

What's New in Web Development in WebKit and Safari

Session 501

Brent Fulgham WebKit Engineer

Chris Young-Zawada Senior Front End Developer

Introduction to WebKit

WebKit Enhancements in Safari

Creating Amazing Experiences on Mac and iOS

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Introduction to WebKit

Introduction

WebKit

Web Browser Engine

Open Source Project



WebKit



WebKit



WebKit

Consistent features on iOS and OS X



WebKit



Safari
(iOS and OS X)



WKWebView



JavaScriptCore
Framework

WebKit



Safari
(iOS and OS X)



WKWebView



JavaScriptCore
Framework



WebKit



Safari
(iOS and OS X)



WKWebView



JavaScriptCore
Framework



WebKit



Safari
(iOS and OS X)



WKWebView



JavaScriptCore
Framework



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WebKit Enhancements

New Layout and Rendering Features

Modern JavaScript Updates

New CSS Features

WebKit Enhancements

New Layout and Rendering Features

Modern JavaScript Updates

New CSS Features

WebKit Enhancements

New Layout and Rendering Features

Modern JavaScript Updates

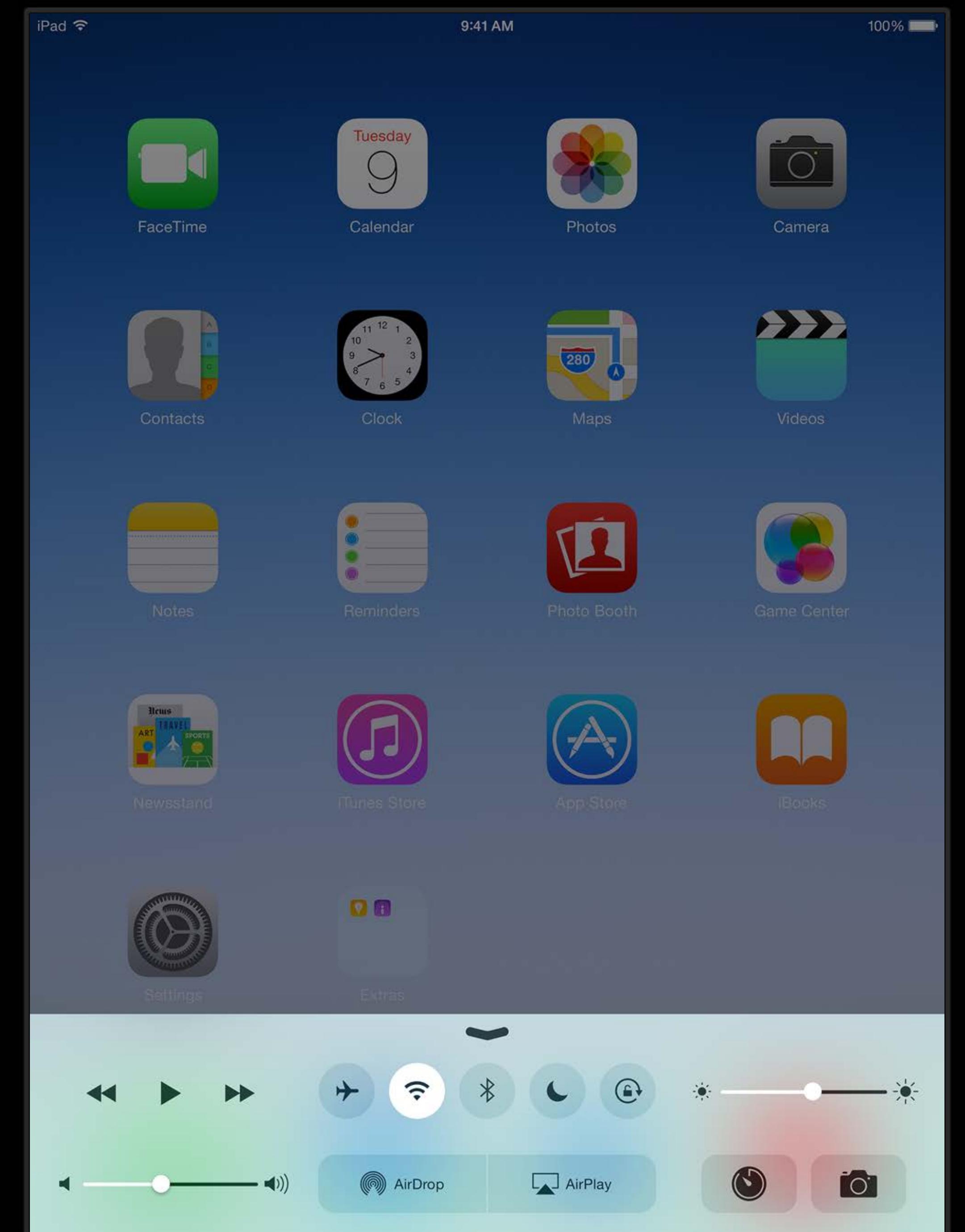
New CSS Features

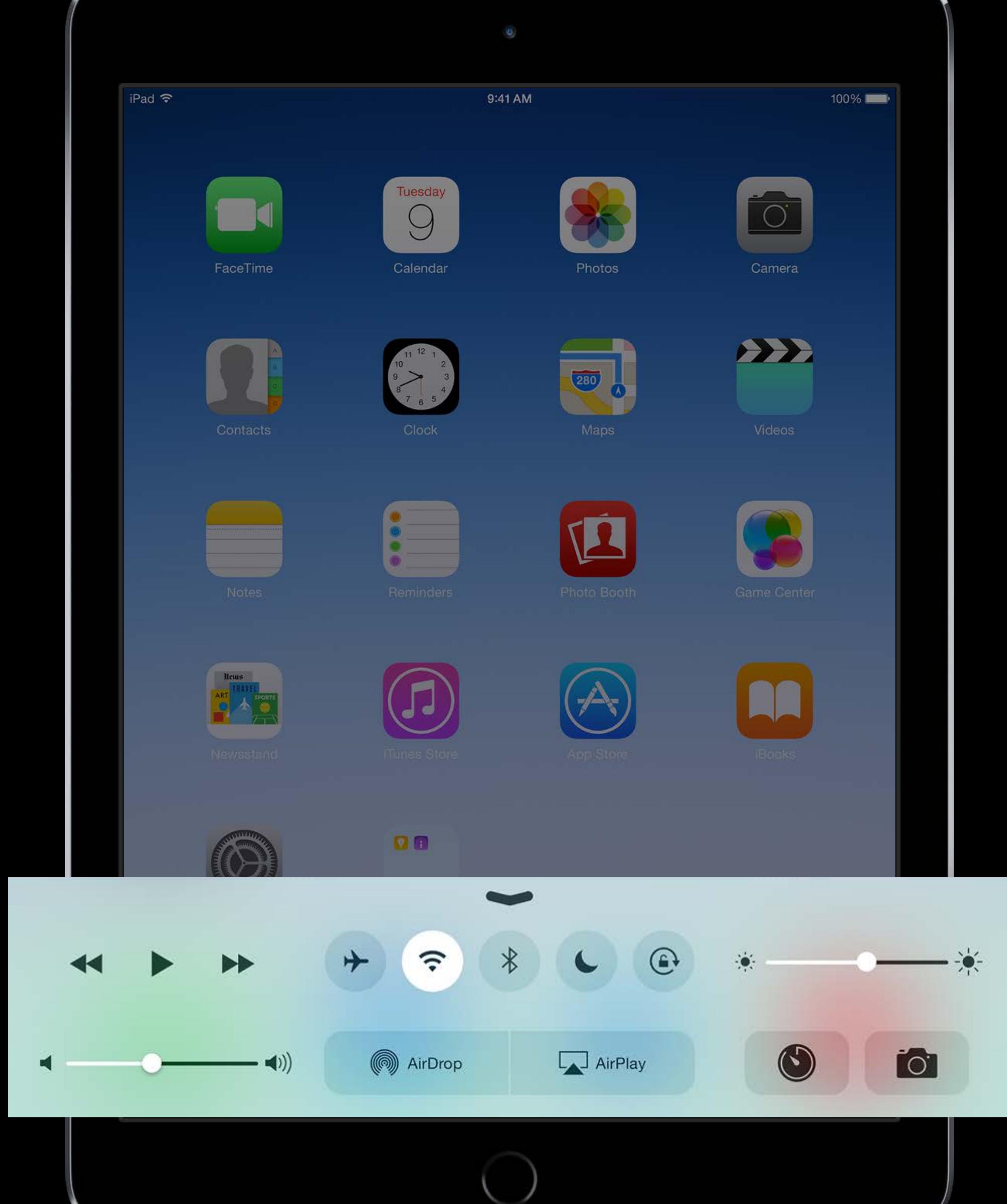
WebKit Enhancements in Safari

New layout and rendering features

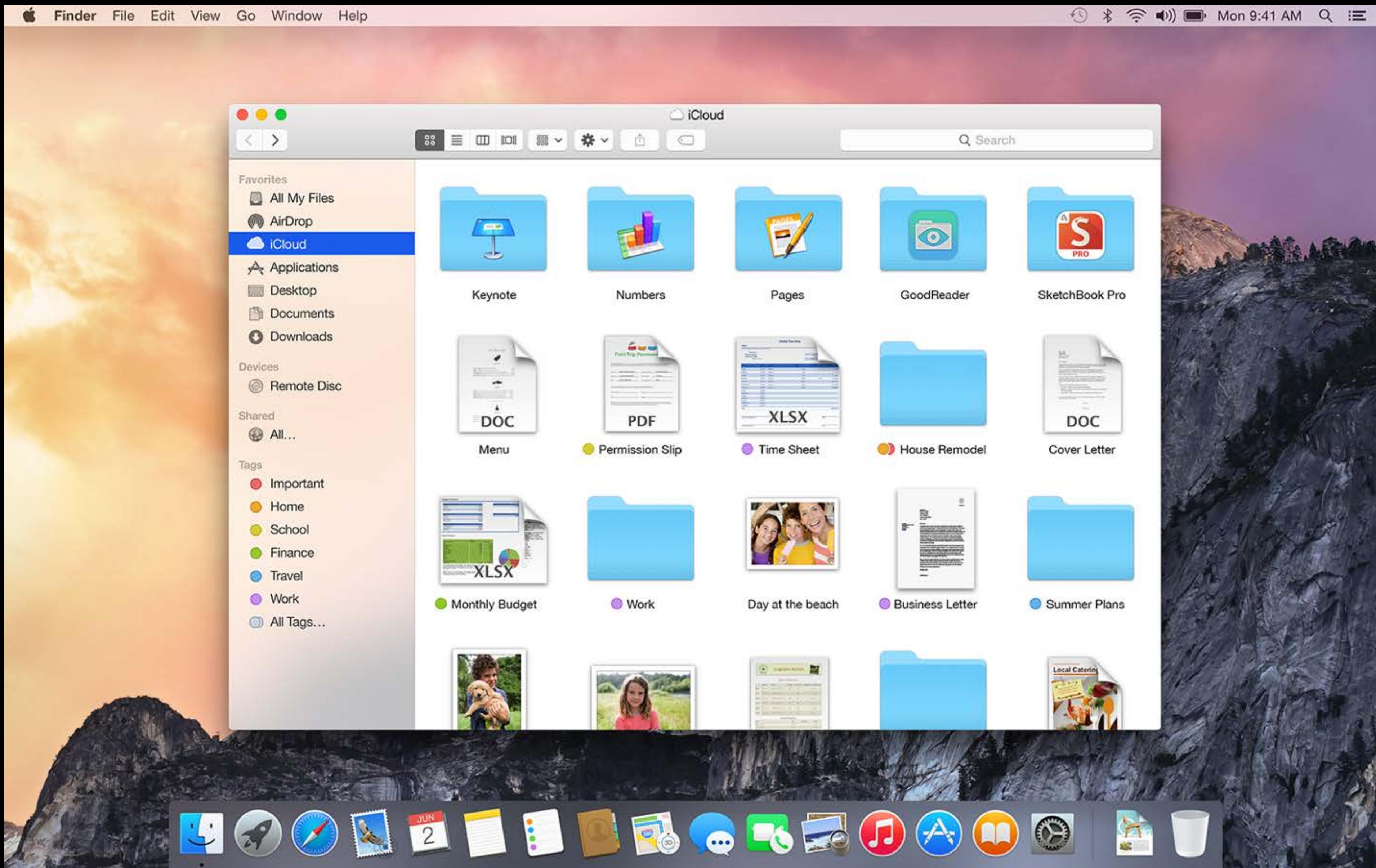
New Layout and Rendering Features

Backdrop effects

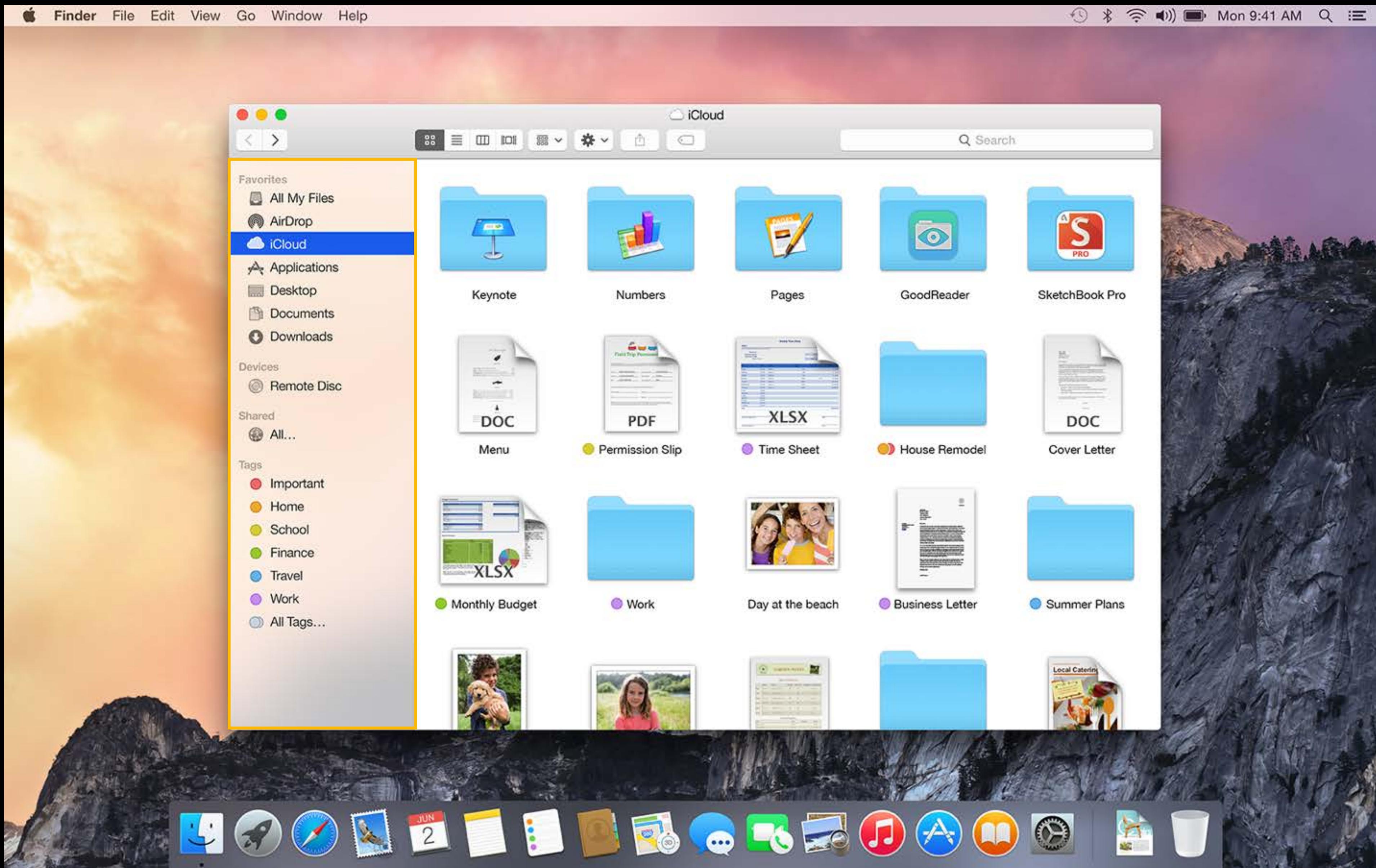




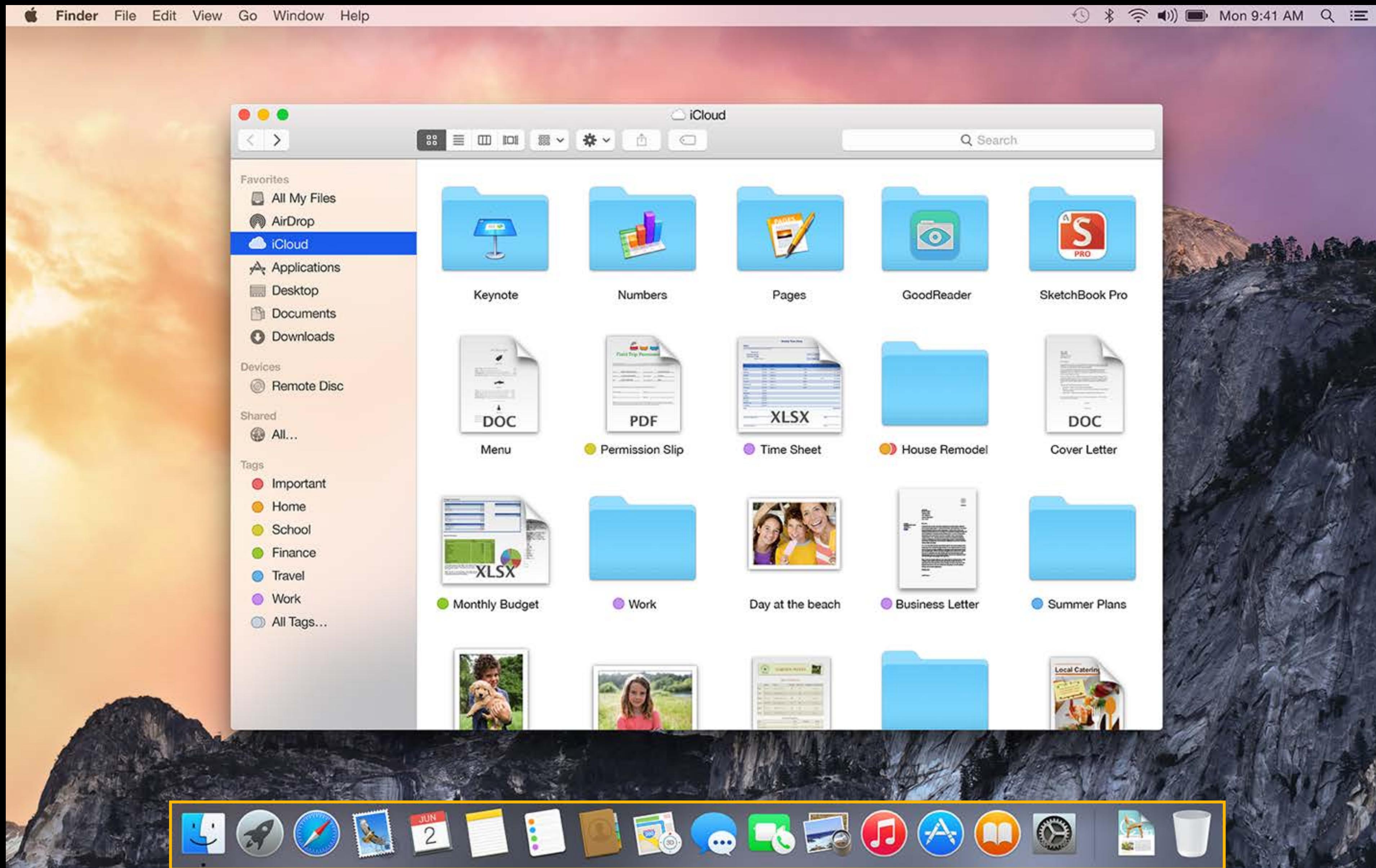
Backdrop Effects



Backdrop Effects



Backdrop Effects





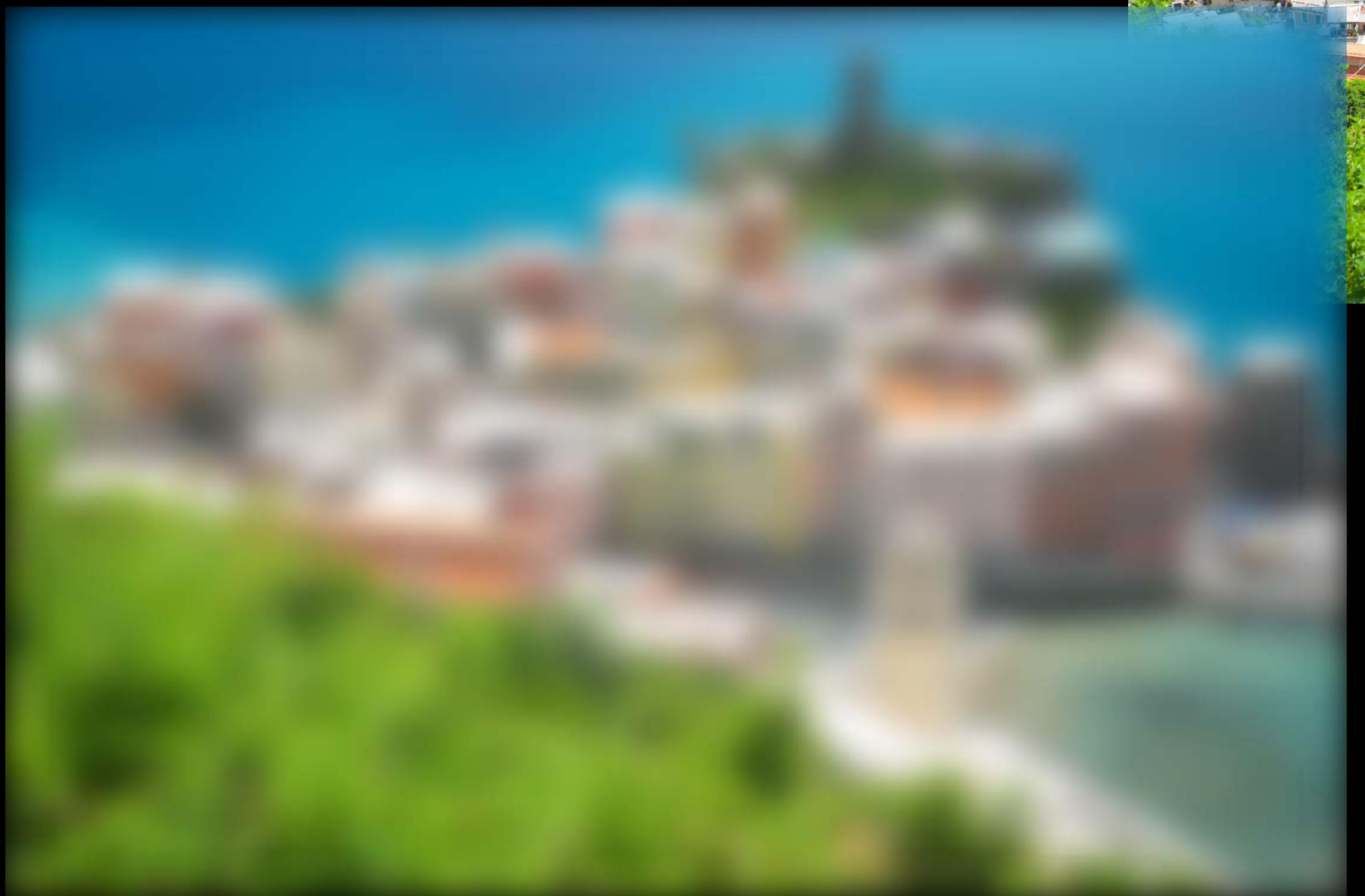


Translucent Background



interiorbox





Manual Backdrop Effects

Downsides

Can't animate backdrop

Difficult to change blur effect

NEW

backdrop-filter: blur(...)

Backdrop Filter

NEW

Declare backdrop filter effects in CSS

Addition to *CSS Filters Level 2 Draft Specification*

Backdrop Filter

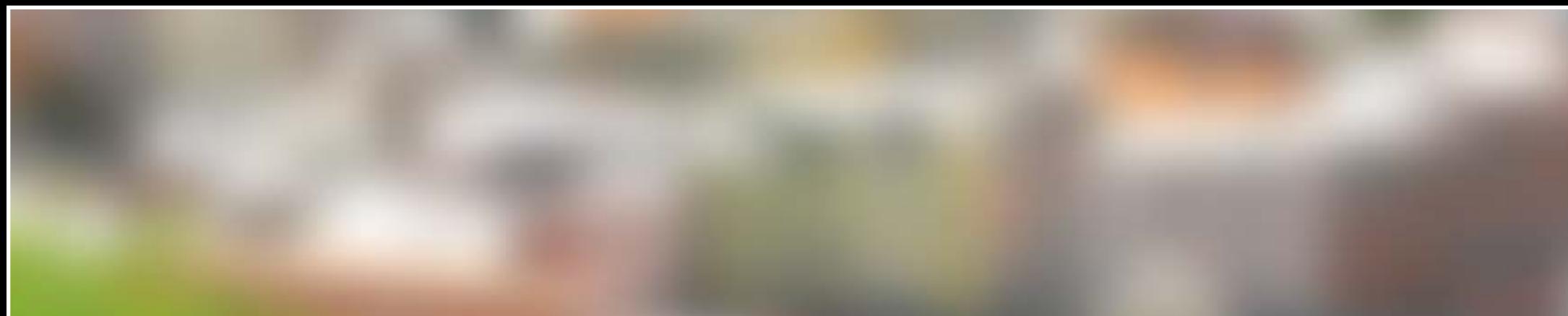


backdrop-filter: blur(10px)

backdrop-filter: blur(10px)



backdrop-filter: blur(10px)



backdrop-filter: blur(10px)



backdrop-filter: blur(10px)





A scenic coastal town built into a cliff overlooking the sea. The town features colorful buildings with red roofs, terraced gardens, and a prominent stone tower. In the foreground, green foliage frames a view of a harbor with boats and a church tower. A large, semi-transparent rectangular overlay with a blurred gradient from green to brown covers the upper half of the image. Inside this overlay, the text "backdrop-filter: blur(10px)" is displayed in a white, sans-serif font.

backdrop-filter: blur(10px)

`backdrop-filter: blur(...)`

NEW

backdrop-filter: *[Filter]*



backdrop-filter: invert()

A close-up photograph of a white dog with brown spots on its back and a black collar. The dog is standing on a green lawn. In the background, there's a colorful striped object, possibly a toy or a piece of equipment, and a person's bare foot is visible on the left. A dark gray rectangular box is overlaid on the image, containing the text.

backdrop-filter: blur(10px)

grayscale(100%)

A photograph of a snowy landscape. In the foreground, there's a snow-covered ground with some tracks. In the middle ground, a person stands on a small hill. The background features a sky filled with white and grey clouds. A bright rainbow arches across the upper left portion of the sky, its colors visible against the darker clouds.

Dynamic Background

A photograph of a person standing on a snow-covered hillside. The sky is filled with large, white clouds, and a bright rainbow arches across the upper left. The foreground is a textured snow field, and the background shows more snow-covered ground and some dark evergreen trees.

Dynamic Background

New Layout and Rendering Features

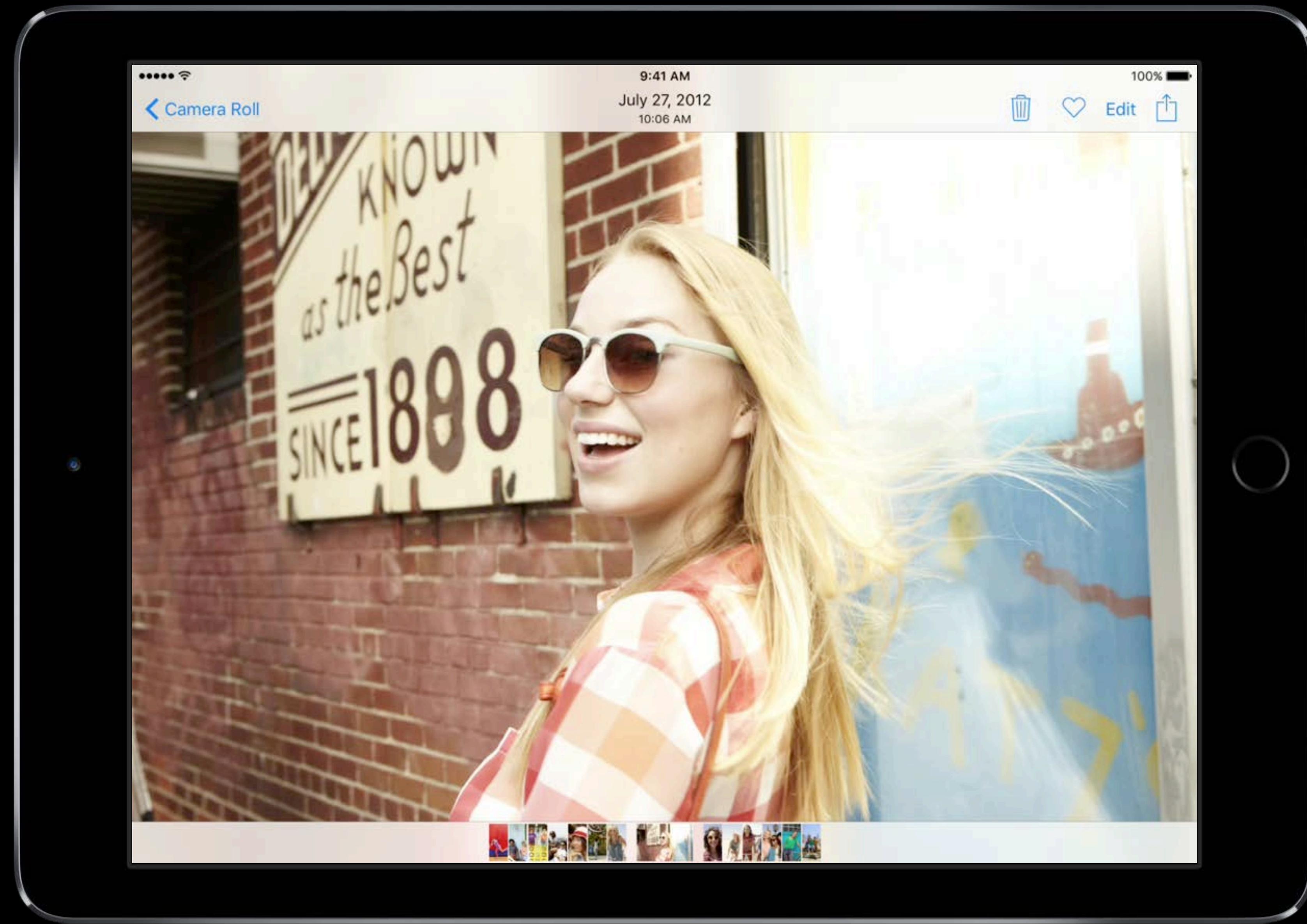
Scrolling

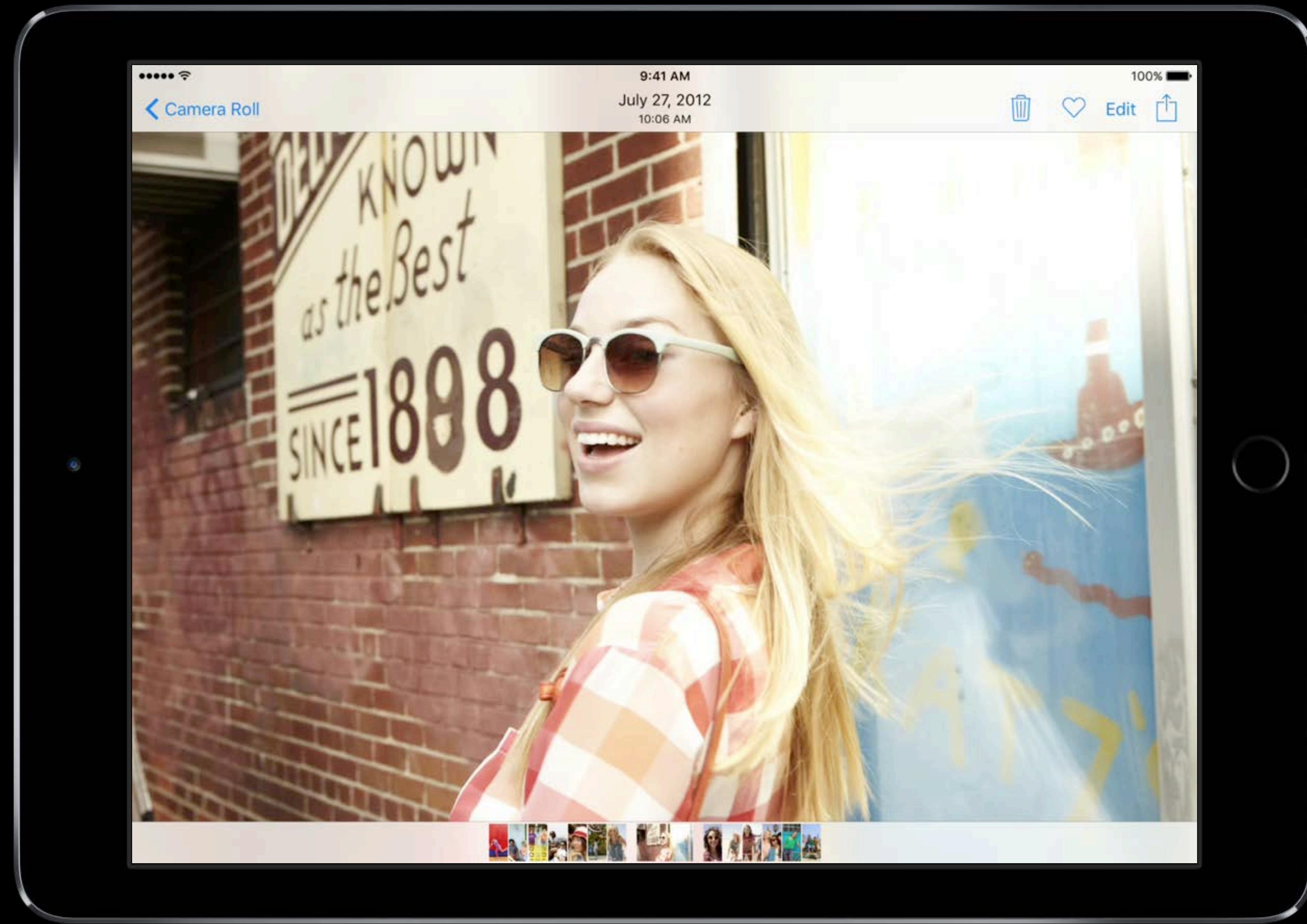
iTunes Style Banners



iTunes Style Banners







Paged Scrolling in JavaScript

Requires complicated JavaScript implementation

Does not use browser engine's smooth scrolling features

Significant performance issues

NEW

Scroll Snap Points

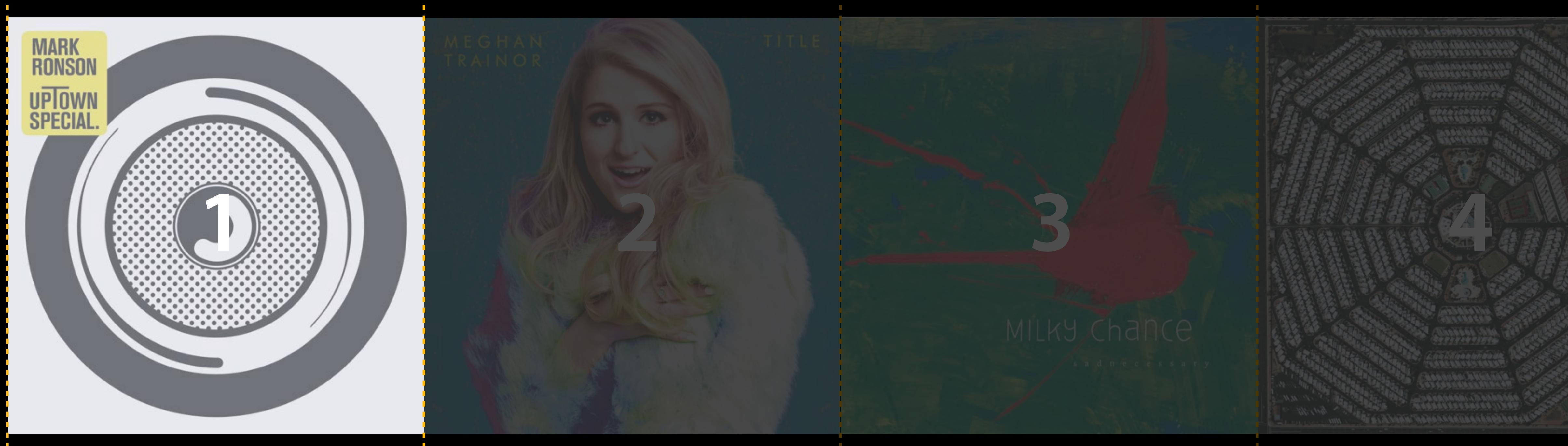
Scroll Snap Points

NEW

Declare target scroll positions in CSS

Specified in *CSS Scroll Snap Points Module Level 1*

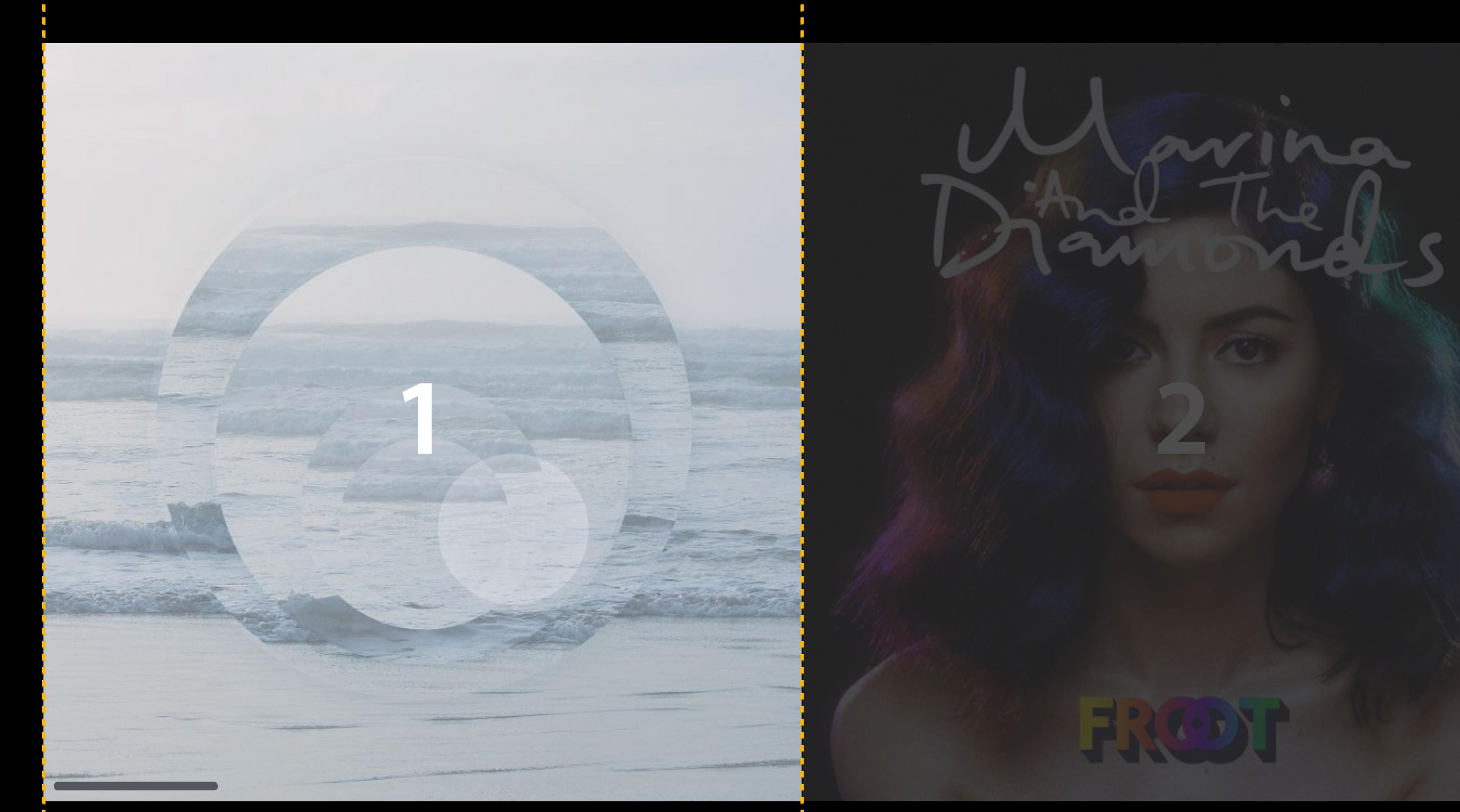
Scroll Snap Points



Scroll Snap Points

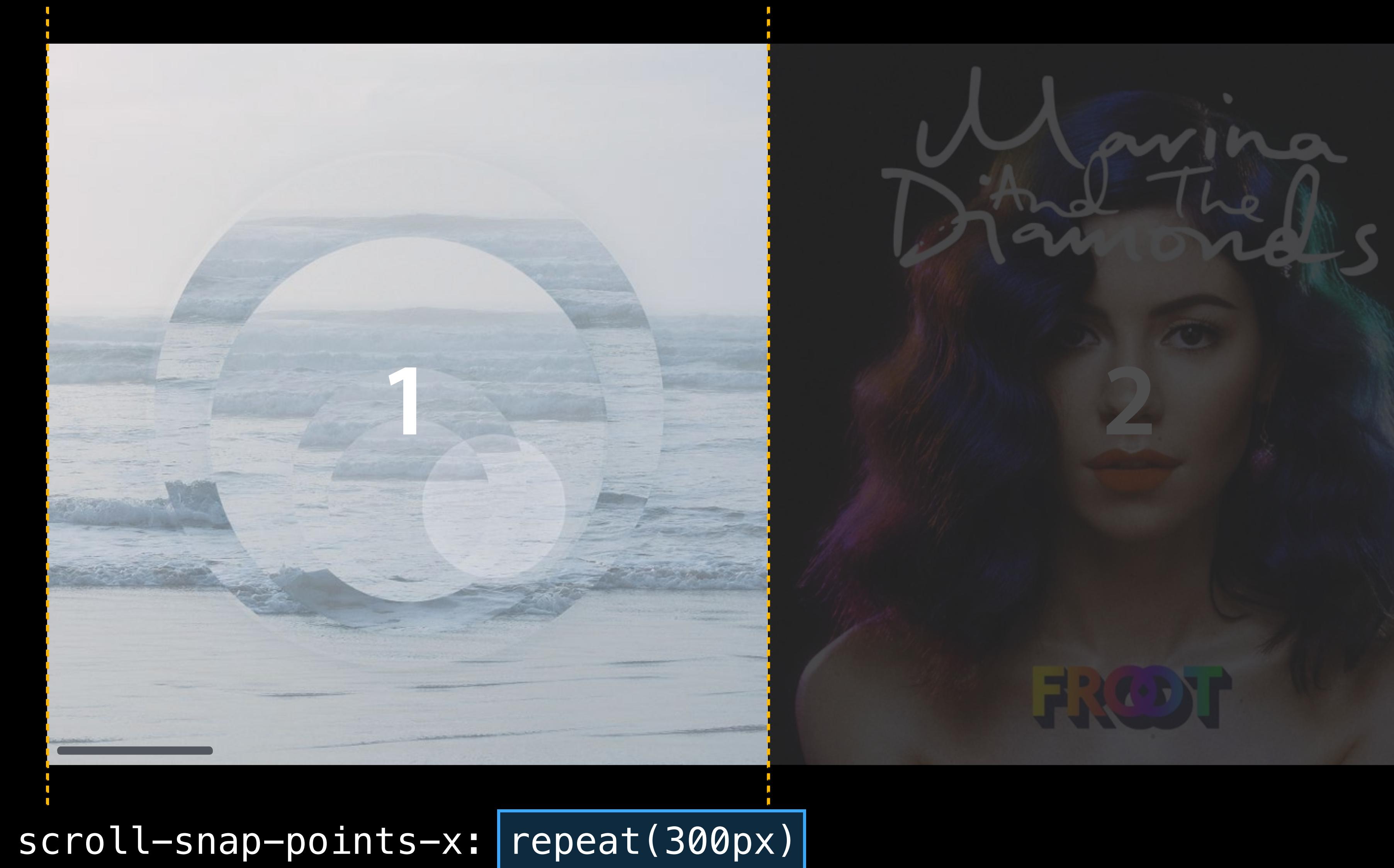


NEW

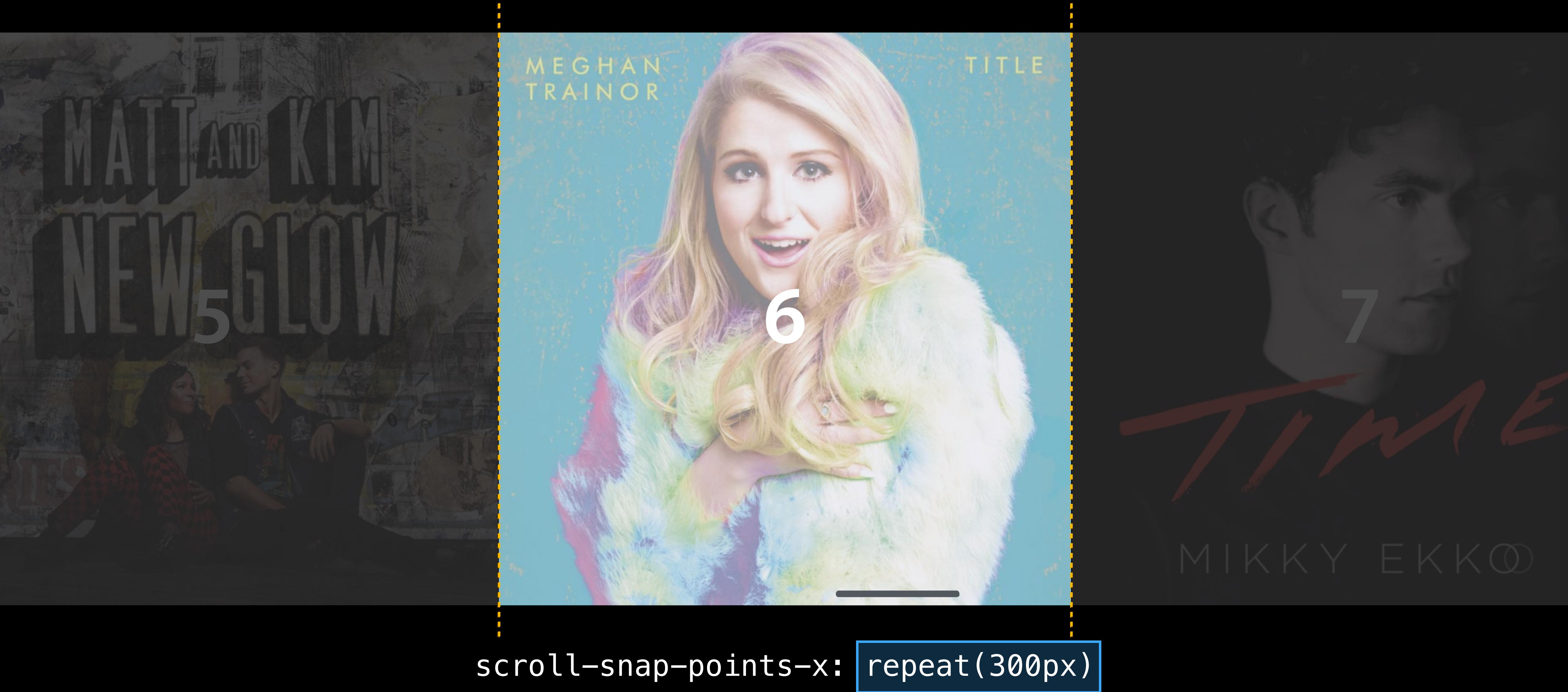


scroll-snap-points-x: repeat(300px)

NEW



NEW



Scroll Snap Points

```
<style>
  #left-snap {
    width: 300px;
    overflow-x: auto;
    overflow-y: hidden;
    -webkit-scroll-snap-type: mandatory;
    -webkit-scroll-snap-points-x: repeat(300px);
  }
</style>
<div id="left-snap">
  
  
  ...
  
</div>
```

Scroll Snap Points

```
<style>
  #left-snap {
    width: 300px;
    overflow-x: auto;
    overflow-y: hidden;
    -webkit-scroll-snap-type: mandatory;
    -webkit-scroll-snap-points-x: repeat(300px);
  }
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<div id="left-snap">
  
  
  ...
  
</div>
```

Scroll Snap Points

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</style>
<div id="left-snap">
  
  
  ...
  
</div>
```



-webkit-scroll-snap-points-x: repeat(300px)



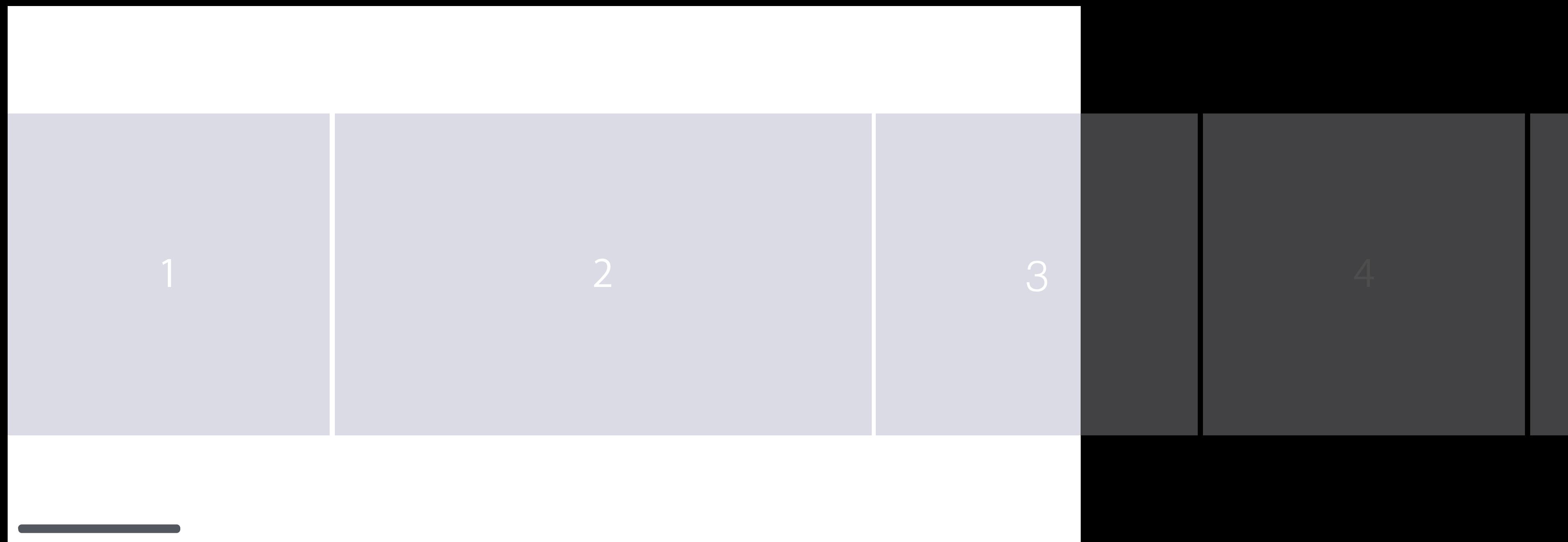
-webkit-scroll-snap-points-x: repeat(300px)

scroll-snap-points-y

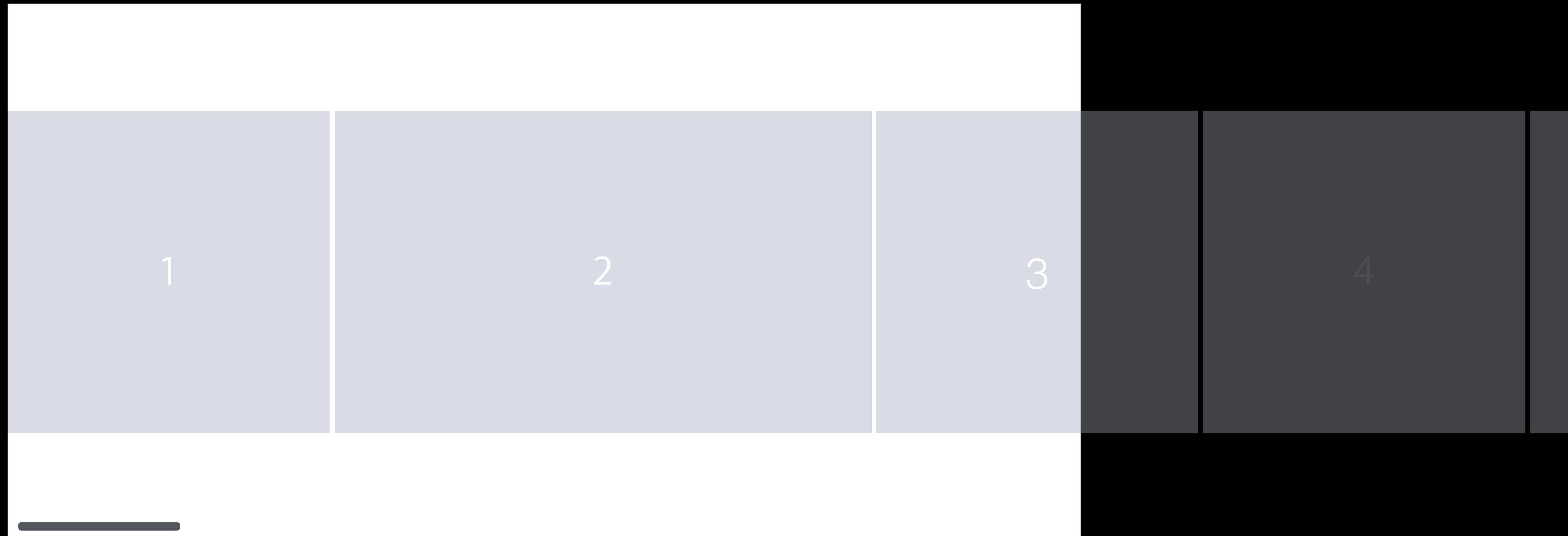


scroll-snap-points-x

Non-Uniform Elements



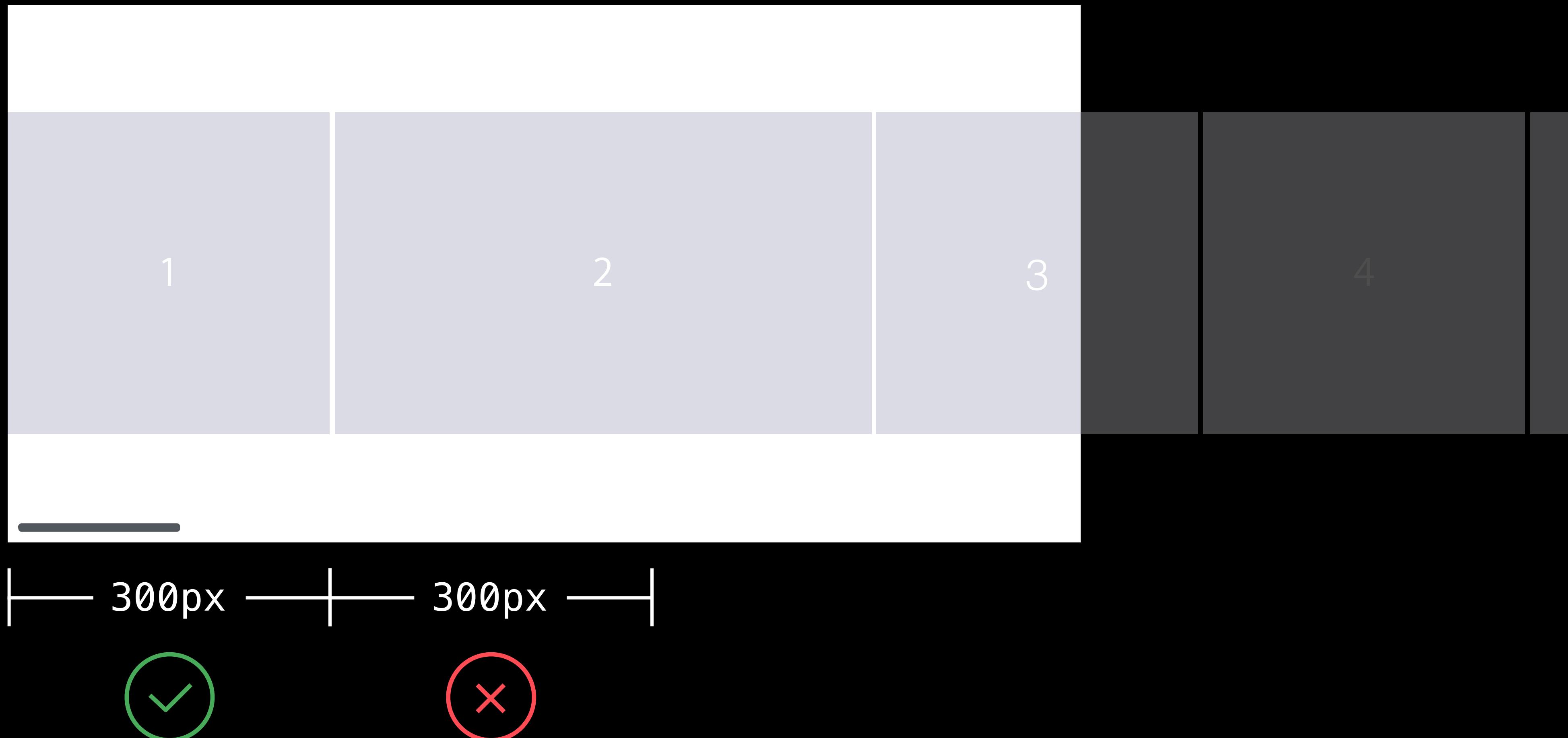
Non-Uniform Elements



300px



Non-Uniform Elements



scroll-snap-destination

NEW



scroll-snap-destination

NEW



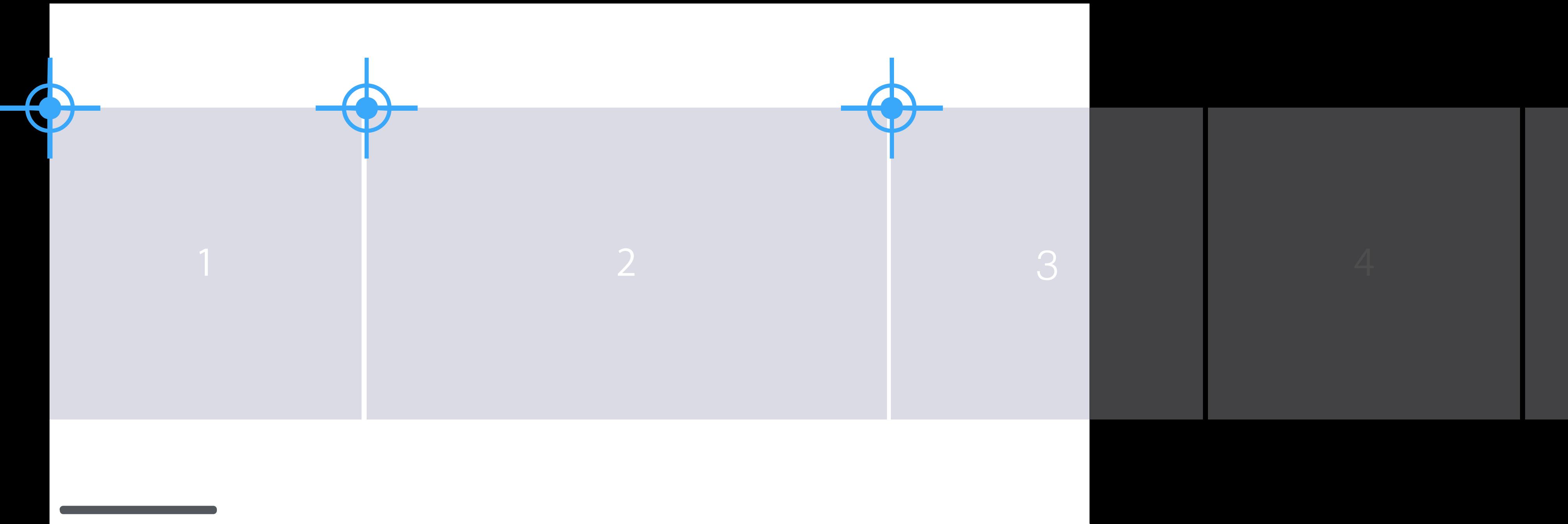
scroll-snap-coordinate

NEW

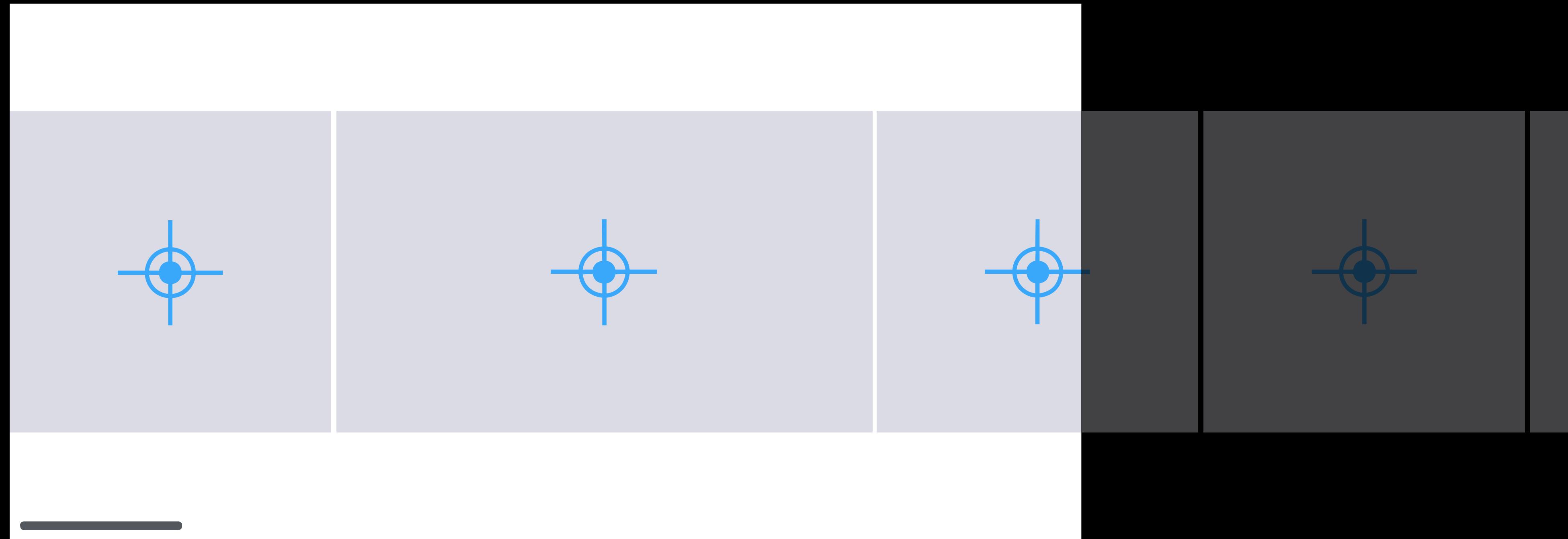


scroll-snap-coordinate

NEW

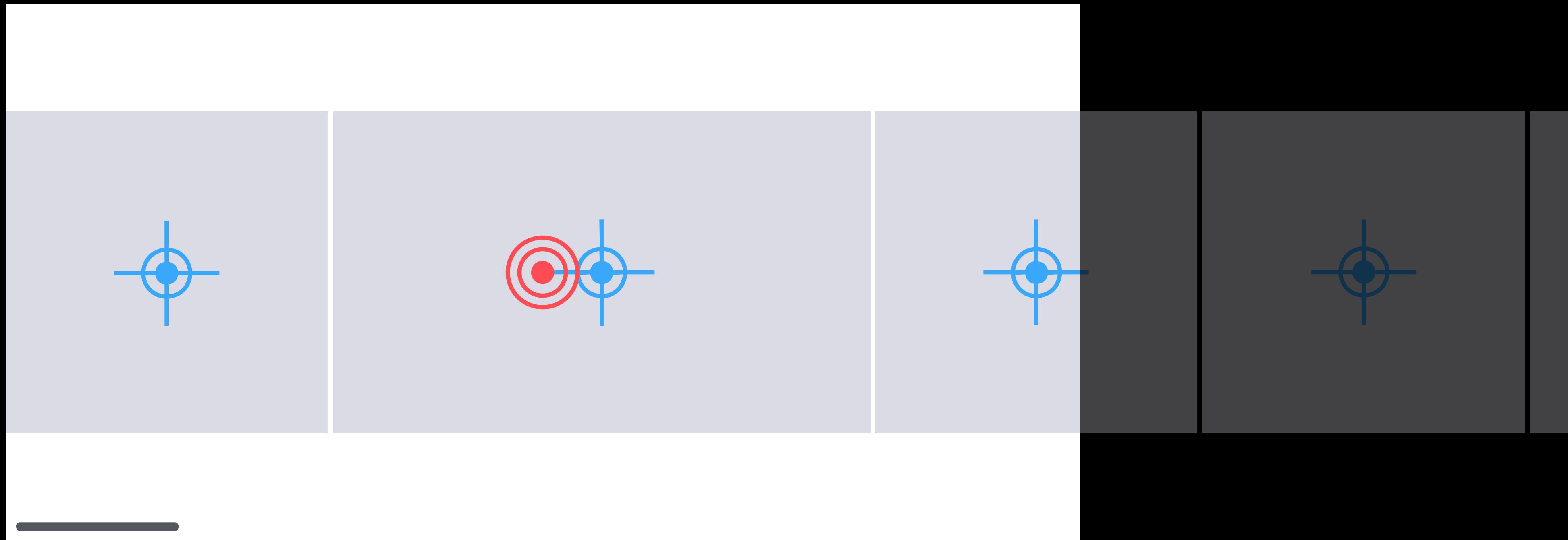


Putting Them Together



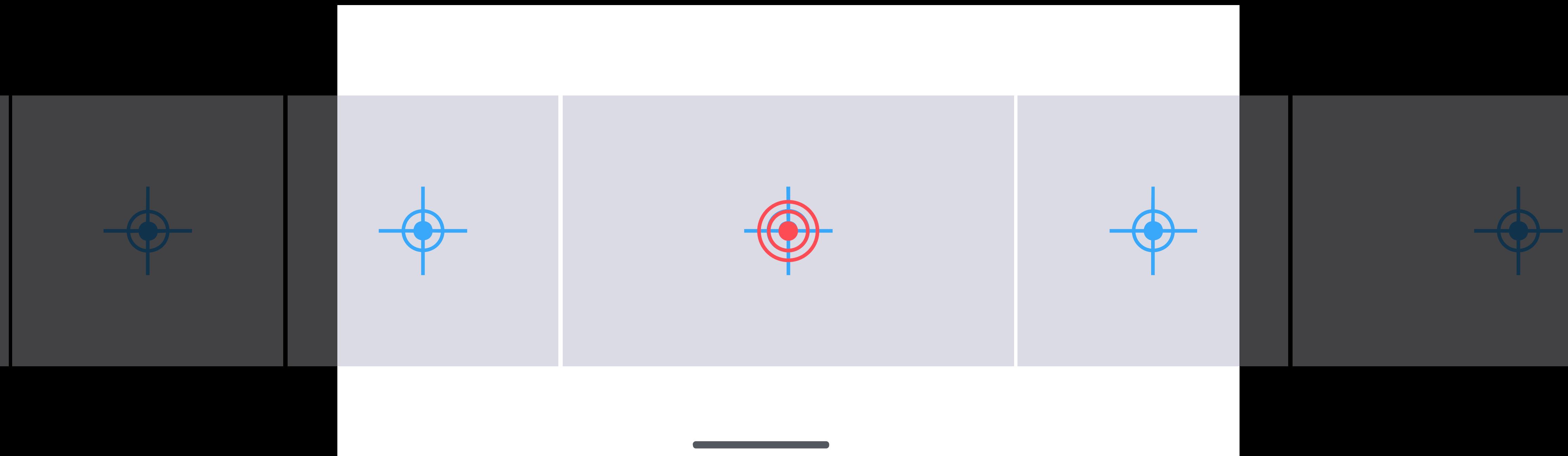
`-webkit-scroll-snap-coordinate: 50% 50%;`

Putting Them Together



```
-webkit-scroll-snap-coordinate: 50% 50%;  
-webkit-scroll-snap-destination: 50% 50%;
```

Putting Them Together



```
-webkit-scroll-snap-coordinate: 50% 50%;  
-webkit-scroll-snap-destination: 50% 50%;
```

Scroll Snap Points

```
#gallery {  
    width: 300px;  
    overflow-x: auto;  
    overflow-y: hidden;  
    -webkit-scroll-snap-type: mandatory;  
    -webkit-scroll-snap-destination: 50% 50%;  
}  
  
.photograph {  
    -webkit-scroll-snap-coordinate: 50% 50%;  
}
```

Scroll Snap Points

```
#gallery {  
    width: 300px;  
    overflow-x: auto;  
    overflow-y: hidden;  
    -webkit-scroll-snap-type: mandatory;  
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}  
  
.photograph {  
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Scroll Snap Points

```
#gallery {  
    width: 300px;  
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    -webkit-scroll-snap-type: mandatory;  
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.photograph {  
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Scroll Snap Points

```
#gallery {  
    width: 300px;  
    overflow-x: auto;  
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    -webkit-scroll-snap-type: mandatory;  
    -webkit-scroll-snap-destination: 50% 50%;  
}  
  
.photograph {  
    -webkit-scroll-snap-coordinate: 50% 50%;  
}
```



`-webkit-scroll-snap-destination: 50% 50%;`
`-webkit-scroll-snap-coordinate: 50% 50%;`



`-webkit-scroll-snap-destination: 50% 50%;
-webkit-scroll-snap-coordinate: 50% 50%;`

Demo

Backdrop filters and scroll snap points

Chris Young-Zawada

Senior Front End Developer

Presentation Enhancements

Best practices

Backdrop filters are very efficient, but rendering can be expensive

Scroll snap is great for paged content

Be careful mixing programmatic and scroll snap

WebKit Enhancements

New Layout and Rendering Features

Modern JavaScript Updates

New CSS Features

WebKit Enhancements in Safari

Modern JavaScript updates

Modern JavaScript Updates

Last year

Destructuring

Spread Operator

Sets

For-of Loops

Maps

Math Additions

Computed Properties

Iterators

Promises

Weak Maps

String Additions

Modern JavaScript Updates

This year

NEW

Class Syntax

Destructuring

Spread Operator

Computed Properties

Symbol Object

Maps

Math Additions

For-of Loops

Sets

Octal and Binary Literals

Iterators

Inheritance

Promises

Template Literals

Object.assign

Computed Properties

Weak Maps

Weak Sets

String Additions

Tagged Template

Template Literals

NEW

```
var a = 4;  
var b = 8;
```

```
// Old syntax  
console.log("The value of " + a + " + " + b + " = " + (a + b) + ".");
```

```
// New syntax  
console.log(`The value of ${a} + ${b} = ${a + b}.`);
```

Template Literals

NEW

```
var a = 4;  
var b = 8;
```

```
// Old syntax  
console.log("The value of " + a + " + " + b + " = " + (a + b) + ".");
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Template Literals

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var a = 4;  
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// Old syntax  
console.log("The value of " + a + " + " + b + " = " + (a + b) + ".");
```

```
// New syntax  
console.log(`The value of ${a} + ${b} = ${a + b}.`);
```

The value of 4 + 8 = 12.

Object Literal Property Shorthand Syntax

```
var name = "Joe";
var category = "Awesome";

// Old style
function createFoo(name, category) {
  return { name: name, category: category };
};
```

Object Literal Property Shorthand Syntax

NEW

```
var name = "Joe";
var category = "Awesome";

// Old style
function createFoo(name, category) {
    return { name: name, category: category };
};

// New style
function createBar(name, category) {
    return { name, category };
}
```

Prototype Syntax

```
function Polygon(sides) {  
    this.sides = sides;  
}
```

```
Polygon.prototype.name = function() {  
    return 'polygon';  
}
```

```
Polygon.prototype.description = function() {  
    return `This ${this.name()} has ${this.sides} sides.`;  
}
```

Class Syntax

NEW

```
class Polygon {  
    constructor(sides) {  
        this.sides = sides;  
    }  
  
    name() { return 'polygon'; }  
  
    description() {  
        return `This ${this.name()} has ${this.sides} sides.`;  
    }  
}
```

Class Syntax

NEW

```
class Polygon {  
    constructor(sides) {  
        this.sides = sides;  
    }  
  
    name() { return 'polygon'; }  
  
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        return `This ${this.name()} has ${this.sides} sides.`;  
    }  
}
```

Class Syntax

NEW

```
class Polygon {  
    constructor(sides) {  
        this.sides = sides;  
    }  
  
    name() { return 'polygon'; }  
  
    description() {  
        return `This ${this.name()} has ${this.sides} sides.`;  
    }  
}
```

NEW

Class Syntax

Inheritance

```
class Rectangle extends Polygon {  
    constructor() {  
        super(4);  
    }  
  
    name() { return 'rectangle'; }  
  
    static rightAngle() { return 90; }  
}  
  
var bar = new Rectangle();  
console.log(bar.sides()); // 'This rectangle has 4 sides.'  
console.log(Rectangle.rightAngle()); // '90'
```

Class Syntax

Inheritance

```
class Rectangle extends Polygon {  
    constructor() {  
        super(4);  
    }  
  
    name() { return 'rectangle'; }  
  
    static rightAngle() { return 90; }  
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Class Syntax

Inheritance

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var bar = new Rectangle();  
console.log(bar.sides()); // 'This rectangle has 4 sides.'  
console.log(Rectangle.rightAngle()); // '90'
```

Class Syntax

Inheritance

```
class Rectangle extends Polygon {  
    constructor() {  
        super(4);  
    }  
  
    name() { return 'rectangle'; }  
  
    static rightAngle() { return 90; }  
}  
  
var bar = new Rectangle();  
console.log(bar.sides()); // 'This rectangle has 4 sides.'  
console.log(Rectangle.rightAngle()); // '90'
```

Class Syntax

Inheritance

```
class Rectangle extends Polygon {  
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        super(4);  
    }  
  
    name() { return 'rectangle'; }  
  
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}  
  
var bar = new Rectangle();  
console.log(bar.sides()); // 'This rectangle has 4 sides.'  
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```

WebKit Enhancements

New Layout and Rendering Features

Modern JavaScript Updates

New CSS Features

WebKit Enhancements in Safari

New CSS features

WebKit Enhancements

New CSS features

:any-link

placeholder-shown

:lang

Case-insensitive attribute selectors

@supports

:matches

:nth-child(... of ...)

Full selectors in :not

Unprefixed properties and values

New CSS Features

Recently unprefixed properties and values

1

transitions

2

animations

3

transforms

4

flexbox

5

columns

6

cursor zoom-in

7

cursor zoom-out

8

alt

New CSS Features

Detecting feature support

Dog's World



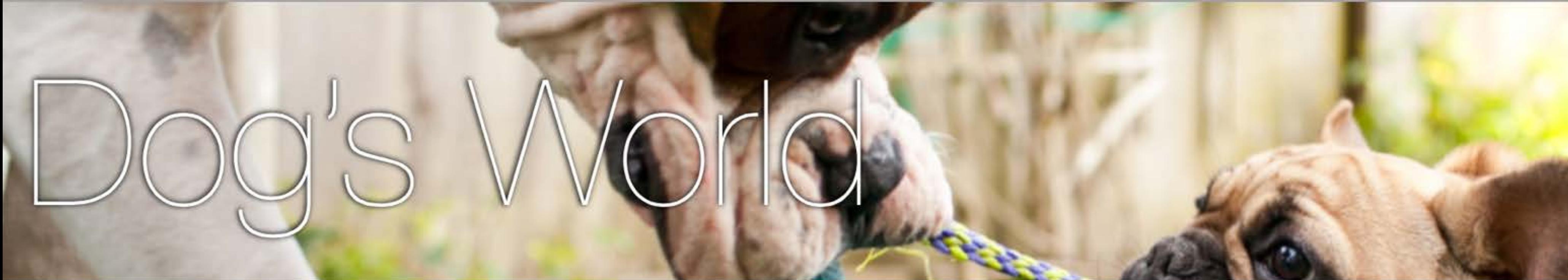
Call me Ishmael. Some years ago—never mind how long precisely—having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen and regulating the circulation.

Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off—then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their

NEW

`-webkit-initial-letter: Lines Occupied [Lines To Sink]`

Dog's World



Call me Ishmael. Some years ago—never mind how long precisely—having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off—then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their degree, some time or other, cherish very nearly the same feelings towards the ocean

Dog's World



Call me Ishmael. Some years ago—never mind how long precisely—having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off—then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their degree, some time or other, cherish very nearly the same feelings towards the ocean

Manually Detecting Feature Support

```
// detect CSS initial-letter support
var browsers = ['moz', 'khtml', 'webkit', 'o', 'ms'];
var options = ("initialLetter," + browsers.join("InitialLetter,")
  + "InitialLetter").split(",");  
  
var test = document.createElement("div");
for (var n = 0; n < options.length; ++n) {
  if (test.style[options[n]] === "") {
    console.log(`#${options[n]} is supported.`)
    break;
  }
}
// Sadface. Must Polyfill
```

NEW

@supports

```
@supports(condition) {  
    /* Rules when condition is true */  
}
```

NEW

@supports

```
@supports(-webkit-initial-letter: 3) {  
  section.main :first-child:first-letter {  
    font-family: "Bodoni 72";  
    -webkit-initial-letter: 3;  
    margin: 0px 4px;  
  }  
}
```

@supports(initial-letter: 3)

Unsupported

Call me Ishmael. Some years ago—never mind how long precisely—having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off—then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their degree, some time or other, cherish very nearly the same feelings towards the ocean

@supports(initial-letter: 3)

Supported

Call me Ishmael. Some years ago—never mind how long precisely—having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off—then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their

New CSS Features

Reducing repetition

Reducing Repetition

```
.default .def,  
.default .bracket,  
.default .operator,  
.default .variable {  
    color: red;  
}
```

Reducing Repetition

```
.default .def,  
.default .bracket,  
.default .operator,  
.default .variable {  
    color: red;  
}
```

:matches

NEW

```
.default :matches(.def, .bracket, .operator, .variable) {  
    color: red;  
}
```

WebKit Enhancements

New Layout and Rendering Features

Modern JavaScript Updates

New CSS Features

Introduction to WebKit

WebKit Enhancements in Safari

Creating Amazing Experiences on Mac and iOS

Creating Amazing Experiences

Maximizing design for iOS and OS X

AirPlay

AirPlay Video for OS X

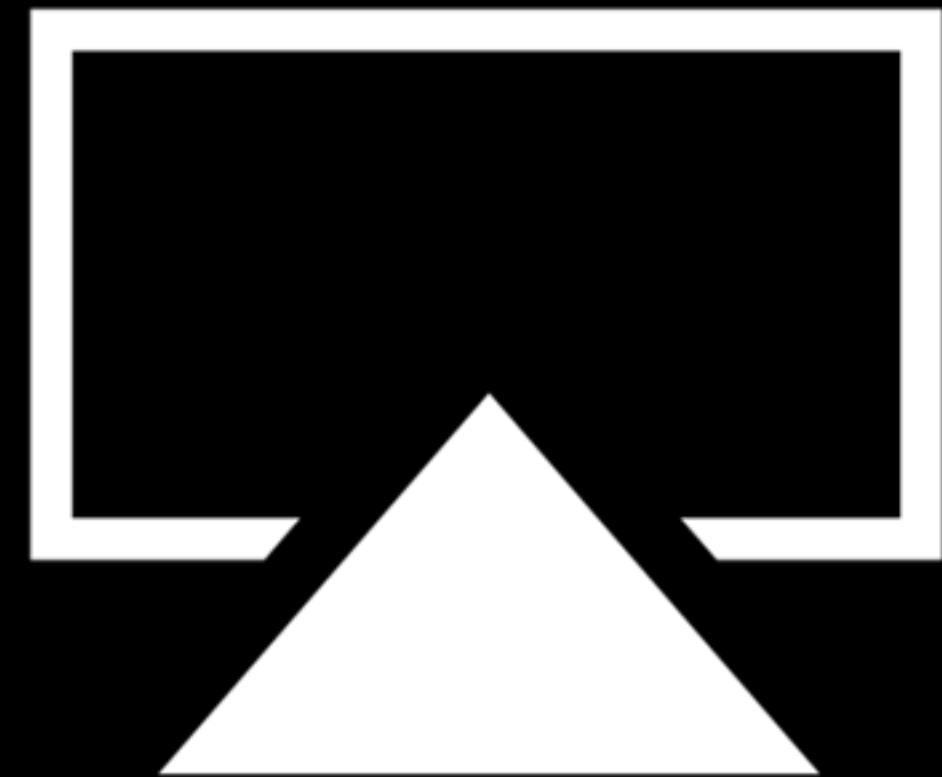
NEW

Allows your content to be played on
Apple TV in full fidelity

WebKit Media Controls support this today

API is identical to iOS

See our WWDC 2013 session for the details



AirPlay Video for OS X

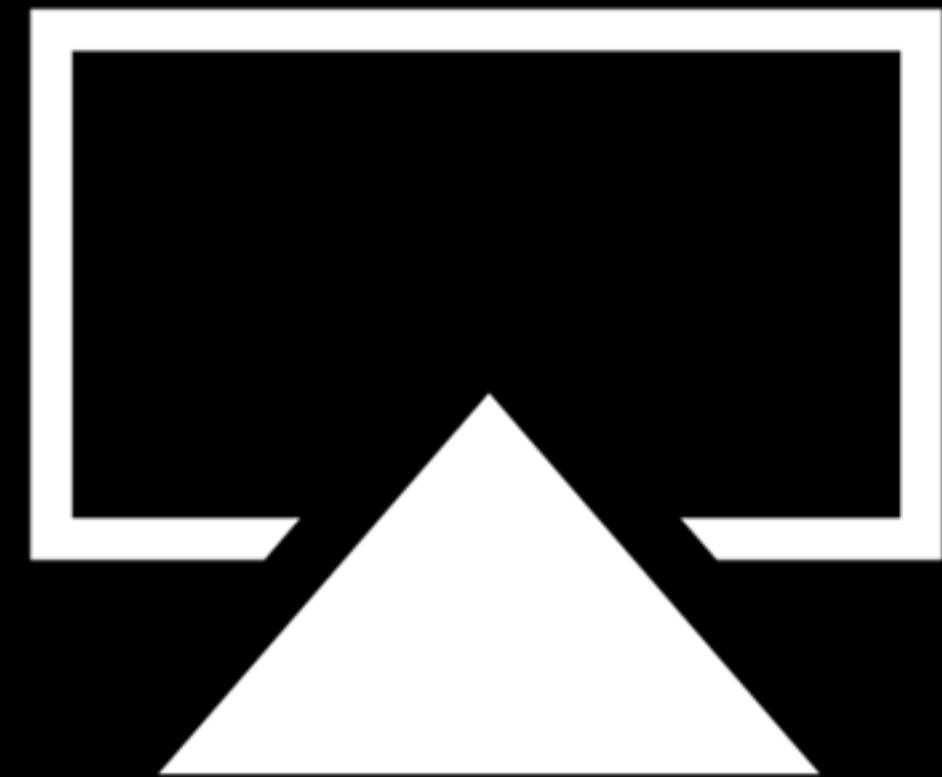
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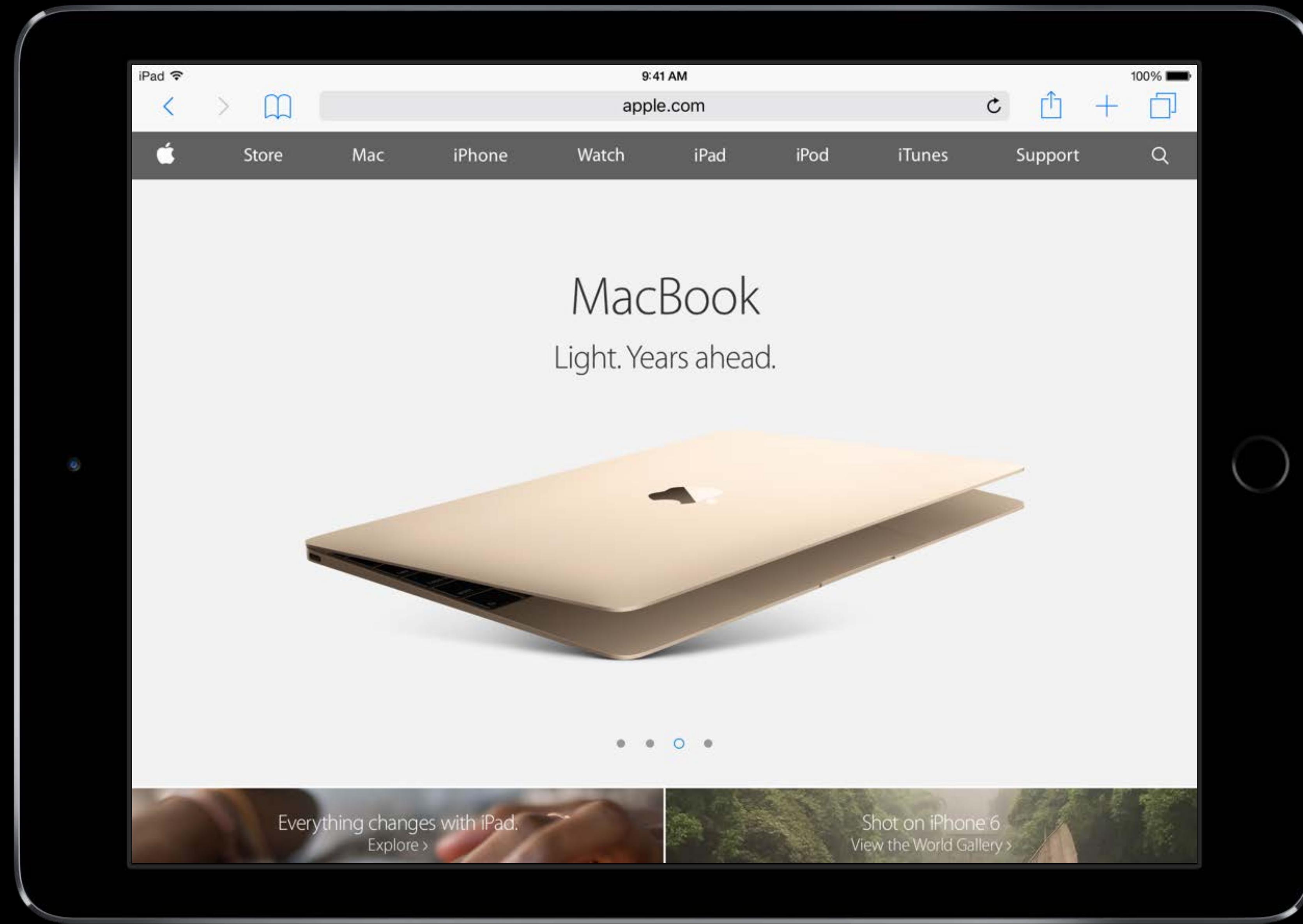
See our WWDC 2013 session for the details



What's New in Safari and WebKit for Web Developers

WWDC13

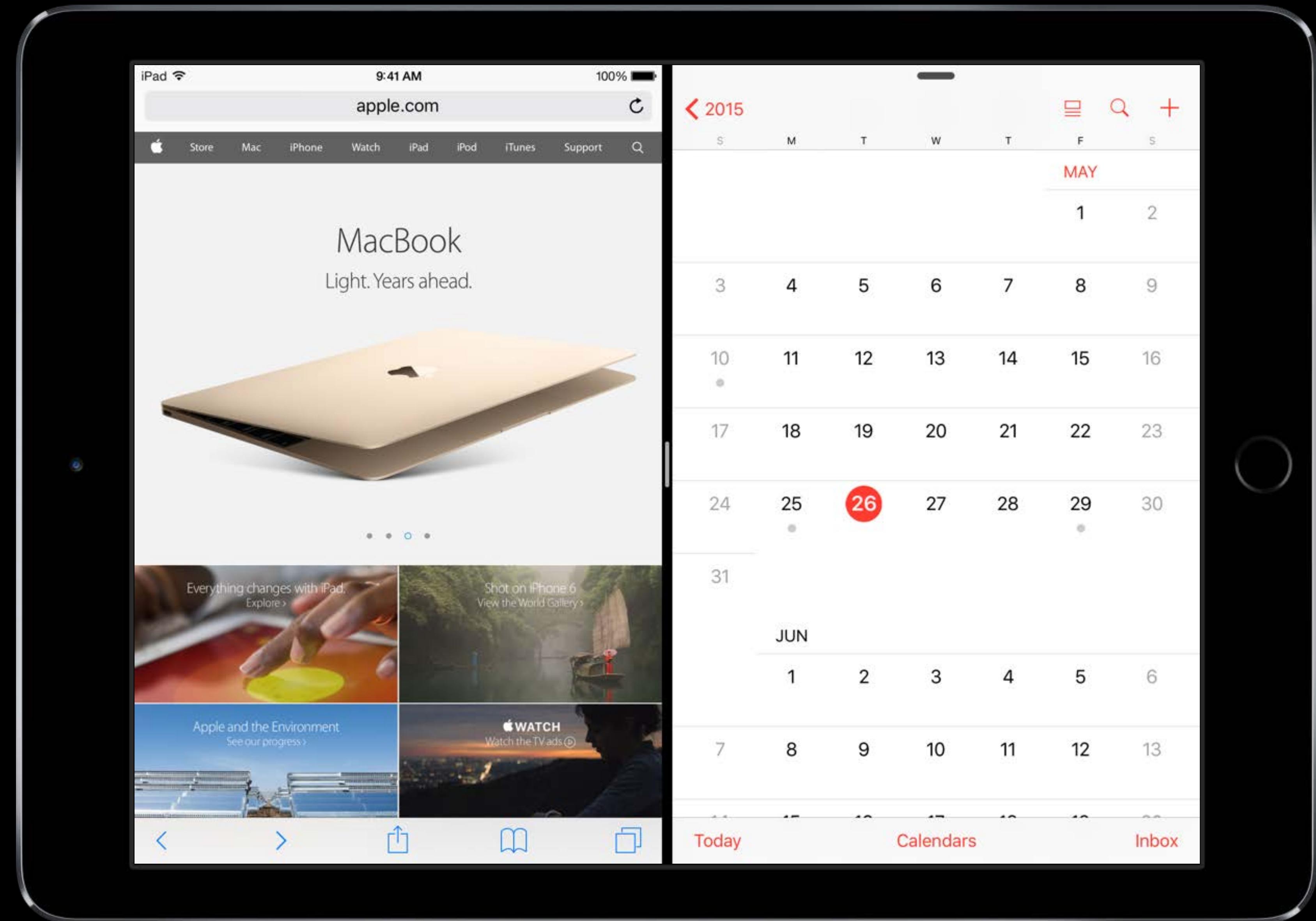
Multitasking



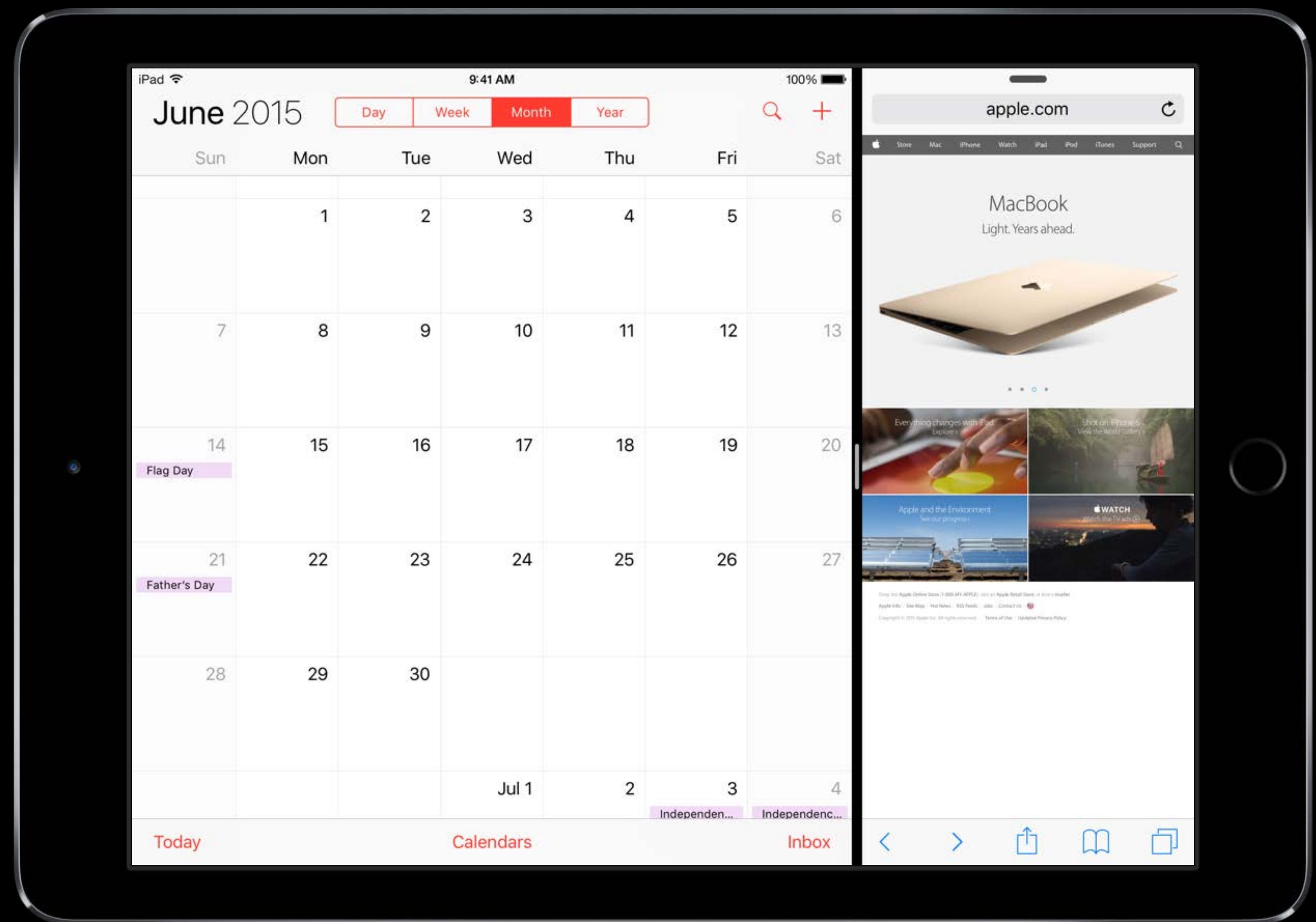
NEW



NEW



NEW



Creating Amazing Experiences

Multitasking

NEW

Remember iOS Multitasking during testing

Users now control view size

Responsive design is critical

Creating Amazing Experiences

Multitasking

NEW

Remember iOS Multitasking during testing

Users now control view size

Responsive design is critical

Using Safari to Deliver and
Debug a Responsive Web Design

Mission

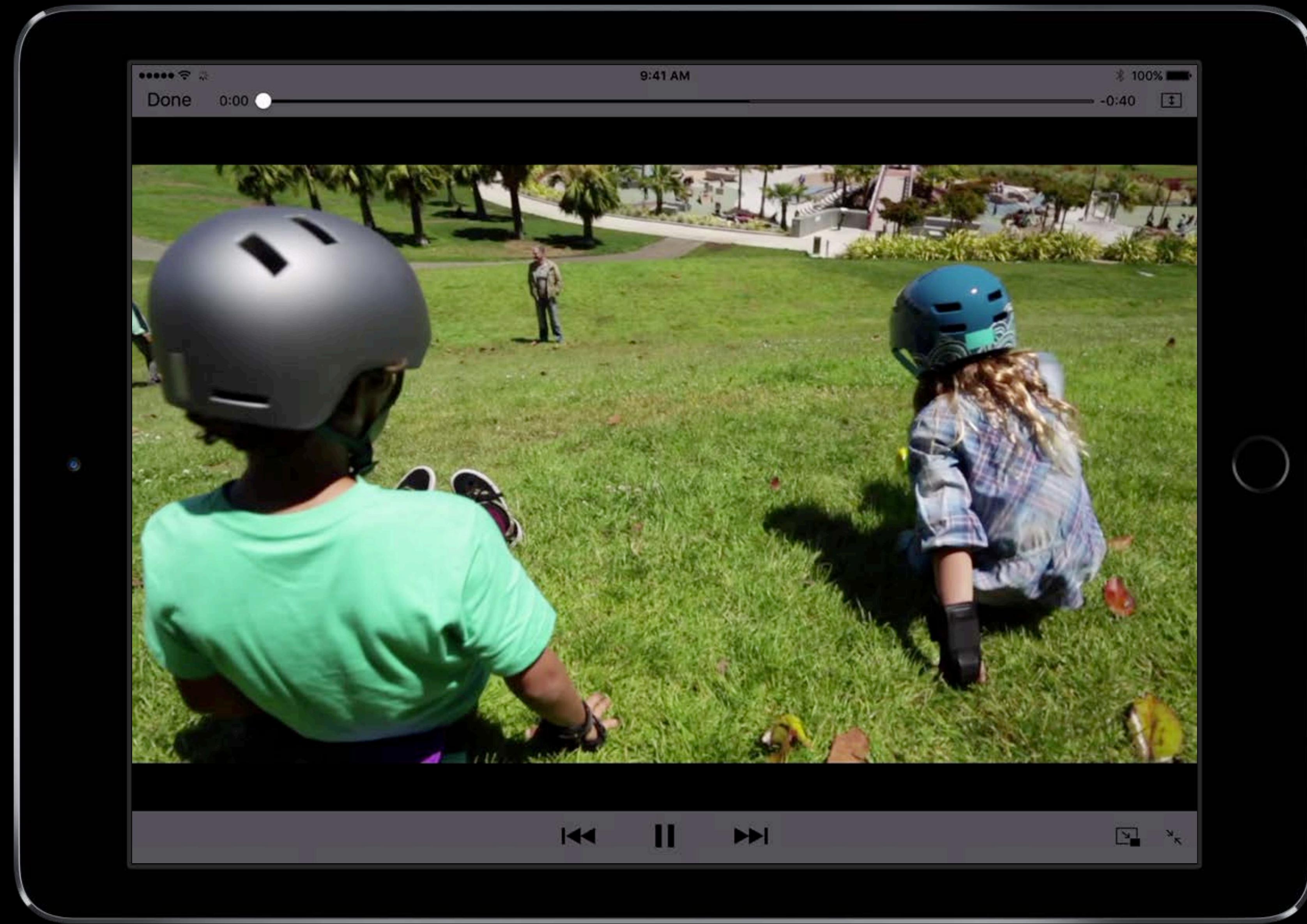
Wednesday 9:00AM

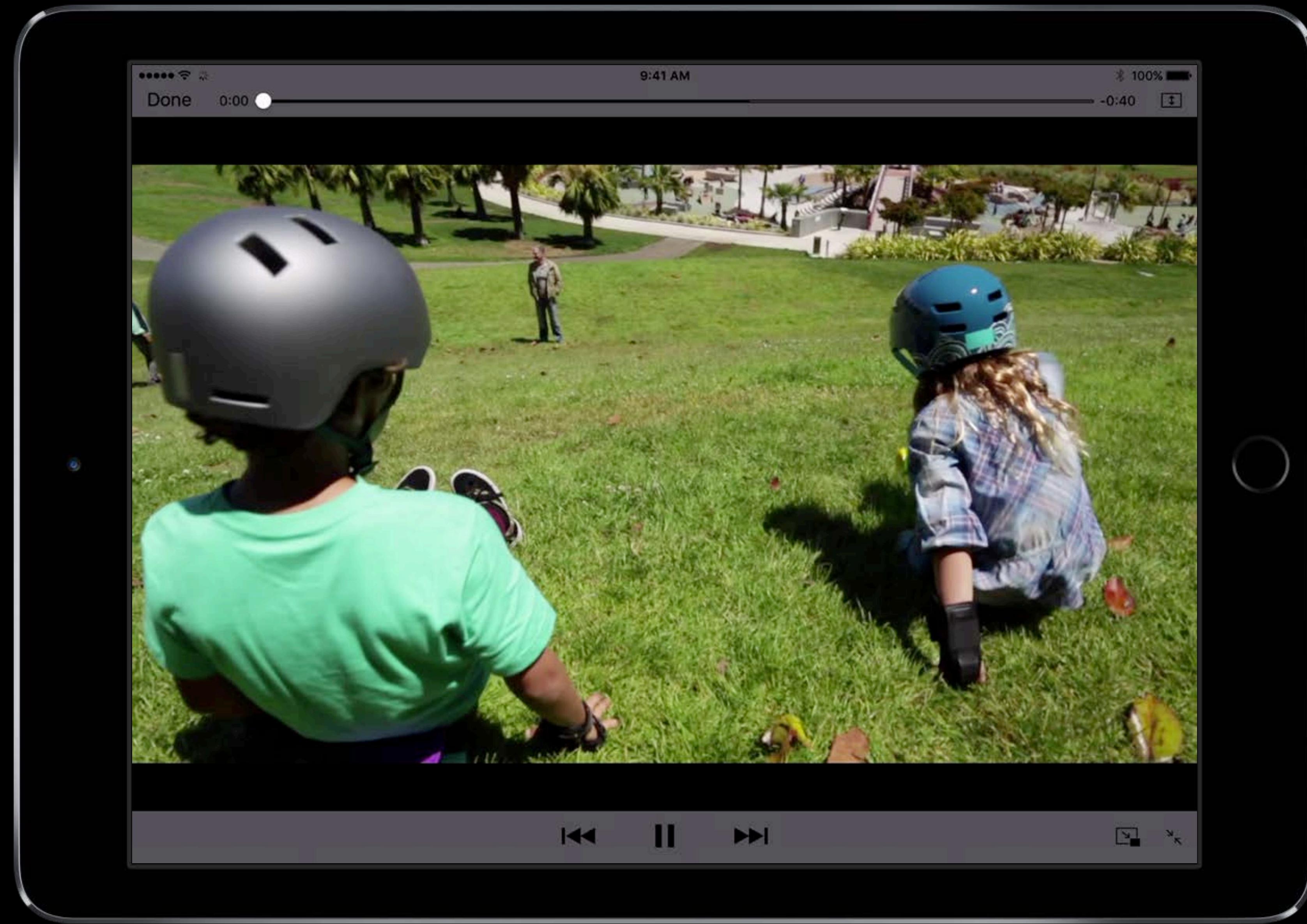
Multitasking Essentials for Media-Based Apps on iPad in
iOS 9

Pacific Heights

Wednesday 2:30PM

Picture-in-Picture





NEW

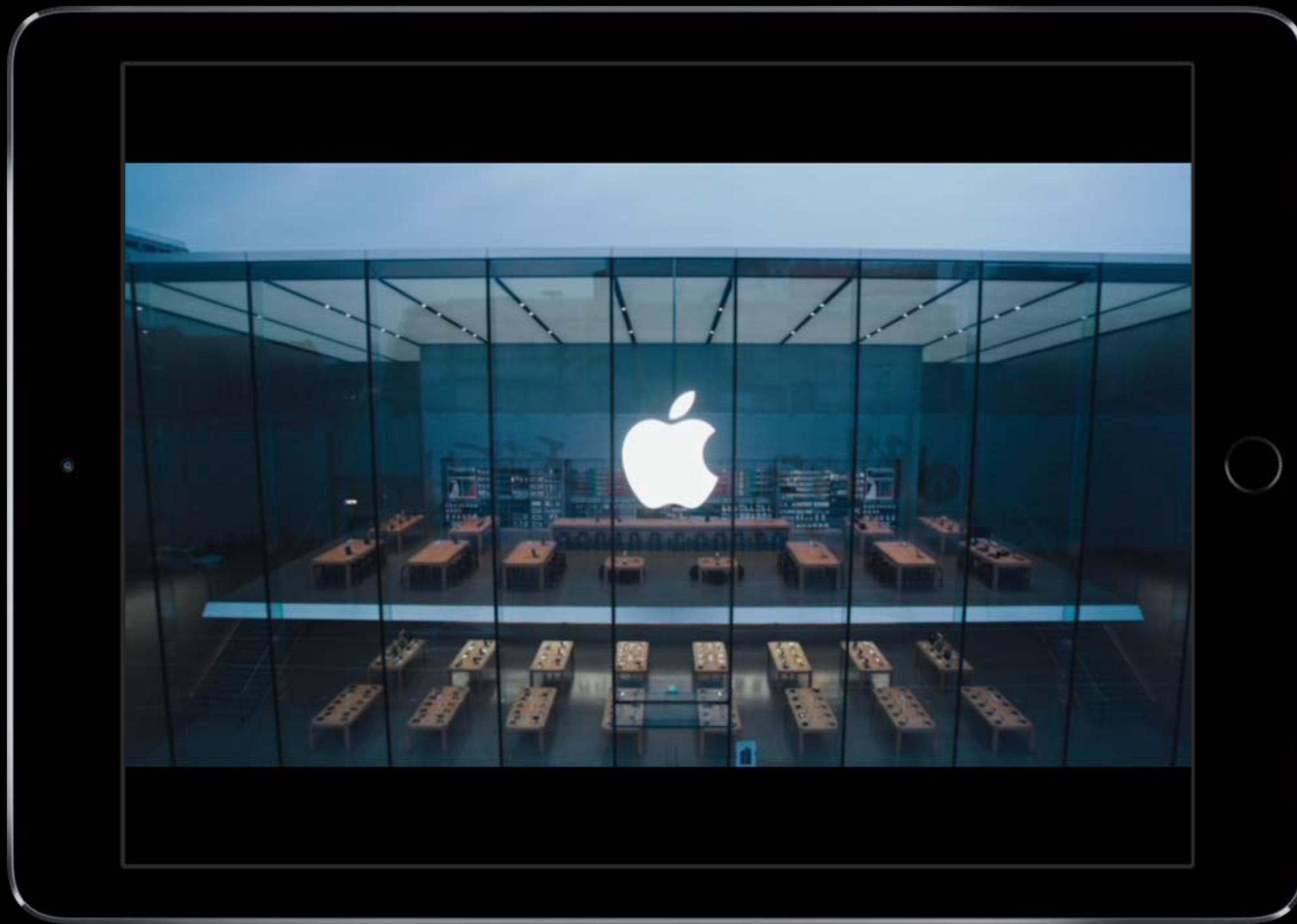


NEW



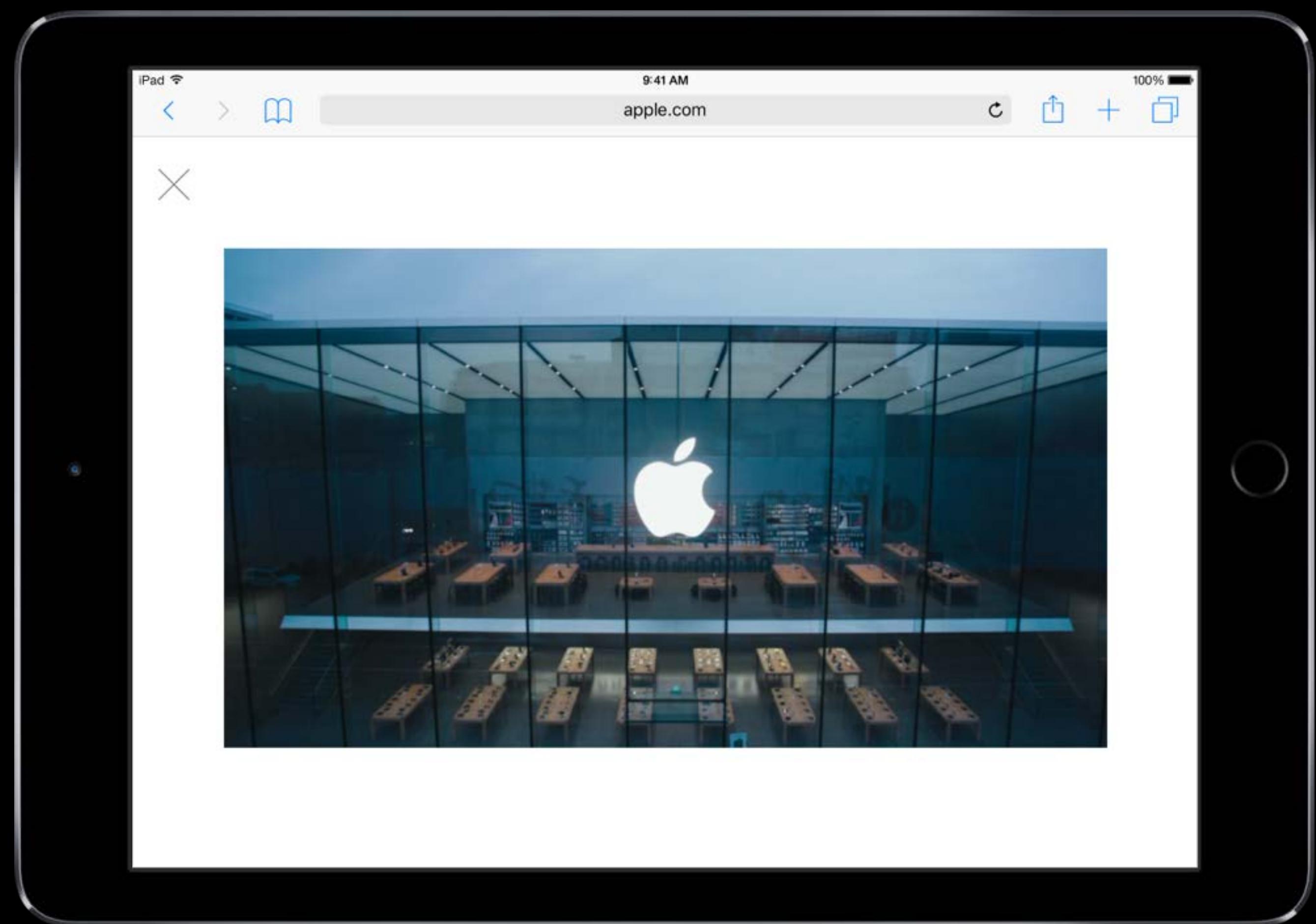
Presentation Mode

fullscreen



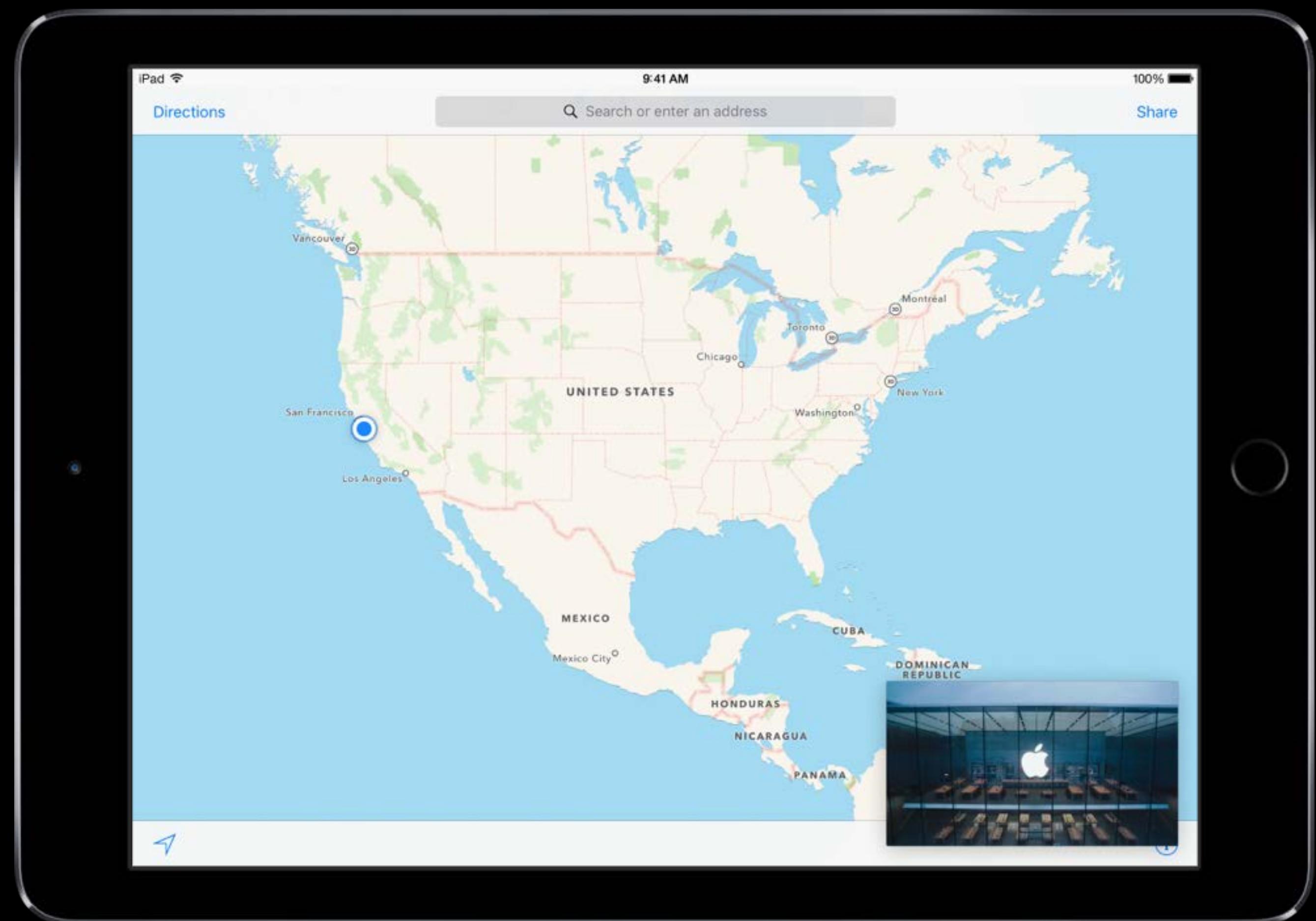
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inline

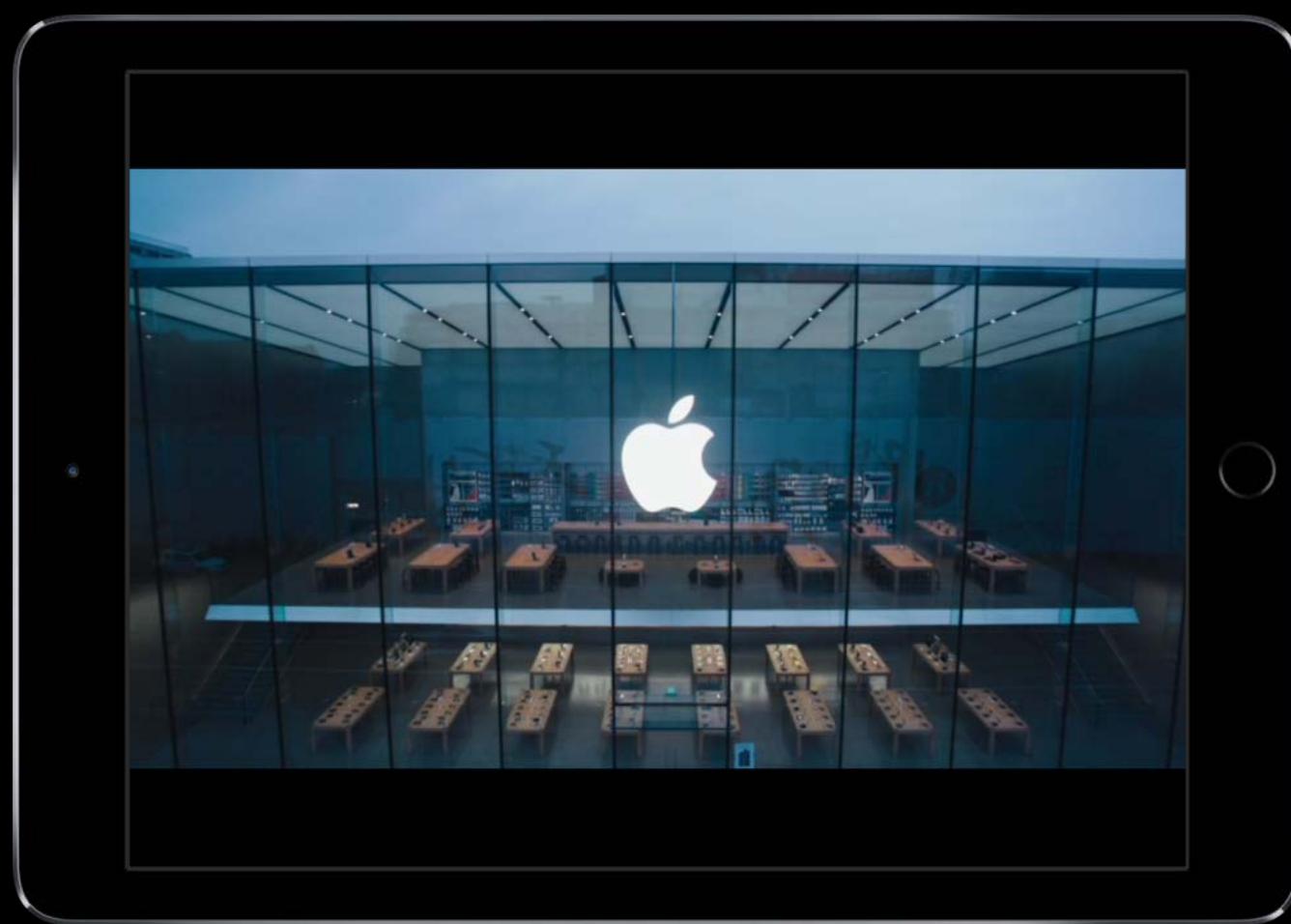


Presentation Mode

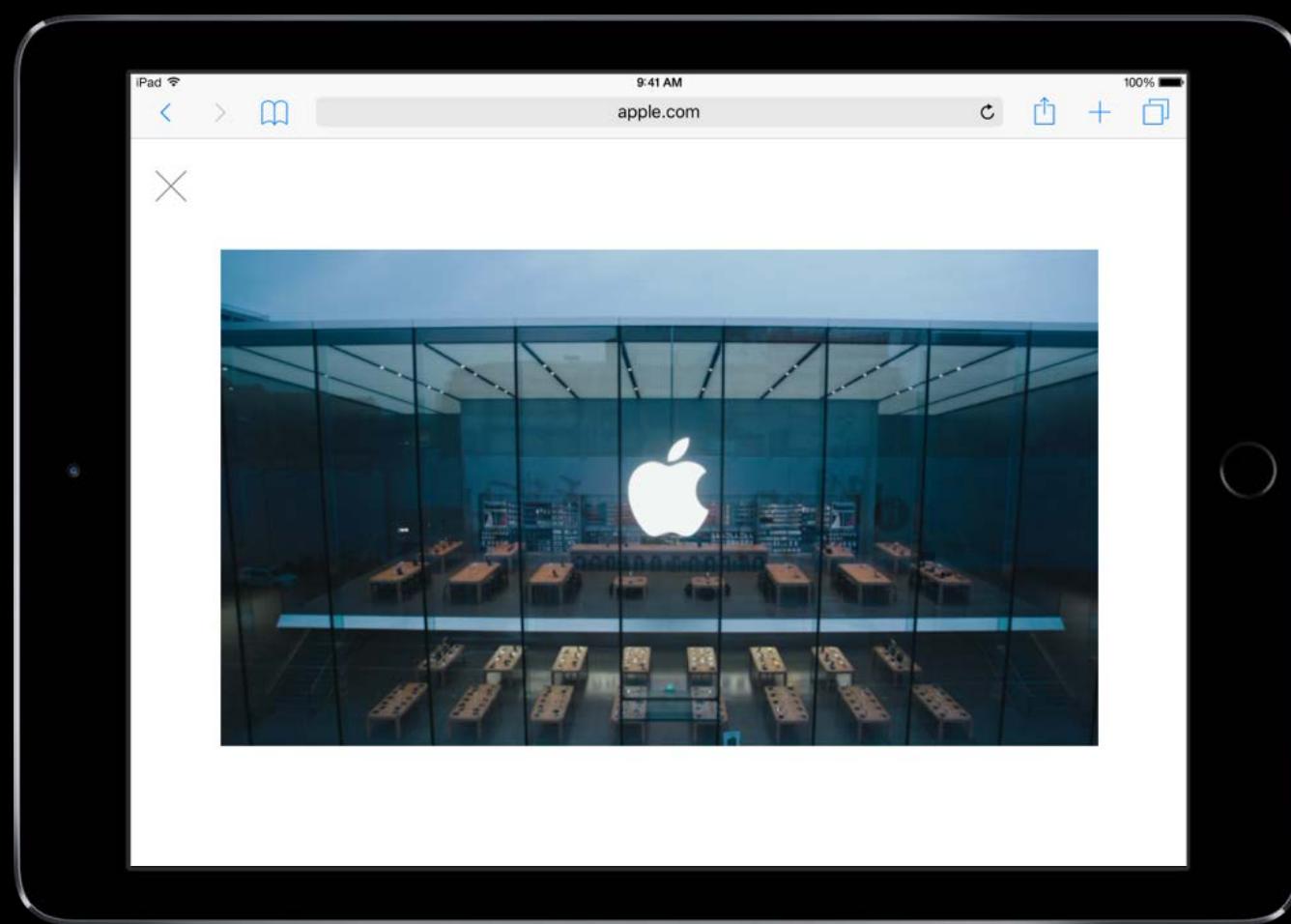
pictureInPicture



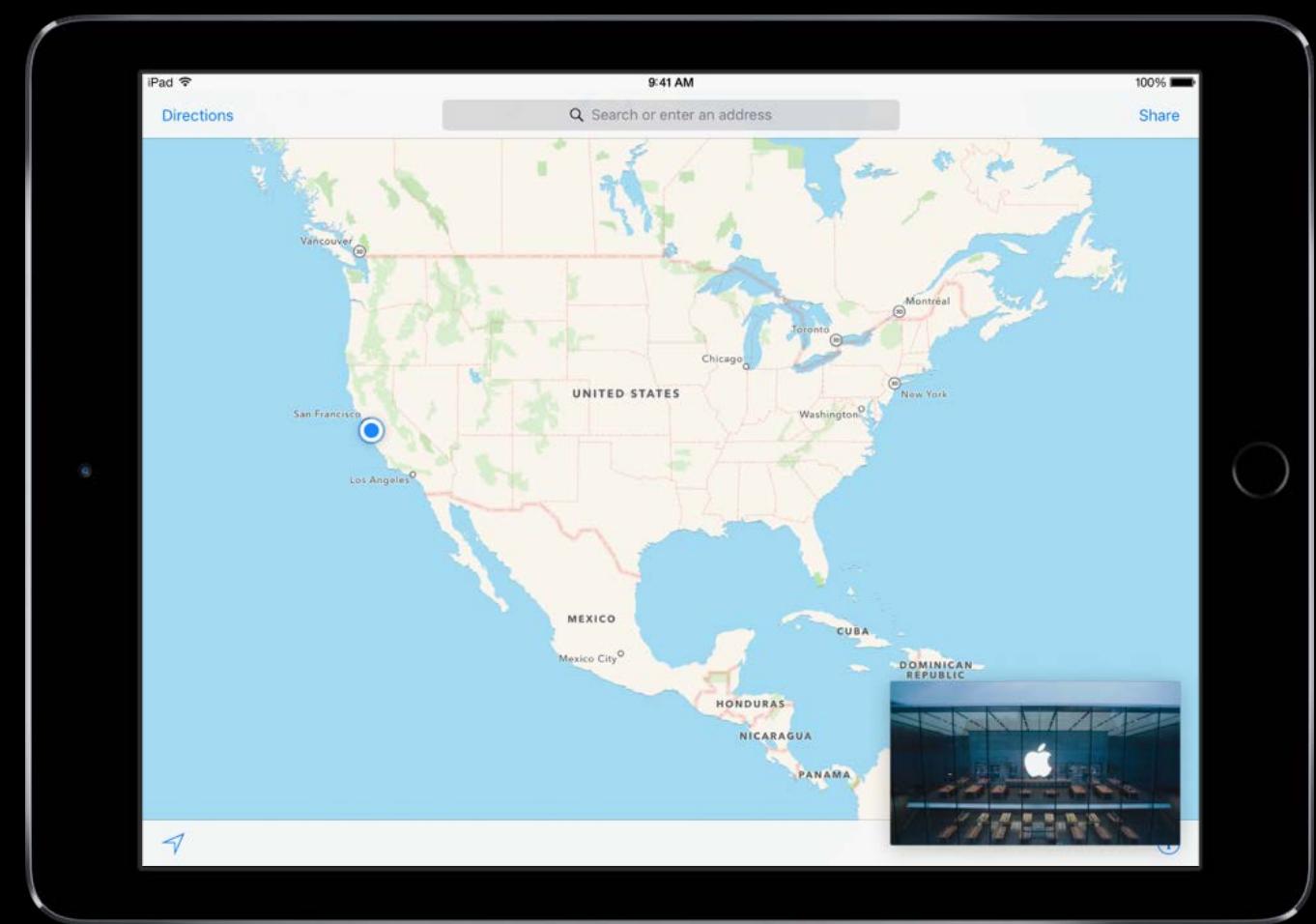
Presentation Mode



fullscreen



inline



pictureInPicture

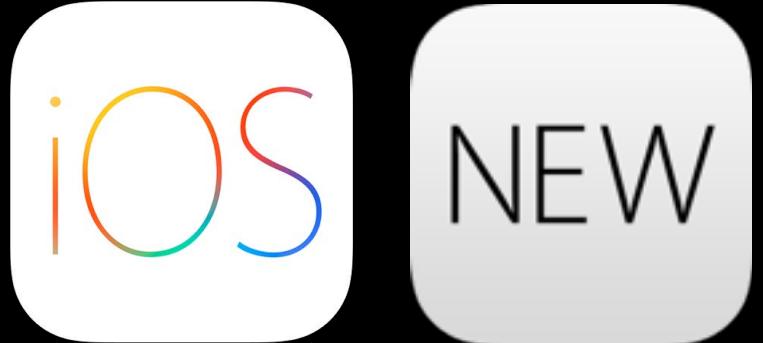
Creating Amazing Experiences

Picture-in-picture support

WebKit Media Controls support

PiP “For Free”

Controlled by **presentationMode** API



Picture-in-Picture Support

NEW

Things to consider

Page may not be obscured while video is playing

Media may play in small view

Use HTTP Live Streaming for delivering media

Picture-in-Picture

Related sessions

Multitasking Essentials for Media-Based Apps on iPad in
iOS 9

Pacific Heights

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Picture-in-Picture

Relevant sessions from last year

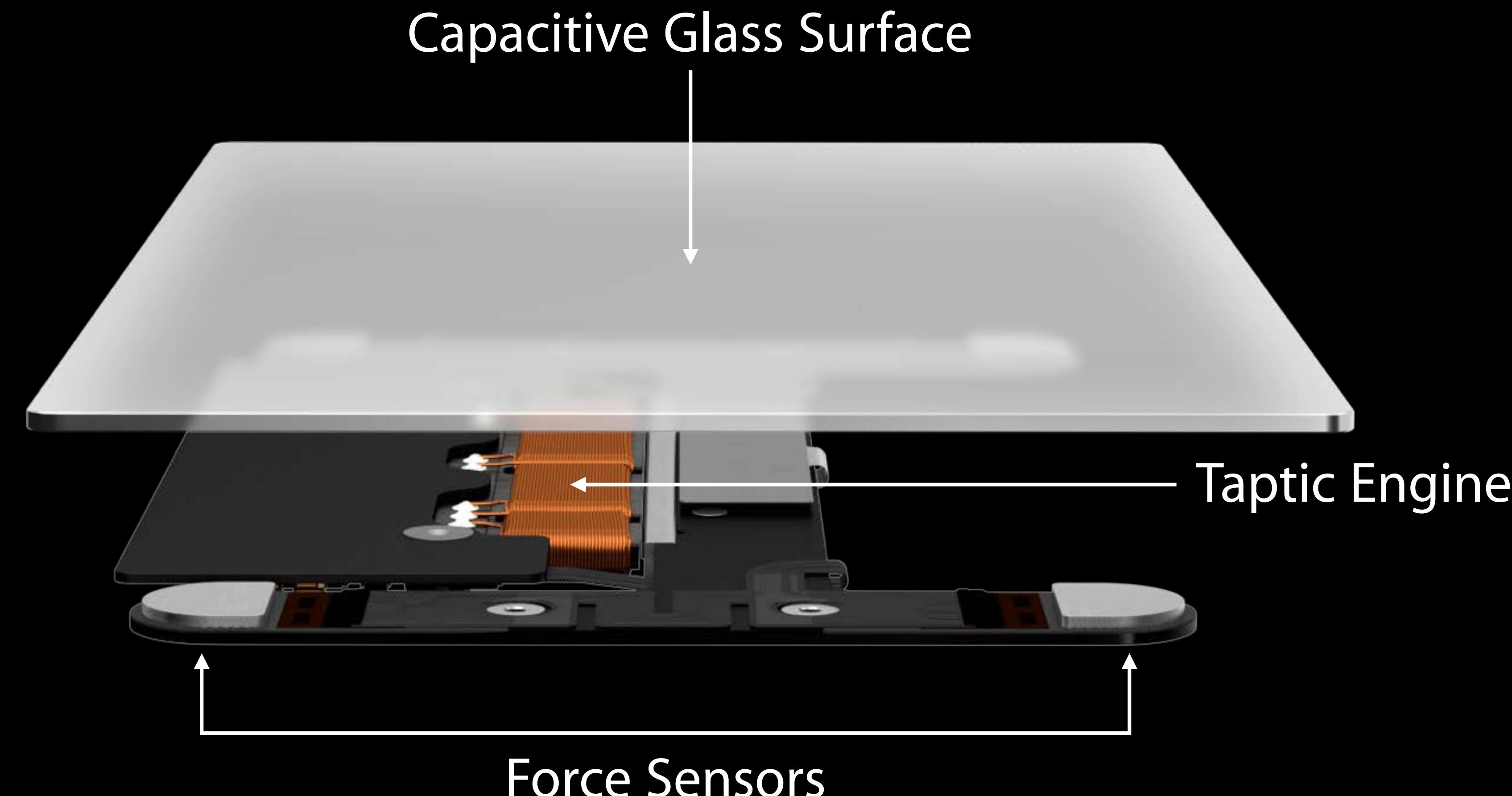
Advanced Media for the Web

WWDC014

Force Touch

Creating Amazing Experiences

Force Touch trackpad



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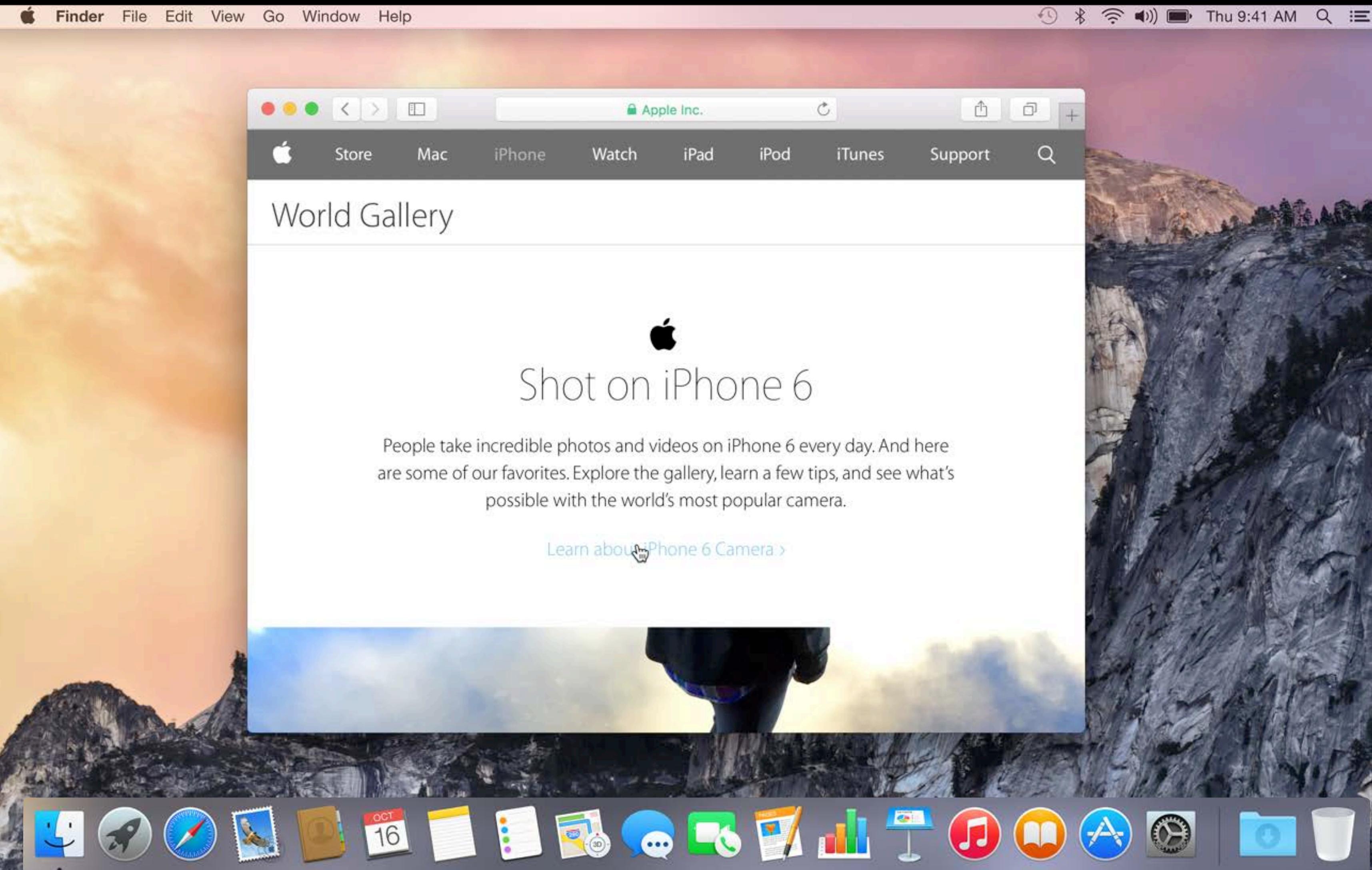
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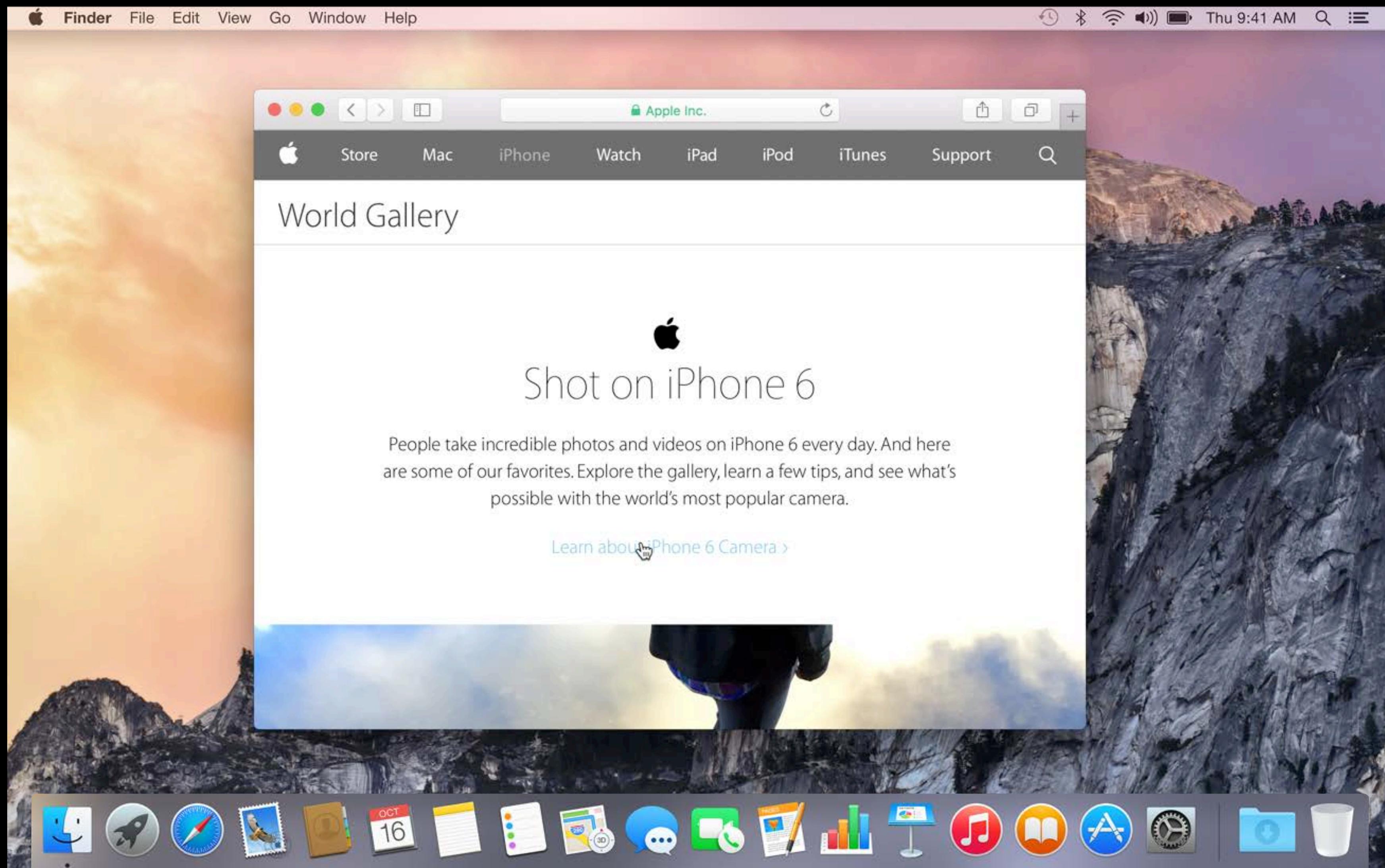
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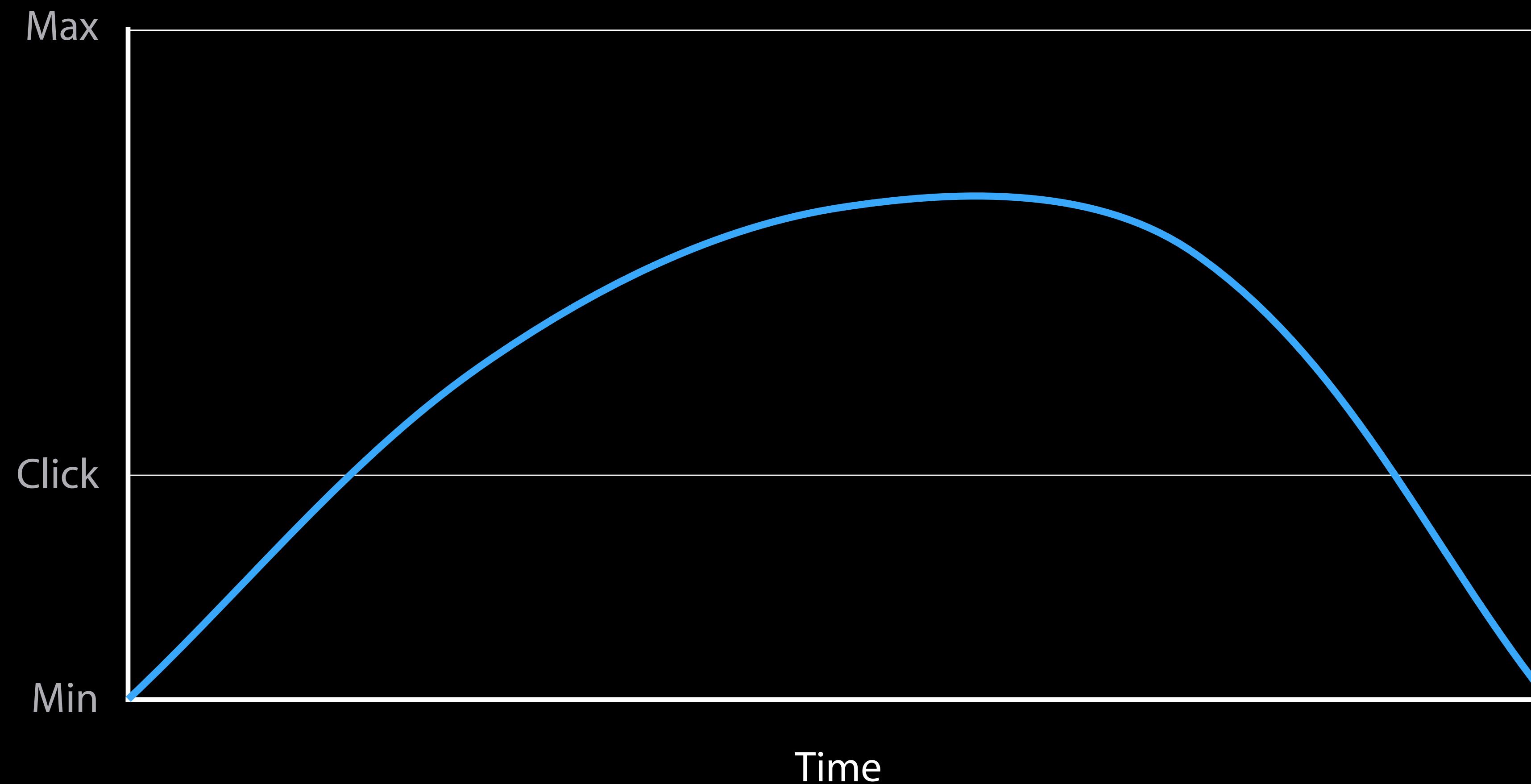
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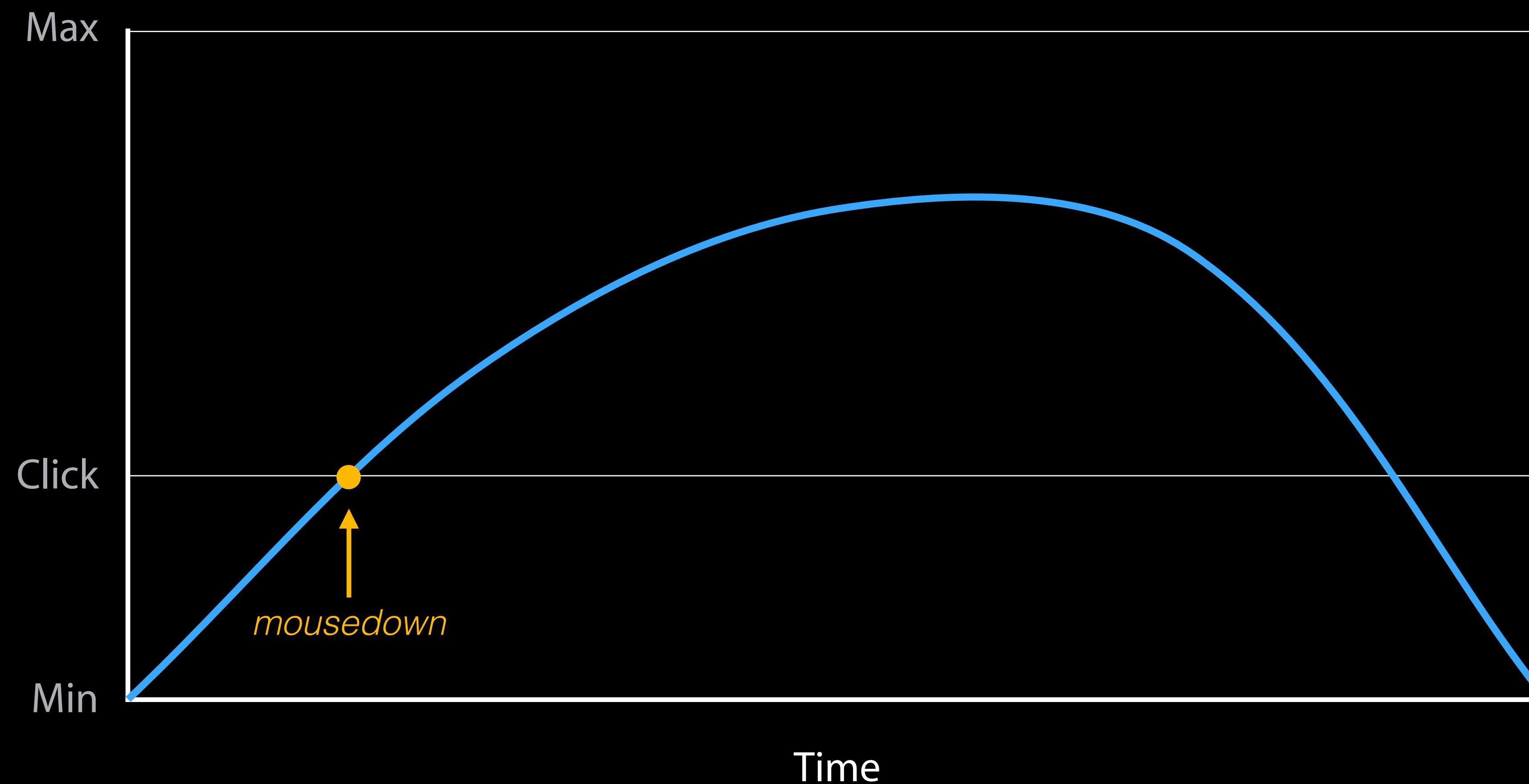




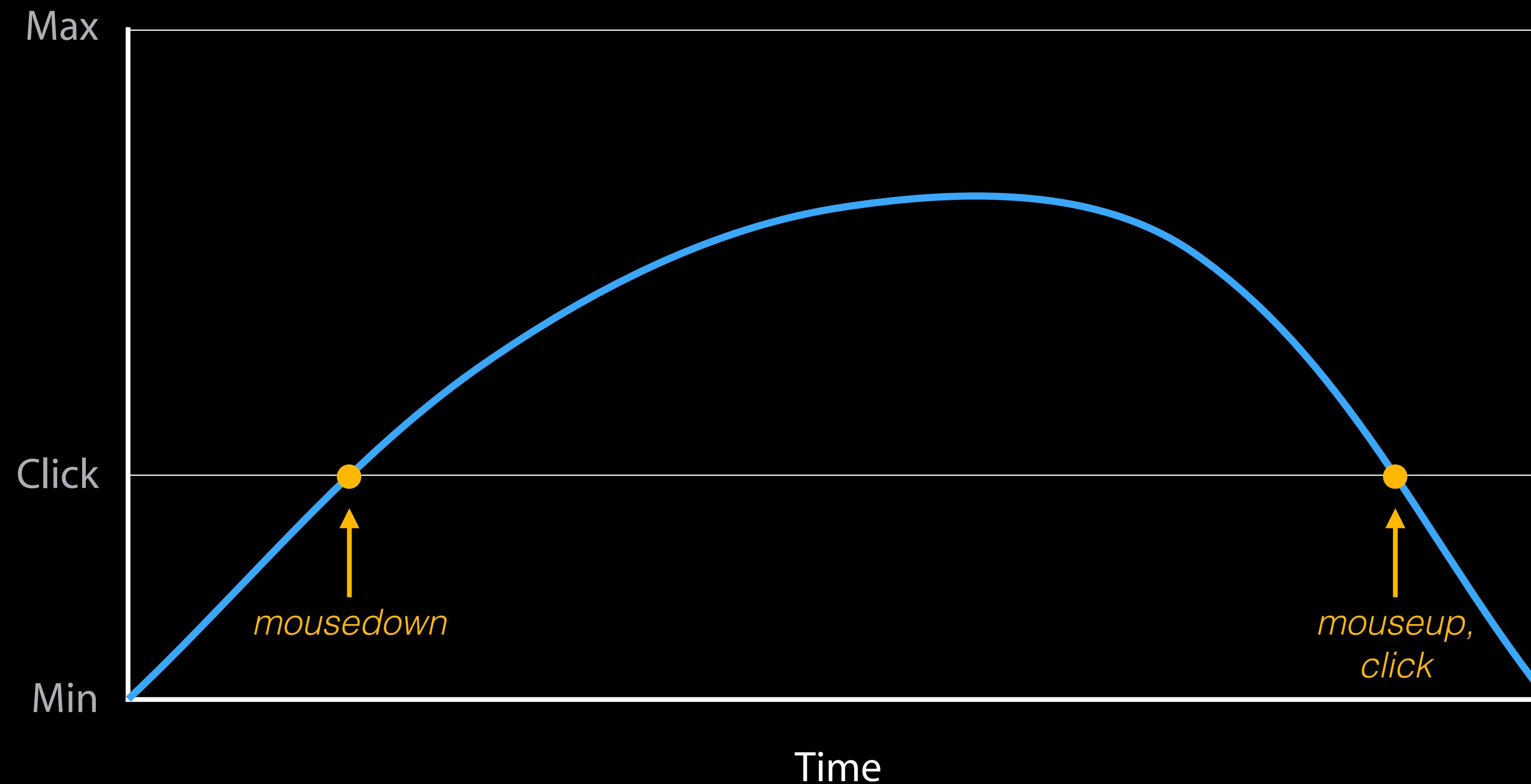
Click



Click



Click



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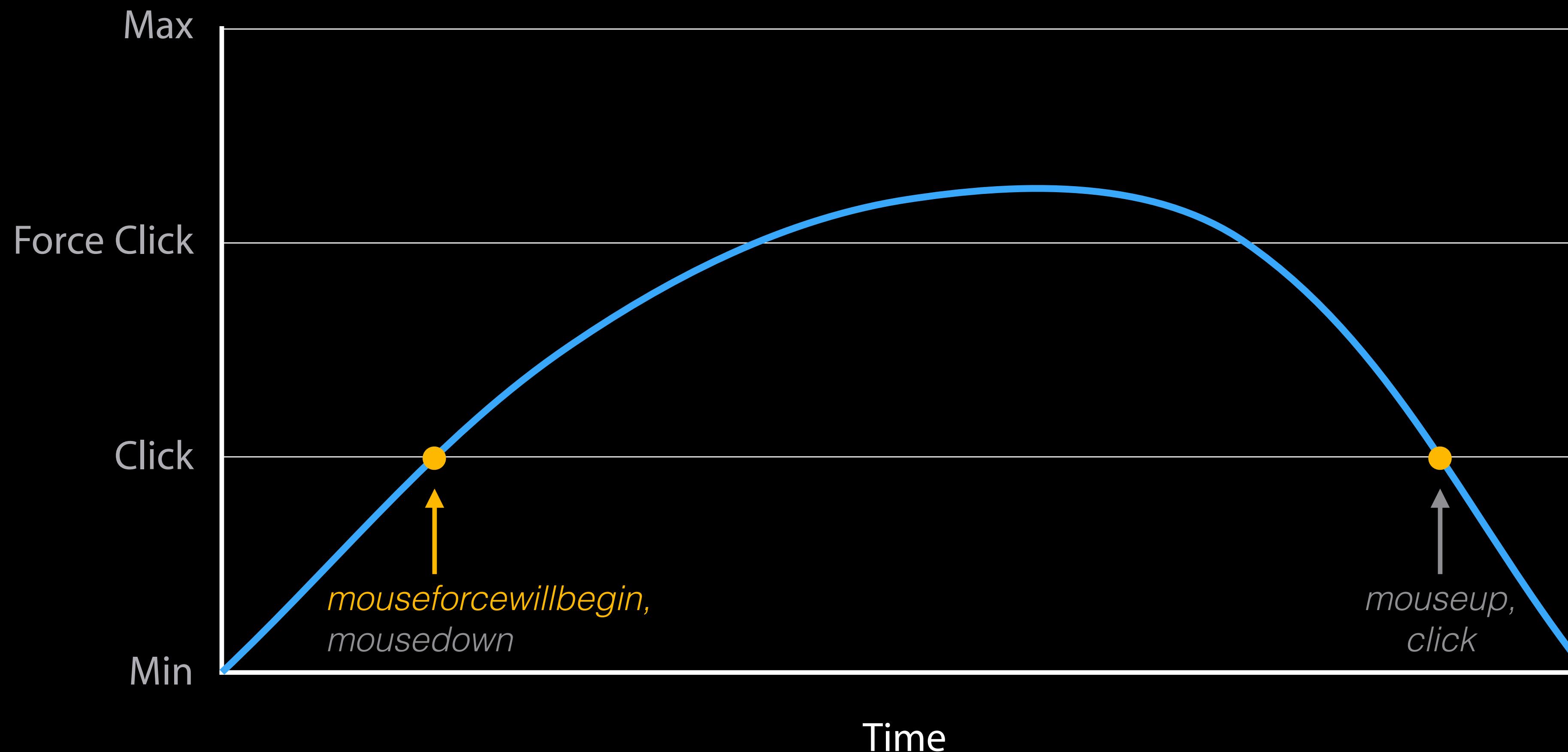
Event changes

All Mouse Events now include a `webkitForce` property

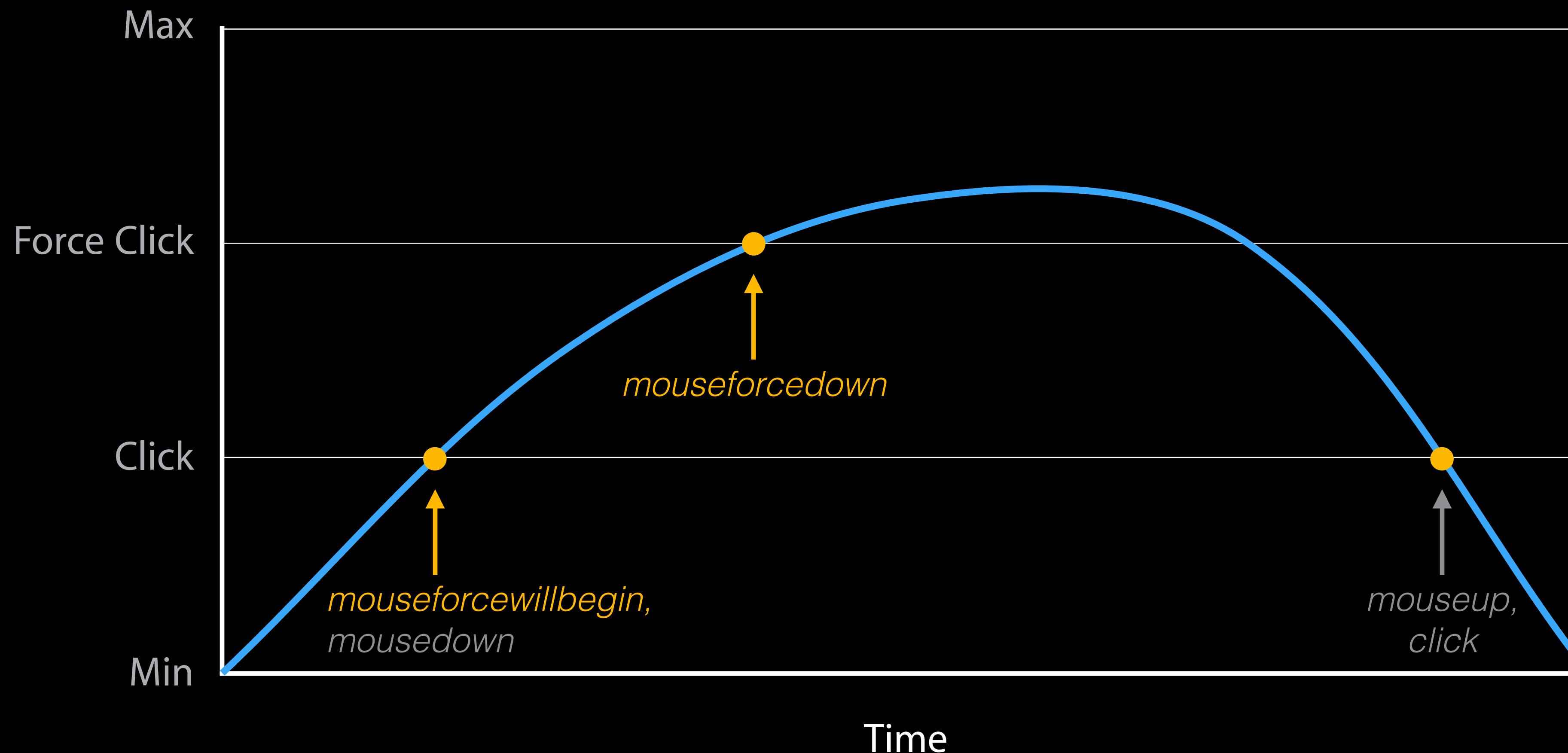
Register to handle a small set of new events



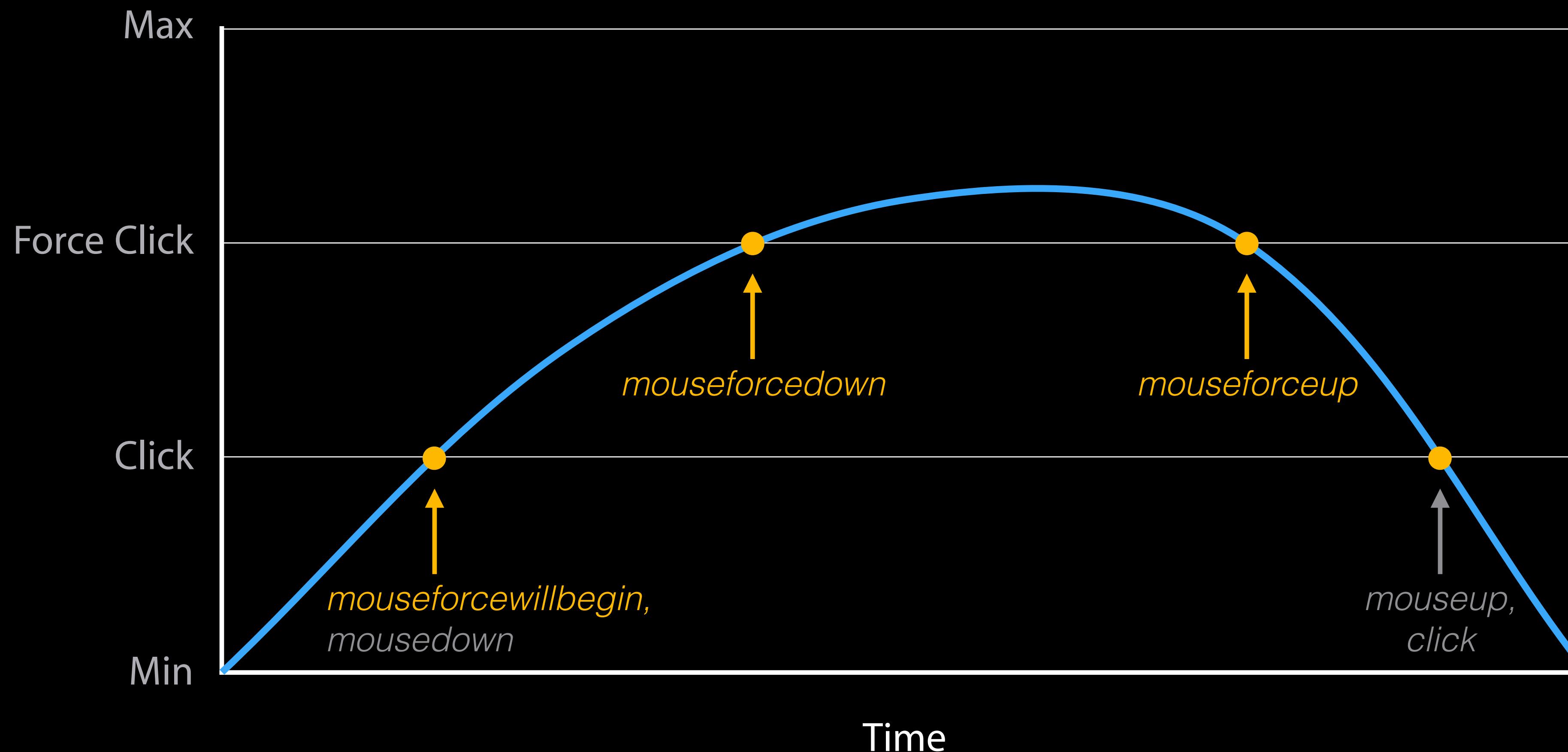
Force Click



Force Click



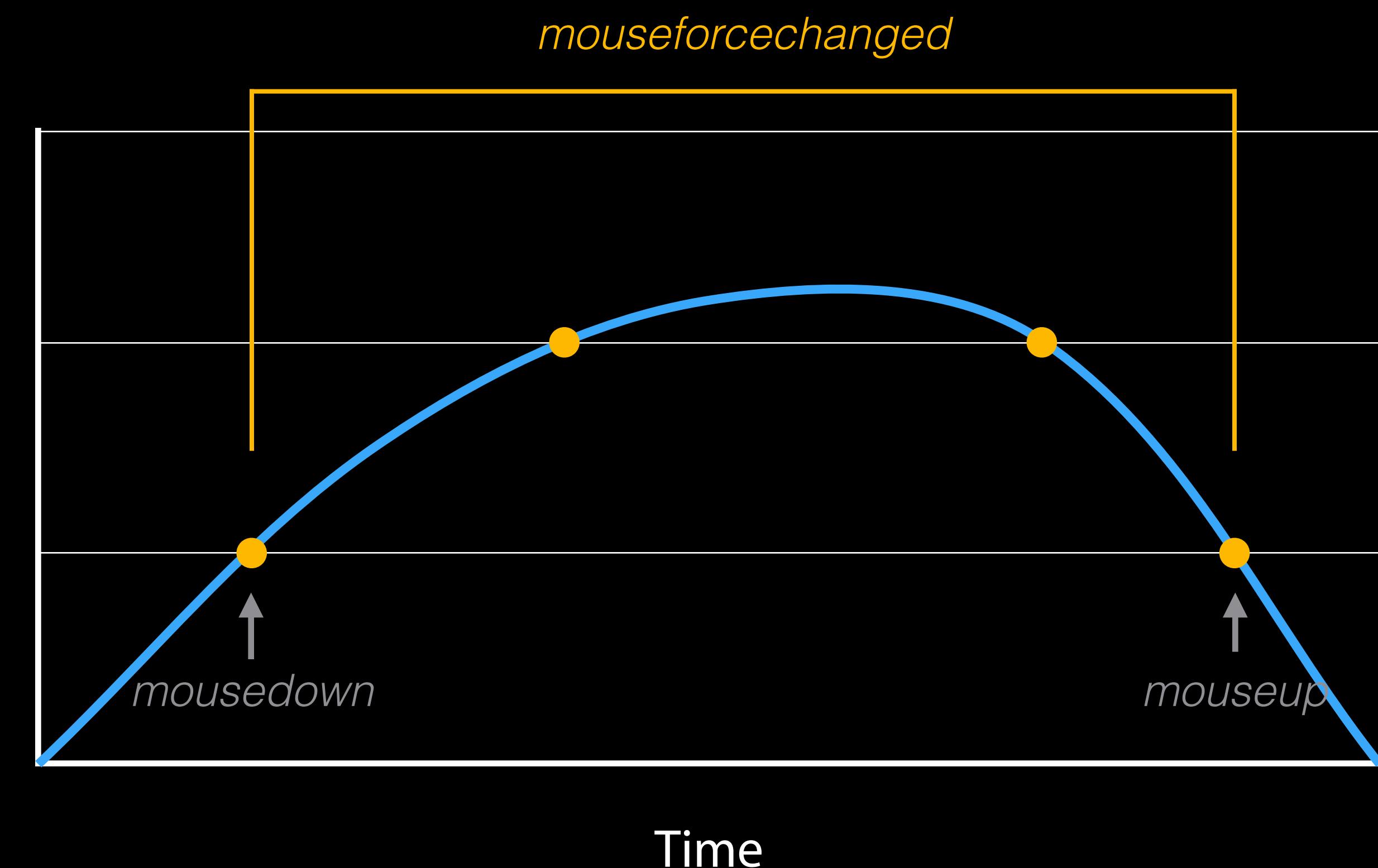
Force Click



mouseforcechanged

WEBKIT_FORCE_AT_FORCE_MOUSE_DOWN

WEBKIT_FORCE_AT_MOUSE_DOWN



Demo

Refined for Force Touch

Chris Young-Zawada

Senior Front End Developer

Force Touch

Best practices

Use the new **MouseEvent** force constants

Not all users have Force Touch hardware

Use as a shortcut or extra flourish

Use to drive animations or other UI state

Introduction to WebKit

WebKit Enhancements in Safari

Creating Amazing Experiences on Mac and iOS

Introduction to WebKit

WebKit Enhancements in Safari

Creating Amazing Experiences on Mac and iOS

Summary

Summary

1

Backdrop Filter

Summary

1

Backdrop Filter

2

Scroll Snap Points

Summary

1

Backdrop Filter

2

Scroll Snap Points

3

Class Syntax

Summary

1

Backdrop Filter

2

Scroll Snap Points

3

Class Syntax

4

@supports

Summary

1

Backdrop Filter

2

Scroll Snap Points

3

Class Syntax

4

@supports

5

AirPlay on OS X

Summary

1

Backdrop Filter

2

Scroll Snap Points

3

Class Syntax

4

@supports

5

AirPlay on OS X

6

PiP

Summary

1

Backdrop Filter

2

Scroll Snap Points

3

Class Syntax

4

@supports

5

AirPlay on OS X

6

PiP

7

iOS Multitasking

Summary

1

Backdrop Filter

2

Scroll Snap Points

3

Class Syntax

4

@supports

5

AirPlay on OS X

6

PiP

7

iOS Multitasking

8

Force Touch API

More Information

Documentation and Videos

Safari for Developers

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

Apple Developer Forums

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

WebKit Project

<http://www.webkit.org>

More Information

General Inquiries

Jonathan Davis, WebKit Evangelist

web-evangelist@apple.com

Related Sessions

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WWDC14

Labs

Safari and WebKit Lab

Graphics, Games, and Media Lab A Tuesday 2:30PM

Safari and WebKit Lab

Graphics, Games, and Media Lab A Wednesday 10:00AM

Safari and WebKit Lab

Graphics, Games, and Media Lab A Friday 12:00PM

