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
Introduction to WebKit

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Creating Amazing Experiences on Mac and iOS
Introduction to WebKit
Introduction

WebKit

Web Browser Engine
Open Source Project
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
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WebKit Enhancements

New Layout and Rendering Features
Modern JavaScript Updates
New CSS Features
WebKit Enhancements

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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
Manual Backdrop Effects

Downsides

Can’t animate backdrop
Difficult to change blur effect
backdrop-filter: blur(...)

Backdrop Filter

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(...)
backdrop-filter: [Filter]
Dynamic Background
Dynamic Background
New Layout and Rendering Features

Scrolling
Paged Scrolling in JavaScript

Requires complicated JavaScript implementation
Does not use browser engine’s smooth scrolling features
Significant performance issues
Scroll Snap Points
Scroll Snap Points

Declare target scroll positions in CSS

Specified in CSS Scroll Snap Points Module Level 1
Scroll Snap Points
Scroll Snap Points

1 300px 2 300px 3 300px 4
scroll-snap-points-x: repeat(300px)
Scroll Snap Points

```html
<style>
    #left-snap {
        width: 300px;
        overflow-x: auto;
        overflow-y: hidden;
        -webkit-scroll-snap-type: mandatory;
        -webkit-scrollbar-track-color: red;
    }
</style>

<div id="left-snap">
    <img src="album/art01.jpeg" />
    <img src="album/art02.jpeg" />
    ...
    <img src="album/art10.jpeg" />
</div>
```
Scroll Snap Points

```html
<style>
  #left-snap {
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    overflow-x: auto;
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```
Non-Uniform Elements
Non-Uniform Elements
Non-Uniform Elements
scroll-snap-destination
scroll-snap-destination
scroll-snap-coordinate
scroll-snap-coordinate
Putting Them Together

-webkit-scroll-snap-coordinate: 50% 50%;
Putting Them Together

-webkit-scrollbar-snap-coordinate: 50% 50%;
-webkit-scrollbar-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

```css
#gallery {
    width: 300px;
    overflow-x: auto;
    overflow-y: hidden;
    -webkit-scrollbar-type: mandatory;
    -webkit-scrollbar-snap-destination: 50% 50%;
}

.photograph {
    -webkit-scrollbar-type: mandatory;
    -webkit-scrollbar-snap-destination: 50% 50%;
}
```
Scroll Snap Points

```css
#gallery {
    width: 300px;
    overflow-x: auto;
    overflow-y: hidden;
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    -webkit-scroll-snap-destination: 50% 50%;
}

.photograph {
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Scroll Snap Points

#gallery {
  width: 300px;
  overflow-x: auto;
  overflow-y: hidden;
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.photograph {
  -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
- Maps
- Math Additions
- Promises
- Spread Operator
- Sets
- For-of Loops
- Computed Properties
- Iterators
- Weak Maps
- String Additions
Modern JavaScript Updates

This year

Class Syntax
Object.assign
Symbol Object
Template Literals

Octal and Binary Literals
Math Additions
For-of Loops
Inheritance

Destructuring
Maps
Iterators
Sets

Promises
Octal and Binary Literals
Math Additions
For-of Loops
Inheritance

Computed Properties
Weak Sets
Weak Maps
Tagged Template

Spread Operator
Weak Sets
String Additions

Object.assign
Weak Sets
String Additions
Template Literals

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

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

```javascript
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}.`);
```

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

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 };
}
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 Polygon {
    constructor(sides) {
        this.sides = sides;
    }

    name() { return 'polygon'; }

    description() {
        return `This ${this.name()} has ${this.sides} sides.`;
    }
}

class Polygon {
    constructor(sides) {
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    }

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    constructor(sides) {
        this.sides = sides;
    }

    name() { return 'polygon'; }

    description() {
        return `This ${this.name()} has ${this.sides} sides.`;
    }
}
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 Rectangle extends Polygon {
    constructor() {
        super(4);
    }

    name() { return 'rectangle'; }

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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
- :matches
- :nth-child(… of …)
- placeholder-shown
- :lang
- @supports

Case-insensitive attribute selectors

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
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 time live much the same as I do.
-webkit-initial-letter: Lines Occupied [Lines To Sink]
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.
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
@supports

gives support to condition

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

NEW
@supports

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

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


Reducing Repetition

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

:matches
WebKit Enhancements

New Layout and Rendering Features
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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

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

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
Multitasking
Creating Amazing Experiences

Multitasking

Remember iOS Multitasking during testing
Users now control view size
Responsive design is critical
Creating Amazing Experiences

Multitasking

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
Fill me with a cool video! Goodness!
Fill me with PIP Goodness!
Presentation Mode

fullscreen
Presentation Mode
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

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  Wednesday 2:30PM
Picture-in-Picture

Relevant sessions from last year

Advanced Media for the Web  WWDC014
Force Touch
Creating Amazing Experiences
Force Touch trackpad

Capacitive Glass Surface

Taptic Engine

Force Sensors
Apple Watch Sport

38mm and 42mm Case
7000 Series Silver Aluminum
Ion-X Glass
Retina Display
Composite Back

Sport Band
White Fluoroelastomer
Stainless Steel Pin

View 38mm in the store ›
View 42mm in the store ›
**Apple Watch Sport**

- 38mm and 42mm Case
- 7000 Series Silver Aluminum
- Ion-X Glass
- Retina Display
- Composite Back

**Sport Band**
- White Fluoroelastomer
- Stainless Steel Pin

[View 38mm in the store ›](#)
[View 42mm in the store ›](#)
World Gallery

Shot on iPhone 6

People take incredible photos and videos on iPhone 6 every day. And here are some of our favorites. Explore the gallery, learn a few tips, and see what’s possible with the world’s most popular camera.

Learn about iPhone 6 Camera >
World Gallery

Shot on iPhone 6

People take incredible photos and videos on iPhone 6 every day. And here are some of our favorites. Explore the gallery, learn a few tips, and see what’s possible with the world’s most popular camera.

Learn about iPhone 6 Camera >
Click

Max

Click

Min

Time
The diagram illustrates the behavior of a click event over time.

- **mousedown** event occurs when the mouse button is pressed.
- **click** event occurs after the mousedown event.
- **mouseup** event occurs when the mouse button is released.

The graph shows a smooth curve indicating the duration of the click event from mousedown to mouseup with a peak at the click point.
Creating Amazing Experiences

Event changes

All Mouse Events now include a `webkitForce` property

Register to handle a small set of new events
Force Click

Time

Max

Force Click

Click

Min

mouseforcewillbegin, mousedown

mouseup, click
Force Click

- **mouseforcewillbegin**, **mousedown**
- **mouseforcedown**
- **mouseup**, **click**

Time

Max

Force Click

Click

Min
Force Click

- MouseForceWillBegin, mousedown
- MouseForceDown
- MouseForceUp
- MouseUp, click

Time

Max

Force Click

Click

Min
mouseforcechanged

WEBKIT_FORCE_AT_FORCE_MOUSE_DOWN

WEBKIT_FORCE_AT_MOUSE_DOWN

mousedown

mouseforcechanged

mousemove

Time
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
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Creating Amazing Experiences on Mac and iOS
Summary
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
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

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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