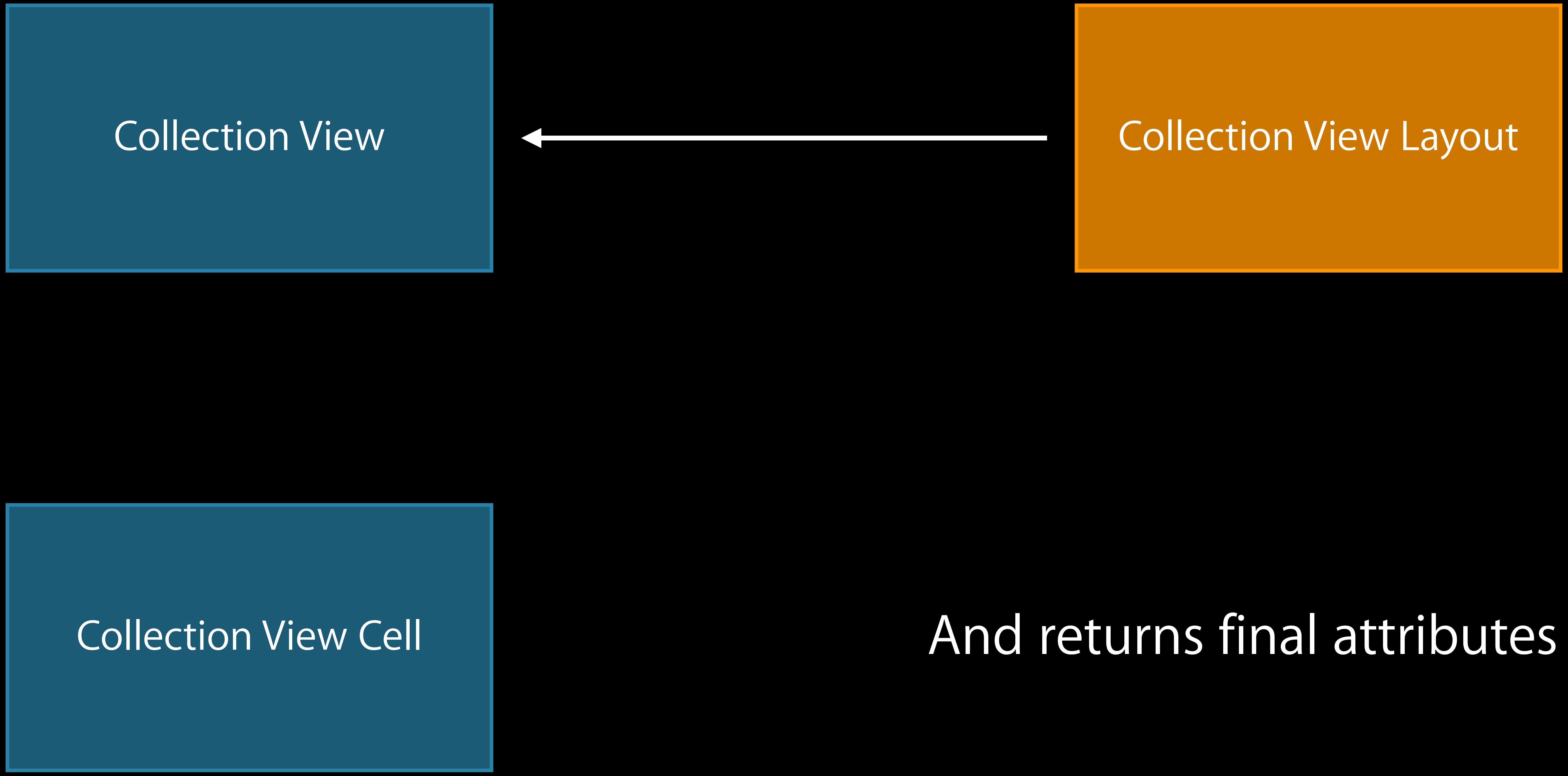


Collection View

Collection View Layout

Collection View Cell

# Self-sizing Cells in Flow Layout

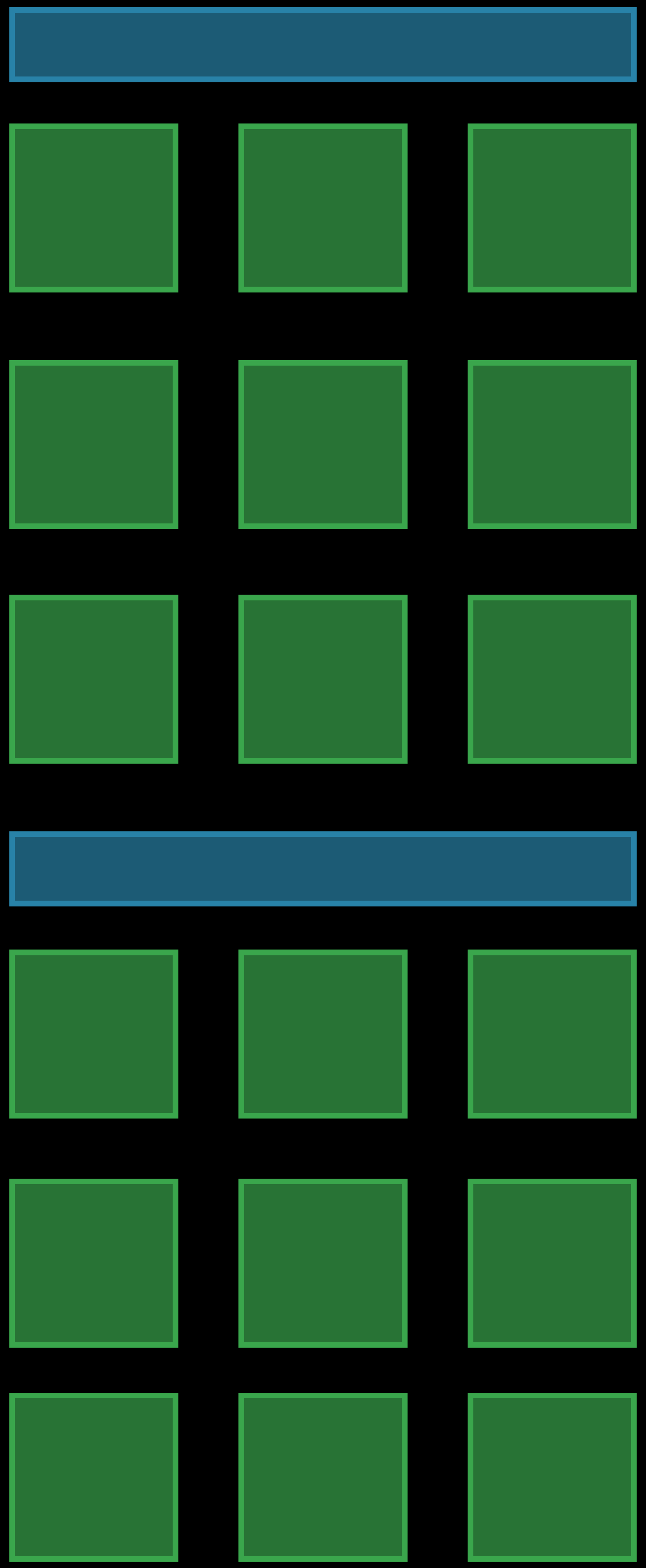


And returns final attributes

# Collection View Invalidation

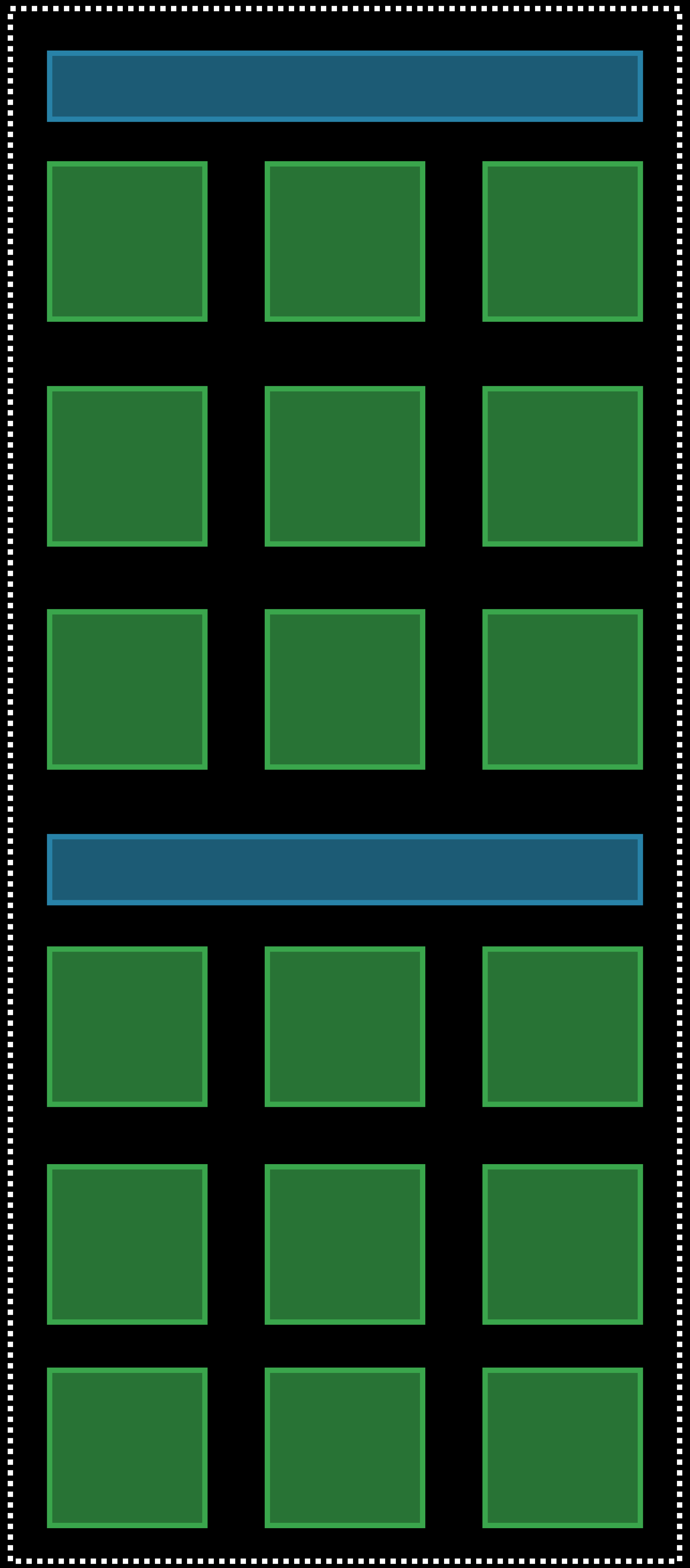
# Collection View Invalidation

`-prepareLayout`



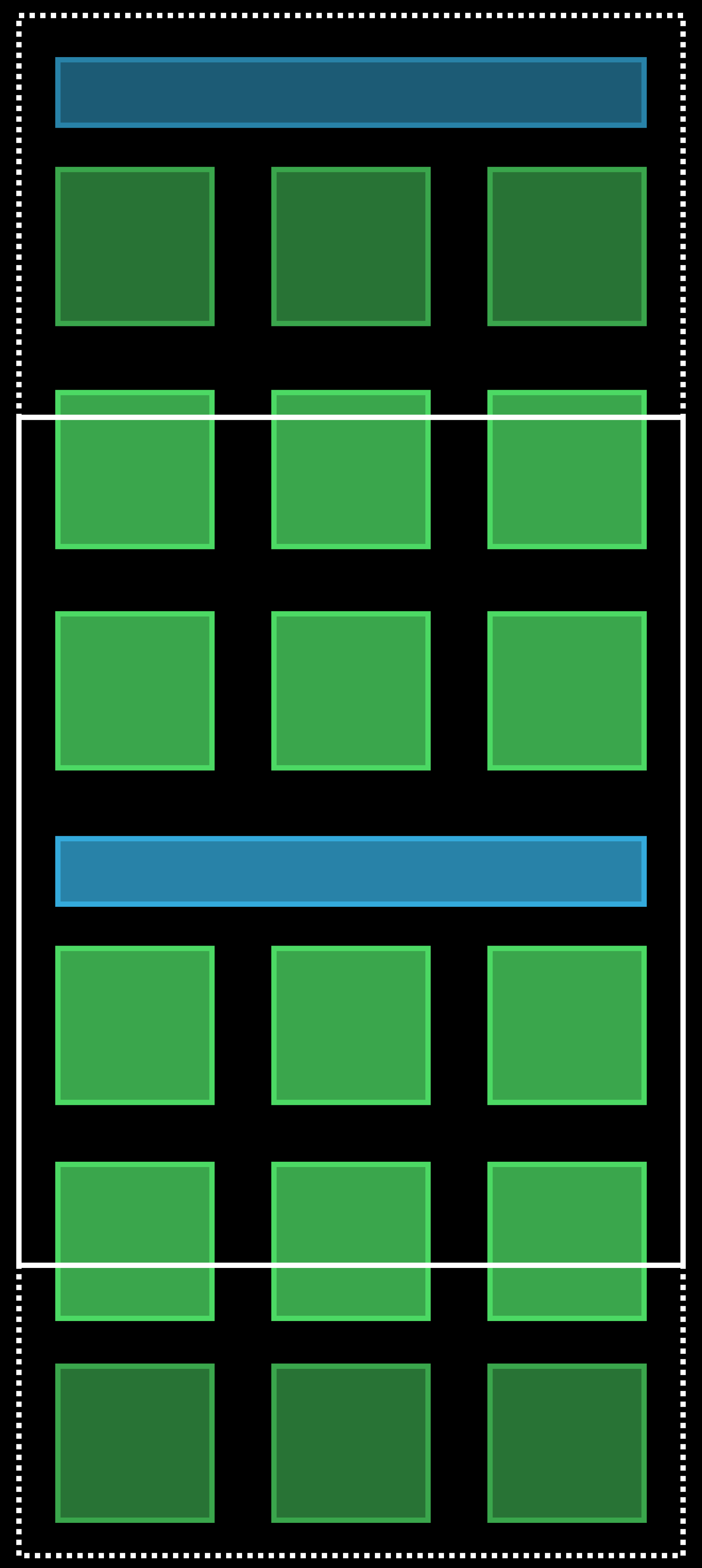
# Collection View Invalidation

```
-prepareLayout
-collectionViewContentSize
```



# Collection View Invalidation

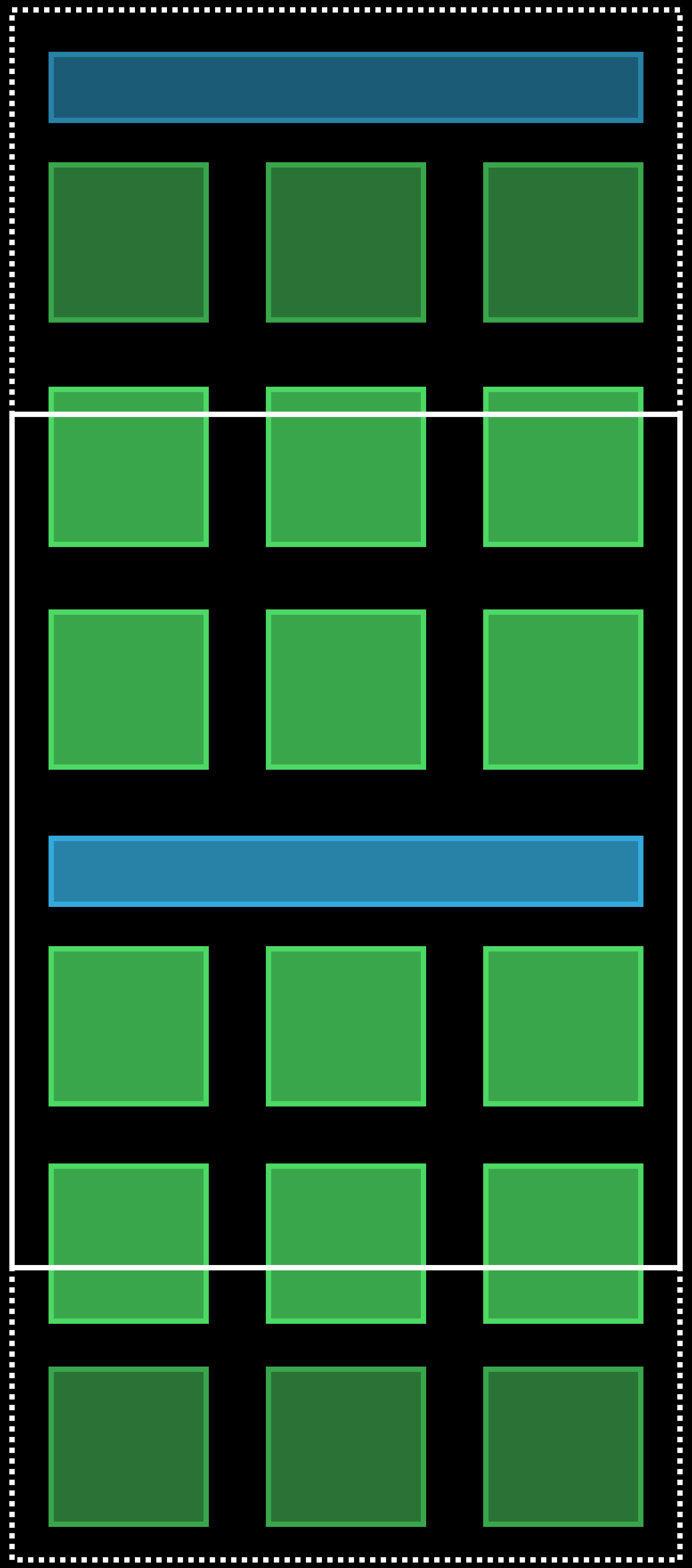
```
-prepareLayout
-collectionViewContentSize
-layoutAttributesForElementsInRect:
```



# Collection View Invalidation

```
-prepareLayout
-collectionViewContentSize
-layoutAttributesForElementsInRect:
```

All other calls

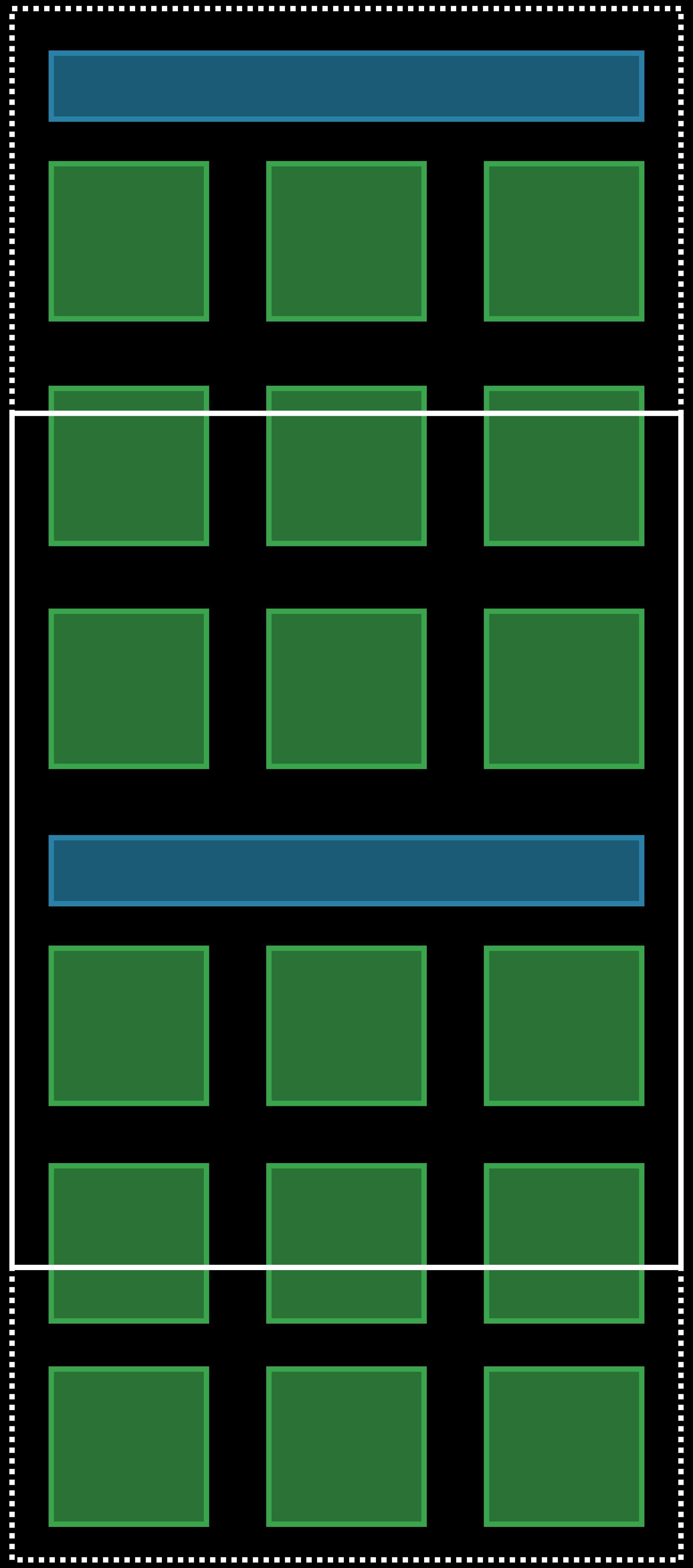


# Collection View Invalidation

```
-prepareLayout
-collectionViewContentSize
-layoutAttributesForElementsInRect:
```

All other calls

```
-invalidateLayout
```



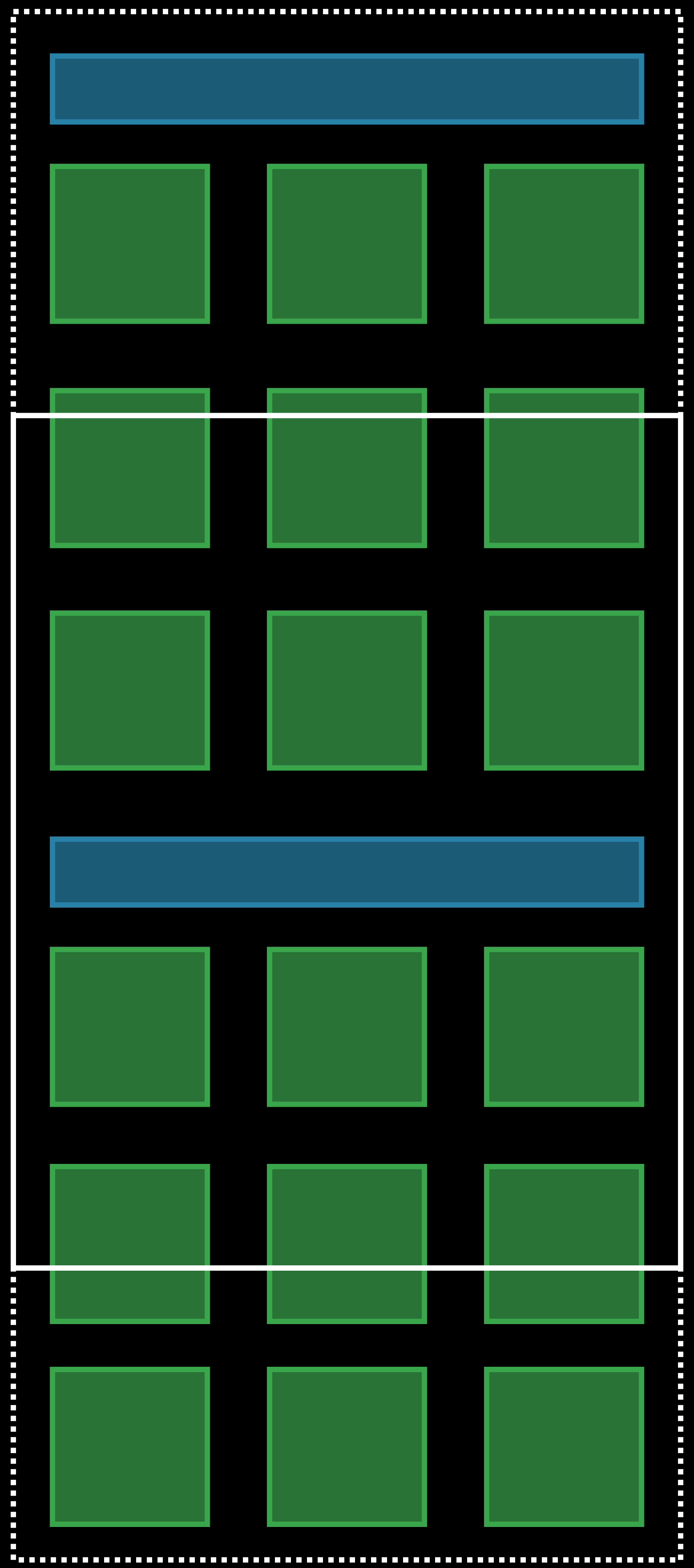
# Collection View Invalidation

```
-prepareLayout
-collectionViewContentSize
-layoutAttributesForElementsInRect:
```

All other calls

```
-invalidateLayout
-prepareLayout
```

…the cycle continues



# How to Build High-performance Layouts

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Recompute only what you need!

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Flow layout is already using invalidation contexts in rotations

# How to Build High-performance Layouts

Recompute only what you need!

Use collection view invalidation contexts

New in ~~iOS 8~~ iOS 7!

Provide fine-grain information to your layout in invalidation situations

Flow layout is already using invalidation contexts in rotations

Now used for self-sizing cells

# Invalidation Contexts

# Invalidation Contexts

Define your own invalidation context class

```
+ (Class)invalidationContextClass
```

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```
+ (Class)invalidationContextClass
```

Invalidate with contextual information

```
- (void)invalidateLayoutWithContext(UICollectionViewLayoutInvalidationContext
*)context;
```

# Invalidation Contexts

Define your own invalidation context class

```
+ (Class)invalidationContextClass
```

Invalidate with contextual information

```
- (void)invalidateLayoutWithContext(UICollectionViewLayoutInvalidationContext
*)context;
```

Override point for bounds change

```
- (UICollectionViewLayoutInvalidationContext
*)invalidationContextForBoundsChange:(CGRect)newBounds;
```

# Invalidation Contexts

# Invalidation Contexts

```
@property (nonatomic, readonly) BOOL invalidateDataSourceCounts;
```

# Invalidation Contexts

```
@property (nonatomic, readonly) BOOL invalidateDataSourceCounts;
@property (nonatomic, readonly) BOOL invalidateEverything;
```

# Invalidation Contexts

```
@property (nonatomic, readonly) BOOL invalidateDataSourceCounts;
@property (nonatomic, readonly) BOOL invalidateEverything;
```

The collection view set in response to specific types of invalidation

# Invalidation Contexts in iOS 8

NEW

# Invalidation Contexts in iOS 8

NEW

Collaboration between your layout and collection view

# Invalidation Contexts in iOS 8

NEW

Collaboration between your layout and collection view

You can pass information to the collection view to enable smart invalidation

# Invalidation Contexts in iOS 8

NEW

Collaboration between your layout and collection view

You can pass information to the collection view to enable smart invalidation

- High-performance floating headers

# Invalidation Contexts in iOS 8

NEW

Collaboration between your layout and collection view

You can pass information to the collection view to enable smart invalidation

- High-performance floating headers
- Avoid visual ‘jumps’ with self-sizing cells

# Invalidation Contexts in iOS 8

NEW

# Invalidation Contexts in iOS 8

NEW

Fine-grain invalidation

# Invalidation Contexts in iOS 8

NEW

Fine-grain invalidation

```
- (void)invalidateItemsAtIndexPaths:(NSArray *)indexPaths;
```

# Invalidation Contexts in iOS 8

NEW

Fine-grain invalidation

```
- (void)invalidateItemsAtIndexPaths:(NSArray *)indexPaths;
- (void)invalidateSupplementaryElementsOfKind:(NSString *)elementKind
atIndexPaths:(NSArray *)indexPaths;
```

# Invalidation Contexts in iOS 8

NEW

Fine-grain invalidation

```
- (void)invalidateItemsAtIndexPaths:(NSArray *)indexPaths;
- (void)invalidateSupplementaryElementsOfKind:(NSString *)elementKind
atIndexPaths:(NSArray *)indexPaths;
- (void)invalidateDecorationElementsOfKind:(NSString *)elementKind atIndexPaths:
(NSArray *)indexPaths
```

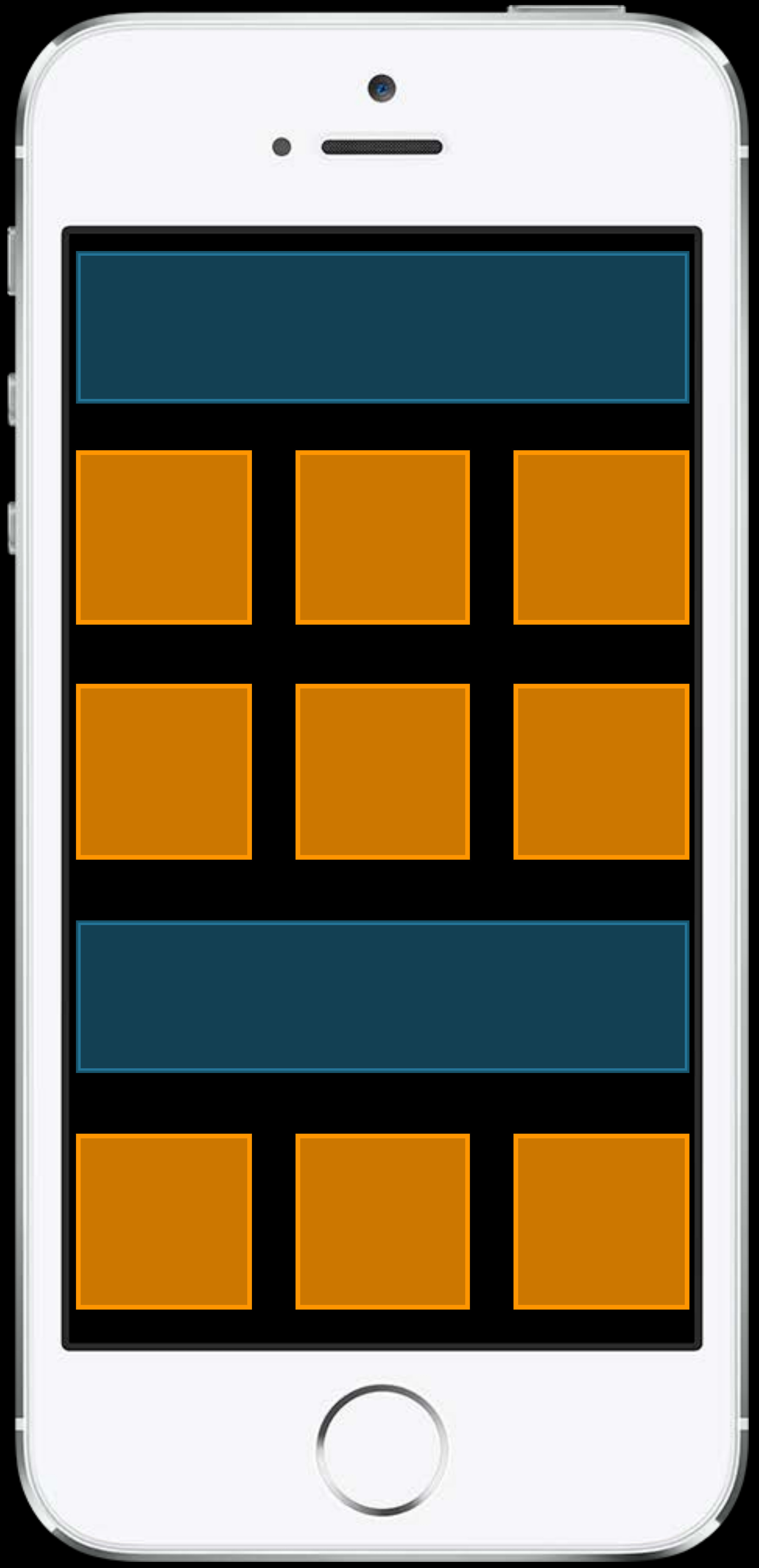
# Invalidation Contexts in iOS 8

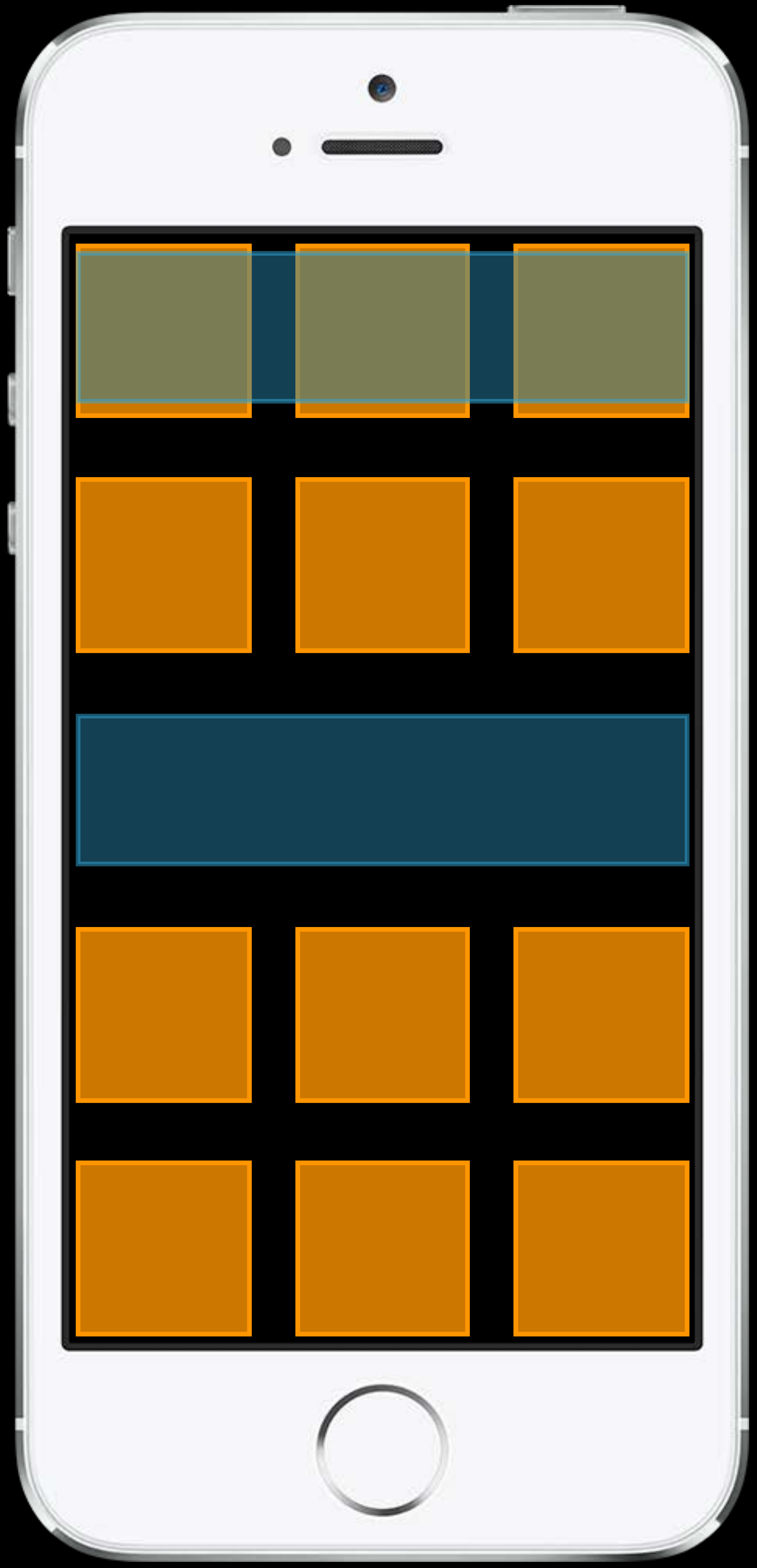
NEW

Fine-grain invalidation

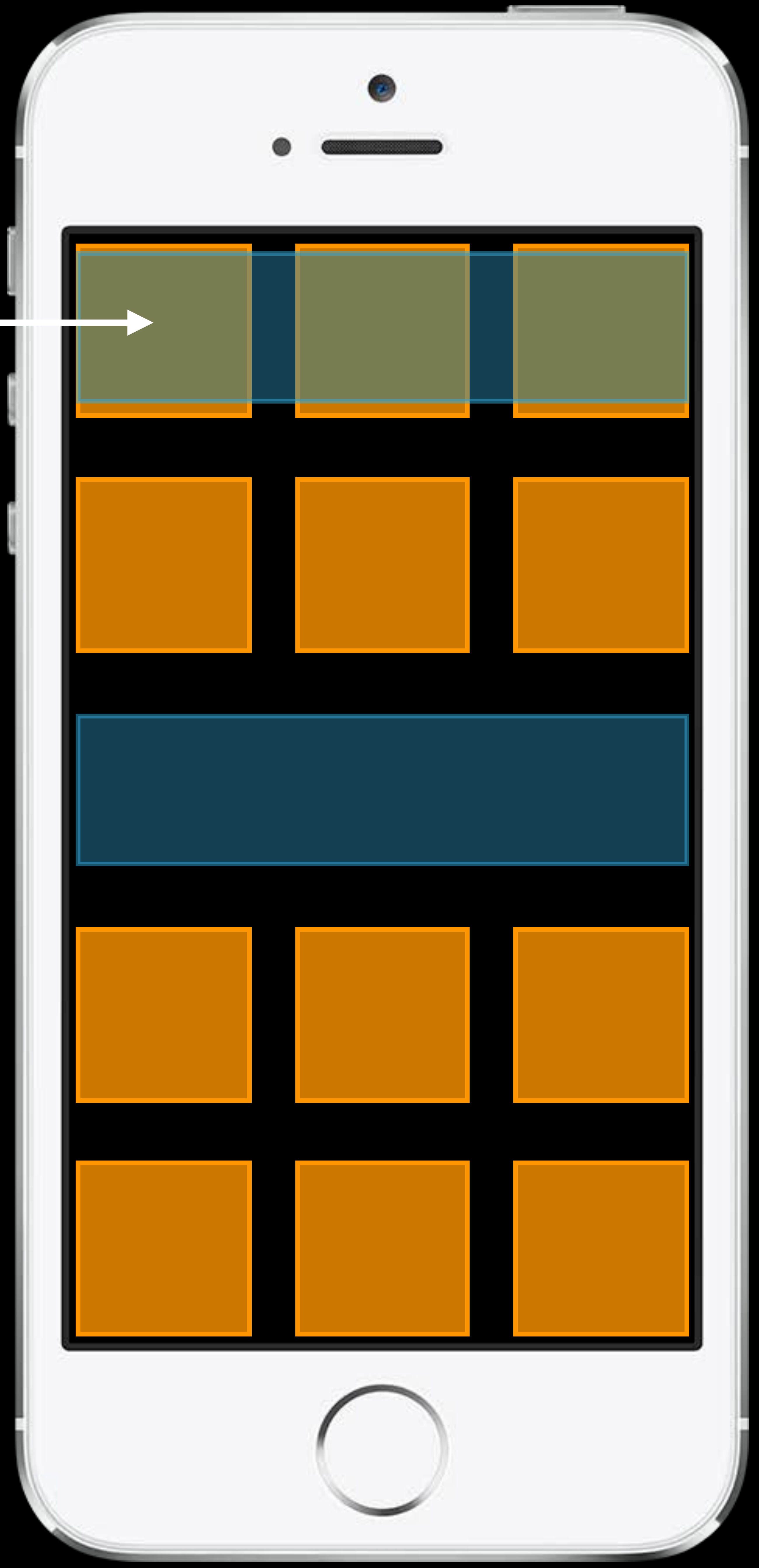
```
– (void)invalidateItemsAtIndexPaths:(NSArray *)indexPaths;
– (void)invalidateSupplementaryElementsOfKind:(NSString *)elementKind
atIndexPaths:(NSArray *)indexPaths;
– (void)invalidateDecorationElementsOfKind:(NSString *)elementKind atIndexPaths:
(NSArray *)indexPaths
```

```
@property (nonatomic, readonly) NSArray *invalidatedItemIndexPaths;
@property (nonatomic, readonly) NSDictionary *invalidatedSupplementaryIndexPaths;
@property (nonatomic, readonly) NSDictionary *invalidatedDecorationIndexPaths;
```

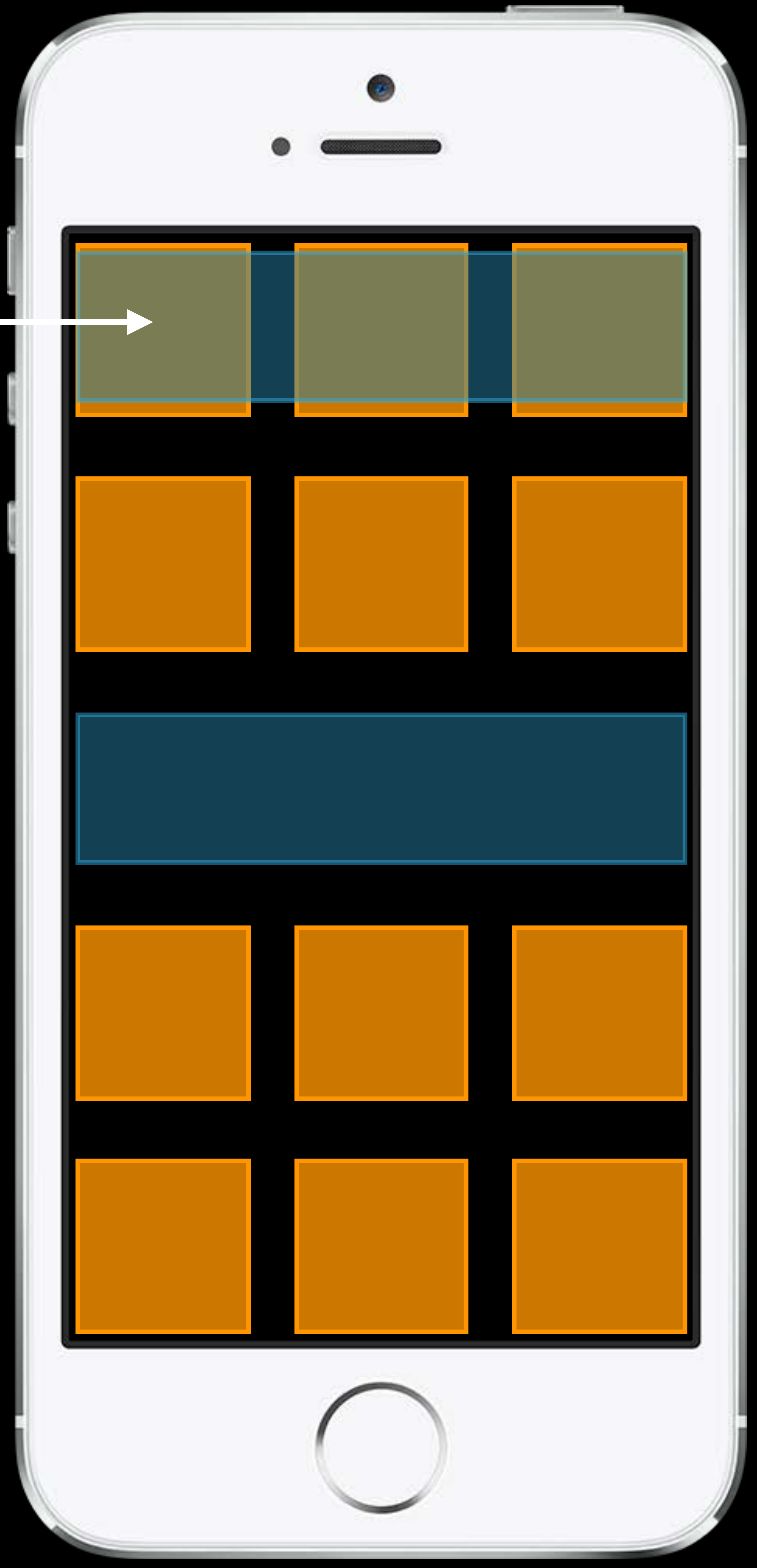




Invalidate supplementary view



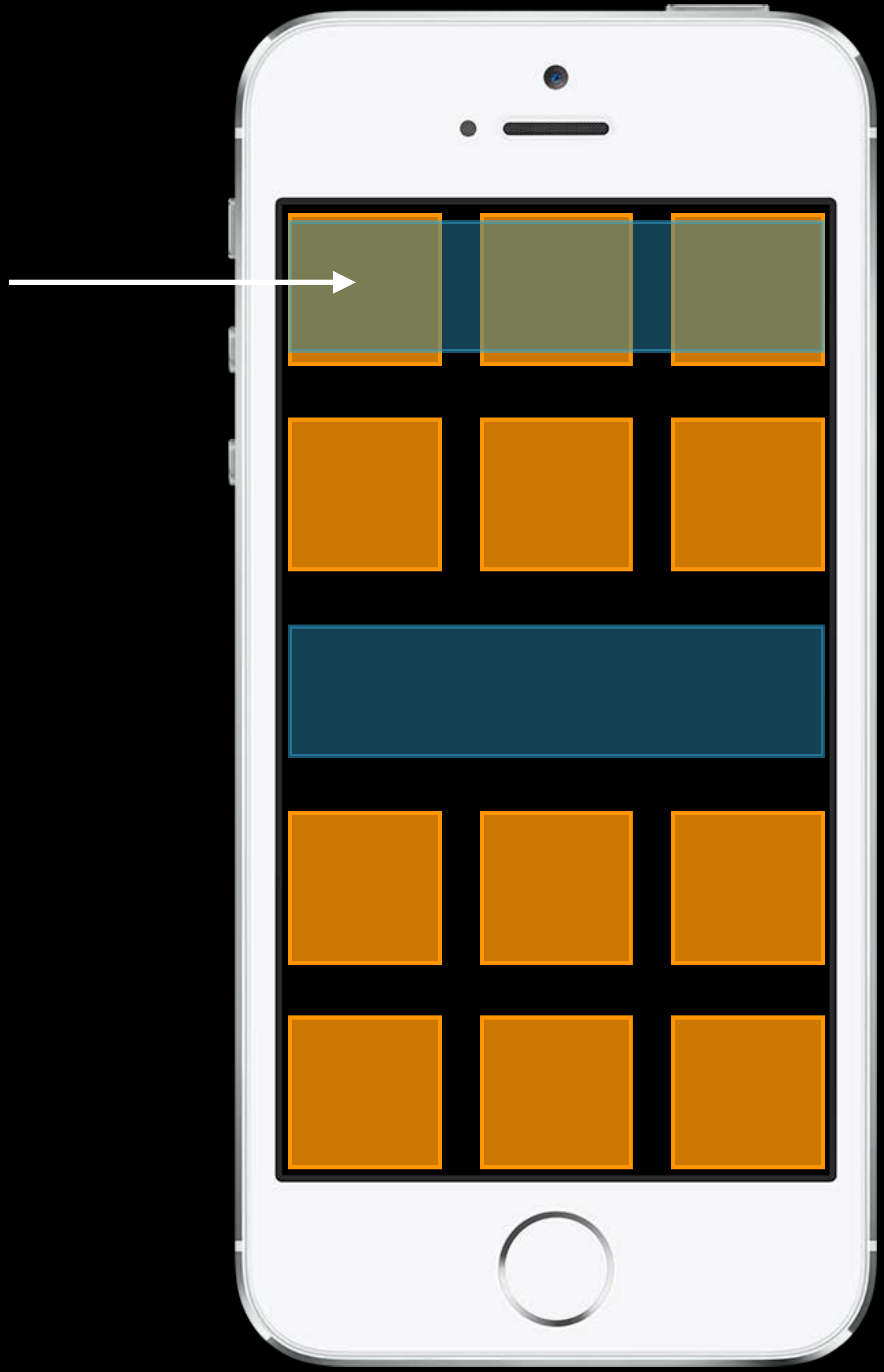
Invalidate supplementary view



The collection view will query layoutAttributes for this index path only

`layoutAttributesForSupplementaryViewOfKind:atIndexPath:`

Invalidate supplementary view



The collection view will query layoutAttributes for this index path only

`layoutAttributesForSupplementaryViewOfKind:atIndexPath:`

And not

`layoutAttributesForElementsInRect:`

# Invalidation Contexts in iOS 8

NEW

# Invalidation Contexts in iOS 8

NEW

Inform the collection view of a content-size change

# Invalidation Contexts in iOS 8

NEW

Inform the collection view of a content-size change

```
@property (nonatomic) CGSize contentSizeAdjustment;
```

# Invalidation Contexts in iOS 8

NEW

Inform the collection view of a content-size change

```
@property (nonatomic) CGSize contentSizeAdjustment;
@property (nonatomic) CGPoint contentOffsetAdjustment;
```

# Invalidation Contexts in iOS 8

NEW

# Invalidation Contexts in iOS 8

NEW

Layout support for self-sizing cells

# Invalidation Contexts in iOS 8

NEW

Layout support for self-sizing cells

```
- (BOOL)shouldInvalidateLayoutForPreferredLayoutAttributes:
(UICollectionViewLayoutAttributes *)preferredAttributes
withOriginalAttributes:(UICollectionViewLayoutAttributes *)originalAttributes
```

# Invalidation Contexts in iOS 8

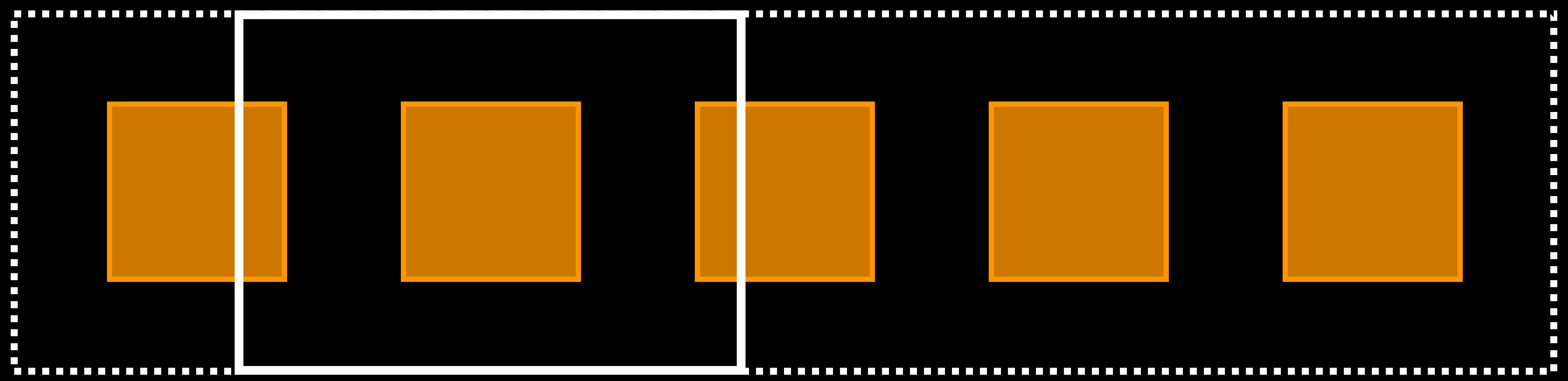
NEW

Layout support for self-sizing cells

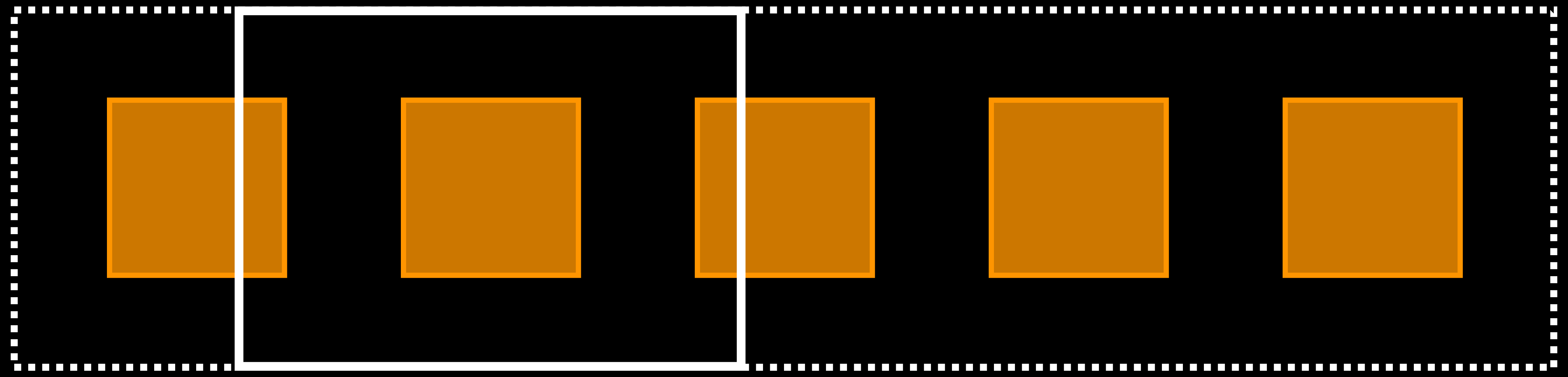
```
- (BOOL)shouldInvalidateLayoutForPreferredLayoutAttributes:
(UICollectionViewLayoutAttributes *)preferredAttributes
withOriginalAttributes:(UICollectionViewLayoutAttributes *)originalAttributes
- (UICollectionViewLayoutInvalidationContext *)
invalidationContextForPreferredLayoutAttributes:
(UICollectionViewLayoutAttributes  *)preferredAttributes
withOriginalAttributes:
(UICollectionViewLayoutAttributes *)originalAttributes;
```

# Self-sizing Cells in a Custom Layout

# Self-sizing Cells in a Custom Layout

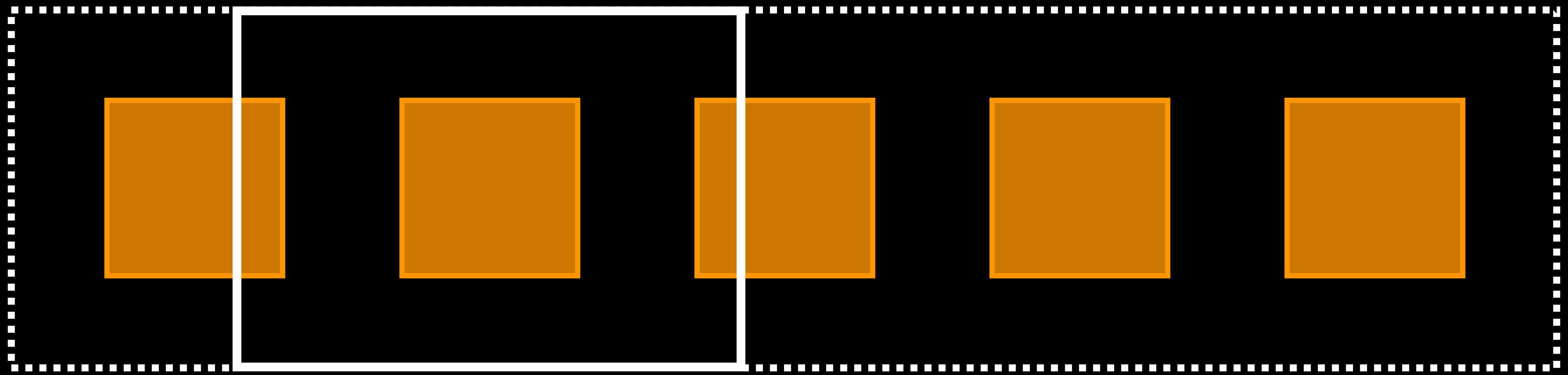


# Self-sizing Cells in a Custom Layout



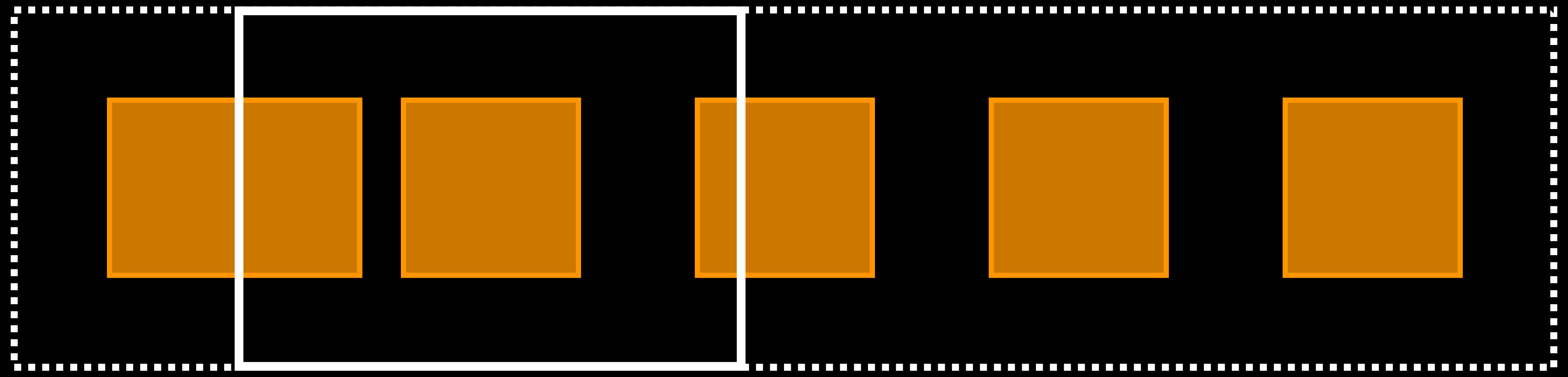
Generate a first approximation by returning layout attributes in `layoutAttributesForElementsInRect:`

# Self-sizing Cells in a Custom Layout



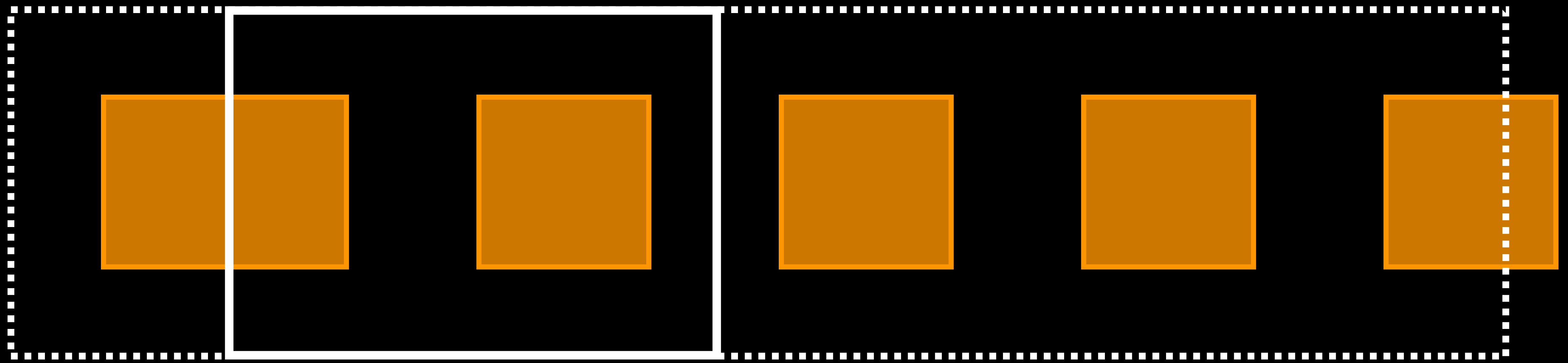
The collection view will dequeue and query cells

# Self-sizing Cells in a Custom Layout



Cells can self-size with auto layout, `sizeThatFits:` or `preferredLayoutAttributesFittingAttributes:`

# Self-sizing Cells in a Custom Layout

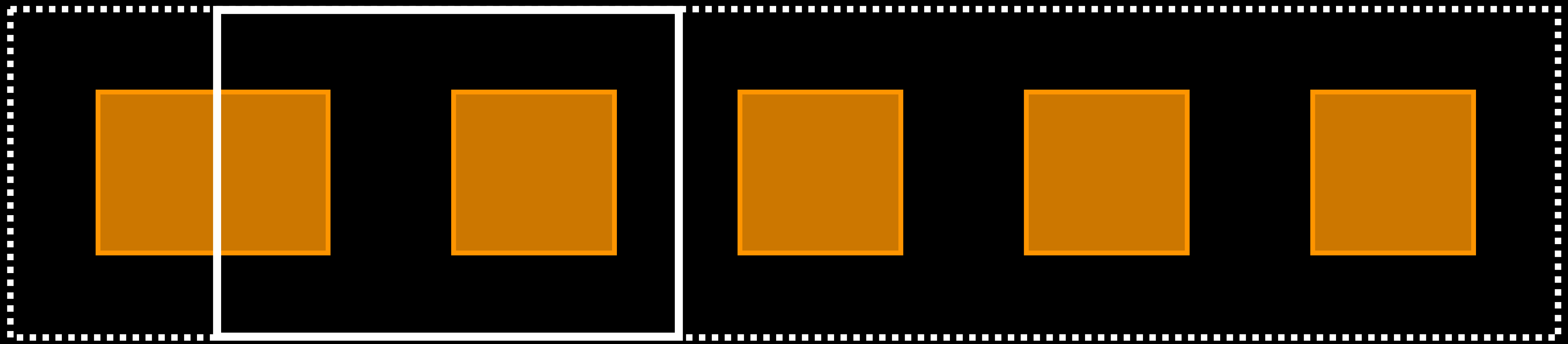


Other layout attributes (position) can then be invalidated:

`shouldInvalidateLayoutForPreferredLayoutAttributes:withOriginalAttributes:`

`invalidationContextForPreferredLayoutAttributes:withOriginalAttributes:`

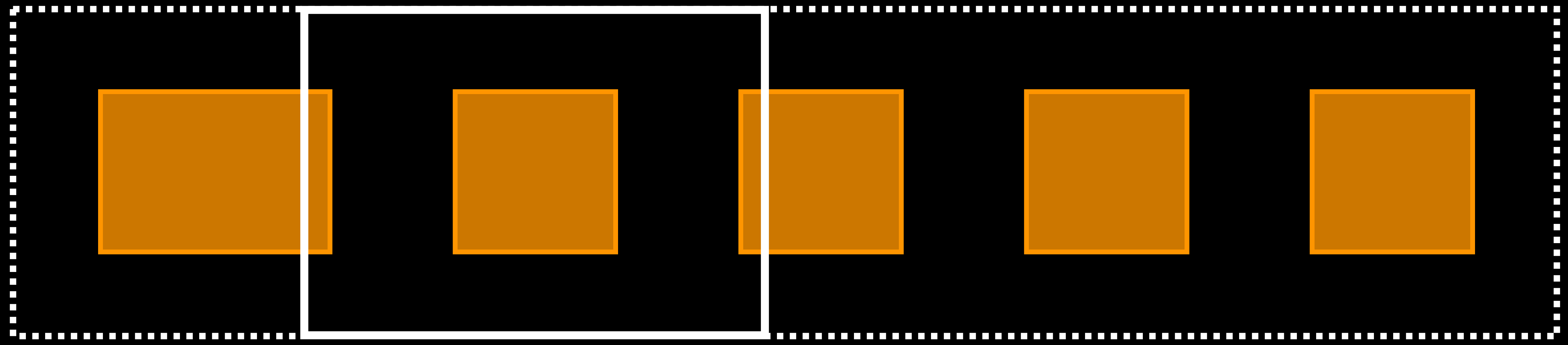
# Self-sizing Cells in a Custom Layout



The collection view layout content size must change

`contentSizeAdjustment`

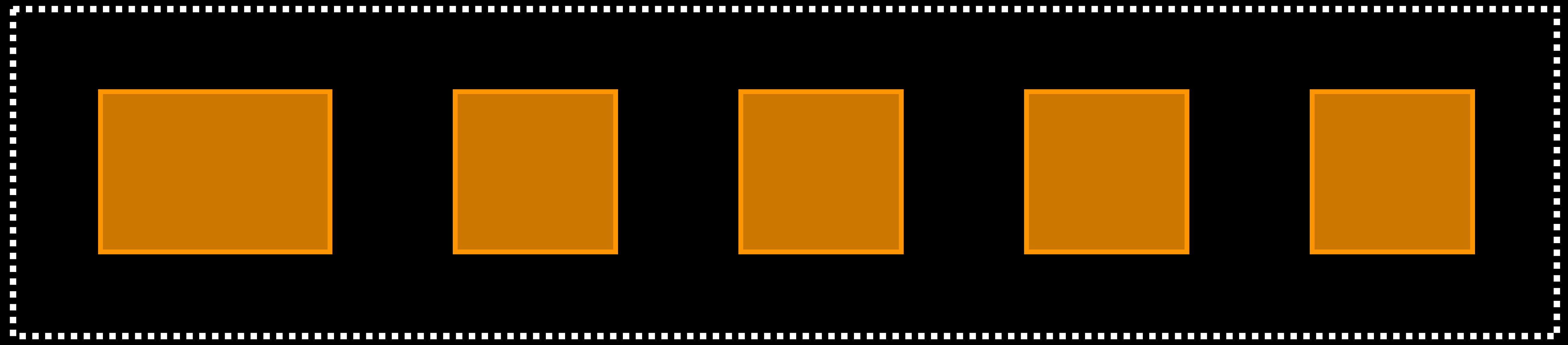
# Self-sizing Cells in a Custom Layout



The collection view layout offset must change

`contentOffsetAdjustment`

# Self-sizing Cells in a Custom Layout



The actual implementation is layout specific

# Final Thoughts

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Every app should adopt Dynamic Type

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Self-sizing cells will help

# Final Thoughts

Every app should adopt Dynamic Type

Self-sizing cells will help

Use invalidation contexts for high-performance collection view layouts

# Related Sessions

| | | |
|---|---|---|
| ● Advanced User Interfaces with Collection Views | Marina | Thursday 3:15PM |

# Labs

| | | |
|---|---|---|
| Table View and Collection View Lab | Frameworks Lab A | Thursday 11:30AM |
| Cocoa Touch Lab | Frameworks Lab A | Thursday 2:00PM |

# More Information

Jake Behrens
iOS Frameworks Evangelist
behrens@apple.com

Table View and Collection View Reference Guides
https://developer.apple.com/library/prerelease/ios

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

WWDC14