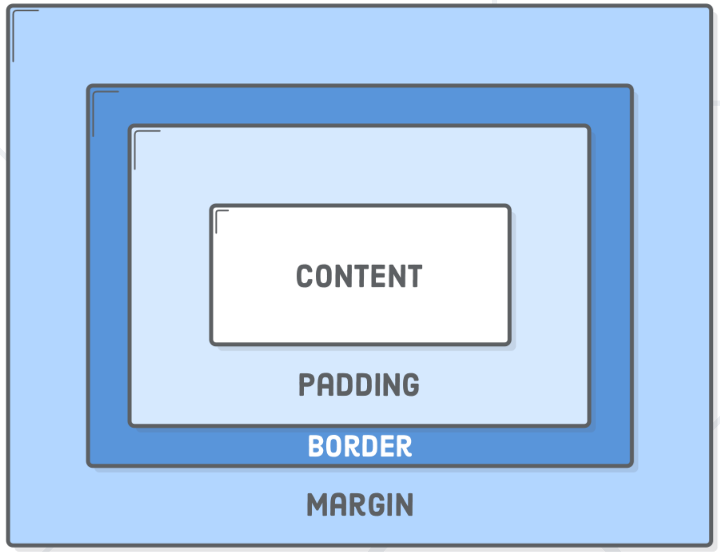
HTML and CSS

Box Model, Containers and Flexbox



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#QA-FrontEnd

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CSS Box Model

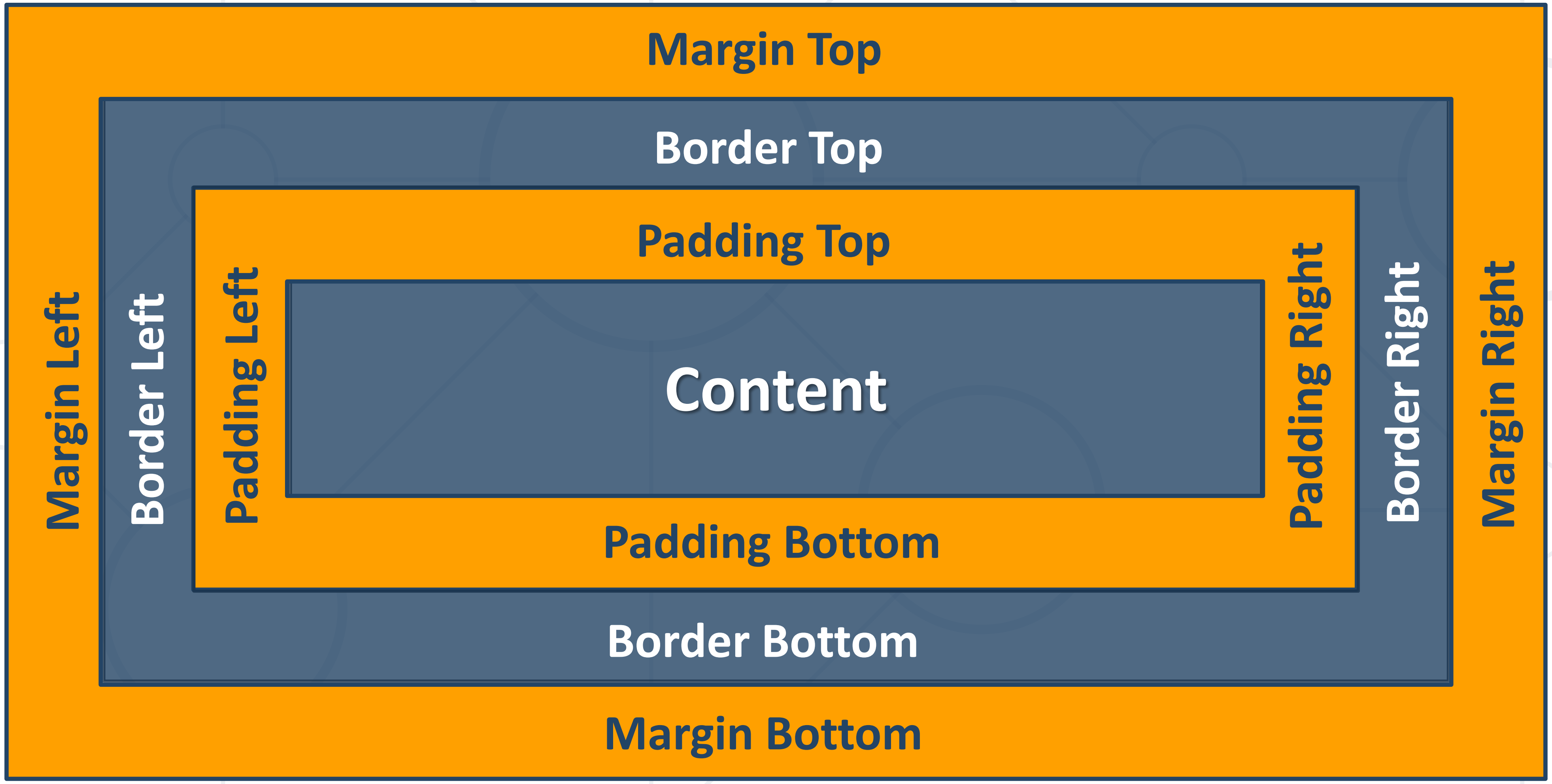
The CSS Box Model

- Fundamental concept in web design and development
- Each **HTML element** is represented as a **rectangular box** by the rendering engine of the browser
- Allows controlling the **spacing** and **sizing** of elements
  - Crucial for **structure** and **consistency**
- Four elements
  - **Content**, **padding**, **border**, **margin**

CSS Box Model Elements

- **Content**
  - Text and / or media (e.g., images)
- **Padding**
  - Transparent area around the content
- **Border**
  - Wraps content and padding
- **Margin**
  - Transparent area outside the border

The CSS Box Model



Box Model – CSS Properties

- `margin`
  - Sets the margin area on all four sides of an element
  - Shorthand for `margin-top`, `margin-right`, `margin-bottom`, and `margin-left`

```css
.box {
  margin: 50px;
}
```

Box Model – CSS Properties

- **border**
  - Sets the element's border
  - Shorthand for **border-width**, **border-style** and **border-color**

```css
.box {
  border: 1px solid black;
}
```

Box Model – CSS Properties

- **padding**
  - Sets the margin area on all four sides of an element
  - Shorthand for **padding-top**, **padding-right**, **padding-bottom**, and **padding-left**

```css
.box {
  padding: 50px;
}
```

Block & Inline Elements

Block & Inline Elements

- In HTML & CSS, elements are categorized in **two main** types
  - **Block**
  - **Inline**
- They have differences in both **behavior** and **styling**
- Third type → **inline-block**
  - **Combines features** of block and inline elements

Block Elements

- Used for defining the web page's **structure**
- **Start** on a **new line**
- Occupy the **full available width**
- **Accept width** and **height** properties
- Can have **margins** and **paddings**
- Examples
  - `<p>`, `<div>`, `<h1>`, `<section>`, …

Inline Elements

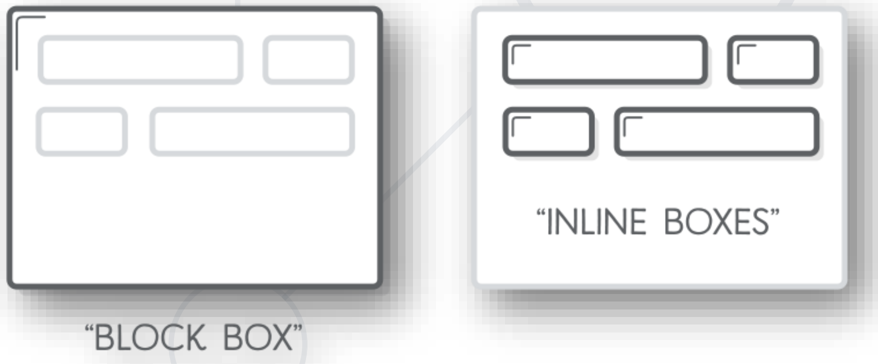
- Used for **styling** segments or small components of a web page
- **Do not start** on a **new line**
- Occupy the **needed width** only
- **Do not accept width** and **height** properties
- Can have **horizontal margins** and **paddings**
- Examples
  - `<span>`, `<a>`, `<strong>`, `<img>`, …

Inline-block Elements

- Used for special cases
  - e.g., horizontally aligned menus
- **Do not start** on a **new line**
- Occupy the **needed width** only
- **Accept width** and **height** properties
- Can have **margins** and **paddings**

CSS Display Properties

- `display`
  - Most important property for controlling an element's layout
  - Specifies how an element is shown on a web page
    - Sets an element's **inner** and **outer** display types
      - **Outer** type defines **element's position** in flow layout
      - **Inner** type defines the layout of the **element's children**



CSS Display Properties

- `display: block;`
  - Displays an element as a **block** element
  - Starts on a **new** line
  - Takes the **whole** width
- `display: inline;`
  - Default value for the `display` property
  - Displays an element as an **inline** element
  - Starts on the **same** line
  - Takes only the **necessary** width

CSS Display Properties

- `display: inline-block;`
  - Treat **inline** elements as **block** elements
  - Starts on the **same** line
  - Takes the **specified width** and **height**
  - Respects **margins** and **paddings**

```
.box {
  display: inline-block;
}
```

CSS Width & Height

CSS Width & Height

- `width`
  - Sets an element's width
- `height`
  - Sets an element's height

```
.box {
  width: 150px;
  height: 250px;
}
```

CSS Width & Height Values

- `auto`
  - Default value, calculated by the browser
- `length`
  - Defines the value in one of the CSS Units
- `%`
  - Defines the value according to the containing block
- `Initial`
  - Sets the width/height to its default value
- `Inherit`
  - Inherited from the parent's value

CSS Width & Height Min Values

- Set the **minimum width** and **height** of an element
- **Prevent** the used **values** of the width and height properties from becoming **smaller** than the values specified
  - **`min-width`**
  - **`min-heigth`**

```css
.box {
  min-width: 150px;
  min-height: 200px;
}
```

CSS Width & Height Max Values

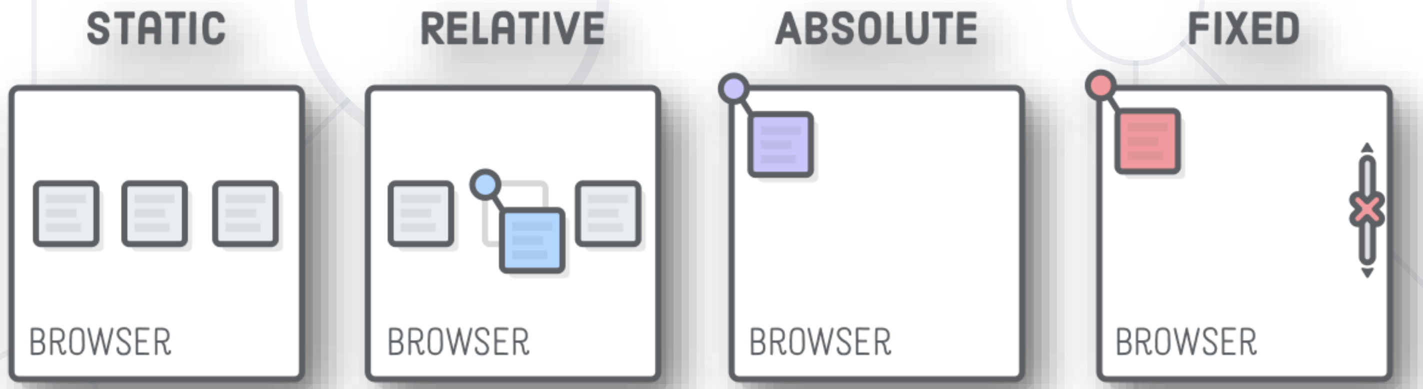
- Set the **maximum width** and **height** of an element
- **Prevent** the used **values** of the width and height properties from becoming **larger** than the values specified
  - `max-width`
  - `max-height`

```css
.box {
  max-width: 300px;
  max-height: 400px;
}
```

CSS Position

Position

- Specify the type of positioning method used for an element
- Four **major** types
  - Static
  - Relative
  - Absolute
  - Fixed



CSS Position

- `position: static;`
  - The default state of every element
  - Places the element into its normal position in the document layout flow
  - **Not affected** by `top`, `bottom`, `left` and `right` properties

```
.box {
  position: static;
}
```

CSS Position

- `position: relative;`
  - Similar to static positioning
  - Once the positioned element has taken its place in the normal layout flow, its final position can be modified using `top`, `bottom`, `left` and `right` properties

```
.box {
  position: relative;
}
```

CSS Position

- `position: fixed;`
  - Position is relative to the viewport
  - Elements stays in the same place even if the page is scrolled
  - Affected by properties `top`, `bottom`, `left` and `right`

```
.box {
  position: fixed;
}
```

CSS Position

- `position: absolute;`
  - Element is positioned based on the two-dimensional coordinate system
  - Relative to the nearest positioned ancestor

```css
.box {
  position: absolute;
}
```

CSS Position

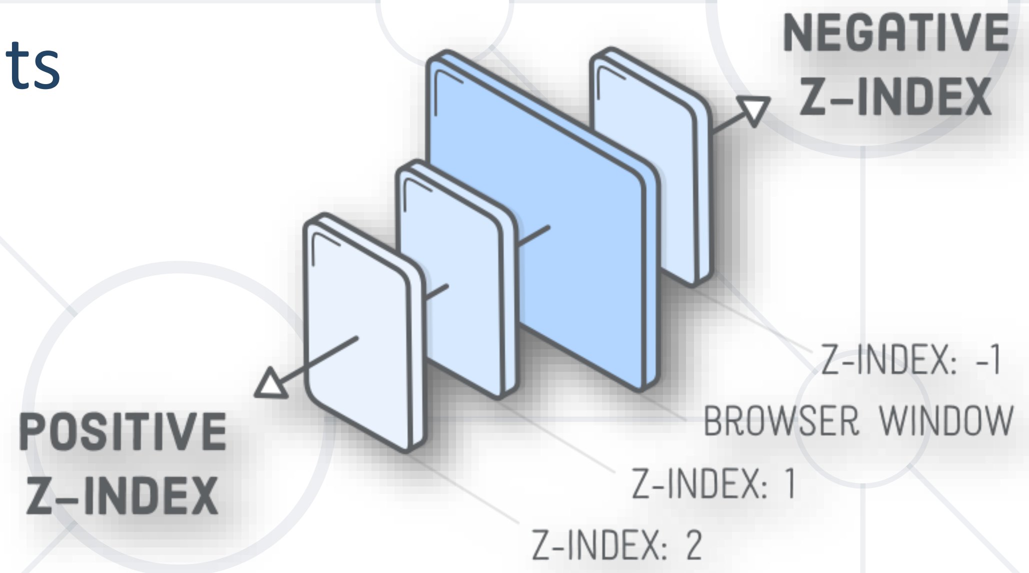
- `position: sticky;`
  - Based on the user's scrolling
  - Resembles `position: relative`
  - Once the given offset position is met, resembles `position: fixed`

```css
.box {
  position: sticky;
}
```

CSS Position

- `z-index`
  - Specifies stack order of an element
  - Used for overlapping other elements

```
.box {
  z-index: [number];
}
```



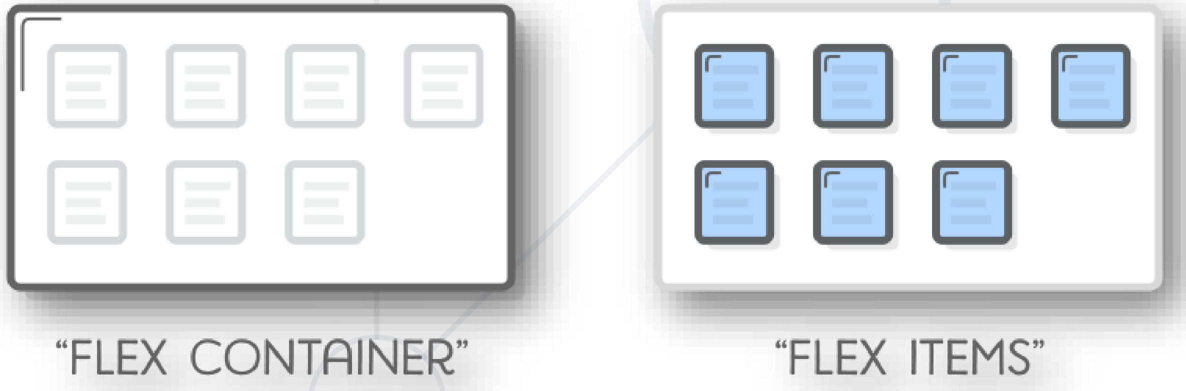
CSS Positioning Properties

- Control placement of an element within its containing element
- Four positioning properties for direction
  - `top`
  - `bottom`
  - `left`
  - `right`
- Set the margin edge for the positioned box
- Combined with the different types of `position` property

Flexbox

What is Flexbox?

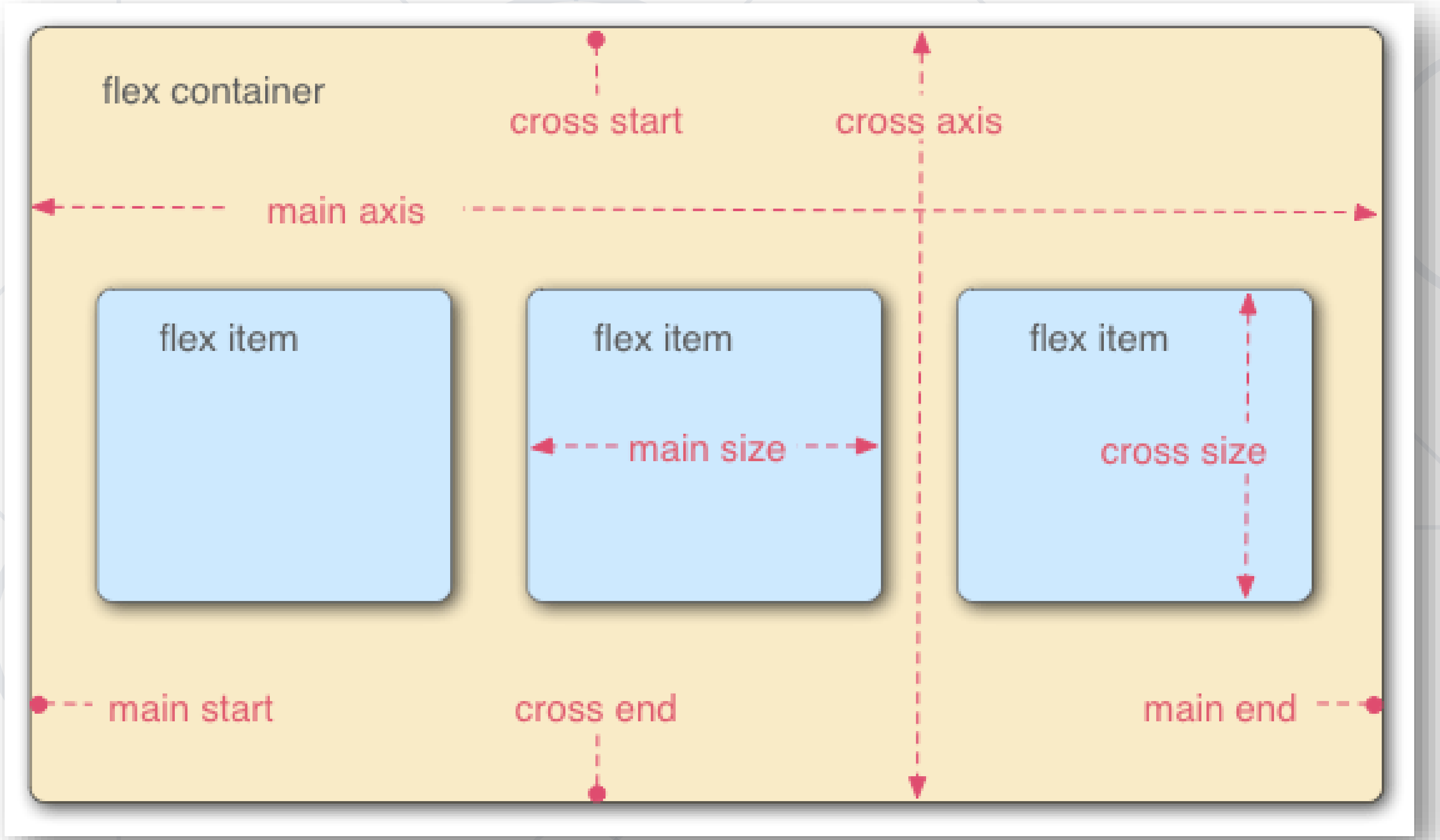
- Flexbox == Flexible Box Layout Module
- Powerful layout method for arranging elements
  - Organize the elements in **rows** and **columns** within a container
  - Design flexible layout **without positioning**



The Flex Model

- **Flex container**
  - **Main** element that holds other elements
  - Defines the **layout** and **positioning** of all its **children**
  - Used for creating **distinct sections** in a webpage
- **Items**
  - **Direct child** element of a container element
  - Managed by the parent container element's properties

The Flex Model



Container Properties

Container Properties

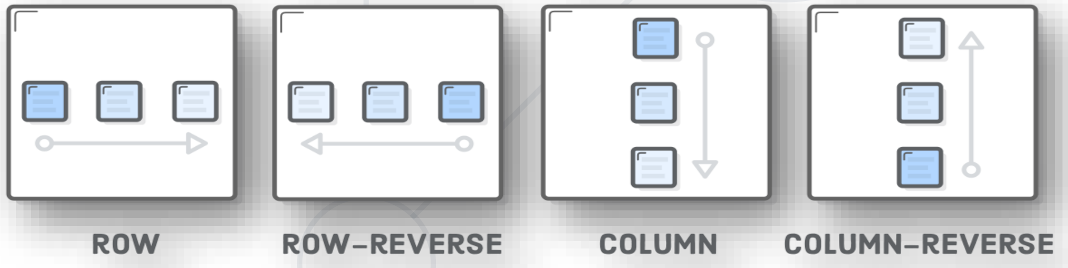
- `display: flex;`
  - Define the flex container
  - Enable the flex context for the direct children of the container

```
.box {
  display: flex;
}
```

Container Properties

- `flex-direction`
  - Specify which direction the main axis runs (which direction the flexbox children are laid out in)
  - Default value → `row`

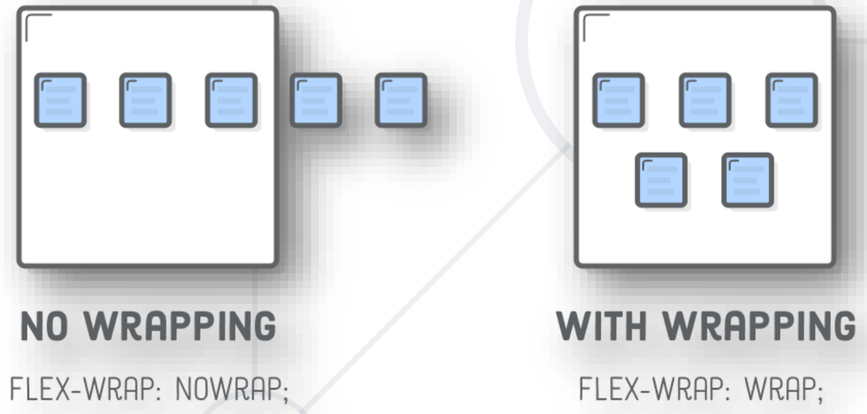
```
.box {
  flex-direction: row | row-verse | column | column-verse;
}
```



Container Properties

- `flex-wrap`
  - Control the children overflow of the container

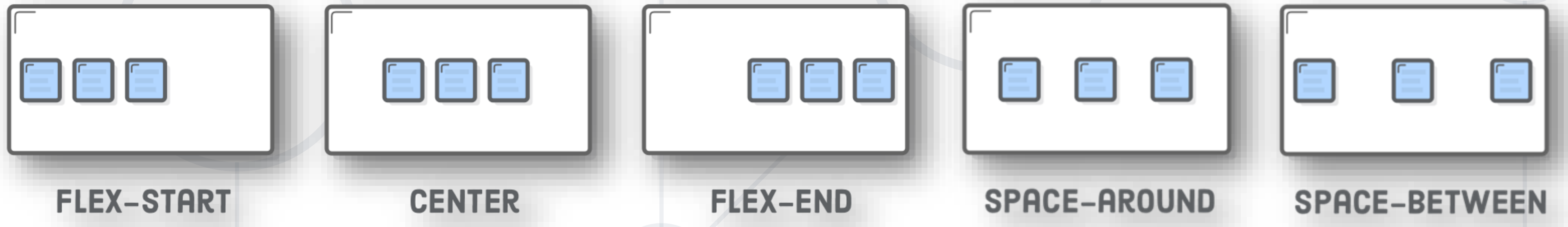
```
.box {
  flex-wrap: wrap | nowrap | wrap-verse;
}
```



Container Properties

- `justify-content`
  - Define the items alignment along the **main** axis

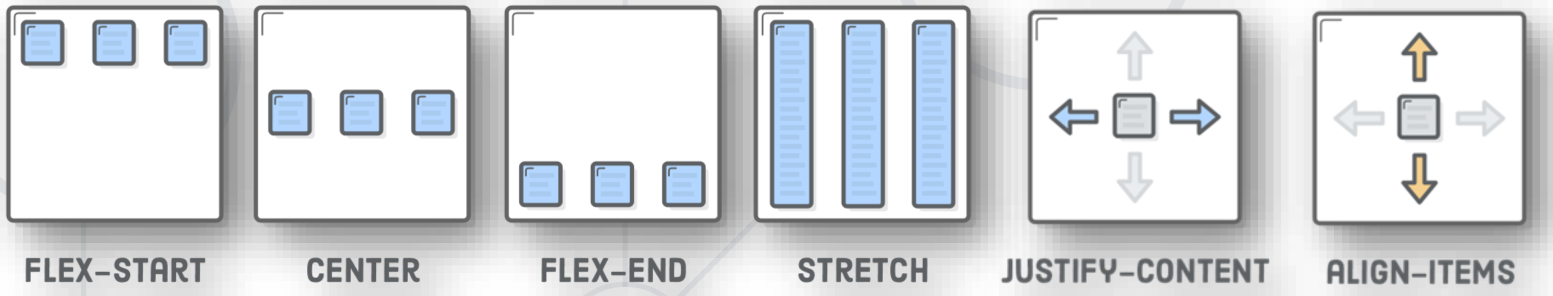
```
.box {
  justify-content: flex-start | center | flex-end | space-around | space-between;
}
```



Container Properties

- align-items
  - Define the items alignment along the **cross** axis

```
.box {
  align-items: stretch | flex-start | flex-end | center |
justify-content | align-items;
}
```



Container Properties

- `align-content`
  - Define the container's lines alignment along the **cross** axis

```
.box {
  align-items: flex-start | flex-end | center | space-between
| space-around | stretch | start | end;
}
```

Container Properties

- gap
  - Sets the gaps (gutters) between rows and columns

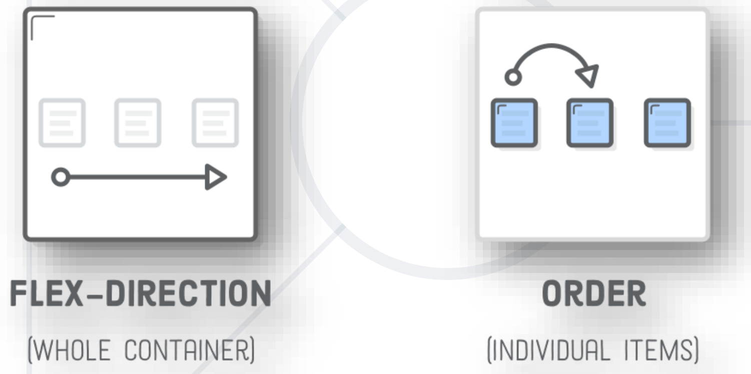
```
.box {
  gap: 2em;
}
```

Items Properties

Item Properties

- order
  - Set the order to lay out an item in a flex container
    - Items in a container are sorted by ascending order value and then by their source code order

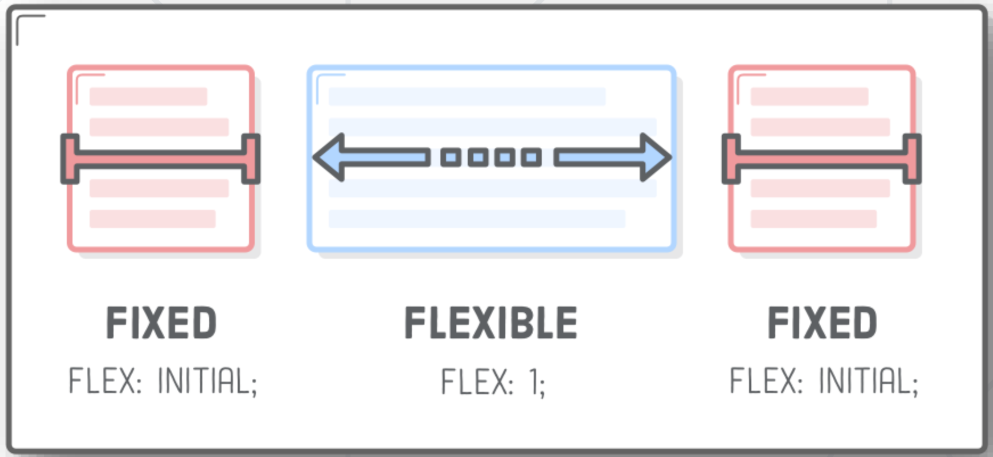
```
.box {
  order: 1;
}
```



Item Properties

- `flex-grow`
  - Define the ability to grow an item

```
.box {
  flex-grow: 1;
}
```



Item Properties

- `flex-shrink`
  - Define the ability to shrink an item

```css
.box {
  flex-shrink: 1;
}
```

- `flex-basis`
  - Set the initial main size of a flex item

```css
.box {
  flex-basis: 20em;
}
```

Summary

- The CSS Box model is a fundamental concept in web development
- Using various properties, allows controlling the spacing and sizing of elements
- Inline & Block elements define the behavior and styling of HTML elements
- Flexbox == powerful layout method for arranging elements in a web page
  - Container
  - Items

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