CSS Box Model

Everything whatever we see on the webpage renders in a rectangular box. Whether it is heading, paragraph, video or something else. The box can be the browser window, the div in which we place the element or the element itself.
The browser uses the CSS Box Model to manage the boxes which are rendering.

The box model consists of the following things:

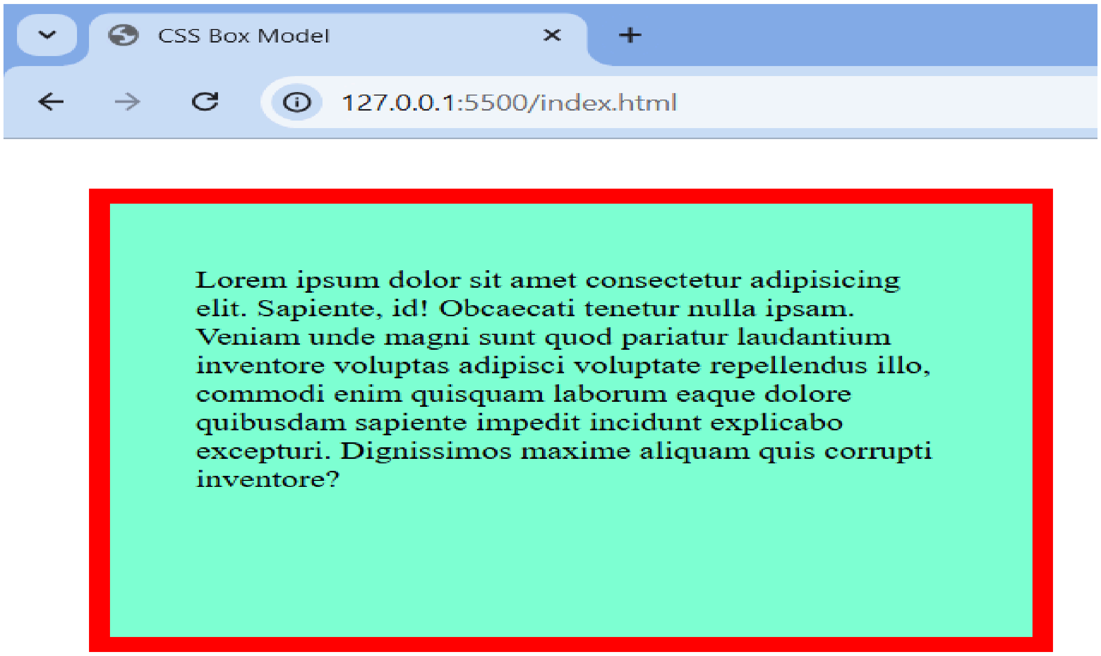
Content: The actual content of the element (e.g., text, image).
Padding: Space between the content and the border.
Border: A line surrounding the padding and content.
Margin: Space outside the border that separates the element from other elements.

Code Example:

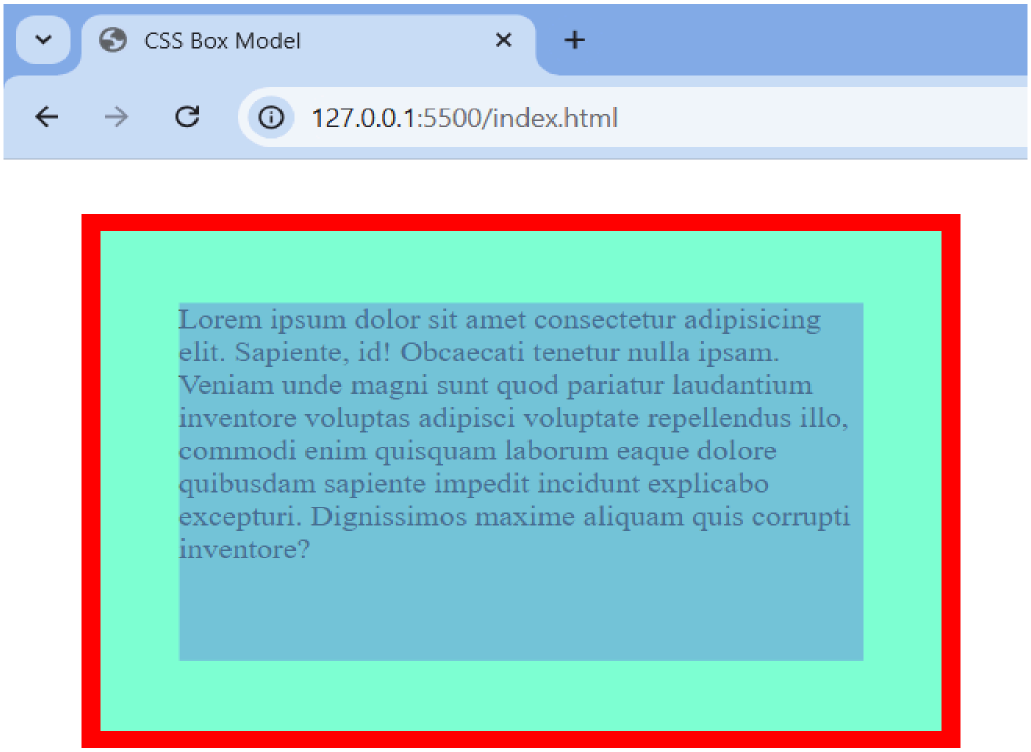
```
<!DOCTYPE html>
<html>
  <head>
    <title>CSS Box Model</title>
    <style>

      p {
        border: 10px solid red;
        background-color: aquamarine;
        height: 200px;
        width: 350px;
        margin: 32px;
        padding: 40px;
      }
    </style>
  </head>
  <body>
      <p>Lorem ipsum dolor sit amet consectetur adipisicing elit. Sapiente, id! Obcaecati tenetur nulla ipsam. Veniam unde magni sunt quod pariatur laudantium inventore voluptas adipisci voluptate repellendus illo, commodi enim quisquam laborum eaque dolore quibusdam sapiente impedit incidunt explicabo excepturi. Dignissimos maxime
```

```
aliquam quis corrupti inventore?</p>
  </body>
</html>
```

OUTPUT

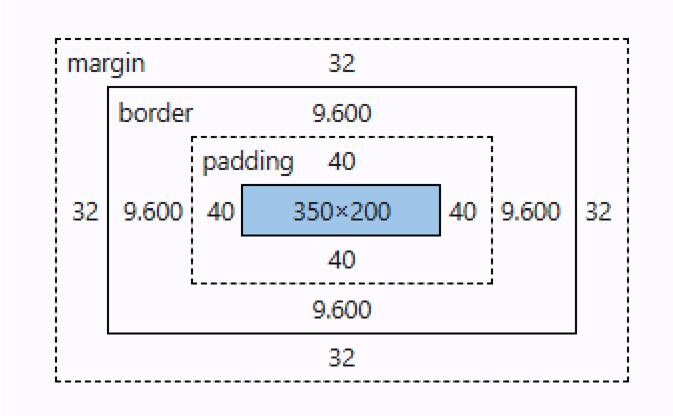


Lorem ipsum dolor sit amet consectetur adipisicing elit. Sapiente, id! Obcaecati tenetur nulla ipsam. Veniam unde magni sunt quod pariatur laudantium inventore voluptas adipisci voluptate repellendus illo, commodi enim quisquam laborum eaque dolore quibusdam sapiente impedit incidunt explicabo excepturi. Dignissimos maxime aliquam quis corrupti inventore?



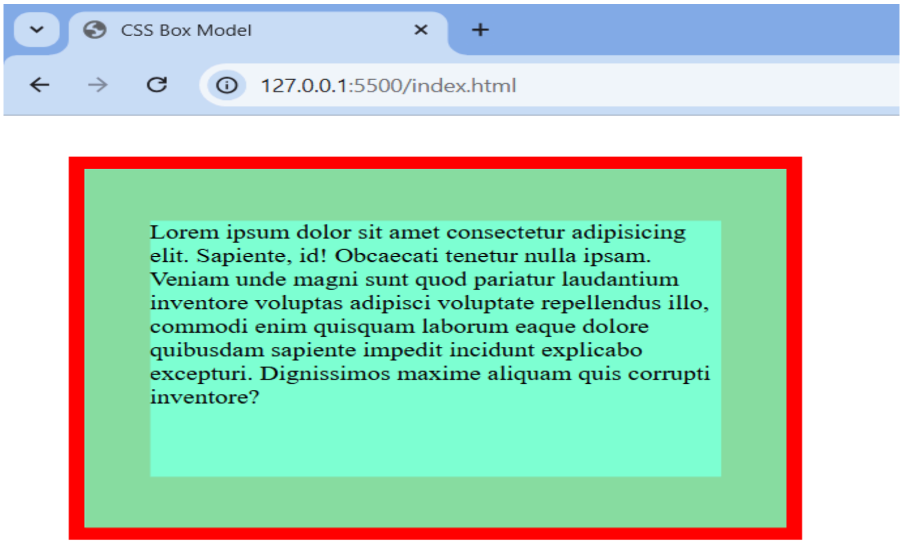
Lorem ipsum dolor sit amet consectetur adipisicing elit. Sapiente, id! Obcaecati tenetur nulla ipsam. Veniam unde magni sunt quod pariatur laudantium inventore voluptas adipisci voluptate repellendus illo, commodi enim quisquam laborum eaque dolore quibusdam sapiente impedit incidunt explicabo excepturi. Dignissimos maxime aliquam quis corrupti inventore?

Box Model



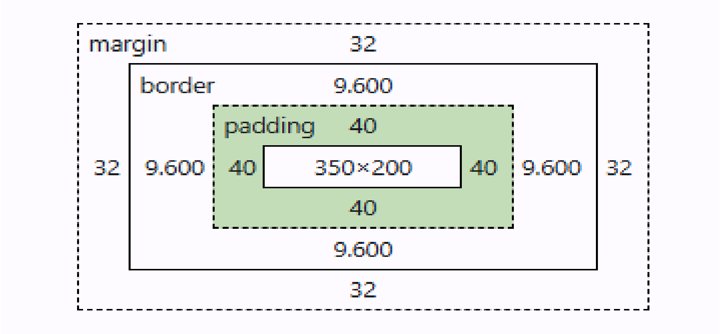
In the above two figures you can see that in the box model it is written 350x200, and in the output screen which is above the box model the written things is highlighted with the same color by which 350x200 is highlighted in the box model. This is the content part of the CSS box model. The content is the core part of the CSS Box Model and represents the actual data or content inside an element.

Padding part explanation



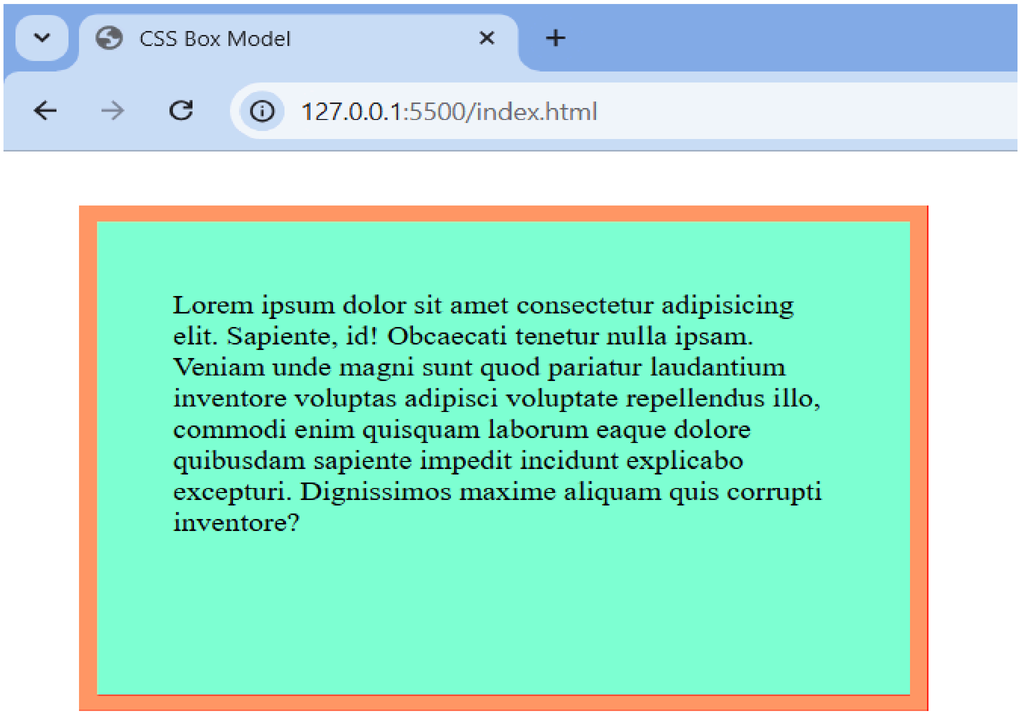
Lorem ipsum dolor sit amet consectetur adipisicing elit. Sapiente, id! Obcaecati tenetur nulla ipsam. Veniam unde magni sunt quod pariatur laudantium inventore voluptas adipisci voluptate repellendus illo, commodi enim quisquam laborum eaque dolore quibusdam sapiente impedit incidunt explicabo excepturi. Dignissimos maxime aliquam quis corrupti inventore?

Box Model



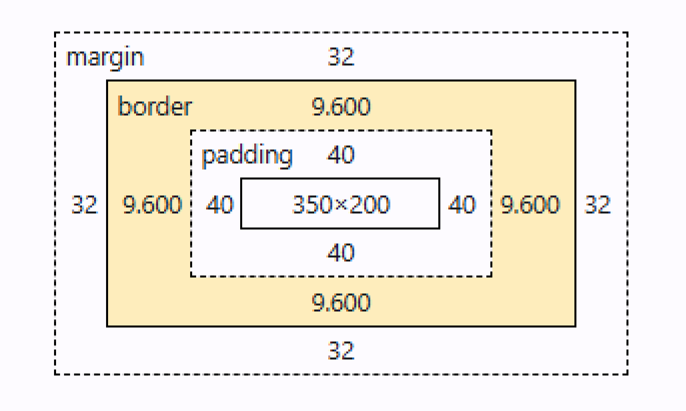
In the above box model there is written padding, 40 is also written on the four sides in the highlighted area of the rectangular part and the rectangular part is highlighted except of 350x200 with a color, this is the padding space and it is the space between the content and the border of the box model. In the output screen the padding part is also highlighted with the same color by which it is highlighted in the box model so that you can identify it easily.

Border part explanation



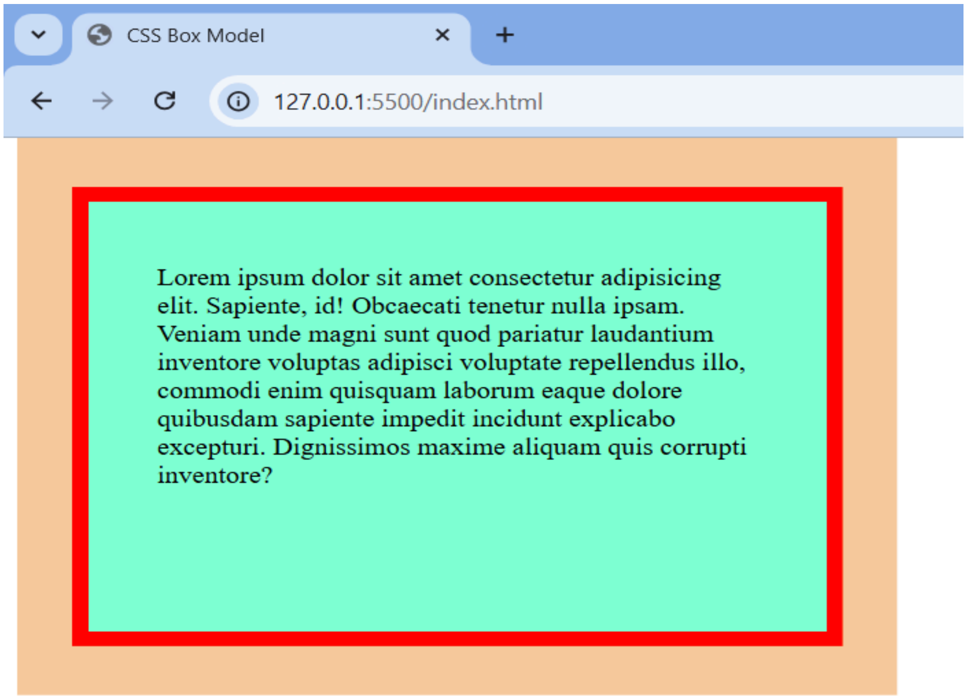
Lorem ipsum dolor sit amet consectetur adipisicing elit. Sapiente, id! Obcaecati tenetur nulla ipsam. Veniam unde magni sunt quod pariatur laudantium inventore voluptas adipisci voluptate repellendus illo, commodi enim quisquam laborum eaque dolore quibusdam sapiente impedit incidunt explicabo excepturi. Dignissimos maxime aliquam quis corrupti inventore?

Box Model



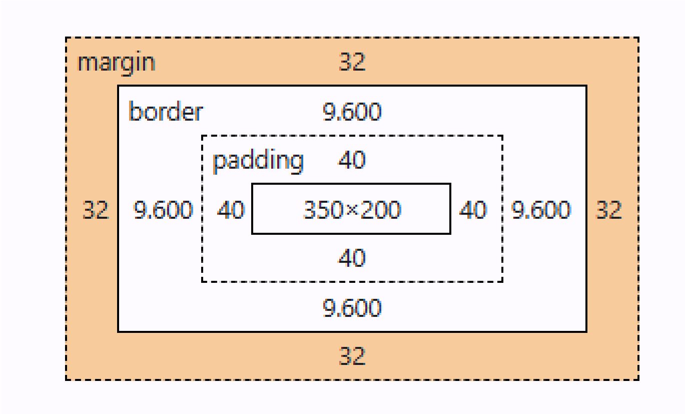
In the above box model the border part is highlighted in the CSS box model, and in the output screen also the border color has changed from red to a different color. It visually separates the element from other elements and can be styled in various ways.

Margin part explanation



Lorem ipsum dolor sit amet consectetur adipisicing elit. Sapiente, id! Obcaecati tenetur nulla ipsam. Veniam unde magni sunt quod pariatur laudantium inventore voluptas adipisci voluptate repellendus illo, commodi enim quisquam laborum eaque dolore quibusdam sapiente impedit incidunt explicabo excepturi. Dignissimos maxime aliquam quis corrupti inventore?

Box Model



In the above box model the coloured area is representing the margin part. Where 32 is the value of the margin which is applied from all the 4 sides as mentioned in the box model and visible in the output part also of the same color.
The margin is a key component of the CSS Box Model and defines the space outside the border of an element. It creates spacing between the element and its neighbors, ensuring proper separation and alignment in the layout.

IMPORTANT : When you set the width and height properties of an element with CSS, you just set the width and height of the content area. To calculate the total width and height of an element, you must also include the padding and borders.
Lets calculate the the width and height of the element in which the content is shown
Width = 350px (content width) + 80px (left padding+ right padding) + 20px (left border + right border)
So the total width of the element is 450px.

Height = 200px (content height) + 80px(top padding + bottom padding) + 20px (top border + bottom border)
So the total height of the element is 300px.

Note : The margin property also affects the total space that the box will take up on the page, but the margin is not included in the actual size of the box. The box's total width and height stops at the border.

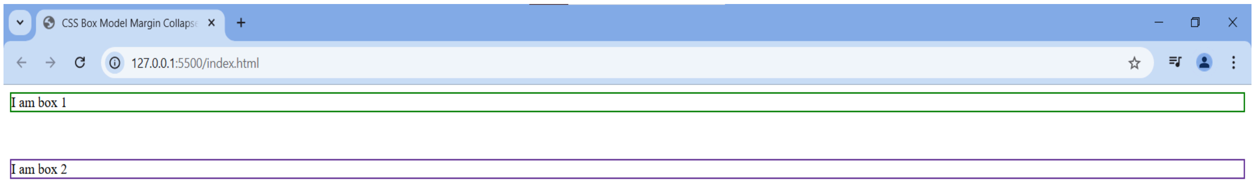
Margin collapse - Margin collapse occurs when the vertical margins of adjacent elements (or the top and bottom margins of two elements) combine into a single margin, rather than adding together. This behavior simplifies spacing in layouts by preventing excessive gaps between elements. This does not happen on left and right margins.

Code Example:

```
<!DOCTYPE html>
<html>
  <head>
```

```
    <title>CSS Box Model Margin Collapse</title>
    <style>
      .box1 {
        border: 2px solid green;
        margin-bottom: 40px;
      }
      .box2 {
        border: 2px solid rebeccapurple;
        margin-top: 50px;
      }
    </style>
  </head>
  <body>
    <div class="box1">I am box 1</div>
    <div class="box2">I am box 2</div>
  </body>
</html>
```

OUTPUT



I am box 1

I am box 2

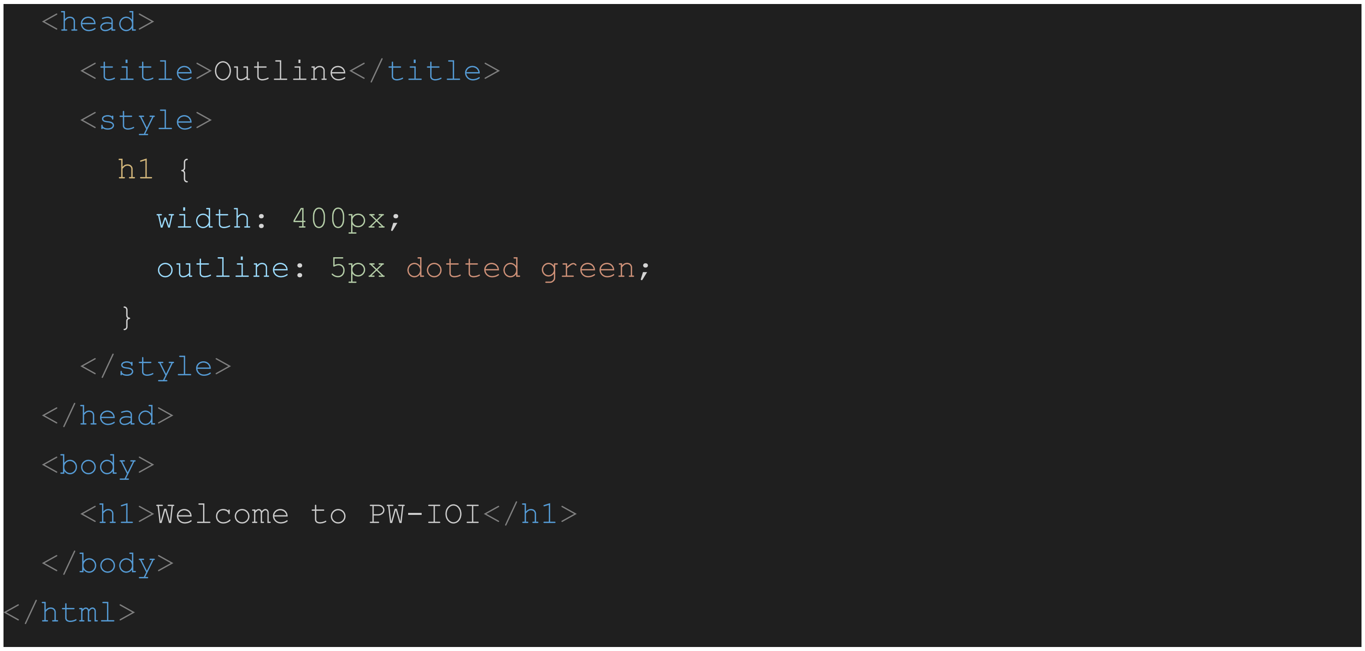
The vertical margin between the two boxes is 50px only, not 90px by summing the two.

Outline

Outline and its properties : An outline is a line that is drawn around elements, outside the borders, to make the element "stand out".
The outline property is a shorthand property for: outline-width, outline-style (required), outline-color.
If outline-color is omitted, the color applied will be the color of the text. The outline is NOT a part of the element's dimensions.

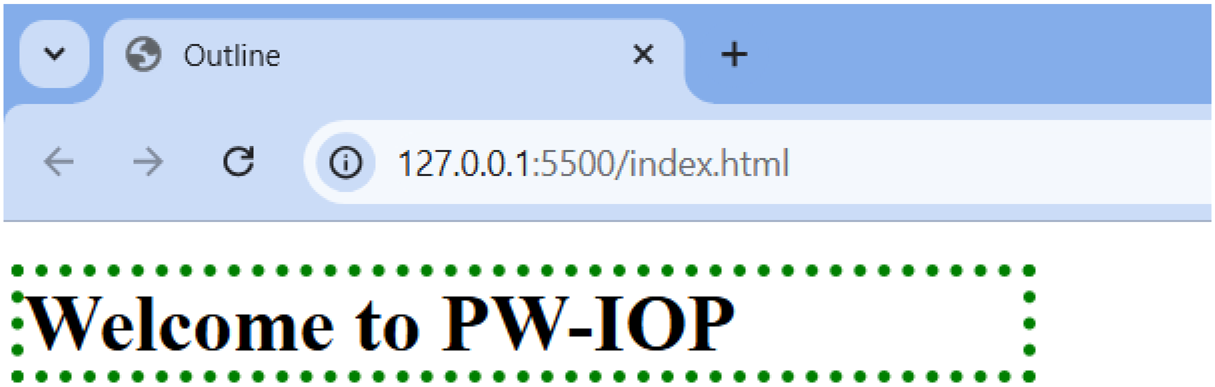
Code Example:

```
<!DOCTYPE html>
<html>
```



```
  <head>
    <title>Outline</title>
    <style>
      h1 {
        width: 400px;
        outline: 5px dotted green;
      }
    </style>
  </head>
  <body>
    <h1>Welcome to PW-IOI</h1>
  </body>
</html>
```

OUTPUT



Welcome to PW-IOP

Key differences between border and outline:

1. The border is part of the CSS box model, whereas the outline is out of the box model.
2. The border cannot overlap other borders because it's part of the element's box. Whereas overlap with neighboring elements because it’s drawn outside the element’s border.
3. Border used for decorative purposes, dividing areas, or defining boundaries of elements whereas outline is primarily used for accessibility and focus indication.

Width and Height

width : The width CSS property sets an element's width. By default, it sets the width of the content area. It does not include padding, borders, or margins.

Min width: The min-width property defines the minimum width of an element. If the content is smaller than the minimum width, the minimum width will be applied. If the content is larger than the minimum width, the min-width property has no effect.

Max width: The max-width property defines the maximum width of an element. If the content is larger than the maximum width, it will automatically change the height of the element. If the content is smaller than the maximum width, the max-width property has no effect.

height: The height CSS property sets the height of an element's content area. By default, it does not include padding, borders, or margins.

min-height: The min-height property defines the minimum height of an element. If the content is smaller than the minimum height, the minimum height will be applied. If the content is taller, the min-height property has no effect.

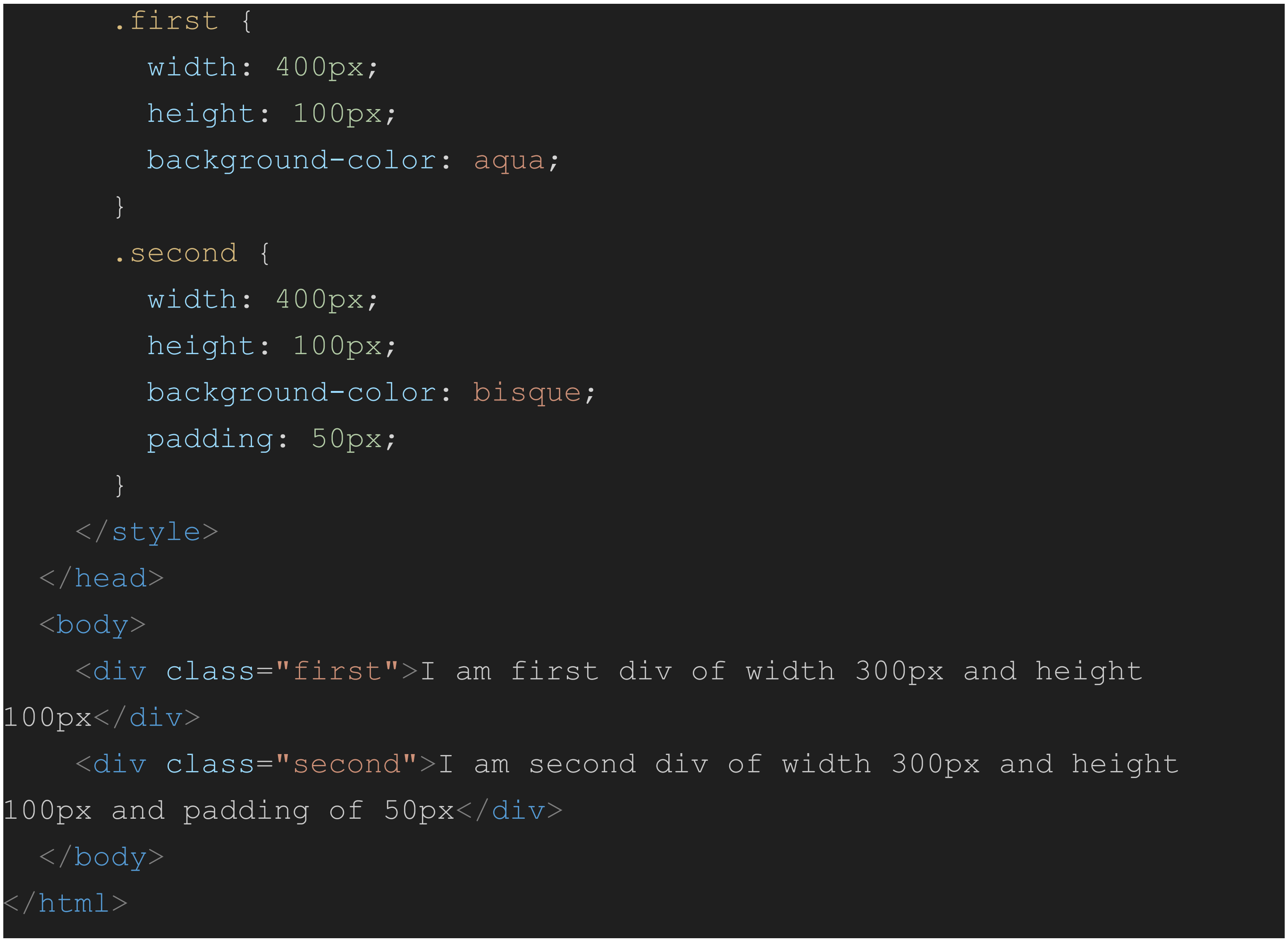
max-height: The max-height property defines the maximum height of an element. If the content is taller than the maximum height, the height will be restricted to the maximum value, and the content may overflow (depending on the overflow property). If the content is smaller, the max-height property has no effect.

box-sizing and its properties

The CSS box-sizing property allows us to include the padding and border in an element's total width and height.
By default, the width and height of an element is calculated like this:
width + padding + border = actual width of an element
height + padding + border = actual height of an element

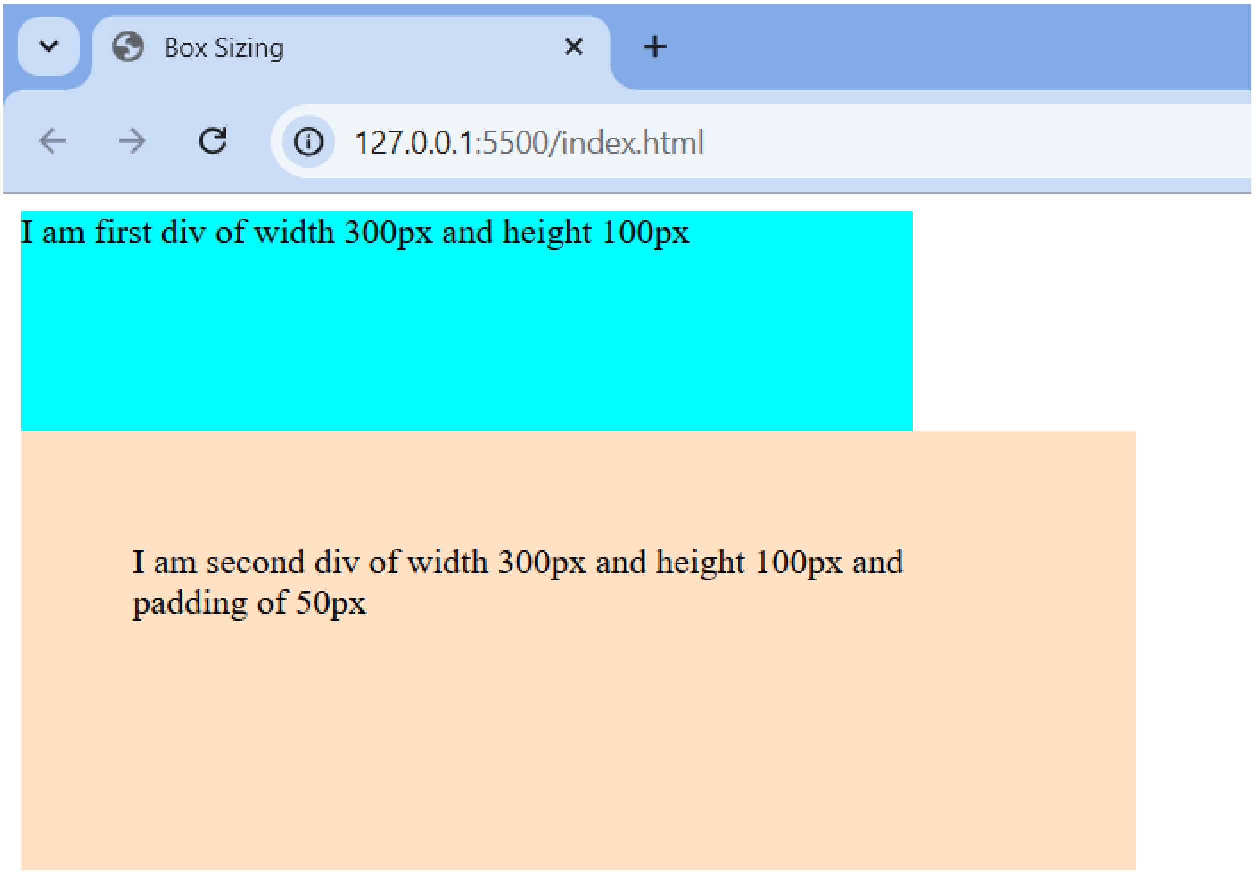
Code Example:

```
<!DOCTYPE html>
<html>
  <head>
    <title>Box Sizing</title>
    <style>
```



```
      .first {
        width: 400px;
        height: 100px;
        background-color: aqua;
      }
      .second {
        width: 400px;
        height: 100px;
        background-color: bisque;
        padding: 50px;
      }
    </style>
  </head>
  <body>
    <div class="first">I am first div of width 300px and height
100px</div>
    <div class="second">I am second div of width 300px and height
100px and padding of 50px</div>
  </body>
</html>
```

OUTPUT



I am first div of width 300px and height 100px

I am second div of width 300px and height 100px and padding of 50px

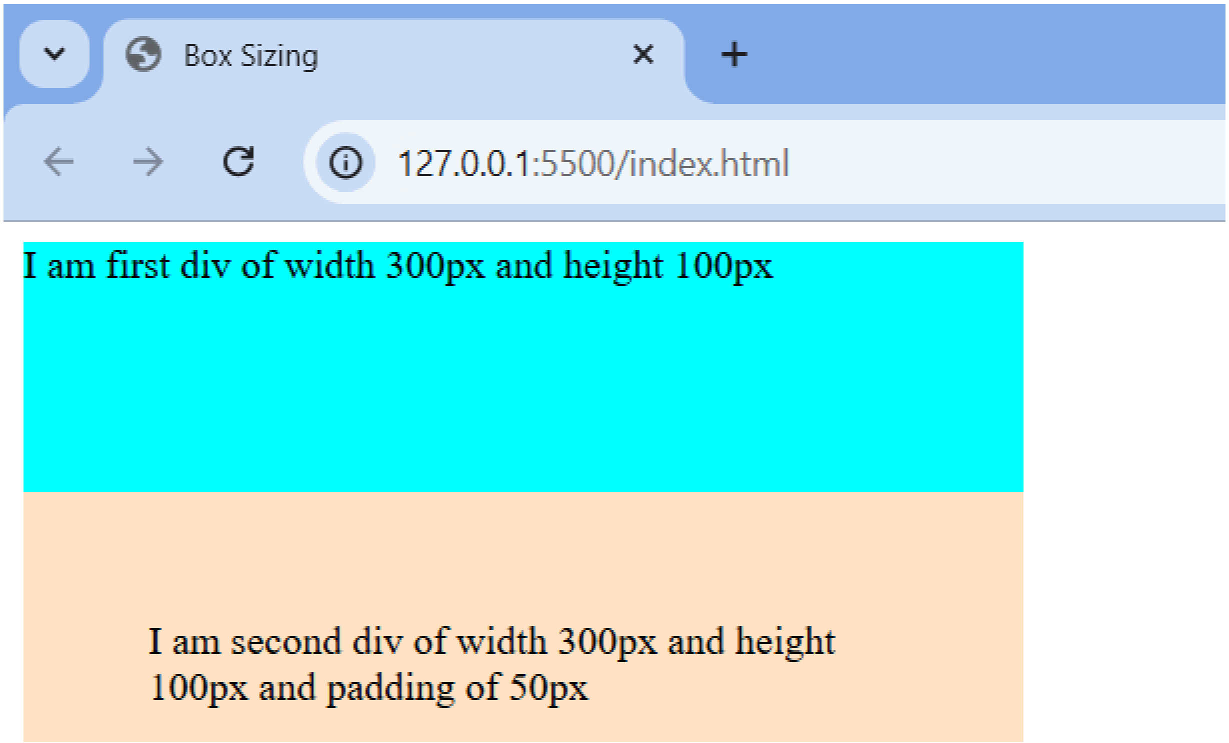
To resolve this size difference use the box-sizing property. The box-sizing property allows us to include the padding and border in an element's total width and height.

If we set box-sizing: border-box; on an element, padding and border are included in the width and height of the element.

CSS Code:

```
.second {
        width: 400px;
        height: 100px;
        background-color: bisque;
        padding: 50px;
        box-sizing: border-box; // it is added to fix the size
      }
```

OUTPUT



I am first div of width 300px and height 100px

I am second div of width 300px and height 100px and padding of 50px

box-sizing: content-box; Will set it again back to the original shape as it was before in the above example.