The Web Can Do That!?

Adventures Into HTML5

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Watch the video!

Who is this Guy?

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HTML CAN NOT

DO THAT!!!1!!

Legend

This slide deck is alive!

 Close to being ready. Keep it on your radar.

 Relevant Chrome/WebKit bug.

 Bug has been fixed/resolved.

 Specification link

#1 CSS For Web Apps

Floats, Tables, & Positioning...OH MY!

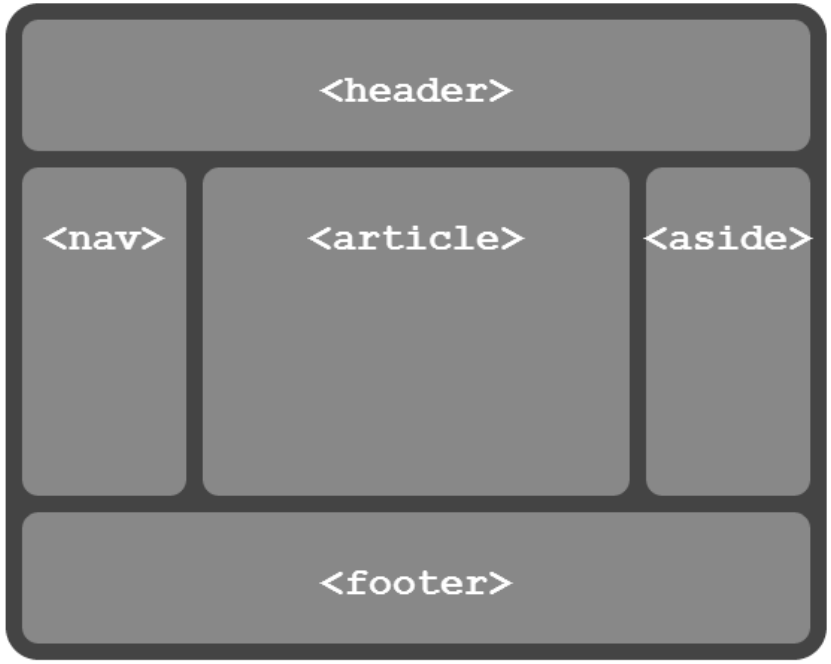
- Floats stack horizontally to allow simple placement.
- Tables lack repeatability and semantic meaning.
- Using absolute positioning is difficult. Makes adaptive display hard.
- CSS3 specifications address layout cases with regions, exclusions, grid and flexible box.

2012: The Rise of CSS for Web Apps

- CSS Regions Module Level 3
- CSS Flexible Box Layout Module (da new one)
- CSS Grid Layout
- CSS Hierarchies
- CSS Filter Effects 1.0
- Web Animations 1.0
- CSS Variables Module Level 1

So why is flexbox so awesome?

Achieve That "Holy Grail" Layout!

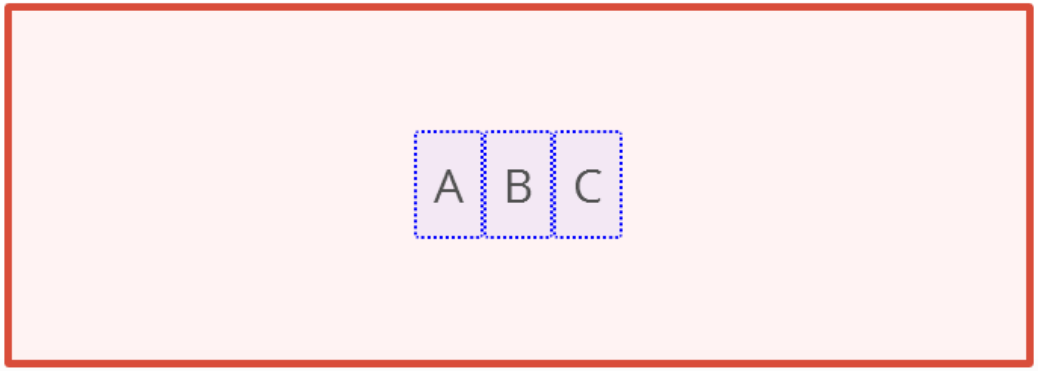


Alignment

Vertically centered content is easy peasy!

CSS

```
.box {
  display: +flex;
  +justify-content: center      ;
  +align-items: center    ;
 }
```



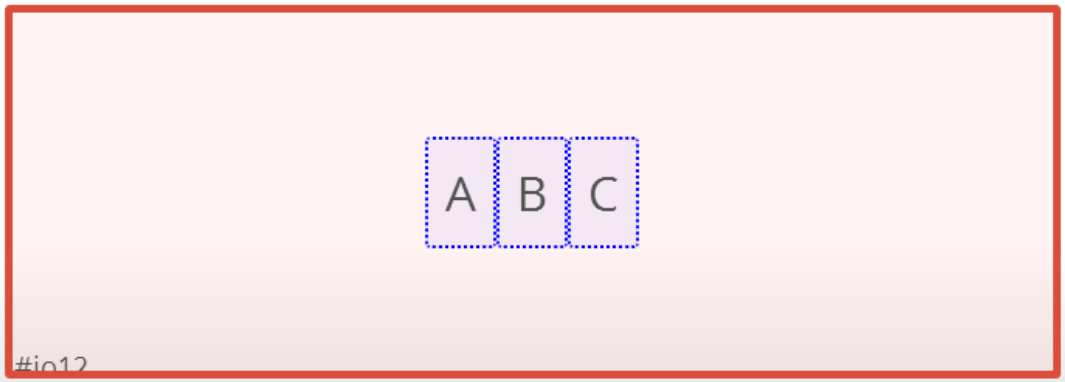
Ordering & Orientation

Order independent from source

- Content is laid out from lowest to highest numbered ordinal group.
- Items with the same order group are laid out per source document.

CSS

```
.box {
  +flex-direction:  row           ;
}
.box > :nth-child(2) {
  +order:  0 ;
}
```



Same Height Columns!

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height: 196px

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height: 74px

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nulla varius tortor ut sem volutpat eu tincidunt ligula feugiat.

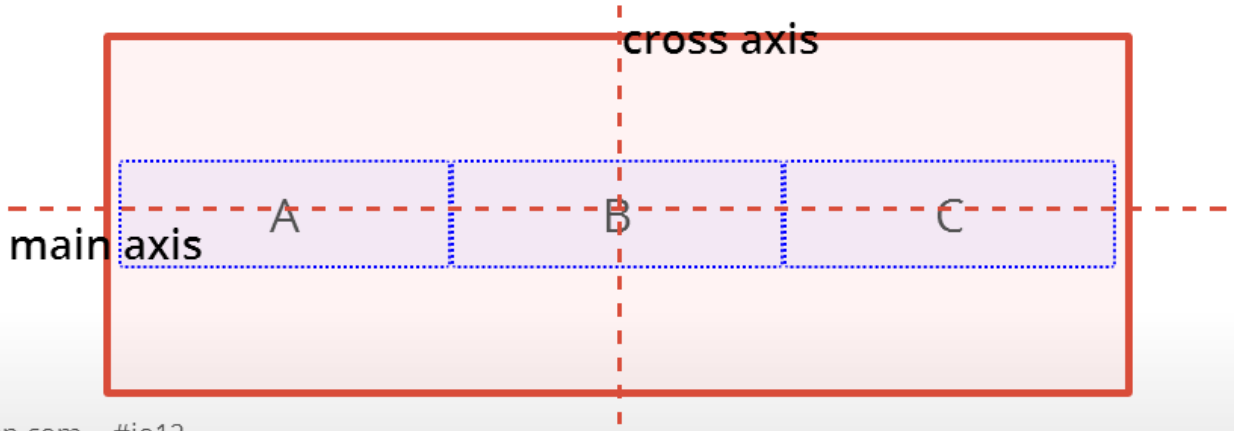
height: 123px

Flexibility

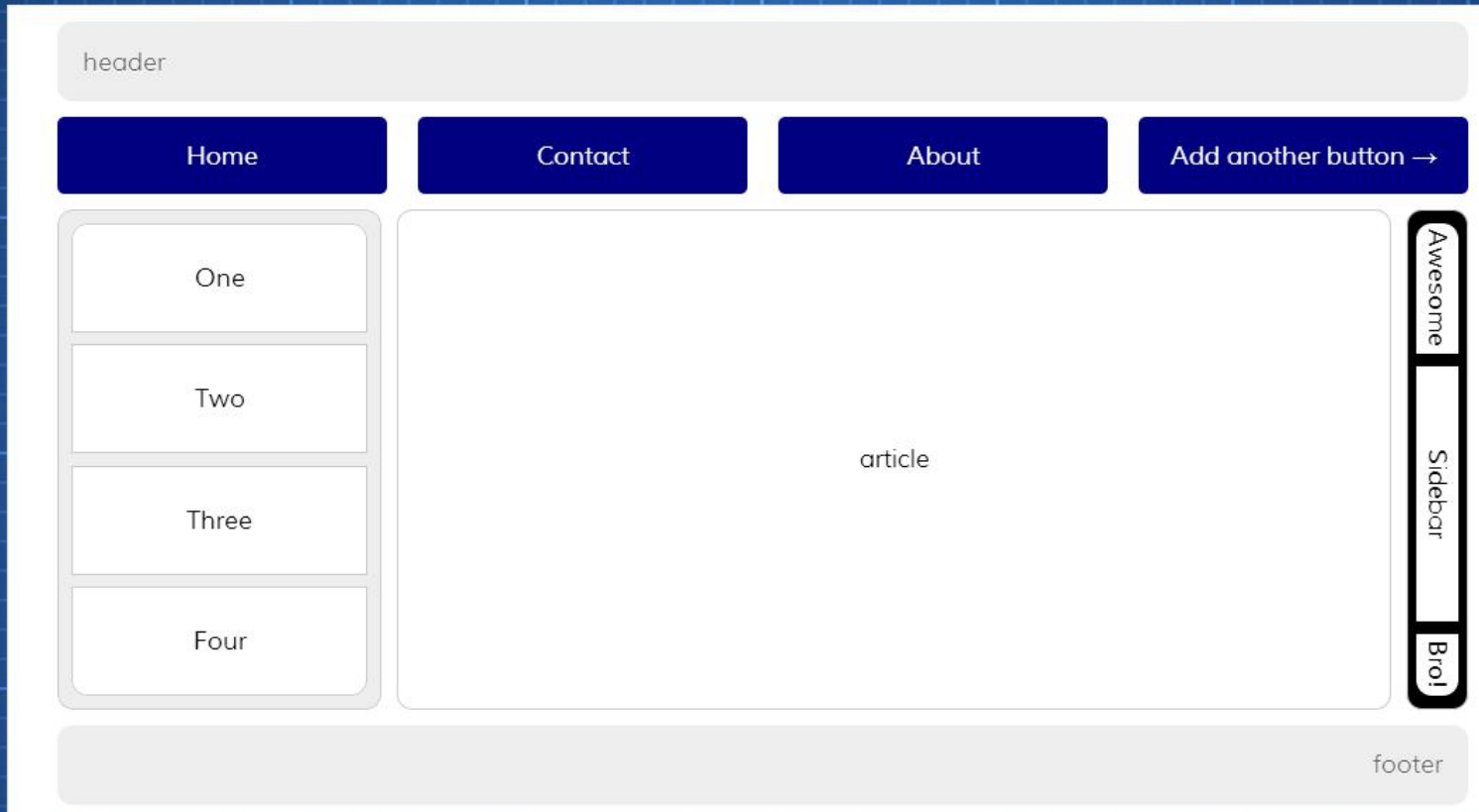
- Flexbox items alter their width/height to fill available space.
- Items grow/shrink proportional to their positive/negative flexibility
- 3rd argument is preferred size

CSS

```
.box > * {
  +flex: 1 0 0px;
}
.box > :nth-child(2) {
  +flex: 1  0  0 px;
}
```



Demo: Holy Grail Layout



Browser Support

CSS Flexbox (da new one)


#2 Dynamic CSS
CONFIRMED

calc()

CSS

```
.circle {
  width: 300px;
  height: 300px;
}
div {
  display: +flex;
  width: +calc(100% - 4em);
  height: +calc(100% - 4em);
  border-radius: 50%;
  +align-items: center;
  +justify-content: center;
}
div:hover {
  border-radius: 0;
}
```

calc()

CSS

```
.circle {
  width: 300px;
  height: 300px;
}
div {
  display: +flex;
  width: +calc(100% - 4em);
  height: +calc(100% - 4em);
  border-radius: 50%;
  +align-items: center;
  +justify-content: center;
}
div:hover {
  border-radius: 0;
}
```

Browser Support

CSS calc()


#3 Data binding
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Old Hat for JS Frameworks

Angular (angularjs.org) example:

HTML

```
<div ng-app ng-init="val=25">
  Volume: <input type="range" min="0" max="100" ng-model="val">
  {{val}}/100
</div>
```

Volume: 25/100

One-way Data Binding: `data-*` Attributes

"Poor man's data binding"

- Model: data attribute
- Use `attr()` to get the value(s)
- View: render generated content to `:before`/`:after` pseudo elements
- Hook listeners that watch for changes.

"Poor Man's Data Binding"

HTML/JS

```
<style>
input::after {
  content: attr(data-value) '/' attr(max);
  position: relative;
  left: 135px; top: -20px;
}
</style>
<input type="range" min="0" max="100" value="25">
<script>
var input = document.querySelector('input');
input.dataset.value = input.value; // Set an initial value.

input.addEventListener('change', function(e) {
  this.dataset.value = this.value;
});
</script>
```

Volume:  25/100

One-way Data Binding: <datalist>

HTML

```
Browsers: <input list="browsers">
<datalist id="browsers">
  <option value="Chrome">
  <option value="Firefox">
  <option value="Internet Explorer">
  <option value="Opera">
  <option value="Safari">
</datalist>
```

- Specifies a list of pre-defined options for an <input> element.
- `list` attribute "binds" data list to an <input>
- Useful for "autocomplete" on <input> elements.

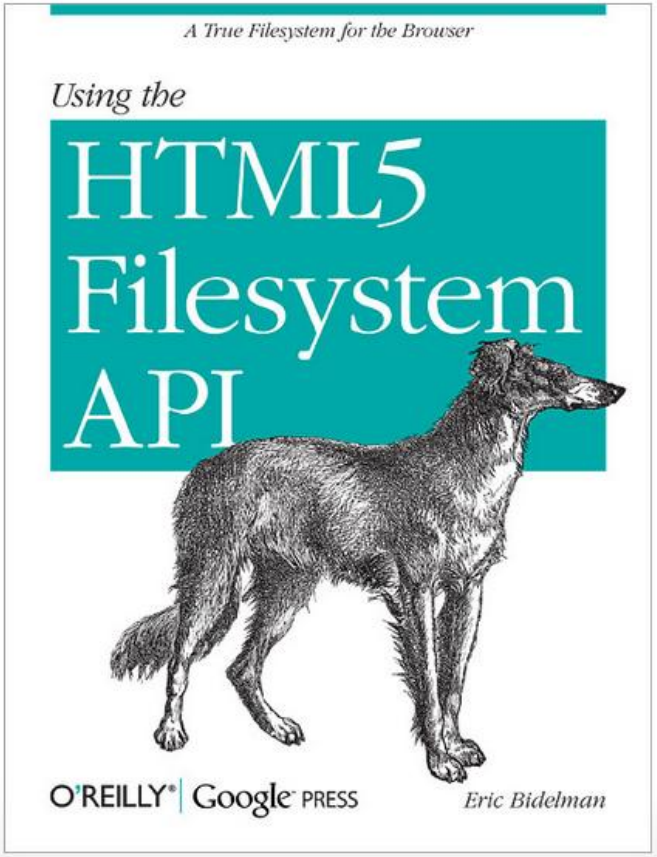
Browsers:

Browser Support

Data binding with `data-*` attrs / `<datalist>`

#4 Access a Filesystem

I Got So Excited...I Wrote a Book :)



HTML5 Filesystem API

Persist data to files/folders

Opening a filesystem:

JS

```
window.requestFileSystem(
  TEMPORARY,          // persistent vs. temporary storage
  1024 * 1024,        // size (bytes) of needed space
  initFs,             // success callback
  opt_errorHandler    // opt. error callback, denial of access
);
```

- Security: sandboxed per origin
- Power: native apps can do files/folders,...web apps should too!
- Benefit: dynamically cache and manage assets.

Example: Caching Remote Files

JS

```
var xhr = new XMLHttpRequest();
xhr.open('GET', '/path/to/image.png', true);
xhr.responseType = 'arraybuffer';
xhr.onload = function(e) {









};

xhr.send();
```

Example: Caching Remote Files

JS

```
var xhr = new XMLHttpRequest();
xhr.open('GET', '/path/to/image.png', true);
xhr.responseType = 'arraybuffer';
xhr.onload = function(e) {
  window.requestFileSystem(TEMPORARY, 1024 * 1024, function(fs) {
    fs.root.getFile('image.png', {create: true}, function(fileEntry) {

      fileEntry.createWriter(function(writer) {
        writer.onwriteend = function(e) { ... };
        writer.onerror = function(e) { ... };
        writer.write(new Blob([xhr.response], {type: 'image/png'}));
      }, onError);

    }, onError);
  }, onError);
};

xhr.send();
```

Using Local Assets

- Stored files/folders get their own (`filesystem:`) URL:

```
filesystem:http://example.com/temporary/image.png
```

- Use for a src/href value:

JS

```
var img = document.createElement('img');
img.src = fileEntry.toURL();
document.body.appendChild(img);
```

- Get back to a `FileEntry` from its `filesystem:` URL:

JS

```
window.resolveLocalFileSystemURL(img.src, function(fileEntry) { ... });
```

Moar Callbackzzzzzz!

JS

```
var xhr = new XMLHttpRequest();
xhr.open('GET', '/path/to/image.png', true);
xhr.responseType = 'arraybuffer';
xhr.onload = function(e) {
  window.requestFileSystem(TEMPORARY, 1024 * 1024, function(fs) {
    fs.root.getFile('image.png', {create: true}, function(fileEntry) {

      fileEntry.createWriter(function(writer) {
        writer.onwriteend = function(e) { ... };
        writer.onerror = function(e) { ... };
        writer.write(new Blob([xhr.response], {type: 'image/png'}));
      }, onError);

    }, onError);
  }, onError);
};

xhr.send();
```

“Callback spaghetti is hard,... let's go shopping!”

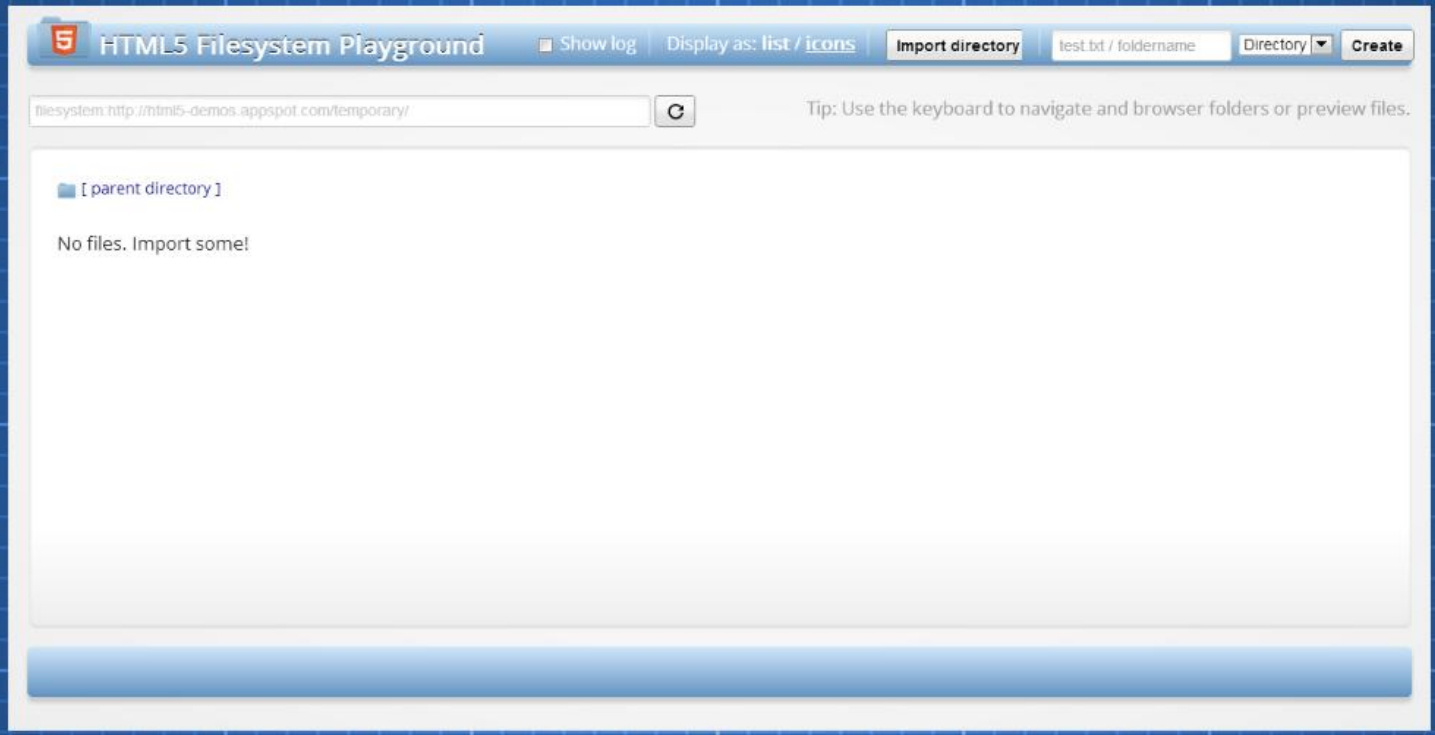
filer.js (github.com/ebidel/filer.js)

Wrapper lib that implements common UNIX cmds (ls, cp, mv)

JS

```
var filer = new Filer();

filer.init({persistent: false, size: 1024 * 1024}, function(fs) {...}, onError);

filer.ls('path/to/some/dir/', function(entries) { ... }, onError);

filer.cp('file.txt', '/path/to/folder', 'newname.txt', function(entry) {
  // entry.fullPath == '/path/to/folder/newname.txt'
}, onError);

var b = new Blob(['body { color: red; }'], {type: 'text/css'});
filer.write('styles.css', {data: b, type: b.type}, function(entry, writer) {
    ...
}, onError);
```

Demo: Filesystem Playground



But kind Sir, this marvel is only in Chrome!

OH YEAH?

Browser Support

HTML5 Filesystem API - thanks to idb.filesystem.js shim!

#5 sudo make me a sandwich

#6 Serverless Downloads

Client-side Downloads

OLD Force downloads with a server:

```http
Content-Disposition: attachment; filename="MyLogo.png";
```

HTTP

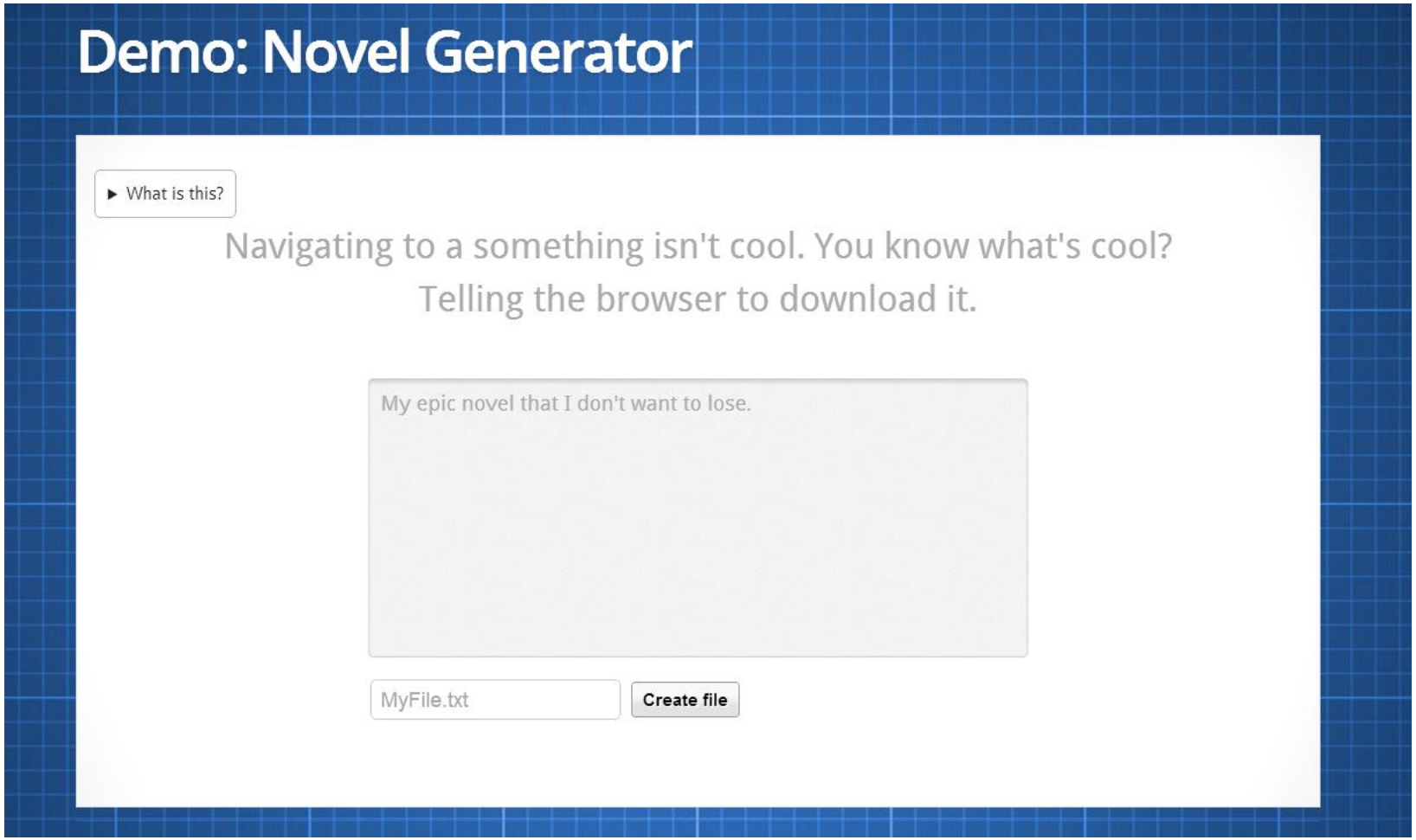
- Need a way for users to download data created in the app.

NEW Use `download` to download resources rather than navigate to them:

```html
<a href="http://google.com/logo.png" download="Logo.png">download me</a>
```

HTML

Demo: Novel Generator



Example: Downloading a Generated File

JS

```
function downloadLink(name, content, mimetype) {
  var a = document.createElement('a');
  a.href = window.URL.createObjectURL(new Blob([content], {type: mimetype}));
  a.download = name;
  a.textContent = 'Download ready';

  document.body.appendChild(a);
}

downloadLink('MyNovel.txt', document.querySelector('textarea').textContent, 'text/plain
```


#7 Efficiently Transfer Data
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AIR SERVICE

Evolution of postMessage()

1. Basic strings

```JS
worker.postMessage('Hello World');
window.postMessage(JSON.stringify({msg: 'Hello World'}), '*');
```

2. JSON

```JS
worker.postMessage({msg: 'Look ma, no strings!'});
```

Evolution of postMessage()

3. Complex types (`File`, `Blob`, `ArrayBuffer`) via structured cloning

JS

```
var data = [1, 2, 3, 4];

// Blob() in Chrome 20, FF 13
worker.postMessage(new Blob(data.toString(), {type: 'text/plain'}));

var uint8Array = new Uint8Array(data);
worker.postMessage(uint8Array);
worker.postMessage(uint8Array.buffer);
```

- Problem: all of these methods are copies. Not efficient!
- We can do better...

Transferable Objects

a.k.a. workers that "don't suck"

Same old friend, different semantics (note the vendor prefix):

```JS
worker.postMessage(arrayBuffer, [arrayBuffer]);
window.postMessage(arrayBuffer, targetOrigin, [arrayBuffer]);
```

- Zero-copy
  - Ownership of data (`ArrayBuffer`) is transferred to new context (e.g. worker/window). Source buffer becomes unavailable.
  - ~50x faster than structured cloning (Chrome 13/FF).
- 2nd argument is list of what to transfer.

Demo: Transferable Objects

▶ Yo dawg, what is this?

Transferable Objects are lightning fast! The prefixed `[window|worker].webkitPostMessage()` now supports sending an `ArrayBuffer` as a transferable.

Run test

```
11:52:47:341 thread: USING TRANSFERABLE OBJECTS :)
11:52:47:342 thread: READY!
11:52:47:626 worker: READY! [11:52:47:622]
```

Feature Detection

- Feature detecting is a PITA b/c of false positives.
- If transferred, buffer's `.byteLength` goes to zero.

JS

```
var ab = new ArrayBuffer(1);
worker.postMessage(ab, [ab]);
if (ab.byteLength) {
  alert('Transferables are not supported in your browser!');
} else {
  // Transferables are supported.
}
```

Browser Support

Transferable Objects


#8 Access Native Hardware
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"Device APIs"

Device APIs WG: www.w3.org/2009/dap/

- Geolocation API
- Device Orientation API (accelerometer)
- WebGL (GPU)
- HTML5 Filesystem API (sandboxed filesystem)
- `navigator.onLine` / `navigator.connection` (network connectivity)
- Battery API
- Gamepad API
- WebRTC (voice & video input) / Web Audio API (core audio)

First Step to Speech Enabled Apps!

```HTML
<input type="text" x-webkit-speech>
```

Camera & Microphone Access

Plugin-free acess to camera/microphone.

JS

```
navigator.getUserMedia({audio: true, video: true}, function(stream) {
  var video = document.querySelector('video');
  video.src = window.URL.createObjectURL(stream);
}, function(e) {
  console.log(e);
});
```

HTML

```
<video autoplay controls></video>
```

Demos

- Photo booth
- Live Effects
- Augmented Reality
- WebGL Live TV
- Instant Camera
- Explode Video

Recording Content

HTML

```
<input type="button" value="" onclick="record(this)">
<input type="button" value="" onclick="stop(this)">
```

JS

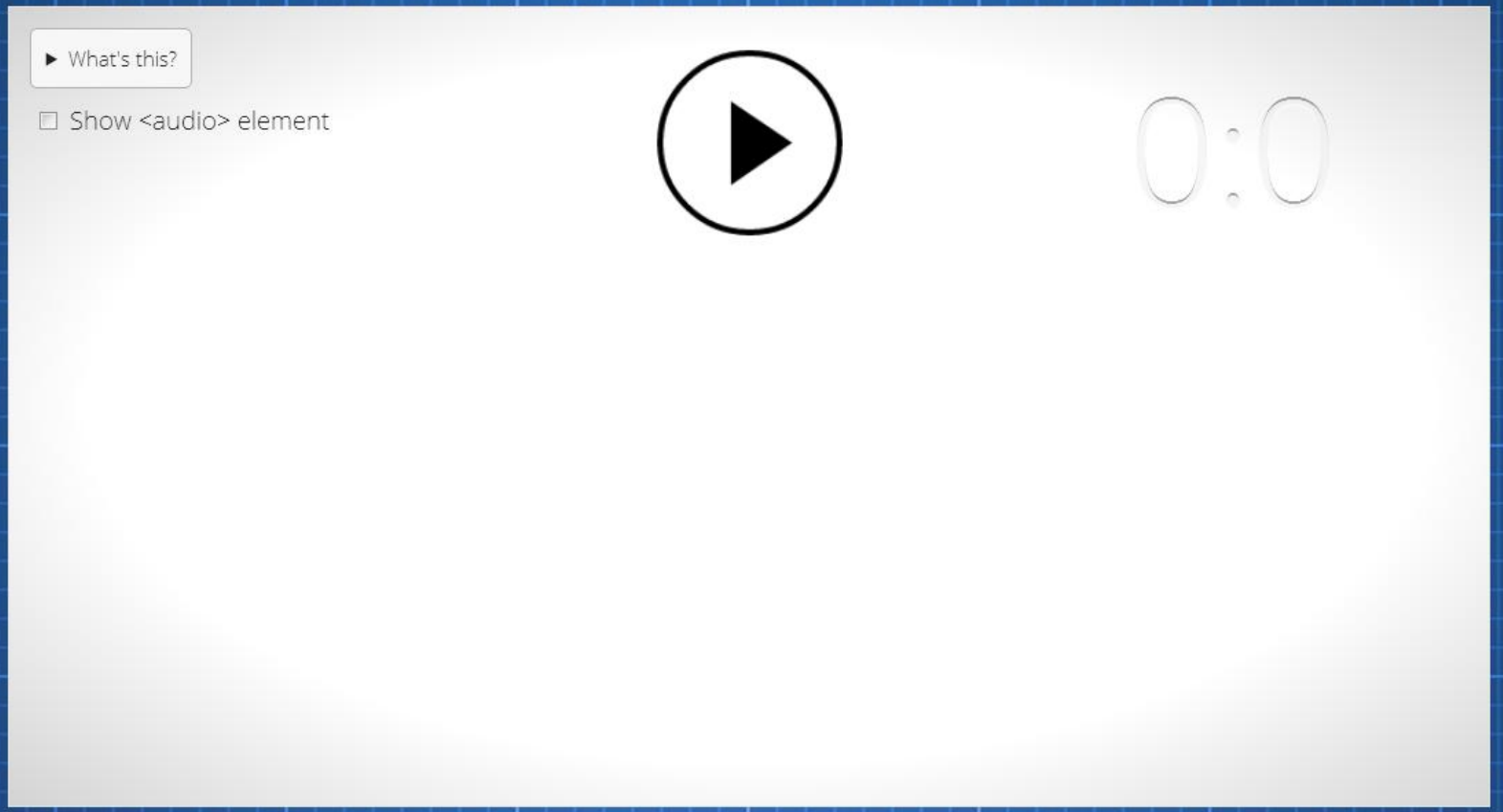
```
var localMediaStream, recorder;

var record = function(button) {
  recorder = localMediaStream.record();
};

var stop = function(button) {
  localMediaStream.stop();
  recorder.getRecordedData(function(blob) {
    // Upload blob using XHR2.
  });
};
```

Browser Support

`getUserMedia()`

#9 Make <audio> Sexy Again

Demo: HTML5 <audio> Visualizer



Web Audio API + <audio>/<video>

Use an `HTMLMediaElement` as the source to the API:

JS

```
var ctx = new window.AudioContext();
var audioElement = new Audio();
audioElement.src = 'sounds/dope_beats.mp3';
audioElement.controls = true;
audioElement.autoplay = true;

var source = ctx.createMediaElementSource(audioElement);
var analyser = ctx.createAnalyser();

source.connect(analyser);
analyser.connect(ctx.destination);
```

Note: There's no `source.noteOn(0)`. Play/pause is controlled by the `<audio>` element.


#10
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Binary WebSockets

New look, same great taste

- WebSockets suffered the same limitations as Workers.
- Now send `File`, `Blob`, or `ArrayBuffer` types.

JS

```
var socket = new WebSocket('ws://example.com/sock', ['dumby-protocol']);
socket.binaryType = 'blob'; // or 'arraybuffer'
socket.onopen = function(e) {
  window.setInterval(function() {
    if (socket.bufferedAmount == 0) {
      socket.send(new Blob([blob1, blob2]));
    }
  }, 50); // rate limit us.
};
socket.onmessage = function(e) {
  document.querySelector('img').src = URL.createObjectURL(e.data);
};
```

Demos: Media Streaming

AUDIO STREAMER

INSTALL SCREENSHARE

Finito.

The Web Can Do Amazing Things...

- CSS For Web Apps
- Dynamic CSS
- Data binding
- Access a Filesystem
- sudo make me a sandwich
- Serverless Downloads
- Efficiently Transfer Data
- Access Native Hardware
- Make <audio> Sexy Again
- Stream Multimedia

< Thank You! >

Source: github.com/ebidel/html5can

g+ plus.ericbidelman.com
twitter @ebidel
www www.ericbidelman.com
github github.com/ebidel