

MOBA1

MOBILE WEB: STYLE AND LAYOUT

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OVERVIEW

- Fonts and Graphical Effects
- Device Adaptation: Responsive Webdesign
- Layouts: CSS Flexible Box Layout Module
- Layouts: CSS Grid Layout
- Final Remarks

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CASCADING STYLE SHEETS

From WEB1 (or WBE preparation course) you already know:

- Semantic markup
- CSS2 and CSS3 selectors
- Styling text and boxes
- Box model, positioning elements, floating boxes

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CASCADING STYLE SHEETS

- If necessary consult:
 - WEB1 slides and related material
 - WBE preparation course
<https://moodle.zhaw.ch/course/view.php?id=1007>
 - Learn to Code HTML & CSS
<https://learn.shayhowe.com/html-css/>
- You probably also know:
 - Front-end frameworks like [Foundation](#) or [Bootstrap](#)
 - CSS preprocessors like [Less](#) or [Sass](#)

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GRAPHICS AND LAYOUT

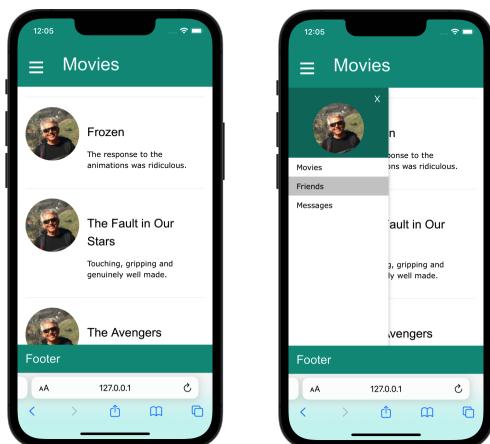
- [Graphical effects:](#)
Rounded corners, shadow effects, rotated content, animations
- [Downloadable fonts, hyphenation](#)
- [Graphics and Graphics APIs:](#)
SVG, Canvas, WebGL
- [Complex layouts:](#)
Flexbox, CSS Grid

<https://w3c.github.io/web-roadmaps/mobile/graphics.html>

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GRAPHICS AND LAYOUT



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FONTS

- Downloadable fonts:
WOFF File Format 2.0

Technologies in progress:

- CSS Font Loading: progressive availability of fonts
- [font-display](#): how to display font while loading
- Font Variation Properties

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SYSTEM FONTS

```
font-family: -apple-system, BlinkMacSystemFont,  
"Segoe UI", "Roboto", "Oxygen", "Ubuntu", "Cantarell",  
"Fira Sans", "Droid Sans", "Helvetica Neue",  
sans-serif;
```

- San Francisco in Safari on Mac OS X and iOS
- Helvetica Neue/Lucida Grande on older versions of Mac OS X
- BlinkMacSystemFont is the equivalent for Chrome on Mac OS X
- Segoe UI targets Windows and Windows Phone
- Roboto targets Android and newer Chrome OS
- ...

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SYSTEM FONTS

This should be rendered in your system's UI font. The quick brown fox jumps over the lazy dog.

[Using UI System Fonts In Web Design: A Quick Practical Guide](#)

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HYPHENS

- CSS `hyphens` property
- How words should be hyphenated when text wraps across lines
- Values: `none` | `manual` | `auto` | `inherit` | `initial` | `unset`
- Initial value: `manual`
- Language-specific: `lang` attribute

```
<p>Manual hyphens at &hyphen; or &shy; (if needed) :<br>  
An extreme&shy;ly long English word</p>
```

```
<p>Automatic hyphens where the algorithm is deciding (if needed)</p>
```

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DEVICE ADAPTATION

- Viewport-relative CSS units `vw`, `vh`, `vmin` and `vmax`
- CSS Media Queries, responsive design
- Responsive Images: `picture`, `srcset` (or: SVG)
- JS-based: Web Components

Technologies in progress:

- CSS Device Adaptation (could replace viewport meta tag)
- CSS Mobile Text Size Adjustment
- ...

<https://w3c.github.io/web-roadmaps/mobile/adaptation.html>

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RESPONSIVE, BUT...

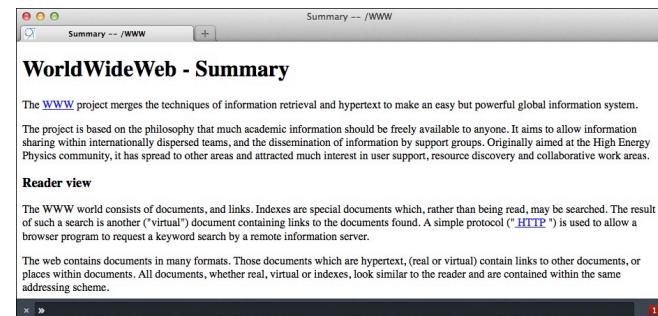


- Mobile browsers assume a page width of about 960px
- And scale the page respectively...

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WEBSITE FROM 1992 – RESPONSIVE?



<http://www.w3.org/Summary.html>

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VIEWPORT



- **Viewport:** area of the browser in which the website is displayed
- Desktop websites typically assume a viewport width of about 960px
- Less space available on smartphones, e.g. 320px width
- Scaling necessary for desktop optimized pages

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VIEWPORT

- Desktop optimized website: scaling suitable
- Mobile optimized website: scaling harmful
- Viewport statement to the rescue...

```
<meta name="viewport" content="width=320">  
<meta name="viewport" content="width=device-width">
```

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VIEWPORT

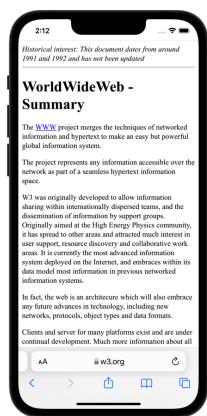
```
<meta name="viewport" content="??">
```

content value	meaning
width	viewport width
initial-scale	initial zoom factor, default: 1
minimum-scale	minimum and maximum zoom factor
maximum-scale	
user-scalable: no	user cannot scale the page

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WEBSITE FROM 1992



- With viewport statement
- Perfectly usable

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FLUID LAYOUT

- Layout and container width adjusts to viewport width
- Main container with `max-width` (or percentage)
- Other sizes in percent

```
#container {  
    max-width: 960px; /*...*/  
}  
aside {  
    width: 29.1666667%; /* 280/960x100 */  
    padding: 2.0833333%; /* 20/960x100 */  
}
```

<http://media.kulturbanause.de/blog/2013/01/fluessiges-layout.html>

<http://resources.sameerast.com/responsive-web-design-formula-easy-calculator.html>

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FLUID LAYOUT

- Images should not stick out of the surrounding container

```
img {  
    max-width: 100%;  
}
```

- But:
On small viewports the fluid layout is barely usable, too
- In that case the layout needs to be adjusted
- Tool: [CSS Media Queries](#)

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CSS MEDIA QUERIES

```
<link rel="stylesheet" media="screen and (min-width: 400px)"  
      href="large.css">
```

```
@import url(large.css) screen and (min-width: 400px);  
@media screen and (min-width: 400px) { ... }
```

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CSS MEDIA QUERIES

```
@media all and (min-width:500px) {}  
@media (min-width:500px) {}  
@media not screen and (color) {}  
@media only screen and (color) {}  
@media print and (min-width: 25cm) {}  
@media screen and (min-width: 400px) and (max-width: 700px) {}  
@media screen and (device-width: 800px) {}  
@media screen and (device-height: 600px) {}  
@media all and (orientation: portrait) {}  
@media all and (orientation: landscape) {}  
@media screen and (device-aspect-ratio: 16/9) {}  
@media print and (min-resolution: 300dpi) {}  
@media tv and (scan: progressive) {}  
@media tv and (scan: interlace) {}
```

<https://www.w3.org/TR/css3-mediaqueries/>
<https://drafts.csswg.org/mediaqueries-5/>

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RESPONSIVE WEBDESIGN

- Use media queries to adjust layout to the device's capabilities
- Example: blocks side by side if sufficient viewport width is available, one above the other otherwise

```
@media screen and (min-width: 480px) {  
    .column {  
        float: left;  
    }  
}
```

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RESPONSIVE WEBDESIGN

- Ethan Marcotte: Fluid Grids
- Ethan Marcotte: Responsive Web Design

Examples

- <https://responsivedesign.is/examples/>
- <http://2012.buildconf.com>
- <https://alistapart.github.io/code-samples/responsive-web-design/ex/ex-site-larger.html>

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WHAT IS A PIXEL?

- According to the CSS 2.1 specification px is an absolute unit:

unit	description
pt	points — the points used by CSS are equal to 1/72nd of 1in
px	pixel units — 1px is equal to 0.75pt

- But: user agent can define the actual size
- Print: based on physical units like cm
- Screen: based on a *reference pixel*

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MOBILE DISPLAY RESOLUTIONS

Device	Resolution
Typical desktop monitor	90-100 ppi
Original iPhone	164 ppi
Nexus One	266 ppi
iPhone 4	329 ppi
Google Pixel 4	441 ppi
iPhone 12 Pro	460 ppi
Samsung Galaxy Note10+	498 ppi

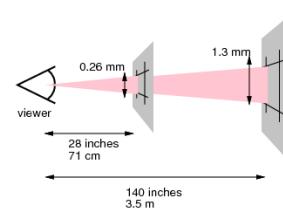
<https://www.sizescreens.com>

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REFERENCE PIXEL

The *reference pixel* is the visual angle of one pixel on a device with a pixel density of 96dpi and a distance from the reader of an arm's length.
[\(CSS 2.1 specification\)](#)



- Size of 1px based on this reference pixel
- Seems to be the same size
- Actually sizes can differ considerably

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CSS PIXEL

- Screen size of 1px is based on the reference pixel
- Units like `cm` are calculated based on this pixel size
- The actual size of a CSS `cm` on a screen may differ from the common length unit `cm`
- Example: iPhone 12 Pro, 460 ppi, 2532×1170 px
1 CSS pixel equals 3 screen pixels

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RESPONSIVE IMAGES

```
<picture>
  <source media="(min-width: 36em)"
         srcset="large.jpg 1024w, medium.jpg 640w, small.jpg 320w"
         sizes="50vw" />
  <source srcset="cropped-large.jpg 2x, cropped-small.jpg 1x" />
  
</picture>
```

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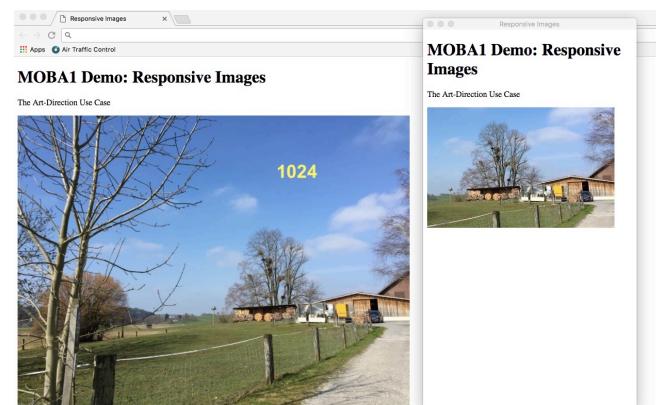
IMAGE RESOLUTION

- Example: JPEG 300x300px
- Placed on a website in a 300x300px box (CSS pixels)
- Capabilities of HD displays given away
- Options:
 - Provide image in higher resolution, scale in browser
 - Background image: provide various resolutions
 - Use scalable images (SVG, icon fonts)
 - Responsive images: `picture` and `srcset`

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RESPONSIVE IMAGES



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CSS LAYOUT: FLOAT

```
demo.html
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Layout Demo</title>
  <style>
    * {
      box-sizing: border-box;
    }

    .container > div {
      float: left;
      width: 30vw;
      min-width: 300px;
      min-height: 10vh;
      margin: 10px;
    }

    .container div: nth-child(odd) {
      background-color: #4CAF50;
      color: white;
    }

    </style>
  </head>
  <body>
    <div class="container">= 1 2
      = 3 4
      = 5 6
      = 7 8
    </div>
  </body>
</html>
```

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LAYOUT OPTIONS

- Traditional: CSS float, box model
- Or: inline-block, table-cell
- CSS Flexible Box Layout
- CSS Grid Layout
- Library/Framework (e.g., Bootstrap)

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CSS LAYOUT: INLINE-BLOCK

```
demo.html
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Layout Demo</title>
  <style>
    * {
      box-sizing: border-box;
    }

    .container > div {
      display: inline-block;
      width: 30vw;
      min-width: 300px;
      min-height: 10vh;
      margin: 10px;
    }

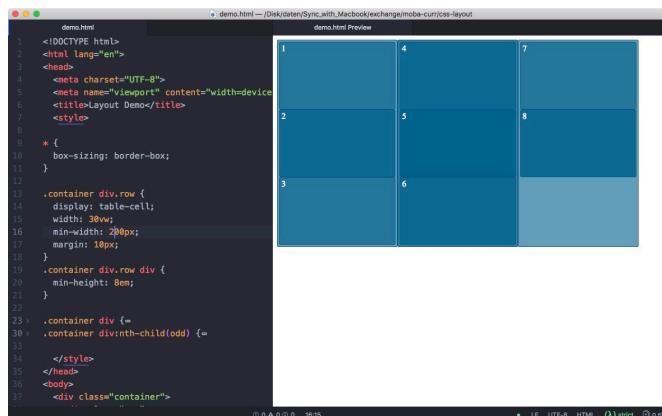
    .container div: nth-child(odd) {
      background-color: #4CAF50;
      color: white;
    }

    </style>
  </head>
  <body>
    <div class="container">= 1 2
      = 3 4
      = 5 6
      = 7 8
    </div>
  </body>
</html>
```

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CSS LAYOUT: TABLE-CELL



```
demo.html
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <meta charset="UTF-8">
5     <meta name="viewport" content="width=device-width, initial-scale=1.0">
6     <title>Layout Demo</title>
7     <style>
8       * {
9         box-sizing: border-box;
10      }
11
12     .container div.row {
13       display: table-cell;
14       width: 30px;
15       min-width: 20px;
16       margin: 10px;
17     }
18
19     .container div.row div {
20       min-height: 8em;
21     }
22
23     .container div {
24       &:nth-child(odd) {
25         background-color: #1abc9c;
26       }
27     }
28   </style>
29 </head>
30 <body>
31   <div class="container">
32     <div class="row">
33       <div>1</div>
34       <div>4</div>
35       <div>7</div>
36     </div>
37     <div class="row">
38       <div>2</div>
39       <div>5</div>
40       <div>8</div>
41     </div>
42     <div class="row">
43       <div>3</div>
44       <div>6</div>
45     </div>
46   </div>
47 </body>
48 </html>
```

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CSS FLEXBOX

- Efficiently 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
- Overall good support in current browsers

CSS Flexible Box Layout Module Level 1

Caniuse: Flexbox

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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; }
...

```

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39.1

EXAMPLE



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39.2

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 that results in an inline element:
`display: inline-flex`

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EXAMPLE: FLEX CONTAINER

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

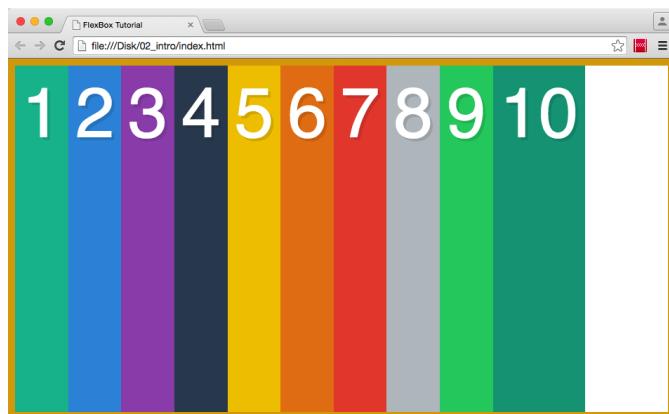
- 100vh – what's that ??
- It's the viewport height

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41-1

EXAMPLE: FLEX CONTAINER



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41-2

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

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FLEX DIRECTION

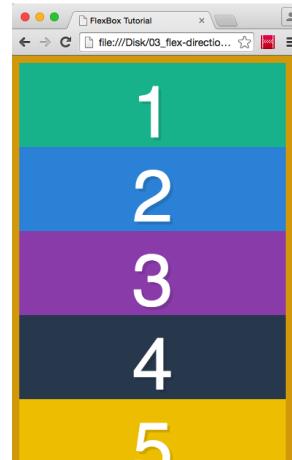
```
.container {  
  display: flex;  
  border: 10px solid goldenrod;  
  min-height: 100vh;  
  flex-direction: column;  
}
```

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FLEX DIRECTION



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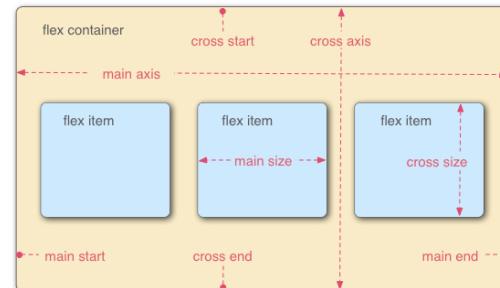
FLEX DIRECTION

- CSS attribute: `flex-direction`
- Possible values: `row` (Default)
`row-reverse` | `column` | `column-reverse`
- Terminology:
 - Main direction (sometimes called the flow direction)
 - Main start and main end
 - Cross direction
 - Cross start and cross end

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FLEX DIRECTION



(Source: [MDN](#))

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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 */  
}
```

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FLEXBOX ORDERING

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



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FLEXBOX ORDERING

- Flex items can be re-ordered with the `order` property
- Markup contents based on logical criteria and re-order as needed for various screen sizes
- Problems likely when selecting text over multiple items
- Initial value: 0

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FLEXBOX ALIGNMENT

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



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FLEXBOX ALIGNMENT

- Property: `justify-content`
- Defines the alignment along the *main axis*
- Possible values: `flex-start` (Default)
`flex-end` | `center` | `space-between` | `space-around`

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FLEXBOX ALIGNMENT

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

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FLEXBOX ALIGNMENT

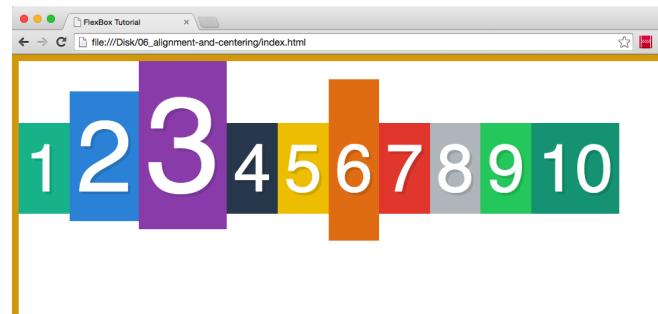
```
.container {  
  display: flex;  
  border: 10px solid goldenrod;  
  min-height: 100vh;  
  align-items: baseline;  
}  
.box2 {  
  font-size: 150px;  
}  
.box3 {  
  font-size: 200px;  
}  
.box6 {  
  padding-bottom: 50px;  
  padding-top: 75px;  
}
```

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FLEXBOX ALIGNMENT



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FLEXBOX ALIGNMENT

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

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FLEXBOX ALIGNMENT

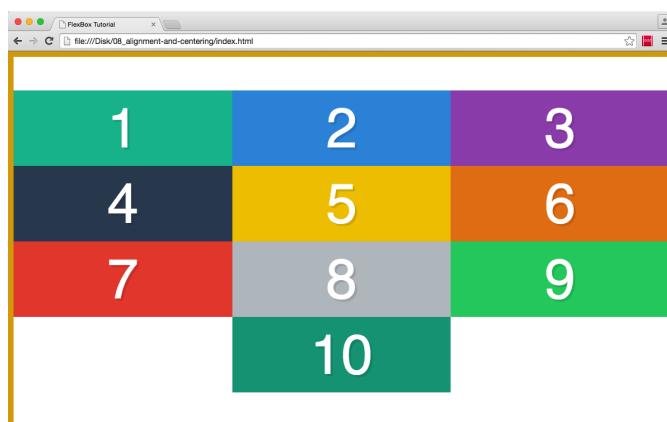
```
.container {  
    display: flex;  
    border: 10px solid goldenrod;  
    min-height: 100vh;  
    flex-wrap: wrap;  
    justify-content: center;  
    align-content: center;  
}  
.box {  
    width: 33.33333%;  
}
```

↓ preview ↓

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54.1

FLEXBOX ALIGNMENT



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FLEXBOX SELF ALIGNMENT

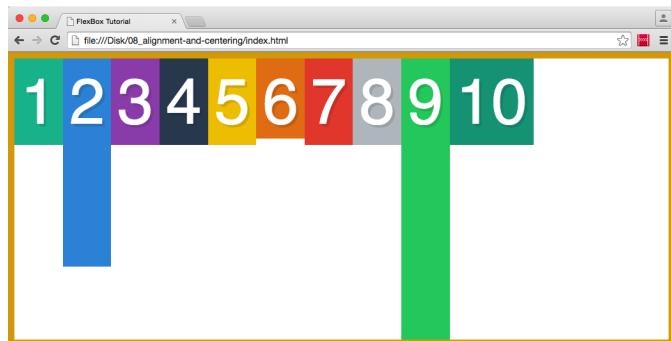
```
.container {  
    display: flex;  
    border: 10px solid goldenrod;  
    min-height: 100vh;  
    align-items: flex-start;  
}  
.box2 {  
    padding-bottom: 200px;  
}  
.box6 {  
    padding-bottom: 0;  
}  
.box9 {  
    padding-bottom: 50px;  
    align-self: stretch;  
}
```

↓ preview ↓

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55.1

FLEXBOX SELF ALIGNMENT



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55.2

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>

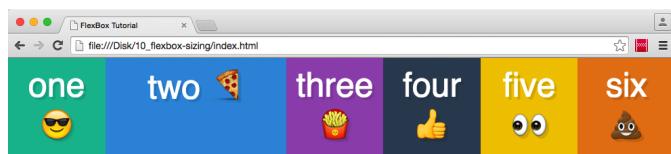
/* CSS */
.container {
  display: flex;
}
.box { /*...*/
  flex: 1;
}
.box2 {
  flex: 2;
}
```

↓ preview ↓

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56.1

FLEXBOX SIZING



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56.2

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

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PROPERTY FLEX

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

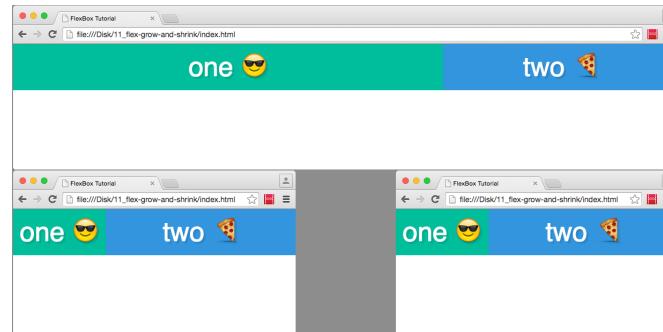
- Shorthand for these properties combined:
`flex-grow`, `flex-shrink`, `flex-basis`
- Second and third parameters are optional
- Default: `0 1 auto`

↓ preview ↓

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58 .1

GROW AND SHRINK FLEX ITEMS



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58 .2

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>
```

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RESIZING COMBINED WITH WRAPPING

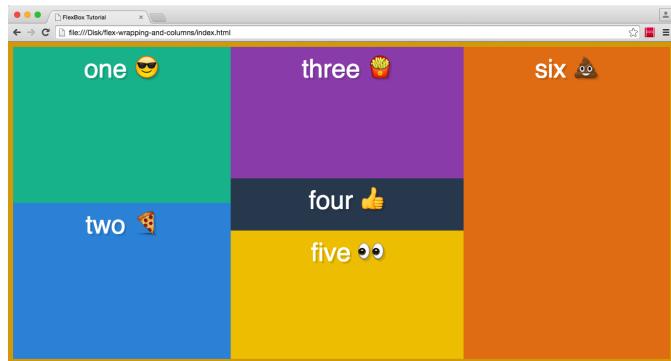
```
.container {  
  display: flex;  
  flex-wrap: wrap;  
  flex-direction: column;  
  border: 10px solid goldenrod;  
  height: 100vh;  
}  
.box {  
  flex-basis: 250px;  
  flex-grow: 1;  
}  
.box3 {  
  flex-grow: 5;  
}  
.box4 {  
  flex-basis: 100px;  
}
```

↓ preview ↓

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59 .1

RESIZING COMBINED WITH WRAPPING



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60_2

EXAMPLE: NAVIGATION

HTML

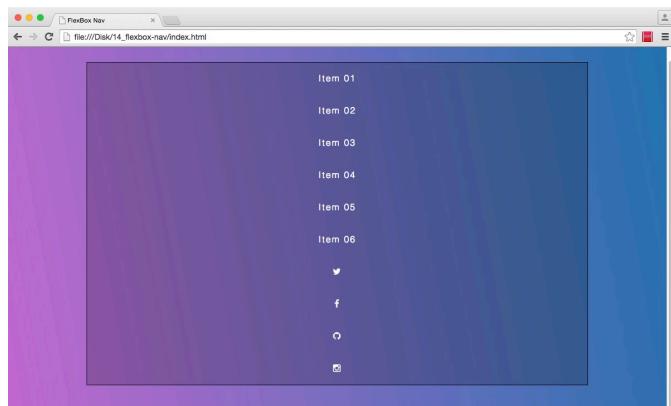
```
<nav class="flex-nav">
  <ul>
    <li><a href="#">Item 01</a></li>
    <li><a href="#">Item 02</a></li>
    ...
    <li class="social">
      <a href="http://twitter.com/wesbos"><i class="fa fa-twitter"></i></a>
    </li>
    ...
  </ul>
</nav>
```

↓ with a little bit of styling not shown here ↓

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61_1

EXAMPLE: NAVIGATION



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61_2

EXAMPLE: NAVIGATION

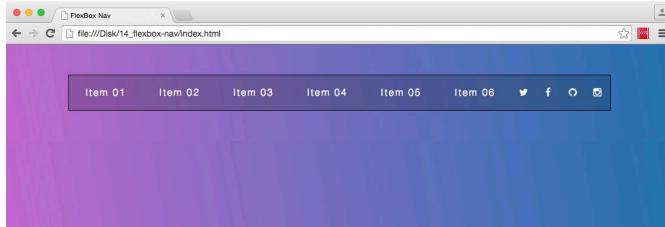
```
.flex-nav ul {
  border: 1px solid black;
  list-style: none;
  margin: 0;
  padding: 0;
  display: flex;
}
.flex-nav li {
  flex: 3;
}
.flex-nav .social {
  flex: 1;
}
```

↓ preview ↓

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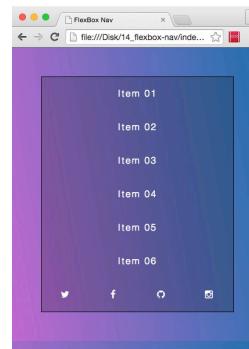
62_1

EXAMPLE: NAVIGATION



↓ media queries for smaller screens ↓

EXAMPLE: NAVIGATION



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62.2

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62.3

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>
```

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EXAMPLE: MOBILE REORDERING

- On small mobile devices
 - the navigation should be on top of the screen
 - it could 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*

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MOBILE APP LAYOUT

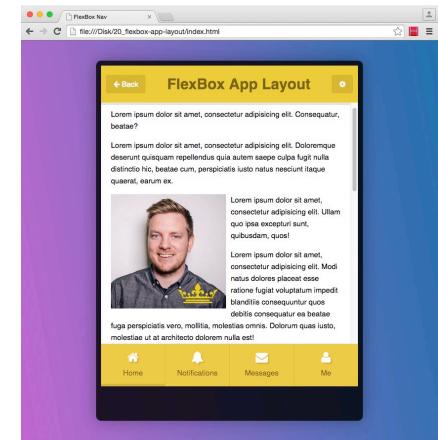
```
<div class="app-wrap">
  <header class="app-header">
    <a class="button">...</a>
    <h1>FlexBox App Layout</h1>
    <a class="button">...</a>
  </header>
  <div class="content">
    <p>...</p><p>...</p><img><p>...</p>
  </div>
  <div class="icon-bar">
    <a><i class="fa fa-home"></i>Home</a>
    <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>
```

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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;
}
```



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BOOTSTRAP

- Popular front-end component library
- Responsive grid system
- Prebuilt components and plugins
- Sass variables and mixins
- Grid system built with FlexBox

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BOOTSTRAP GRID

```
<div class="container">
  <div class="row">
    <div class="col-12 col-md-8".col-12 .col-md-8</div>
    <div class="col-6 col-md-4".col-6 .col-md-4</div>
  </div>
</div>
```



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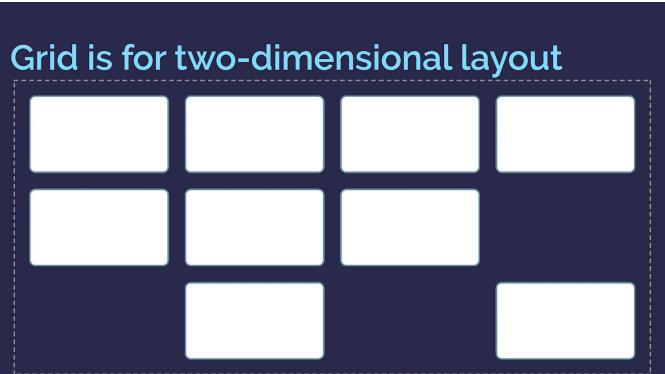
OVERVIEW

- Fonts and Graphical Effects
- Device Adaptation: Responsive Webdesign
- Layouts: CSS Flexible Box Layout Module
- **Layouts: CSS Grid Layout**
- Final Remarks

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GRID

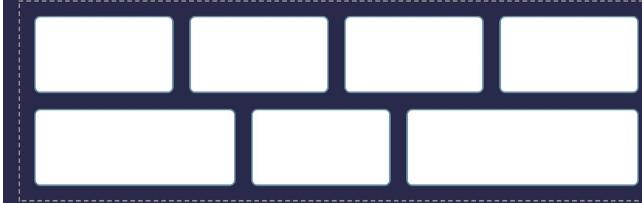


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FLEXBOX

Flexbox is for one-dimensional layout



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DEFINING A GRID

A screenshot of a code editor showing a file named "01-grid-define.html". The code defines a grid with 8 items (1-8) arranged in a 3x3 grid with some items spanning multiple cells. The preview shows the visual representation of the grid.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Grid Layout Demo</title>
    <style>
      * { box-sizing: border-box; }

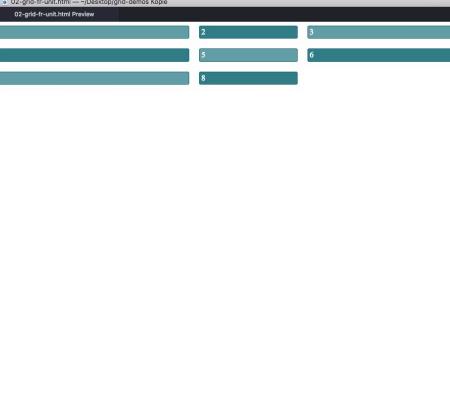
      .grid {
        display: grid;
        grid-template-columns: 200px 200px 200px;
        grid-template-rows: 200px 180px;
        grid-auto-rows: 100px;
        grid-gap: 20px;
      }

      .grid div {
        grid-column: 1;
        grid-row: 1;
      }
    </style>
  </head>
  <body>
    <div class="grid">
      <div></div>
      <div></div>
      <div></div>
      <div></div>
      <div></div>
      <div></div>
      <div></div>
      <div></div>
    </div>
  </body>
</html>
```

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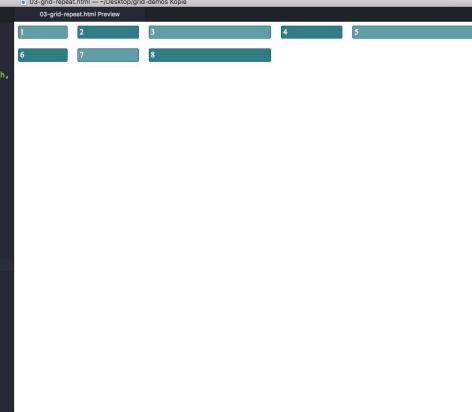
THE FR UNIT



```
01-grid-define.html | 02-grid-fr-unit.html
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Grid Layout Demo</title>
</head>
<body>
<div class="grid">
</div>
</body>
</html>
```

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REPEAT NOTATION



```
01-grid-define.html | 03-grid-repeat.html
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Grid Layout Demo</title>
</head>
<body>
<div class="grid">
</div>
</body>
</html>
```

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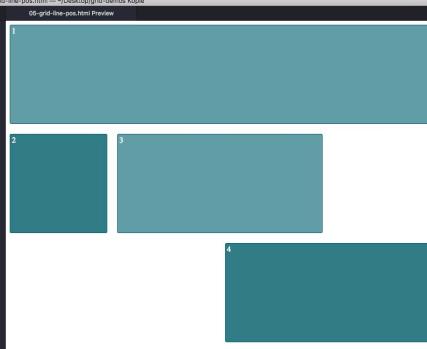
AUTO-PLACEMENT AND ORDER



```
01-grid-define.html | 04-grid-order.html
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Grid Layout Demo</title>
</head>
<body>
<div class="grid">
</div>
</body>
</html>
```

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LINE-BASED PLACEMENT



```
01-grid-define.html | 05-grid-line-pos.html
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Grid Layout Demo</title>
</head>
<body>
<div class="grid">
</div>
</body>
</html>
```

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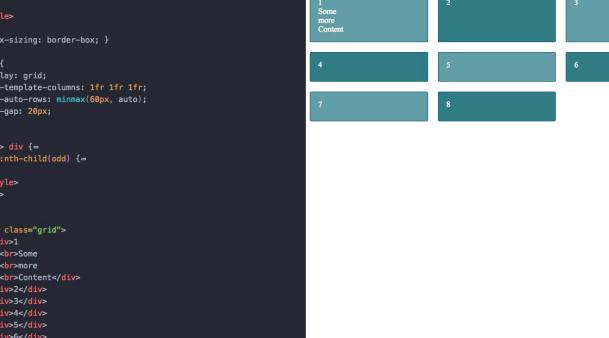
GRID TEMPLATE AREAS

```
06-grid-template-areas.html 06-grid-template-areas.html Preview
<style>
  > .grid {
    >   display: grid;
    >   grid-gap: 20px;
    >   grid-template-areas:
    >     "hd"
    >     "main"
    >     "sidebar"
    >     "ft"
    >   }
    >
    > @media (min-width: 640px) {
    >   .grid {
    >     grid-template-columns: 2fr 4fr;
    >     grid-template-areas:
    >       "hd" "hd"
    >       "sidebar" "main"
    >       "sidebar" "ft"
    >   }
    >
    >   .grid > * {
    >     grid-area: <span>
    >   }
  </style>
  > <header>Header</header>
  > <aside>Aside</aside>
  > <article><h2>Article</h2><p>Content would go here</p></article>
  > <aside>Footer</aside>
```

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INTRODUCING MINMAX()



The screenshot shows a browser window with two tabs. The left tab is titled '07-grid-minmax.html' and contains the following CSS code:

```
07-grid-minmax.html
<title>Grid Layout Demo</title>
<style>
* { box-sizing: border-box; }

.grid {
  display: grid;
  grid-template-columns: 1fr 1fr 1fr;
  grid-auto-rows: minmax(60px, auto);
  grid-gap: 20px;
}

.grid > div {
  grid:nth-child(odd) {
    </style>
  }
</head>
<body>

<div class="grid">
<div>
<div>One</div>
<div>Two</div>
<div>Three</div>
<div>Content</div>
<div>Four</div>
<div>Five</div>
<div>Six</div>
<div>Seven</div>
<div>Eight</div>
</div>

```

The right tab is titled '07-grid-minmax.html Preview' and shows a 2x4 grid of 8 items. Item 1 contains the text 'Some more Content'.

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INTRODUCING AUTO-FILL AND AUTO-FIT

```
08-grid-auto-fit.html 08-grid-auto-fit.html — Desktopgrid-items Kopie  
08-grid-auto-fit.html Preview  
  
1 2 3 4 5 6 7 8  
  
<style>  
* { box-sizing: border-box; }  
.grid {  
display: grid;  
grid-template-columns: repeat(auto-fit, minmax(50px, 1fr));  
grid-template-columns: repeat(auto-fit, minmax(50px, 1fr));  
grid-gap: 20px;  
}  
  
.grid > div {  
grid-column: odd; /*>  
grid-column: 1; /*>  
}</style>  
</head>  
<body>  
  
<div class="grid">  
<div></div>  
<div></div>  
<div></div>  
<div></div>  
<div></div>  
<div></div>  
<div></div>  
<div></div>  
<div></div>  
</div>  
</body>  
</html>
```

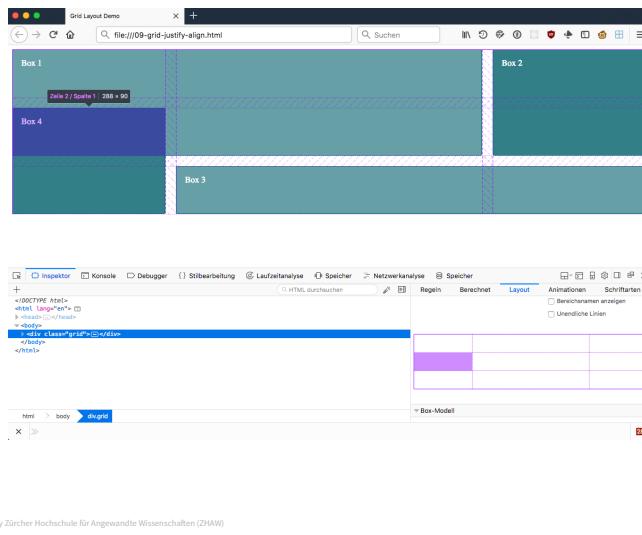
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ALIGNING AND JUSTIFYING GRID ITEMS

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FIREFOX GRID INSPECTOR

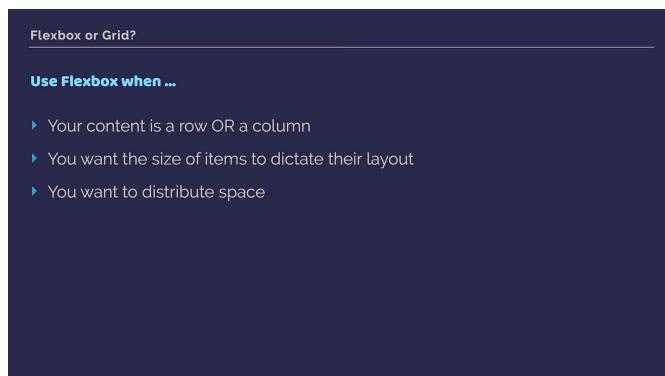


OVERVIEW

- Fonts and Graphical Effects
- Device Adaptation: Responsive Webdesign
- Layouts: CSS Flexible Box Layout Module
- Layouts: CSS Grid Layout
- Final Remarks

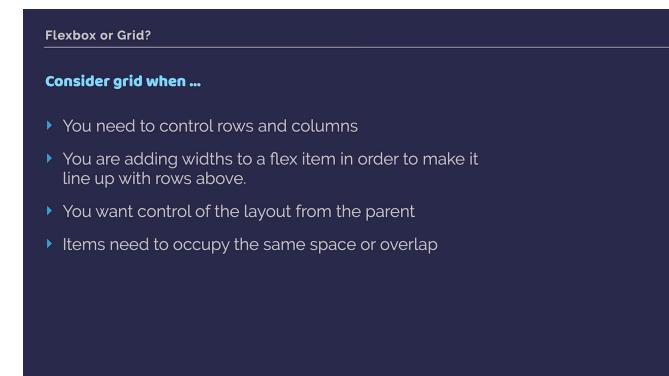
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CONSIDER FLEXBOX



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CONSIDER GRID



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GRID AND OLD BROWSERS

What about old browsers?

If using display: grid on a container, child items:

- ▶ Using float, lose their float behaviour
- ▶ The vertical-align property has no effect
- ▶ Flex items become grid items
- ▶ Items set to display: block or inline-block become grid items
- ▶ Items set to display: table-cell stop creating anonymous boxes

GRID FEATURE QUERIES

Using feature queries

Add a margin for flex layout, remove it if we are using grid layout.

```
.listing > * {  
  flex: 1 1 30%;  
  margin: 0 20px 20px 20px;  
}  
  
@supports(display: grid) {  
  .listing > * {  
    margin: 0;  
  }  
}
```

READING MATERIAL, SOURCES

READING MATERIAL

- A Complete Guide to Flexbox, CSS-Tricks
css-tricks.com/snippets/css/a-guide-to-flexbox/
- A Complete Guide to Grid, CSS-Tricks
css-tricks.com/snippets/css/complete-guide-grid/

SOURCES: FLEXBOX

- What The Flexbox?! Video Tutorial by Wes Bos
flexbox.io/
- Mozilla Developer Network: Using CSS flexible boxes
developer.mozilla.org/en-US/docs/Web/Guide/CSS/Flexible_boxes
- Mozilla Developer Network: CSS Length Units
developer.mozilla.org/en-US/docs/Web/CSS/length
- Flexbox Froggy – A Game For Learning Flexbox
flexboxfroggy.com

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SOURCES: GRID

- Get Started with Grid Layout (Videos)
gridbyexample.com/learn/
- SmashingConf San Francisco 2017 - Rachel Andrew on Laying Out The Future With Grid And Flexbox
vimeo.com/215091807
- Grid Garden – A Game For Learning Grid
cssgridgarden.com

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