

Auto Layout Techniques in Interface Builder

Session 412

Jonathon Mah, Interface Builder Engineer
Jason Yao, Interface Builder Engineer



9:41 AM

100%

[Edit](#)

Find My Dates

[Cart](#)

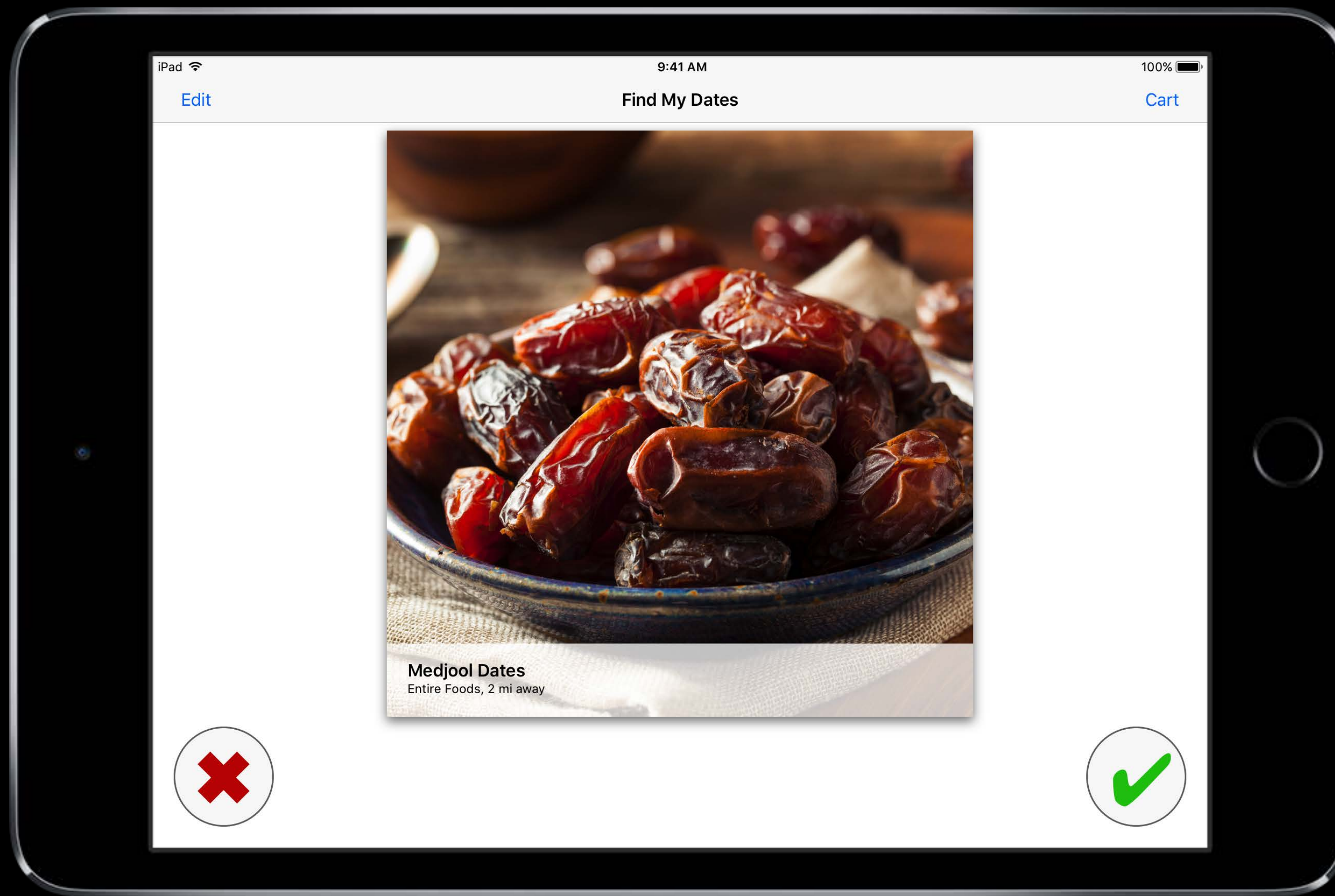
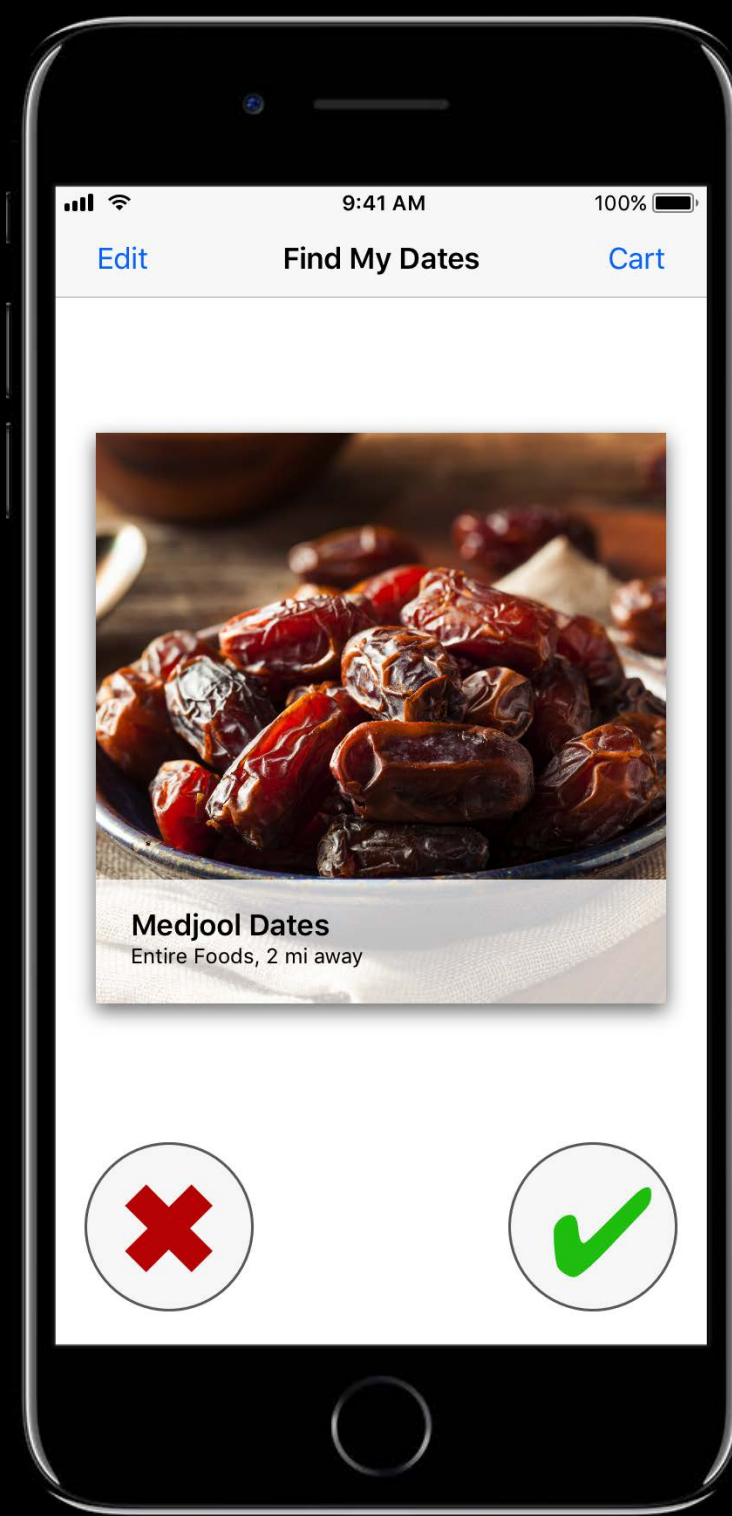
Maximum Distance



Medjool Dates

Entire Foods, 2 mi away





Changing layout at runtime

Tracking touch

Dynamic type

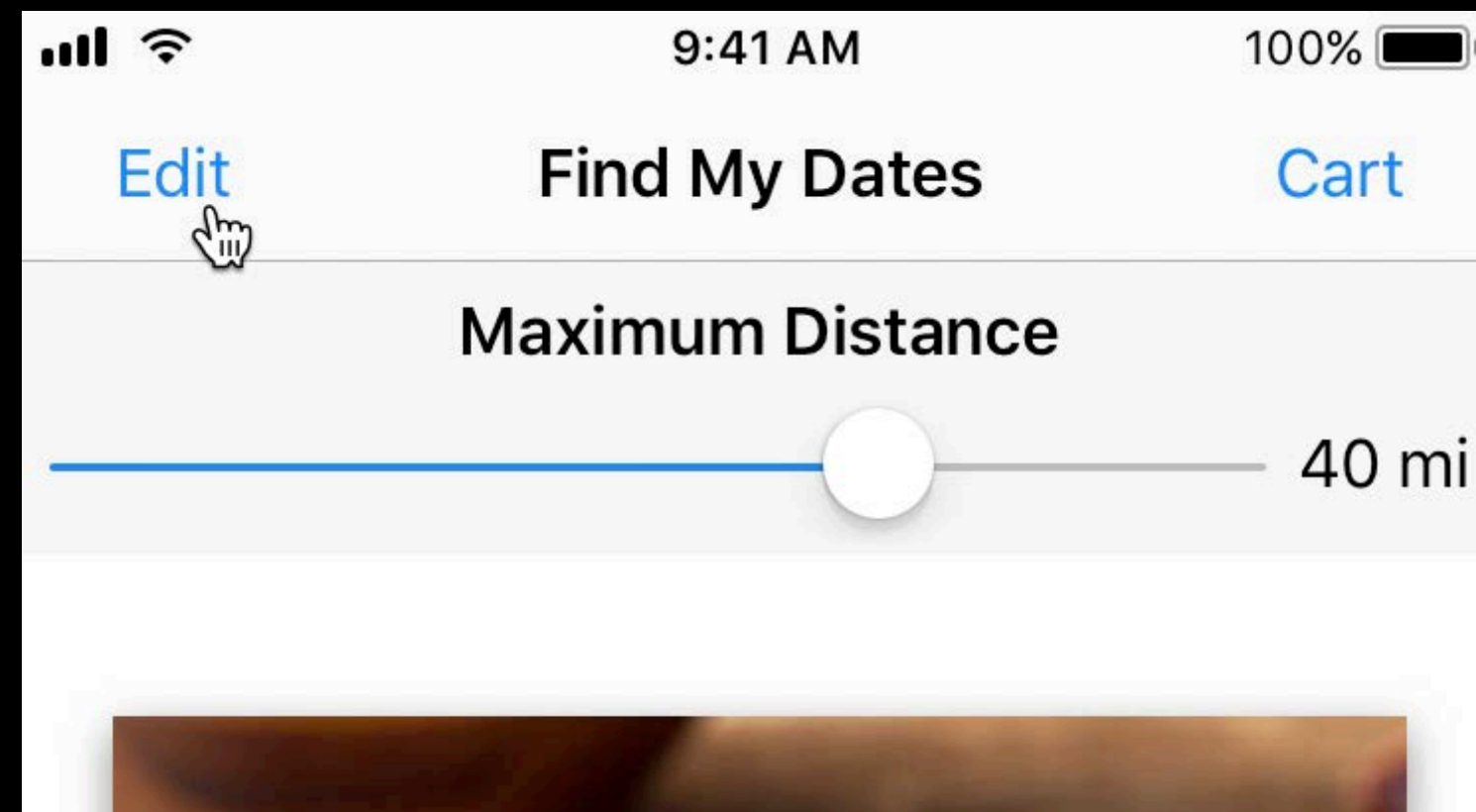
Safe areas

Proportional positioning

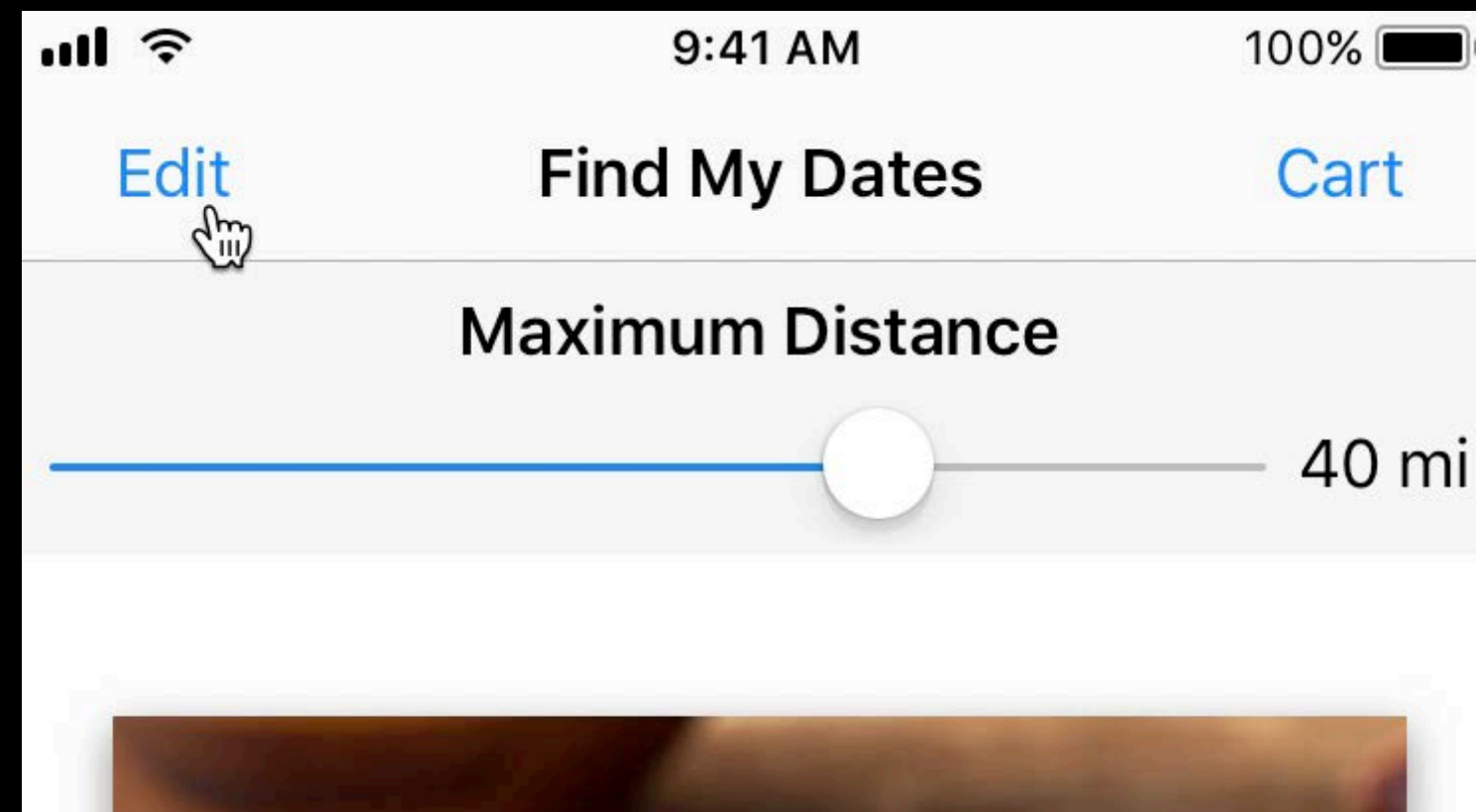
Stack view adaptive layout

Changing Layout at Runtime

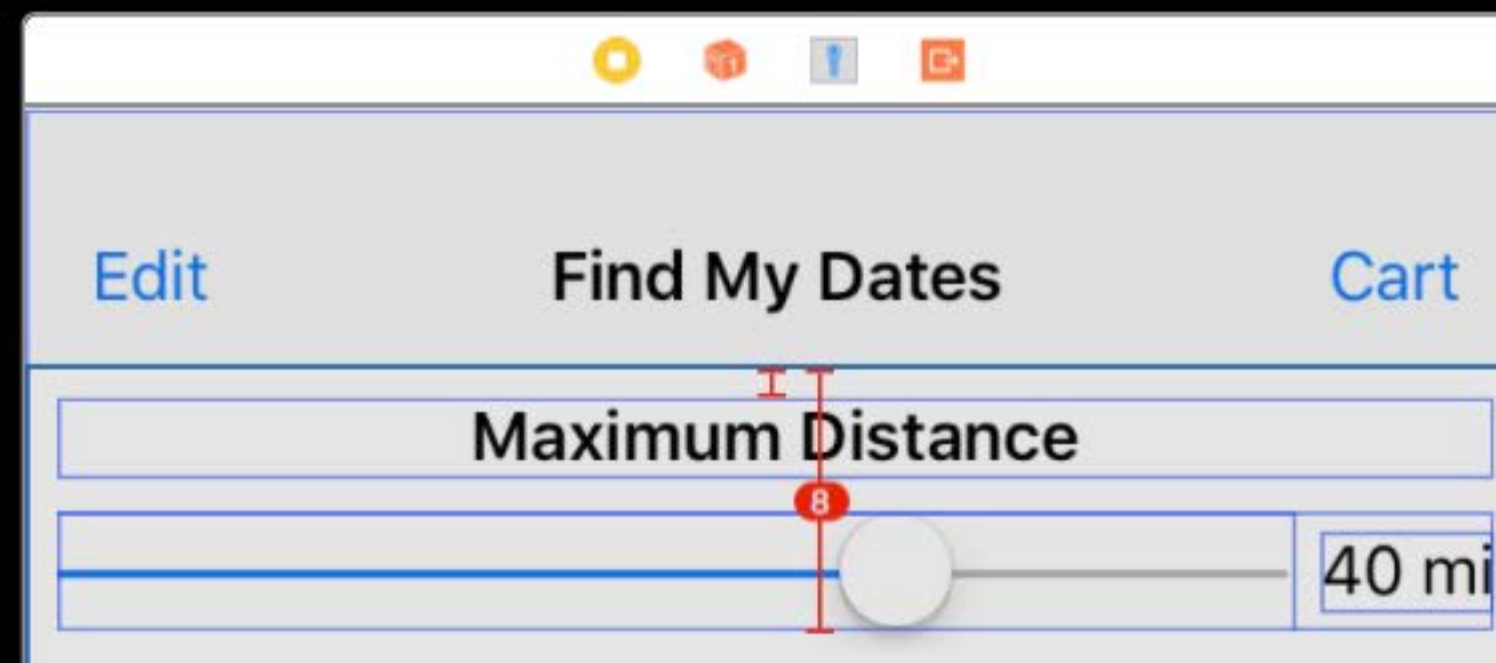
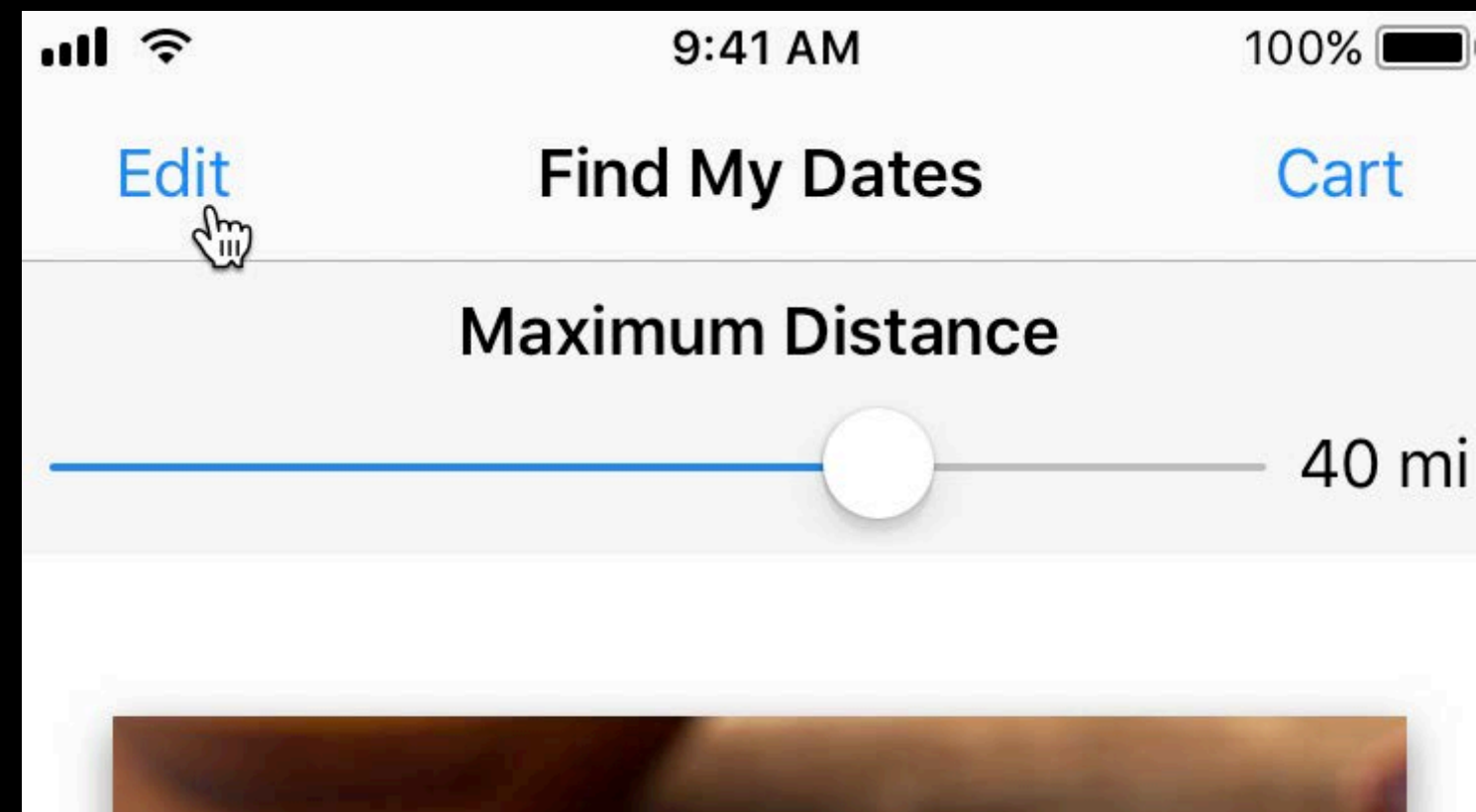
Changing Layout at Runtime



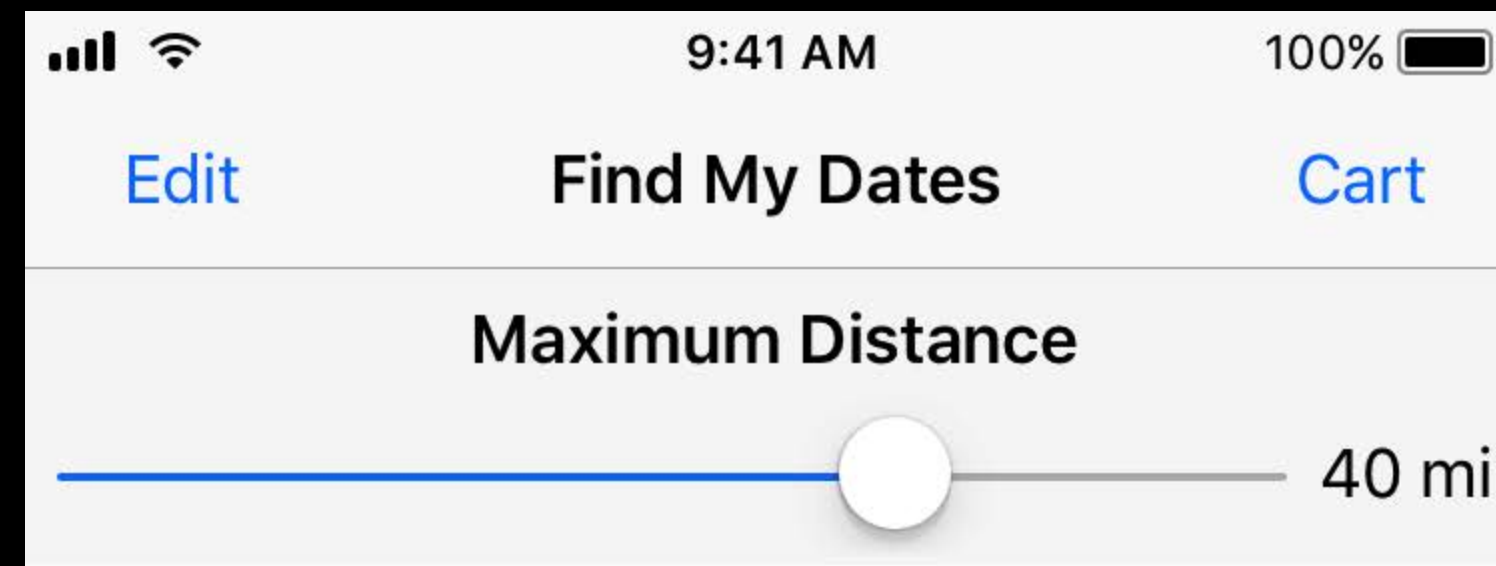
Changing Layout at Runtime



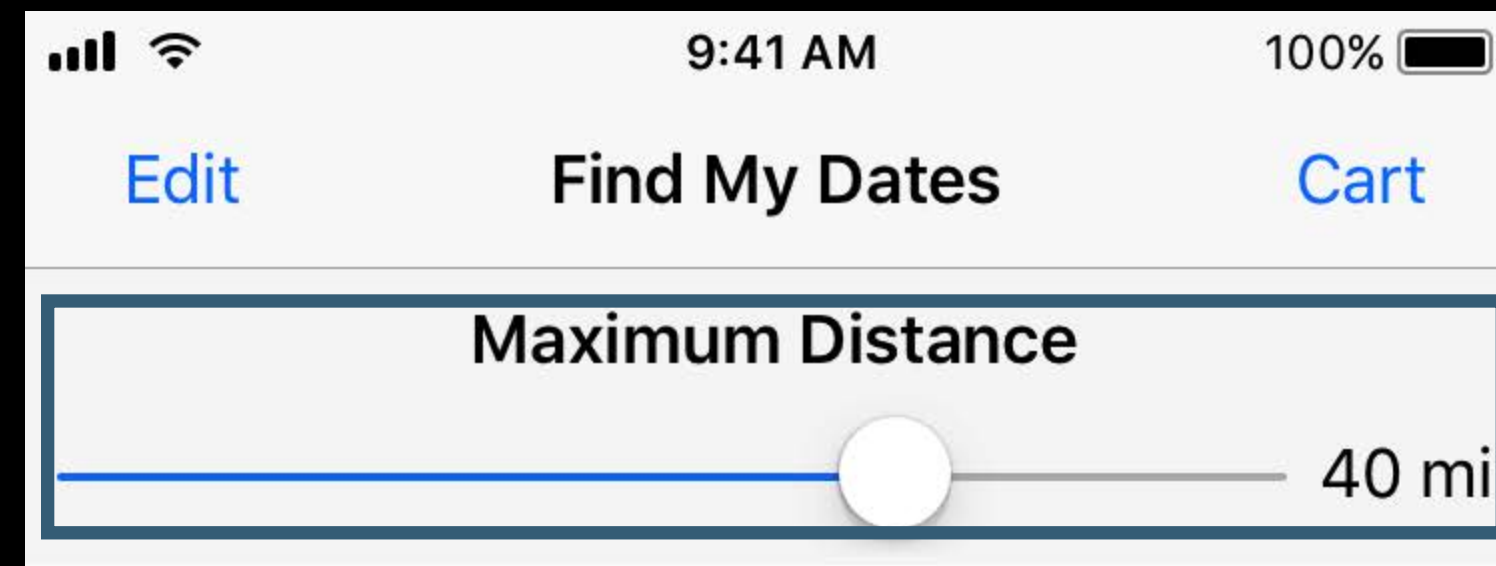
Changing Layout at Runtime



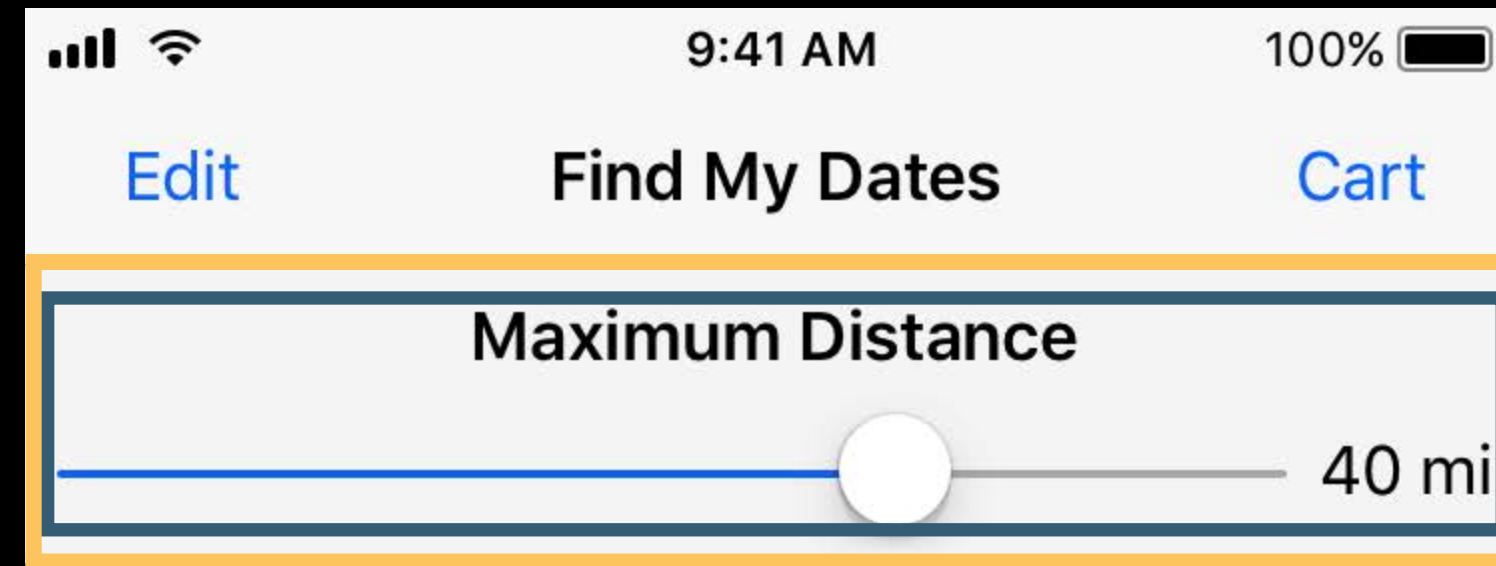
Changing Layout at Runtime



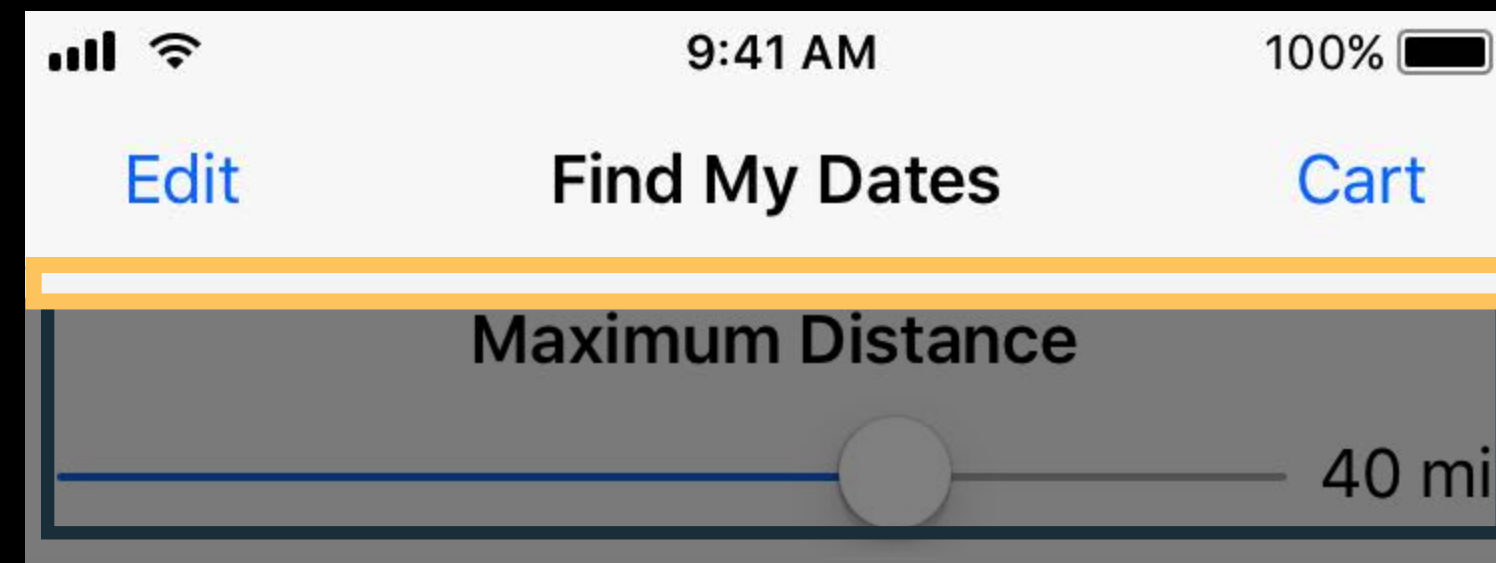
Changing Layout at Runtime



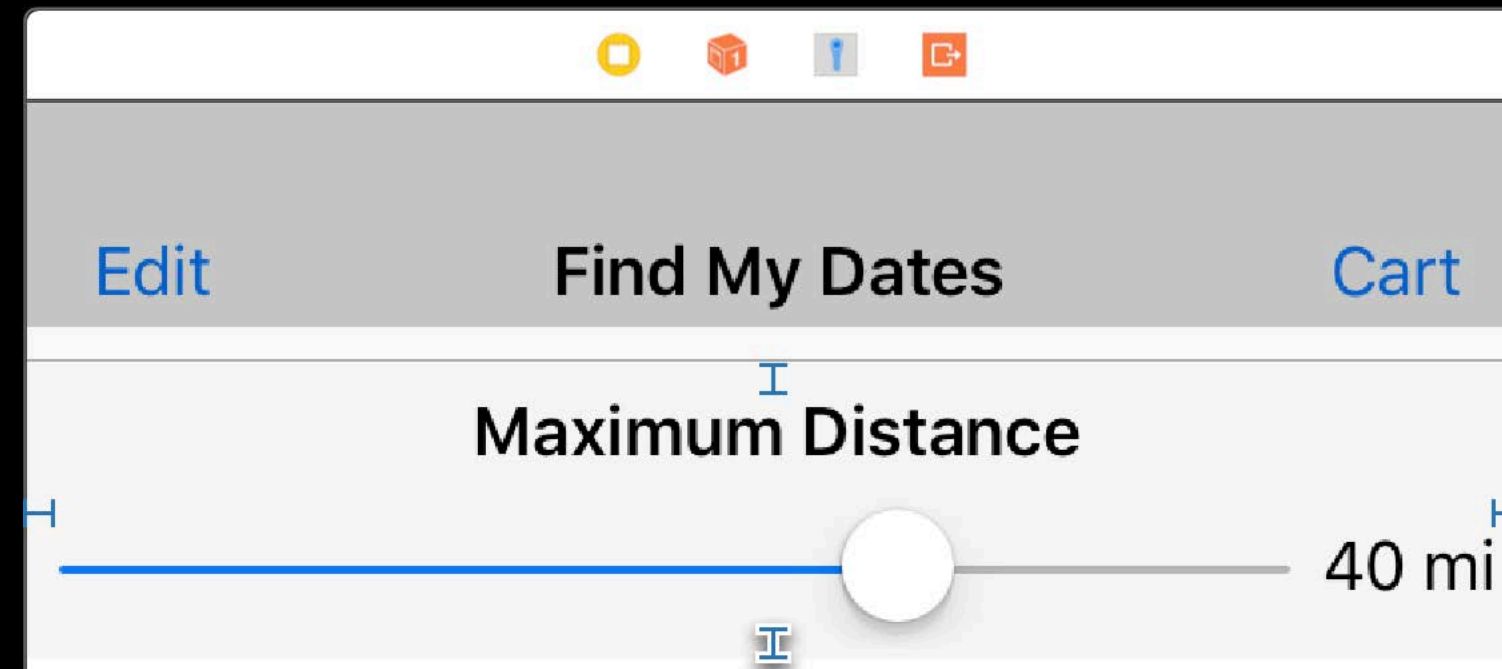
Changing Layout at Runtime



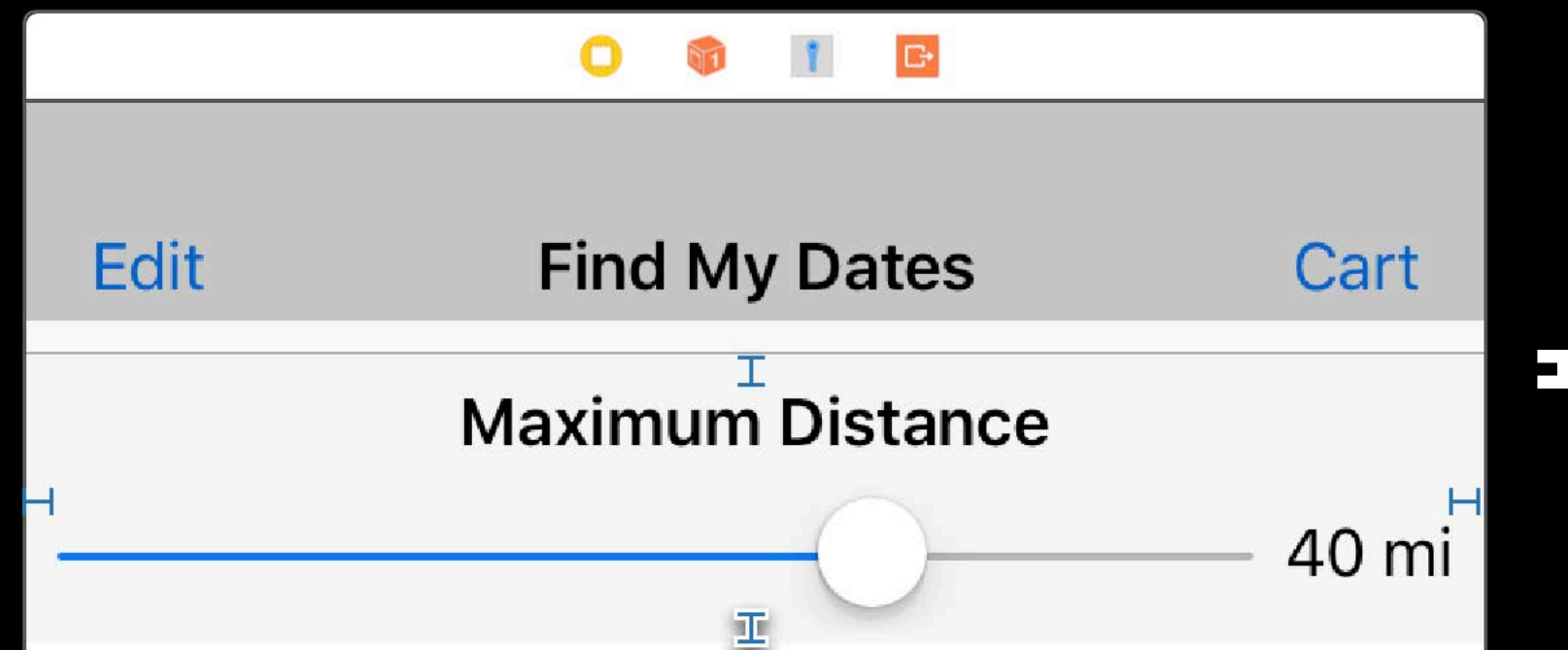
Changing Layout at Runtime



Changing Layout at Runtime

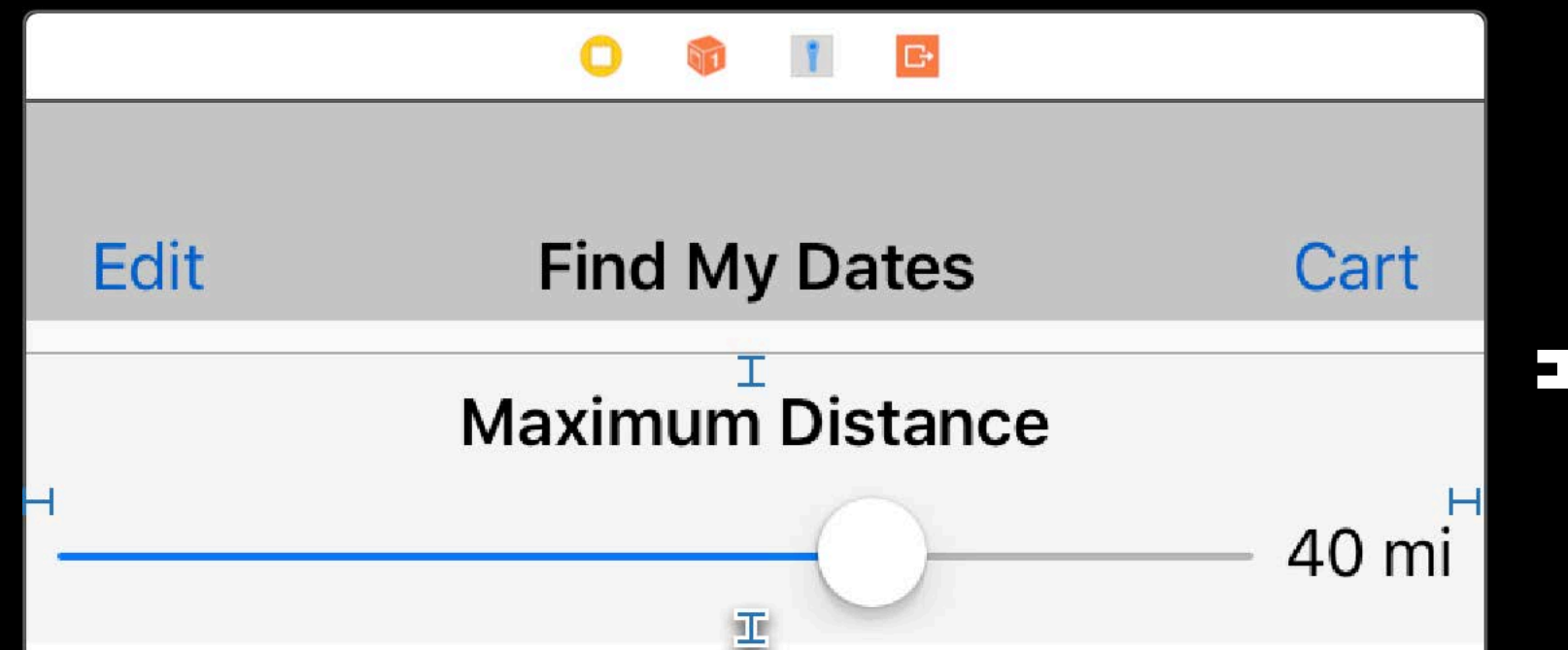


Changing Layout at Runtime



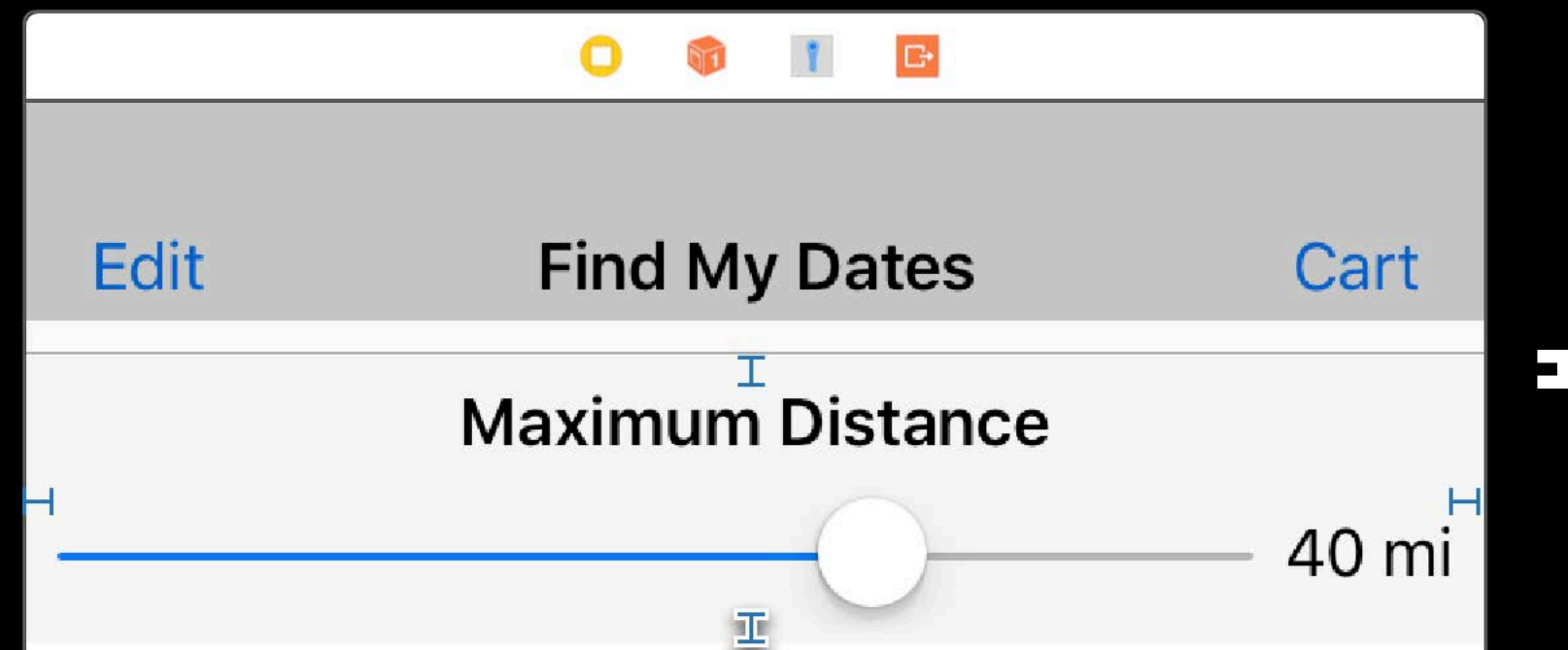
```
let zeroHeightConstraint = wrappingView.heightAnchor.constraint(equalToConstant: 0)
```

Changing Layout at Runtime



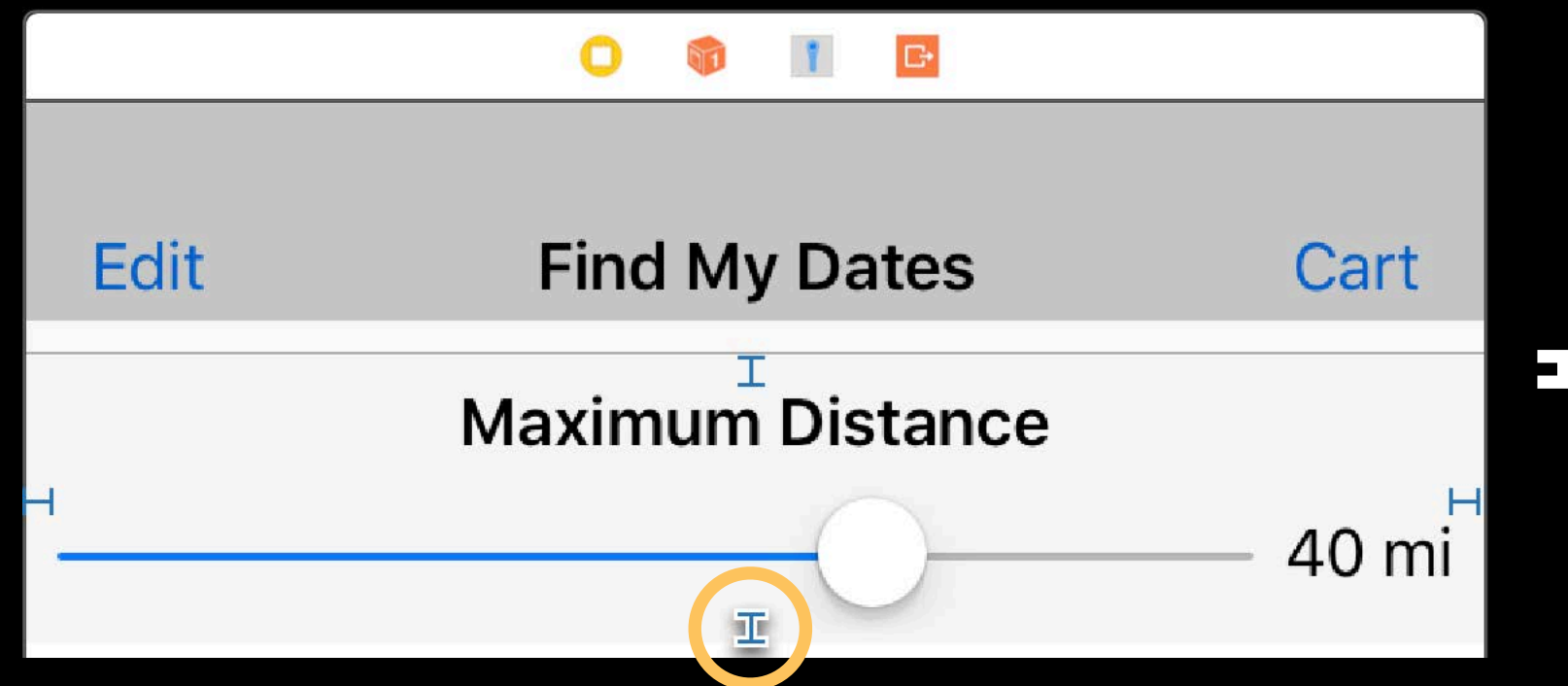
```
let zeroHeightConstraint = wrappingView.heightAnchor.constraint(equalToConstant: 0)  
//...
```

Changing Layout at Runtime



```
let zeroHeightConstraint = wrappingView.heightAnchor.constraint(equalToConstant: 0)
//...
zeroHeightConstraint.isActive = true
```

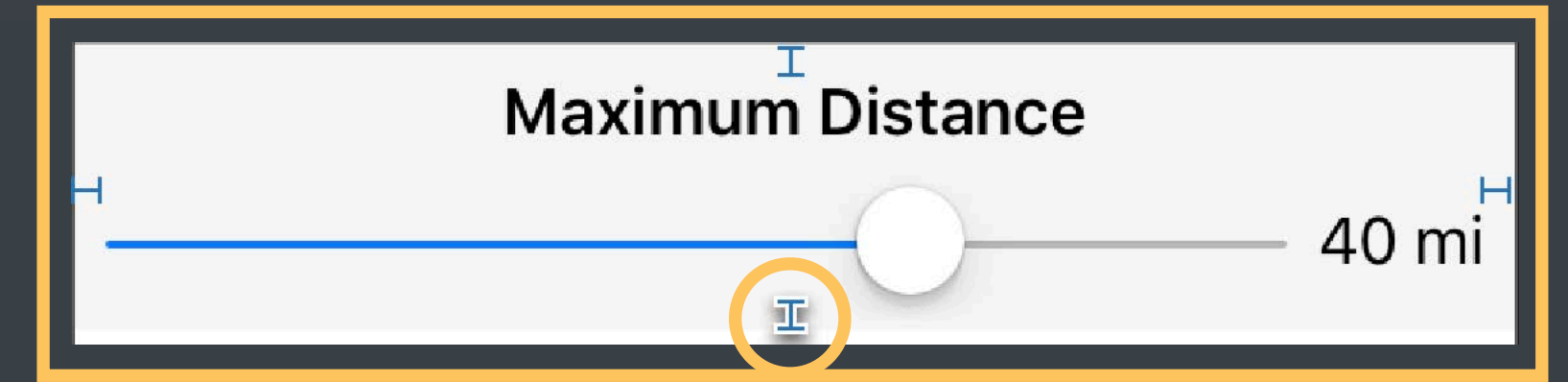

Changing Layout at Runtime



```
let zeroHeightConstraint = wrappingView.heightAnchor.constraint(equalToConstant: 0)
//...
zeroHeightConstraint.isActive = true
edgeConstraint.isActive = false
```

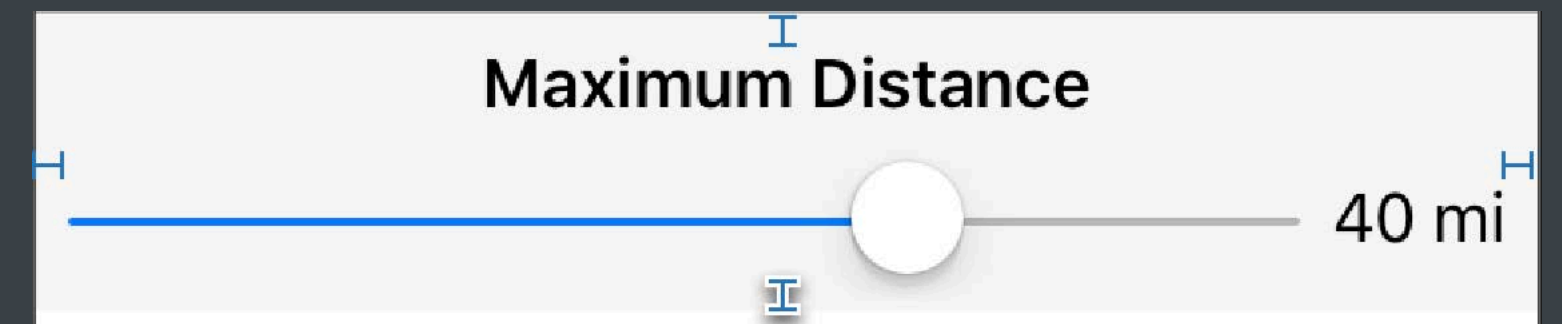
```
@IBOutlet var wrappingView: UIView!  
@IBOutlet var edgeConstraint: NSLayoutConstraint!  
var zeroHeightConstraint: NSLayoutConstraint!
```

```
@IBOutlet var wrappingView: UIView!  
@IBOutlet var edgeConstraint: NSLayoutConstraint!  
var zeroHeightConstraint: NSLayoutConstraint!
```



```
@IBOutlet var wrappingView: UIView!
@IBOutlet var edgeConstraint: NSLayoutConstraint!
var zeroHeightConstraint: NSLayoutConstraint!

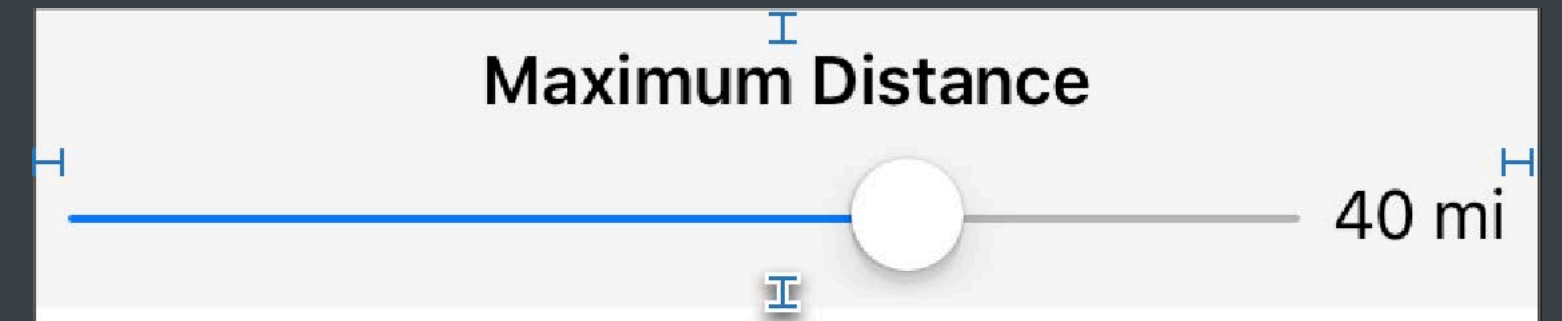
@IBAction func toggleDistanceControls(_ sender: Any) {
    if zeroHeightConstraint == nil {
        zeroHeightConstraint = wrappingView.heightAnchor
            .constraint(equalToConstant: 0)
    }
}
```



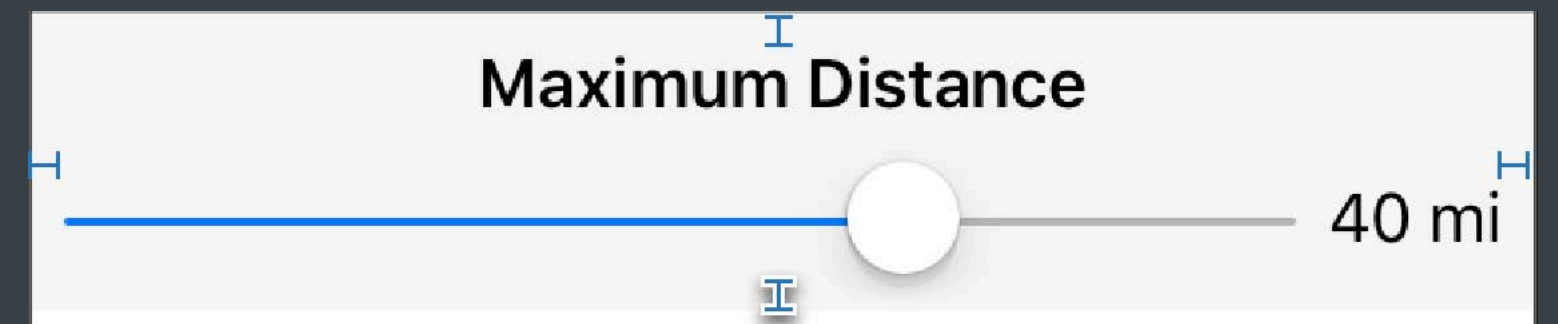
```
@IBOutlet var wrappingView: UIView!
@IBOutlet var edgeConstraint: NSLayoutConstraint!
var zeroHeightConstraint: NSLayoutConstraint!

@IBAction func toggleDistanceControls(_ sender: Any) {
    if zeroHeightConstraint == nil {
        zeroHeightConstraint = wrappingView.heightAnchor
            .constraint(equalToConstant: 0)
    }

    let shouldShow = !edgeConstraint.isActive
```

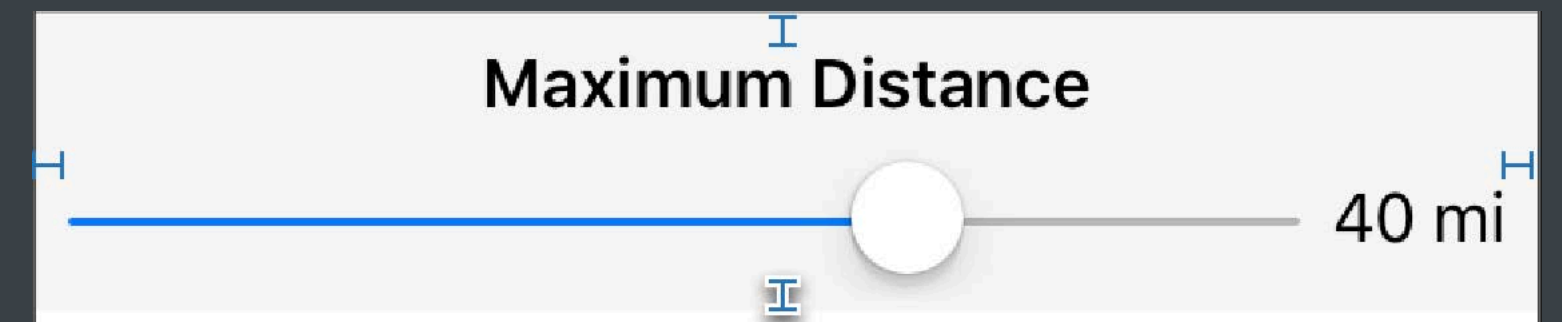


```
zeroHeightConstraint = wrappingView.heightAnchor  
    .constraint(equalToConstant: 0)  
}
```



```
let shouldShow = !edgeConstraint.isActive
```

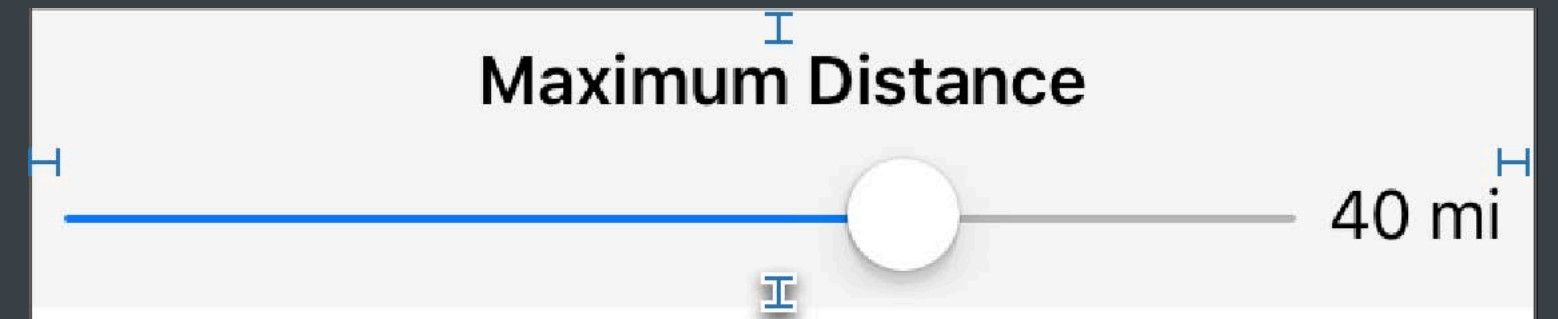
```
    zeroHeightConstraint = wrappingView.heightAnchor
        .constraint(equalToConstant: 0)
}
```



```
let shouldShow = !edgeConstraint.isActive

// Deactivate constraint first to avoid constraint conflict message
if shouldShow {
    zeroHeightConstraint.isActive = false
    edgeConstraint.isActive = true
} else {
    edgeConstraint.isActive = false
    zeroHeightConstraint.isActive = true
}
```

```
    zeroHeightConstraint = wrappingView.heightAnchor
        .constraint(equalToConstant: 0)
}
```



```
let shouldShow = !edgeConstraint.isActive
```

```
// Deactivate constraint first to avoid constraint conflict message
```

```
if shouldShow {
```

```
    zeroHeightConstraint.isActive = false
```

```
    edgeConstraint.isActive = true
```

```
} else {
```

```
    edgeConstraint.isActive = false
```

```
    zeroHeightConstraint.isActive = true
```

```
}
```

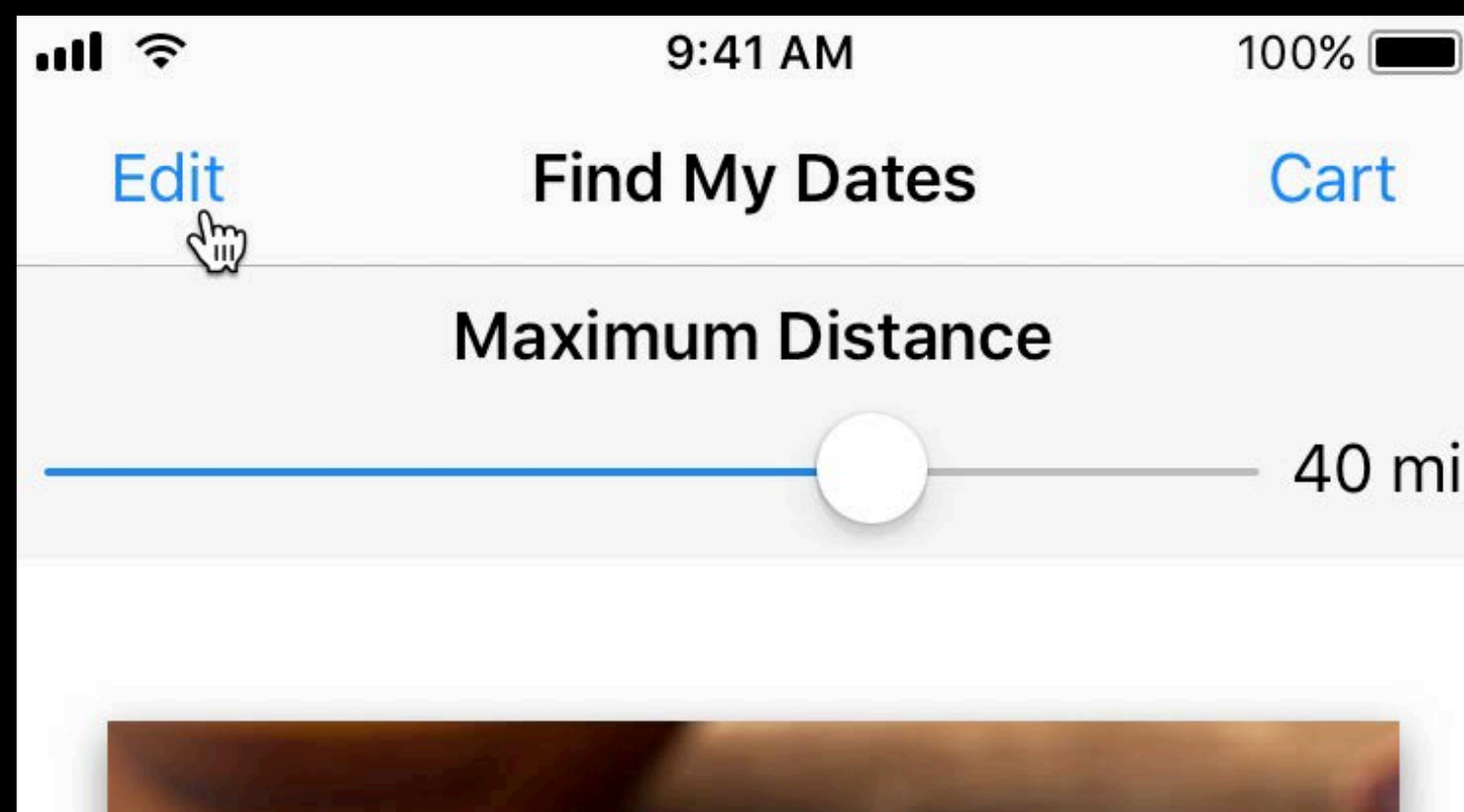
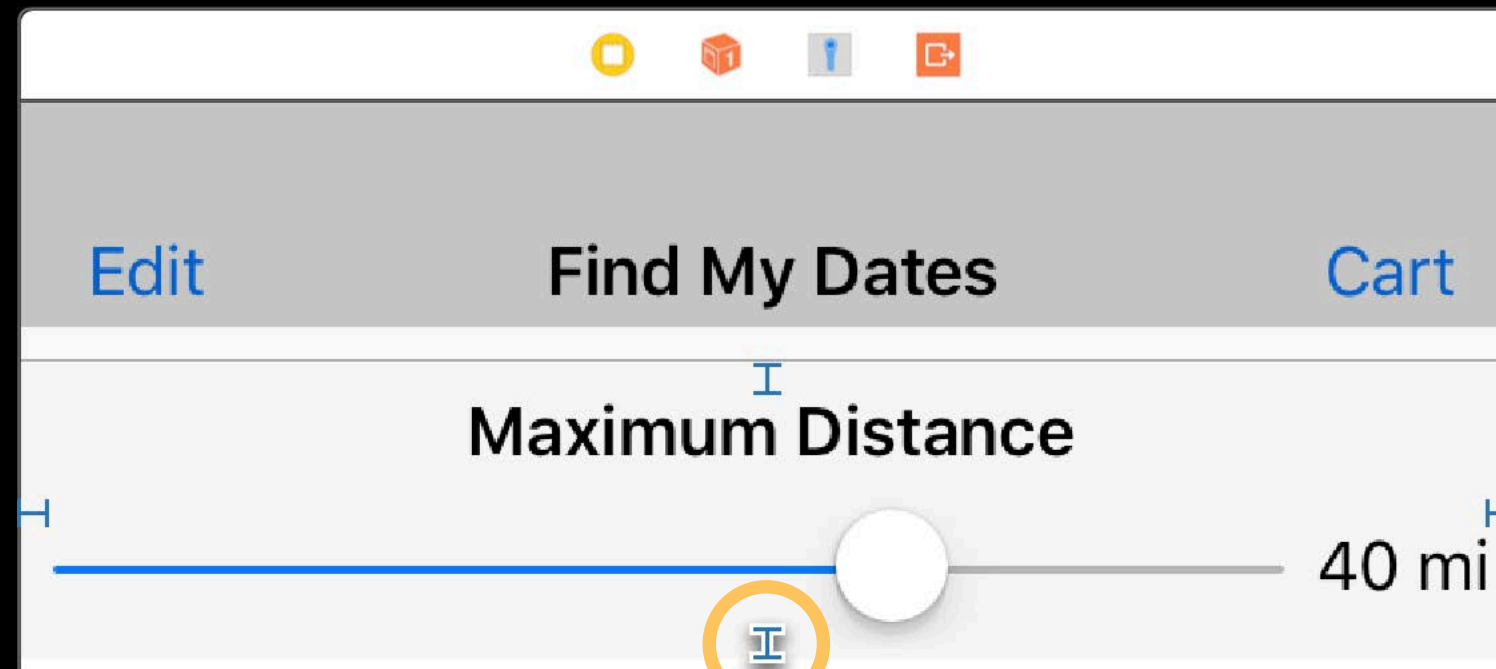
```
UIView.animate(withDuration: 0.25) {
```

```
    self.view.layoutIfNeeded()
```

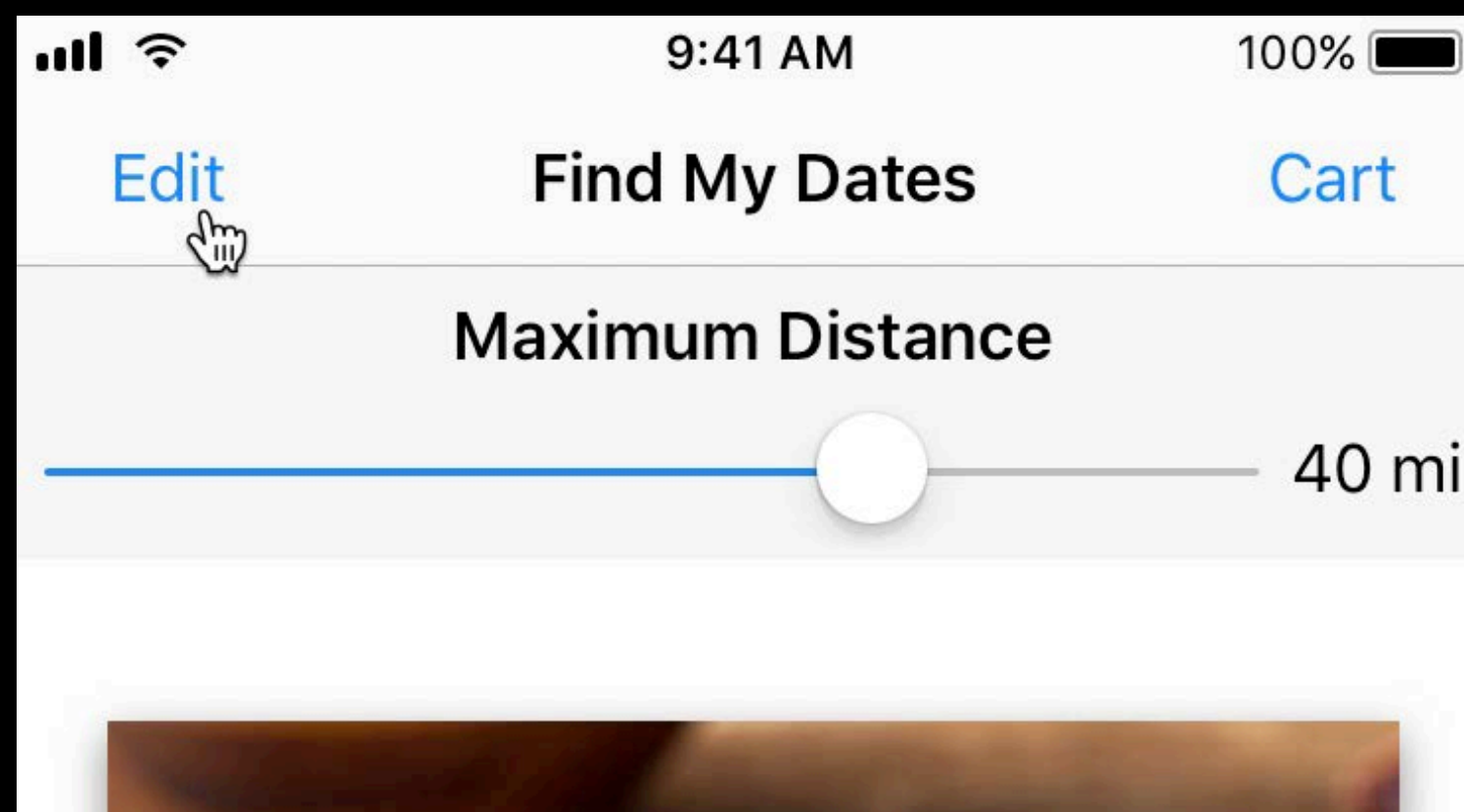
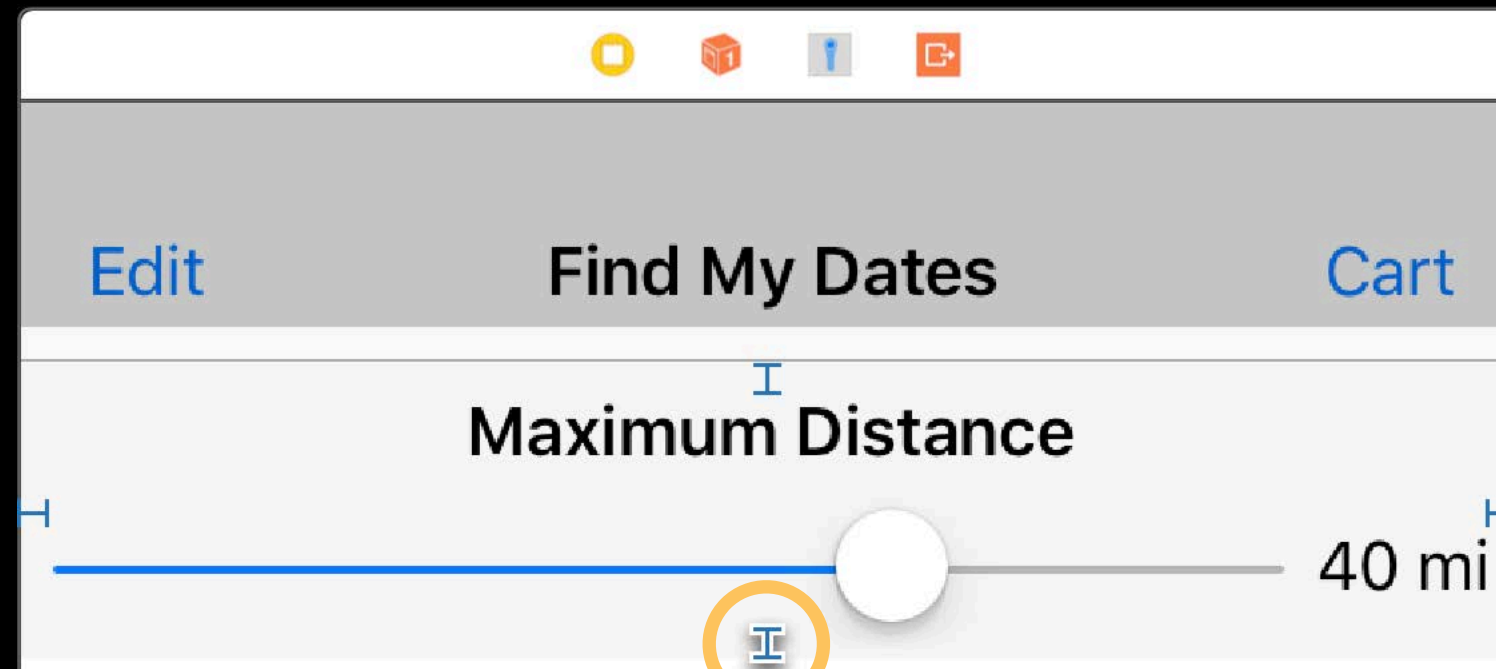
```
}
```

```
}
```

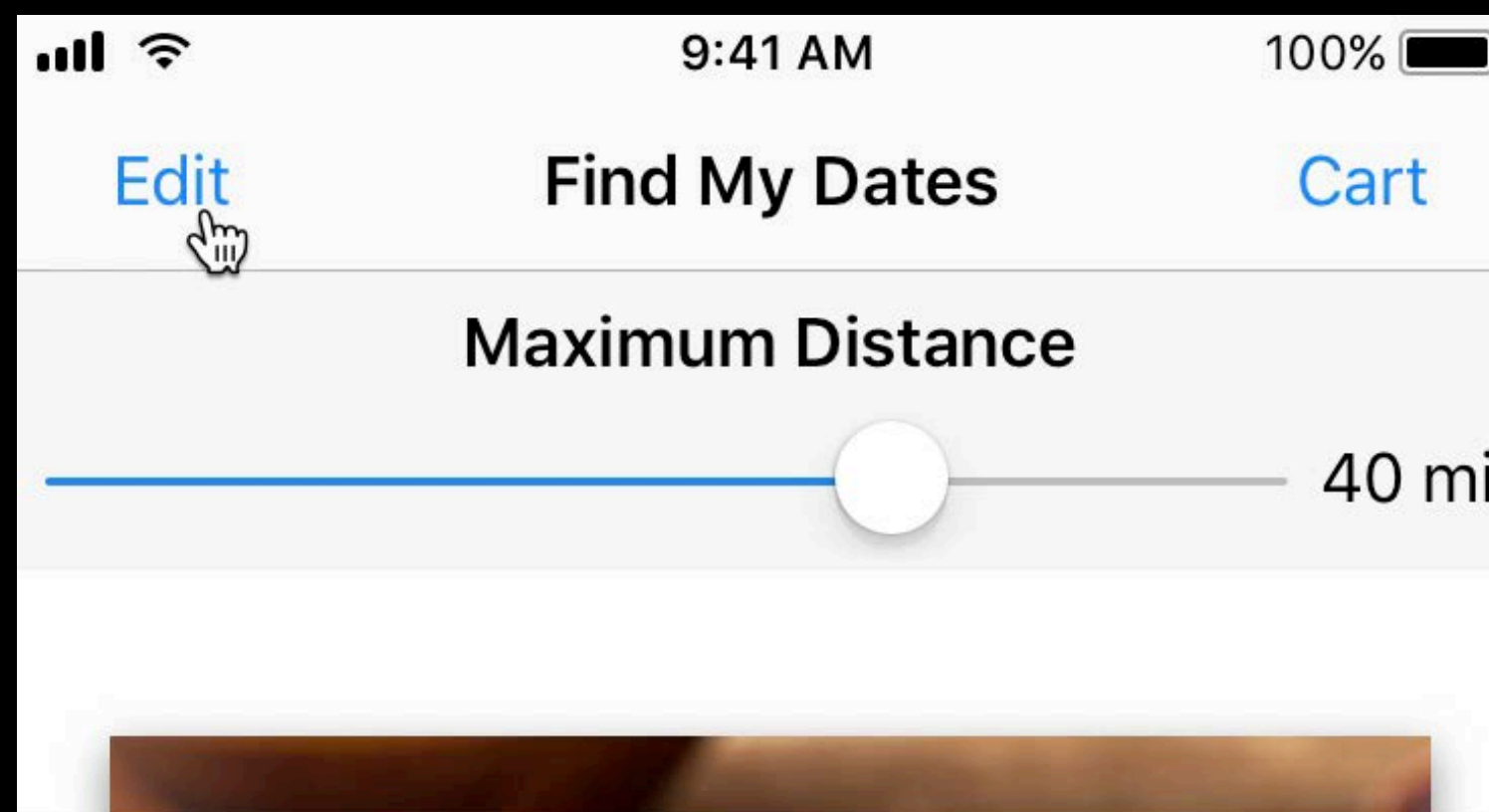
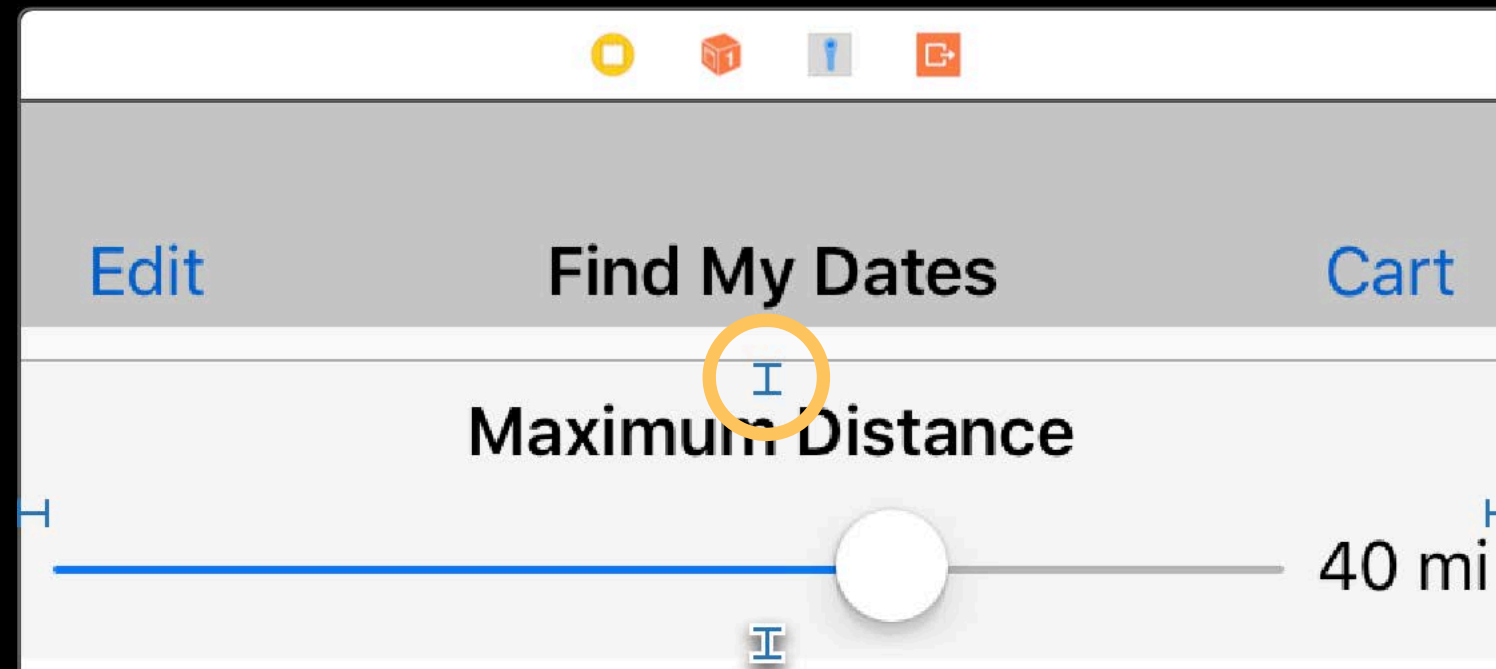

Changing Layout at Runtime



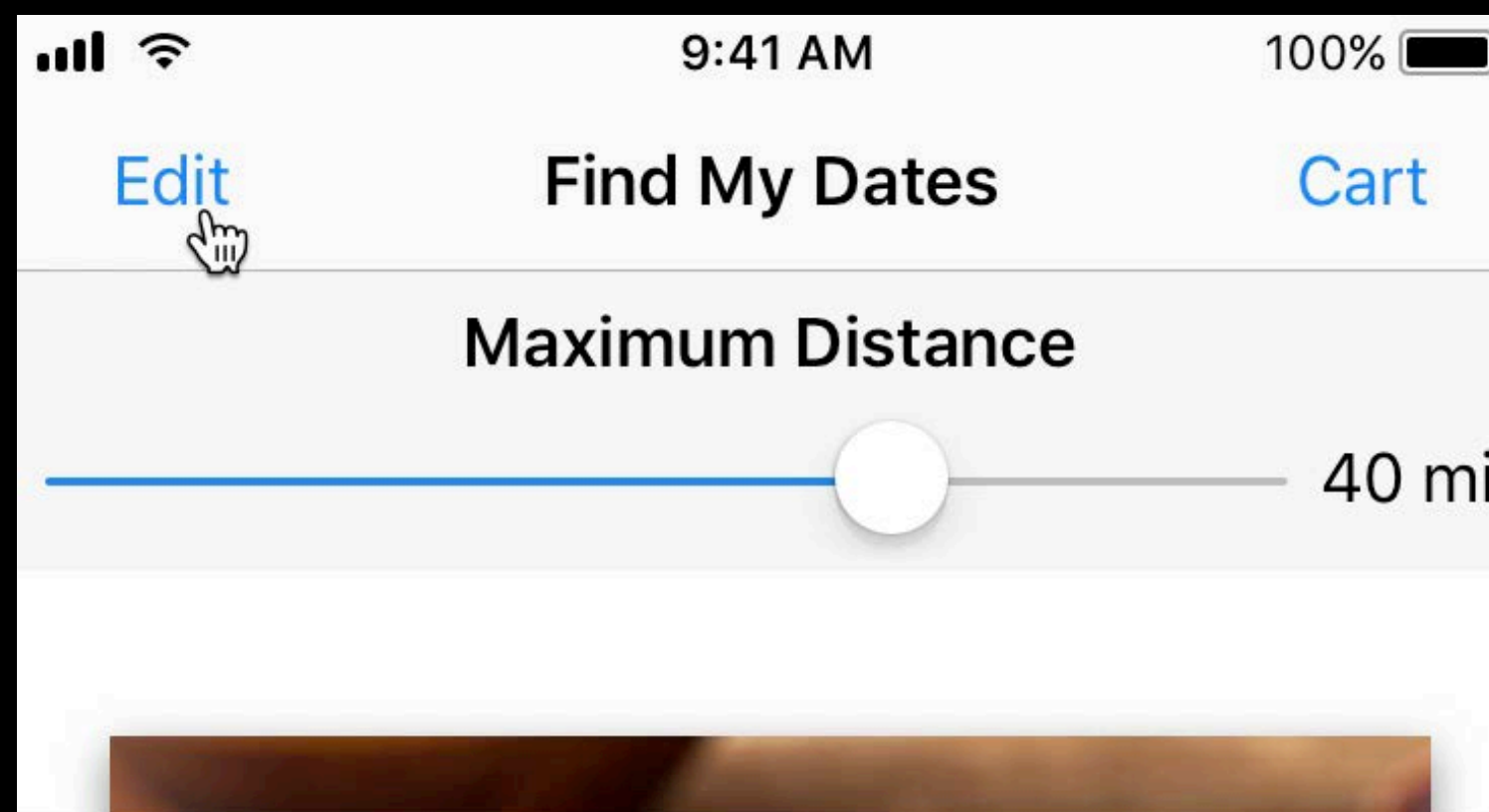
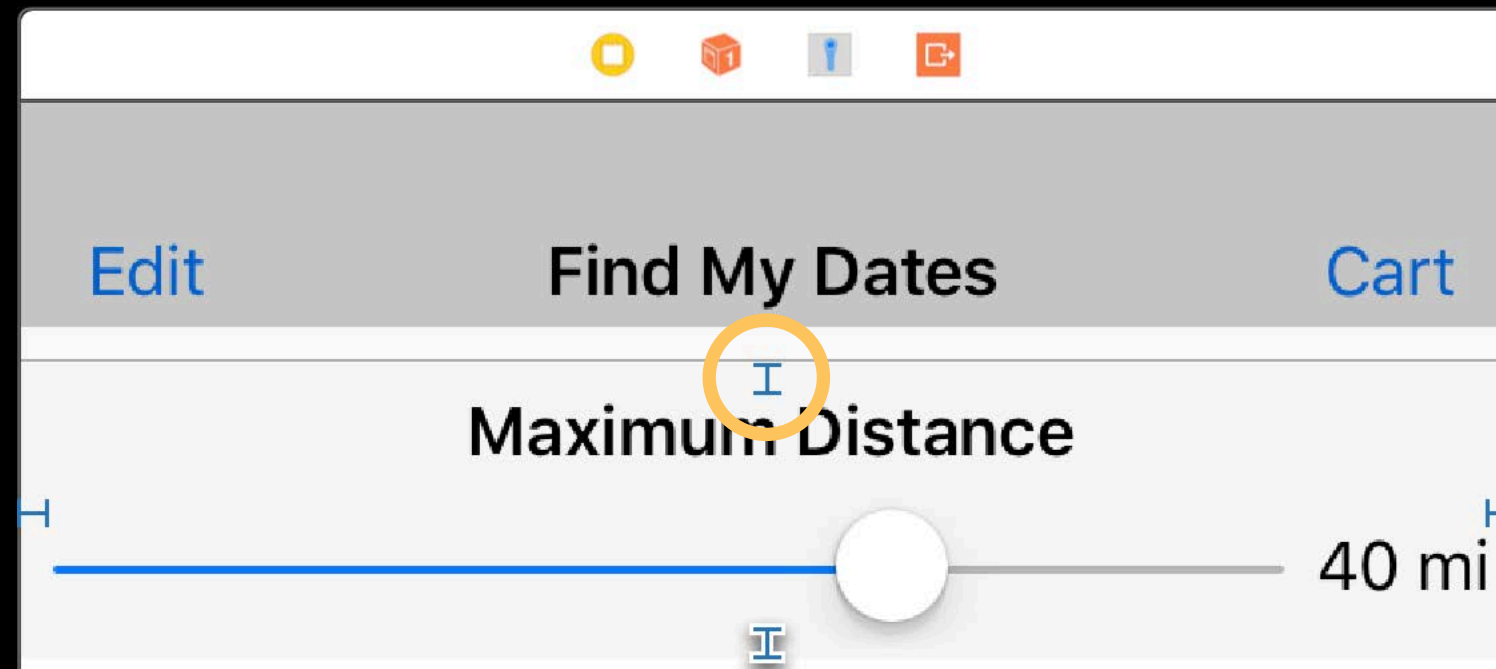
Changing Layout at Runtime



Changing Layout at Runtime



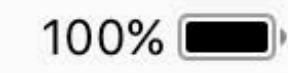
Changing Layout at Runtime



Tracking Touch



9:41 AM



Edit

Find My Dates

Cart



Medjool Dates

Entire Foods, 2 mi away



Tracking Touch

Tracking Touch

Layout engine owns `frame`

Tracking Touch

Layout engine owns `frame`

- Value derived from constraints

Tracking Touch

Layout engine owns `frame`

- Value derived from constraints

`transform` property offsets from frame

Tracking Touch

Layout engine owns `frame`

- Value derived from constraints

`transform` property offsets from frame

`CGAffineTransform` = translation + rotation + scale

Demo

Tracking Touch

Tracking Touch

View position is a result of multiple properties

Tracking Touch

View position is a result of multiple properties

- `frame` (derived from constraints)

Tracking Touch

View position is a result of multiple properties

- `frame` (derived from constraints)
- `transform`

Tracking Touch

View position is a result of multiple properties

- `frame` (derived from constraints)
- `transform`

Transform is great for temporary changes

Tracking Touch

View position is a result of multiple properties

- `frame` (derived from constraints)
- `transform`

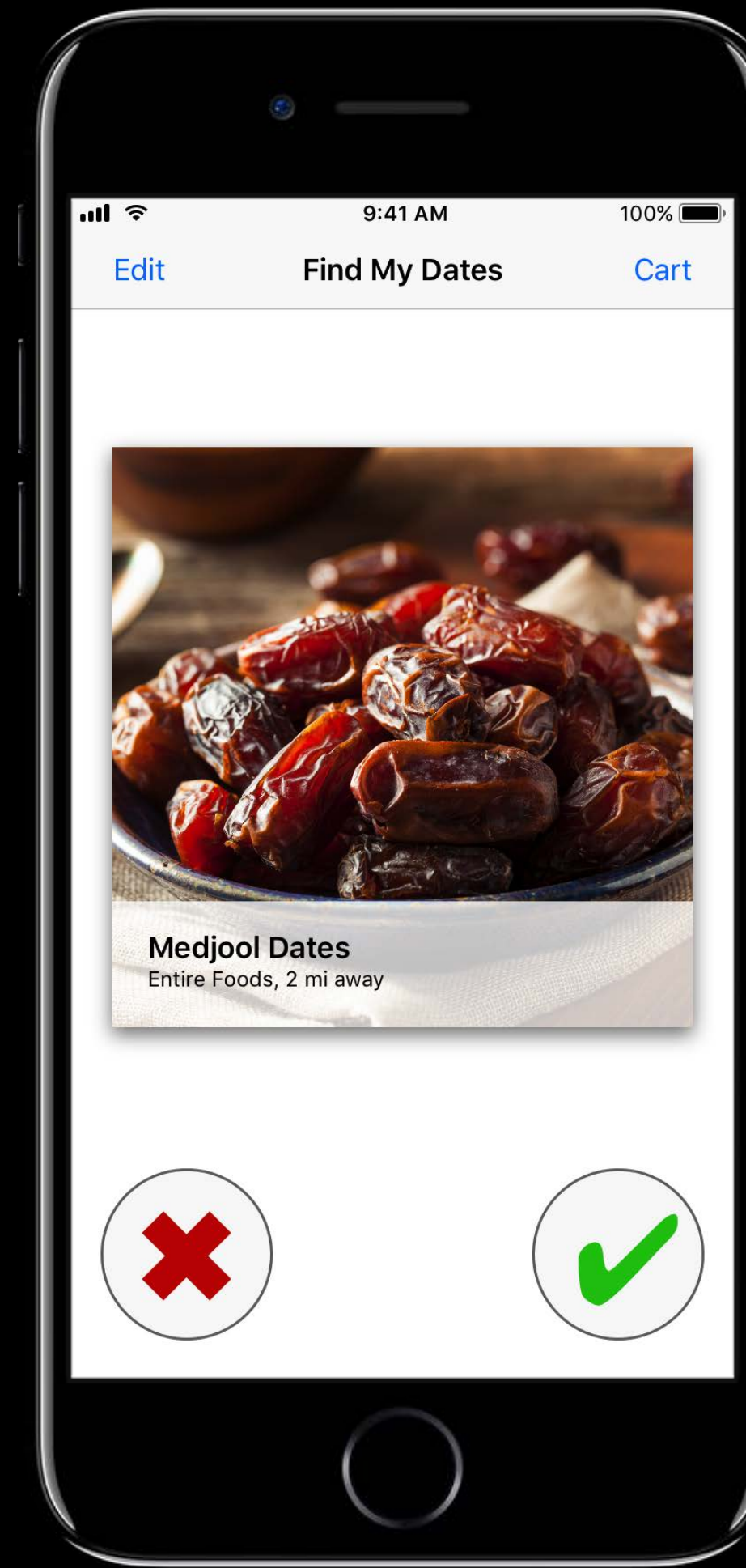
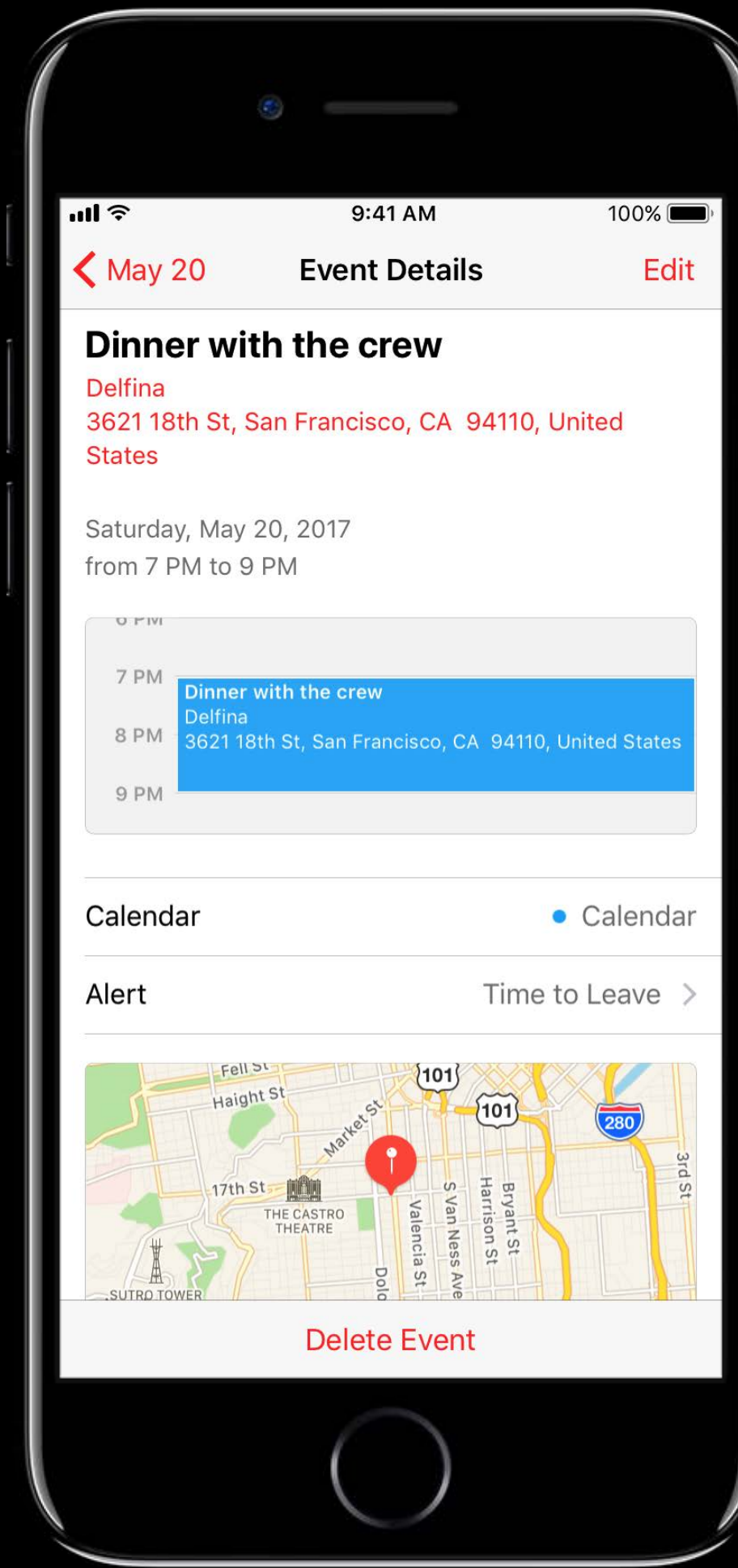
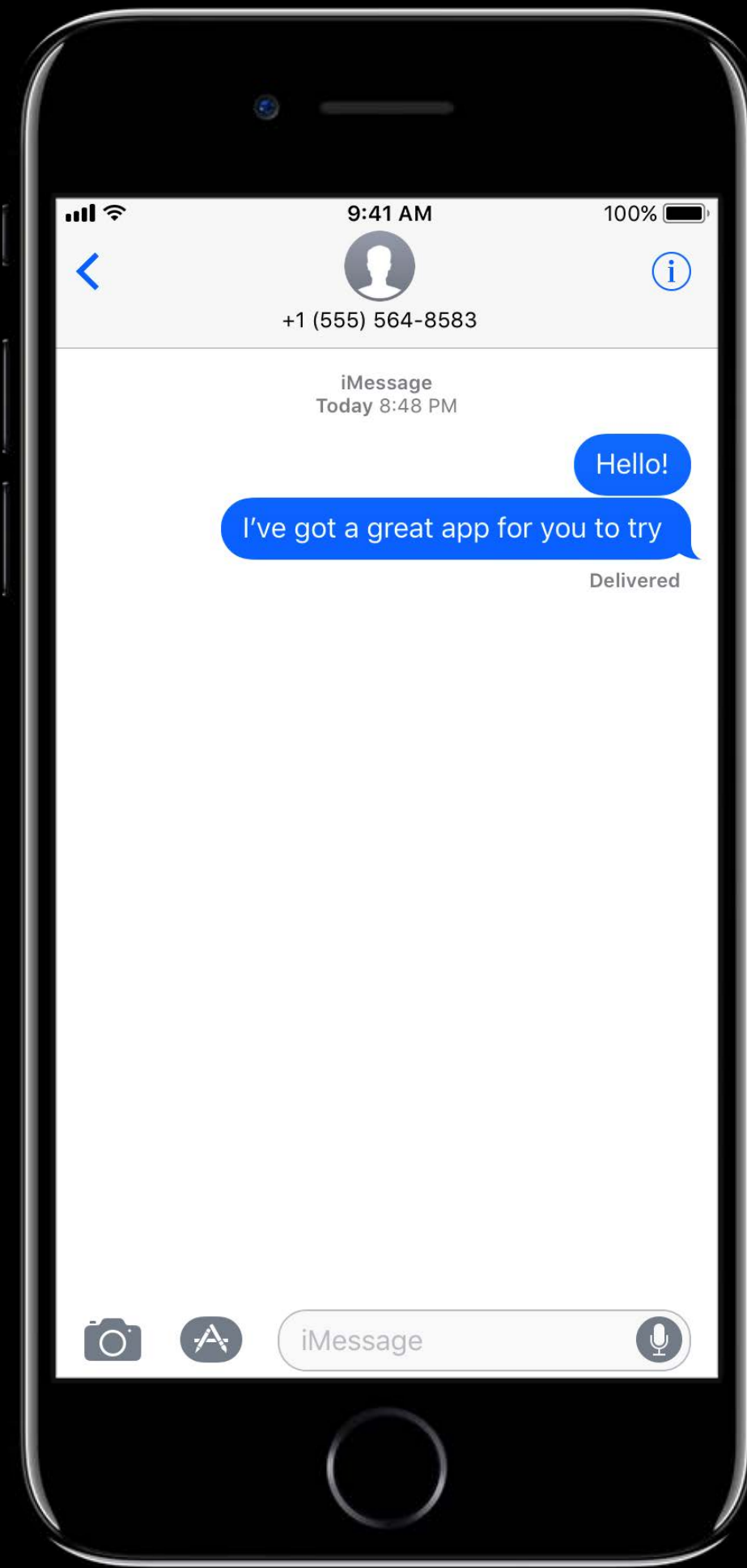
Transform is great for temporary changes

- Reset to `CGAffineTransform.identity` when done

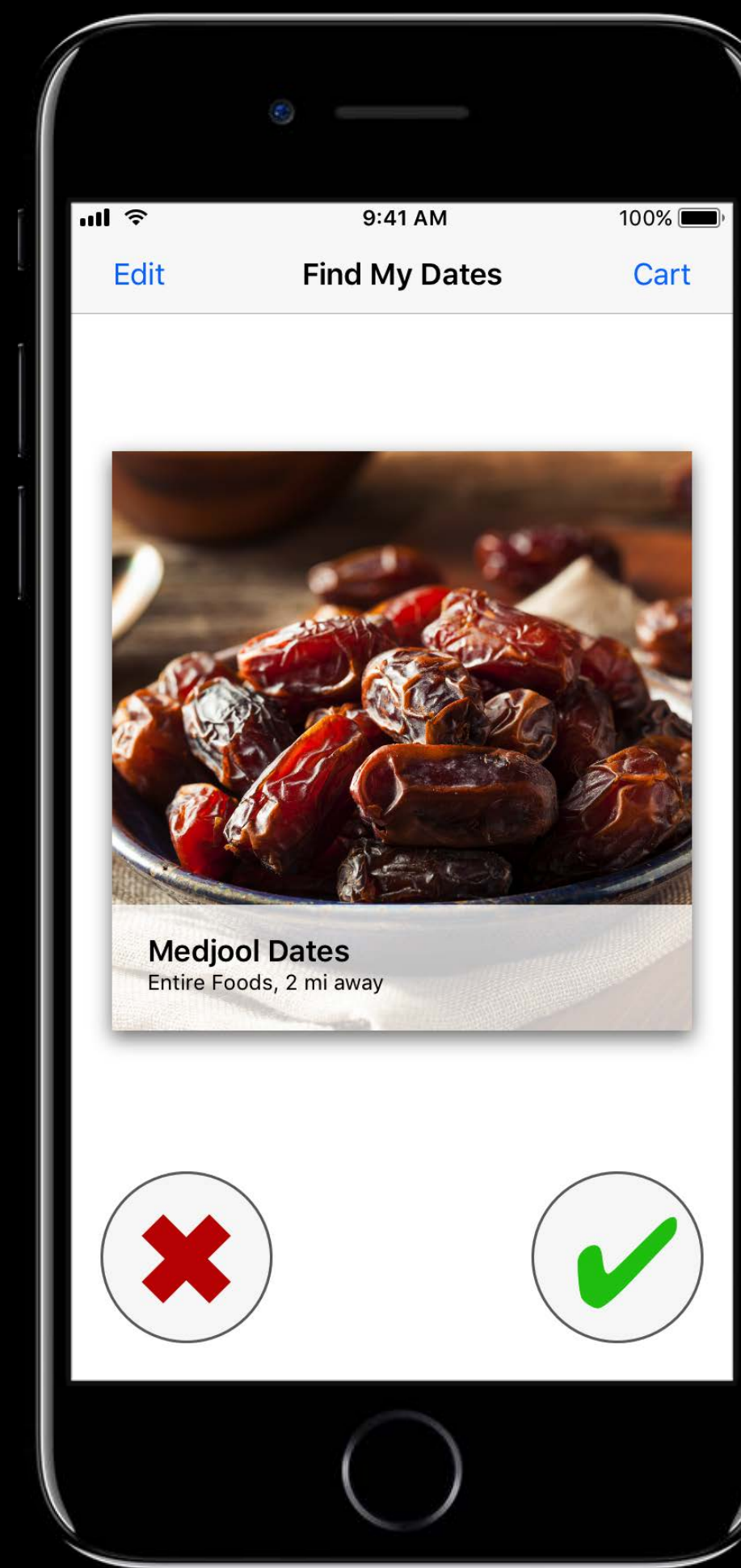
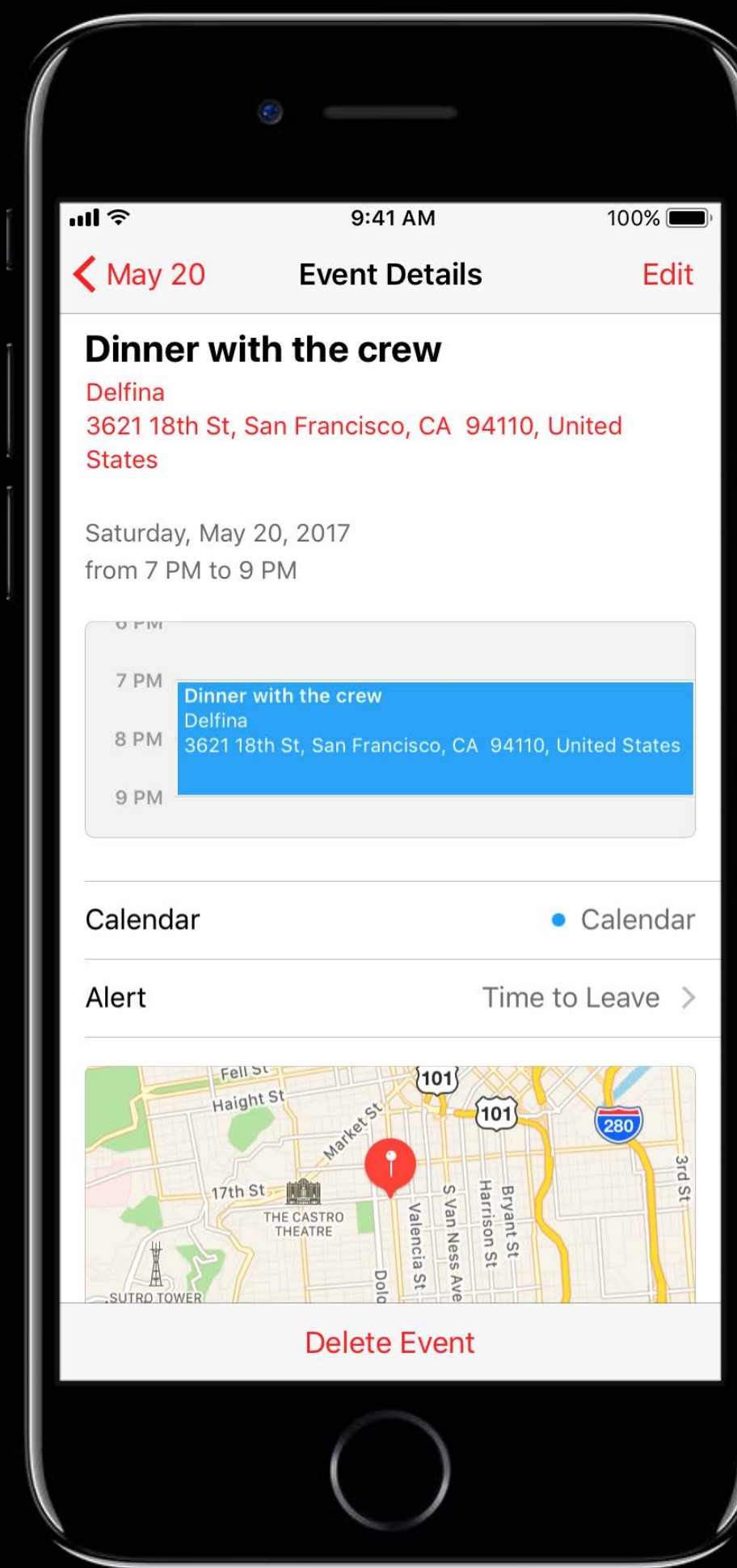
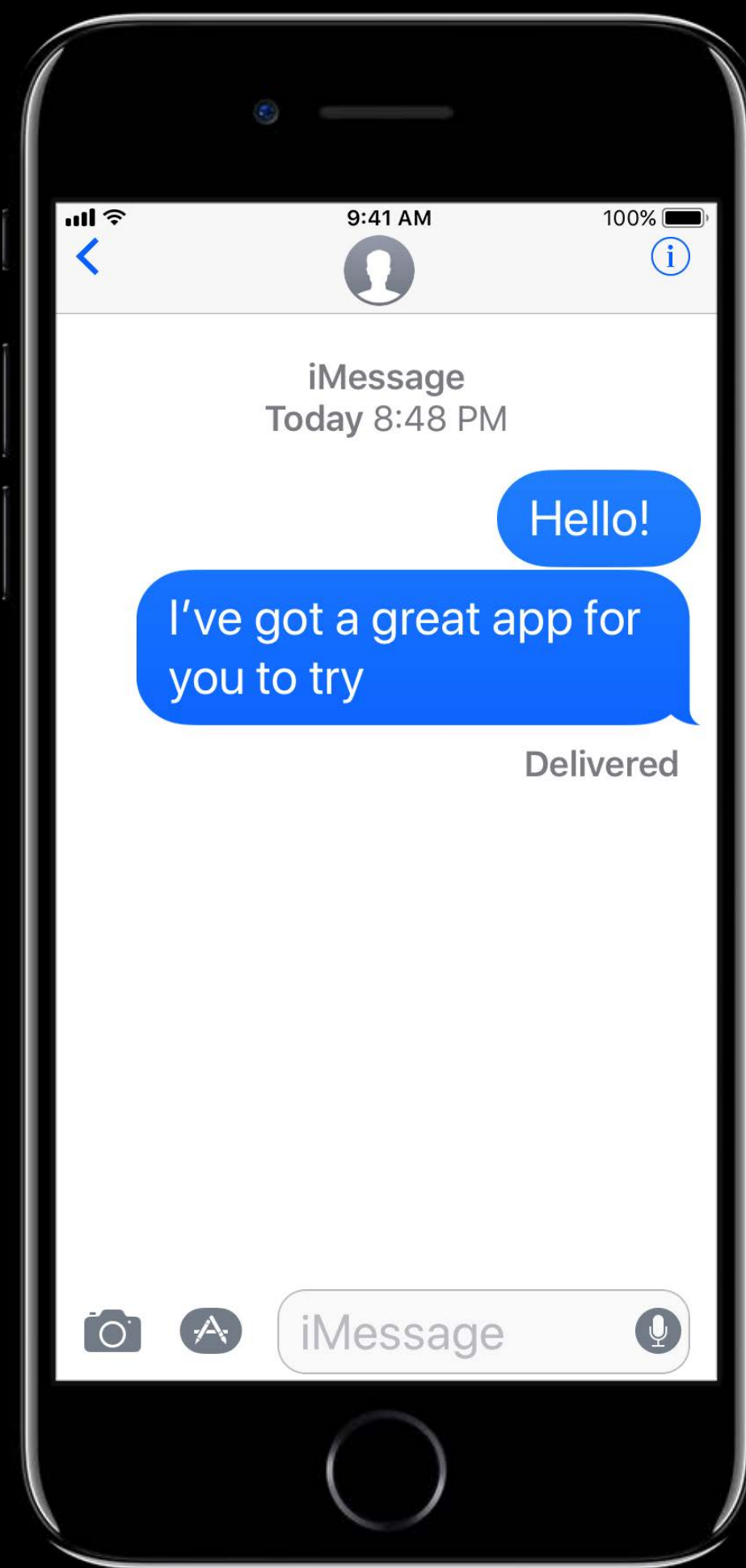
Supporting Dynamic Type

Dynamic Type

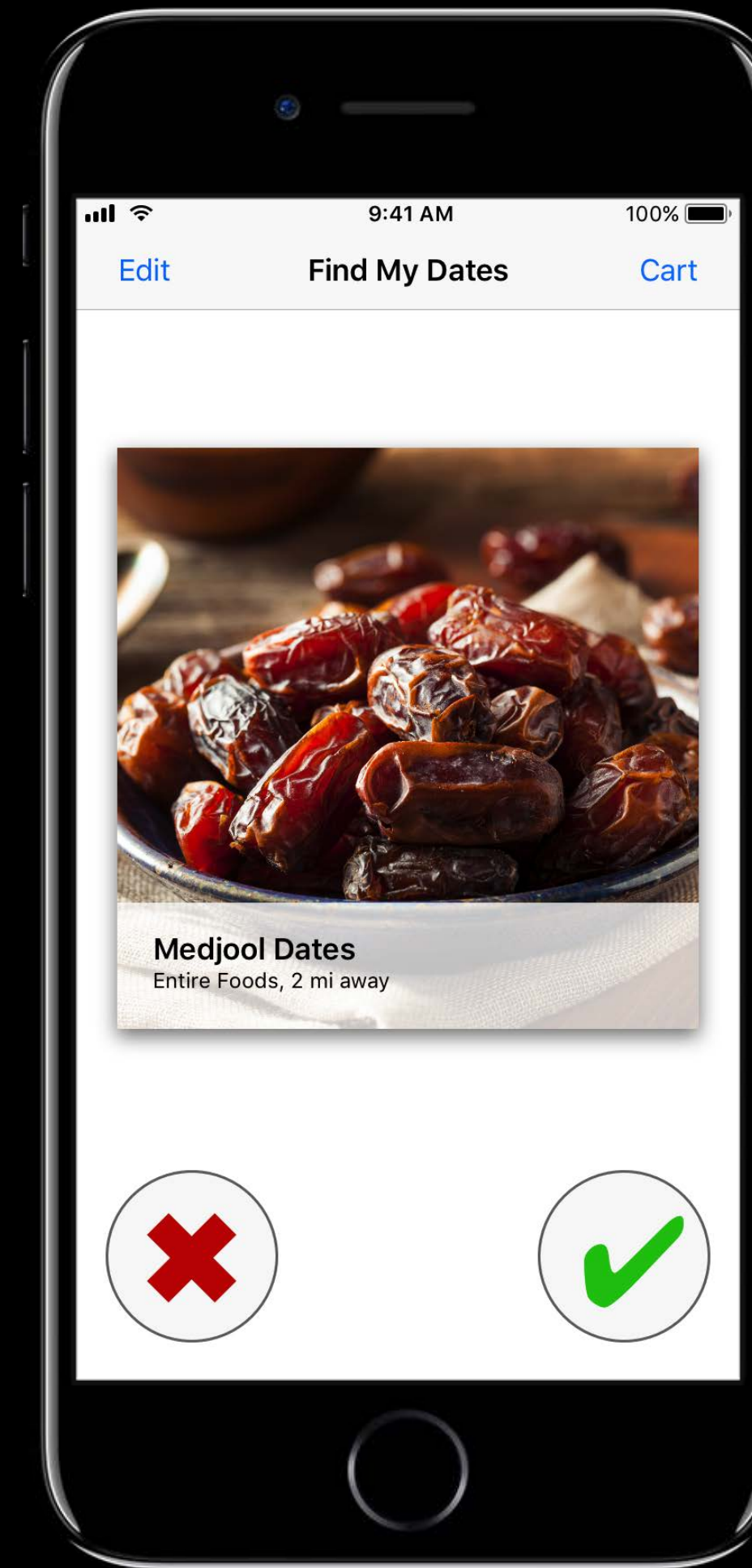
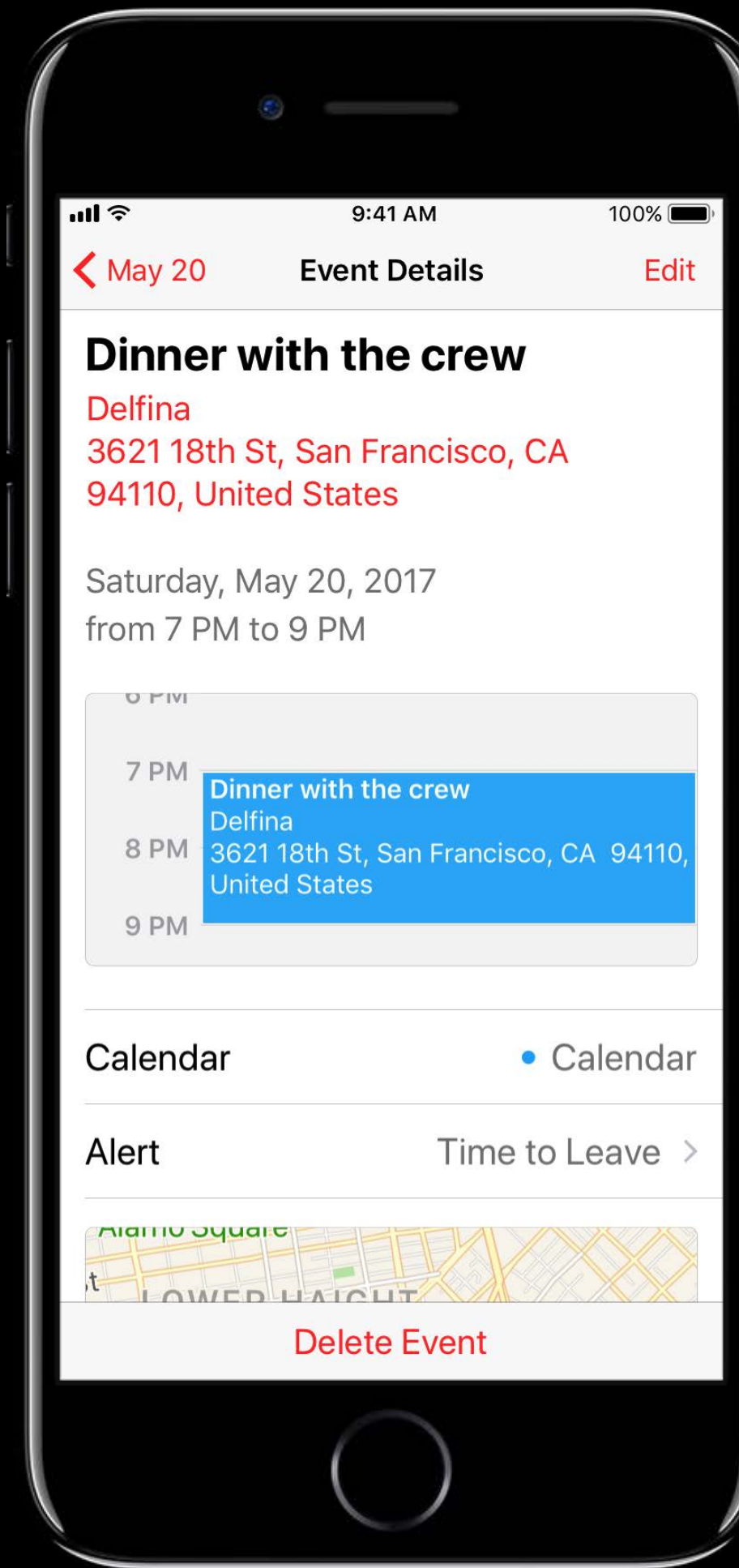
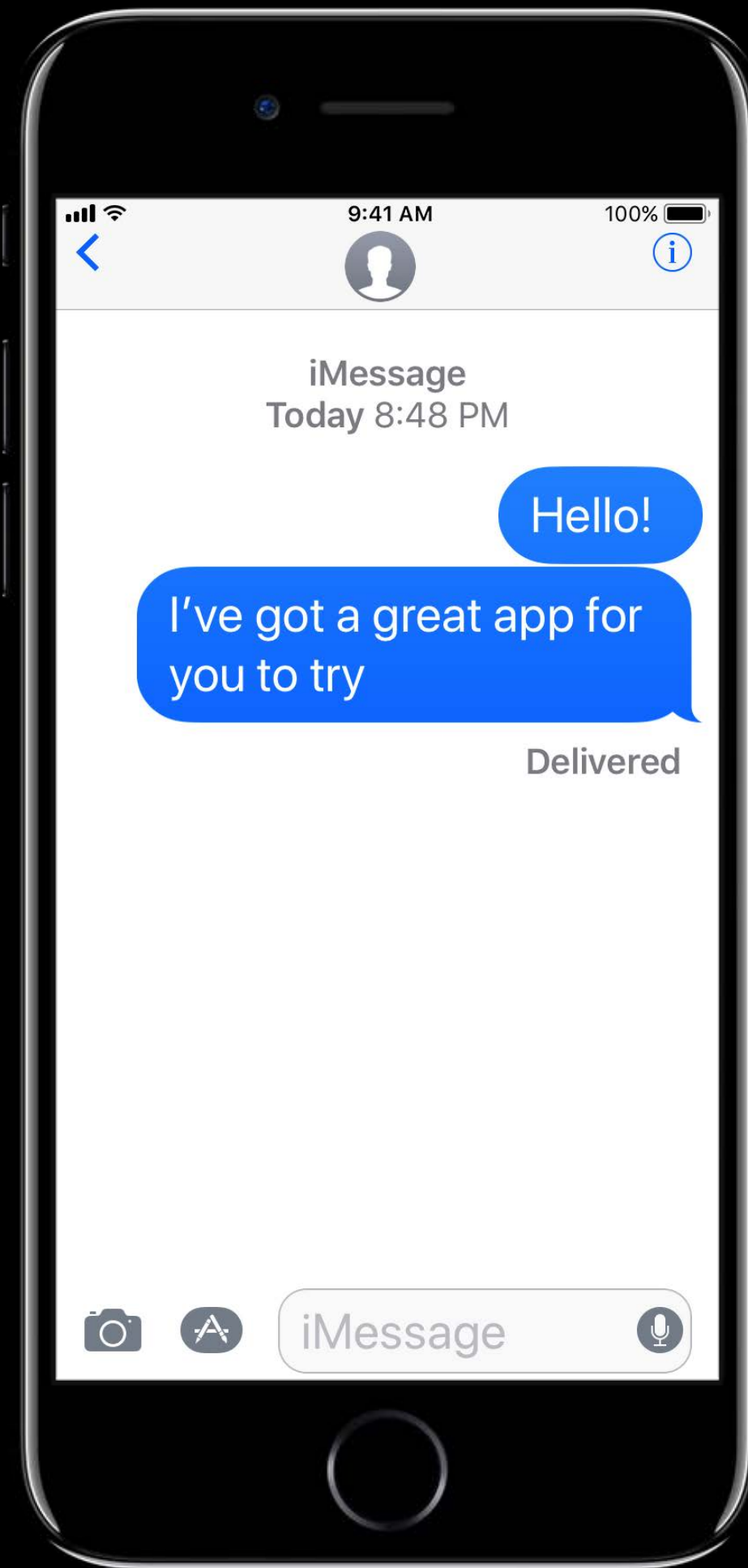
Dynamic Type



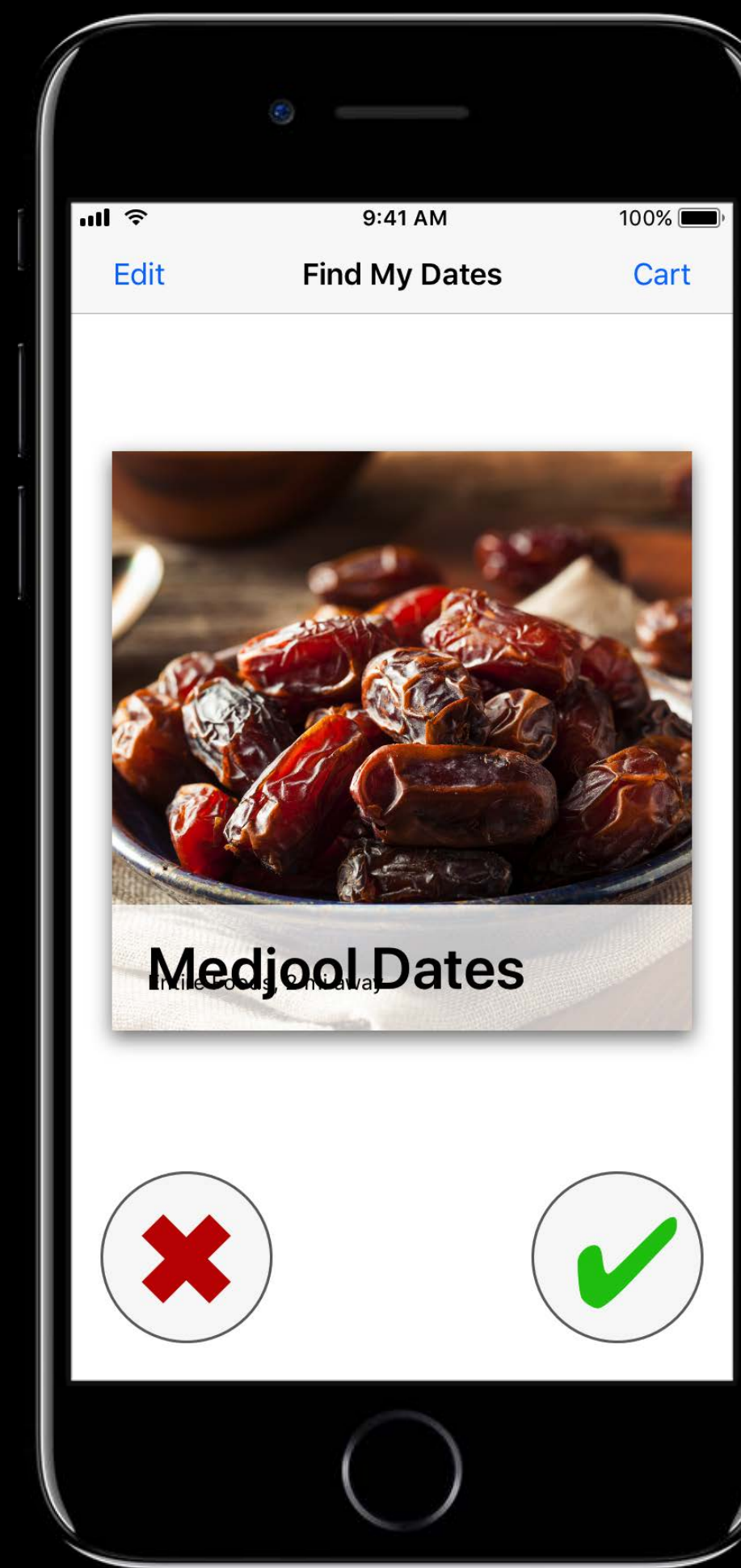
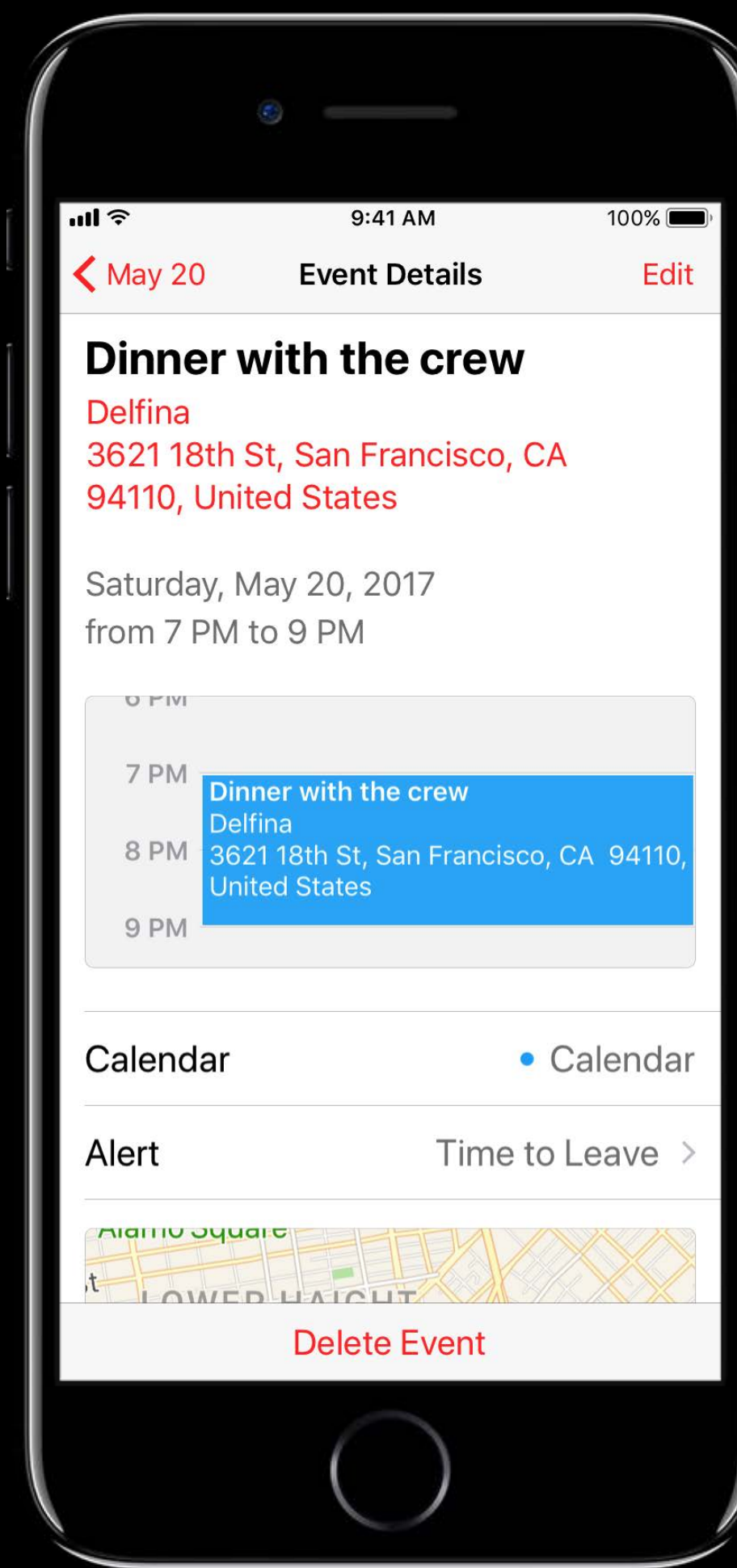
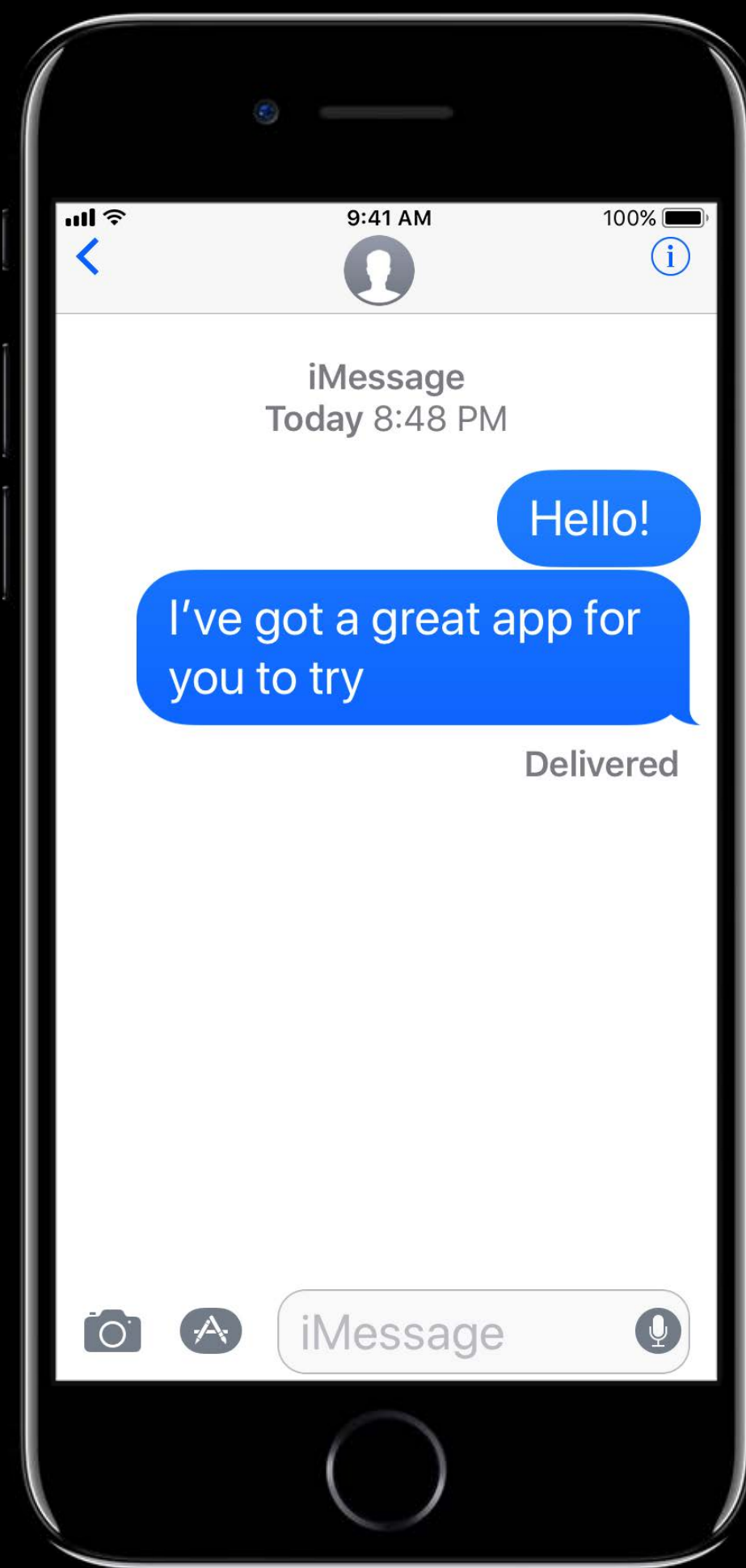
Dynamic Type



Dynamic Type




Dynamic Type






Demo

Dynamic Type

Label


Text 

+ Color 


+ Font  


Dynamic Type Automatically Adjusts Font

Alignment

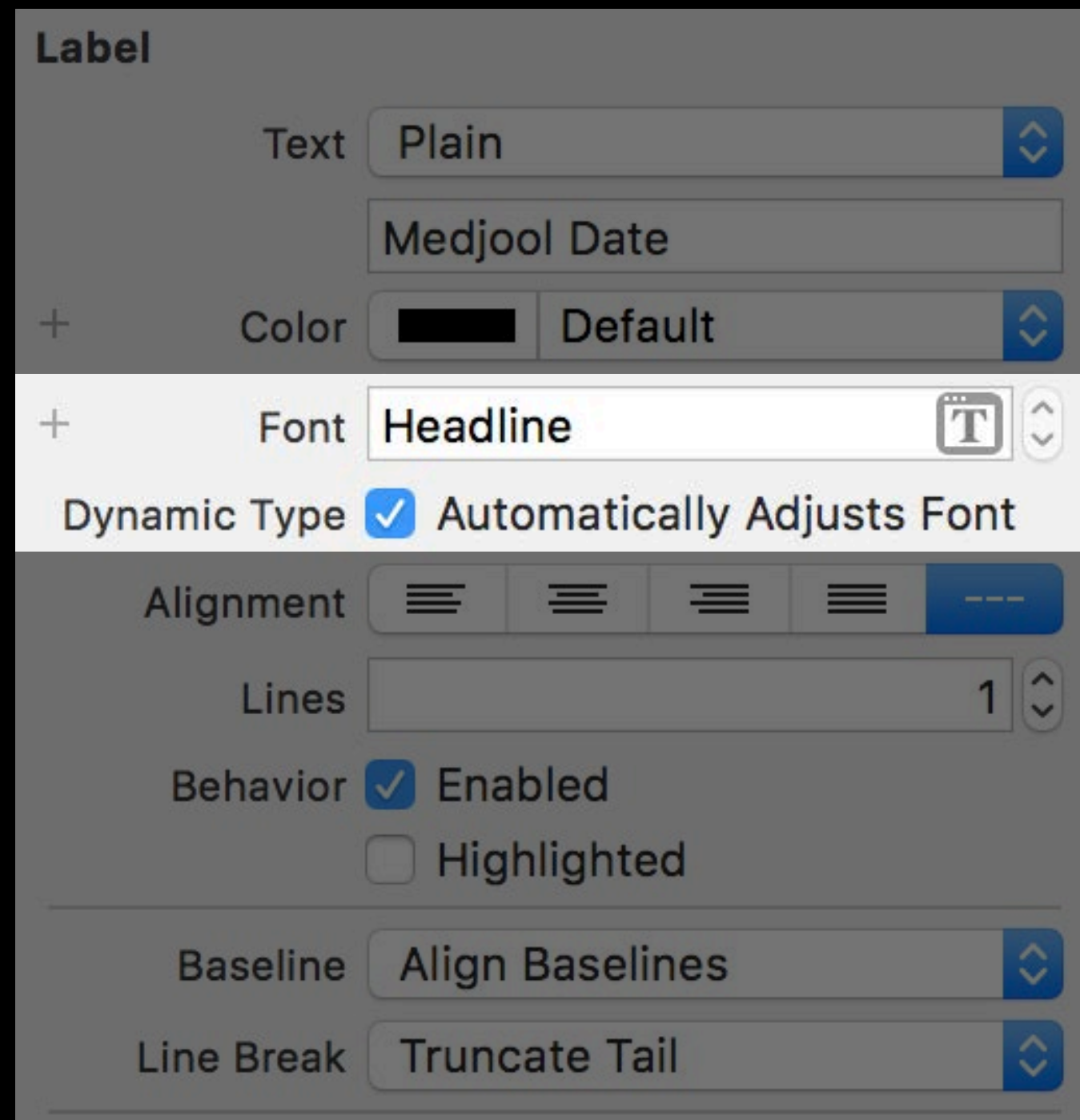
Lines 

Behavior Enabled
 Highlighted

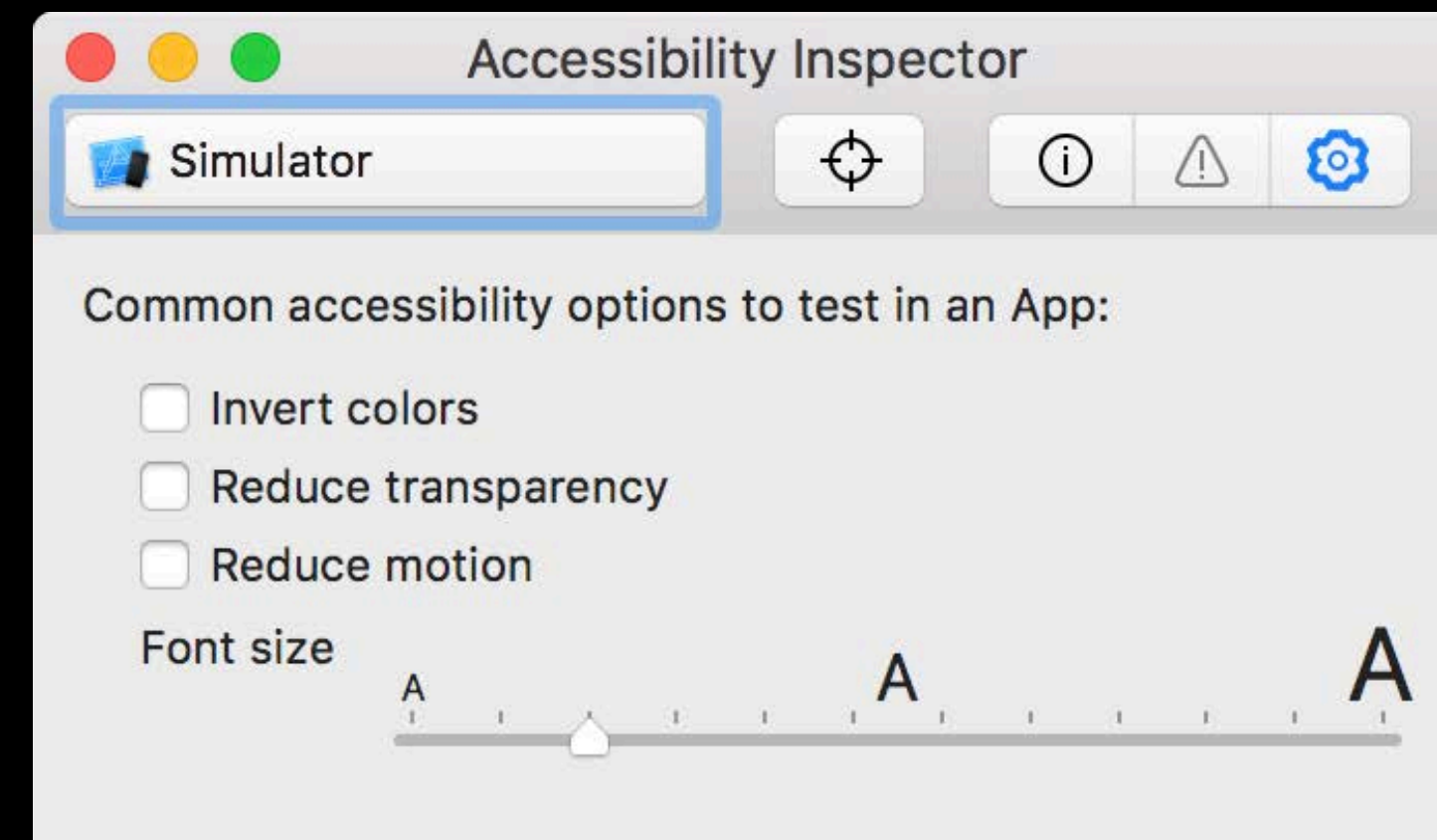
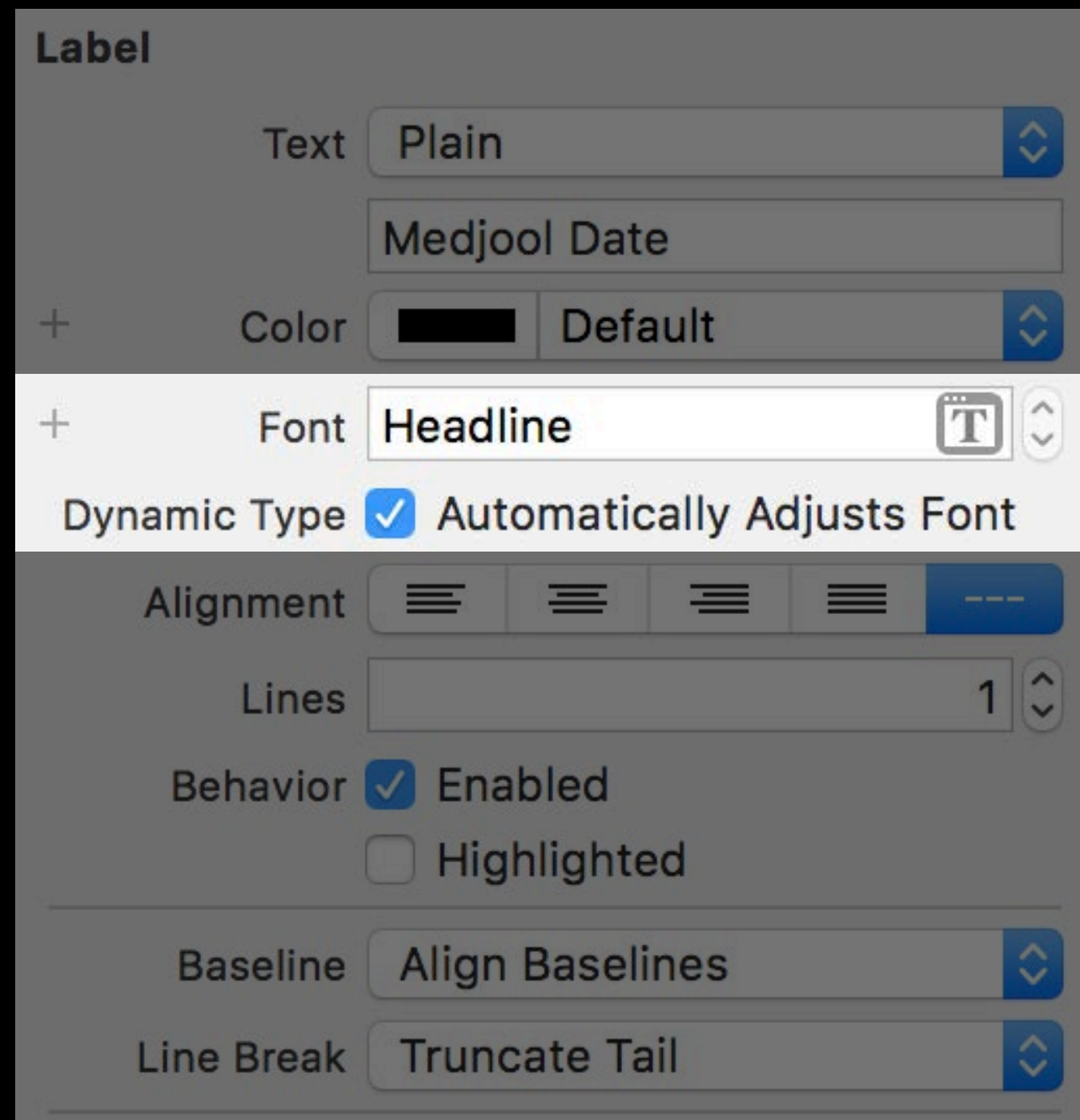
Baseline 

Line Break 

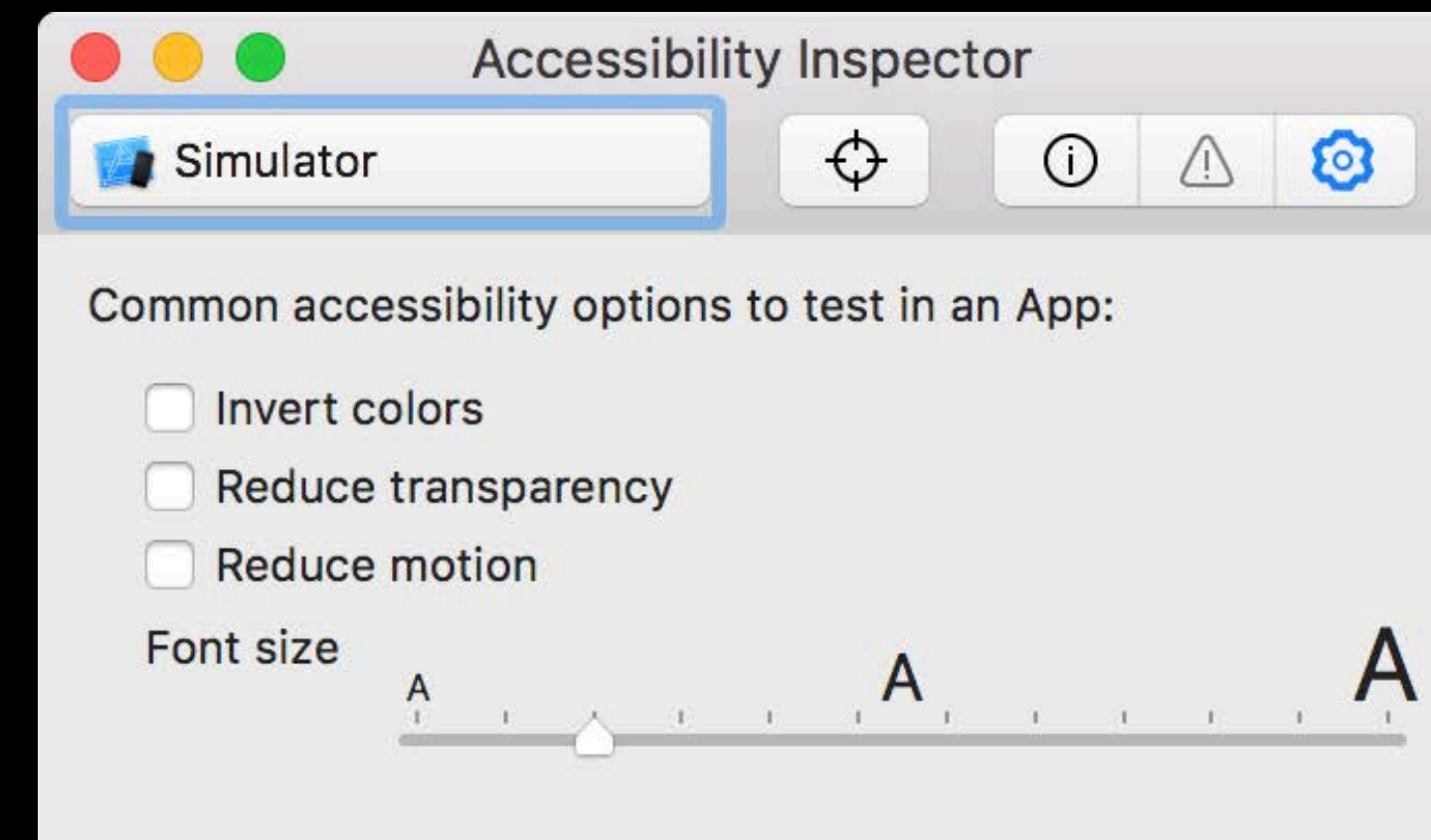
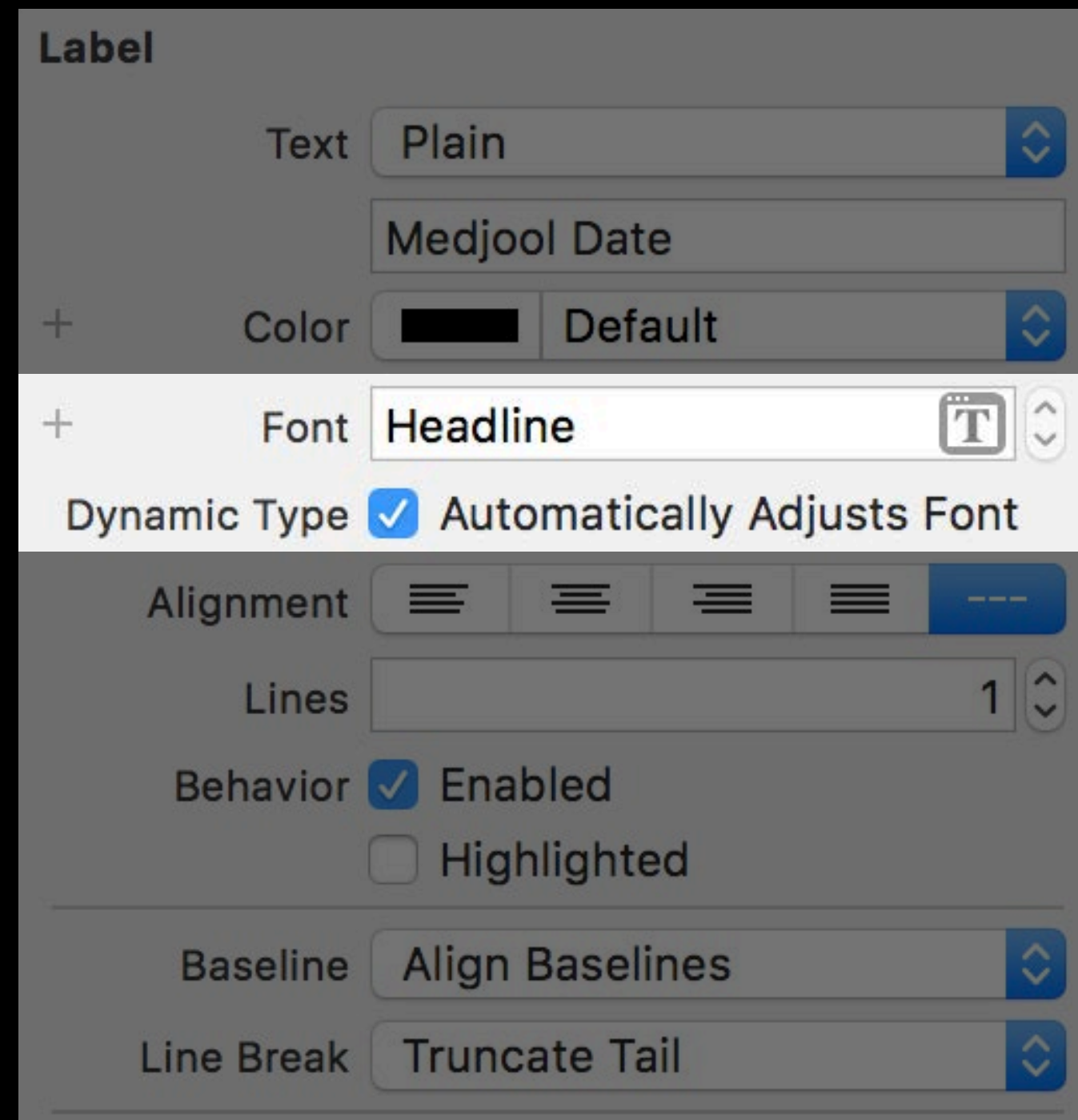
Dynamic Type



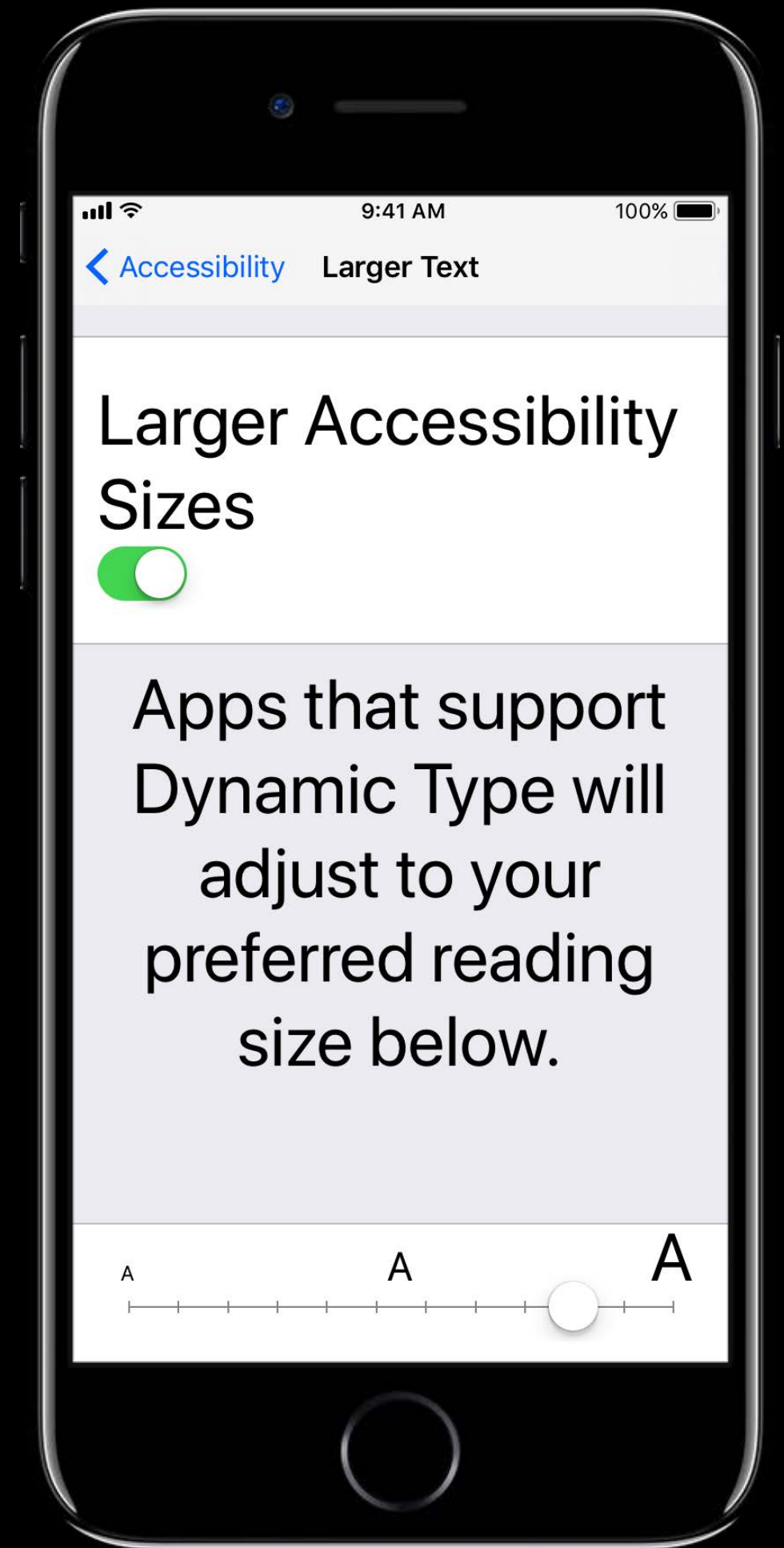
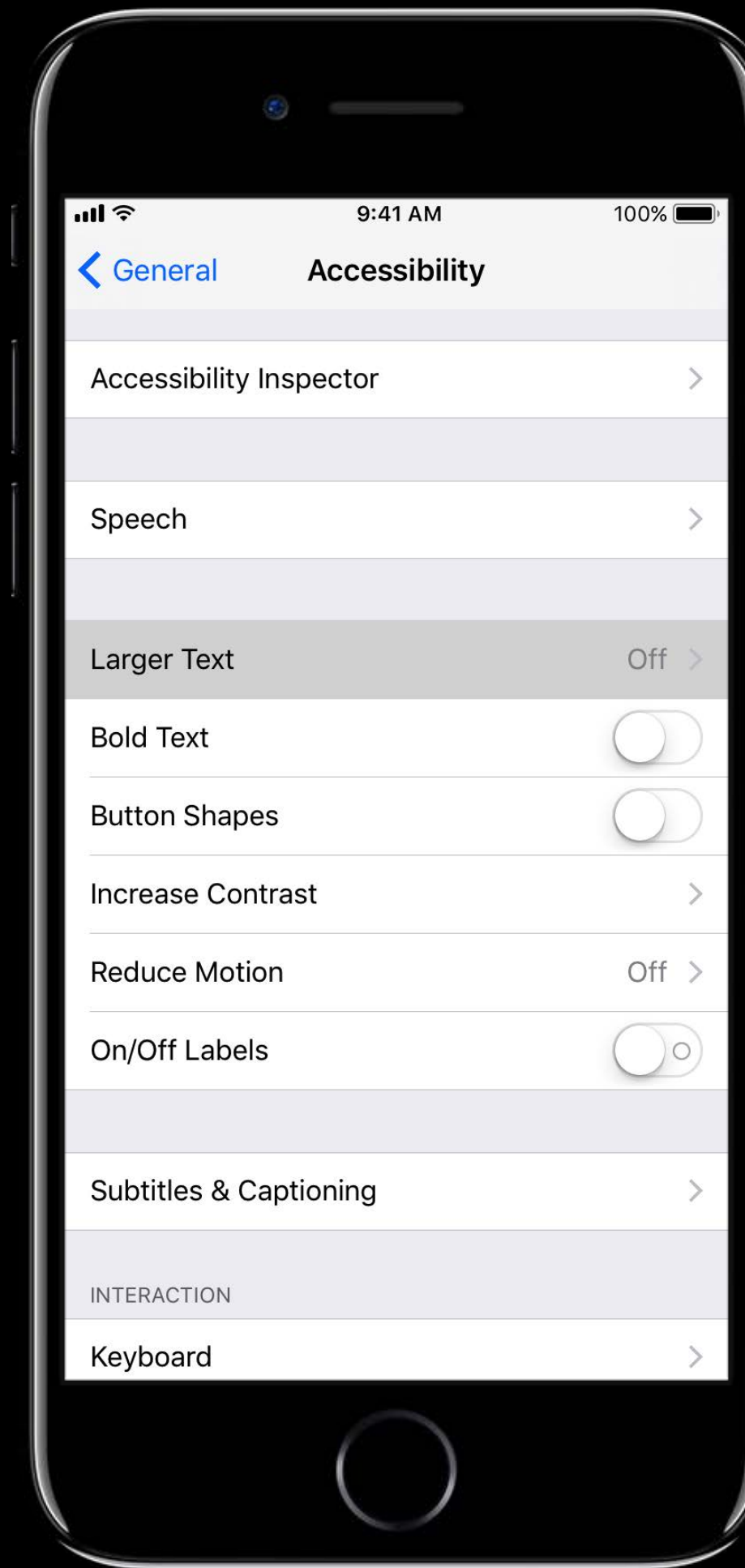
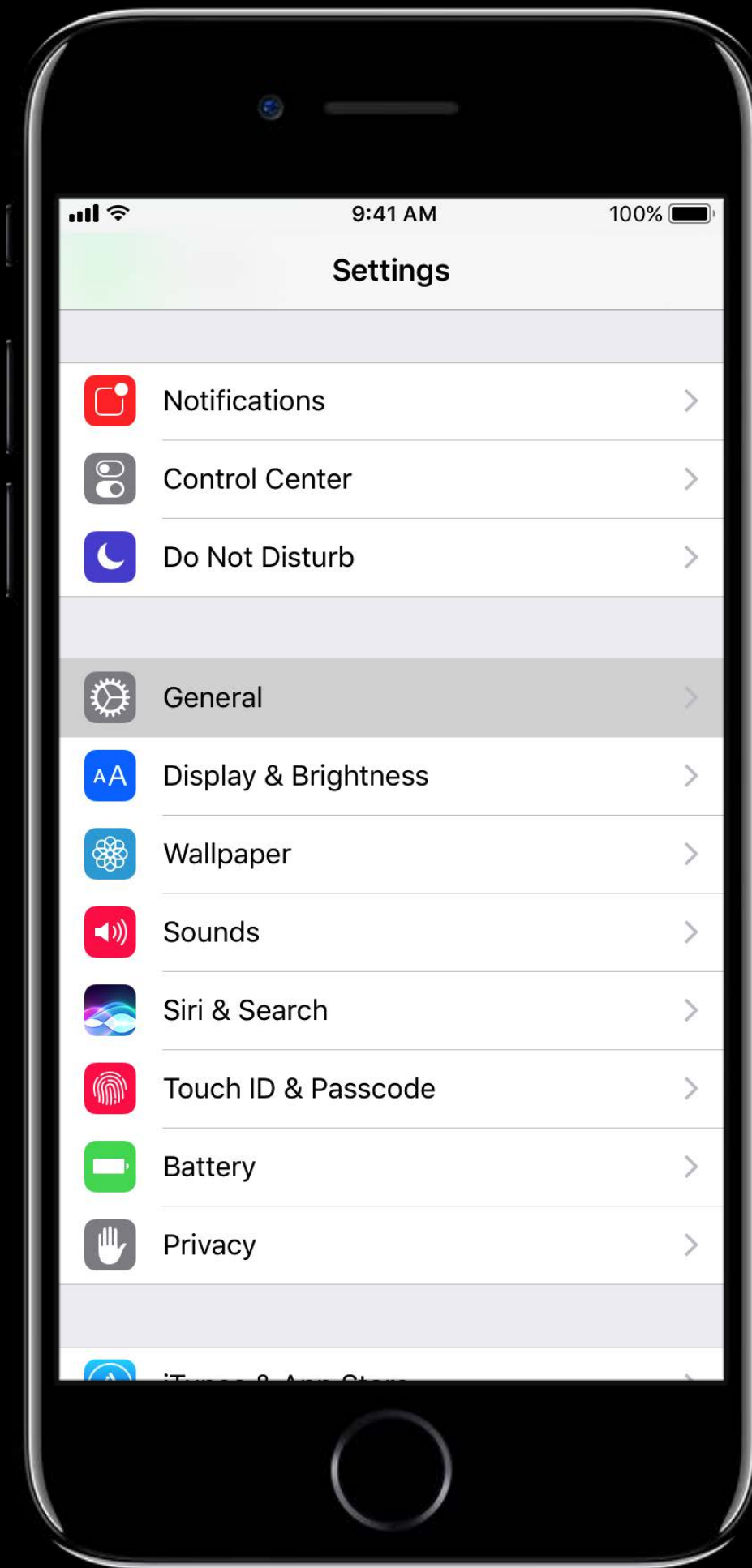
Dynamic Type



Dynamic Type



Dynamic Type



Safe Areas

Jason Yao, Interface Builder Engineer



9:41 AM



[← Dates](#)

Nearby Dates



Favorites



Bookmarks



History



Search



9:41 AM

100%

[← Dates](#)

Nearby Dates



Favorites



Bookmarks



History



Search





9:41 AM

100%

[← Dates](#)

Nearby Dates



Favorites



Bookmarks



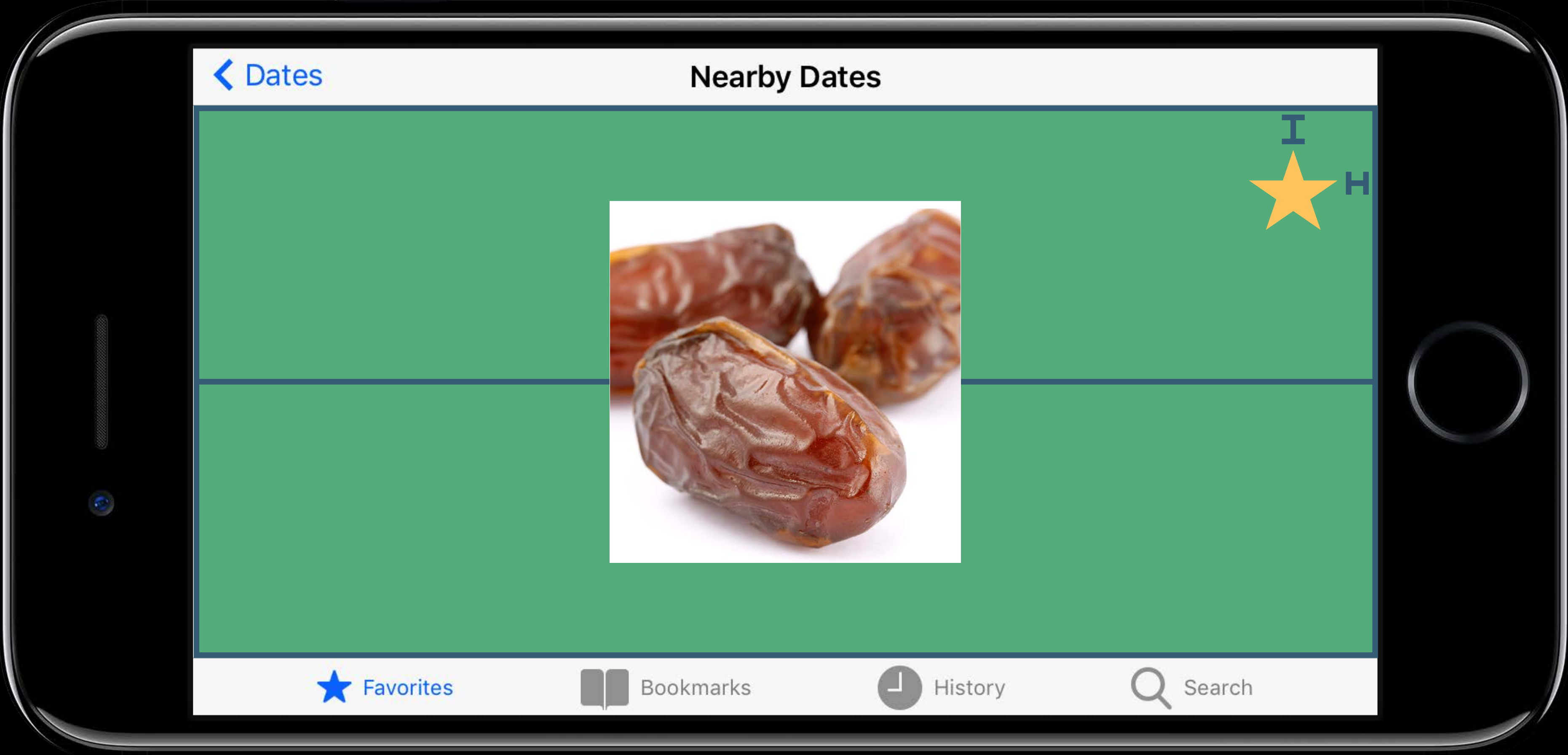
History



Search

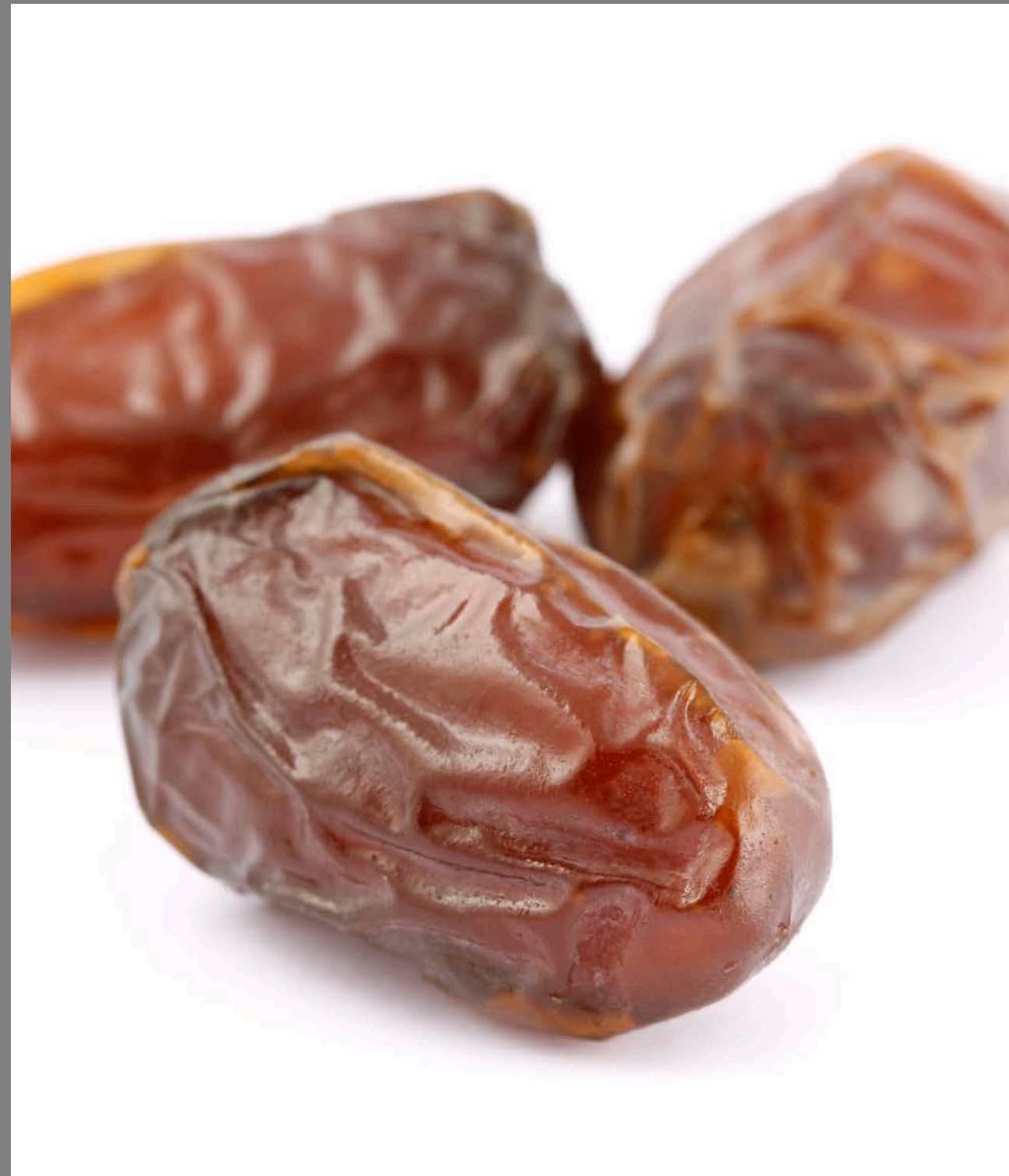


NEW



Date B

Date A



Date C



Date B

Date A



Date C



Date B

Date A

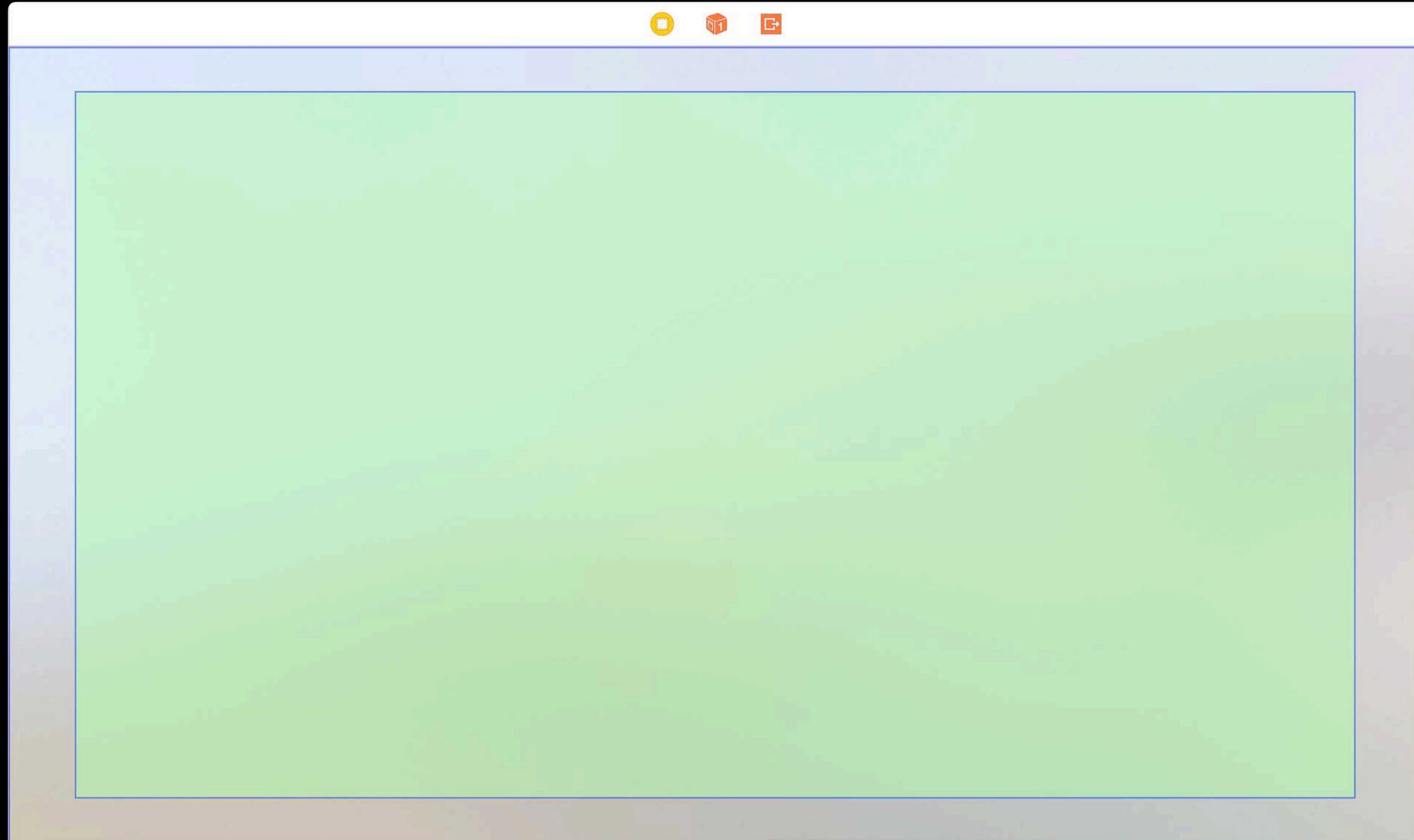


Date C



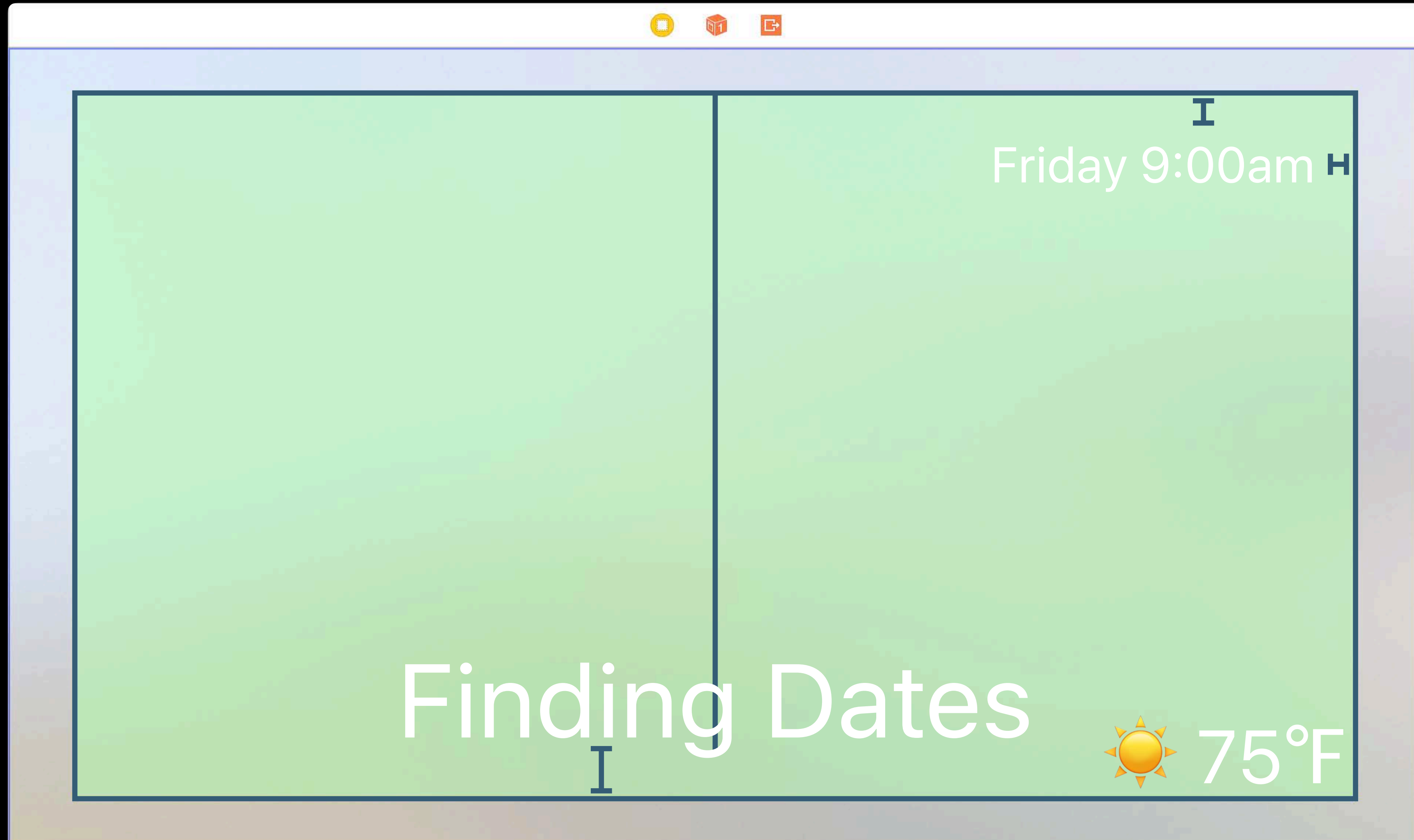
Safe Area Layout Guide

NEW



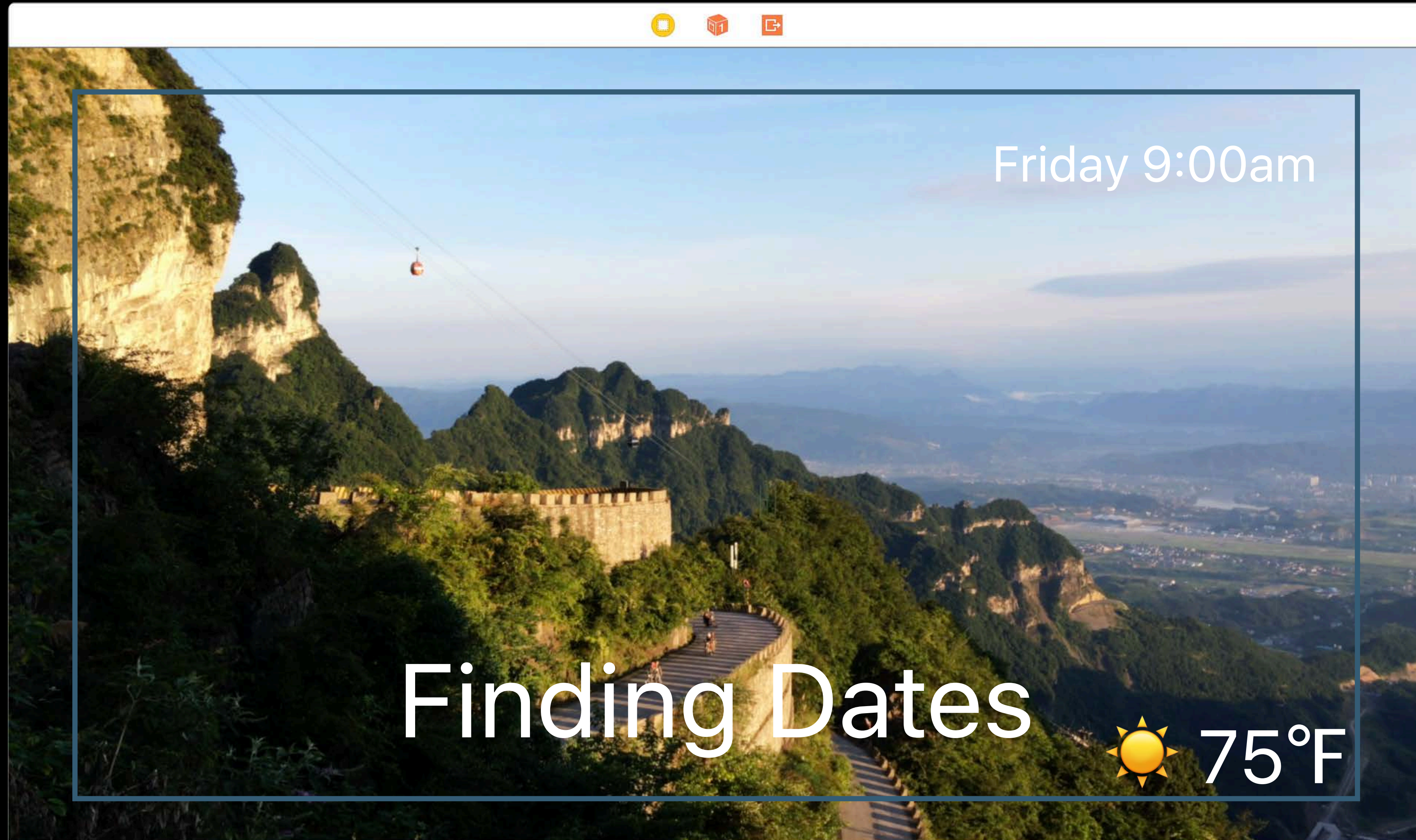
Safe Area Layout Guide

NEW



Safe Area Layout Guide

NEW



Identity and Type

Name ProportionalPositioningStoryboard.storyboard

Type Default - Interface Builder...

Location Relative to Group

Base.lproj/
ProportionalPositioningStoryboard.storyboard

Full Path /Users/j_yao/DevAux/
wwdc2017_interfacebuilder/
utolayout/Demos/Jason/
FindMyDates/FindMyDates/
Base.lproj/
ProportionalPositioningStoryboard.storyboard

On Demand Resource Tags

Tags

Interface Builder Document

Opens in Latest Xcode (9.0)

Builds for Deployment Target (11.0)

- Use Auto Layout
- Use Trait Variations
- Use Safe Area Layout Guides
- Use as Launch Screen

Global Tint Default

FindMyDates > FindMyDates

View Controller Scene

- View Controller
 - Top Layout Guide
 - Bottom Layout Guide
 - View
 - Dates B
 - Dates Image
 - First Responder
 - Exit

Filter

Identity and Type

Name ProportionalPositioningStoryboard.storyboard

Type Default - Interface Builder...

Location Relative to Group

Base.lproj/
ProportionalPositioningStoryboard.storyboard

Full Path /Users/j_yao/DevAux/
wwdc2017_interfacebuilder/
utolayout/Demos/Jason/
FindMyDates/FindMyDates/
Base.lproj/
ProportionalPositioningStoryboard.storyboard

On Demand Resource Tags

Tags

Interface Builder Document

Opens in Latest Xcode (9.0)

Builds for Deployment Target (11.0)

- Use Auto Layout
- Use Trait Variations
- Use Safe Area Layout Guides
- Use as Launch Screen

Global Tint Default

FindMyDates > FindMyDates

View Controller Scene

- View Controller
 - Top Layout Guide
 - Bottom Layout Guide
 - View
 - Dates B
 - Dates Image
 - First Responder
 - Exit

Filter

Identity and Type

Name ProportionalPositioningStoryboard.storyboard

Type Default - Interface Builder...

Location Relative to Group

Base.lproj/
ProportionalPositioningStoryboard.storyboard

Full Path /Users/j_yao/DevAux/
wwdc2017_interfacebuilder/
utolayout/Demos/Jason/
FindMyDates/FindMyDates/
Base.lproj/
ProportionalPositioningStoryboard.storyboard

On Demand Resource Tags

Tags

Interface Builder Document

Opens in Latest Xcode (9.0)

Builds for Deployment Target (11.0)

- Use Auto Layout
- Use Trait Variations
- Use Safe Area Layout Guides
- Use as Launch Screen

Global Tint Default

FindMyDates > FindMyDates

View Controller Scene

- View Controller
 - Top Layout Guide
 - Bottom Layout Guide
 - View
 - Dates B
 - Dates Image
 - First Responder
 - Exit

Filter

Identity and Type

Name ProportionalPositioningStoryboard.storyboard

Type Default - Interface Builder...

Location Relative to Group

Base.lproj/
ProportionalPositioningStoryboard.storyboard

Full Path /Users/j_yao/DevAux/
wwdc2017_interfacebuilder/
utolayout/Demos/Jason/
FindMyDates/FindMyDates/
Base.lproj/
ProportionalPositioningStoryboard.storyboard

On Demand Resource Tags

Tags

Interface Builder Document

Opens in Latest Xcode (9.0)

Builds for Deployment Target (11.0)

- Use Auto Layout
- Use Trait Variations
- Use Safe Area Layout Guides
- Use as Launch Screen

Global Tint Default

FindMyDates > FindMyDates

View Controller Scene

- View Controller
 - Top Layout Guide
 - Bottom Layout Guide
 - View
 - Dates B
 - Dates Image
 - First Responder
 - Exit

Filter

Identity and Type

Name ProportionalPositioningStoryboard.storyboard

Type Default - Interface Builder...

Location Relative to Group

Base.lproj/
ProportionalPositioningStoryboard.storyboard

Full Path /Users/j_yao/DevAux/
wwdc2017_interfacebuilder/
utolayout/Demos/Jason/
FindMyDates/FindMyDates/
Base.lproj/
ProportionalPositioningStoryboard.storyboard

On Demand Resource Tags

Tags

Interface Builder Document

Opens in Latest Xcode (9.0)

Builds for Deployment Target (11.0)

- Use Auto Layout
- Use Trait Variations
- Use Safe Area Layout Guides
- Use as Launch Screen

Global Tint Default

FindMyDates > FindMyDates

View Controller Scene

- View Controller
 - Top Layout Guide
 - Bottom Layout Guide
 - View
 - Dates B
 - Dates Image
 - First Responder
 - Exit

Filter

Identity and Type

Name ProportionalPositioningStoryboard.storyboard

Type Default - Interface Builder...

Location Relative to Group

Base.lproj/
ProportionalPositioningStoryboard.storyboard

Full Path /Users/j_yao/DevAux/
wwdc2017_interfacebuildera
utolayout/Demos/Jason/
FindMyDates/FindMyDates/
Base.lproj/
ProportionalPositioningStoryboard.storyboard

On Demand Resource Tags

Tags

Interface Builder Document

Opens in Latest Xcode (9.0)

Builds for Deployment Target (11.0)

- Use Auto Layout
- Use Trait Variations
- Use Safe Area Layout Guides
- Use as Launch Screen

Global Tint Default

FindMyDates > FindMyDates

View Controller Scene

- View Controller
 - View
 - Safe Area
 - Dates B
 - Dates Image
 - First Responder
 - Exit

Filter

Safe Area Layout Guide

Safe Area Layout Guide

Property on UIView

Safe Area Layout Guide

Property on UIView

Title safe, unobscured content

Safe Area Layout Guide

Property on UIView

Title safe, unobscured content

iOS storyboards

Safe Area Layout Guide

Property on UIView

Title safe, unobscured content

iOS storyboards

- Constraints automatically upgrade

Safe Area Layout Guide

Property on UIView

Title safe, unobscured content

iOS storyboards

- Constraints automatically upgrade
- Backwards deployable

Proportional Positioning



Dates

70%



Dates

70%



Dates

Date B



Sweetness

1/5

2/5

2/5

Date B



Sweetness

Demo

Proportional Positioning

Proportional Positioning

Use spacer views when needed in Interface Builder

Proportional Positioning

Use spacer views when needed in Interface Builder

- Mark as hidden

Proportional Positioning

Use spacer views when needed in Interface Builder

- Mark as hidden

Use UILayoutGuide programmatically

Stack View

Adaptive layout



Top Dates



**To date or not to date,
that is the question.**

Lorem ipsum dolor sit amet,
ligula suspendisse nulla
pretium, rhoncus tempor
fermentum, enim integer ad
vestibulum volutpat. Nisl
rhoncus turpis est, vel elit,
congue wisi enim nunc
ultricies sit, magna
tincidunt. Maecenas
aliquam maecenas ligula
nostra, accumsan taciti.

Demo

Stack View Adaptive Layout

Stack View Adaptive Layout

Use distribution, alignment, and spacing

Stack View Adaptive Layout

Use distribution, alignment, and spacing

Add some constraints

Stack View Adaptive Layout

Use distribution, alignment, and spacing

Add some constraints

Hidden property by size class in Xcode 9

Stack View Adaptive Layout

Use distribution, alignment, and spacing

Add some constraints

Hidden property by size class in Xcode 9

- Works great with Stack View

Stack View Adaptive Layout

Use distribution, alignment, and spacing

Add some constraints

Hidden property by size class in Xcode 9

- Works great with Stack View
- Backwards deployable

Summary

Dynamic content

- Layout changes with outlets
- Animate using transform

Layout

- Safe areas and spacer views
- Adaptive layout with stack views

More Information

<https://developer.apple.com/wwdc17/412>

Related Sessions

Building Apps with Dynamic Type	Executive Ballroom	Friday 1:50PM
Updating Your App for iOS 11		WWDC 2017
What's New in tvOS		WWDC 2017
What's New in Auto Layout		WWDC 2016
Mysteries of Auto Layout, Part 1		WWDC 2015
Mysteries of Auto Layout, Part 2		WWDC 2015

Labs

Advanced Interface Builder and Auto Layout Lab

Technology Lab K

Fri 12:00–1:50PM

