Mobile Application Development with Flutter

Lecture 2: Introduction to Flutter

What is Flutter?

- **Flutter** is an **open-source UI software development kit (SDK)** developed by **Google** for building **cross-platform mobile applications** using a **single codebase**.

- With Flutter developers can build:
  - Android apps
  - iOS apps
  - Web & Desktop apps

- Write code once → run on Android and iOS

Why Flutter?

Flutter is chosen because:

- Single codebase
- Near-native performance
- Fast development
- Beautiful UI
- Strong community support

Key Features of Flutter

1. Dart programming language
2. Widget-based UI
3. Hot Reload
4. Material Design support
5. Cross-platform development
6. Single Codebase

1. Dart programming language

- **Dart** is a **modern**, **object-oriented programming language** developed by **Google**, specifically optimized for building **fast**, **cross-platform applications** using Flutter

- Flutter uses Dart because it:
  - Supports **Just-In-Time (JIT)** compilation → enables **Hot Reload**
  - Supports **Ahead-Of-Time (AOT)** compilation → high performance
  - Has clean and easy syntax (similar to Java, C#, JavaScript)

- Dart is the brain behind Flutter apps

2. Widget-Based UI

- In Flutter, **everything is a widget**:
  - Button, Text, Image, Layout, Screen

Types of Widgets

1. StatelessWidget
   - UI does not change
   - Example: Text, Icon
2. StatefulWidget
   - UI can change during runtime
   - Example: Counter, Form

3. Hot Reload

- **Hot Reload** allows developers to **see code changes instantly** in a running app **without restarting it**
- How It Works
  - Injects updated code into the running Dart Virtual Machine
  - Preserves app state
- Benefits
  - Faster development
  - Easy UI experimentation
  - Quick bug fixing

4. Material Design Support

- In Flutter, **Material Design** is Google's open-source design system (currently in its third iteration, Material 3) that provides a comprehensive set of guidelines and components for building consistent, intuitive, and visually appealing user interfaces across mobile, web, and desktop platforms
- Flutter provides built-in Material widgets such as:
  - AppBar
  - Scaffold
  - FloatingActionButton
  - Card
  - Snackbar

5. Cross-Platform Development

- **Cross-platform development** means creating **one application** that runs on **multiple platforms** using a **single codebase**

- Advantages:
  - Faster development
  - Low cost
  - Easier maintenance

- Write once, run everywhere — that's Flutter

6. Single Codebase

- Single codebase means writing code once to deploy apps across multiple platforms, including:
  - Android
  - iOS
  - Web
  - Desktop
- Single codebase reduces development time and cost