

# **CSS AND JAVASCRIPT UPDATE**

# OVERVIEW

- A quick look back
- CSS: Flexbox
- JavaScript: ES6

**A QUICK LOOK BACK**

# HTML AND CSS

From WEB1 you already know:

- Structuring content with HTML
- Document structure, lists, forms, tables, media
- Semantic markup
- CSS2 and CSS3 selectors
- Styling text and boxes
- Box model, positioning elements, floating boxes

If necessary consult:

- WEB1 slides and related material
- [Learn to Code HTML & CSS](#)

# HTML AND CSS

You probably also know:

- Front-end frameworks like [Foundation](#) or [Bootstrap](#)
- CSS preprocessors like [Less](#) or [Sass](#)

# HTML AND CSS

- CSS3 has a Flexible Box Layout Module, short: *Flexbox*
- Currently a *W3C Last Call Working Draft*
- This has not been addressed in WEB1

More on CSS3 *Flexbox* in a moment...

# JAVASCRIPT

From WEB2 you know:

- JavaScript basics: statements, expressions, variables
- Values and types: numbers, strings, boolean, undefined, ...
- Functions, closures, this, scoping
- Objects, methods, constructors, prototypes
- Arrays, Math-object, regular expressions
- Strict mode

If necessary consult:

- WEB2 slides and related material
- [Speaking JavaScript, Chapter 1: Basic JavaScript](#)

# JAVASCRIPT: FUNCTIONS

---

```
// Function declaration
function add (a, b) { return a+b; }

// Function expression
var add = function (a, b) { return a+b; };

// Named function expression
// Name fact is used here for recursive call
// It's scope is limited to the function
var factorial = function fact (n) {
    if (n <= 1) return 1;
    else return n * fact(n-1);
};
```

---



# JAVASCRIPT: CLOSURES, CALLBACKS

---

```
// Fade the background color of an element
var fade = function (node) {
    var level = 1;
    var step = function () {
        var hex = level.toString(16);
        node.style.backgroundColor = '#FFF' + hex + hex;
        if (level < 15) {
            level += 1;
            setTimeout(step, 100);
        }
    };
    setTimeout(step, 100);
};

// Sample call
window.onload = function() {
    fade(document.querySelector(".newitem"));
};
```

---

# JAVASCRIPT: OBJECTS AND CONSTRUCTORS

```
var Person = function (name) {  
    this.name = name;  
    this.greet = function () {  
        return "Hello, my name is " + this.name;  
    };  
};  
  
var eva = new Person("Eva");  
console.log(eva.greet());    // Hello, my name is Eva
```

# JAVASCRIPT: INHERITANCE

```
// User extends Person
var User = function (name, uid) {
    Person.call(this, name);
    this.uid = uid;
};

// Dummy Person object for the inheritance chain
User.prototype = new Person;
User.prototype.constructor = User;
```

# JQUERY

---

```
// example from the exercise
readNotes : function () {
    $.getJSON( this.SERVER_URL + "notes", function(data) {

        //delete all notes
        $('#notes').empty();

        //now iterate over our notes (template preferred...)
        $.each(data.notes, function(i, note) {
            $('<li class="note" data-note-id="'+note.id+'">')
                .append('<span class="subject">'+note.subject+'</span>')
                .append('<span class="message">'+note.message+'</span>')
                .append('<a class="delete" href="#">delete</a>')
                .appendTo('#notes');
        });
    });
}
```

# JQUERY

```
addHandler : function () {
    var url = this.SERVER_URL;

    $('#notes').on('click', '.delete', function (e) {
        var note = $(this).parents('.note'),
            noteid = note.data('note-id');

        $.getJSON(url + "deleteNote?id=" + noteid, function(data) {
            //check the server answer
            if (data.message == 'ok') {
                //if successful, reload the list
                NOTE_CLIENT.readNotes();
            }
            else {
                //if not successful, show an error message
                alert('Note could not be deleted');
            }
        });
        e.preventDefault();
    });
}
```

---

# JAVASCRIPT: CURRENT DEVELOPMENT

- ECMAScript 6 (2015), more in a moment...
- Node.js, io.js merged again
- [jQuery 3 in development](#), status: alpha
- Web Components, in another lesson...

# JAVASCRIPT APPLICATION FRAMEWORKS

- Backbone, Ember, Angular, Meteor, React
- These can prove useful for mobile applications, too
- We will have a look into React.js in another lesson
- React Native for building native apps using the React way

# CSS FLEXBOX



# CSS FLEXBOX

- Page layout is difficult with traditional CSS
- Hence the various grid frameworks like Bootstrap
- Flexbox aims to facilitate typical layout problems

# CSS FLEXBOX

- Efficient way to lay out, align and distribute items in a container
- Option to re-order items helps making responsive designs
- Used in React Native for laying out native apps
- Will optionally be used by Bootstrap (V4, currently alpha)

CSS Flexible Box Layout Module Level 1

# BROWSER SUPPORT

[caniuse.com/#search=flexbox](http://caniuse.com/#search=flexbox)

- Overall good support of current browsers
- Problems with Internet Explorer, good support by Edge
- Safari up to version 8: Use -webkit prefix

The examples on the following slides are from

<http://flexbox.io/>

# EXAMPLE

---

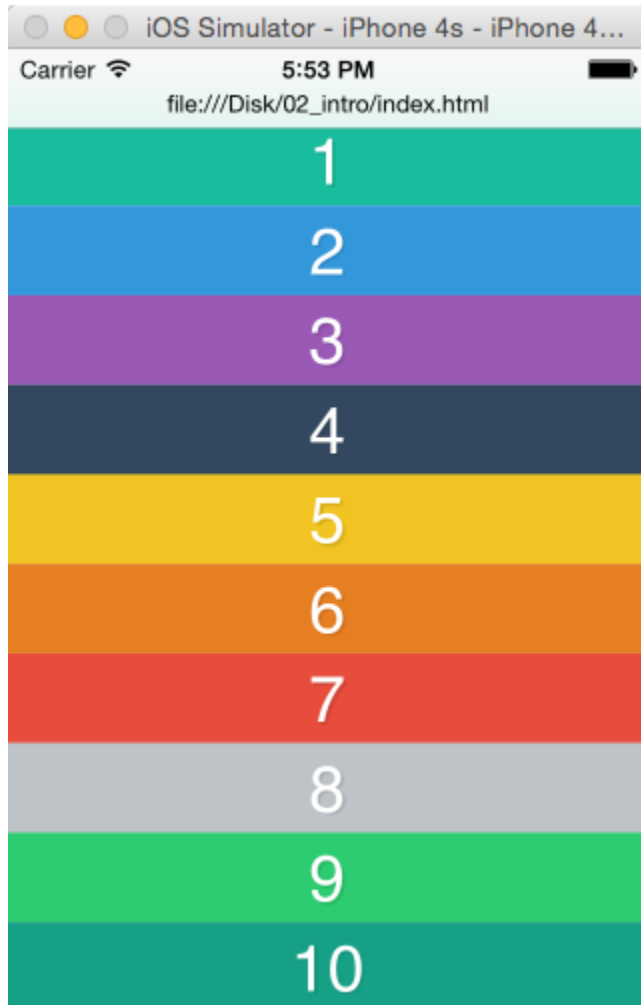
```
<!-- HTML -->
<div class="container">
  <div class="box box1">1</div>
  <div class="box box2">2</div>
  ...
  <div class="box box10">10</div>
</div>

/* CSS */
.box {
  padding:10px;
  text-align: center;
  color:white;
  text-shadow:4px 4px 0 rgba(0,0,0,0.1);
  font-size: 100px;
}
.box1 { background:#1abc9c;}
...
```

---

↓ preview ↓

# EXAMPLE



# EXAMPLE: FLEX CONTAINER

```
.container {  
  display: flex;  
  border: 10px solid goldenrod;  
  height: 100vh;  
}
```

- Flexbox consists of flex containers and flex items
- A flex container is declared with the *display* property
- Container is now a *flex container*
- Alternative: *display: inline-flex* results in an inline element

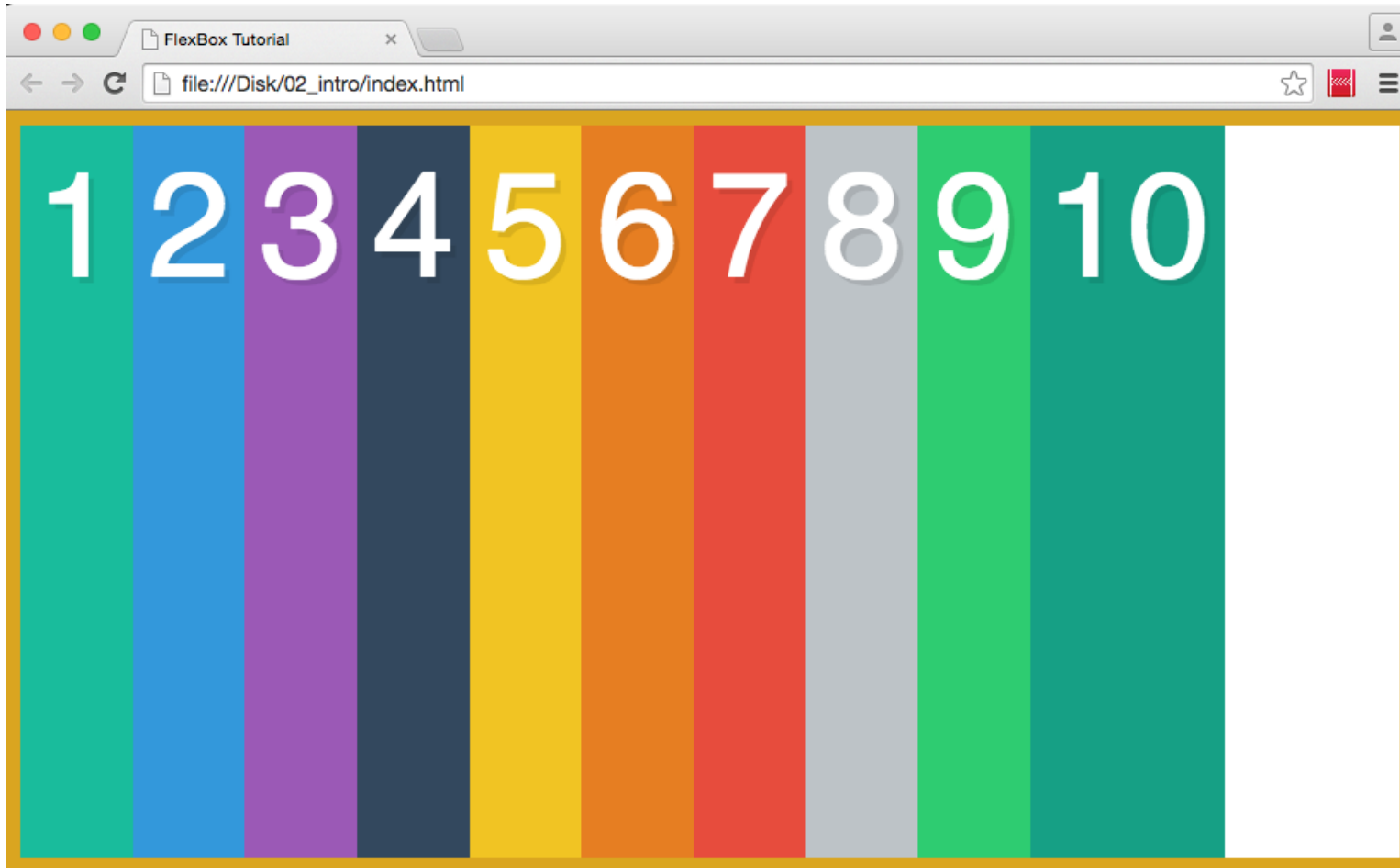
# EXAMPLE: FLEX CONTAINER

```
.container {  
  display: flex;  
  border: 10px solid goldenrod;  
  height: 100vh;  
}
```

- 100vh – what's that ??
- It's the viewport height

↓ preview ↓

# EXAMPLE: FLEX CONTAINER





# FLEX ITEMS

- Every child of a *flex container* is a *flex item*
- There can be any number of flex items
- Flexbox defines how flex items are laid out inside of flex containers

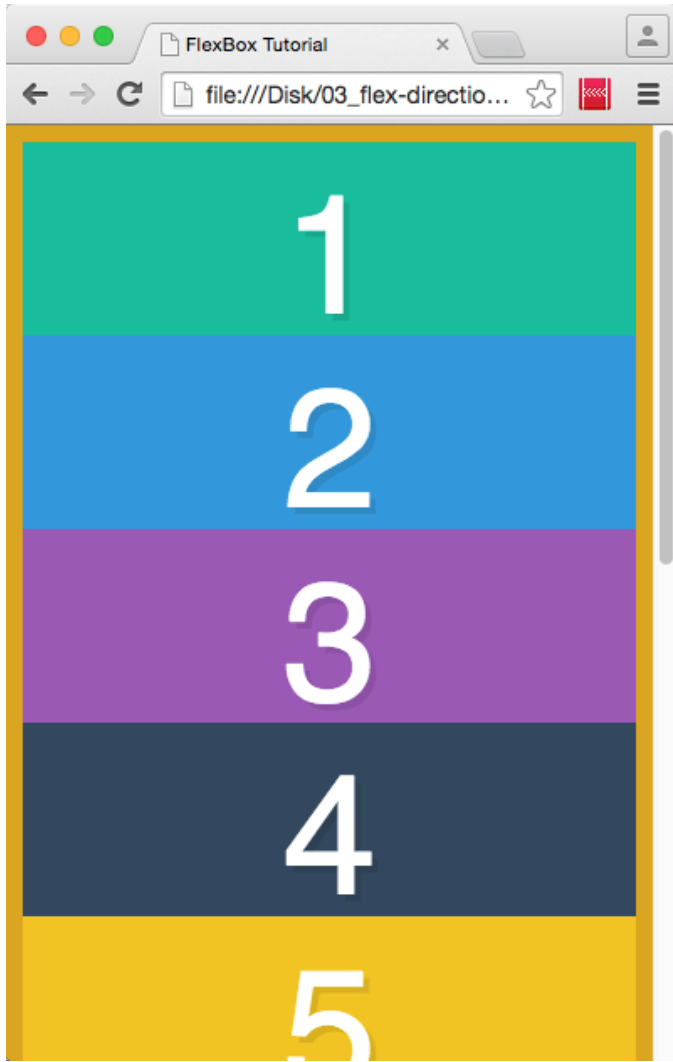
# FLEX DIRECTION

---

```
.container {  
  display:flex;  
  border:10px solid goldenrod;  
  min-height:100vh;  
  flex-direction: column;  
}
```

↓ preview ↓

# FLEX DIRECTION



# FLEX DIRECTION

- CSS attribute: *flex-direction*
- Possible values: *row* | *row-reverse* | *column* | *column-reverse*
- Default: *row*  
(items are laid out in the direction of the writing-mode)
- Terminology:
  - Main direction (sometimes called the flow direction)
  - Main start and main end
  - Cross direction
  - Cross start and cross end

# FLEX DIRECTION

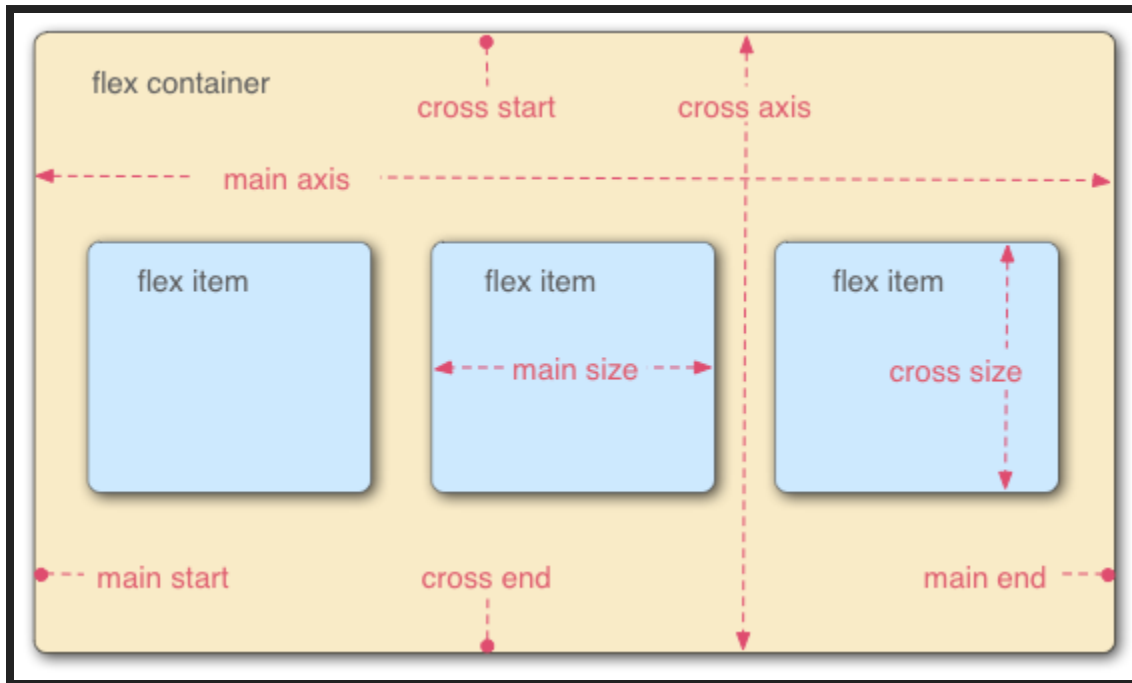
---

```
body {  
    direction: rtl;    /* main direction right to left */  
}  
.container {  
    display: flex;  
    border: 10px solid goldenrod;  
    min-height: 100vh;  
    flex-direction: row-reverse; /* left to right again */  
}
```

---

↓ preview ↓

# FLEX DIRECTION



(Source: [MDN](#))

# FLEXBOX ORDERING

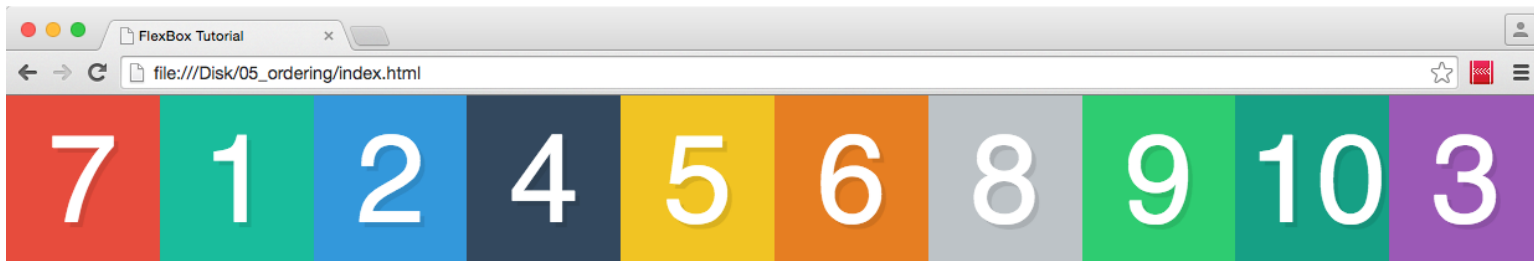
---

```
.container {  
  display: flex;  
}  
.box {  
  flex: 1;  
  order: 1;  
}  
.box3 {  
  order: 3;  
}  
.box7 {  
  order: -2;  
}
```

---

# FLEXBOX ORDERING

- Flex items can be re-ordered with the `order` property
- Initial value: 0
- Problems likely when selecting text over multiple items



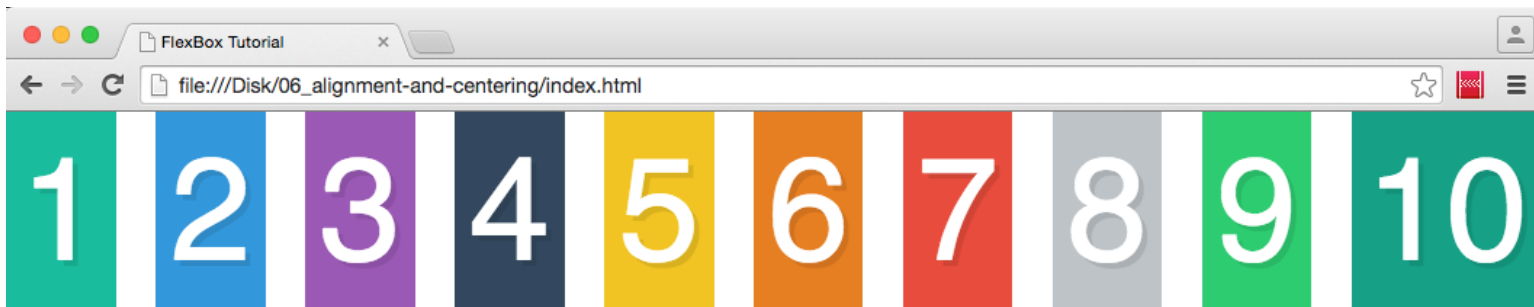


# FLEXBOX ALIGNMENT

---

```
.container {  
  display: flex;  
  justify-content: space-between;  
}
```

---



# FLEXBOX ALIGNMENT

- Property: *justify-content*
- Defines the alignment along the *main* axis
- Remember: with *flex-direction:column* the main axis is from top to bottom
- Possible values: *flex-start* | *flex-end* | *center* | *space-between* | *space-around*
- Default: *flex-start*

# FLEXBOX ALIGNMENT

- Another property : *align-items*
- This one defines the alignment along the *cross* axis
- Possible values: *flex-start* | *flex-end* | *center* | *baseline* | *stretch*
- Default: *stretch*

# FLEXBOX ALIGNMENT

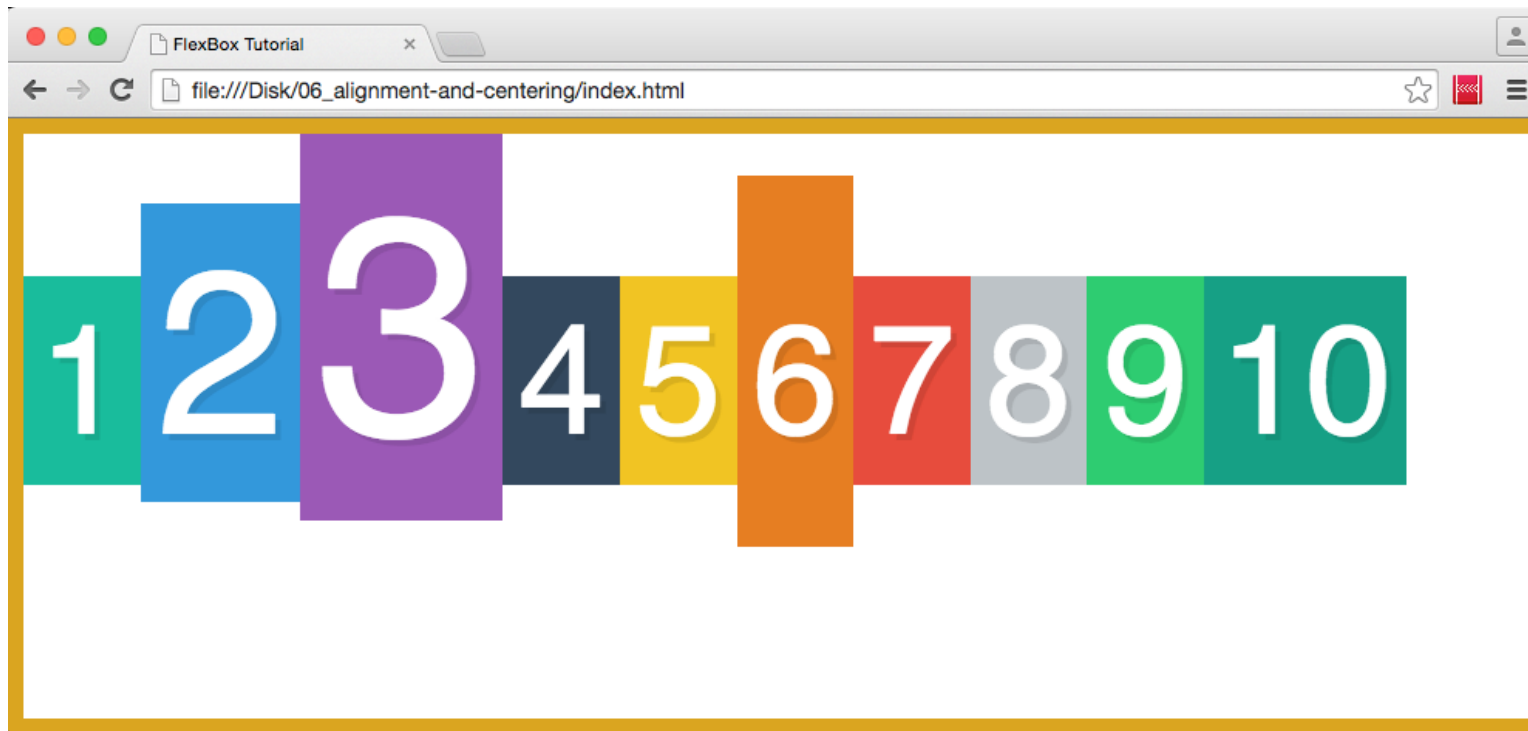
---

```
.container {  
  display:flex;  
  border:10px solid goldenrod;  
  min-height:100vh;  
  align-items:baseline;  
}  
.box2 {  
  font-size: 150px;  
}  
.box3 {  
  font-size: 200px;  
}  
.box6 {  
  padding-bottom: 50px;  
  padding-top: 75px;  
}
```

---

↓ preview ↓

# FLEXBOX ALIGNMENT



# FLEXBOX ALIGNMENT

- One more property : *align-content*
- Alignment along the *cross* axis for the whole content
- Possible values: *flex-start* | *flex-end* | *center* | *space-between* | *space-around* | *stretch*
- Default: *stretch*

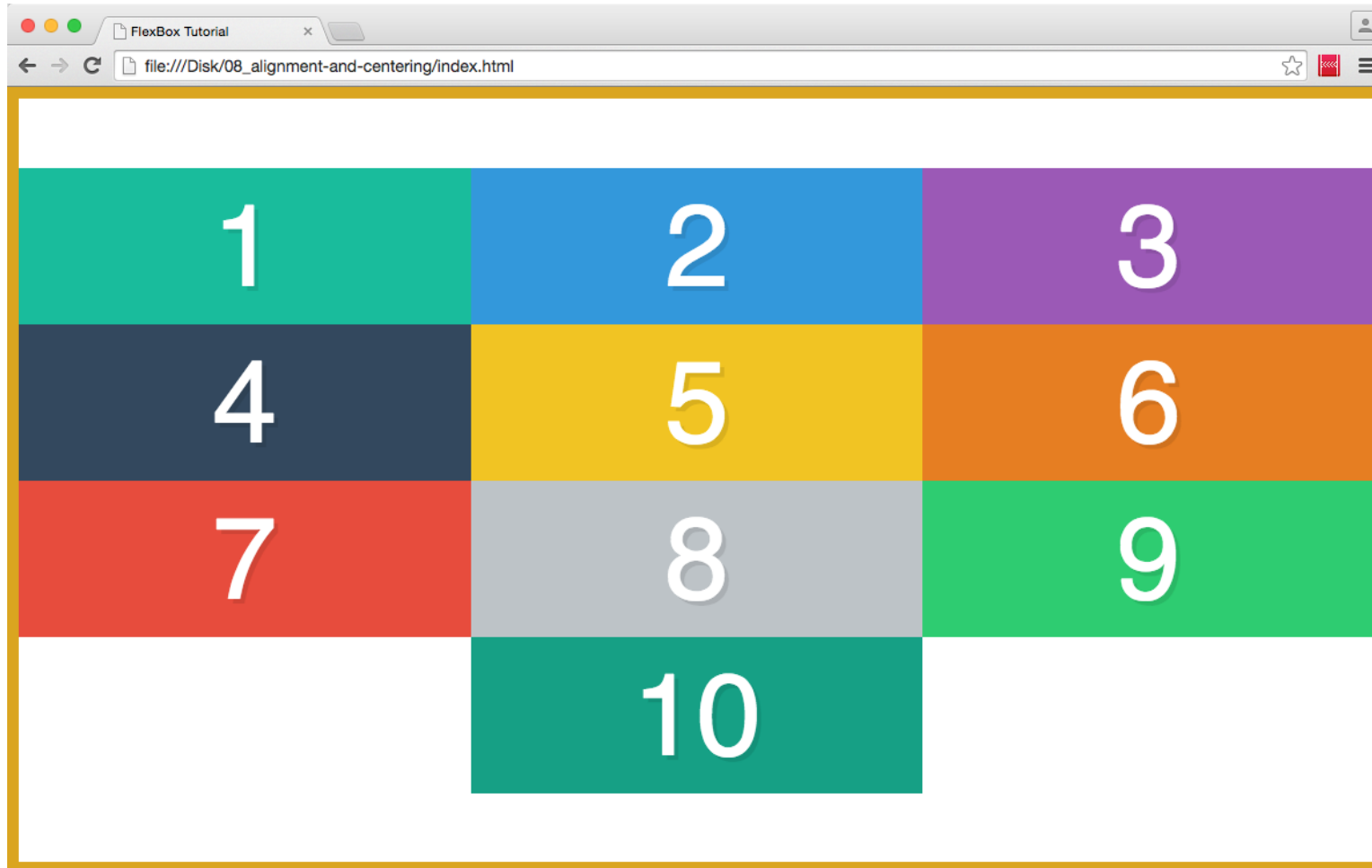
# FLEXBOX ALIGNMENT

```
.container {  
  display: flex;  
  border: 10px solid goldenrod;  
  min-height: 100vh;  
  flex-wrap: wrap;  
  justify-content: center;  
  align-content: center;  
}  
.box {  
  width: 33.33333%;  
}
```

---

↓ preview ↓

# FLEXBOX ALIGNMENT





# FLEXBOX SELF ALIGNMENT

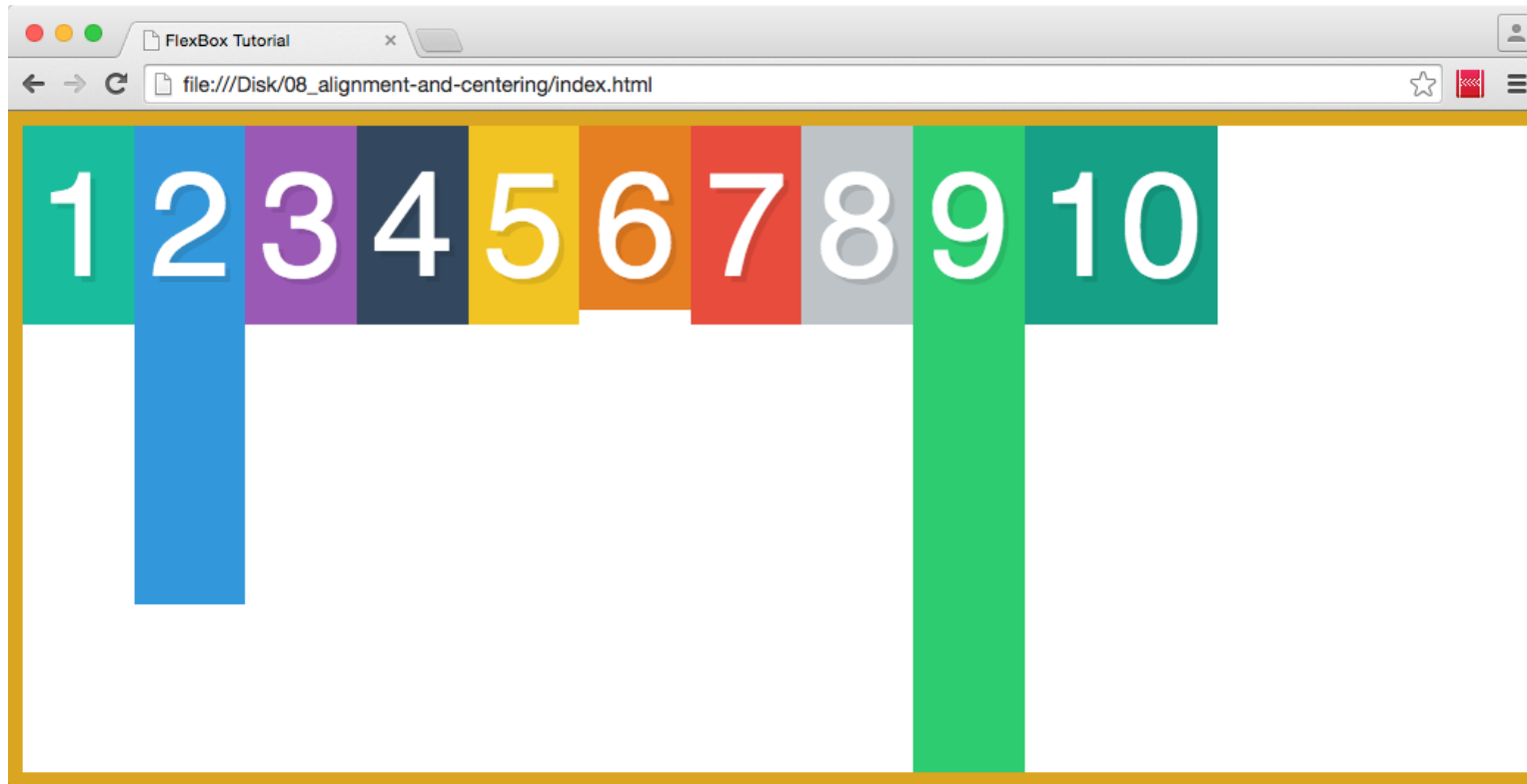
---

```
.container {  
  display: flex;  
  border: 10px solid goldenrod;  
  min-height: 100vh;  
  align-items: flex-start;  
}  
.box2 {  
  padding-bottom: 200px;  
}  
.box6 {  
  padding-bottom: 0;  
}  
.box9 {  
  padding-bottom: 50px;  
  align-self: stretch;  
}
```

---

↓ preview ↓

# FLEXBOX SELF ALIGNMENT



# FLEXBOX SIZING

---

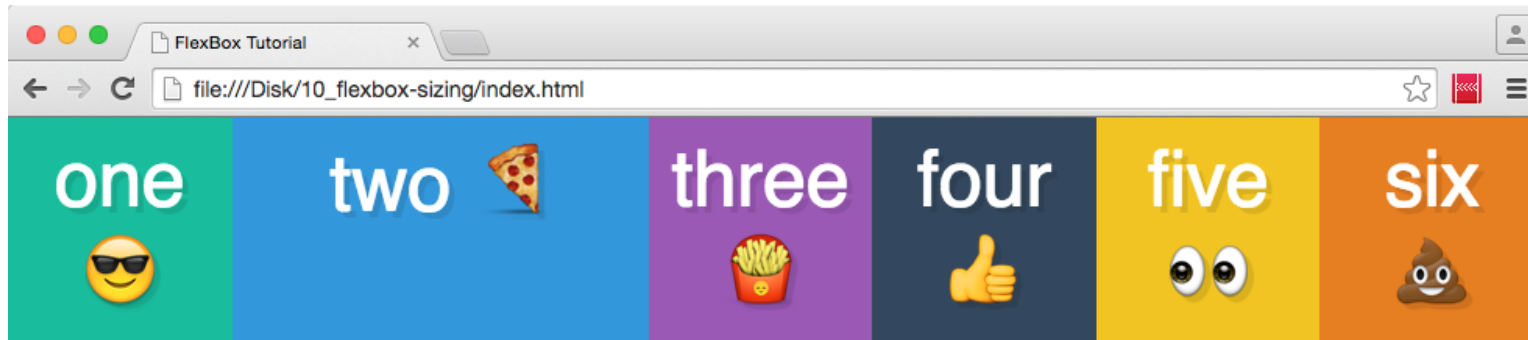
```
<!-- HTML -->
<div class="container">
  <div class="box box1">one   </div>
  <div class="box box2">two   </div>
  <div class="box box3">three </div>
  ...
</div>
```

---

```
/* CSS */
.container {
  display: flex;
}
.box { /*...*/
  flex: 1;
}
.box2 {
  flex: 2;
}
```

↓ preview ↓

# FLEXBOX SIZING



# GROW AND SHRINK FLEX ITEMS

- `flex-grow`
  - Defines the ability for a flex item to grow if necessary
  - Unitless value that serves as a proportion
  - Default: 0
- `flex-shrink`
  - Defines the ability for a flex item to shrink if necessary
  - Default: 1
- `flex-basis`
  - Size of an element before the remaining space is distributed
  - Default: *auto*

# PROPERTY *FLEX*

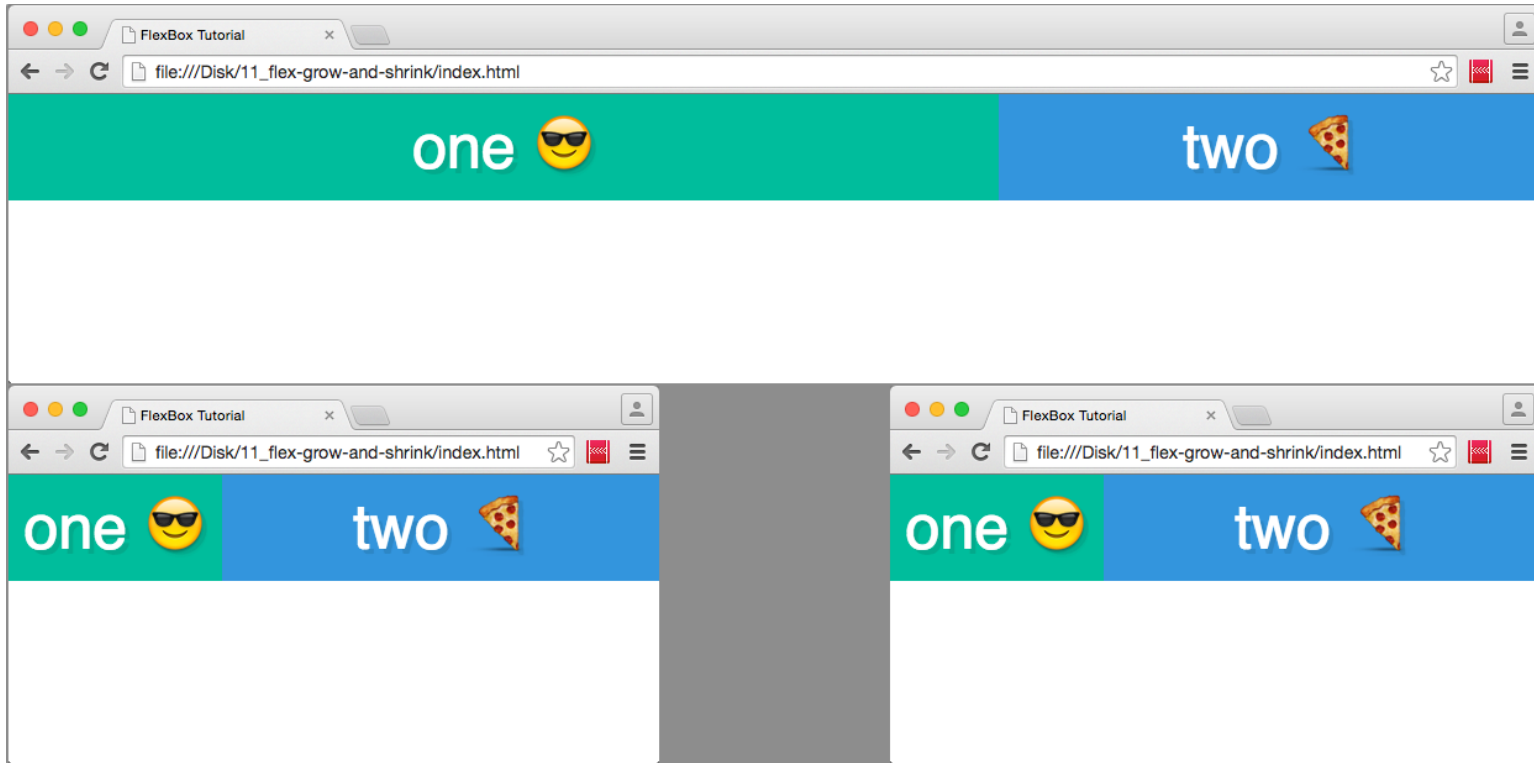
- Shorthand for *flex-grow*, *flex-shrink* and *flex-basis* combined
- Second and third parameters are optional
- Default: 0 1 auto

```
.box1 {  
    flex: 10 5 400px;  
}  
.box2 {  
    flex: 1 1 400px;  
}
```

---

↓ preview ↓

# GROW AND SHRINK FLEX ITEMS



# RESIZING COMBINED WITH WRAPPING

- Resizing/wrapping combined allows for flexible layouts
- To demonstrate we use a container with six flex items

---

```
<div class="container">  
  <div class="box box1">one  </div>  
  ...  
  <div class="box box6">six  </div>  
</div>
```



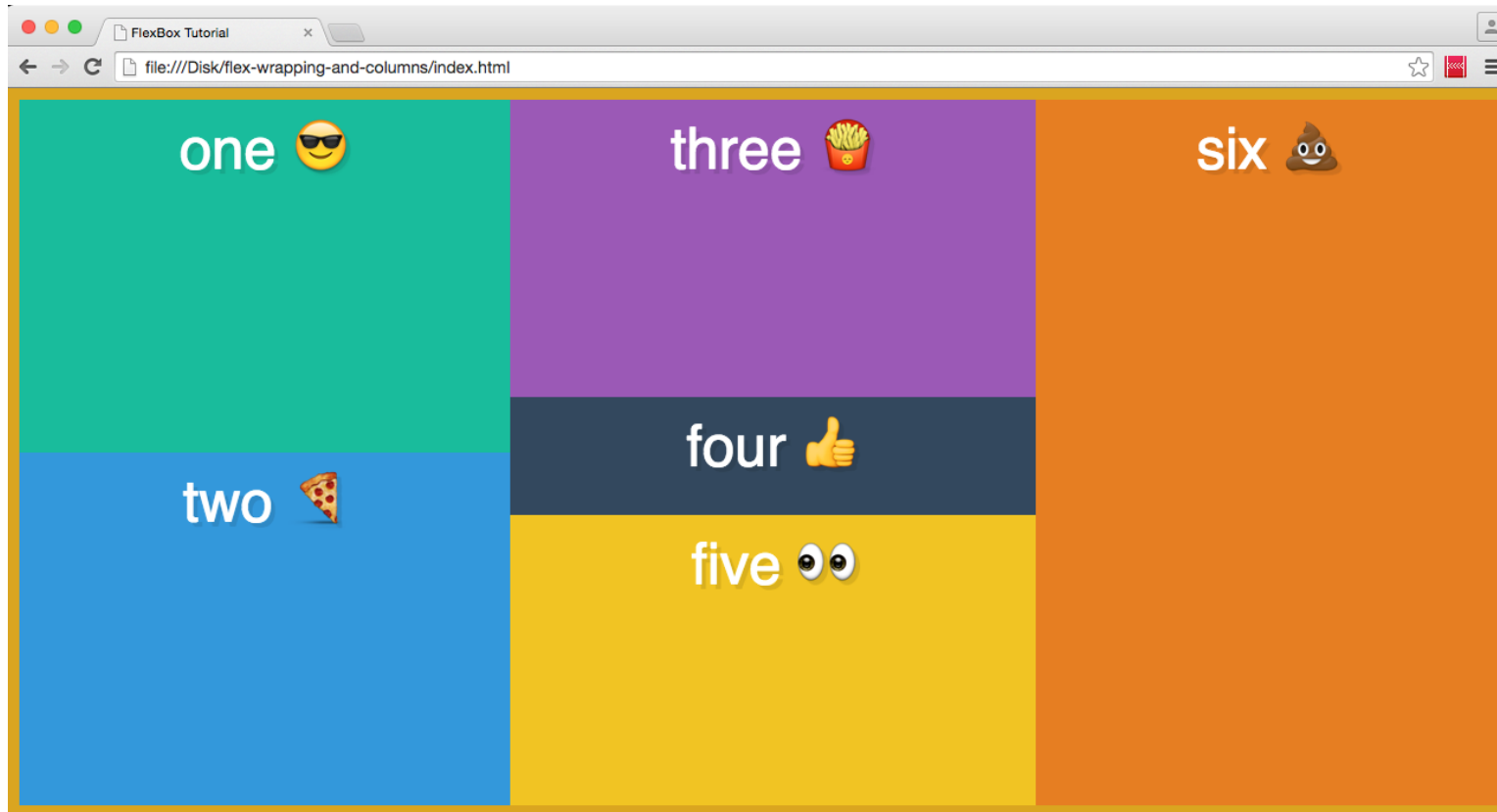
# RESIZING COMBINED WITH WRAPPING

---

```
.container {  
  display:flex;  
  flex-wrap:wrap;  
  flex-direction:column;  
  border:10px solid goldenrod;  
  height:100vh;  
}  
.box {  
  flex-basis:250px;  
  flex-grow:1;  
}  
.box3 {  
  flex-grow:5;  
}  
.box4 {  
  flex-basis:100px;  
}
```

↓ preview ↓

# RESIZING COMBINED WITH WRAPPING



# EXAMPLE: NAVIGATION

## HTML

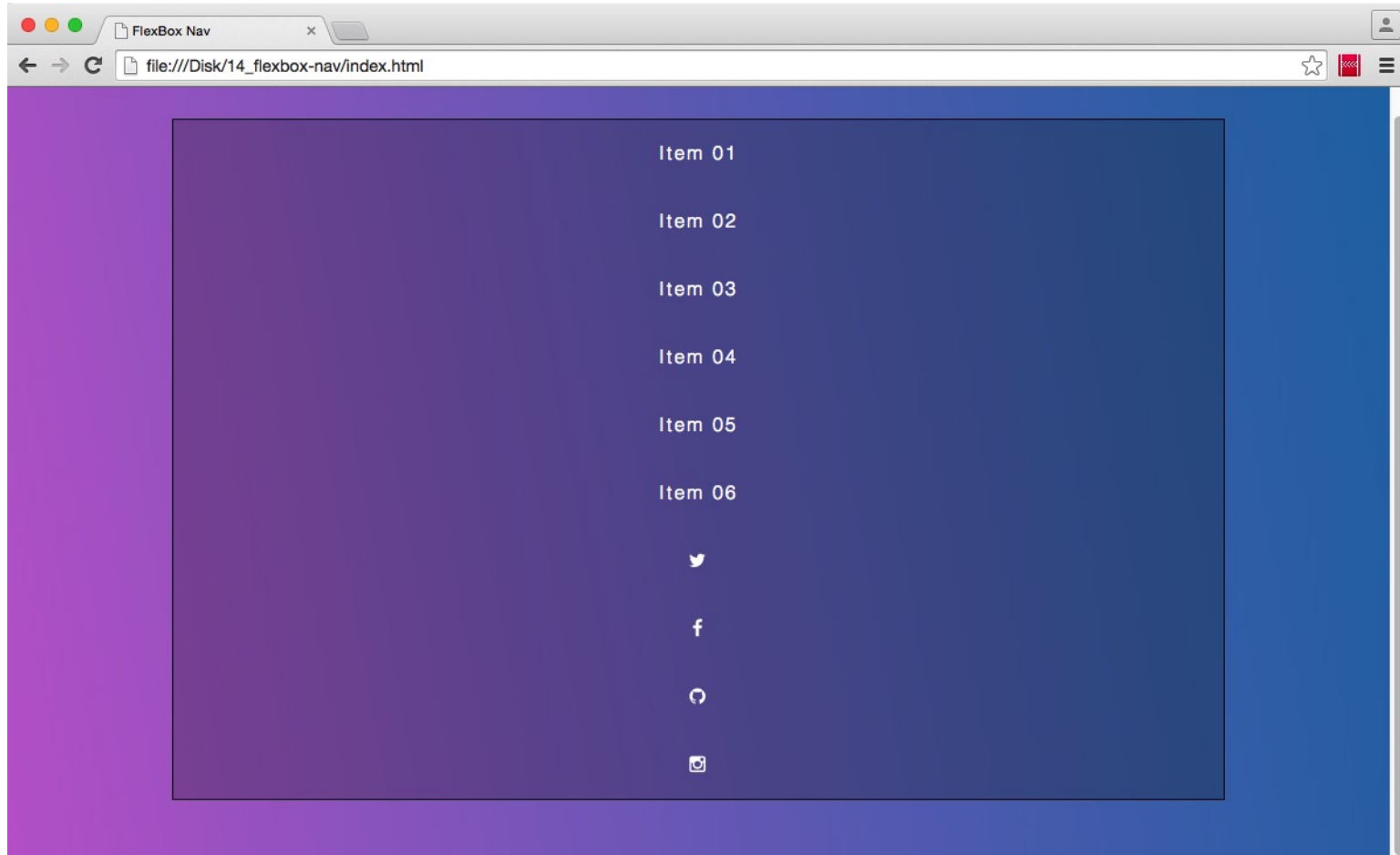
---

```
<nav class="flex-nav">
  <ul>
    <li><a href="#">Item 01</a></li>
    <li><a href="#">Item 02</a></li>
    ...
    <li class="social">
      <a href="http://twitter.com/wesbos"><i class="fa fa-twitter"></i></a>
    </li>
    ...
  </ul>
</nav>
```

---

↓ With a little bit of styling not shown here ↓

# EXAMPLE: NAVIGATION



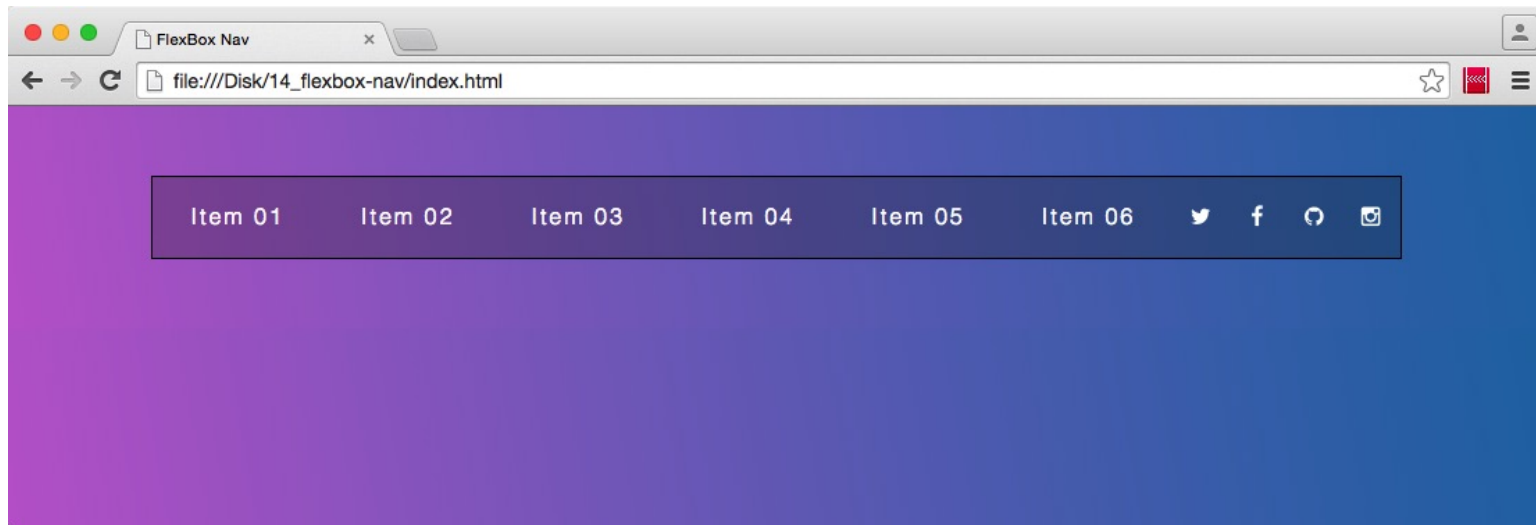
# EXAMPLE: NAVIGATION

---

```
.flex-nav ul {  
  border: 1px solid black;  
  list-style: none;  
  margin: 0;  
  padding: 0;  
  display: flex;  
}  
.flex-nav li {  
  flex: 3;  
}  
.flex-nav .social {  
  flex: 1;  
}
```

↓ preview ↓

# EXAMPLE: NAVIGATION



# EXAMPLE: NAVIGATION

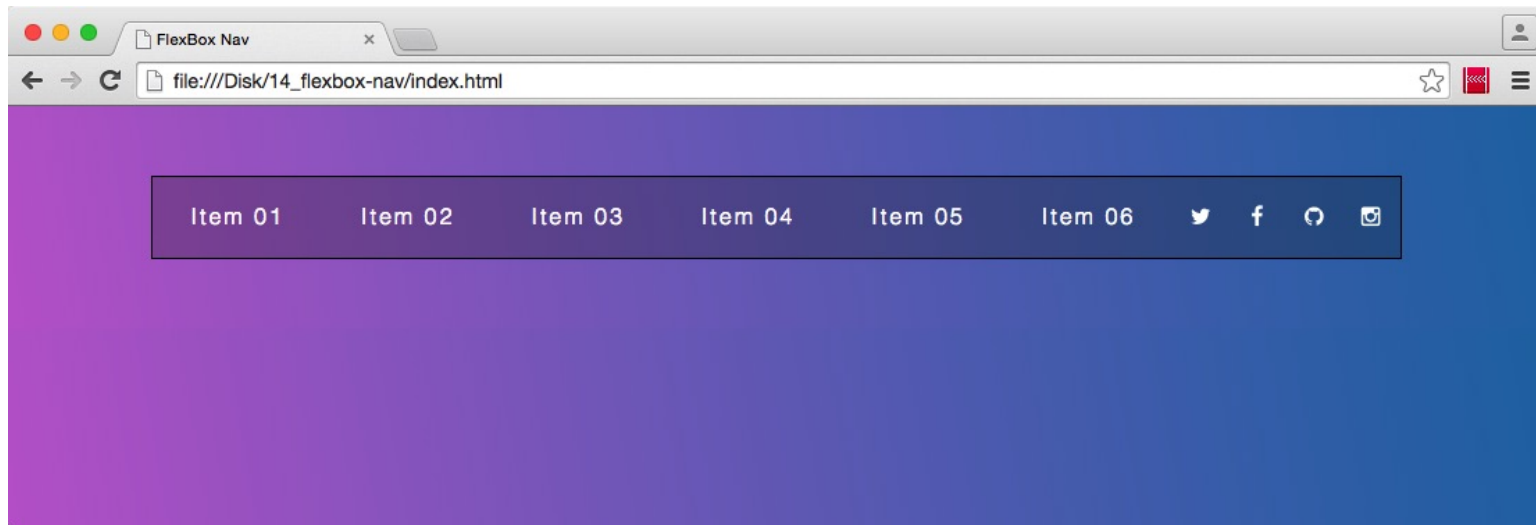
---

```
@media all and (max-width:1000px) {  
  .flex-nav ul {  
    flex-wrap: wrap;  
  }  
  .flex-nav li {  
    flex: 1 1 50%;  
  }  
  .flex-nav .social {  
    flex: 1 1 25%;  
  }  
}  
@media all and (max-width:500px) {  
  .flex-nav li {  
    flex-basis: 100%;  
  }  
}
```

---

↓ preview ↓

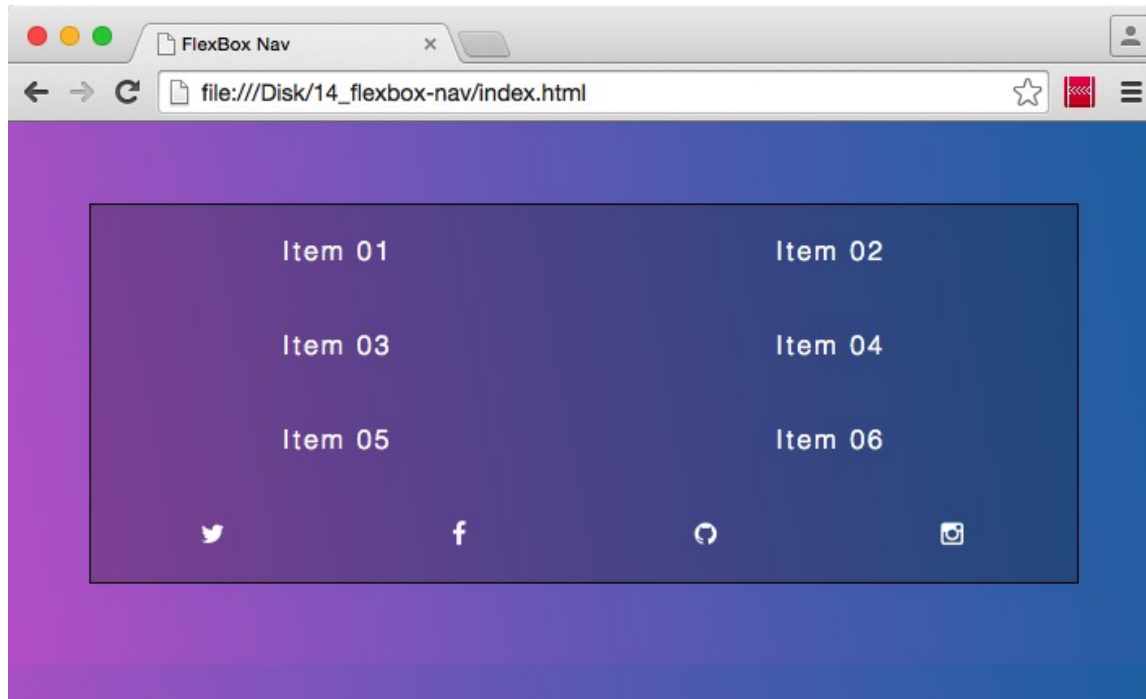
# EXAMPLE: NAVIGATION



↓ more ↓

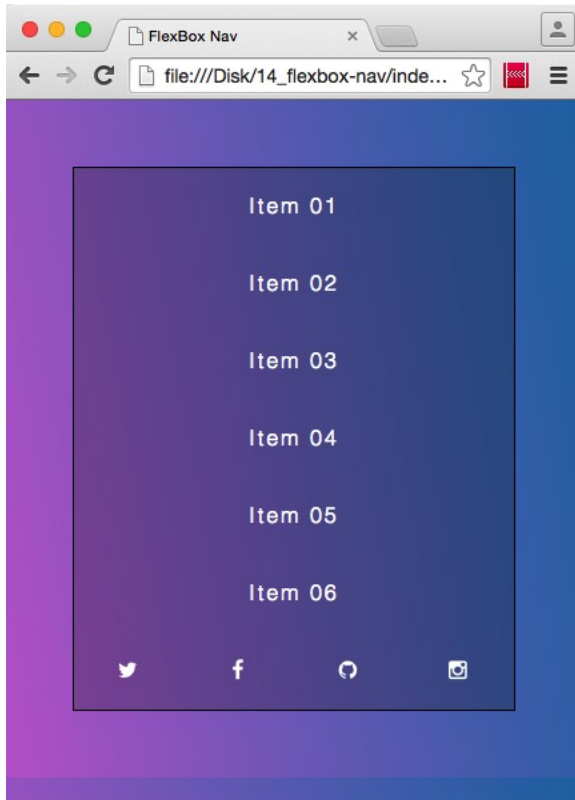


# EXAMPLE: NAVIGATION

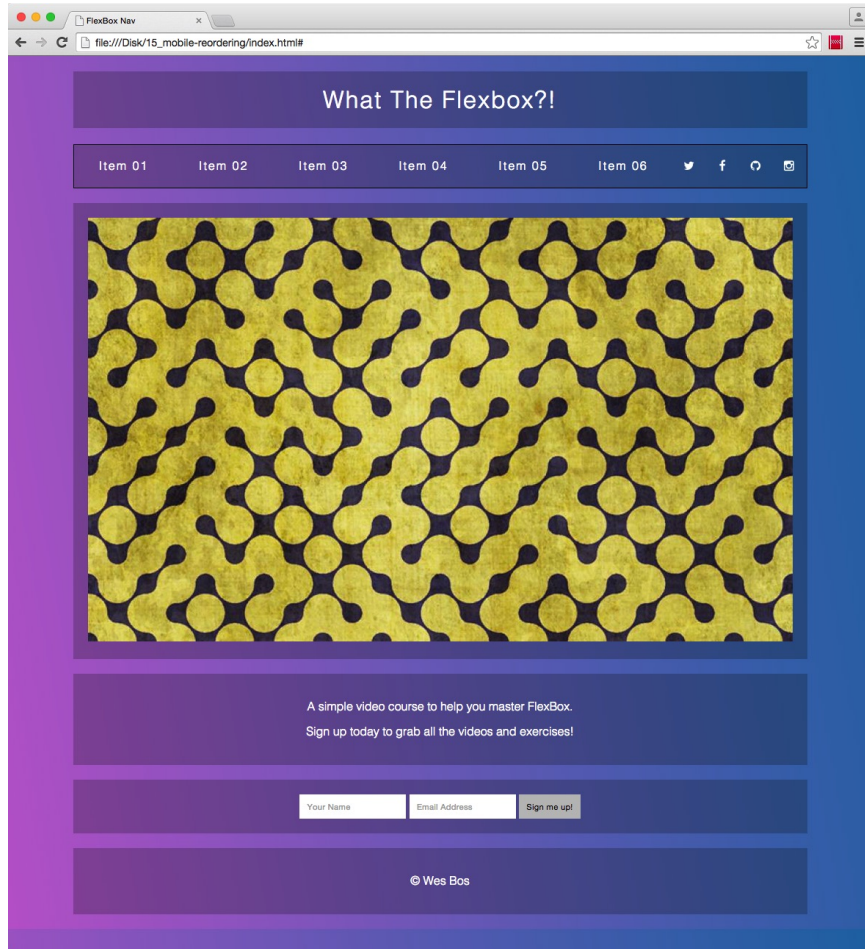


↓ more ↓

# EXAMPLE: NAVIGATION



# EXAMPLE: MOBILE REORDERING



# EXAMPLE: MOBILE REORDERING

---

```
<body>
  <div class="wrapper">
    <header class="top">...</header>
    <nav class="flex-nav">...</nav>
    <section class="hero">...</section>
    <section class="details">...</section>
    <section class="signup">...</section>
    <footer>...</footer>
  </div>
  <script>...</script>
</body>
```

---

## EXAMPLE: MOBILE REORDERING

- On small mobile devices
  - the navigation should be on top of the screen
  - it should also be replaced by a toggle button
  - the details and signup areas should be moved up
- All this is easy with flexbox
- For re-ordering, the outer div must be *flex*

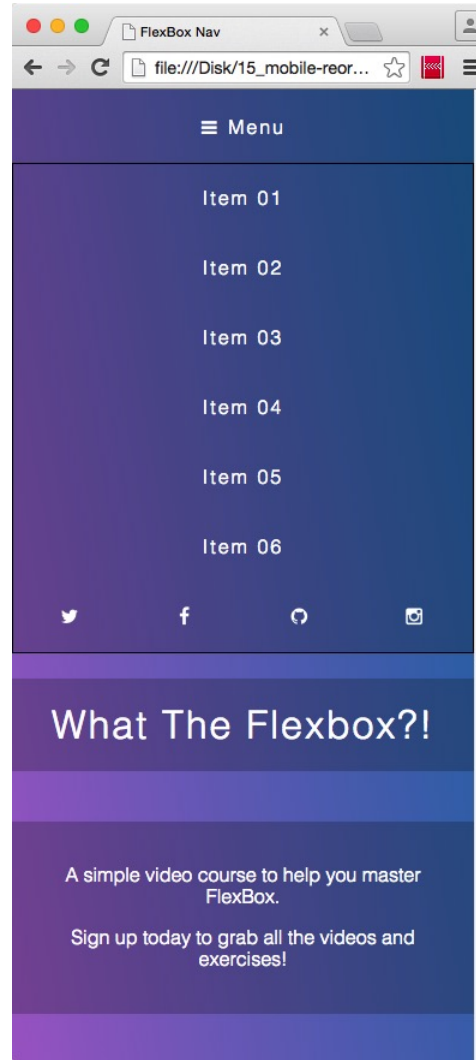
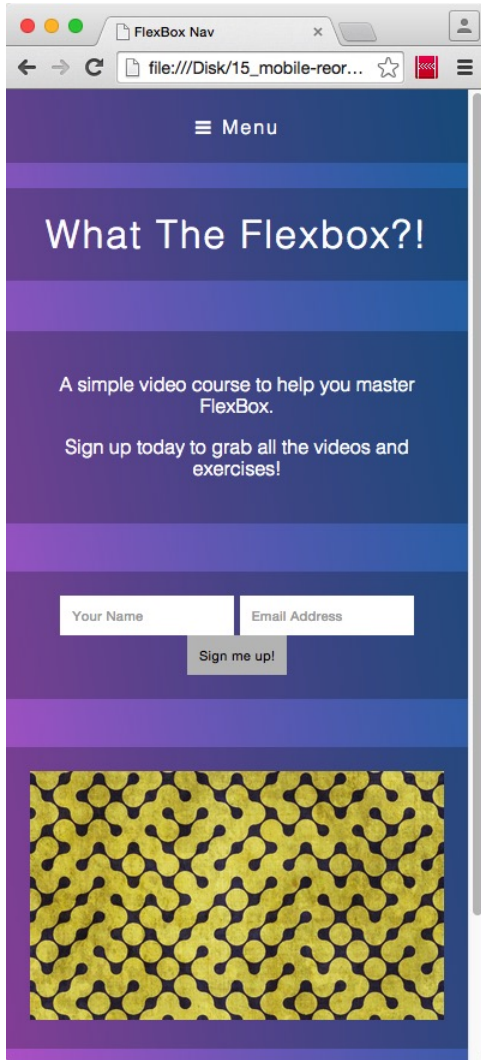
# EXAMPLE: MOBILE REORDERING

```
@media all and (max-width:500px) {  
  .wrapper {  
    display: flex;  
    flex-direction: column;  
  }  
  .wrapper > * {  
    order: 9999;  
  }  
  .flex-nav { order: 1;  
  }  
  .toggleNav {  
    display: block;  
  }  
  .flex-nav ul {  
    display: none;  
  }  
  .flex-nav ul.open {  
    display: flex;  
  }  
  .top { order: 2; }  
  .details { order: 3; }  
  .signup { order: 4; }  
}
```

---

↓ preview ↓

# EXAMPLE: MOBILE REORDERING



# MOBILE APP LAYOUT

```
<div class="app-wrap">
  <header class="app-header">
    <a class="button">...</a>
    <h1>FlexBox App Layout</h1>
    <a class="button">...</a>
  </header>

  <div class="content">
    <p>...</p><p>...</p><img><p>...</p>
  </div>

  <div class="icon-bar">
    <a><i class="fa fa-home"></i>Home</a>
    <a><i class="fa fa-bell"></i>Notifications</a>
    <a><i class="fa fa-envelope"></i>Messages</a>
    <a><i class="fa fa-user"></i>Me</a>
  </div>
</div>
```

---

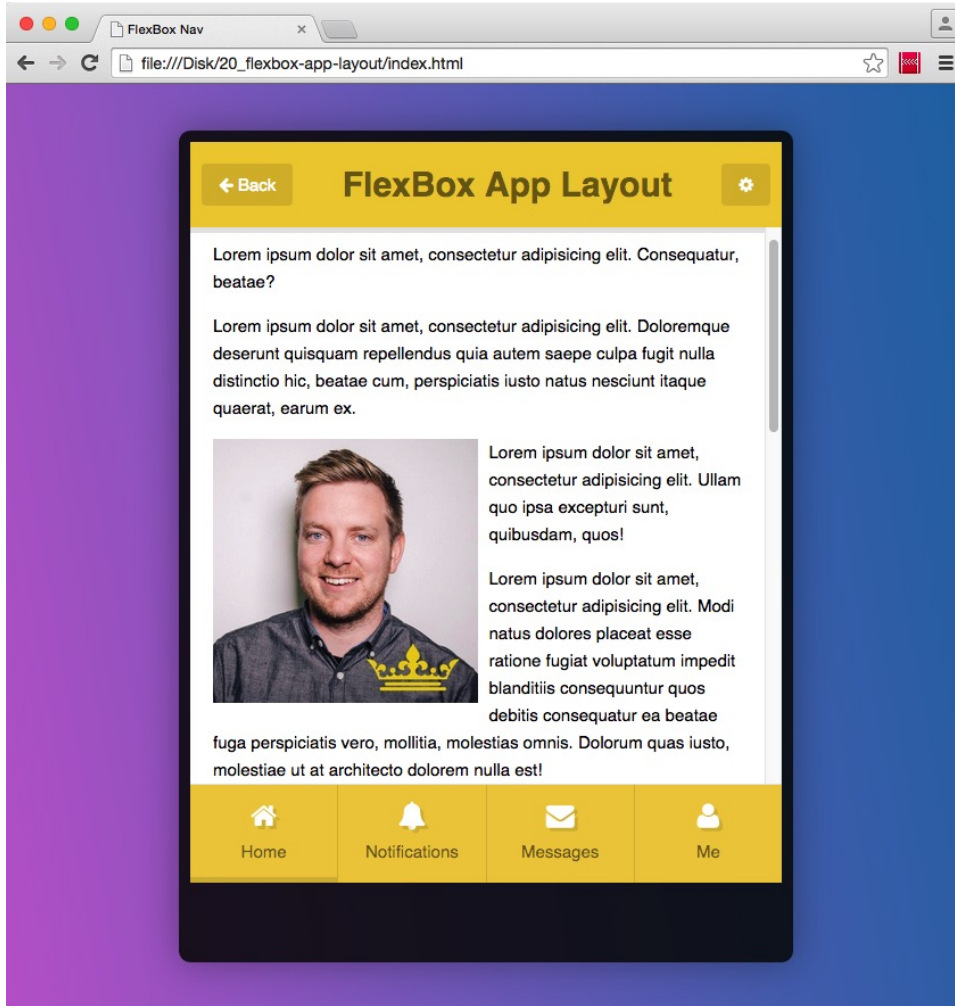


# MOBILE APP LAYOUT

```
.app-wrap {  
  display:flex;  
  flex-direction:column;  
}  
.app-wrap > * {  
  flex:1 1 auto;  
}  
.app-header {  
  display:flex;  
  align-items:center;  
  justify-content:space-between;  
}  
.content {  
  overflow-y:scroll;  
  -webkit-overflow-scrolling:touch;  
}  
.icon-bar {  
  display:flex;  
}  
.icon-bar a {  
  flex:1;  
}
```

↓ preview ↓

# MOBILE APP LAYOUT



# FLEXBOX COMPATIBILITY

- Flexbox changed over time
  - [CSS Tricks: Old Flexbox and New Flexbox](#)
  - [Mozilla Developer Network: flex-basis](#)
- Some browsers (Safari < 9) need vendor prefixes
- Use an autoprefixer
  - Try: [autoprefixer.github.io](https://autoprefixer.github.io)
- Make this part of your build procedure
  - Use Grunt, Gulp, CodeKit, or similar tool

# **JAVASCRIPT: ES6**

# ECMA-262 6TH EDITION

Also called:

- ECMAScript 6
- ES6
- ECMAScript 2015
- JavaScript 2015

# ECMAScript 2015

- Major improvement (?) over ES5
- Language spec has almost 600 pages (ES 5.1: 245)
- Much needed features such as modules and classes
- Useful features like Maps, Sets, Promises or Generators
- Work has started on ECMAScript 2016

# GOALS FOR ECMASCRIPT 2015

Among others: make JavaScript better ...

- for complex applications
- for libraries (including the DOM)
- as a target of code generators

# HOW TO UPGRADE A WEB LANGUAGE?

## JavaScript engines

- New versions = forced upgrades
- Must run all existing code
- Consequence: ES6 only adds features

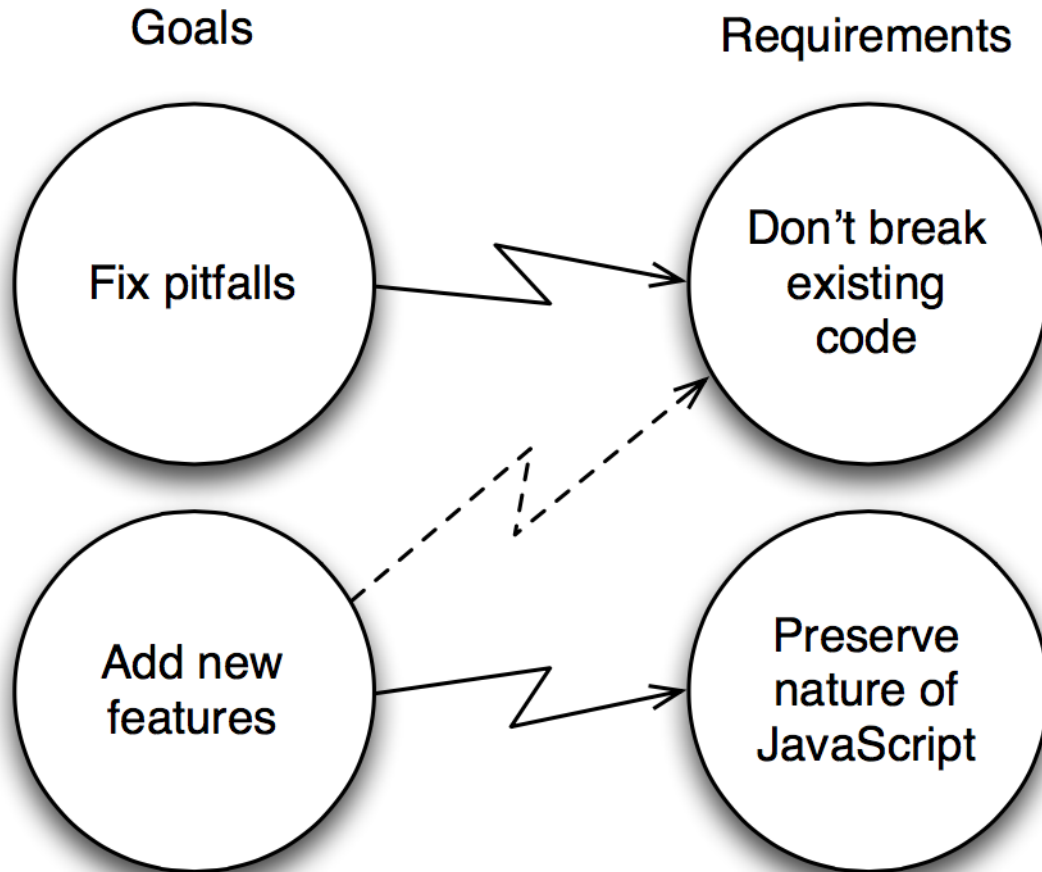
## JavaScript code

- Must run on all engines that are in use
- Consequence: wait or compile ECMAScript 6 to ES5

↓ more ↓



# GOALS AND REQUIREMENTS



# ECMAScript 2015

- These slides only cover a small selection of features
- Consult the link list at the end of the slides for more

# BASICS

- Better unicode support
- New string methods
- Block bindings
- Destructuring assignment
- Numbers
- Other basics

# LET DECLARATIONS

- Block level scope

Example:

```
for (var i=0; i < items.length; i++) {  
    process(items[i]);  
}  
// i is still accessible here and is equal to items.length  
  
for (let m=0; m < items.length; m++) {  
    process(items[m]);  
}  
// m is not accessible here
```

---

# CONSTANT DECLARATIONS

- Declaration of constants
- Value cannot be changed once set
- Every *const* variable must be initialized
- Constants are block-level declarations, similar to let

Example:

```
// Valid constant  
const MAX_ITEMS = 30;
```

---

# DESTRUCTURING ASSIGNMENT

```
var options = {  
    repeat: true,  
    save: false  
};  
  
// later  
  
var { repeat: localRepeat, save: localSave } = options;  
  
console.log(localRepeat);    // true  
console.log(localSave);     // false
```

---

- Object destructuring
- Array and mixed destructuring

# FUNCTIONS

- Default parameters
- Rest parameters
- Destructured parameters
- The spread operator
- Arrow functions
- Syntax

# DEFAULT PARAMETERS

---

// ES5

```
function makeRequest(url, timeout, callback) {  
  timeout = timeout || 2000;  
  callback = callback || function() {};  
  // the rest of the function  
}
```

// ES6

```
function makeRequest(url, timeout = 2000, callback = function() {})  
  // the rest of the function  
}
```

---



# REST PARAMETERS

- Indicated by three dots (...)
- Named parameter becomes an array containing the rest of the parameters
- No other named arguments can follow

Example:

---

```
function sum(first, ...numbers) {  
    let result = first,  
        i = 0,  
        len = numbers.length;  
    while (i < len) {  
        result += numbers[i];  
        i++;  
    }  
    return result;  
}
```

# DESTRUCTURED PARAMETERS

```
// pre ES6
function setCookie(name, value, options) {
  options = options || {};
  var secure = options.secure,
      path = options.path,
      domain = options.domain,
      expires = options.expires;
  // ...
}

// ES6
function setCookie(name, value, { secure, path, domain, expires }) {
  // ...
}
```

---

# THE SPREAD OPERATOR

---

```
var values = [25, 50, 75, 100];  
  
console.log(Math.max.apply(Math, values)); // pre ES6  
console.log(Math.max(...values));         // ES6
```

---

# ARROW FUNCTIONS

- Arrow functions are defined with a new syntax that uses an “arrow” ( $\Rightarrow$ )
- The value of `this` inside of the function is determined by where the arrow function is defined not where it is used
- Cannot be used as constructors (with `new`)
- Can't change *this*
- No arguments object

# ARROW FUNCTIONS

---

```
// ES6  
var sum = (num1, num2) => num1 + num2;
```

```
// pre ES6  
var sum = function(num1, num2) {  
    return num1 + num2;  
};
```

```
// ES6  
var doNothing = () => {};
```

```
// pre ES6  
var doNothing = function() {};
```

---

# ARROW FUNCTIONS

```
let arr = [1, 2, 3];  
let squ;  
  
squ = arr.map(function (a) {return a * a});  
squ = arr.map(a => a * a);
```

---

# SYMBOLS

A new kind of primitive value – unique IDs:

---

```
let sym = Symbol();  
console.log(typeof sym) // 'symbol'
```

---

# SYMBOLS: ENUM-STYLE VALUES

```
const COLOR_RED = Symbol();
const COLOR_ORANGE = Symbol();
...

function getComplement(color) {
  switch (color) {
    case COLOR_RED:
      return COLOR_GREEN;
    case COLOR_ORANGE:
      return COLOR_BLUE; ...
    default:
      throw new Exception('Unknown color: '+color);
  }
}
```

---



# OBJECTS

- Object Literal Extensions
- Property value shorthands
- Computed property keys
- Other new features

# OBJECTS: METHOD DEFINITIONS

```
let obj = {  
  myMethod() {  
    ...  
  }  
};
```

// instead of:

```
var obj = {  
  myMethod: function () {  
    ...  
  }  
};
```

---

# OTHER OBJECT FEATURES

- Object Categories
- Object.assign() (similar to jQuery extend)
- Duplicate Object Literal Properties
- Changing Prototypes
- Super References
- Reflection Methods

# CLASSES

- Class Declarations
- Subclassing

# CLASS DECLARATIONS

```
class Point {  
    constructor(x, y) {  
        this.x = x;  
        this.y = y;  
    }  
    toString() {  
        return '('+this.x+', '+this.y+')';  
    }  
}
```

# SUBCLASSING

```
class ColorPoint extends Point {  
    constructor(x, y, color) {  
        super(x, y);  
        this.color = color;  
    }  
    toString() {  
        return this.color+' '+super.toString();  
    }  
}
```

---

# OTHER CLASS FEATURES

- Class expressions
- Accessor properties
- Static members
- `new.target`

# MODULES

- Basic Exporting and Importing

Other features:

- Exporting and Importing Defaults
- Re-exporting
- Importing Without Bindings



# MODULES: BASICS

---

```
// lib/math.js
let notExported = 'abc';
export function square(x) {
    return x * x;
}
export const MY_CONSTANT = 123;
```

```
// main1.js
import {square} from 'lib/math';
console.log(square(3));
```

```
// main2.js
import * as math from 'lib/math';
console.log(math.square(3));
```

---

# TEMPLATE STRINGS

- Basic Syntax
- Multiline Strings

Other features:

- Substitutions
- Tagged Templates

# TEMPLATE STRINGS

---

```
// String interpolation
if (x > MAX) {
    throw new Error(
        `At most ${MAX} allowed: ${x}!`
        // 'At most '+MAX+' allowed: '+x+'!'
    );
}

// Multiple lines
let str = `this is
a text with
multiple lines`;
```

---

# MORE

- Collections
  - Maps
  - Sets
- Iterators
- Generators
- Promises

# COLLECTIONS: MAPS

---

```
let map = new Map();
let obj = {};

map.set(obj, 123);
console.log(map.get(obj)); // 123
console.log(map.has(obj)); // true

map.delete(obj);
console.log(map.has(obj)); // false

for (let [key,value] of map) {
    console.log(key, value);
}
```

---

# ECMAScript 6 TODAY

Compile ES6 to ES5

- Babel ([babeljs.io](http://babeljs.io))
- Google Traceur ([github.com/google/traceur-compiler](https://github.com/google/traceur-compiler))
- TypeScript ([typescriptlang.org](http://typescriptlang.org)): ECMAScript 6 plus (optional) type annotations

# **READING MATERIAL, SOURCES**

# READING MATERIAL

## Repetition of Web basics

- Learn to Code HTML & CSS, Shay Howe  
[learn.shayhowe.com/html-css/](https://learn.shayhowe.com/html-css/)
- Chapter 1 „Basic JavaScript“ of the book „Speaking JavaScript“, Axel Rauschmayer  
[speakingjs.com/es5/ch01.html](https://speakingjs.com/es5/ch01.html)
- A guide to the basics of jQuery  
[jqfundamentals.com](https://jqfundamentals.com)



# READING MATERIAL

- A Complete Guide to Flexbox, CSS-Tricks  
[css-tricks.com/snippets/css/a-guide-to-flexbox/](https://css-tricks.com/snippets/css/a-guide-to-flexbox/)
- Learn ES2015, A detailed overview of ECMAScript 6 features  
[babeljs.io/docs/learn-es2015/](https://babeljs.io/docs/learn-es2015/)

# SOURCES: FLEXBOX

- What The Flexbox?! Video Tutorial by Wes Bos  
[flexbox.io/](https://flexbox.io/)
- A Complete Guide to Flexbox, CSS-Tricks  
[css-tricks.com/snippets/css/a-guide-to-flexbox/](https://css-tricks.com/snippets/css/a-guide-to-flexbox/)
- Old Flexbox and New Flexbox, CSS Tricks  
[css-tricks.com/old-flexbox-and-new-flexbox/](https://css-tricks.com/old-flexbox-and-new-flexbox/)
- Mozilla Developer Network: Using CSS flexible boxes  
[developer.mozilla.org/en-US/docs/Web/Guide/CSS/Flexible\\_boxes](https://developer.mozilla.org/en-US/docs/Web/Guide/CSS/Flexible_boxes)
- Autoprefixer on GitHub  
[autoprefixer.github.io](https://autoprefixer.github.io)
- Mozilla Developer Network: CSS Length Units  
[developer.mozilla.org/en-US/docs/Web/CSS/length](https://developer.mozilla.org/en-US/docs/Web/CSS/length)

# SOURCES: ECMASCRIPT 6

- ECMAScript 2015 Language Specification  
[ecma-international.org/ecma-262/6.0/index.html](http://ecma-international.org/ecma-262/6.0/index.html)
- Understanding ECMAScript 6  
<https://leanpub.com/understandingses6>
- Using ECMAScript 6 today, Rolling Scopes Conference, 2015, Slides:  
[speakerdeck.com/rauschma](http://speakerdeck.com/rauschma)
- Exploring ES6: Upgrade to the next version of JavaScript, Dr. Axel Rauschmayer  
[exploringjs.com](http://exploringjs.com)
- ECMAScript compatibility table  
[kangax.github.io/compat-table/es6/](http://kangax.github.io/compat-table/es6/)
- ECMAScript 6 Features  
[github.com/lukehoban/es6features](http://github.com/lukehoban/es6features)

