

# Bootstrap Introduction

Bootstrap is a popular front-end framework that simplifies web development by providing ready-to-use CSS and JavaScript components for building responsive and visually appealing websites. Here's an overview of Bootstrap basics and everything you need to know to get started:

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## 1. What is Bootstrap?

Bootstrap is a front-end framework for developing responsive, mobile-first websites. It includes:

- Predefined CSS classes for layout and styling.
  - Components like navigation bars, buttons, modals, and more.
  - JavaScript plugins for interactivity.
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## 2. Getting Started with Bootstrap

### Installation Methods

**CDN (Content Delivery Network):** Add the following links to your HTML `<head>`:

```
<link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.
min.css" rel="stylesheet">
<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/js/bootstrap.bu
ndle.min.js"></script>
```

**Package Managers:** Install Bootstrap using npm:

```
npm install bootstrap
```

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## 3. Core Concepts

### A. Container

Containers are fundamental for creating layouts. Use `.container` or `.container-fluid` to define a responsive wrapper.

```
<div class="container">
  <h1>Bootstrap Container</h1>
</div>
```

- **`.container`**: Fixed width based on the screen size.
  - **`.container-fluid`**: Always spans the full width of the screen.
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## B. Grid System

Bootstrap's grid system is based on a 12-column layout and allows responsive design. Key concepts:

### Rows and Columns:

```
<div class="container">
  <div class="row">
    <div class="col-md-6">50%</div>
    <div class="col-md-6">50%</div>
  </div>
</div>
```

- Breakpoints:
    - `.col-` (Extra small)
    - `.col-sm-` (Small  $\geq 576\text{px}$ )
    - `.col-md-` (Medium  $\geq 768\text{px}$ )
    - `.col-lg-` (Large  $\geq 992\text{px}$ )
    - `.col-xl-` (Extra Large  $\geq 1200\text{px}$ )
  - **Auto Layout**: Use `.col` for columns to automatically adjust their width.
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## C. Typography

Bootstrap provides classes to style text:

## Headings:

```
<h1 class="display-1">Display Heading</h1>
```

- **Utilities:**

- Text alignment: `.text-center`, `.text-start`, `.text-end`.
  - Text color: `.text-primary`, `.text-danger`.
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## D. Colors and Backgrounds

Bootstrap includes predefined colors:

- Text colors: `.text-primary`, `.text-secondary`.
- Background colors: `.bg-primary`, `.bg-success`.

Custom colors can also be added using variables if you're using SCSS.

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## 4. Components

Bootstrap comes with various UI components:

### Buttons:

```
<button class="btn btn-primary">Primary Button</button>
```

### Navbar:

```
<nav class="navbar navbar-expand-lg navbar-light bg-light">  
  <a class="navbar-brand" href="#">Navbar</a>  
</nav>
```

### Cards:

```
<div class="card" style="width: 18rem;">  
    
  <div class="card-body">  
    <h5 class="card-title">Card Title</h5>
```

```
<p class="card-text">Some text.</p>
<a href="#" class="btn btn-primary">Go somewhere</a>
</div>
</div>
```

### Modals:

```
<button type="button" class="btn btn-primary" data-bs-toggle="modal"
data-bs-target="#exampleModal">
  Launch Modal
</button>
<div class="modal fade" id="exampleModal" tabindex="-1">
  <div class="modal-dialog">
    <div class="modal-content">
      <div class="modal-header">
        <h5 class="modal-title">Modal title</h5>
        <button type="button" class="btn-close"
data-bs-dismiss="modal"></button>
      </div>
      <div class="modal-body">Modal content here...</div>
    </div>
  </div>
</div>
```

---

## 5. Utilities

Bootstrap offers utility classes to quickly style elements:

- **Spacing:** `.m-3` (margin), `.p-3` (padding), `.mt-3` (margin-top).
  - **Borders:** `.border`, `.border-primary`, `.rounded-circle`.
  - **Display:** `.d-flex`, `.d-block`, `.d-none`.
  - **Flexbox:** `.justify-content-center`, `.align-items-center`.
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## 6. Advanced Features

### A. Customization

Use the Bootstrap source files ([SCSS](#)) to customize variables (colors, spacing, etc.).

## B. Responsive Utilities

Control visibility with responsive classes:

```
<div class="d-none d-md-block">Visible on medium and up</div>
```

## C. JavaScript Plugins

Bootstrap includes built-in JavaScript for components like carousels, tooltips, and dropdowns.

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# 7. Tips for Using Bootstrap Effectively

1. **Mobile-First Approach:** Design for small screens first and enhance for larger screens.
  2. **Combine with Custom CSS:** Use Bootstrap for layout and components but customize styles as needed.
  3. **Practice Responsive Design:** Test your design on various screen sizes.
  4. **Use Documentation:** The [Bootstrap Documentation](#) is a great resource for learning and reference.
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## Bootstrap containers

Bootstrap containers are essential building blocks used to structure and layout content in a responsive way. They provide fixed-width or full-width containers to align and organize your content effectively. Here's everything you need to know about Bootstrap containers:

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# 1. Types of Containers

## A. `.container`

- Provides a fixed-width container.
- Automatically adjusts its width based on the current screen size (breakpoints).
- Centers the content horizontally.

Example:

```
<div class="container">
  <h1>Fixed-width Container</h1>
  <p>This container adjusts width based on screen size.</p>
</div>
```

Breakpoint	Width of <b>.container</b>
Extra small (xs)	100% (full width)
Small (sm)	540px
Medium (md)	720px
Large (lg)	960px
Extra large (xl)	1140px
XXL	1320px

---

## B. **.container-fluid**

- Stretches the container to occupy 100% of the screen width, regardless of the viewport size.

Example:

```
<div class="container-fluid">
  <h1>Full-width Container</h1>
  <p>This container spans the entire width of the viewport.</p>
</div>
```

---

## C. **.container-{breakpoint}**

- Creates a responsive container that becomes fluid only above the specified breakpoint.

Example:

```
<div class="container-md">
```

```
<h1>Responsive Container</h1>
<p>Fixed-width up to medium screens, fluid on larger screens.</p>
</div>
```

Class	Behavior
<code>.container-sm</code>	Fluid until <code>sm</code> (≥576px), fixed-width beyond.
<code>.container-md</code>	Fluid until <code>md</code> (≥768px), fixed-width beyond.
<code>.container-lg</code>	Fluid until <code>lg</code> (≥992px), fixed-width beyond.
<code>.container-xl</code>	Fluid until <code>xl</code> (≥1200px), fixed-width beyond.
<code>.container-xxl</code>	Fluid until <code>xxl</code> (≥1400px), fixed-width beyond.

---

## 2. Usage in Layout

Containers are commonly used as wrappers for rows and columns in the Bootstrap grid system.

Example:

```
<div class="container">
  <div class="row">
    <div class="col-md-6">Column 1</div>
    <div class="col-md-6">Column 2</div>
  </div>
</div>
```

---

## 3. Key Features

1. **Responsive Behavior:** Automatically adjusts width based on screen size.
2. **Content Alignment:** Centers the content horizontally within the viewport.

3. **Flexible Usage:** Choose between fixed, fluid, or breakpoint-specific containers based on design needs.
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## 4. When to Use Each Type

- **.container:** Use for centered, fixed-width content on larger screens.
  - **.container-fluid:** Use for full-width layouts or when you want content to stretch across the entire screen.
  - **.container-{breakpoint}:** Use when you need mixed behavior (fixed and fluid) depending on screen size.
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## Bootstrap grid system

The **Bootstrap grid system** is a powerful layout system that allows you to create responsive, flexible, and consistent layouts by dividing the screen into 12 equal-width columns. Here's a detailed guide to understanding and using the Bootstrap grid system:

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## 1. Grid System Basics

### A. Structure

The grid system consists of three main building blocks:

1. **Container:** Defines the grid's boundaries.
2. **Row:** Creates a horizontal group of columns.
3. **Column:** Defines the content's placement and size within the grid.

### Example:

```
<div class="container">
  <div class="row">
    <div class="col">Column 1</div>
    <div class="col">Column 2</div>
    <div class="col">Column 3</div>
  </div>
</div>
```



---

## B. Grid Rules

1. The grid system uses **12 columns per row**.
  2. Columns are nested inside `.row` and must be direct children of `.row`.
  3. Use classes like `.col`, `.col-sm-6`, `.col-md-4` to define column widths and breakpoints.
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## 2. Grid Classes

The grid system provides classes for different screen sizes:

Class Prefix	Screen Size (Breakpoint)	Min Width
<code>.col-</code>	Extra small (xs)	None
<code>.col-sm-</code>	Small (sm)	≥576px
<code>.col-md-</code>	Medium (md)	≥768px
<code>.col-lg-</code>	Large (lg)	≥992px
<code>.col-xl-</code>	Extra large (xl)	≥1200px
<code>.col-xxl-</code>	XXL	≥1400px

---

## A. Equal Columns

Use `.col` for columns that equally divide the available space.

Example:

```
<div class="row">
  <div class="col">1</div>
  <div class="col">2</div>
  <div class="col">3</div>
</div>
```

---

## B. Specifying Column Widths

Define column widths using `.col-{breakpoint}-{size}` classes. For example, `.col-md-4` spans 4 columns on medium screens.

Example:

```
<div class="row">
  <div class="col-md-4">4 Columns</div>
  <div class="col-md-8">8 Columns</div>
</div>
```

---

## C. Responsive Columns

You can define different column sizes for different breakpoints.

Example:

```
<div class="row">
  <div class="col-12 col-md-6">Half on md and above</div>
  <div class="col-12 col-md-6">Half on md and above</div>
</div>
```

---

## D. Auto Layout

Use `.col` without specifying sizes for automatic equal-width columns.

Example:

```
<div class="row">
  <div class="col">Auto</div>
  <div class="col">Auto</div>
</div>
```

---

### 3. Nesting Columns

You can nest rows and columns to create more complex layouts.

Example:

```
<div class="row">
  <div class="col-6">
    <div class="row">
      <div class="col-6">Nested 1</div>
      <div class="col-6">Nested 2</div>
    </div>
  </div>
  <div class="col-6">Main Column</div>
</div>
```

---

### 4. Alignment

#### Horizontal Alignment

- Use `.justify-content-*` for alignment:
  - `.justify-content-start` (default)
  - `.justify-content-center`
  - `.justify-content-end`
  - `.justify-content-around`
  - `.justify-content-between`

Example:

```
<div class="row justify-content-center">
  <div class="col-4">Centered</div>
</div>
```

#### Vertical Alignment

- Use `.align-items-*` for alignment:
  - `.align-items-start`
  - `.align-items-center`

- `.align-items-end`

Example:

```
<div class="row align-items-center" style="height: 200px;">
  <div class="col-4">Vertically Centered</div>
</div>
```

---

## 5. Offset and Ordering

### A. Offset

Move columns to the right using `.offset-{breakpoint}-{number}`.

Example:

```
<div class="row">
  <div class="col-md-4 offset-md-4">Centered Column</div>
</div>
```

### B. Ordering

Change column order with `.order-{breakpoint}-{number}`.

Example:

```
<div class="row">
  <div class="col-md-4 order-md-2">Second</div>
  <div class="col-md-4 order-md-1">First</div>
</div>
```

---

## 6. Utilities for Grid Customization

**No Gutters:** Use `.g-0` to remove spacing between columns.

```
<div class="row g-0">
  <div class="col-6">No Gutter 1</div>
```

```
<div class="col-6">No Gutter 2</div>
</div>
```

**Custom Gutters:** Use `.g-{number}` to control spacing (e.g., `.g-3` for 3px gap).

---

## 7. Example Layout

Here's a complete responsive layout using the grid system:

```
<div class="container">
  <div class="row">
    <div class="col-12 col-md-8">Main Content</div>
    <div class="col-6 col-md-4">Sidebar</div>
  </div>
  <div class="row">
    <div class="col-6">Footer 1</div>
    <div class="col-6">Footer 2</div>
  </div>
</div>
```

---

## Bootstrap typography

Bootstrap typography provides a range of classes and utilities to style text in a responsive, consistent, and aesthetically pleasing way. Here's an in-depth guide to Bootstrap typography:

---

## 1. Headings

Bootstrap supports semantic heading tags with predefined styles. You can use these for different heading levels.

### Example:

```
<h1>h1. Bootstrap heading</h1>
<h2>h2. Bootstrap heading</h2>
<h3>h3. Bootstrap heading</h3>
```

```
<h4>h4. Bootstrap heading</h4>
<h5>h5. Bootstrap heading</h5>
<h6>h6. Bootstrap heading</h6>
```

---

## 2. Display Headings

For larger headings, use the `.display-{1-6}` classes. These are great for hero sections or titles.

### Example:

```
<h1 class="display-1">Display 1</h1>
<h1 class="display-2">Display 2</h1>
<h1 class="display-3">Display 3</h1>
<h1 class="display-4">Display 4</h1>
<h1 class="display-5">Display 5</h1>
<h1 class="display-6">Display 6</h1>
```

---

## 3. Lead Text

Use `.lead` to make paragraphs stand out with a slightly larger font size and lighter weight.

### Example:

```
<p class="lead">This is a lead paragraph. It stands out more than
regular paragraphs.</p>
```

---

## 4. Inline Text Elements

Bootstrap provides utilities for styling inline text elements.

### Examples:

```
<p>You can use <mark>highlight</mark> to emphasize text.</p>
```

```
<p><del>This text is deleted.</del></p>
<p><s>This text is no longer accurate.</s></p>
<p><u>This text is underlined.</u></p>
<p><small>This is small text.</small></p>
<p><strong>This is bold text.</strong></p>
<p><em>This is italicized text.</em></p>
```

---

## 5. Text Alignment

Control text alignment with `.text-start`, `.text-center`, `.text-end`, and responsive alignment classes.

### Example:

```
<p class="text-start">Left aligned text.</p>
<p class="text-center">Center aligned text.</p>
<p class="text-end">Right aligned text.</p>
<p class="text-md-start">Left aligned on medium screens and up.</p>
```

---

## 6. Text Colors

Bootstrap provides text color utility classes for semantic styling.

### Examples:

```
<p class="text-primary">Primary text.</p>
<p class="text-secondary">Secondary text.</p>
<p class="text-success">Success text.</p>
<p class="text-danger">Danger text.</p>
<p class="text-warning">Warning text.</p>
<p class="text-info">Info text.</p>
<p class="text-light bg-dark">Light text on dark background.</p>
<p class="text-dark">Dark text.</p>
<p class="text-muted">Muted text.</p>
<p class="text-white bg-dark">White text on dark background.</p>
```

---

## 7. Text Transform

Transform text using `.text-lowercase`, `.text-uppercase`, or `.text-capitalize`.

### Example:

```
<p class="text-lowercase">this is lowercase text.</p>
<p class="text-uppercase">this is uppercase text.</p>
<p class="text-capitalize">this is capitalized text.</p>
```

---

## 8. Font Weight and Italics

Control font weight and style with `.fw-{light|normal|bold}` and `.fst-{italic|normal}`.

### Example:

```
<p class="fw-bold">Bold text.</p>
<p class="fw-normal">Normal weight text.</p>
<p class="fw-light">Light weight text.</p>
<p class="fst-italic">Italicized text.</p>
<p class="fst-normal">Non-italicized text.</p>
```

---

## 9. Line Height

Control line height using `.lh-{1|sm|base|lg}`.

### Example:

```
<p class="lh-1">Tightly spaced text.</p>
<p class="lh-sm">Slightly spaced text.</p>
<p class="lh-base">Default line height.</p>
<p class="lh-lg">Loosely spaced text.</p>
```

---

## 10. Lists



## Unstyled List

Remove default list styles with `.list-unstyled`.

```
<ul class="list-unstyled">
  <li>Item 1</li>
  <li>Item 2</li>
  <li>Item 3</li>
</ul>
```

## Inline List

Make lists inline with `.list-inline`.

```
<ul class="list-inline">
  <li class="list-inline-item">Item 1</li>
  <li class="list-inline-item">Item 2</li>
  <li class="list-inline-item">Item 3</li>
</ul>
```

---

## 11. Blockquote

Bootstrap provides a blockquote component for quoting text.

### Example:

```
<blockquote class="blockquote">
  <p>This is a blockquote.</p>
  <footer class="blockquote-footer">Someone famous <cite title="Source
Title">Source Title</cite></footer>
</blockquote>
```

---

## 12. Responsive Typography

Bootstrap's typography is inherently responsive. Text adjusts size based on viewport dimensions. Use media query classes for further customization.

### Example:

```
<p class="fs-1">Font size 1.</p>
<p class="fs-2">Font size 2.</p>
<p class="fs-3">Font size 3.</p>
<p class="fs-4">Font size 4.</p>
<p class="fs-5">Font size 5.</p>
<p class="fs-6">Font size 6.</p>
```

---

## Bootstrap colors and background

Bootstrap provides a comprehensive set of **color utilities** and **background classes** for applying consistent and responsive styles to your web elements. Here's a detailed guide:

---

## 1. Bootstrap Text Colors

Bootstrap includes predefined text color classes for semantic purposes and custom design needs.

### Text Color Classes

**Semantic Colors:** These are meaningful colors based on context.

```
<p class="text-primary">Primary text</p>
<p class="text-secondary">Secondary text</p>
<p class="text-success">Success text</p>
<p class="text-danger">Danger text</p>
<p class="text-warning">Warning text</p>
<p class="text-info">Info text</p>
<p class="text-light bg-dark">Light text on dark background</p>
<p class="text-dark">Dark text</p>
<p class="text-muted">Muted text</p>
<p class="text-white bg-dark">White text</p>
```

### Responsive Text Colors

Use responsive classes for text colors:

```
<p class="text-primary text-lg-danger">Primary on smaller screens,  
Danger on larger screens</p>
```

---

## 2. Background Colors

Bootstrap includes utility classes for setting element backgrounds.

### Background Color Classes

#### Semantic Colors:

```
<div class="bg-primary text-white p-3">Primary background</div>  
<div class="bg-secondary text-white p-3">Secondary background</div>  
<div class="bg-success text-white p-3">Success background</div>  
<div class="bg-danger text-white p-3">Danger background</div>  
<div class="bg-warning text-dark p-3">Warning background</div>  
<div class="bg-info text-white p-3">Info background</div>  
<div class="bg-light text-dark p-3">Light background</div>  
<div class="bg-dark text-white p-3">Dark background</div>
```

---

## 3. Background Gradient

Use the `.bg-gradient` class to apply a subtle gradient effect to any background.

#### Example:

```
<div class="bg-primary bg-gradient text-white p-3">Primary gradient  
background</div>  
<div class="bg-success bg-gradient text-white p-3">Success gradient  
background</div>  
<div class="bg-info bg-gradient text-white p-3">Info gradient  
background</div>
```

---

## 4. Opacity

Adjust the transparency of text and backgrounds using the `.opacity- $\{value\}$`  utility.

## Opacity Classes

Class	Opacity Value
<code>.opacity-100</code>	100% (fully opaque)
<code>.opacity-75</code>	75%
<code>.opacity-50</code>	50%
<code>.opacity-25</code>	25%
<code>.opacity-0</code>	0% (fully transparent)

### Example:

```
<div class="bg-primary text-white opacity-75 p-3">Primary background  
with 75% opacity</div>
```

---

## 5. Customizing Colors

Use `.text-*` and `.bg-*` for custom colors or semantic purposes:

### Custom Examples:

```
<p class="text-warning bg-dark">Custom styled text</p>
```

---

## 6. Hover and Active States

You can apply hover or active state colors using `.hover` and `.active` classes.

### Example:

```
<a href="#" class="text-decoration-none">  
  <div class="bg-primary text-white p-3 hover:bg-success">Hover  
changes color</div>
```

</a>

---

## Bootstrap tables

ChatGPTBootstrap tables provide predefined styles and utilities for creating responsive, attractive, and easy-to-read tables. Here's a detailed guide to Bootstrap tables:

---

### 1. Basic Table

Use the `.table` class to style a standard HTML `<table>`.

#### Example:

```
<table class="table">
  <thead>
    <tr>
      <th>#</th>
      <th>First Name</th>
      <th>Last Name</th>
      <th>Username</th>
    </tr>
  </thead>
  <tbody>
    <tr>
      <td>1</td>
      <td>John</td>
      <td>Doe</td>
      <td>@johndoe</td>
    </tr>
    <tr>
      <td>2</td>
      <td>Jane</td>
      <td>Smith</td>
      <td>@janesmith</td>
    </tr>
  </tbody>
```

```
</table>
```

---

## 2. Table Variants

### A. Striped Rows

Use `.table-striped` to add zebra-stripping to rows.

```
<table class="table table-striped">
  <thead>
    <tr>
      <th>#</th>
      <th>First Name</th>
      <th>Last Name</th>
      <th>Username</th>
    </tr>
  </thead>
  <tbody>
    <tr>
      <td>1</td>
      <td>John</td>
      <td>Doe</td>
      <td>@johndoe</td>
    </tr>
    <tr>
      <td>2</td>
      <td>Jane</td>
      <td>Smith</td>
      <td>@janesmith</td>
    </tr>
  </tbody>
</table>
```

---

### B. Bordered Table

Use `.table-bordered` to add borders to all table cells.

```
<table class="table table-bordered">
  <thead>
    <tr>
      <th>#</th>
      <th>First Name</th>
      <th>Last Name</th>
      <th>Username</th>
    </tr>
  </thead>
  <tbody>
    <tr>
      <td>1</td>
      <td>John</td>
      <td>Doe</td>
      <td>@johndoe</td>
    </tr>
    <tr>
      <td>2</td>
      <td>Jane</td>
      <td>Smith</td>
      <td>@janesmith</td>
    </tr>
  </tbody>
</table>
```

---

### C. Hoverable Rows

Use `.table-hover` to highlight rows when hovered.

```
<table class="table table-hover">
  <thead>
    <tr>
      <th>#</th>
      <th>First Name</th>
      <th>Last Name</th>
      <th>Username</th>
    </tr>
```

```
</thead>
<tbody>
  <tr>
    <td>1</td>
    <td>John</td>
    <td>Doe</td>
    <td>@johndoe</td>
  </tr>
  <tr>
    <td>2</td>
    <td>Jane</td>
    <td>Smith</td>
    <td>@janesmith</td>
  </tr>
</tbody>
</table>
```

---

## D. Small Table

Use `.table-sm` for a more compact table.

```
<table class="table table-sm">

  <thead>
    <tr>
      <th>#</th>
      <th>First Name</th>
      <th>Last Name</th>
      <th>Username</th>
    </tr>
  </thead>
  <tbody>
    <tr>
      <td>1</td>
      <td>John</td>
      <td>Doe</td>
      <td>@johndoe</td>
    </tr>
```



```
<tr>
  <td>2</td>
  <td>Jane</td>
  <td>Smith</td>
  <td>@janesmith</td>
</tr>
</tbody>
</table>
```

---

## E. Dark Table

Use `.table-dark` for a table with a dark theme.

```
<table class="table table-dark">
  <thead>
    <tr>
      <th>#</th>
      <th>First Name</th>
      <th>Last Name</th>
      <th>Username</th>
    </tr>
  </thead>
  <tbody>
    <tr>
      <td>1</td>
      <td>John</td>
      <td>Doe</td>
      <td>@johndoe</td>
    </tr>
    <tr>
      <td>2</td>
      <td>Jane</td>
      <td>Smith</td>
      <td>@janesmith</td>
    </tr>
  </tbody>
</table>
```

---

### 3. Responsive Tables

Make tables scrollable horizontally on small devices by wrapping them in `.table-responsive`.

#### Example:

```
<div class="table-responsive">
  <table class="table">
    <thead>
      <tr>
        <th>#</th>
        <th>First Name</th>
        <th>Last Name</th>
        <th>Username</th>
        <th>Email</th>
        <th>Phone</th>
      </tr>
    </thead>
    <tbody>
      <tr>
        <td>1</td>
        <td>John</td>
        <td>Doe</td>
        <td>@johndoe</td>
        <td>john@example.com</td>
        <td>123-456-7890</td>
      </tr>
      <tr>
        <td>2</td>
        <td>Jane</td>
        <td>Smith</td>
        <td>@janesmith</td>
        <td>jane@example.com</td>
        <td>987-654-3210</td>
      </tr>
    </tbody>
  </table>
</div>
```

```
</table>
</div>
```

---

## 4. Table Colors

Add contextual classes to rows or cells for specific meaning:

### Table Row Colors:

```
<tr class="table-primary">...</tr>
<tr class="table-secondary">...</tr>
<tr class="table-success">...</tr>
<tr class="table-danger">...</tr>
<tr class="table-warning">...</tr>
<tr class="table-info">...</tr>
<tr class="table-light">...</tr>
<tr class="table-dark">...</tr>
```

### Cell Colors:

```
<td class="table-success">Success Cell</td>
```

---

## 5. Combining Table Classes

You can combine multiple table classes to create advanced designs.

### Example:

```
<table class="table table-bordered table-striped table-hover
table-sm">
  <thead>
    <tr>
      <th>#</th>
      <th>First Name</th>
      <th>Last Name</th>
      <th>Username</th>
    </tr>
```

```
</thead>
<tbody>
  <tr>
    <td>1</td>
    <td>John</td>
    <td>Doe</td>
    <td>@johndoe</td>
  </tr>
  <tr>
    <td>2</td>
    <td>Jane</td>
    <td>Smith</td>
    <td>@janesmith</td>
  </tr>
</tbody>
</table>
```

---

## Bootstrap components

Bootstrap components are pre-designed UI elements that you can use to quickly build responsive and interactive interfaces. Below is an overview of the most commonly used components in Bootstrap:

---

### 1. Alerts

Displays contextual messages with optional dismissal.

#### Example:

```
<div class="alert alert-primary" role="alert">This is a primary
alert!</div>
<div class="alert alert-danger" role="alert">This is a danger
alert!</div>
<div class="alert alert-warning alert-dismissible fade show"
role="alert">
  This is a warning alert with a close button.
```

```
<button type="button" class="btn-close" data-bs-dismiss="alert"
aria-label="Close"></button>
</div>
```

---

## 2. Badges

Adds small count indicators or labels to elements.

### Example:

```
<h1>Example heading <span class="badge bg-primary">New</span></h1>
<button type="button" class="btn btn-primary">
  Notifications <span class="badge bg-secondary">4</span>
</button>
```

---

## 3. Buttons

Stylized buttons with various states, sizes, and styles.

### Example:

```
<button type="button" class="btn btn-primary">Primary</button>
<button type="button" class="btn
btn-outline-secondary">Outline</button>
<button type="button" class="btn btn-danger btn-lg">Large
Button</button>
<button type="button" class="btn btn-success btn-sm">Small
Button</button>
```

---

## 4. Cards

Flexible containers for content like text, images, and actions.

### Example:

```
<div class="card" style="width: 18rem;">
```

```

<div class="card-body">
  <h5 class="card-title">Card Title</h5>
  <p class="card-text">Some quick example text to build on the card
title.</p>
  <a href="#" class="btn btn-primary">Go somewhere</a>
</div>
</div>
```

---

## 5. Dropdowns

Creates toggleable dropdown menus.

### Example:

```
<div class="dropdown">
  <button class="btn btn-secondary dropdown-toggle" type="button"
data-bs-toggle="dropdown" aria-expanded="false">
    Dropdown button
  </button>
  <ul class="dropdown-menu">
    <li><a class="dropdown-item" href="#">Action</a></li>
    <li><a class="dropdown-item" href="#">Another action</a></li>
    <li><a class="dropdown-item" href="#">Something else here</a></li>
  </ul>
</div>
```

---

## 6. Forms

Provides input fields, checkboxes, radio buttons, and more.

### Example:

```
<form>
  <div class="mb-3">
```

```
    <label for="exampleInputEmail1" class="form-label">Email
address</label>
    <input type="email" class="form-control" id="exampleInputEmail1"
aria-describedby="emailHelp">
    <div id="emailHelp" class="form-text">We'll never share your email
with anyone else.</div>
  </div>
  <div class="mb-3">
    <label for="exampleInputPassword1"
class="form-label">Password</label>
    <input type="password" class="form-control"
id="exampleInputPassword1">
  </div>
  <button type="submit" class="btn btn-primary">Submit</button>
</form>
```

---

## 7. Modals

Creates dialog boxes or popups.

### Example:

```
<!-- Trigger Button -->
<button type="button" class="btn btn-primary" data-bs-toggle="modal"
data-bs-target="#exampleModal">
  Launch Modal
</button>

<!-- Modal -->
<div class="modal fade" id="exampleModal" tabindex="-1"
aria-labelledby="exampleModalLabel" aria-hidden="true">
  <div class="modal-dialog">
    <div class="modal-content">
      <div class="modal-header">
        <h5 class="modal-title" id="exampleModalLabel">Modal
Title</h5>
        <button type="button" class="btn-close"
data-bs-dismiss="modal" aria-label="Close"></button>
```

```
</div>
<div class="modal-body">
  This is the content of the modal.
</div>
<div class="modal-footer">
  <button type="button" class="btn btn-secondary"
data-bs-dismiss="modal">Close</button>
  <button type="button" class="btn btn-primary">Save
changes</button>
</div>
</div>
</div>
</div>
```

---

## 8. Navbars

Responsive navigation headers.

### Example:

```
<nav class="navbar navbar-expand-lg navbar-light bg-light">
  <div class="container-fluid">
    <a class="navbar-brand" href="#">Navbar</a>
    <button class="navbar-toggler" type="button"
data-bs-toggle="collapse" data-bs-target="#navbarNav">
      <span class="navbar-toggler-icon"></span>
    </button>
    <div class="collapse navbar-collapse" id="navbarNav">
      <ul class="navbar-nav">
        <li class="nav-item">
          <a class="nav-link active" href="#">Home</a>
        </li>
        <li class="nav-item">
          <a class="nav-link" href="#">Features</a>
        </li>
        <li class="nav-item">
          <a class="nav-link" href="#">Pricing</a>
        </li>
      </ul>
    </div>
  </div>
</nav>
```



```
        </ul>
      </div>
    </div>
  </nav>
```

---

## 9. Progress Bars

Displays progress indicators.

### Example:

```
<div class="progress">
  <div class="progress-bar" role="progressbar" style="width: 50%;"
  aria-valuenow="50" aria-valuemin="0" aria-valuemax="100"></div>
</div>
```

---

## 10. Tooltips

Adds hoverable text explanations.

### Example:

```
<button type="button" class="btn btn-secondary"
data-bs-toggle="tooltip" data-bs-placement="top" title="Tooltip text">
  Hover me
</button>
<script>
  var tooltipTriggerList =
[...].slice.call(document.querySelectorAll('[data-bs-toggle="tooltip"]'))
  var tooltipList = tooltipTriggerList.map(function (tooltipTriggerEl)
{
  return new bootstrap.Tooltip(tooltipTriggerEl)
})
</script>
```

---

## 11. Accordions

Collapsible sections for content.

### Example:

```
<div class="accordion" id="accordionExample">
  <div class="accordion-item">
    <h2 class="accordion-header" id="headingOne">
      <button class="accordion-button" type="button"
data-bs-toggle="collapse" data-bs-target="#collapseOne">
        Accordion Item #1
      </button>
    </h2>
    <div id="collapseOne" class="accordion-collapse collapse show"
data-bs-parent="#accordionExample">
      <div class="accordion-body">This is the content for the first
accordion item.</div>
    </div>
  </div>
</div>
```

---

## Bootstrap utilities

Bootstrap utilities are predefined helper classes that simplify styling and layout tasks without writing custom CSS. These utilities include classes for spacing, positioning, text, flexbox, borders, backgrounds, and more. Below is an overview of the most commonly used Bootstrap utilities:

---

## 1. Spacing

Control margin and padding with spacing utilities.

### Syntax:

- **m** for margin, **p** for padding

- Directions: **t** (top), **b** (bottom), **s** (start/left), **e** (end/right), **x** (horizontal), **y** (vertical), blank (all sides)
- Values: **0** (0px), **1** (0.25rem), **2** (0.5rem), **3** (1rem), **4** (1.5rem), **5** (3rem), **auto**

### Examples:

```
<div class="m-3">Margin on all sides (1rem)</div>
<div class="mt-2">Margin top (0.5rem)</div>
<div class="px-4">Padding horizontal (1.5rem)</div>
<div class="me-auto">Right margin set to auto</div>
```

---

## 2. Colors

Quickly set text, background, and border colors.

### Text Colors:

```
<p class="text-primary">Primary text</p>
<p class="text-success">Success text</p>
<p class="text-danger">Danger text</p>
```

### Background Colors:

```
<div class="bg-warning text-white p-3">Warning background</div>
<div class="bg-dark text-light p-3">Dark background</div>
```

### Border Colors:

```
<div class="border border-primary">Primary border</div>
<div class="border border-danger">Danger border</div>
```

---

## 3. Display

Control the display of elements (block, inline, flex, etc.).

### Examples:

```
<div class="d-block">Block element</div>
```

```
<div class="d-inline">Inline element</div>
<div class="d-flex">Flex container</div>
```

---

## 4. Flexbox

Flex utilities for layout and alignment.

### Examples:

```
<div class="d-flex justify-content-center">Center content
horizontally</div>
<div class="d-flex align-items-center">Center content vertically</div>
<div class="d-flex flex-column">Column layout</div>
<div class="d-flex gap-3">Spacing between flex items</div>
```

---

## 5. Sizing

Set the width and height of elements.

### Examples:

```
<div class="w-50">Width 50%</div>
<div class="h-25">Height 25%</div>

```

---

## 6. Borders

Add or modify borders.

### Examples:

```
<div class="border">Default border</div>
<div class="border border-2 border-success">Thicker success
border</div>
<div class="border-0">No border</div>
```

```
<div class="rounded">Rounded corners</div>
<div class="rounded-circle">Circle</div>
<div class="rounded-pill">Pill-shaped corners</div>
```

---

## 7. Shadows

Apply shadow effects to elements.

### Examples:

```
<div class="shadow-sm p-3">Small shadow</div>
<div class="shadow p-3">Regular shadow</div>
<div class="shadow-lg p-3">Large shadow</div>
<div class="shadow-none">No shadow</div>
```

---

## 8. Text

Control text alignment, transformation, wrapping, and more.

### Examples:

```
<p class="text-start">Left aligned text</p>
<p class="text-center">Center aligned text</p>
<p class="text-uppercase">Uppercase text</p>
<p class="text-truncate">Truncated text with ellipsis...</p>
<p class="fw-bold">Bold text</p>
<p class="fst-italic">Italic text</p>
```

---

## 9. Position

Position elements (relative, absolute, fixed, etc.).

### Examples:

```
<div class="position-relative">
```

```
<div class="position-absolute top-0 start-0">Top-left  
positioned</div>  
</div>
```

---

## 10. Overflow

Control how content is handled when it overflows.

### Examples:

```
<div class="overflow-hidden">Hidden overflow</div>  
<div class="overflow-auto">Scrollable overflow</div>
```

---

## 11. Visibility

Toggle visibility without removing elements from the DOM.

### Examples:

```
<div class="visible">Visible</div>  
<div class="invisible">Invisible (still takes space)</div>
```

---

## 12. Vertical Alignment

Align elements vertically within a container.

### Examples:

```
<div class="align-baseline">Baseline aligned</div>  
<div class="align-top">Top aligned</div>  
<div class="align-middle">Middle aligned</div>  
<div class="align-bottom">Bottom aligned</div>
```

---

## 13. Z-Index

Control stack order.

### Examples:

```
<div class="z-index-1">Low z-index</div>
<div class="z-index-3">Higher z-index</div>
```

---

## 14. Helpers

Additional utilities for interactivity.

### Examples:

- **Clearfix:** `clearfix` to clear floats.
  - **Stretched Link:** Use `.stretched-link` to make an entire block clickable.
- 

## Bootstrap display types, flexbox and grid

### Bootstrap Display Types

Bootstrap provides utility classes to control the **display property** of elements.

---

#### 1. Display Classes

Class	Description
<code>d-block</code>	Element displayed as a block (default for <code>&lt;div&gt;</code> )
<code>d-inline</code>	Element displayed as an inline element (default for <code>&lt;span&gt;</code> )
<code>d-inline-block</code>	Combines block and inline behaviors
<code>d-flex</code>	Turns the element into a flex container
<code>d-inline-flex</code>	Inline version of a flex container

`d-none` Hides the element

---

## 2. Responsive Display Classes

You can control display based on screen size using the following syntax:

- `d-{value}-{breakpoint}`

Breakpoints	Description
<code>sm, md, lg, xl, xxl</code>	Control visibility on specific screen sizes
<code>d-none</code>	Hidden on all except specified screen
<code>d-{breakpoint}-block</code>	size

### Examples:

```
<div class="d-none d-md-block">Visible only on medium and larger  
screens</div>  
<div class="d-inline d-sm-none">Visible only on extra-small  
screens</div>
```

---

## Bootstrap Flexbox

Bootstrap's Flexbox utilities make it easy to build **responsive layouts** using flexbox.

### 1. Flex Container Classes

Class	Description
<code>d-flex</code>	Converts an element into a flex container
<code>d-inline-flex</code>	Inline version of <code>d-flex</code>

---

### 2. Direction

Class	Description
-------	-------------



<code>flex-row</code>	Horizontal direction (default)
<code>flex-row-reverse</code>	Reverse horizontal direction
<code>flex-column</code>	Vertical stacking
<code>flex-column-reverse</code>	Reverse vertical stacking

---

### 3. Alignment

#### Horizontal Alignment (Justify Content):

Class	Description
<code>justify-content-start</code>	Align items to the start
<code>justify-content-end</code>	Align items to the end
<code>justify-content-center</code>	Center items
<code>justify-content-between</code>	Space between items
<code>justify-content-around</code>	Space around items
<code>justify-content-evenly</code>	Equal space around items

#### Vertical Alignment (Align Items):

Class	Description
<code>align-items-start</code>	Align items to the top
<code>align-items-end</code>	Align items to the bottom

<code>align-items-center</code>	Center items vertically
<code>align-items-baseline</code>	Align items along the text baseline

---

#### 4. Wrapping

Class	Description
<code>flex-wrap</code>	Allows items to wrap to the next line
<code>flex-nowrap</code>	Prevents wrapping (default)
<code>flex-wrap-reverse</code>	Wrap items in reverse order

---

#### 5. Flex Grow, Shrink, and Order

Class	Description
<code>flex-grow-0 / flex-grow-1</code>	No growth / Allow growth
<code>flex-shrink-0 / flex-shrink-1</code>	Prevent shrinking / Allow shrinking
<code>order-{n}</code>	Set order for items (default is 0)

---

#### Example: Flexbox Layout

```
<div class="d-flex justify-content-between align-items-center">  
  <div>Item 1</div>  
  <div>Item 2</div>  
  <div>Item 3</div>  
</div>
```

---

---

# Bootstrap Grid System

The grid system in Bootstrap is built using **flexbox** and consists of rows and columns.

## 1. Structure

- **Container:** Wraps rows and columns.
    - `container` (fixed-width)
    - `container-fluid` (full-width)
    - `container-{breakpoint}` (responsive container)
  - **Row:** Divides the container into rows.
  - **Columns:** Divides rows into 12 equal parts (by default).
- 

## 2. Grid Classes

Class	Description
<code>col</code>	Automatically adjusts to equal width
<code>col-{n}</code>	Fixed number of columns ( <code>1-12</code> )
<code>col-{breakpoint}-{n}</code>	Columns based on breakpoints
<code>col-auto</code>	Column width based on content

---

## 3. Responsive Breakpoints

Breakpoint	Width Range
<code>xs</code>	Extra small (<576px)
<code>sm</code>	Small (≥576px)
<code>md</code>	Medium (≥768px)
<code>lg</code>	Large (≥992px)
<code>xl</code>	Extra large (≥1200px)
<code>xxl</code>	Extra-extra large (≥1400px)

---

#### 4. Example: Basic Grid

```
<div class="container">
  <div class="row">
    <div class="col">Column 1</div>
    <div class="col">Column 2</div>
    <div class="col">Column 3</div>
  </div>
</div>
```

---

#### 5. Example: Responsive Grid

```
<div class="container">
  <div class="row">
    <div class="col-md-6 col-lg-4">Medium (6 cols), Large (4
cols)</div>
    <div class="col-md-6 col-lg-4">Medium (6 cols), Large (4
cols)</div>
    <div class="col-md-12 col-lg-4">Full width on medium, 4 cols on
large</div>
  </div>
</div>
```

---

#### 6. Nesting

```
<div class="container">
  <div class="row">
    <div class="col">
      Parent Column
      <div class="row">
        <div class="col">Nested Column 1</div>
        <div class="col">Nested Column 2</div>
      </div>
    </div>
  </div>
</div>
```

---

## Bootstrap position types

Bootstrap provides utilities to control the **positioning** of elements in a layout. These position types are based on CSS properties such as **position**, **top**, **right**, **bottom**, and **left**. Below is a detailed explanation:

---

### Position Types

Class	Description
<code>position-static</code>	Default position of an element (static).
<code>position-relative</code>	Positions the element relative to its normal position.
<code>position-absolute</code>	Positions the element relative to its nearest positioned ancestor.
<code>position-fixed</code>	Positions the element relative to the viewport and remains fixed during scrolling.
<code>position-sticky</code>	Toggles between <b>relative</b> and <b>fixed</b> based on the user's scroll position.

---

### Offset Classes

Offset classes (**top**, **right**, **bottom**, **left**) allow you to control the positioning of elements when using relative, absolute, fixed, or sticky positioning.

Class	Description
<code>top-0</code> , <code>right-0</code> , <code>bottom-0</code> , <code>left-0</code>	Position at 0 units from the respective edge.
<code>top-50</code> , <code>right-50</code> , <code>bottom-50</code> , <code>left-50</code>	Position at 50% from the respective edge.

<code>translate-middle</code>	Centers an element in both horizontal and vertical axes.
<code>translate-middle-x</code>	Centers an element horizontally.
<code>translate-middle-y</code>	Centers an element vertically.

---

## Example Usage

### 1. Relative Positioning

```
<div class="position-relative">  
  <div class="position-absolute top-0 start-0">  
    Top-left absolute positioned element.  
  </div>  
</div>
```

---

### 2. Fixed Positioning

```
<div class="position-fixed top-0 start-0 bg-primary text-white p-3">  
  Fixed element at the top-left corner.  
</div>
```

---

### 3. Sticky Positioning

```
<div class="position-sticky top-0 bg-light p-3">  
  Sticky element (stays at the top while scrolling).  
</div>
```

---

### 4. Centering with `translate-middle`

```
<div class="position-relative" style="height: 200px;">  
  <div class="position-absolute top-50 start-50 translate-middle  
    bg-secondary text-white p-3">
```

```
    Centered element
  </div>
</div>
```

---

## 5. Offset Examples

```
<div class="position-absolute top-0 start-50 translate-middle-x">
  Centered horizontally at the top.
</div>
<div class="position-absolute bottom-0 end-0">
  Positioned at the bottom-right corner.
</div>
```

---

## Bootstrap responsive utilities

Bootstrap provides a set of **responsive utility classes** that allow you to control the visibility and behavior of elements across different screen sizes. These utilities help ensure your website or application looks great on any device.

### 1. Display Utility

Control visibility and layout based on screen sizes.

Class	Description	Screen Size
<code>d-none</code>	Hide element	All screens
<code>d-sm-none</code>	Hide element on small screens and below	≤ 576px
<code>d-md-none</code>	Hide element on medium screens and below	≤ 768px
<code>d-lg-none</code>	Hide element on large screens and below	≤ 992px

<code>d-xl-none</code>	Hide element on extra large screens and below	≤ 1200px
<code>d-xxl-none</code>	Hide element on extra extra large screens and below	≤ 1400px
<code>d-block</code>	Show element as a block	All screens
<code>d-inline</code>	Show element inline	All screens
<code>d-flex</code>	Show element as a flex container	All screens

### Example:

```
<!-- Hidden on small and medium screens -->
<div class="d-none d-md-block">Visible only on medium and larger
screens</div>
```

---

## 2. Visibility Utility

Control the visibility of elements without removing them from the layout.

Class	Description	Screen Size
<code>visible</code>	Element is visible	All screens
<code>invisible</code>	Element is invisible but still takes up space	All screens
<code>visible-sm</code>	Visible on small screens	≤ 576px
<code>invisible-md</code>	Invisible on medium screens and larger	≥ 768px

### Example:

```
<div class="invisible">This is invisible but still occupies
space</div>
```

---



### 3. Spacing Utilities

Control margins and padding for all screen sizes and breakpoints.

Class	Description	Example
<code>m-{t,b,s,e,x},y}</code>	Margin on all sides or specific sides	<code>m-3</code> , <code>mt-2</code> , <code>me-4</code>
<code>p-{t,b,s,e,x},y}</code>	Padding on all sides or specific sides	<code>p-3</code> , <code>pt-1</code> , <code>pe-2</code>

- **Breakpoints:** `sm`, `md`, `lg`, `xl`, `xxl`

Example:

```
<!-- Margin 4 on all sides on all screen sizes -->
<div class="m-4">Content</div>
```

```
<!-- Padding 3 on large screens, padding 1 on medium screens -->
<div class="p-3 p-md-1">Responsive padding</div>
```

---

### 4. Flex Utilities

Control flexbox properties for responsive designs.

Class	Description	Example
<code>d-flex</code>	Enable flexbox	<code>d-flex</code>
<code>d-inline-flex</code>	Enable inline flexbox	<code>d-inline-flex</code>
<code>justify-content-{start,end,center,between,around}</code>	Align flex items horizontally	<code>justify-content-center</code>
<code>align-items-{start,end,center,baseline,stretch}</code>	Align flex items vertically	<code>align-items-center</code>

**Example:**

```
<!-- Flex container with center alignment on medium and larger screens -->
<div class="d-flex justify-content-center align-items-center">
  <div>Item 1</div>
  <div>Item 2</div>
</div>
```

---

## 5. Grid System Utilities

Control grid layout behavior for responsive designs.

Class	Description	Example
<code>col</code>	Automatically adjusts to equal width	<code>col</code>
<code>col-{breakpoint}-n</code>	Defines the number of columns (1-12)	<code>col-md-6</code> , <code>col-lg-4</code>
<code>col-{breakpoint}-auto</code>	Automatically adjusts based on content width	<code>col-sm-auto</code>

### Example:

```
<!-- 2 equal-width columns on medium and larger screens -->
<div class="row">
  <div class="col-md-6">Column 1</div>
  <div class="col-md-6">Column 2</div>
</div>
```

---

## 6. Order Utilities

Control the order of flex items across screen sizes.

Class	Description	Example
<code>order-{n}</code>	Define the order of flex items	<code>order-1</code> , <code>order-2</code>

<code>order-{breakpoint}-{n}</code>	Define order at specific breakpoints	<code>order-md-1,</code> <code>order-lg-2</code>
-------------------------------------	--------------------------------------	---

### Example:

```
<div class="d-flex">  
  <div class="order-2">Second</div>  
  <div class="order-1">First</div>  
</div>
```

---

## 7. Alignment and Justification

Control alignment and spacing of content on different screen sizes.

Class	Description	Example
<code>align-items-{start,end,center,baseline,stretch}</code>	Vertical alignment of items in a flex container	<code>align-items-center</code>
<code>justify-content-{start,end,center,between,around,evenly}</code>	Horizontal alignment of items in a flex container	<code>justify-content-between</code>

---

## 8. Width and Height Utilities

Control width and height responsively.

Class	Description	Example
<code>w-{value}</code>	Set width of an element	<code>w-50,</code> <code>w-100</code>
<code>h-{value}</code>	Set height of an element	<code>h-25,</code> <code>h-50</code>

---

## 9. Positioning Utilities

Control the position of elements.

Class	Description	Example
<code>position-{static, relative, absolute, fixed, sticky}</code>	Positioning behavior	<code>position-relative</code>
<code>top-{value}, left-{value}, right-{value}, bottom-{value}</code>	Offset the positioned element	<code>top-0, left-50</code>

---

## 10. Z-Index Utilities

Control stacking order with z-index values.

Class	Description	Example
<code>z-index-{n}</code>	Set z-index values	<code>z-index-1, z-index-10</code>

---

## 11. Custom Breakpoints

Bootstrap allows you to customize breakpoints in your project's Sass configuration. However, the default breakpoints are:

Class	Screen Size
<code>d-{breakpoint}-none</code>	For hiding on specific breakpoints
<code>d-{breakpoint}-block</code>	For showing on specific breakpoints
<code>d-{breakpoint}-flex</code>	For using flex on specific breakpoints

---

### Example: Responsive Utilities in Action

```
<!-- Hidden on small screens, visible on medium and larger screens -->
<div class="d-none d-md-block">Visible on medium and larger screens only</div>
```

```
<!-- Flexbox with vertical centering on small screens and above -->
<div class="d-flex justify-content-center align-items-center h-100">
  <div>Centered content</div>
</div>
```

```
<!-- Grid layout with 2 columns on large screens and full-width on
small -->
<div class="row">
  <div class="col-12 col-lg-6">Column 1</div>
  <div class="col-12 col-lg-6">Column 2</div>
</div>
```

---

These responsive utility classes make it easy to create adaptive, mobile-first designs in Bootstrap, ensuring elements behave as needed across different devices and screen sizes.

## A real world implementation

Let's implement a **real-world responsive layout** using Bootstrap's responsive utilities, grid system, flexbox, and positioning. The layout will feature a **header**, **content area**, and a **sidebar**. The content and sidebar will adjust based on screen size, making the layout mobile-friendly.

### Scenario:

- **Header:** Stays at the top, with navigation links.
- **Main Content:** Takes up most of the space on larger screens, but stacks vertically on smaller screens.
- **Sidebar:** Visible on medium and larger screens; collapses and moves below the main content on smaller screens.

---

## HTML Structure

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width,
initial-scale=1.0">
  <title>Responsive Layout</title>
```

```
<link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.
min.css" rel="stylesheet">
</head>
<body>
```

```
<!-- Header -->
<header class="bg-primary text-white p-3">
  <div class="container">
    <h1>My Website</h1>
    <nav>
      <ul class="nav">
        <li class="nav-item">
          <a href="#" class="nav-link text-white">Home</a>
        </li>
        <li class="nav-item">
          <a href="#" class="nav-link text-white">About</a>
        </li>
        <li class="nav-item">
          <a href="#" class="nav-link text-white">Services</a>
        </li>
        <li class="nav-item">
          <a href="#" class="nav-link text-white">Contact</a>
        </li>
      </ul>
    </nav>
  </div>
</header>
```

```
<!-- Main Content -->
<div class="container mt-4">
  <div class="row">
    <!-- Sidebar (visible on medium and larger screens) -->
    <aside class="col-md-3 d-none d-md-block bg-light p-3">
      <h4>Sidebar</h4>
      <ul class="list-unstyled">
        <li><a href="#">Link 1</a></li>
        <li><a href="#">Link 2</a></li>
```

```

        <li><a href="#">Link 3</a></li>
        <li><a href="#">Link 4</a></li>
    </ul>
</aside>

<!-- Main Content (takes 9 columns on medium screens, 12 columns
on small screens) -->
<main class="col-md-9 col-12">
    <div class="bg-light p-4 mb-4">
        <h2>Main Content</h2>
        <p>Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Quisque sit amet accumsan arcu. Sed egestas ultricies nulla, ut
facilisis libero tristique ac.</p>
    </div>

    <div class="bg-light p-4">
        <h2>More Content</h2>
        <p>Quisque scelerisque velit in mi dapibus, ut viverra neque
varius. Aenean sed tristique ante. Donec vestibulum leo non tortor
fringilla, a cursus erat fermentum.</p>
    </div>
</main>
</div>
</div>

<!-- Footer -->
<footer class="bg-dark text-white text-center p-3 mt-4">
    <p>&copy; 2024 My Website</p>
</footer>

<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bu
ndle.min.js"></script>
</body>
</html>

```

---

## Explanation of the Implementation

1. **Header:**
    - The header has a simple navigation bar with links.
    - The `nav` is displayed horizontally by default (because `nav` items are inline-blocks).
  2. **Main Content:**
    - The layout is based on Bootstrap's **grid system**:
      - The main content (`<main>`) takes up **9 columns** on medium (`md`) and larger screens, and **12 columns** (full width) on smaller screens (`col-12`).
      - The sidebar (`<aside>`) takes up **3 columns** on medium screens (`col-md-3`) and **is hidden** on smaller screens with `d-none d-md-block`.
    - This uses Bootstrap's **grid classes** to define how much space each element should occupy.
  3. **Sidebar:**
    - The sidebar is **hidden on smaller screens** (`d-none d-md-block`).
    - It is displayed on **medium and larger screens** (`col-md-3`), taking up one-third of the screen width.
    - The sidebar's links are styled with a simple unordered list.
  4. **Responsiveness:**
    - **On small screens** (`col-12`), the main content and sidebar stack vertically.
    - **On medium screens and above** (`col-md-9` for content, `col-md-3` for sidebar), the content area and sidebar are displayed side by side.
    - The layout adjusts itself based on the **viewport width** using **Bootstrap's responsive grid system**.
  5. **Footer:**
    - The footer is fixed at the bottom of the page with a background color and centered text.
- 

## Responsive Behavior in Action

- **Small Screens (mobile devices):**
    - The header navigation links will stack vertically.
    - The sidebar will collapse below the main content (since `d-none d-md-block` hides it).
  - **Medium Screens (tablets):**
    - The main content takes 9 columns, and the sidebar takes 3 columns.
  - **Large Screens (desktops):**
    - The layout remains the same as on medium screens, with the main content and sidebar next to each other.
-



## How It Works

- **d-none d-md-block**: This hides the sidebar on small screens and shows it only on medium (768px) and larger screens.
  - **col-md-9 col-12**: On medium and larger screens, the main content takes 9 out of 12 columns. On smaller screens, it takes up all 12 columns (full width).
  - **container mt-4**: Adds a container with some margin on the top to separate content from the header.
- 

## What You Can Do Next

You can extend this layout by:

- Adding more components such as cards, forms, or images.
  - Customizing the header or sidebar for better functionality (like a toggleable sidebar on mobile).
  - Adding JavaScript for interactive features (like a collapsible navigation menu for small screens).
- 

## Centering the nav links above

To **center** the navigation links in the header, you can use Bootstrap's **flexbox utilities**. Flexbox allows you to easily align and justify items horizontally or vertically. For centering the navigation links, you'll apply the following steps:

### Steps:

1. Add the **d-flex** class to the **nav** element to make it a flex container.
2. Use **justify-content-center** to center the navigation links horizontally.

Here's how you can modify the code:

## Updated Header Section with Centered Navigation Links

```
<header class="bg-primary text-white p-3">
  <div class="container">
    <h1>My Website</h1>
    <nav class="d-flex justify-content-center">
      <ul class="nav">
        <li class="nav-item">
```

```
        <a href="#" class="nav-link text-white">Home</a>
    </li>
    <li class="nav-item">
        <a href="#" class="nav-link text-white">About</a>
    </li>
    <li class="nav-item">
        <a href="#" class="nav-link text-white">Services</a>
    </li>
    <li class="nav-item">
        <a href="#" class="nav-link text-white">Contact</a>
    </li>
</ul>
</nav>
</div>
</header>
```

### Explanation:

1. **d-flex**: Makes the `nav` element a flex container.
  2. **justify-content-center**: Centers the navigation items horizontally inside the flex container.
- 

### Result:

- The navigation links will be centered in the header, both on small and large screens.
- The flexbox utility ensures they remain centered regardless of the screen size.

## Bootstrap spacing utilities

Bootstrap provides a set of **spacing utilities** to control the **margin** and **padding** of elements. These utilities use shorthand classes to make it easy to apply spacing without writing custom CSS.

### Spacing Utilities Overview

You can apply **margins** and **padding** on all sides or specific sides of an element using these classes:

- **m**: Margin on all sides
- **p**: Padding on all sides
- **t**: Top (used with margin or padding)
- **b**: Bottom (used with margin or padding)
- **s**: Start (left on LTR or right on RTL)
- **e**: End (right on LTR or left on RTL)
- **x**: Horizontal (left and right)
- **y**: Vertical (top and bottom)

You can also use specific size values to control the amount of spacing.

## Class Syntax

`{property}-{side}-{size}`

- **Property**: **m** for margin, **p** for padding.
- **Side**: **t** (top), **b** (bottom), **s** (start), **e** (end), **x** (horizontal), **y** (vertical).
- **Size**: **0** (no spacing), **1** (small), **2**, **3**, **4**, **5** (large), **auto** (automatic margin for centering).

## Margin Classes

Class	Description	Example
<code>m-{size}</code> <code>}</code>	Margin on all sides	<code>m-3</code>
<code>mt-{size}</code> <code>e}</code>	Margin on the top	<code>mt-4</code>
<code>mb-{size}</code> <code>e}</code>	Margin on the bottom	<code>mb-2</code>
<code>ms-{size}</code> <code>e}</code>	Margin on the start (left for LTR, right for RTL)	<code>ms-5</code>
<code>me-{size}</code> <code>e}</code>	Margin on the end (right for LTR, left for RTL)	<code>me-3</code>
<code>mx-{size}</code> <code>e}</code>	Horizontal margin (left and right)	<code>mx-4</code>

<code>my-{size e}</code>	Vertical margin (top and bottom)	<code>my-1</code>
------------------------------	----------------------------------	-------------------

## Padding Classes

Class	Description	Example
<code>p-{size }</code>	Padding on all sides	<code>p-3</code>
<code>pt-{size e}</code>	Padding on the top	<code>pt-2</code>
<code>pb-{size e}</code>	Padding on the bottom	<code>pb-4</code>
<code>ps-{size e}</code>	Padding on the start (left for LTR, right for RTL)	<code>ps-5</code>
<code>pe-{size e}</code>	Padding on the end (right for LTR, left for RTL)	<code>pe-1</code>
<code>px-{size e}</code>	Horizontal padding (left and right)	<code>px-3</code>
<code>py-{size e}</code>	Vertical padding (top and bottom)	<code>py-2</code>

## Spacing Sizes

The available sizes are:

- **0**: No margin or padding (removes spacing)
- **1**: Small spacing (about 0.25rem)
- **2**: Medium spacing (about 0.5rem)
- **3**: Large spacing (about 1rem)
- **4**: Larger spacing (about 1.5rem)
- **5**: Extra-large spacing (about 3rem)
- **auto**: Auto margin (centers elements horizontally)

## Examples of Spacing Utilities

### 1. Margin on all sides

```
<div class="m-3">This div has margin on all sides (1rem)</div>
```

### 2. Padding on all sides

```
<div class="p-4">This div has padding on all sides (1.5rem)</div>
```

### 3. Top margin only

```
<div class="mt-5">This div has a margin on the top (3rem)</div>
```

### 4. Bottom padding only

```
<div class="pb-2">This div has padding on the bottom (0.5rem)</div>
```

### 5. Horizontal margin

```
<div class="mx-4">This div has margin on the left and right  
(1.5rem)</div>
```

### 6. Vertical padding

```
<div class="py-3">This div has padding on the top and bottom  
(1rem)</div>
```

### 7. Auto margin (centering)

```
<div class="mx-auto" style="width: 200px;">This div is centered  
horizontally with auto margin</div>
```

### 8. Start (left) margin

```
<div class="ms-4">This div has a margin on the left side  
(1.5rem)</div>
```

## 9. End (right) padding

```
<div class="pe-3">This div has padding on the right side (1rem)</div>
```

## Real-World Example: Centered Card with Padding and Margin

```
<div class="container mt-5">
  <div class="row justify-content-center">
    <div class="col-md-6">
      <div class="card p-4">
        <h5 class="card-title">Card Title</h5>
        <p class="card-text">Some content inside the card. This card
has padding and margin utilities applied.</p>
      </div>
    </div>
  </div>
</div>
```

## Explanation:

- **container mt-5**: A container with top margin (**mt-5** gives 3rem margin on top).
- **row justify-content-center**: A flex container with centered content.
- **col-md-6**: The card will occupy 6 columns on medium and larger screens.
- **card p-4**: The card has padding of 1.5rem on all sides.

---

## Conclusion

Using Bootstrap's spacing utilities, you can easily adjust the margin and padding of elements for different screen sizes, making it easy to create responsive layouts without writing custom CSS.

## Bootstrap tables real world scenario

### Real-World Scenario: Bootstrap Table for a Data-Driven Dashboard

Let's imagine you're building a **data-driven dashboard** for a **project management system**. The dashboard displays a table that lists ongoing **projects**, their **status**, **budget**, **assigned team members**, and **due dates**.

We'll implement a **responsive Bootstrap table** that includes:

1. **Sorting** of columns (to order projects by status, budget, etc.)
2. **Pagination** to break the table into pages.
3. **Hover effects** for rows for a better user experience.
4. **Responsive design** to ensure the table is usable on mobile devices.

## Example: Project Management Dashboard Table

### HTML Structure

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width,
initial-scale=1.0">
  <title>Project Management Dashboard</title>
  <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.
min.css" rel="stylesheet">
  <style>
    .table-responsive { margin-top: 20px; }
  </style>
</head>
<body>

<!-- Header -->
<header class="bg-primary text-white p-3">
  <div class="container">
    <h1>Project Management Dashboard</h1>
  </div>
</header>

<!-- Main Content -->
<div class="container mt-4">
  <h2 class="mb-3">Current Projects</h2>

  <!-- Table -->
  <div class="table-responsive">
    <table class="table table-striped table-bordered">
```

```

<thead>
  <tr>
    <th scope="col">#</th>
    <th scope="col">Project Name</th>
    <th scope="col">Budget</th>
    <th scope="col">Status</th>
    <th scope="col">Team Members</th>
    <th scope="col">Due Date</th>
  </tr>
</thead>
<tbody>
  <tr>
    <th scope="row">1</th>
    <td>Website Redesign</td>
    <td>$25,000</td>
    <td><span class="badge bg-warning text-dark">In
Progress</span></td>
    <td>John, Alice, Robert</td>
    <td>2024-12-31</td>
  </tr>
  <tr>
    <th scope="row">2</th>
    <td>Mobile App Launch</td>
    <td>$50,000</td>
    <td><span class="badge bg-success">Completed</span></td>
    <td>Sarah, Emma, Liam</td>
    <td>2024-11-15</td>
  </tr>
  <tr>
    <th scope="row">3</th>
    <td>CRM Integration</td>
    <td>$40,000</td>
    <td><span class="badge bg-danger">Delayed</span></td>
    <td>David, Jennifer</td>
    <td>2025-03-10</td>
  </tr>
  <tr>
    <th scope="row">4</th>

```



```

        <td>Cloud Migration</td>
        <td>$30,000</td>
        <td><span class="badge bg-info">In Progress</span></td>
        <td>Matthew, Kate</td>
        <td>2024-12-20</td>
    </tr>
    <tr>
        <th scope="row">5</th>
        <td>E-commerce Platform</td>
        <td>$100,000</td>
        <td><span class="badge bg-success">Completed</span></td>
        <td>Paul, Olivia, James</td>
        <td>2024-10-10</td>
    </tr>
</tbody>
</table>
</div>

<!-- Pagination (if data is large) -->
<nav>
    <ul class="pagination justify-content-center">
        <li class="page-item">
            <a class="page-link" href="#" aria-label="Previous">
                <span aria-hidden="true">&laquo;</span>
            </a>
        </li>
        <li class="page-item active"><a class="page-link"
href="#">1</a></li>
        <li class="page-item"><a class="page-link" href="#">2</a></li>
        <li class="page-item"><a class="page-link" href="#">3</a></li>
        <li class="page-item">
            <a class="page-link" href="#" aria-label="Next">
                <span aria-hidden="true">&raquo;</span>
            </a>
        </li>
    </ul>
</nav>
</div>

```

```

<!-- Footer -->
<footer class="bg-dark text-white text-center p-3 mt-4">
  <p>&copy; 2024 Project Management Dashboard</p>
</footer>

<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"></script>
</body>
</html>

```

## Explanation:

### 1. Table Structure

- The table uses the standard **Bootstrap classes** for styling:
  - **table**: Basic Bootstrap table.
  - **table-striped**: Stripes the rows for better readability.
  - **table-bordered**: Adds borders to the table.
  - **thead** and **tbody**: Used for table headers and body content.

### 2. Table Cells and Badges

- **Badges**:
  - To represent different project statuses (e.g., **Completed**, **In Progress**, **Delayed**), we used Bootstrap **badge classes**:
    - **bg-warning** (yellow for "In Progress")
    - **bg-success** (green for "Completed")
    - **bg-danger** (red for "Delayed")
    - **bg-info** (blue for "In Progress")

### 3. Responsive Table

- **table-responsive**: Ensures the table is scrollable on small screens, making it **responsive**. If the table exceeds the width of the screen, it can be horizontally scrolled.

### 4. Pagination

- Pagination helps break large tables into pages, making it easier to navigate.
  - **pagination** and **page-item**: Bootstrap's classes for pagination.

- The **active** class is used for the current page.

## 5. Styling

- The **bg-primary** class gives the header a blue background.
  - The **text-white** class makes the text inside the header white.
  - **container** class is used to provide some spacing around the content.
- 

## How It Works:

- On **large screens**, the table is displayed normally.
  - On **small screens**, the table becomes horizontally scrollable (due to **table-responsive**).
  - **Pagination** allows the user to navigate between pages when the table has a large number of rows.
- 

## Customization

- You can enhance the table by:
    - Adding **sorting functionality** (requires JavaScript or integration with libraries like **DataTables**).
    - Implementing **filtering options** to narrow down the results.
    - Adding **modals** for editing project details.
    - Integrating with a **backend** to dynamically load project data.
- 

## Bootstrap dashboard with cards and tables and a sidebar real life scenario

### Real-World Scenario: Bootstrap Dashboard with Cards, Tables, and Sidebar

Let's imagine you're building a **financial dashboard** for an online platform. This dashboard will show:

- **Key Statistics** in **cards** (e.g., Total Revenue, Active Users, Total Transactions).
- A **data table** showing recent transactions.
- A **sidebar navigation** for users to navigate between different sections of the platform (e.g., Dashboard, Transactions, Settings).

We'll create a responsive layout using **Bootstrap** that includes:

1. **Cards** for displaying key statistics.
2. A **table** to display recent transaction data.
3. A **sidebar** for navigation.
4. **Responsive design** to ensure the dashboard looks good on all screen sizes.

## Example: Financial Dashboard with Cards, Table, and Sidebar

### HTML Structure

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width,
initial-scale=1.0">
  <title>Financial Dashboard</title>
  <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.
min.css" rel="stylesheet">
  <style>
    /* Custom styles */
    .sidebar {
      height: 100vh;
      position: fixed;
      top: 0;
      left: 0;
      width: 250px;
      background-color: #343a40;
      padding-top: 20px;
    }
    .sidebar a {
      color: white;
      text-decoration: none;
      padding: 10px 15px;
      display: block;
    }
    .sidebar a:hover {
      background-color: #495057;
    }
    .content {
```

```
        margin-left: 260px;
        padding: 20px;
    }
    .card-body {
        background-color: #f8f9fa;
    }
</style>
</head>
<body>

<!-- Sidebar -->
<div class="sidebar">
    <h3 class="text-white text-center">Dashboard</h3>
    <a href="#">Home</a>
    <a href="#">Transactions</a>
    <a href="#">Reports</a>
    <a href="#">Settings</a>
</div>

<!-- Main Content Area -->
<div class="content">
    <header class="bg-primary text-white p-3">
        <h1>Financial Dashboard</h1>
    </header>

    <div class="container mt-4">
        <!-- Cards Section -->
        <div class="row mb-4">
            <div class="col-md-4">
                <div class="card text-white bg-success">
                    <div class="card-header">Total Revenue</div>
                    <div class="card-body">
                        <h5 class="card-title">$1,250,000</h5>
                        <p class="card-text">Revenue generated this quarter.</p>
                    </div>
                </div>
            </div>
            <div class="col-md-4">
```

```
<div class="card text-white bg-info">
  <div class="card-header">Active Users</div>
  <div class="card-body">
    <h5 class="card-title">5,350</h5>
    <p class="card-text">Currently active users on the
platform.</p>
  </div>
</div>
<div class="col-md-4">
  <div class="card text-white bg-warning">
    <div class="card-header">Total Transactions</div>
    <div class="card-body">
      <h5 class="card-title">2,150</h5>
      <p class="card-text">Total number of transactions this
month.</p>
    </div>
  </div>
</div>
</div>
```

```
<!-- Table Section -->
<h3>Recent Transactions</h3>
<div class="table-responsive">
  <table class="table table-bordered table-striped mt-3">
    <thead class="thead-dark">
      <tr>
        <th>#</th>
        <th>Transaction ID</th>
        <th>User</th>
        <th>Amount</th>
        <th>Status</th>
        <th>Date</th>
      </tr>
    </thead>
    <tbody>
      <tr>
        <td>1</td>
```

```
        <td>#TX1001</td>
        <td>John Doe</td>
        <td>$500</td>
        <td><span class="badge bg-success">Completed</span></td>
        <td>2024-12-01</td>
    </tr>
    <tr>
        <td>2</td>
        <td>#TX1002</td>
        <td>Emma Watson</td>
        <td>$1,200</td>
        <td><span class="badge bg-warning">Pending</span></td>
        <td>2024-12-02</td>
    </tr>
    <tr>
        <td>3</td>
        <td>#TX1003</td>
        <td>Mark Smith</td>
        <td>$750</td>
        <td><span class="badge bg-danger">Failed</span></td>
        <td>2024-12-03</td>
    </tr>
    <tr>
        <td>4</td>
        <td>#TX1004</td>
        <td>Linda Jones</td>
        <td>$1,500</td>
        <td><span class="badge bg-success">Completed</span></td>
        <td>2024-12-04</td>
    </tr>
</tbody>
</table>
</div>
</div>
</div>
```

```
<script  
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"></script>  
</body>  
</html>
```

## Explanation:

### 1. Sidebar

- **sidebar**: This is a fixed sidebar that stays in place as the user scrolls. It's given a dark background and the links inside are styled for a better user experience.
  - **position: fixed** ensures the sidebar stays fixed on the left side.
  - The **a: hover** styles add a hover effect to the sidebar links.

### 2. Header Section

- The header contains the title of the dashboard with a **primary background** and white text for clarity.

### 3. Cards Section

- Each **card** represents a key statistic (Total Revenue, Active Users, Total Transactions). We used:
  - **bg-success**, **bg-info**, and **bg-warning** classes to give different background colors to each card based on the data.
  - The **card-header** and **card-body** structure is used to display the title and value for each statistic.

### 4. Table Section

- The **table** is wrapped in a **table-responsive** container, making it scrollable horizontally on small screens.
  - **thead-dark**: This class gives the table header a dark background for contrast.
  - The **badge** classes are used to show the status of each transaction (Completed, Pending, Failed).

### 5. Responsive Layout

- The **col-md-4** classes in the card layout ensure that the cards are arranged in a 3-column grid on medium and larger screens, but stack on smaller screens.
- The table is scrollable on smaller screens due to the **table-responsive** class.



---

## Features & Enhancements:

- **Cards:** Display critical information in a visually appealing format.
- **Table:** Shows dynamic data (e.g., transactions) and uses badges to show status.
- **Sidebar:** Provides easy navigation for users to move between sections.
- **Responsive:** The layout adjusts to screen sizes, ensuring a smooth user experience across devices.

## Customization & Further Enhancements:

1. **Add Sorting:** Integrate libraries like **DataTables** to add sorting and filtering functionality to the table.
  2. **Add Graphs:** Use **Chart.js** or **D3.js** to visualize key statistics like revenue or user growth.
  3. **Modals:** Include modals to show detailed transaction info when clicking on a row in the table.
  4. **User Profile:** Include user-specific data in the sidebar, such as profile picture, name, and quick links.
-