



**University of
Sunderland**

Faculty of Business and Technology: Programme -

NAME: Upendra Khanal

STUDENT NUMBER: 240704403

MODULE CODE: CET138

MODULE TITLE: Full Stack Development

MODULE LEADER: David Grey

SUBMISSION DATE AND TIME: 29 AUG 2025/23:59 GMT

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ANY OTHER COMMENTS FROM STUDENT:

Bootstrap Framework

What is Bootstrap?

Bootstrap is the most popular open-source front-end framework by Twitter designed to help developers create responsive, visually appealing websites swiftly and efficiently. Initially built by Twitter, we have all adopted it as part of our web design toolchain because of how simple and consistent it is, and a wide range of prebuilt styles which we can use.

Bootstrap is essentially a 12 column responsive grid system that can scale up and down in size based on the viewport size allowing for fluid layouts that don't involve writing custom media queries. It also packs an extensive library of pre-styled objects like navbar, card, form, button, and table all with the newest design principles. These components allow developers to keep the website with a consistent look-and-feel across all pages.

Apart from that, bootstrap also has a hell lot of utility classes, which can give spacing, colors, typography styles, alignment and visibility with just few classes and writing a single line of CSS. This can drastically speed up development, especially for those just starting out or when under tight deadlines.

For this section, we are focusing on **Bootstrap's CSS features only** (without its JavaScript plugins) to demonstrate how professional-grade layouts, animations, and visual polish can be achieved purely through the framework's styling tools—no additional CSS files required.

Why Bootstrap is Widely Used Today

Bootstrap remains one of the most popular front-end frameworks because it **saves developers significant time** by providing pre-built solutions for common design patterns such as navigation bars, buttons, grids, and forms. Instead of writing CSS from scratch, developers can apply ready-made classes and achieve professional results quickly.

Another major advantage is that Bootstrap ensures **cross-browser and cross-device consistency** out-of-the-box. Websites built with Bootstrap automatically handle differences between browsers and adapt seamlessly to desktops, tablets, and mobile devices using its responsive grid system. This reliability and efficiency make it an industry standard, especially for projects that need to be delivered fast without sacrificing usability.

Core Features of Bootstrap

- **Grid & Breakpoints** — `.container`, `.row`, `.col-*` with tiers **sm, md, lg, xl, xxl** for responsive layouts.

- **Utility Classes** — Spacing (`m-`, `p-`, `g-`), colors (`text-*`, `bg-*`), display (`d-*`), flex/alignment (`d-flex`, `justify-content-*`, `align-items-*`).
- **Pre-styled Components** — `.card`, `.btn`, `.form-control`, navigation bars, alerts (*only CSS parts are used here*).
- **Typography System** — Readable defaults with utilities for size (`.lead`, headings), weight (`.fw-*`), and alignment (`.text-*`).
- **Helpers** — `.ratio` for media aspect ratios, `.img-fluid` for responsive images, `.rounded-*`, `.shadow-*` for visual polish.
- **Theme Colors** — Semantic palette: `primary`, `secondary`, `success`, `danger`, `warning`, `info`, `light`, `dark`.

Ways to Include Bootstrap CSS

1. CDN (Content Delivery Network) —

You can include Bootstrap by linking the minified `bootstrap.min.css` file hosted on a CDN (such as jsDelivr or Bootstrap's own CDN) inside the `<head>` section of your HTML.

- **Advantages:** No need to download files, fast loading due to caching across many websites, and always gets the latest stable version if you use the versioned link.
- **Example:**

```
<link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css"
rel="stylesheet">
```

2. Local File —

Download the Bootstrap CSS file (`bootstrap.min.css`) and store it in your project directory. Then, link to it in your HTML using a relative file path.

- **Advantages:** Works without an internet connection, allows you to customize the CSS file if needed, and ensures full control over the version used.
- **Example:**

```
<link rel="stylesheet" href="css/bootstrap.min.css">
```

3. Package Managers (npm / yarn) —

Install Bootstrap as a dependency in your project using a package manager like npm or yarn. This is the preferred method for modern web development workflows using build tools such as Webpack, Vite, or Gulp.

- **Advantages:** Easy to manage updates, integrates seamlessly with bundlers, and works well in large-scale projects.
- **Example (npm):**

```
npm install bootstrap
```

Then import the CSS in your build pipeline or main CSS file:

```
@import "~bootstrap/dist/css/bootstrap.min.css";
```

Bootstrap Example — Hosted on UOS Webspaces

Live Example Link:

<https://upendra11223.github.io/CET138-A1-ePortfolio/bootstrap-demo/bootstrap-demo.html>

This example uses only Bootstrap's CSS classes: a themed page background, a centered container, and a responsive three-across card grid that stacks on smaller screens. No custom CSS or JavaScript is used.

Detailed Breakdown of Bootstrap Components in the Example

1. Page Theme & Base Structure

```
<body class="bg-primary text-white">
  <div class="container py-5">
```

- **bg-primary** — Sets the page background to the framework's primary theme color.
- **text-white** — Ensures high-contrast text on the primary background.
- **container** — Centers content and applies responsive horizontal padding at each breakpoint.
- **py-5** — Adds generous vertical padding to the main content area.

2. Section Header

```
<header class="text-center mb-5">
  <h1 class="fw-bold">Bootstrap CSS Demo</h1>
  <p class="lead">A professional page using only Bootstrap's built-in
styles</p>
</header>
```

- **text-center** — Centers the heading and paragraph.
- **mb-5** — Adds bottom margin to separate the header from the grid.

- **fw-bold** — Uses heavier font weight for the main heading.
- **lead** — Slightly larger, more readable intro paragraph.

3. Responsive Grid Layout

```
<div class="row text-center g-4">
  <div class="col-md-4">
    <div class="card bg-light text-dark h-100 shadow-sm"> ... </div>
  </div>
  <div class="col-md-4"> ... </div>
  <div class="col-md-4"> ... </div>
</div>
```

- **row** — Defines a horizontal group that contains columns and manages gutters.
- **text-center** — Centers text inside the grid section.
- **g-4** — Sets a consistent gap between columns and rows.
- **col-md-4** — Three equal columns at md ($\geq 768\text{px}$) and above; stacks automatically on smaller screens.

4. Cards

```
<div class="card bg-light text-dark h-100 shadow-sm">
  <div class="card-body">
    <h5 class="card-title fw-bold">Responsive Grid</h5>
    <p class="card-text">Bootstrap's grid adapts to any device size.</p>
  </div>
</div>
```

- **card** — Pre-styled container with border, radius, and internal structure.
- **bg-light text-dark** — Light background and dark text for strong readability.
- **h-100** — Stretches the card to fill the height of its column for even alignment.
- **shadow-sm** — Subtle drop shadow for depth.
- **card-body / card-title / card-text** — Provide spacing and typographic hierarchy inside the card.
- **fw-bold** — Adds emphasis to the card title.

5. Footer

```
<footer class="text-center mt-5">
  <p class="mb-0">© 2025 Bootstrap Demo Page</p>
</footer>
```

- **text-center** — Centers the footer text.
- **mt-5** — Adds top margin to separate the footer from the grid above.
- **mb-0** — Removes default bottom margin on the paragraph for a tight footer.