

# 14th Class – Responsive Web Design & Bootstrap Grid System

## MERN Stack Journey – Frontend Foundations

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### 1. Responsive Web Design

Responsive Web Design ensures that a website adapts smoothly to different screen sizes such as **mobile, tablet, laptop, and desktop**.

Instead of creating separate websites for each device, we build **one flexible layout** that adjusts automatically.

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### 2. Bootstrap Grid System

Bootstrap Grid System is a powerful layout system built using: - **Containers - Rows - Columns**

It uses a **12-column layout** to create responsive and flexible designs.

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### 3. Column Wrapping

#### What is Column Wrapping?

When the total number of columns inside a row exceeds **12**, the extra columns automatically move to the **next line**.

#### Example Explanation

- `col-6 + col-6` → Fits in one row ( $6 + 6 = 12$ )
- Adding more `col-6` elements → Wraps to next line

#### Example Code

```
<div class="container">
  <div class="row">
    <div class="col-6">Content 1</div>
    <div class="col-6">Content 2</div>
    <div class="col-6">Content 3</div>
    <div class="col-6">Content 4</div>
  </div>
</div>
```

## Learning Outcome

- Bootstrap automatically manages layout
  - No need for custom CSS for wrapping
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## 4. Layout at Different Breakpoints

Bootstrap provides **responsive breakpoints** to control layout on different screen sizes.

### Bootstrap Responsive Tiers

Device Type	Width	Class Prefix
Extra small	<576px	col-
Small	≥576px	col-sm-
Medium	≥768px	col-md-
Large	≥992px	col-lg-
Extra Large	≥1200px	col-xl-

### Important Rule

If we define layout behavior for a **smaller device**, it automatically applies to all **larger devices**.

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## 5. Combining Bootstrap Column Classes

We can combine multiple grid classes to control layout across devices.

### Example

```
<div class="col-12 col-lg-6">
  Content
</div>
```

### Explanation

- Mobile & Tablet → Full width ( `col-12` )
- Large Screens → Half width ( `col-lg-6` )

This helps us build **mobile-friendly layouts first**, then enhance for larger screens.

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## 6. Mobile First Approach

Bootstrap follows a **Mobile First Approach**:

1. Design layout for mobile devices
2. Gradually adjust layout for tablets and desktops using breakpoints

### Why Mobile First?

- Majority of users browse on mobile
  - Better performance
  - Cleaner design structure
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## 7. MCQs (With Options & Answers)

### Q1. How many columns are there in Bootstrap Grid System?

- A. 10
- B. 8
- C. 12
- D. 16

**Answer:** 12

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### Q2. What happens if columns exceed 12 in a row?

- A. Layout breaks
- B. Columns disappear
- C. Columns wrap to next line
- D. Page crashes

**Answer:** Columns wrap to next line

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### Q3. Which class is used for large devices?

- A. `col-md-`
- B. `col-sm-`
- C. `col-lg-`
- D. `col-xl-`

**Answer:** `col-lg-`

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## 8. Interview Questions (Beginner Friendly)

### Q1. What is Bootstrap Grid System?

**Answer:** It is a responsive layout system based on 12 columns using containers, rows, and columns.

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### Q2. What is column wrapping?

**Answer:** When columns exceed 12 in a row, extra columns move to the next line automatically.

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### Q3. What does `col-12 col-lg-6` mean?

**Answer:** Full width on mobile and half width on large screens.

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### Q4. What is Mobile First Approach?

**Answer:** Designing layout for mobile first, then scaling up for larger screens.

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## 9. Folder Structure for GitHub

```
14-responsive-web-design-bootstrap-grid/
├── index.html
├── style.css
└── README.md
```

## 10. Key Takeaways

- Learned responsive design fundamentals
- Understood column wrapping behavior
- Practiced Bootstrap breakpoints
- Built mobile-first layouts
- Strengthened frontend foundation for MERN Stack

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 This class is essential for building responsive React & MERN applications.