Slideshow 7

CSS layouts

INFO 6150
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In this lesson:

- Flex layouts
- Grid layouts
- Grid systems
- Making a responsive layout
- CSS frameworks

CSS, continued

In the previous CSS lesson we learned about its generalities. Now let’s talk more about how to create complete page layouts - that is, the general structure of a page.

Common page layouts

One column: Suitable for even the smallest screens (mobile devices, etc.)

Images from Mozilla.

Common page layouts

Two columns: Okay for bigger screens.

Images from Mozilla.

Common page layouts

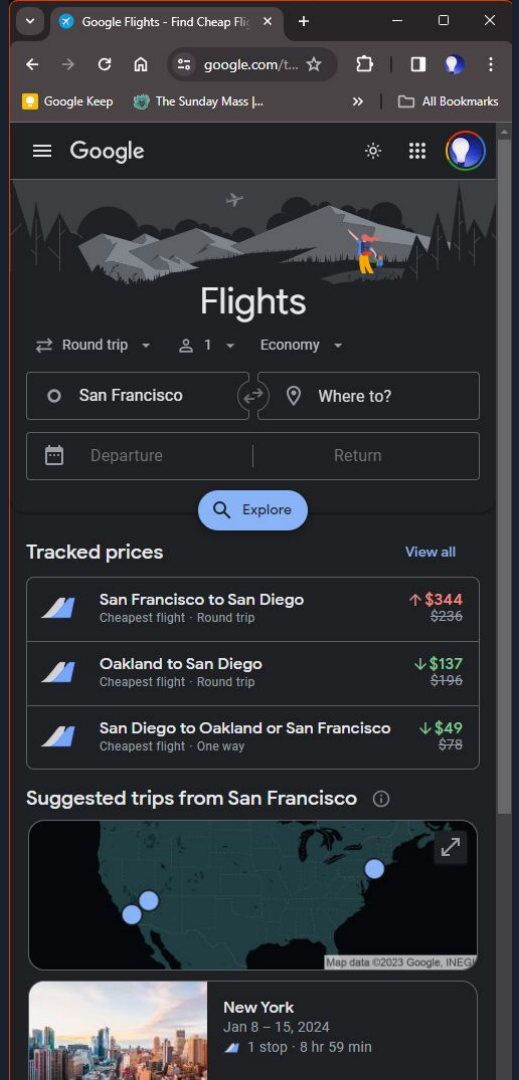
Three columns: Only really suitable for big screens, such as PC monitors.

Images from Mozilla.

Common page layouts

Doing responsive page design often means changing layouts depending on the screen width.

While this is possible with layout techniques used with `display: block` and other CSS attributes such as `float` and `clear`, the advent of new display values made these techniques obsolete.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Flights
Round trip
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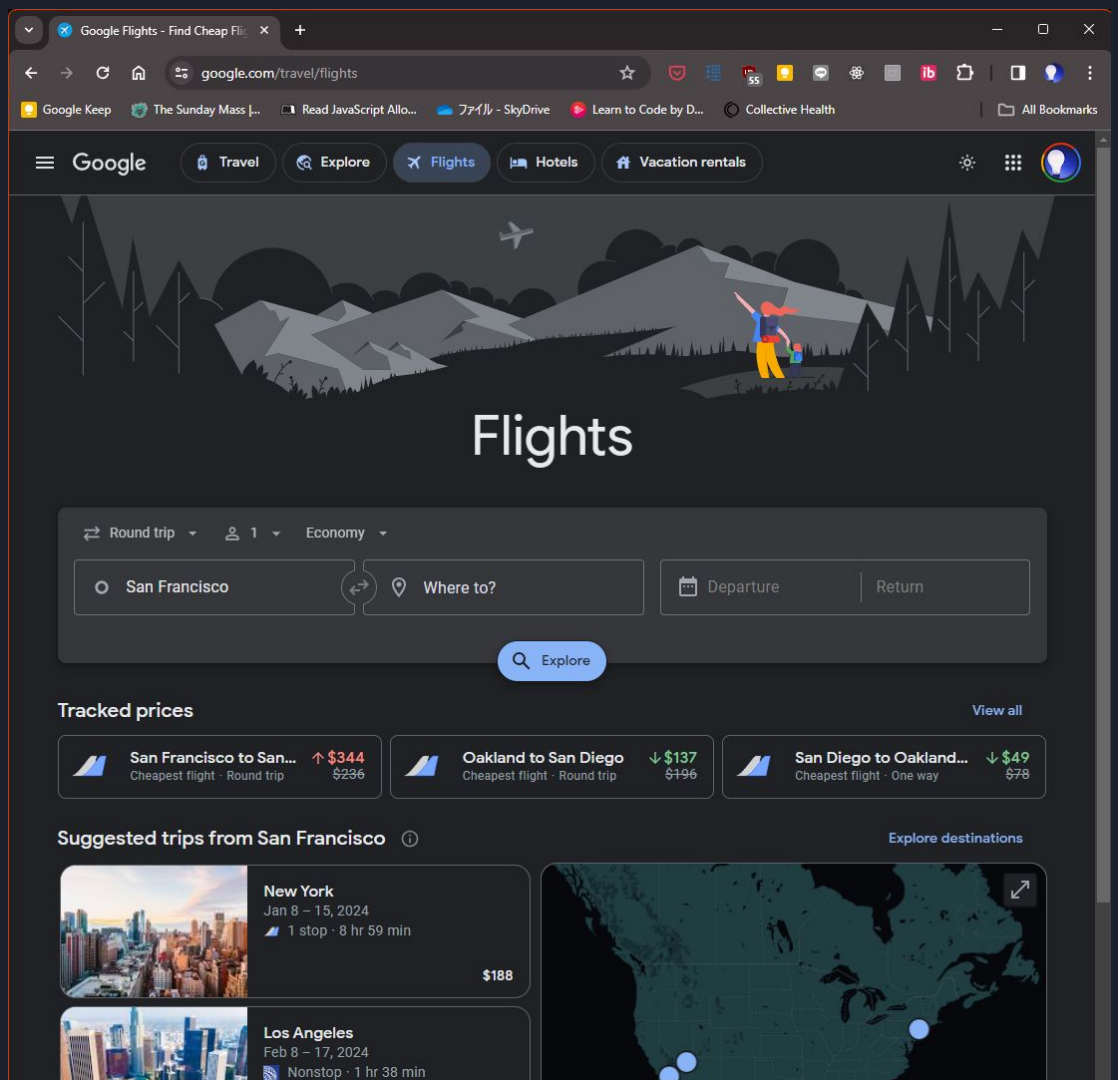
Economy
San Francisco
Where to?
Departure
Return
Explore
Tracked prices
View all
San Francisco to San Diego
Cheapest flight · Round trip
↑$344
$236
Oakland to San Diego
Cheapest flight · Round trip
↓$137
$196
San Diego to Oakland or San Francisco
Cheapest flight · One way
↓$49
$78
Suggested trips from San Francisco
Map data ©2023 Google, INEGI
New York
Jan 8 – 15, 2024
1 stop · 8 hr 59 min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Los Angeles
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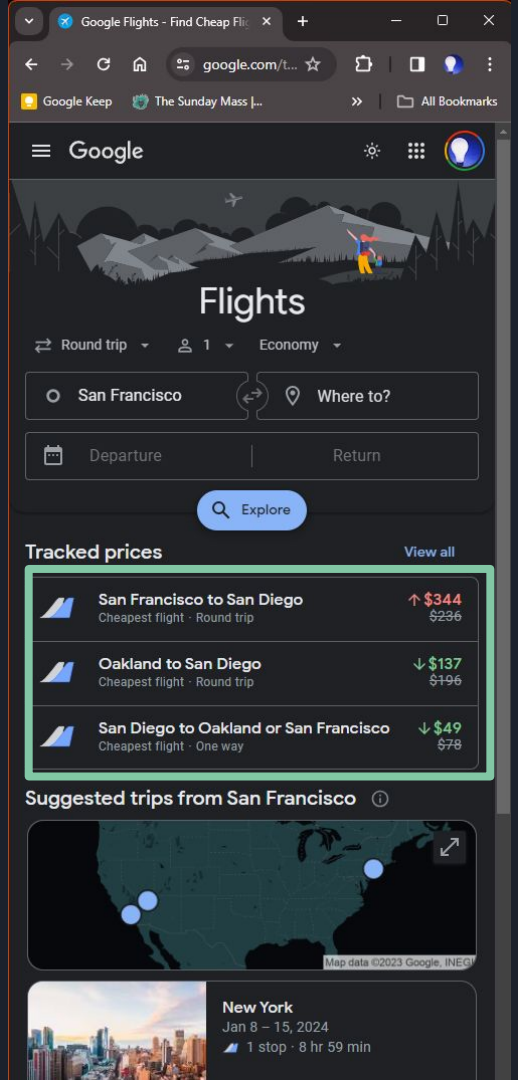
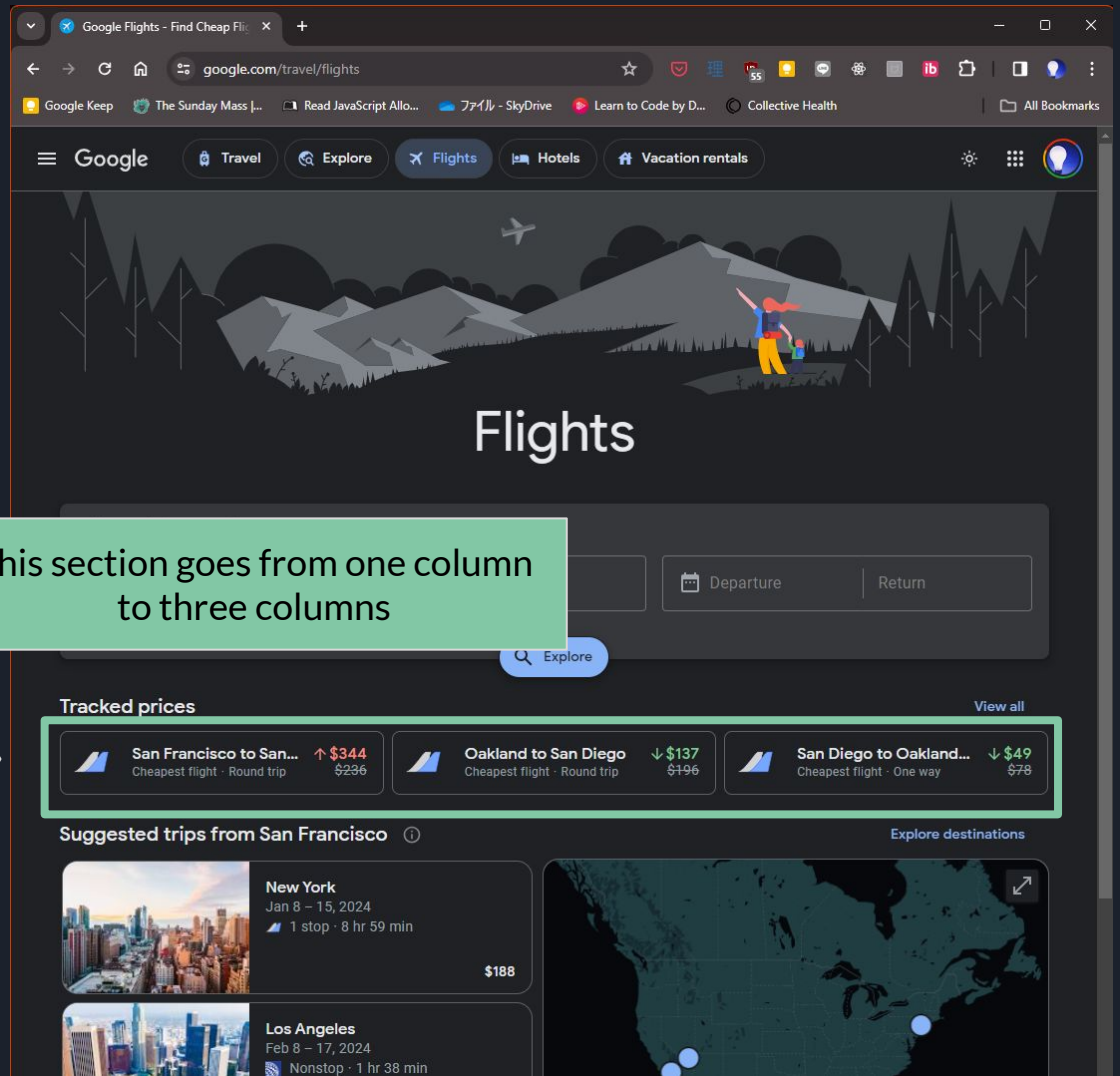
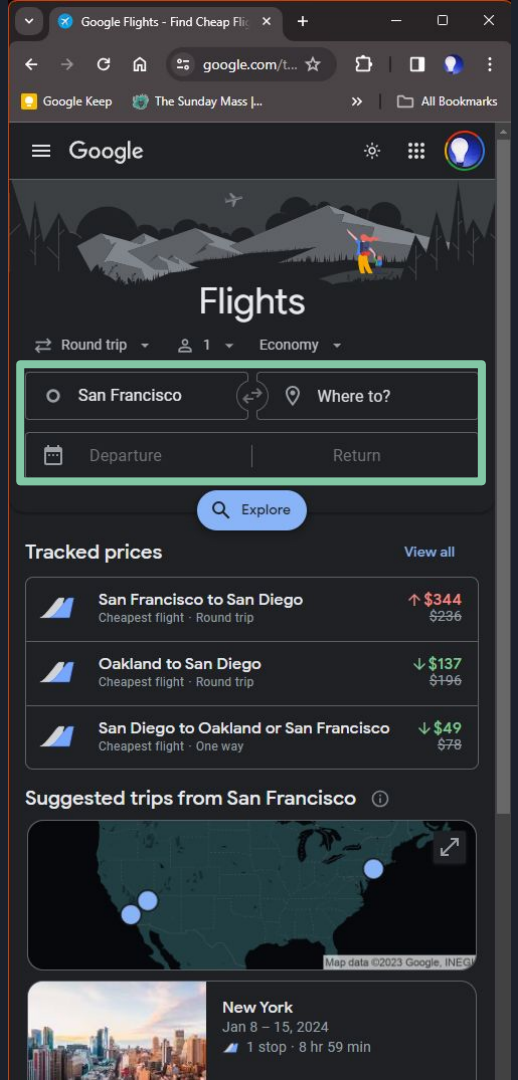
Nonstop · 1 hr 38 min

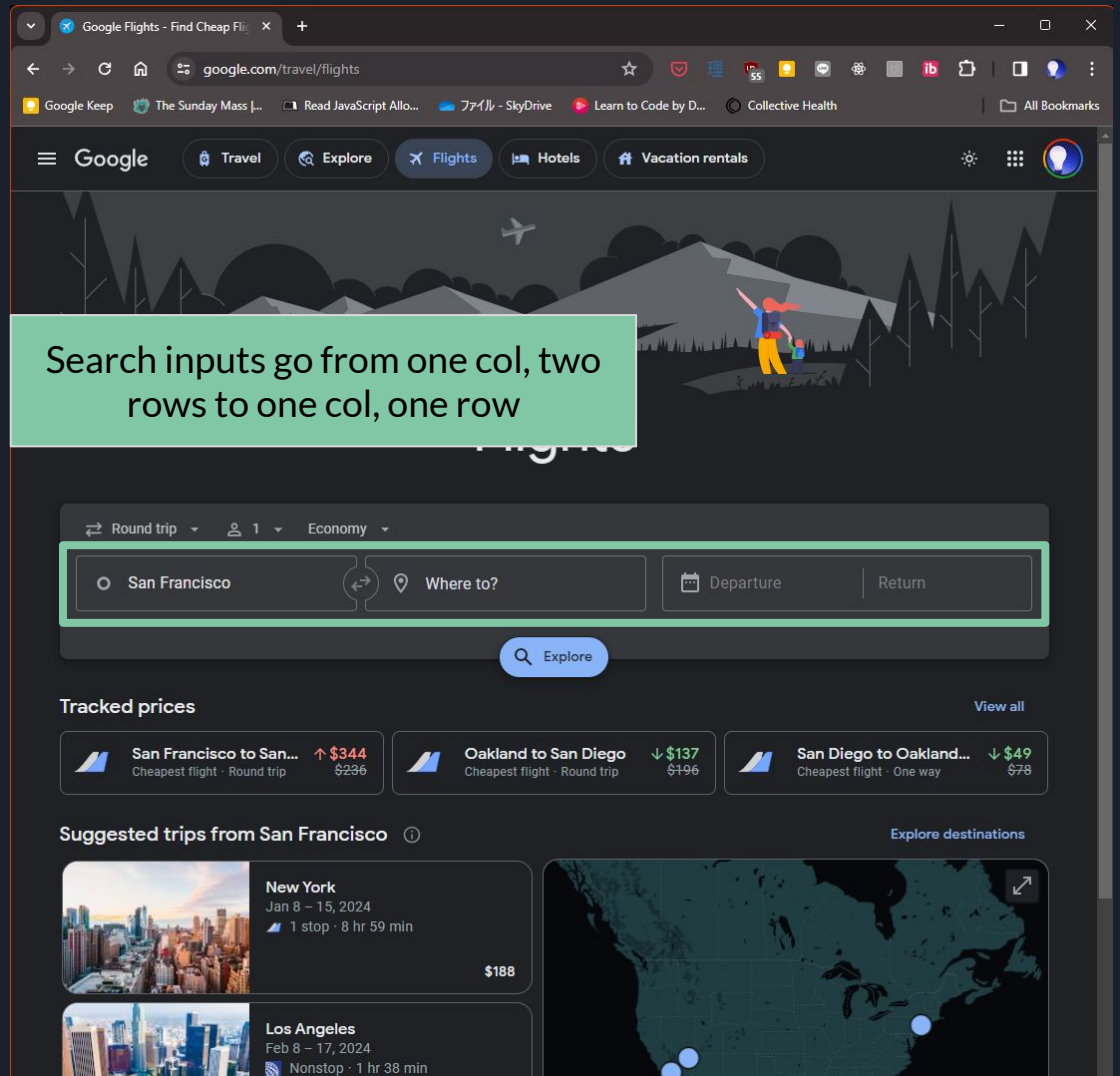


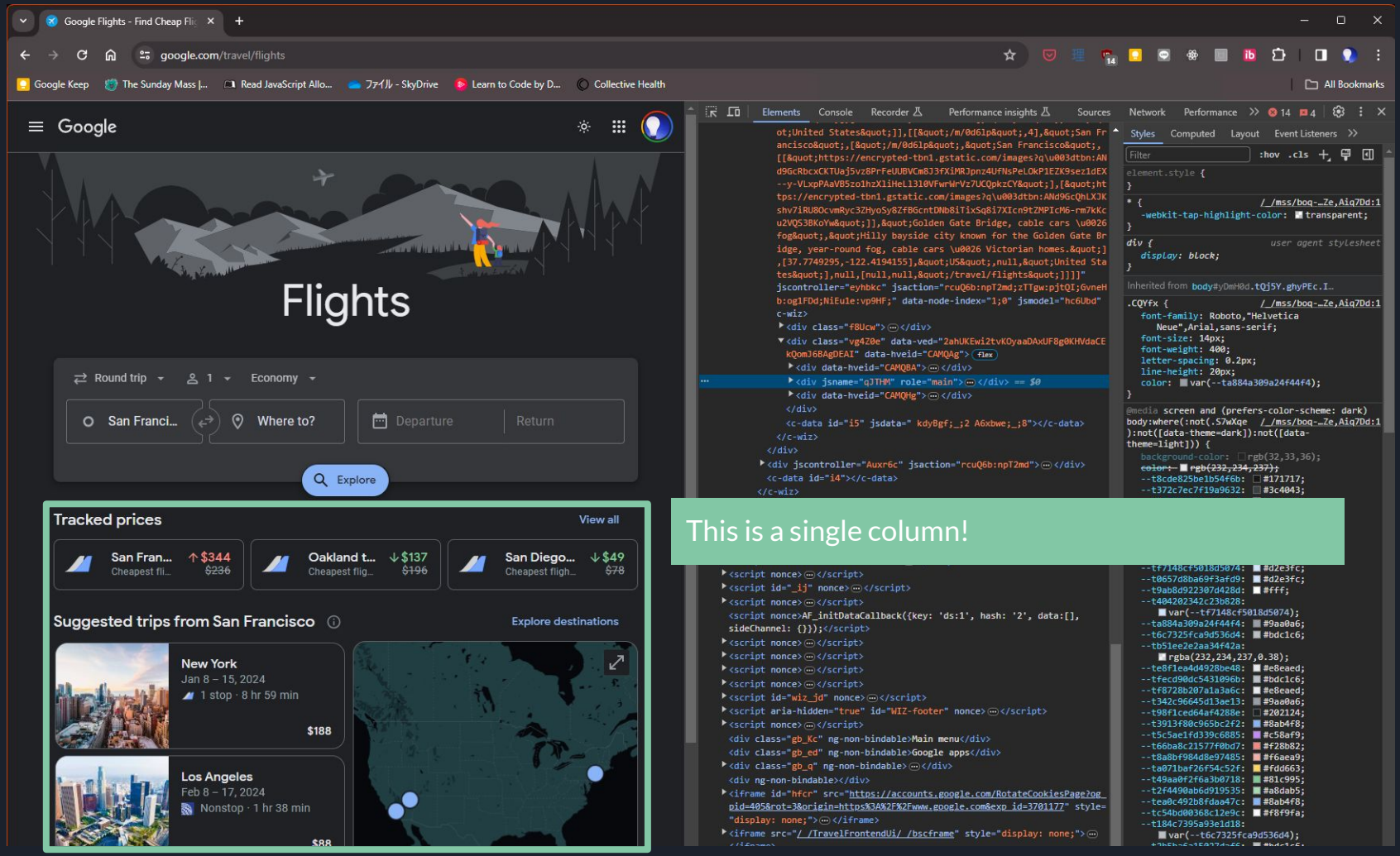
This section goes from one column to three columns





Search inputs go from one col, two rows to one col, one row

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google.com/travel/flights
Google Keep
The Sunday Mass |...
Read JavaScript Allo...
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Nonstop · 1 hr 38 min
$88
Elements
Console
Recorder
Performance insights
Sources
Network
Performance
Styles
Computed
Layout
Event Listeners
Filter
:hov .cls
element.style {
}
* {
-webkit-tap-highlight-color: transparent;
}
div {
display: block;
}
user agent stylesheet
Inherited from body#yDmH0d.tQj5Y.ghyPEc.I...
.CQYfx {
font-family: Roboto,"Helvetica Neue",Arial,sans-serif;
font-size: 14px;
font-weight: 400;
letter-spacing: 0.2px;
line-height: 20px;
color: var(--ta884a309a24f44f4);
}
@media screen and (prefers-color-scheme: dark)
body:where(:not(.S7wXqe):not([data-theme=dark]):not([data-theme=light])) {
background-color: rgb(32,33,36);
color: rgb(232,234,237);
--t8cde825be1b54f6b: #171717;
--t372c7ec7f19a9632: #3c4043;
--tf7148cf5018d5074: #d2e3fc;
--t0657d8ba69f3afd9: #d2e3fc;
--t9ab8d922307d428d: #fff;
--t404202342c23b828: var(--tf7148cf5018d5074);
--ta884a309a24f44f4: #9aa0a6;
--t6c7325fca9d536d4: #bdc1c6;
--tb51ee2e2aa34f42a: rgba(232,234,237,0.38);
--te8f1ea4d4928be48: #e8eaed;
--tfecd90dc5431096b: #bdc1c6;
--tf8728b207a1a3a6c: #e8eaed;
--t342c96645d13ae13: #9aa0a6;
--t98f1ced64af4288e: #202124;
--t3913f80c965bc2f2: #8ab4f8;
--t5c5ae1fd339c6885: #c58af9;
--t66ba8c21577f0bd7: #f28b82;
--t8a8bf984d8e97485: #f6aea9;
--ta071baf26f54c52f: #fdd663;
--t49aa0f2f6a3b0718: #81c995;
--t2f4490ab6d919535: #a8dab5;
--tea0c492b8fdaa47c: #8ab4f8;
--tc54bd00368c12e9c: #f8f9fa;
--t184c7395a93e1d18: var(--t6c7325fca9d536d4);
<script nonce></script>
<script id="_ij" nonce></script>
<script nonce></script>
<script nonce>AF_initDataCallback({key: 'ds:1', hash: '2', data:[], sideChannel: {}});</script>
<script id="wiz_jd" nonce></script>
<script aria-hidden="true" id="WIZ-footer" nonce></script>
<div class="gb_Kc" ng-non-bindable>Main menu
<div class="gb_ed" ng-non-bindable>Google apps
<div class="gb_q" ng-non-bindable>
<iframe id="hfcr" src="https://accounts.google.com/RotateCookiesPage?og_pid=405&rot=3&origin=https%3A%2F%2Fwww.google.com&exp_id=3701177" style="display: none;"></iframe>
<iframe src="/_/TravelFrontendUi/_/bscframe" style="display: none;"></iframe>
This is a single column!

The “modern” display modes

We’ve learned `display: block`, `display: inline` (the basic modes) and `display: inline-block`. While possible to build layouts with these, there are two modes more suited for building layouts: `flexbox` and `grid`.

Flexbox

A flex layout is done with `display: flex` on the parent element.

Its children will now behave like “flex children”. They will fall all in a single line at time (a column or a row; this is the “main axis”).

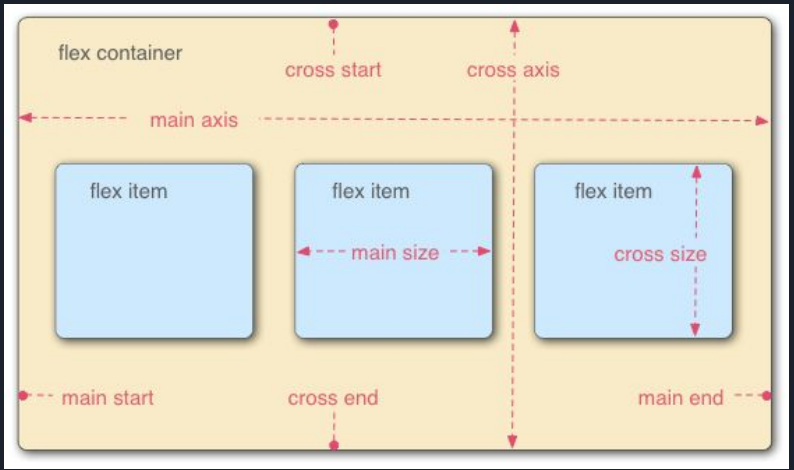

Image from Mozilla.

Flexbox

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```
#parent {
   display: flex;
}
```

Flexbox: attributes in the parent

There are many ways to configure the layout.

`flex-direction` makes the main axis horizontal or vertical.

```
#parent {
   display: flex;
   flex-direction:
row;
}
```

Flexbox: attributes in the parent

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```
#parent {
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row;
}
```

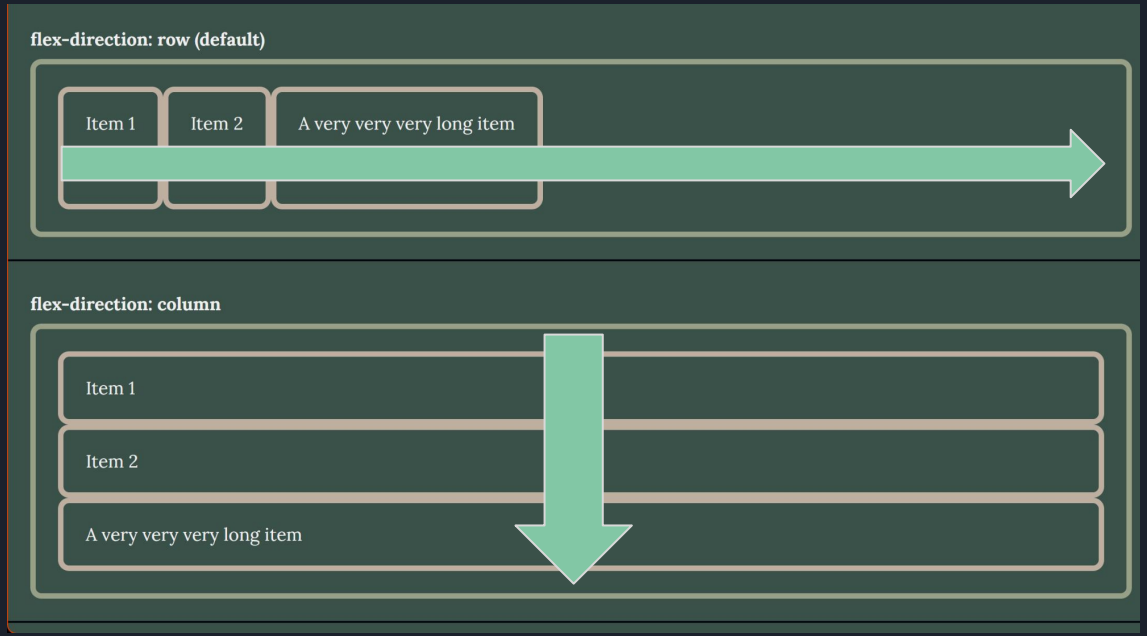

Flexbox: attributes in the parent

There are many ways to configure the layout.

`flex-direction` makes the main axis horizontal or vertical.

It's also possible to reverse this line (eg. down-up instead of up-down).

Flexbox: attributes in the parent

`justify-content` regulates where, in the main line, the items are put - and also the spacing between them.

(In all cases, `flex-direction` here is `row`).

Flexbox: attributes in the parent

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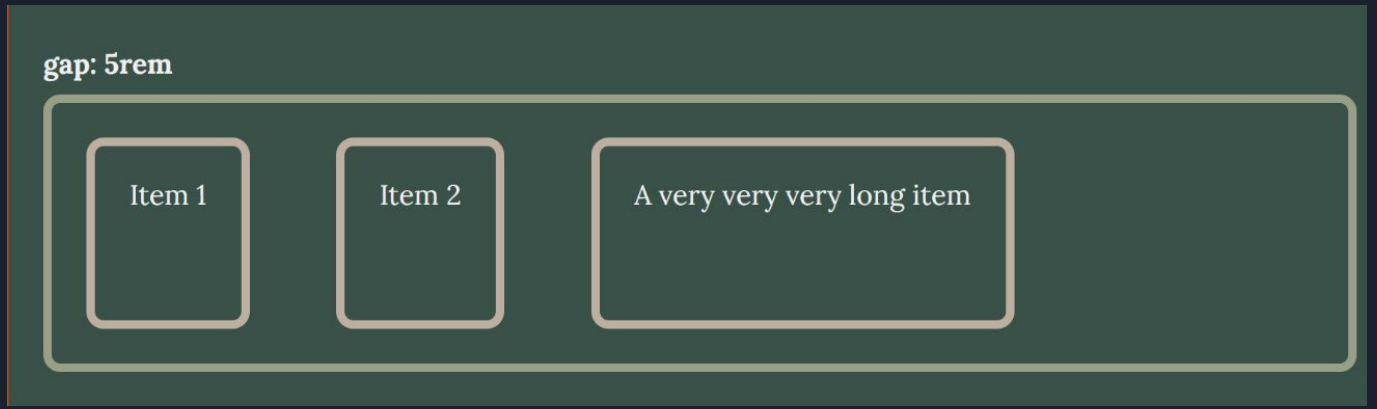
(In all cases, `flex-direction` here is `row`).

Flexbox: attributes in the parent

`gap` sets a minimum spacing between items. Can be used instead of adding `margin` on the children.



Flexbox: attributes in the parent

`flex-wrap` determines if the line can be broken in many lines and if so, how. By default, it won't.

Flexbox: attributes in the parent

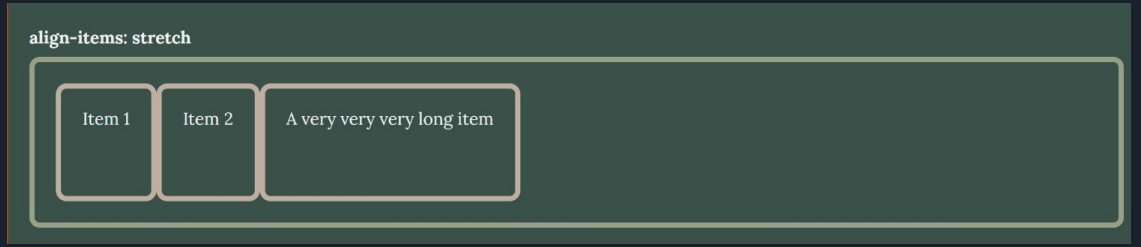
`align-items` sets the children on the secondary axis.

In these examples, the height of the parent has been set to be higher using `min-height: 16rem`.

Flexbox: attributes in the parent

`align-items` sets the children on the secondary axis.

We can also `stretch` the items to occupy the whole space.

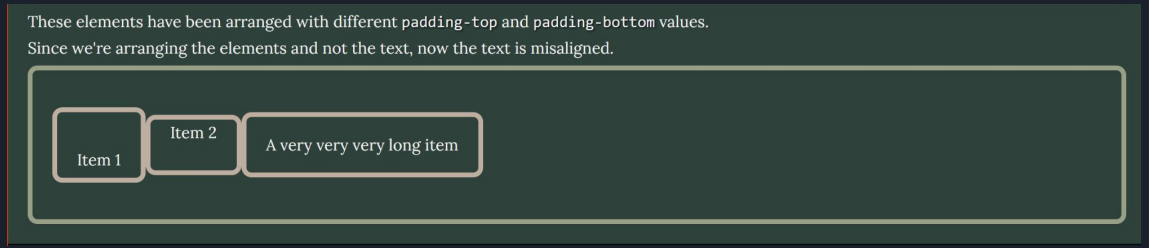


Flexbox: attributes in the parent

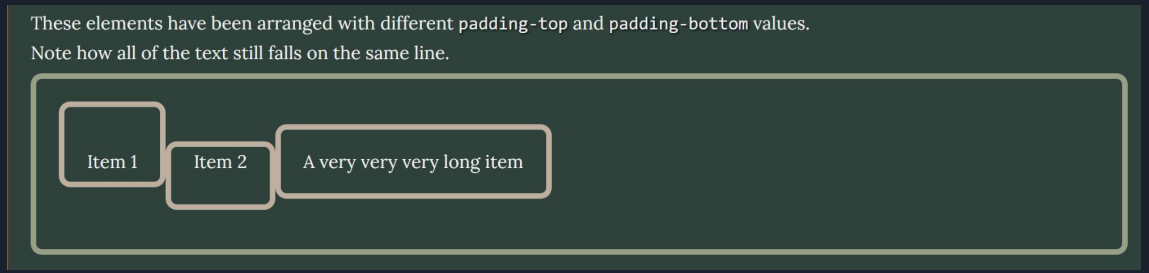
`align-items` sets the children on the secondary axis.

`align-items: baseline` means items are aligned so that the first line of text in all of them falls in the same line, regardless of paddings and margins.

`align-items: center`



`align-items: baseline`

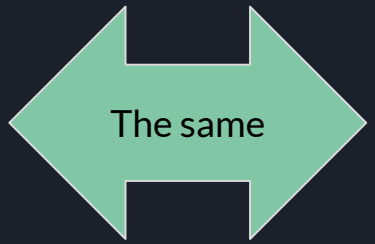


Flexbox: the flex attribute in children

There are also attributes that are set directly in the children. The most important of us is `flex`.

`flex` tells the browser how much space each element takes on the main axis, and how it should distribute the space available between the elements. It is a combination of three values: `flex-grow, flex-shrink and flex-basis.`

```
.children {
   flex: 0 1 auto;
}
```

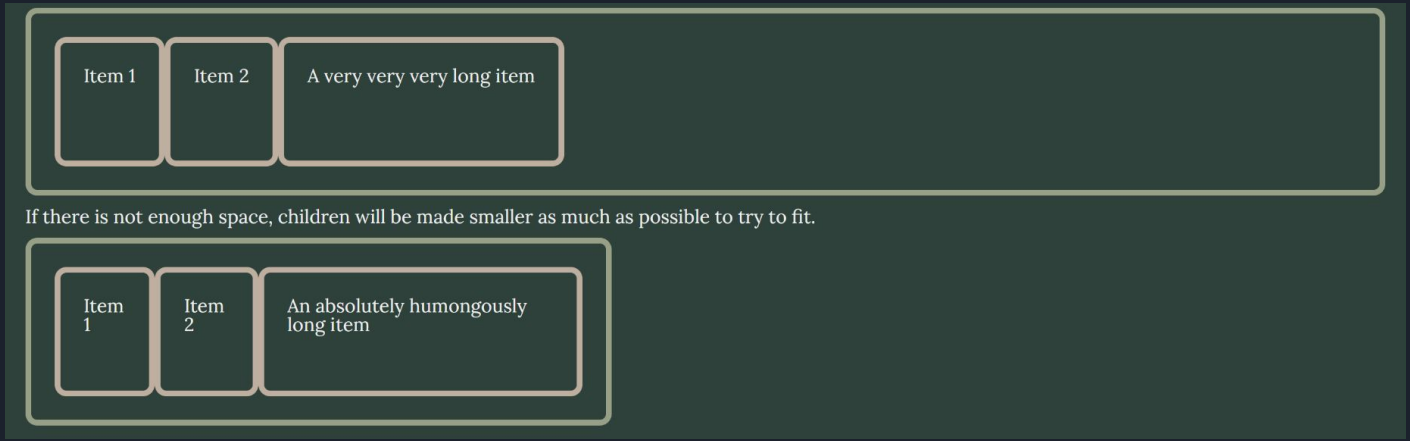



```
.children {
   flex-grow: 0;
   flex-shrink: 1;
   flex-basis: auto;
}
```

Flexbox: the flex attribute in children

By default (`flex: 0 1 auto`):

- Children will only take the space needed for their content;
- If there is not enough space, children will be made smaller as much as possible to try to fit.



Flexbox: the flex attribute in children

Often we will want the children to use all of the space of the parent.

The concept of “available space”:

- When there is more space in the parent than what the children naturally occupy, there is “positive free space”. This is space that flex can use to make the children grow.

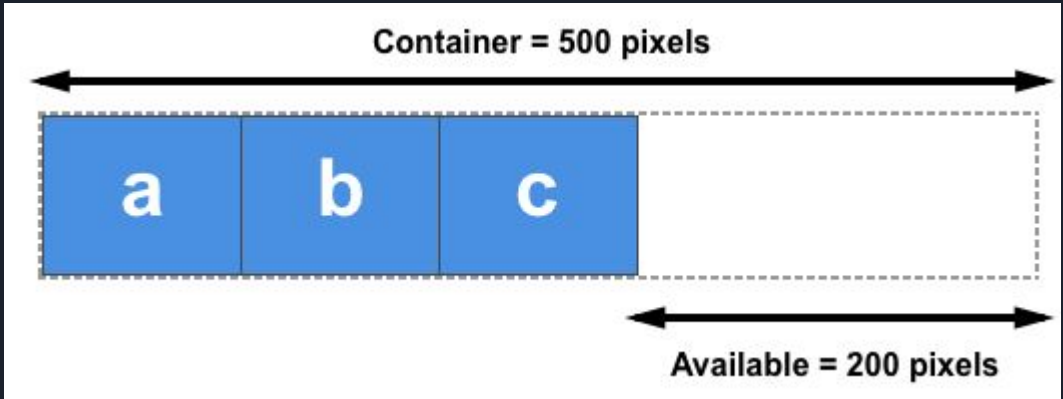


Image from Mozilla.

Flexbox: the flex attribute in children

The concept of “available space”:

- When there is less space in the parent than what the children naturally occupy, there is “negative free space”. flex will try to reclaim this space from the children.

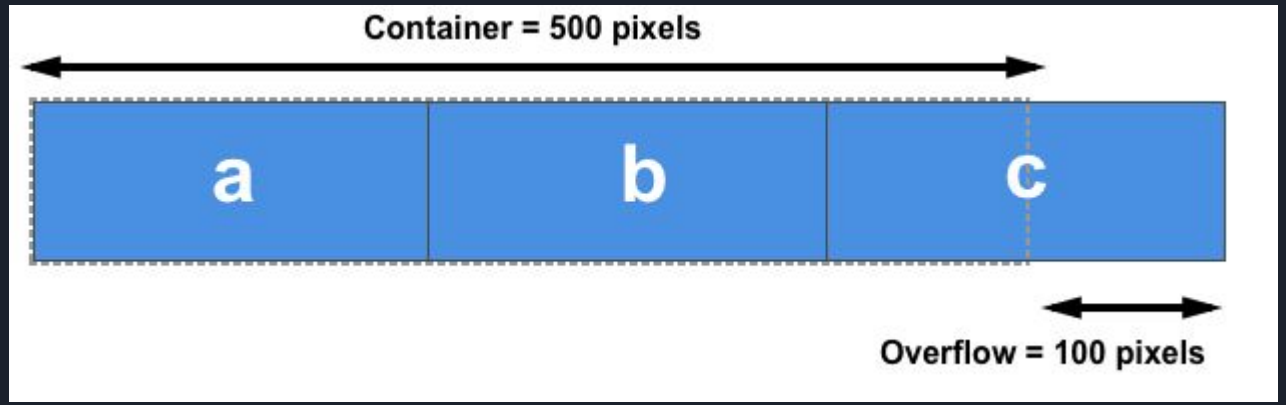


Image from Mozilla.

Flexbox: the flex attribute in children

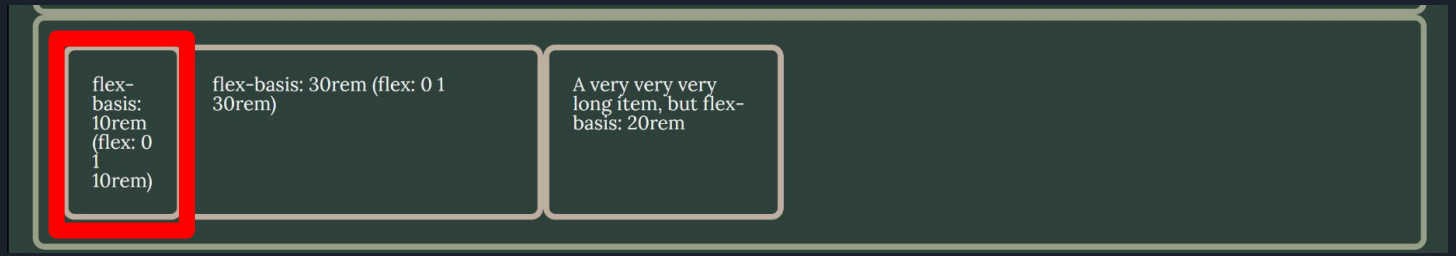
flex-basis:

When provided, it tells the browser how big is the children (instead of the size needed by its content).

Flexbox: the flex attribute in children

flex-basis:

If its value is `auto`, we can still set the size with other attributes such as `width` or `height`.




```
.first-children {
   flex: 0 1 10rem;
}
```

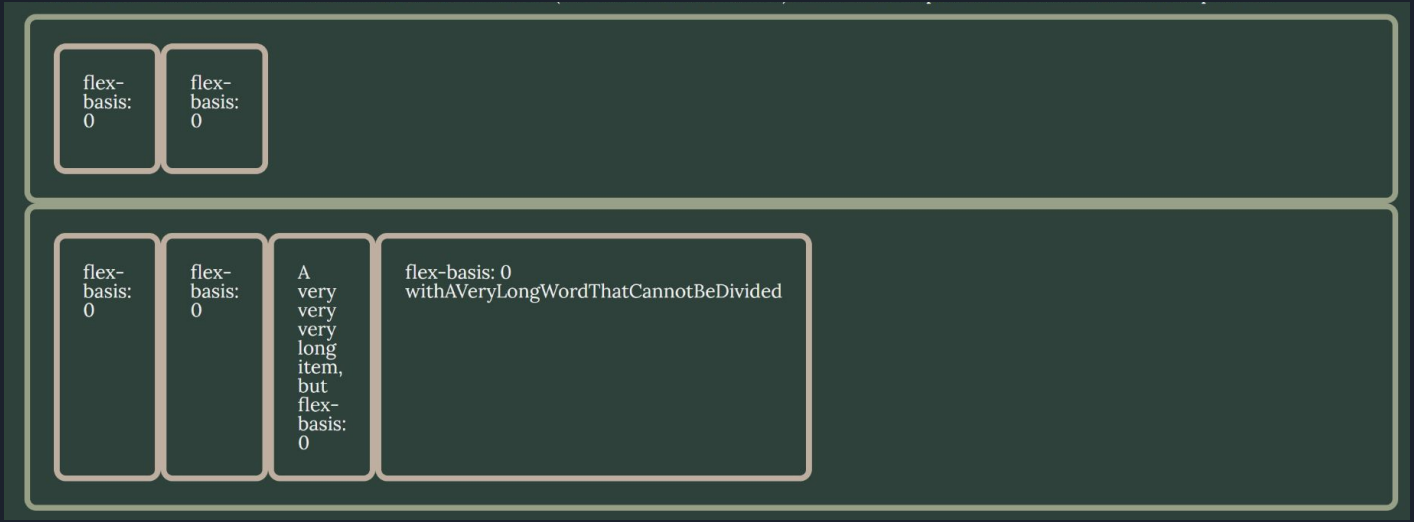
The same

```
.first-children {
   flex: 0 1 auto;
   width: 10rem;
}
```

Flexbox: the flex attribute in children

flex-basis:

If flex-basis: 0, flex assumes the child's size is actually 0, and will compress its contents as much as possible - for example, breaking lines where there are spaces.



Flexbox: the flex attribute in children

flex-grow:

This tells the browser to give this child some of the available space in the parent.

How much? It's a proportion of the space requested by all children.

For example, if all children have `flex-grow: 1` (or any number, but the same number in all of them), the browser will break the available space in equal parts and give each to each children.

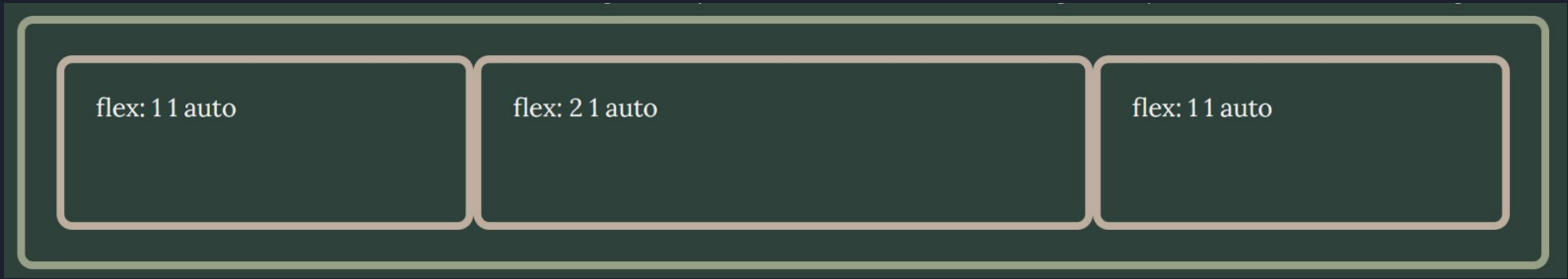
Flexbox: the flex attribute in children

flex-grow:

If children have different flex-grow values, the ones with higher value get more space added:

- First, the values of all children are summed. In this case, 1+2+1 = 4.
- Then, space is distributed according to the proportion (this child's value / total of values).

In this case, the center item ends up with 2/4 = 50% and the others end up with 1/4 = 25% of the available space.

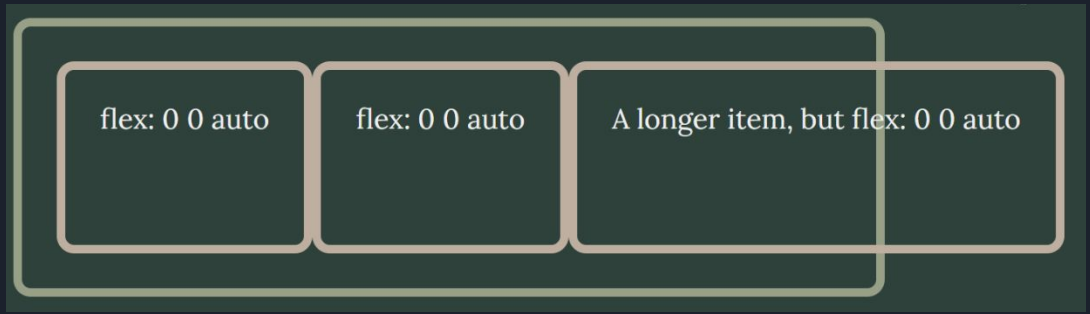


Flexbox: the flex attribute in children

flex-shrink:

By default (`flex-shrink: 1`), the elements will shrink to fit the available space in the parent.

With `flex-shrink: 0`, they won't.

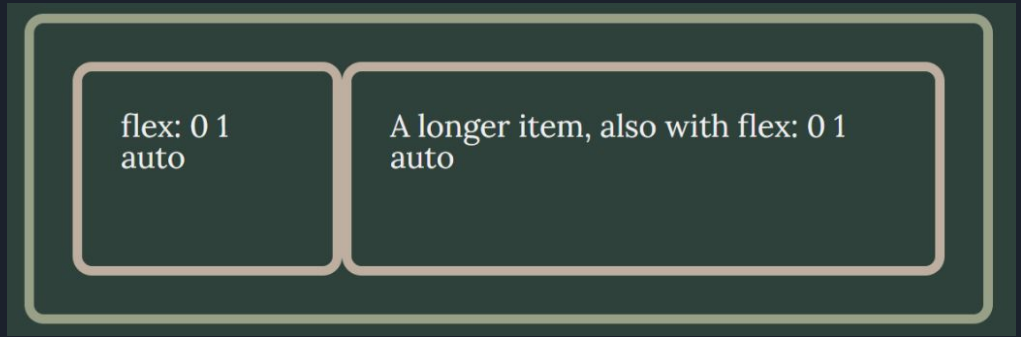


Flexbox: the flex attribute in children

flex-shrink:

With the `flex-shrink: 1` default, all children won't shrink exactly the same. Instead, the browser calculates a proportion adequate to each child's content.

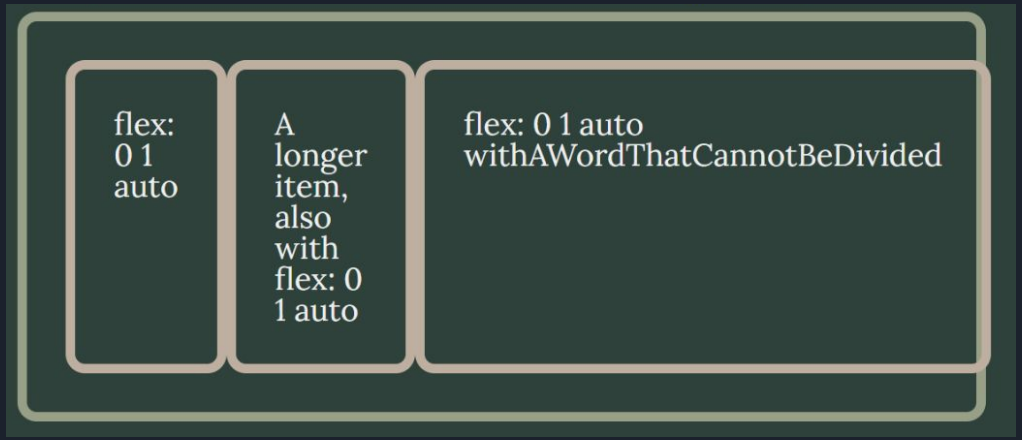
- First, each child element tries to take as little space for their contents - for example, making text lines shorter.
- Then, space gets removed. Elements with more content get more space removed, even if flex-shrink is the same.



Flexbox: the flex attribute in children

flex-shrink:

If after all of that the contents are still too big, they will overflow the parent.

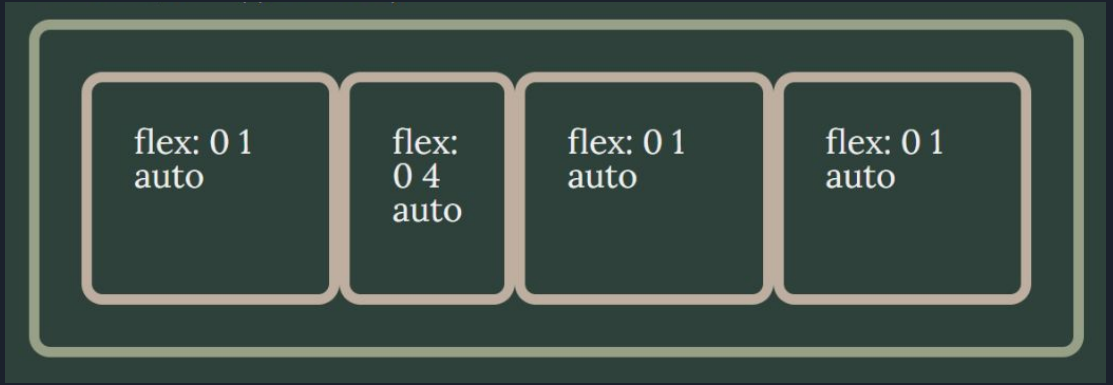


Flexbox: the flex attribute in children

flex-shrink:

With different flex-shrink values, the higher the value, the more space gets removed from the element.

This is similar to how flex-grow works, but it's not an exact proportion: elements with more contents still get more space removed.



Flexbox layouts

Using the attributes above, it's possible to easily build layouts. For example:

```
/* parent element */
article {
    display: flex;
}

/* center column */
.three-column .content {
    flex: 5 1 0;
}

/* sidebars */
.three-column .sidebar {
    flex: 2.5 1 0;
}
```

Responsive flexbox

Mobile-first layouts are one-column only, and get more columns as the screen grows wider.

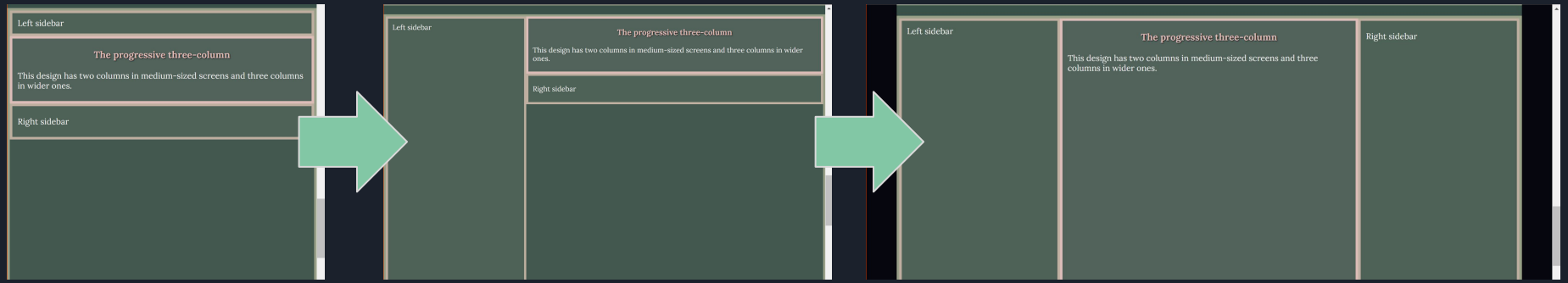
To achieve this effect using flexbox:

- Start with a base one-column layout.
- Next, set up breakpoints for wider screens. Inside them, write CSS that overwrites the base layout to create the columns.

Define a breakpoint with the CSS instruction `@media (...) {}`.

Responsive flexbox

An example: a layout that is one-column for smaller screens, two-column for medium ones, and three-column for wider ones.



Responsive flexbox

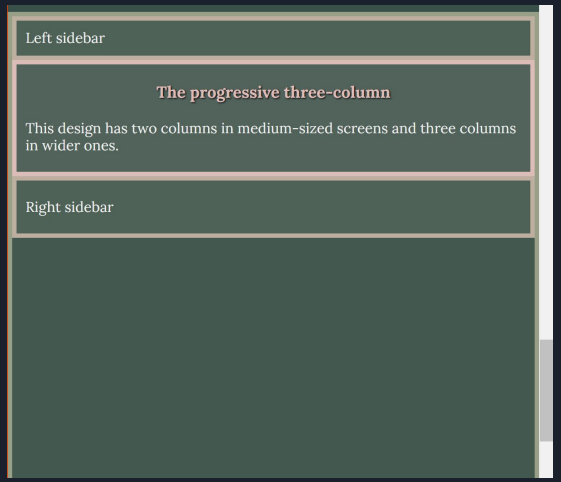
To achieve this, the HTML structure looks as follows. Note there's a `right-wrapper` div around the `content` and `sidebar-right` divs.

```
<article class="three-column-progressive">
    <div class="sidebar sidebar-left">
        Left sidebar
    </div>
    <div class="right-wrapper">
        <div class="content">
            <h2>The progressive three-column</h2>
        </div>
        <div class="sidebar sidebar-right">
            <p>Right sidebar</p>
        </div>
    </div>
</article>
```

Responsive flexbox

The base styles are the ones for the smaller screens.

```
/* parent element */
article {
    display: flex;
    flex-direction: column;
}

/* no particular styles for
children at this point */
```

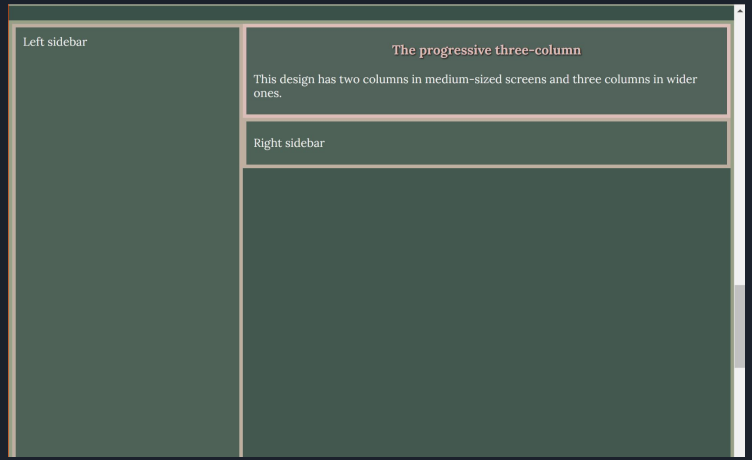


Responsive flexbox

Next, styles for screens that are at least 640px wide. Let's create a first breakpoint.

Only the wrapper will get a `flex` value for now. Also, we flip the `flex-direction` of the parent to be `row`.

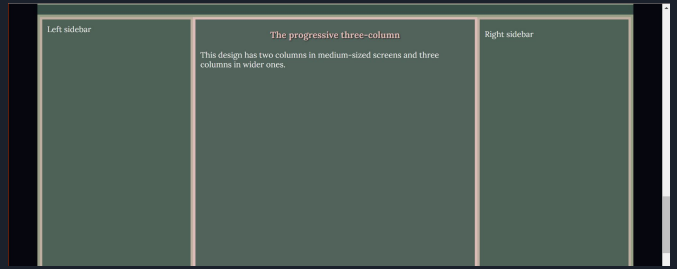
```
@media (min-width: 640px) {
    .three-column-progressive {
        flex-direction: row;
    }

    .three-column-progressive .sidebar-left {
        flex: 3 1 0;
    }

    .three-column-progressive .right-wrapper {
        flex: 7 1 0;
    }
}
```



Responsive flexbox

Lastly, a third breakpoint for the wider screens. We adjust widths again. Also, `.right-wrapper` becomes a flex parent itself (`display: flex`) which allows us to define another flexbox for its children.

```
@media (min-width: 1024px) {
    .three-column-progressive .right-wrapper {
        flex: 7.6 1 0; /* it's a children! */
        display: flex; /* it's also a parent! */
    }
    .three-column-progressive .right-wrapper .content {
        flex: 6.6 1 0;
    }
    .three-column-progressive .right-wrapper .sidebar {
        flex: 3.4 1 0;
    }
    /* the left sidebar also needs to become thinner */
    .three-column-progressive .sidebar-left {
        flex: 2.4 1 0;
    }
}
```



Responsive flexbox

Lastly, a third breakpoint for the wider screens. We adjust widths again. Also, `.right-wrapper` becomes a flex parent itself (`display: flex`) which allows us to define another flexbox for its children.

```
@media (min-width: 1024px) {
    .three-column-progressive .right-wrapper {
        flex: 7.6 1 0; /* it's a children! */
        display: flex; /* it's also a parent! */
    }
    .three-column-progressive .right-wr
        flex: 6.6 1 0;
    }
    .three-column-progressive .right-wr
        flex: 3.4 1 0;
    }
    /* the left sidebar also needs to b
    .three-column-progressive .sidebar-left {
        flex: 2.4 1 0;
    }
}
```

Note how fussy the calculations have become. This is not the best solution; better solutions with flexbox exist but may be more complex.

Flexbox layouts

Files with sample layouts have been provided as part of the course contents.

Review how these layouts were constructed.

Then, create your own example:

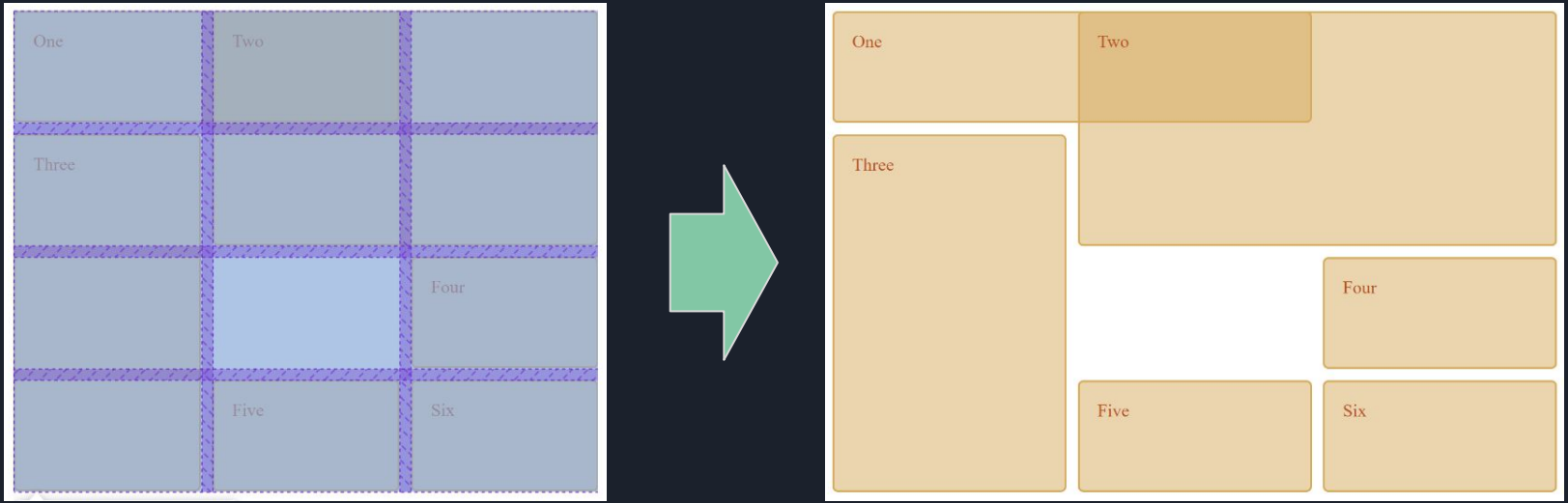
- In a new set of files, create your own HTML and CSS.
- Create a two-column layout with a vertical navigation in the sidebar. The navigation itself should use `display: flex`.

Tip: if you run into trouble, use the Developer Tools to debug the CSS that applies to the parent and the children.

Grid

`display: grid` is the other “modern” display mode.

It allows you to create an invisible grid first, then specify where each element falls within this grid.



Grid: attributes in the parent

display: grid also has attributes both in the parent and in its immediate children.

- In the parent we'll define the grid itself.
- Then, we'll position each child in the grid independently.

Grid: attributes in the parent

display: grid also has attributes both in the parent and in its immediate children.

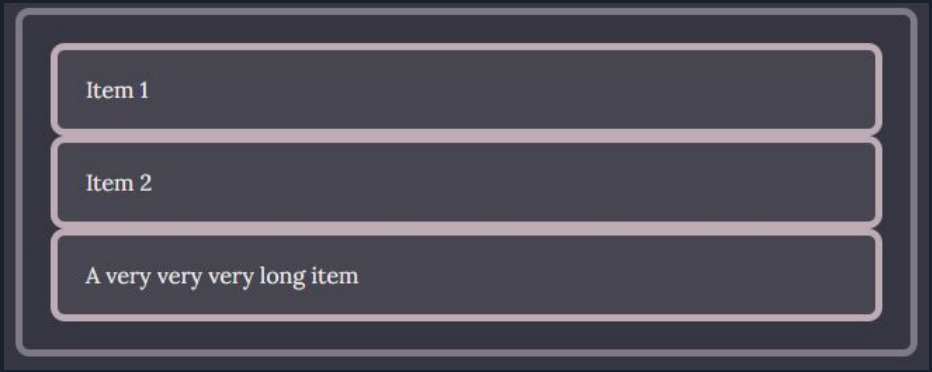
- In the parent we'll define the grid itself.
- Then, we'll position each child in the grid independently.

A default grid

Let’s start with a default grid. At this point, it’s the same as a display: inline: it creates a single column and a row per element.

```
<div class="grid">
    <div>Item 1</div>
    <div>Item 2</div>
    <div>A very very very long item</div>
</div>
```

```
.grid {
    display: grid;
}
```



A default grid

The children will change if the parent changes. Here we force the parent to be higher.

```
<div class="grid" style="height: 600px">
    <div>Item 1</div>
    <div>Item 2</div>
    <div>A very very very long item</div>
</div>
```

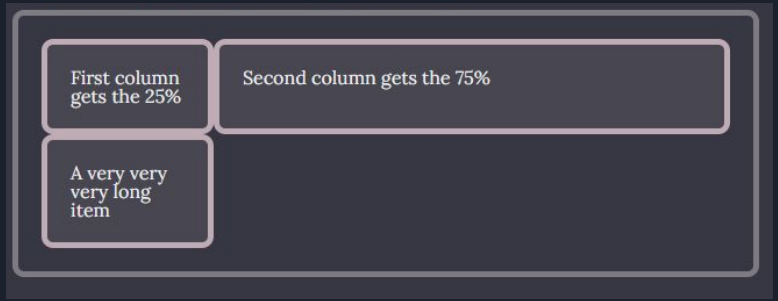
```
.grid {
    display: grid;
}
```

Defining columns

With grid-template-columns we express what columns exist and how big they are.

```
<div class="grid"
style="grid-template-columns: 25% 75%;
">
    <div>Item 1</div>
    <div>Item 2</div>
    <div>A very very very long item</div>
</div>
```

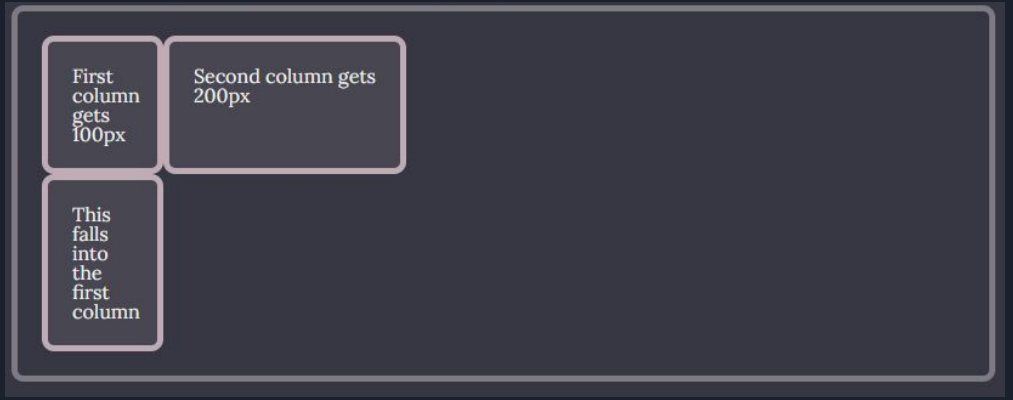
```
.grid {
    display: grid;
}
```



Defining columns

Widths can be expressed with any measurement, such as px or rem.
If our columns are smaller than the available parent width, there will be a gap.

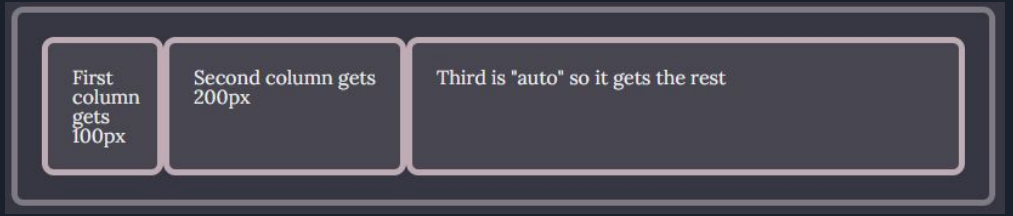
```
<div class="grid" style="grid-template-columns: 100px 200px">
  ...
</div>
```



Defining columns

We can use the keyword “auto” to create a column that fills that gap.

```
<div class="grid" style="grid-template-columns: 100px 200px auto">
  ...
</div>
```



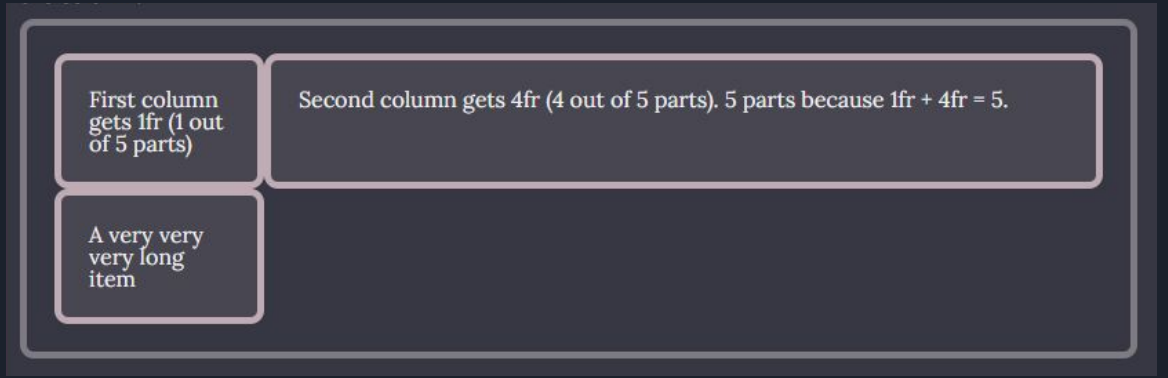
Defining columns with “fr”

Another way to define columns that extend through the available width is using the special measurement “fr” (“fraction”).

This breaks the parent width in “parts”. The sum of all fr values is the width of the parent.

The higher the fr value is for a column, the wider it is.

```
<div class="grid" style="grid-template-columns: 1fr 4fr">
  ...
</div>
```



Defining rows

Even though rows are automatically created, we can choose to use grid-template-rows to control, for example, the size of the rows:

```
<div class="grid" style="grid-template-columns: 1fr 4fr; grid-template-rows: 2fr 1fr">
  ...
</div>
```

Defining rows

If the grid needs more rows than we have defined, new “default” rows are created automatically. Here we only defined two rows, but need more.

```
<div class="grid" style="grid-template-columns: 1fr 4fr; grid-template-rows: 1fr 3fr">
   /* lots of children */
</div>
```

The repeat keyword

Let’s say you have this, which is very long to write:

```
<div class="grid" style="grid-template-columns: 1fr 1fr 1fr 1fr 1fr 1fr 1fr 1fr 1fr
">
  /* nine elements go here */
</div>
```

The repeat keyword

Since all of the columns are the same, you can do this instead:

```
<div class="grid" style="grid-template-columns:  repeat(9, 1fr)">
  /* nine elements go here */
</div>
```

Use `repeat` for values that are repeated. This works for columns and rows.

Align content, justify content

This works the same as in flexbox.

```
<div class="grid" style="height: 600px; align-content: center">
  ...
</div>
```

Align content, justify content

This works the same as in flexbox.

```
<div class="grid" style="height: 600px; align-content: space-evenly">
  ...
</div>
```

Align content, justify content

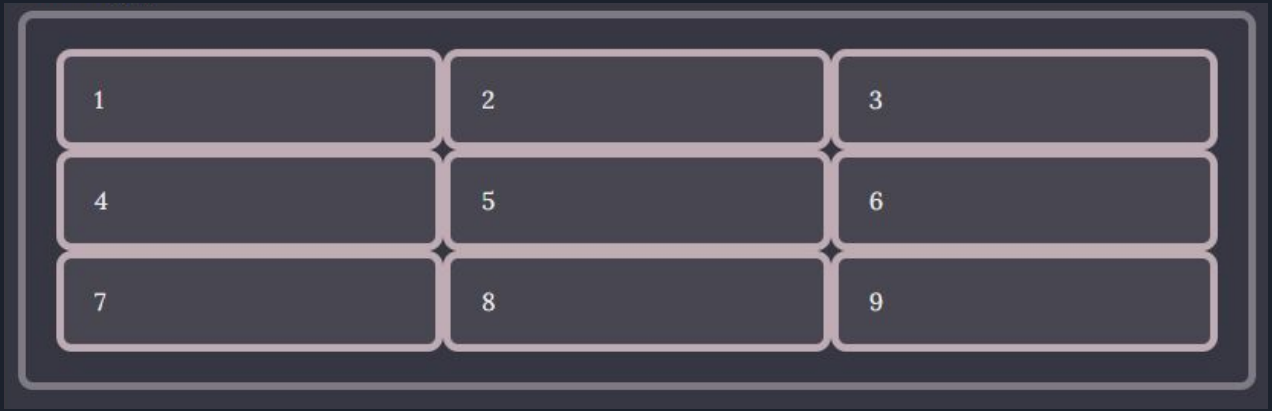
This works the same as in flexbox.

```
<div class="grid" style="height: 600px; justify-content: end">
  ...
</div>
```

Gaps

This also works the same as in flexbox.
Here, our parent has three columns of equal size.

No gap:

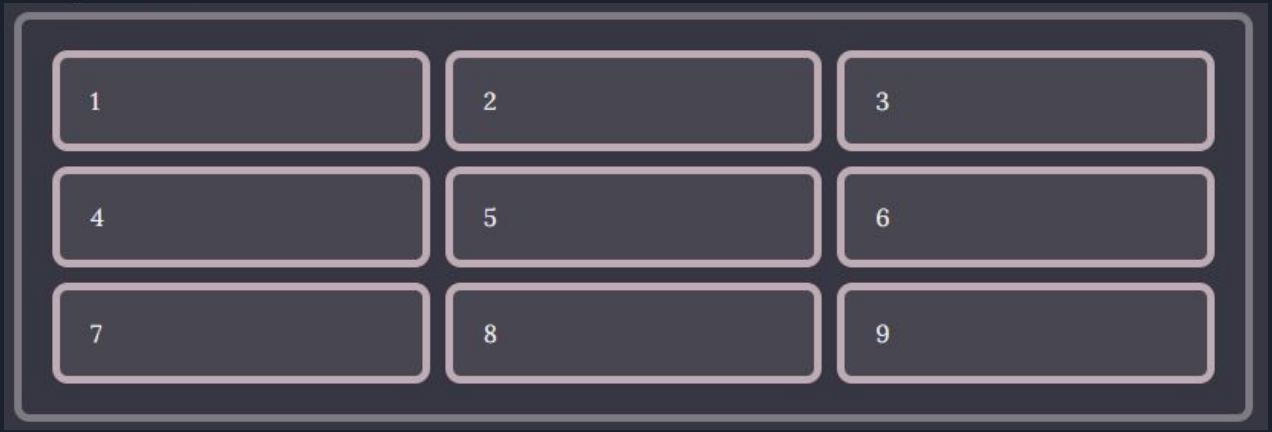


Gaps

This also works the same as in flexbox.
Here, our parent has three columns of equal size.

With gap:

```
<div class="grid" style="gap: 1rem">
  ...
</div>
```



Line-based placement

So far, all of the children occupy only one “cell” of the grid, in order.

We will now learn how to change this. We do this with attributes that go in the children.

We will study two methods:

- Line-based placement
- Named areas

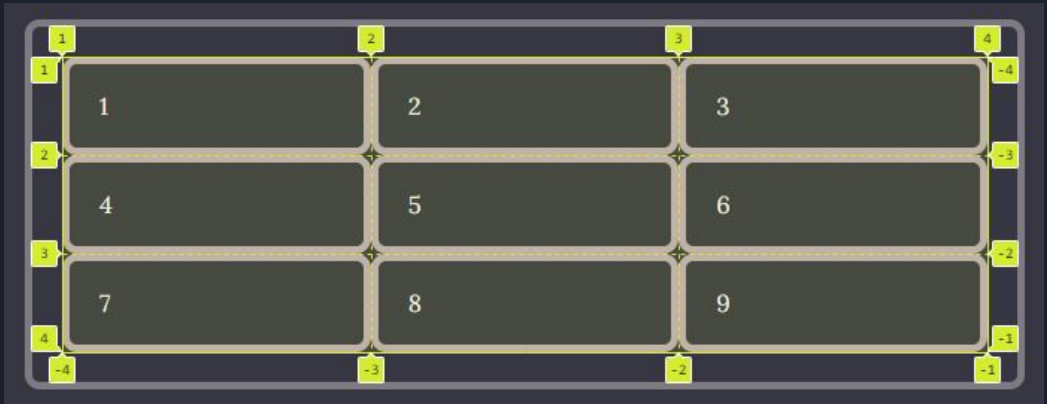
Line-based placement

Observe this grid:

Line-based placement

Imagine the lines that divide the grid: four horizontal and four vertical lines.

This is how they appear with the grid analyzer of Chrome's developer console. Note they are numbered.

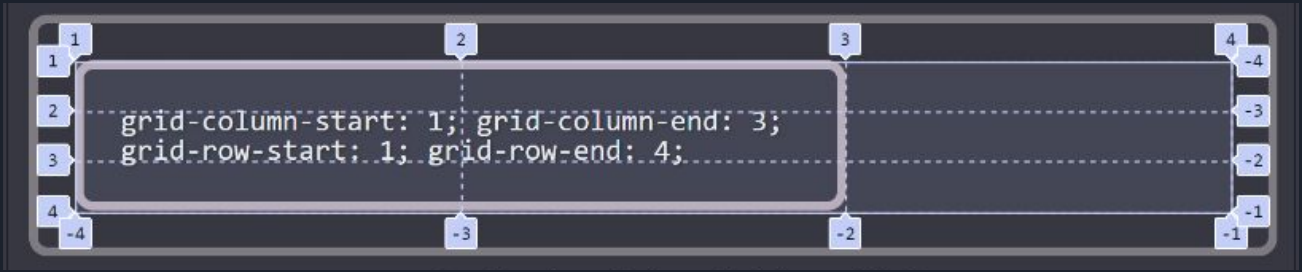


Line-based placement

We can use these numbers to tell each cell, “go from this line to this line”.

We do it like this:

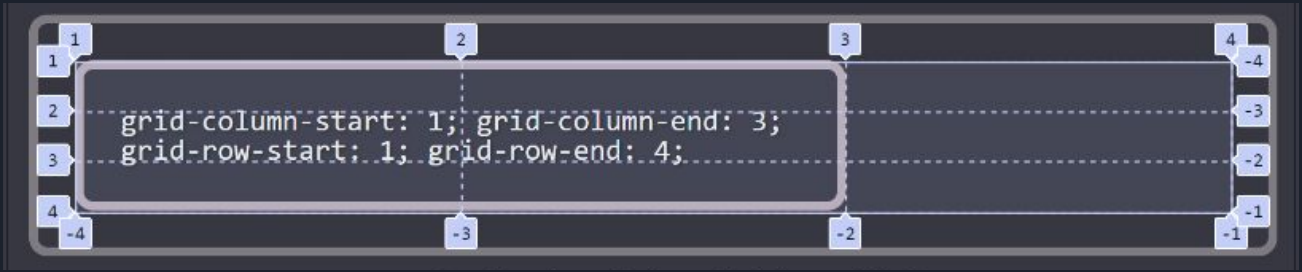
```
<div class="grid">
    <div style="grid-column-start: 1; grid-column-end: 3; grid-row-start: 1; grid-row-end: 4;">
        ...
    </div>
</div>
```



Line-based placement

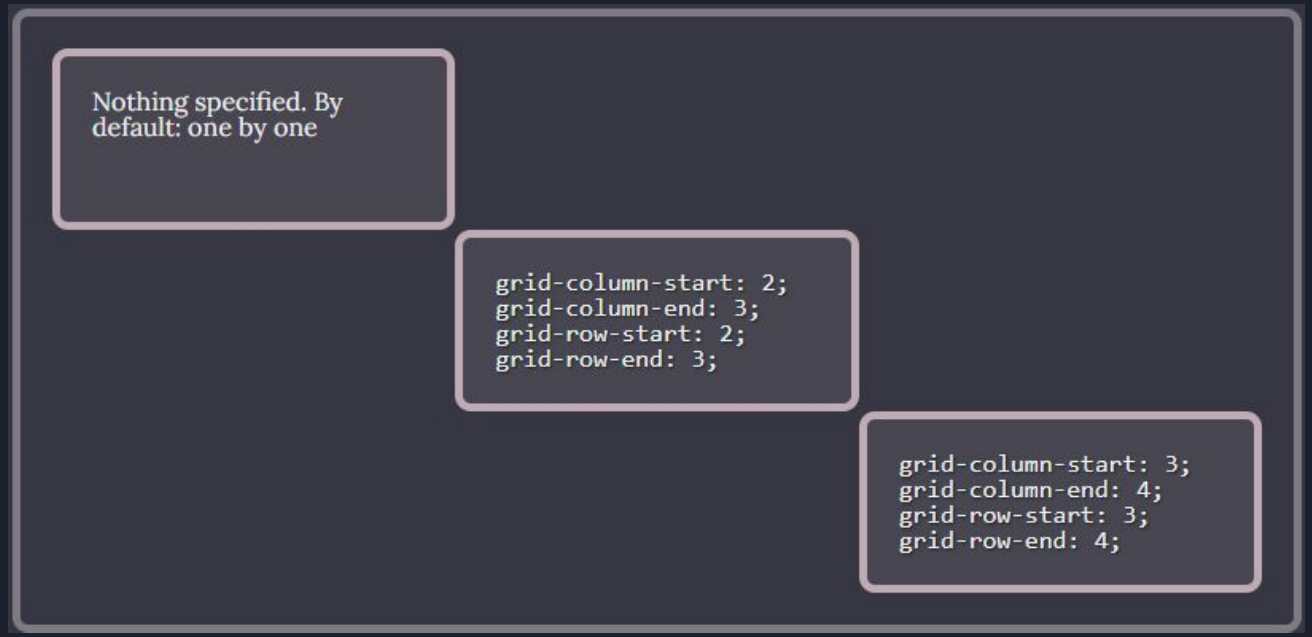
grid-column-start and grid-column-end refer to vertical lines.
grid-row-start and grid-row-end refer to horizontal lines.

```
<div class="grid">
    <div style="grid-column-start: 1; grid-column-end: 3; grid-row-start: 1; grid-row-end: 4;">
        ...
    </div>
</div>
```



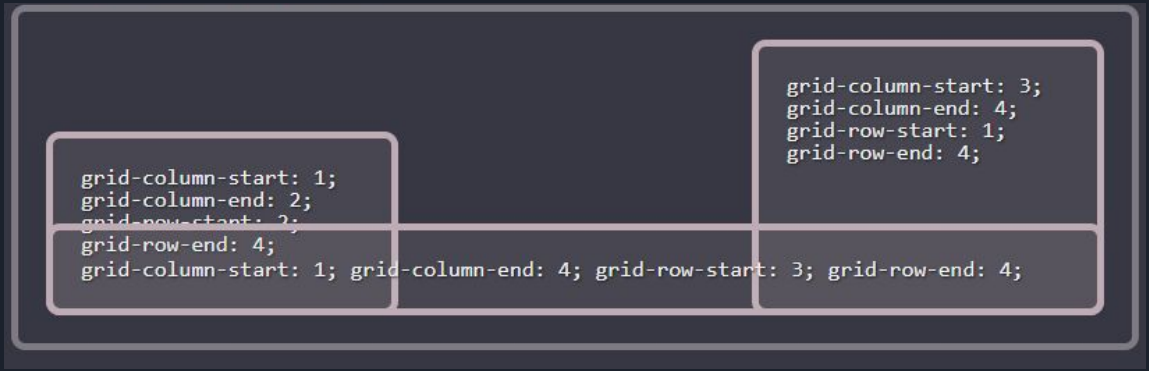
Line-based placement

We can play with these values for all cells.



Line-based placement

We can also make overlapping cells!

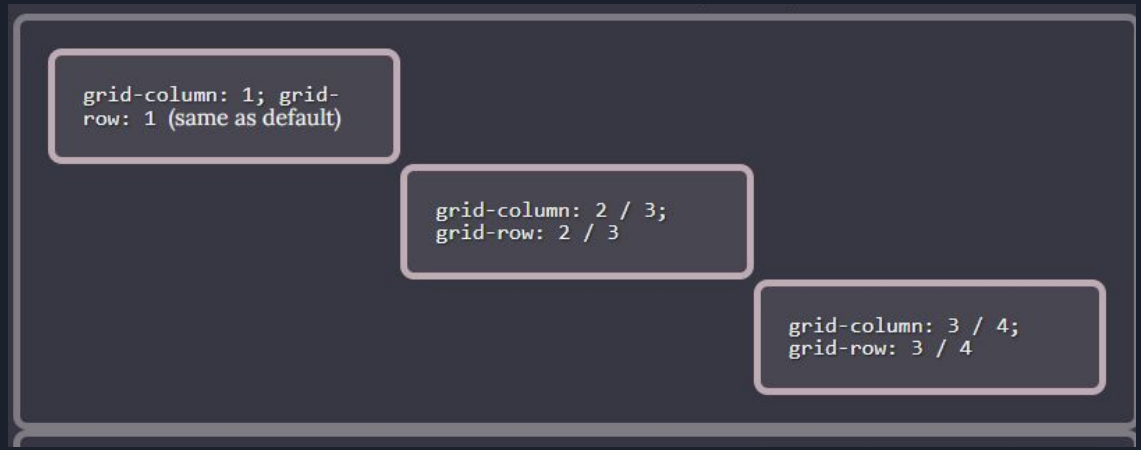


Line-based placement

Now, these things are long to write, but there are shorthands.

We can write:

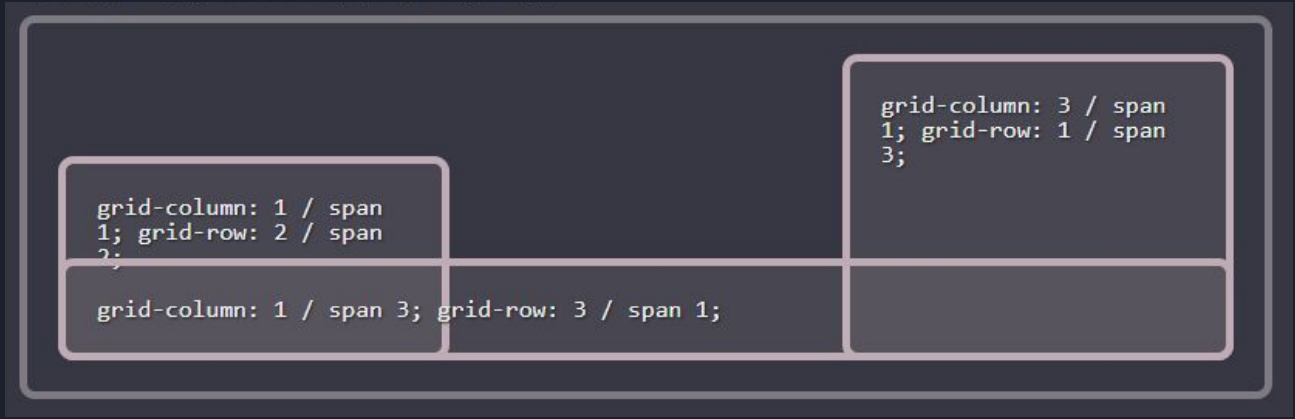
grid-column: <start line> / <end line>
grid-row: <start line> / <end line>



Line-based placement

Instead of writing in what line the cell ends, we can say how many spaces it occupies. For this, use the “span” keyword:

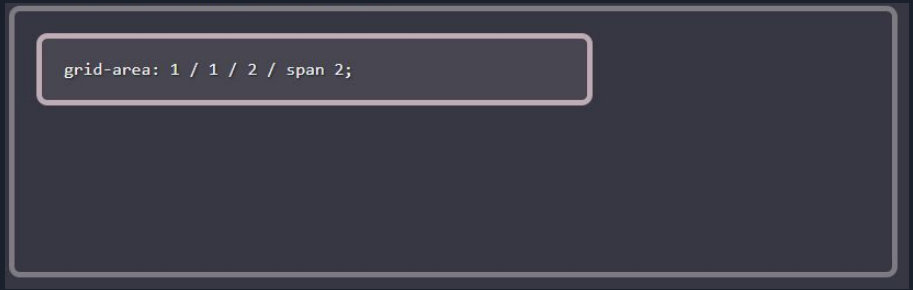
grid-column: <start line> / span <size>
grid-row: <start line> / span <size>



Line-based placement

Want this to be even shorter? Use the grid-area keyword instead:

grid-area: <grid-row-start> / <grid-column-start> / <grid-row-end> / <grid-column-end>



Named areas

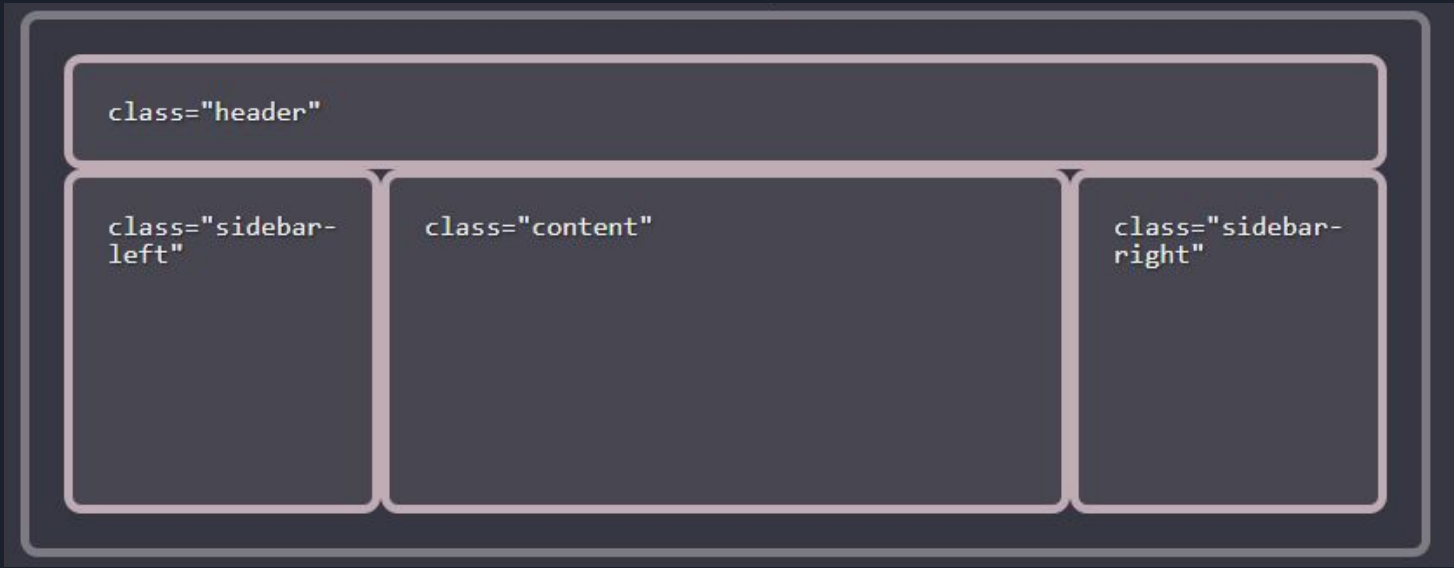
The other cell positioning method allows us to “paint” the areas where the cells will fall. This makes it easier to visualize how the page will look like, without having to calculate numbers.

This method has two steps:

1. Defining grid-area values
2. Using grid-template-areas to “paint” where each grid-area goes.

Named areas

We will create something like this. Our grid will have six columns and four rows.



Named areas

For reference, our HTML looks like this. Note we've given classes to the children:

```
<div class="grid">
    <div class="header">
        <code>class="header"</code>
    </div>
    <div class="sidebar-left">
        <code>class="sidebar-left"</code>
    </div>
    <div class="content">
        <code>class="content"</code>
    </div>
    <div class="sidebar-right">
        <code>class="sidebar-right"</code>
    </div>
</div>
```

Named areas

First, in CSS we give “grid-area” values to each class, like this:

```
.header { grid-area: head }
.sidebar-left { grid-area: left }
.sidebar-right { grid-area: right }
.content { grid-area: cont }
```

The values here don’t have to be “head”, “left”, etc.

They can be any string you want: you get to invent them.

Named areas

Next, we tell CSS where each grid-area goes. We use grid-template-areas for this:

```
.gtareas {
    grid-template-columns: repeat(6, 1fr);
    grid-template-rows: repeat(4, 1fr);
    grid-template-areas:
        'head head head head head head'
        'left cont cont cont cont right'
        'left cont cont cont cont right'
        'left cont cont cont cont right';
}
```

You'll notice I just attached this to a "`.gtareas`" class, so I also need to do:

```
<div class="grid gtareas">...</div>
```

Named areas

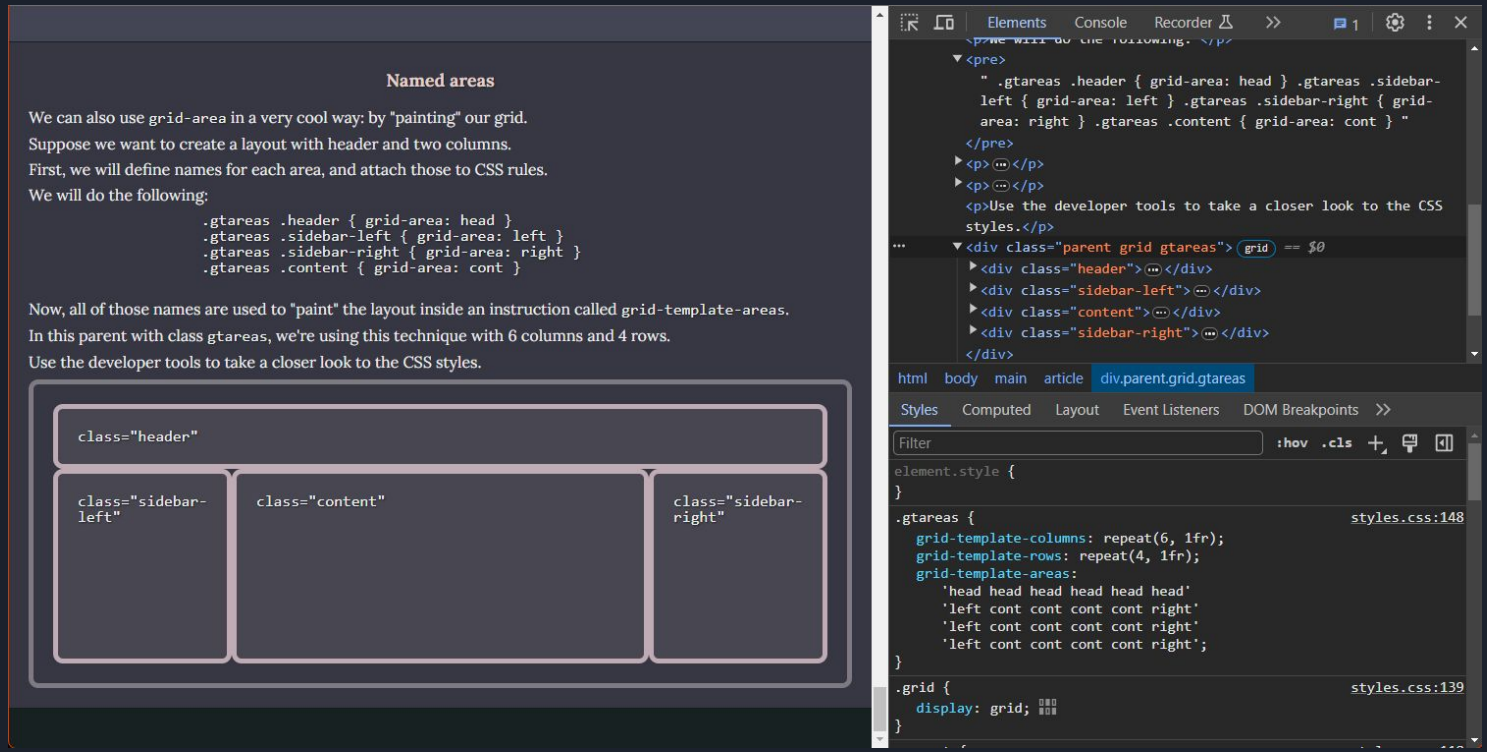
First, we create the four classes and give them “grid-area” values, like this:

```
.header { grid-area: head }
.sidebar-left { grid-area: left }
.sidebar-right { grid-area: right }
.content { grid-area: cont }
```

The values here don’t have to be “head”, “left”, etc.

They can be any string you want: you get to invent them.

Named areas


Named areas
We can also use grid-area in a very cool way: by "painting" our grid.
Suppose we want to create a layout with header and two columns.
First, we will define names for each area, and attach those to CSS rules.
We will do the following:
.gtareas .header { grid-area: head }
.gtareas .sidebar-left { grid-area: left }
.gtareas .sidebar-right { grid-area: right }
.gtareas .content { grid-area: cont }
Now, all of those names are used to "paint" the layout inside an instruction called grid-template-areas.
In this parent with class gtareas, we're using this technique with 6 columns and 4 rows.
Use the developer tools to take a closer look to the CSS styles.
class="header"
class="sidebar-left"
class="content"
class="sidebar-right"
Elements
Console
Recorder
" .gtareas .header { grid-area: head } .gtareas .sidebar-left { grid-area: left } .gtareas .sidebar-right { grid-area: right } .gtareas .content { grid-area: cont } "
Use the developer tools to take a closer look to the CSS styles.

html body main article div.parent.grid.gtareas
Styles
Computed
Layout
Event Listeners
DOM Breakpoints
Filter
:hov .cls
element.style {
}
.gtareas {
styles.css:148
grid-template-columns: repeat(6, 1fr);
grid-template-rows: repeat(4, 1fr);
grid-template-areas:
'head head head head head head'
'left cont cont cont cont right'
'left cont cont cont cont right'
'left cont cont cont cont right';
}
.grid {
styles.css:139
display: grid;
}

Named areas

If you need an empty space, define it with periods (“.”) inside grid-template-areas:

```
.gtareas-2 {
    grid-template-columns: repeat(6, 1fr);
    grid-template-rows: repeat(4, 1fr);
    grid-template-areas:
        'head head head head head head'
        '.    .    cont cont cont right'
        '.    .    cont cont cont right'
        '.    .    cont cont cont right';
}
```

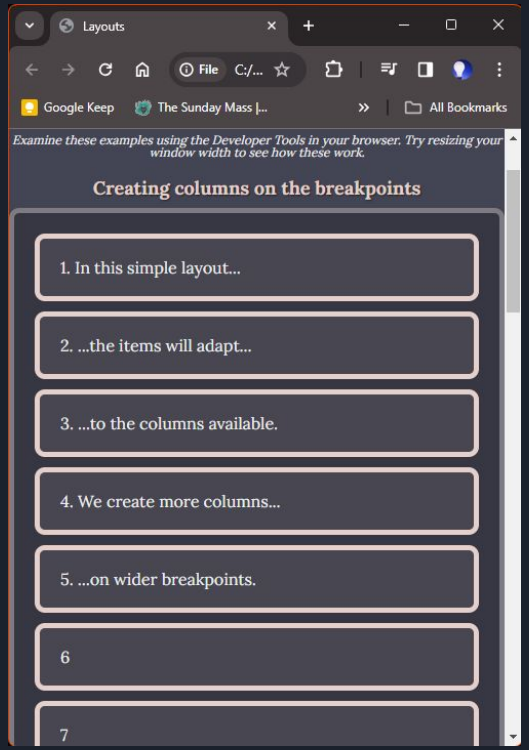
Responsive grids

There are many techniques to create responsive grids. We will study two.

Responsive grids

Creating columns on the breakpoints:

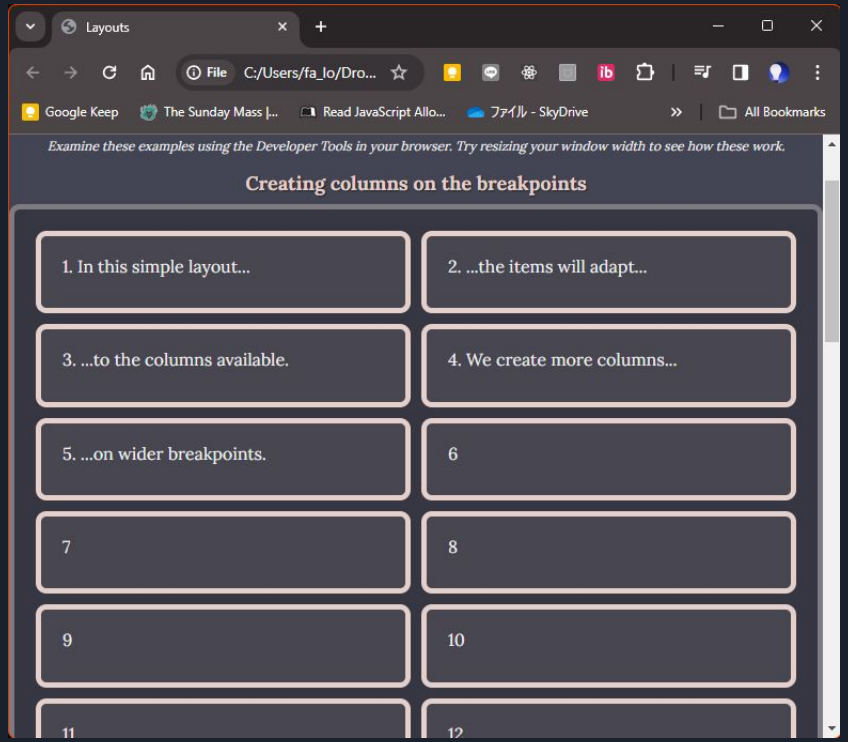
In this technique, we start with no columns and create them as the page grows.



Responsive grids

Creating columns on the breakpoints:

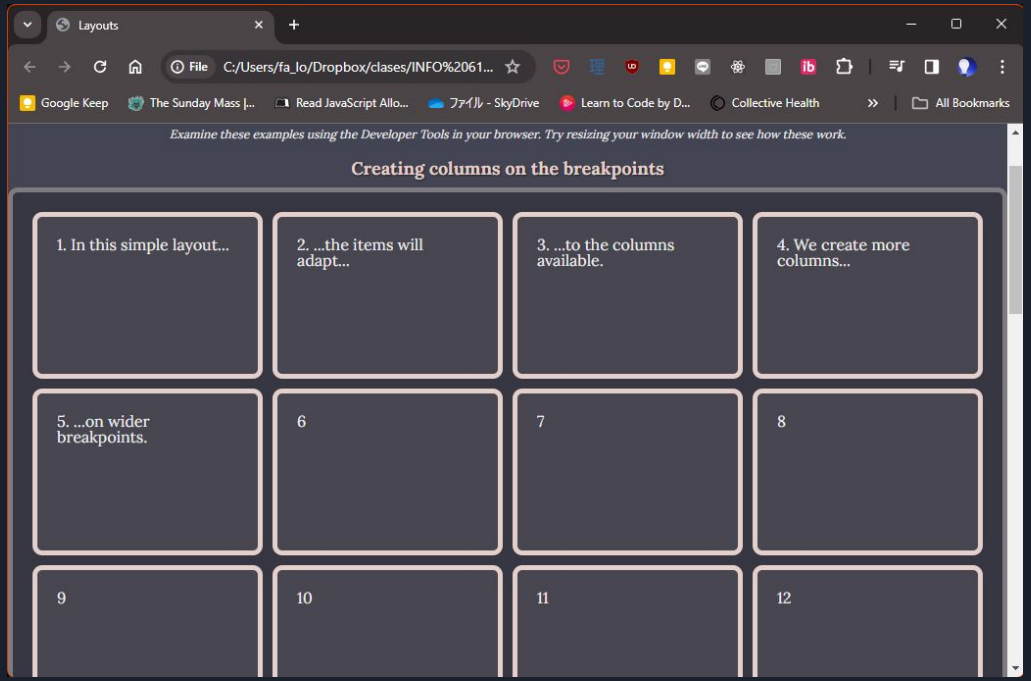
In this technique, we start with no columns and create them as the page grows.



Responsive grids

Creating columns on the breakpoints:

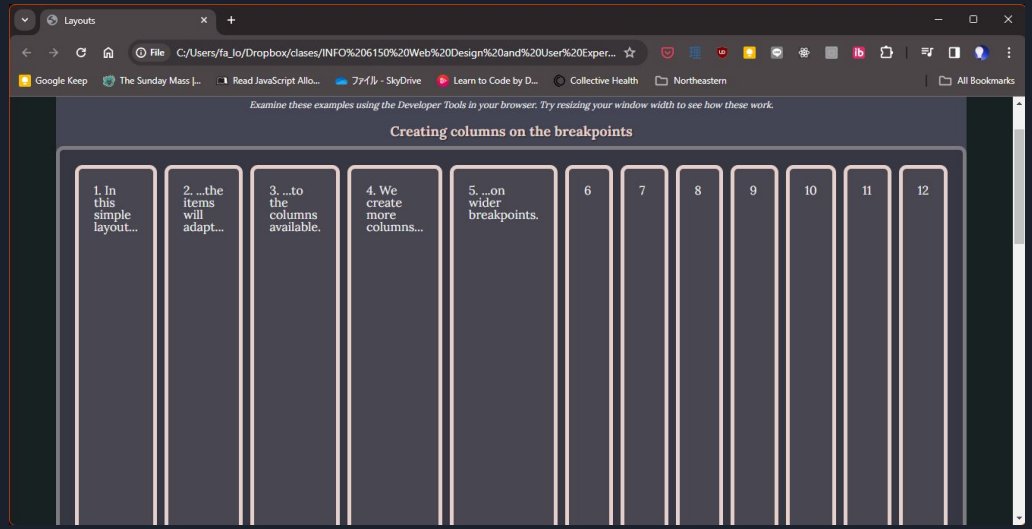
In this technique, we start with no columns and create them as the page grows.



Responsive grids

Creating columns on the breakpoints:

In this technique, we start with no columns and create them as the page grows.



Responsive grids

```
/* Creating columns on breakpoints */
.layout-1 {
    gap: 1rem;
    /* nothing else; this way we get one column by default */
}

@media (min-width: 600px) {
    .layout-1 {
        grid-template-columns: 1fr 1fr;
    }
}

@media (min-width: 800px) {
    .layout-1 {
        grid-template-columns: repeat(4, 1fr);
    }
}

@media (min-width: 1200px) {
    .layout-1 {
        grid-template-columns: repeat(12, 1fr);
    }
}
```

Responsive grids

Always 12 columns, change where cells start on each breakpoint:

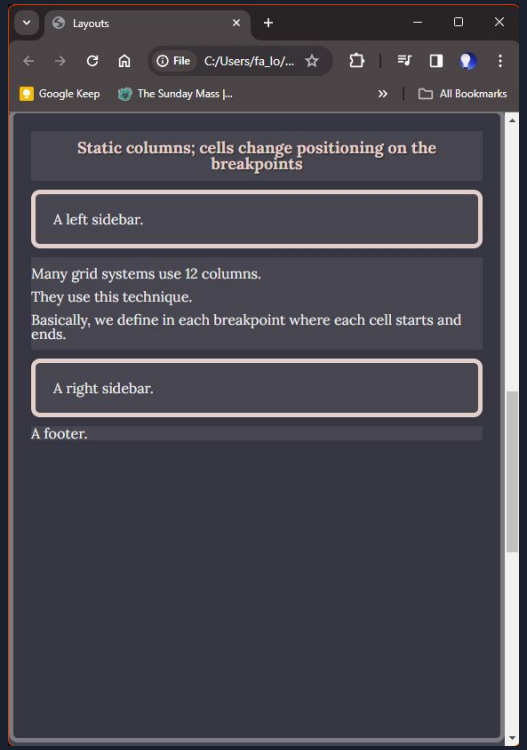
This is very close to how grid design systems work.

There is always the same number of columns in the layout, and what keeps changing is the cells.

This can make things much more flexible.

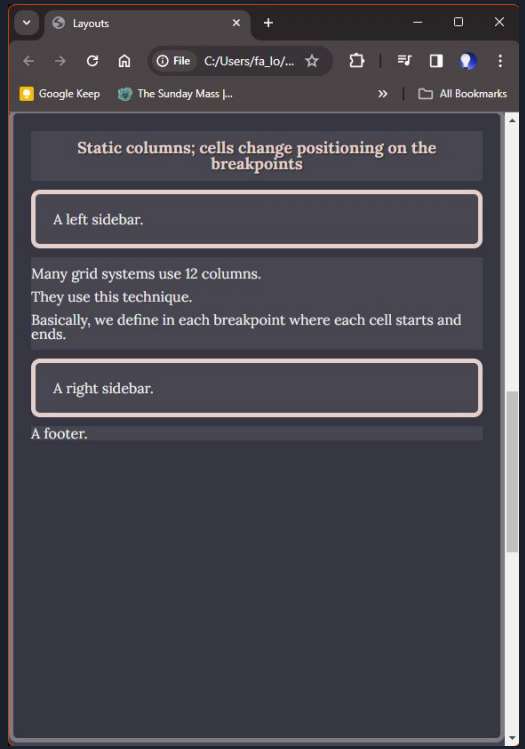
Responsive grids

```
.layout-2 {
    grid-template-columns: repeat(12, 1fr);
    gap: 1rem;

    /* Make the heights flexible. */
    /* max-content means: the maximum size of
the content. */
    /* Note: we can only do this if we know how
many rows we need. */
    grid-template-rows: repeat(5, max-content);
}
```



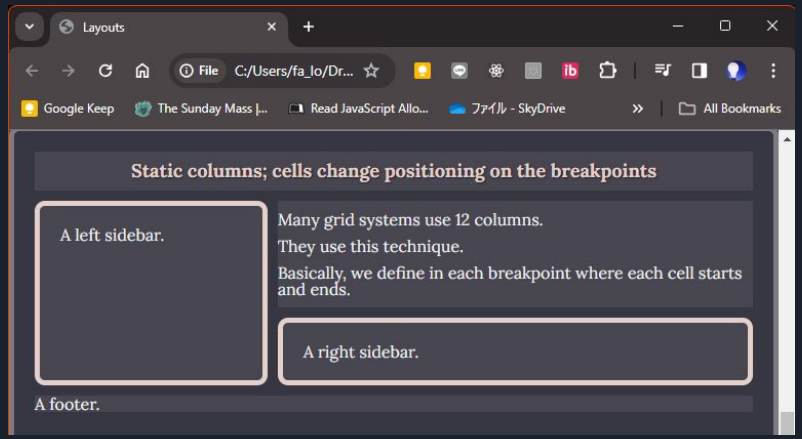
Responsive grids

```
.layout-2 {
    grid-template-columns: repeat(12, 1fr);
    gap: 1rem;

    /* Make the heights flexible. */
    /* max-content means: the maximum size of
the content. */
    /* Note: we can only do this if we know how
many rows we need. */
    grid-template-rows: repeat(5, max-content);
}
/* initially, all elements use the 12 columns.
   This is the same as having a single column.
*/
.layout-2 > * {
    grid-column: 1 / span 12;
}
```



Responsive grids

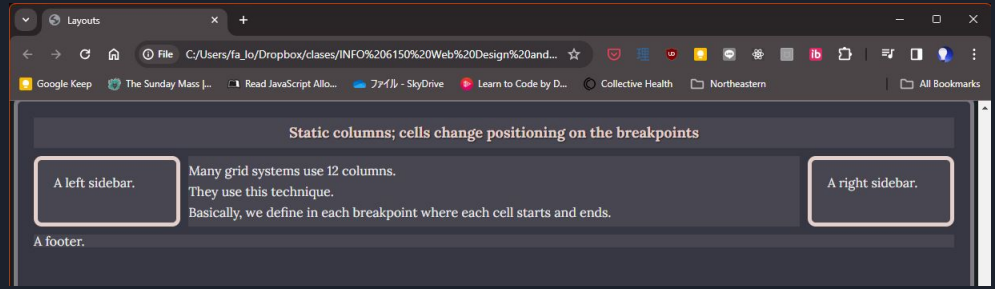
```
/* two-column layout here */
@media (min-width: 600px) {
    /* header uses all the width already */
    .layout-2 header {
        grid-column: 1 / span 12;
        grid-row: 1 / span 1;
    }

    .layout-2 .left-sidebar {
        grid-column: 1 / span 4;
        grid-row: 2 / span 2;
    }

    .layout-2 main {
        grid-column: 5 / span 8;
        grid-row: 2 / span 1;
    }
...
```




```
    .layout-2 .right-sidebar {
        grid-column: 5 / span 8;
        grid-row: 3 / span 1;
    }

    .layout-2 footer {
        grid-column: 1 / span 12;
        grid-row: 4 / span 1;
    }
```

Responsive grids

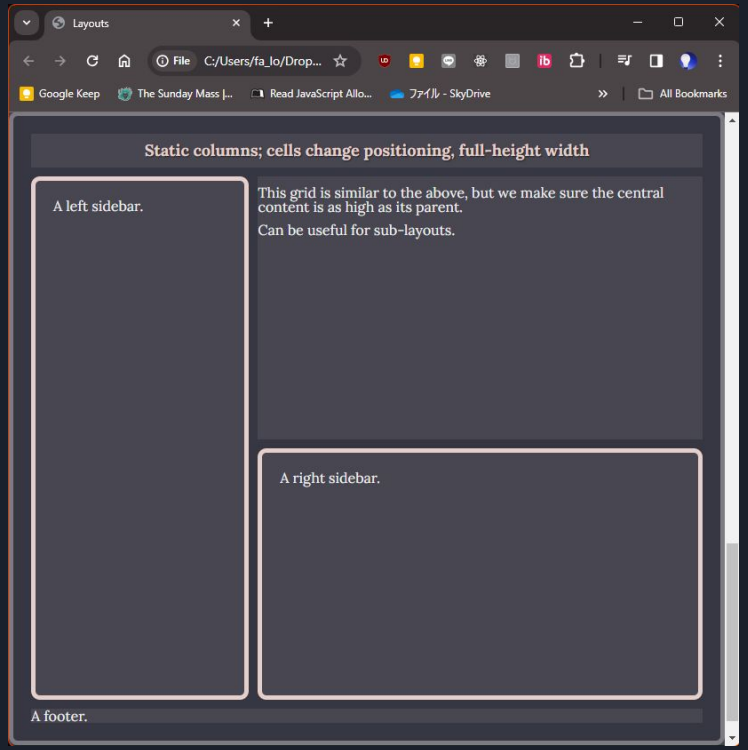
```
/* three-column layout here */
@media (min-width: 1200px) {
    .layout-2 .left-sidebar {
        grid-column: 1 / span 2;
    }

    .layout-2 main {
        grid-column: 3 / span 8;
        grid-row: 2 / span 2;
    }

    .layout-2 .right-sidebar {
        grid-column: 11 / span 2;
        grid-row: 2 / span 2;
    }
}
```



Responsive grids

The layout row heights can be changed to auto to make them fit the parent's size.

```
/* two-column layout here */
@media (min-width: 600px) {
    .layout-3 {
        grid-template-rows: max-content auto
auto max-content;
    }
```



CSS frameworks

In modern web development, it’s increasingly popular to not create (most or any) CSS from scratch, and instead use CSS frameworks.

CSS frameworks are software packages that can be included into your code. They already provide solutions to most situations. Note that you should be familiar with how CSS works to take full advantage of them.

Two popular frameworks are Bootstrap and Tailwind.

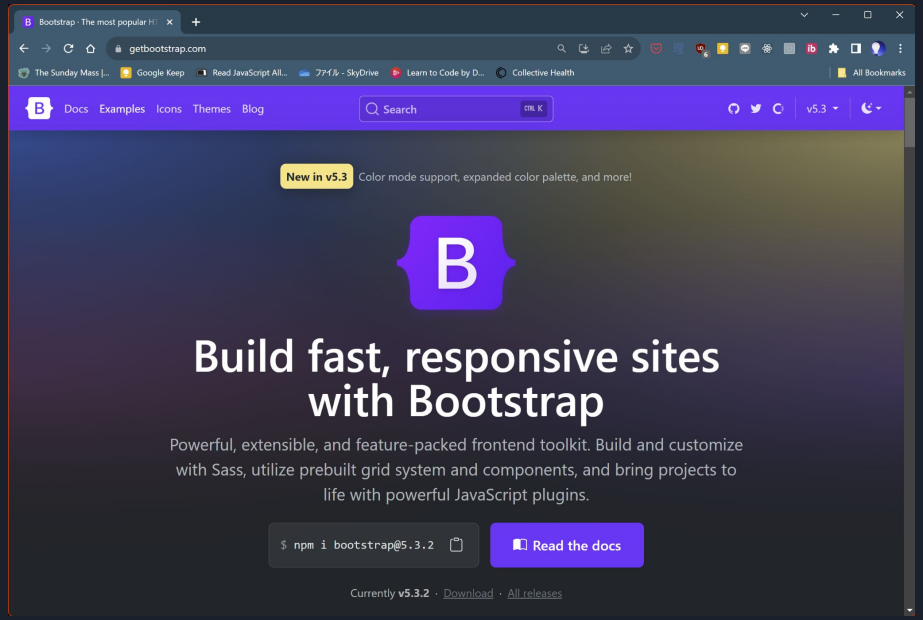
Bootstrap

Bootstrap uses Sass. Sass is CSS with more features, basically.

You can play with the example here and read the docs here.

The easiest way to get started is here: add a <script> and a <style> tag pointing to Bootstrap's files. You will automatically get some useful base styles.

Bootstrap also contains a full library of JS components - you're welcome to explore it!



Tailwind

In Tailwind you get a collection of pre-styled classes, which you can add to your HTML tags.

The website is here; documentation is here. For a quick start, check their playground.

Note: the installation documentation mentions npm and npx; these are covered in a later section of the course. I recommend starting with the “Play CDN” option for now.