Dart Fundamentals

Module 1: Introduction to Programming and Dart Basics

- What is Programming?

- Introduction to Dart Language

- Installing Dart SDK and Setting up the Development Environment

- Variables and Data Types (int, double, String, bool)

- Constants (const, final)

- Basic Input and Output

- String Manipulation

- Comments and Code Structure

- Arithmetic and Logical Operators

- Introduction to Null Safety and its importance

Project Lab:

- Create a simple console-based calculator that performs addition, subtraction, multiplication, and division, making use of constants and ensuring null safety compliance.

Module 2: Control Flow, Loops, and Collections

- Conditional Statements (if, else if, else)

- Switch-Case Statement

- Looping Constructs (for, while, do-while loops)

- Break and Continue Statements

Project Lab:

- Build a shopping list program that allows users to add, remove, and search for items in the list

Module 3: Collections

- Introduction to Collections (Lists, Sets, Maps)

- Manipulating Collections (adding, removing, searching)

- Introduction to Null-Aware Operators (??, ?., ??=)

- Practical Use of Null-Aware Operators in Collection Handling

Project Lab:

- Utilize collections (Lists/Maps) and apply null-aware operators to handle null inputs gracefully.

Module 4: Functions

- Defining and Calling Functions
- Function Parameters and Return Types
- Named and Optional Parameters
- Anonymous Functions and Closures

Project Lab:

- Create a number guessing game where the program randomly selects a number, and the user guesses it

Module 5: Error Handling

- Error Handling with try, catch, finally
- Throwing Custom Exceptions

Project Lab:

- Handle errors for number guessing game for invalid inputs

Module 6: Dart Packages

- Introduction to Dart Packages (using pub.dev)
  - Importing and Using External Packages in Dart
  - Managing Dependencies with pubspec.yaml

Project Lab:

- Use an external Dart package for generating random numbers.

Module 7: Object-Oriented Programming and Collections (Advanced)

- Introduction to Classes and Objects
- Constructors and Named Constructors
- Methods and Properties
- Inheritance, Polymorphism, and Encapsulation
- Abstract Classes and Interfaces

- Getters and Setters

- Static Members and Final Keyword

- Advanced Collections (nested Lists, Maps of Lists)

- Working with custom data structures

Project Lab:

- Design a simple contact management system where users can add contacts (name, phone, email) and retrieve contact details. Use Maps for data storage and ensure the system supports null-aware operators for handling missing contact information.

Module 8: Asynchronous Programming

- Asynchronous Programming in Dart

  - Futures, async, await

  - Streams and handling asynchronous events

- Practical Use of Asynchronous Programming in Dart

Project Lab:

- Develop a basic task management system using Dart's asynchronous programming to fetch or simulate loading tasks (without UI).

Module 9: Usage of Dart in Flutter

- Brief Introduction to Flutter and its Architecture

- Dart's Role in Flutter Development:

  - Using Dart for managing state, handling business logic, and creating data models in Flutter apps

  - Integrating Dart's collections, null safety, and async features in Flutter widgets and logic

- Introduction to Dart Packages and Using Packages in Flutter