JEN KRAMER • HARVARD UNIVERSITY EXTENSION SCHOOL
@JEN4WEB

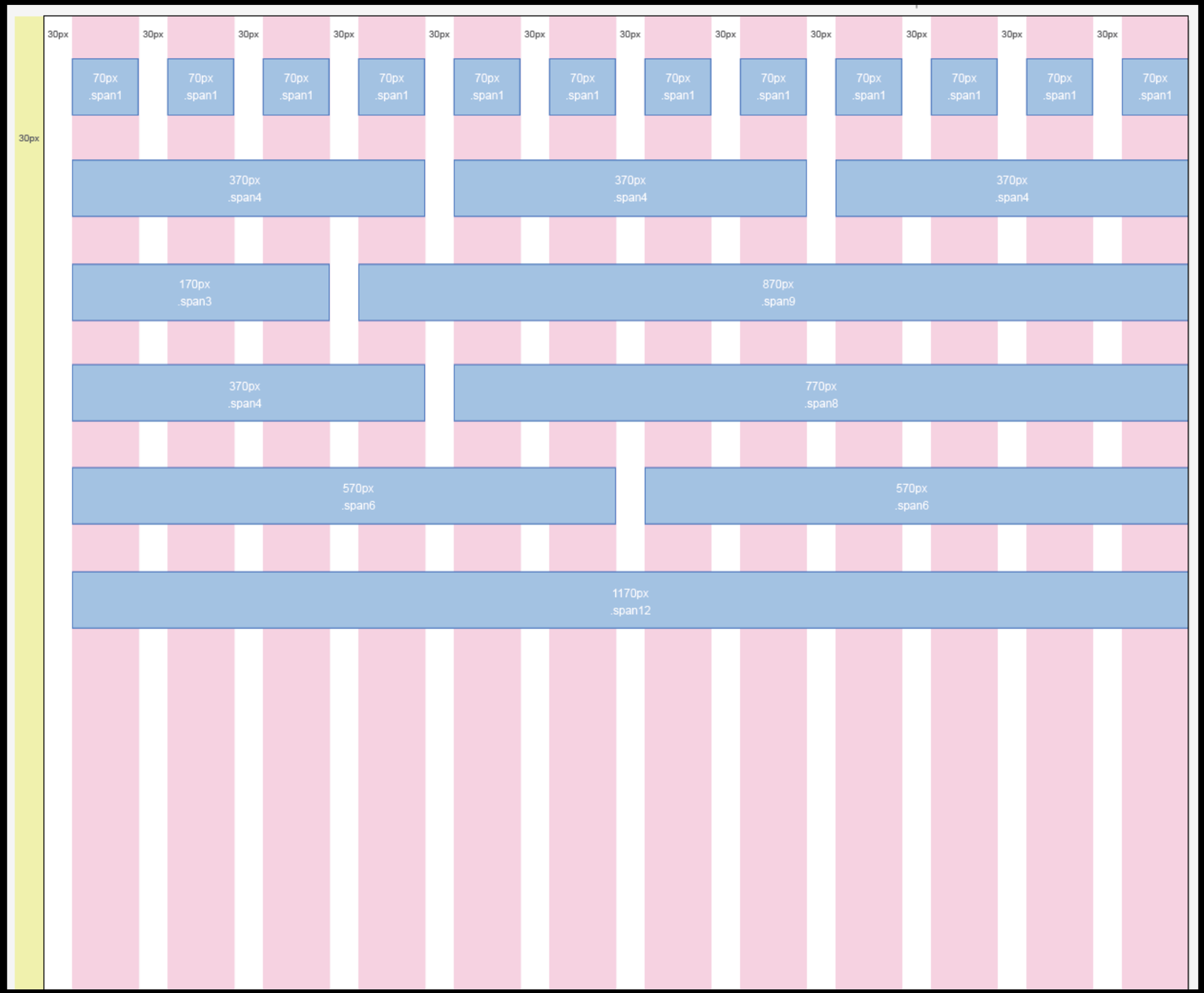
RESPONSIVE WEB DESIGN WITH FLEXBOX AND CSS GRID

DAY 1: FLEXBOX

RESPONSIVE DESIGN

- Defined by three characteristics
  - Flexible grid-based layout
  - Media queries (CSS3)
  - Images that resize
- www.alistapart.com/articles/responsive-web-design/

GRID-BASED LAYOUT

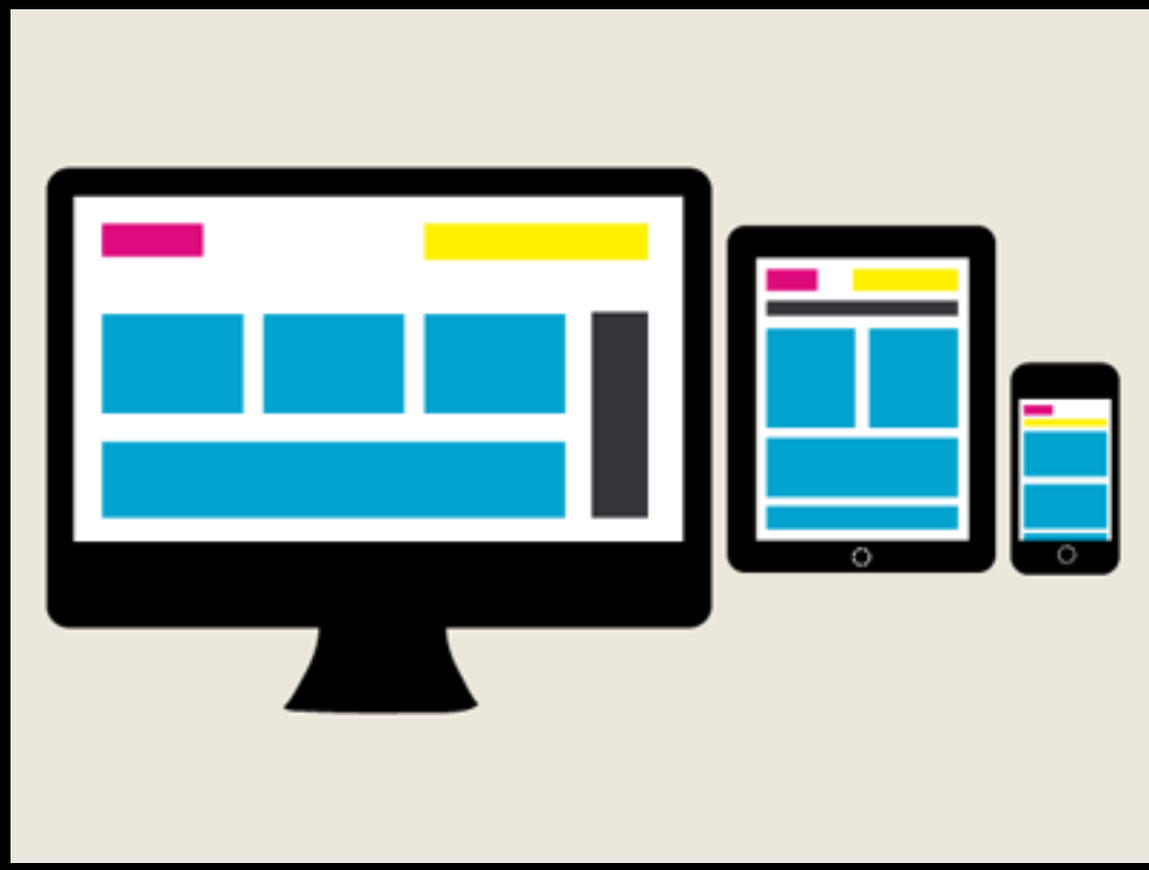


IMAGES THAT RESIZE

- Images should change size, based on screen resolution
- Solutions available client side and server side, including new <picture> tag

CSS3 MEDIA QUERIES

- Browser reports screen resolution
- Based on current width, serve a stylesheet with layout for that width
- No JavaScript involved

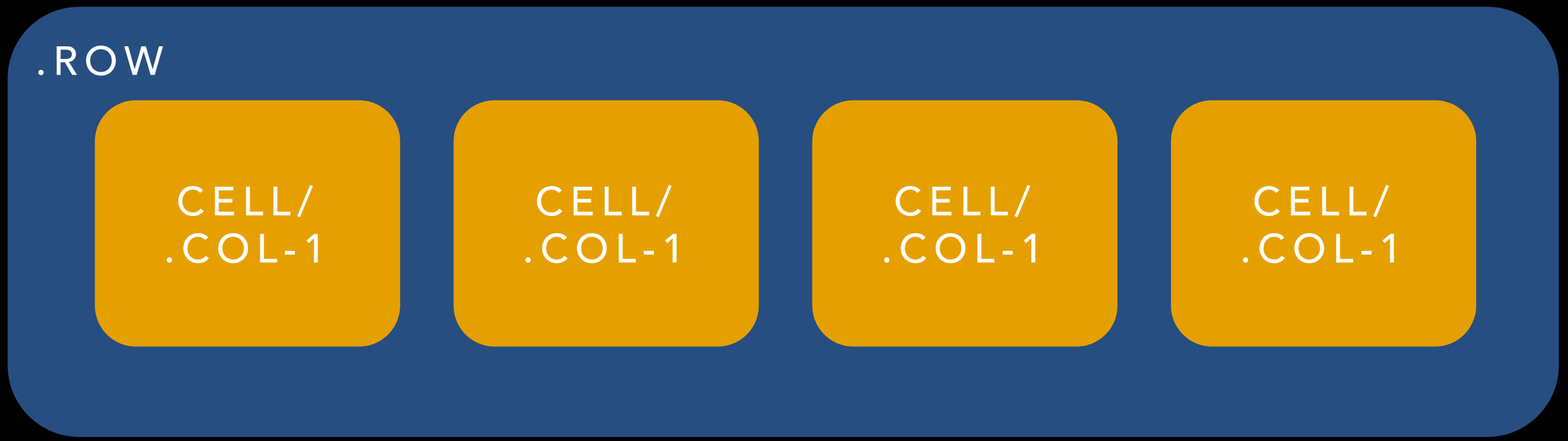


PART 1

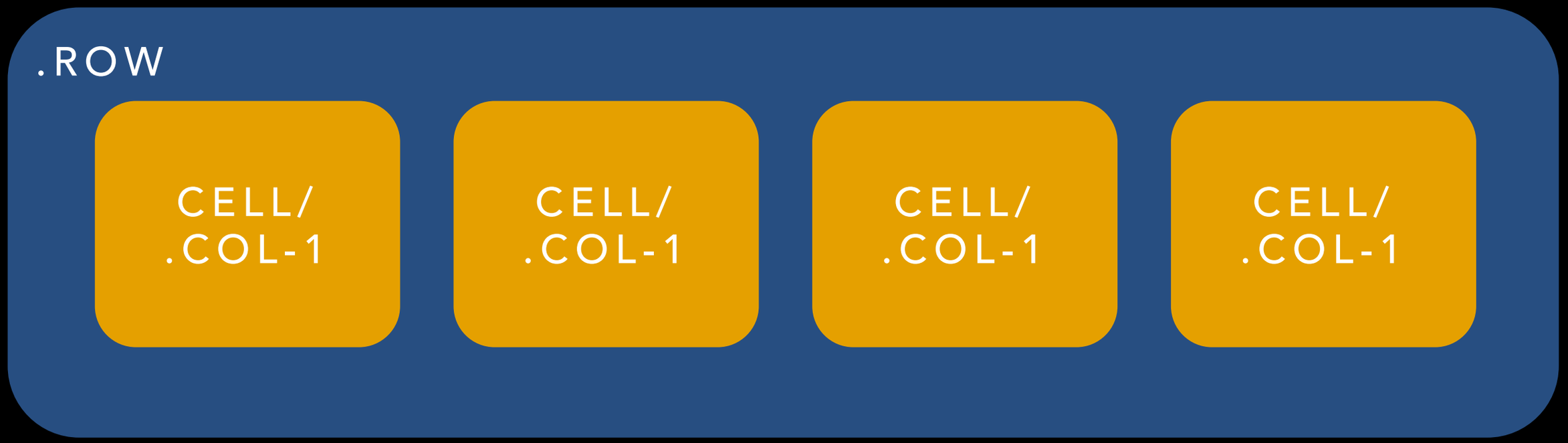
FLOATS

FLOATS

- A hack from the start, right after table-based layout!
- Features rows and cells.
- Rows clear the floats on the cells.
- Source ordering determines display, though some (minor) rearrangement is possible.
- Major disadvantage: equal column heights

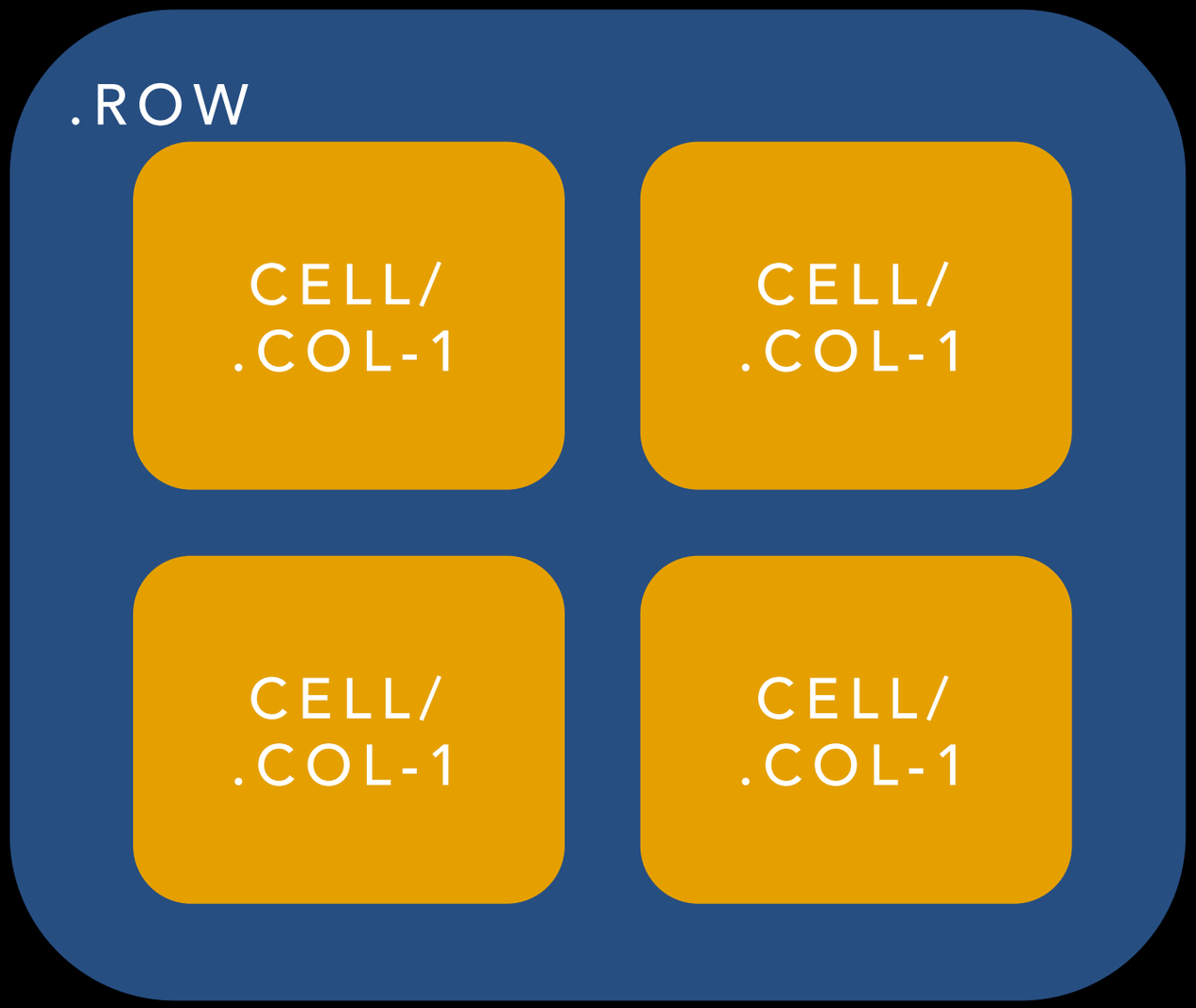



```
<div class=“row”>
      <div class=“col-1”></div>
      <div class=“col-1”></div>
      <div class=“col-1”></div>
      <div class=“col-1”></div>
</div>
```

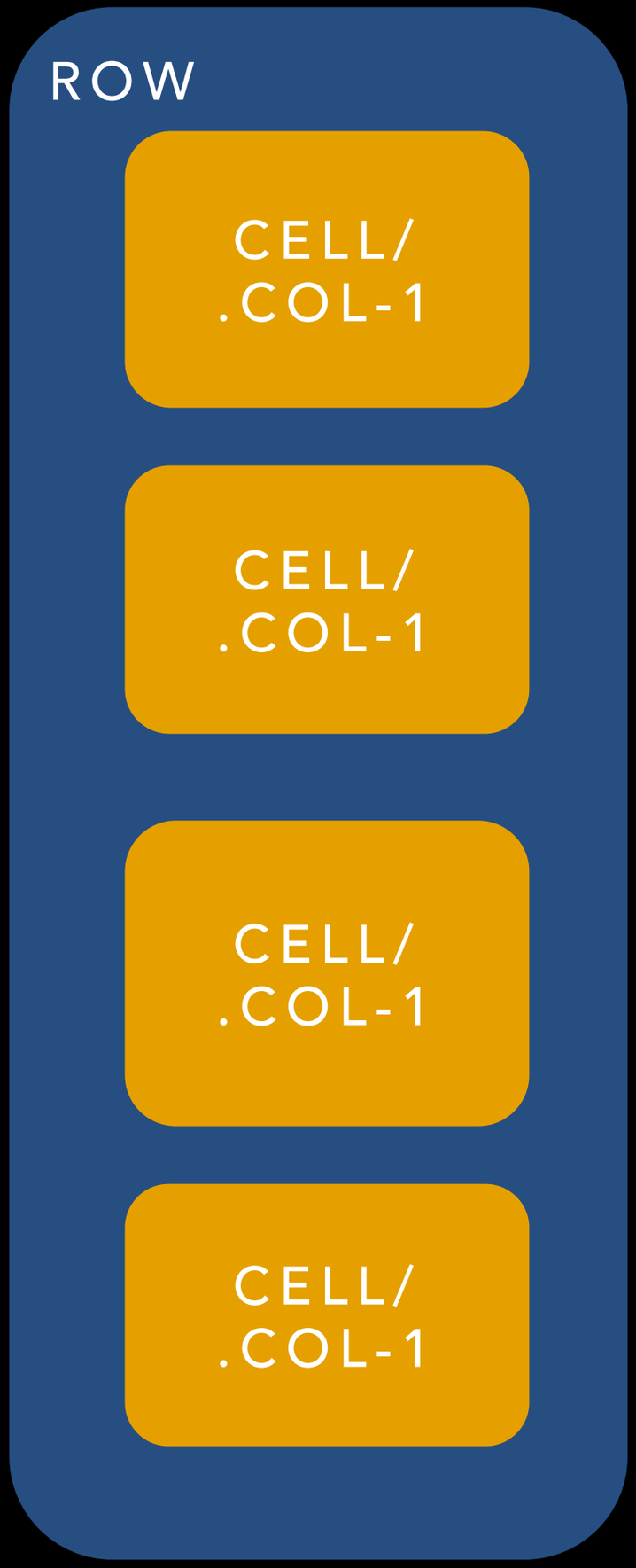



```
.row::after {
    content: "";
    display: table;
    clear: both;
}
```

```
.col-1 {
    float: left;
    margin-left: 4%;
    width: 20%;
}
```

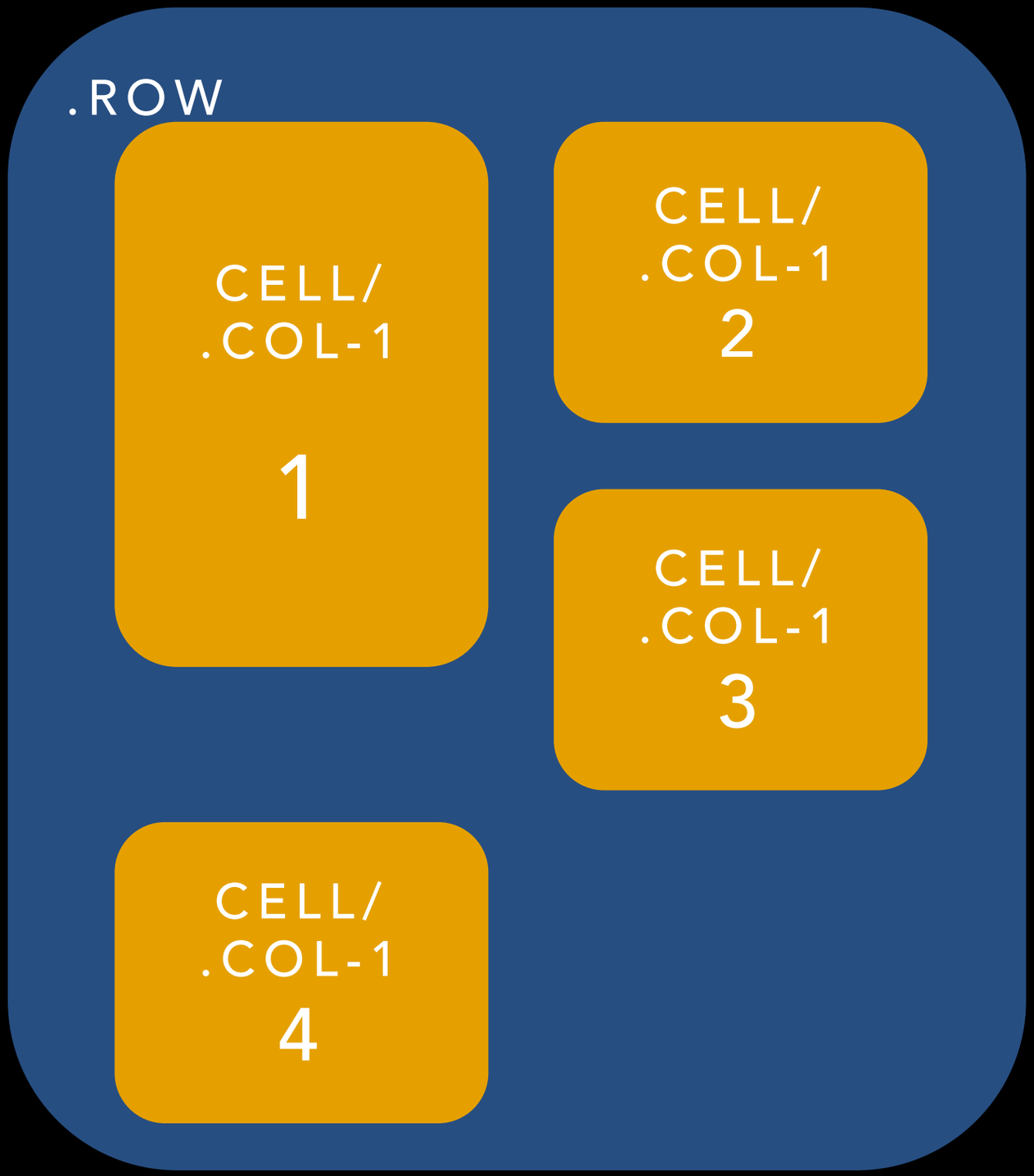



```
@media only screen and (min-width: 480px)
                       and (max-width: 767px) {
    .col-1 {
       width: 44%;
    }
}
```




```
@media only screen and
        (max-width: 479px) {

    .col-1 {
        width: 98%;
        margin: 1%;
        float: none;
    }
}
```



There can be layout problems with floats.

This can be resolved with JavaScript, with a column equalizer script.

```
/* rearranging the columns */

[class*="col-"] {
    position: relative;
}
.col-push-1 {
    left: 26%;
}
.col-pull-3 {
    left: -74%;
}
```

- Create a 4-column floated grid with given starting files
- Include 2 breakpoints (your choice for where) and 3 layouts ("desktop", "tablet", "phone")
- IF YOU HAVE EXTRA TIME:
  - Consider how to equalize the columns so they wrap without breaking
  - Consider reordering of Row 3 at tablet and phone sizes

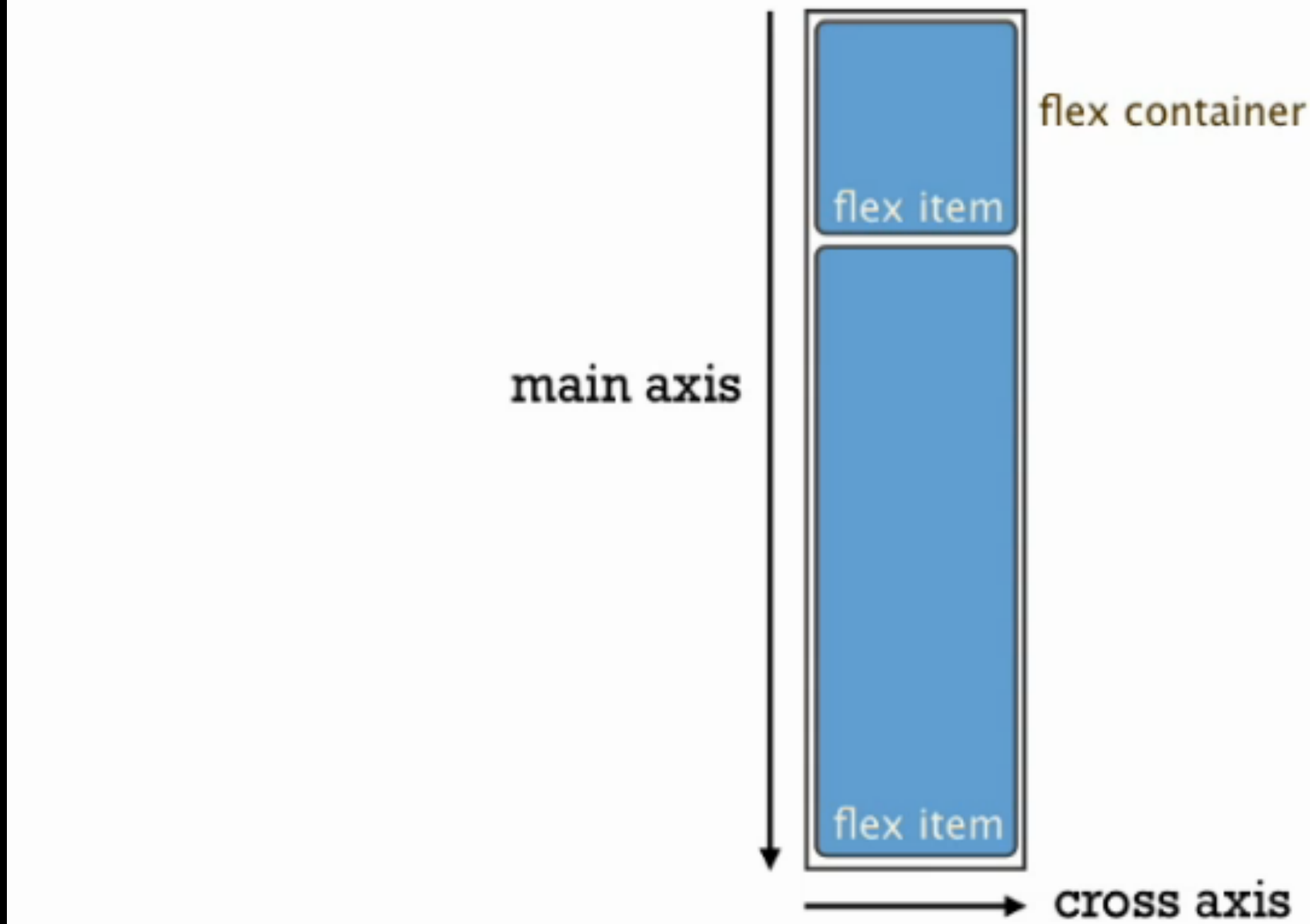
PART 2

FLEXBOX

FLEXBOX

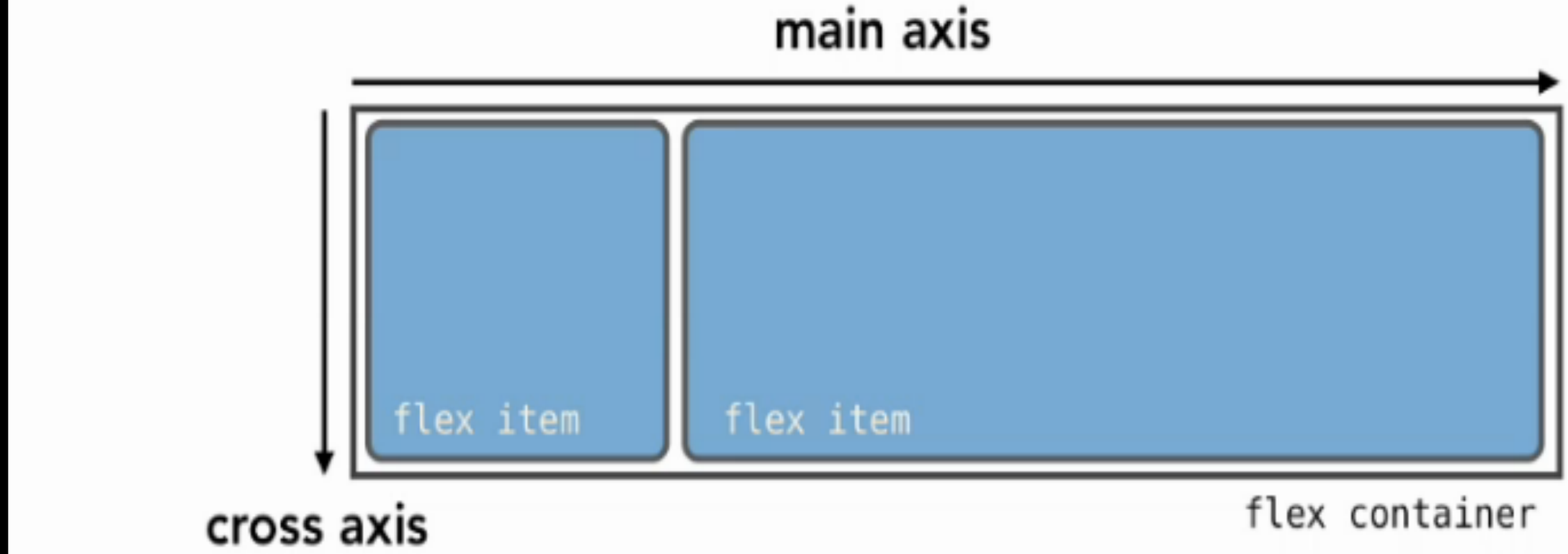
- The first layout elements – but not designed to lay out whole web pages
- Features flex-containers (row) and flex-items (cells). Both are required to work.
- Excels at vertical centering and equal heights
- Very easy to reorder boxes
- Major disadvantages:
  - Wasn’t designed to be locked down for layouts! Works in 1 dimension only.
  - Browser support and syntax is challenging.

Flex container set to column



http://www.lynda.com/CSS-tutorials/CSS-Flexbox-First-Look/116352-2.html

Flex container set to row



http://www.lynda.com/CSS-tutorials/CSS-Flexbox-First-Look/116352-2.html

THREE VERSIONS OF FLEXBOX

- 2009: `display: box;`
- 2011: `display: flexbox;` (“tweener” syntax)
- 2016: `display: flex;`
- Prefixing may still be required depending on browser support desired

EXAMPLE

```
ul {
   display: -webkit-flex; /* targets Chrome, Safari */
   display: -ms-flexbox; /* targets IE10 */
   display: flex;
}
```

CURRENT SUPPORT

- Internet Explorer
  - <= IE 9: not supported
  - IE 10 supports “tweener” syntax (ms prefix)
  - IE 11, Edge: Full support (though buggy in IE 11)
- Safari 7.1/8, iOS Safari 7/8 require webkit prefix
- Others support current syntax (including Opera!)
- http://caniuse.com/#feat=flexbox

BASIC FLEXBOX

CODE DEMO

- Now that you have seen Flexbox in action, time to test your knowledge with either:
  - Flexbox Froggy: http://flexboxfroggy.com/
  - Flexbox Defense: http://www.flexboxdefense.com/

FLEXBOX PROPERTIES

Parent (Flex Container)

display: flex | inline-flex;

flex-direction: row | row-reverse | column | column-reverse;

flex-wrap: wrap | nowrap | wrap-reverse;

flex-flow (shorthand for flex-direction and flex-wrap)

justify-content: flex-start | flex-end | center | space-between | space-around | space-evenly;

align-items: flex-start | flex-end | center | baseline | stretch;

align-content (cross axis - adjust to largest item): flex-start | flex-end | center | stretch | space-between | space-around;

Children (Flex Items)

order: <integer>;

flex-grow: <number>;

flex-shrink: <number>;

flex-basis: <length> | auto;

flex: shorthand for grow, shrink, and basis (default: `0 1 auto`)

align-self: overrides alignment set on parent

FLEXBOX GRID

Flexbox Grid

A grid system based on the `flex` display property.

Download | Github

Responsive

Responsive modifiers enable specifying different column sizes, offsets, alignment and distribution at xs, sm, md & lg viewport widths.

```
<div class="row">
    <div class="col-xs-12
                col-sm-8
                col-md-6
                col-lg-4">
```

Bootstrap

Build responsive, mobile-first projects on the web with the world's most popular front-end component library.

Bootstrap is an open source toolkit for developing with HTML, CSS, and JS. Quickly prototype your ideas or build your entire app with our Sass variables and mixins, responsive grid system, extensive prebuilt components, and powerful plugins built on jQuery.

Get started Download

Currently v4.0.0-beta

getbootstrap.com


```
<div class=“row”>
      <div class=“col-1”></div>
      <div class=“col-1”></div>
      <div class=“col-1”></div>
      <div class=“col-1”></div>
</div>
```

```
.row {
  display: flex;
  flex-flow: row wrap;
  justify-content: center;
  margin: 1%;
}
```

Change flex-flow to other values to change direction of rows – row reverse, column reverse, no wrap

```
.col-1 includes:
  flex: 0 0 24%; /* desktop */
  flex: 0 0 48%; /* tablet */
  flex: 0 0 98%; /* phone */
```

To change widths on .col-1, change the flex-basis property. This is more flexible than width.

```
/* rearranging the columns */

.col-push-1 {
  order: 2;
}
.col-pull-3 {
  order: 1;
}
```

- Code a Flexbox-based grid based on what you've seen here, using the folder 3-flexbox-grid as your starting point
- 2 media queries/3 dimensions as before
- IF YOU HAVE EXTRA TIME:
  - Consider reordering and reversing rows
  - Consider alignment issues, nesting, offsets, etc.

- In folder 4-pie-flexbox, in begin folder, this is a web page laid out using a float-based grid system.

- Apply the flexbox-based grid you just generated to this web page.

- Modify the HTML as little as possible.

- You may need to adjust some of the code you've written to match this specific case.

- You will likely need to add some styling beyond what you've already written.

PROPER USE OF FLEXBOX

- Flexbox grid is a hack!
- Flexbox = "flexible boxes" – grid reduces their flexibility
- How can we use Flexbox properly?

- Create an image gallery with an "unknown" number of images, from folder 5-image-gallery
    - Use the 17 pie images given to you, then change the order and/or number of them displayed on the page with HTML
- Find two solutions to this image gallery problem:
    - Allow images to display on the page in any number per row with any alignment you choose
    - Allow images to display in a fixed number per row for a given screen dimension

RESPONSIVE IMAGES

IMAGES THAT RESIZE

- Images should change size, based on screen resolution
  - Load a big image and let it scale (not good)
  - Server-side (good)
  - Client-side: Load several images and display the one right for this resolution (not good)
  - Client-side: let JavaScript decide (better)

EVEN BETTER

- New <picture> tag released in HTML 5.1
- Picturefill polyfill can help backwards compatibility

Picture element - LS

Global 86.45%

A responsive images method to control which image resource a user agent presents to a user, based on resolution, media query and/or support for a particular image format

Current aligned | Usage relative | Date relative | Show all

IE	Edge *	Firefox	Chrome	Safari	Opera	iOS Safari *	Opera Mini *	Android Browser *	Chrome for Android
			49						
			59			10.2		4.4	
	14	54	60	10.1		10.3		4.4.4	
11	15	55	61	11	47	11	all	56	61
	16	56	62	TP	48				
		57	63		49				
		58	64						

- In the folder 7-wrapup, complete the following:
  - Using merilee-original.jpg, create 3 sizes for Merilee's photo and install them on the history.html page using the <picture> tag and Picturefill.
  - Take the finished image gallery from the 5-image-gallery folder and place it inside another Pie In The Sky branded page, integrating this CSS with the CSS for the rest of the page.
- If you have extra time:
  - Create a home page for this website using materials from the branding folder

QUESTIONS?

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Code available at
www.github.com/jen4web/cssgrid

Slides available at
www.slideshare.net/jen4web