



# **Flutter**

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### Introduction to Flutter & Dart

- Overview of Flutter & Its Advantages
- Understanding Dart Programming Basics
  - a. Variables, Data Types, Functions
  - b. Object-Oriented Programming in Dart
- Setting Up Flutter Development Environment a. Installing Flutter SDK
  - b. Configuring Android Studio / VS Code
- ⇔ Running a Sample Flutter App

### **Flutter Fundamentals**

- Understanding Widgets: Stateless vs Stateful
- ⇔ Widget Tree & Element Tree
- Layouts & Positioning Widgets a. Column, Row, Stack, Expanded, Flexible
  - b. Containers, Padding, Margins
- Handling User Input (Forms, Text Fields, Buttons)

### **Navigation & Routing**

- Types of Navigation (Named Routes vs Anonymous Routes)
- ⇒ Passing Data Between Screens
- Navigation Drawer, Bottom Navigation Bar, and Tabs

### **State Management**

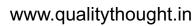
- Understanding the Need for State Management
- Provider: Basic Usage and Concepts
- ⇒ Riverpod & Bloc: When to Use What
- ⇒ SetState vs Inherited Widget vs GetX

### Networking & API Integration

- Fetching Data from REST APIs
- Using HTTP Package for Network Requests
- Handling JSON Parsing
- Error Handling & API Response Management

### Database & Storage

- ⇒ Using Local Storage (Shared Preferences, SQLite, Hive)
- ⇔ Cloud Storage with Firebase Firestore
- ⇒ Uploading & Fetching Data from Firebase



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### **Authentication & Security**

- Implementing Firebase Authentication (Google, Email/Password, OTP)
- ⇒ Securing API Calls & Storing Tokens (JWT, Secure Storage)
- Role-Based Authentication

### **UI/UX & Animations**

- ⇒ Customizing Themes & Fonts
- ⇒ Creating Custom Widgets & Components
- Adding Animations (Implicit & Explicit)
- ⇔ Gesture Detection (Swipe, Drag, Tap)

### **Performance Optimization**

- ⇒ Debugging & Error Handling
- ⇒ Profiling & Reducing App Size
- Optimizing Network Calls & Caching
- ⇒ Lazy Loading & Pagination

### **Advanced Concepts & Real-World Projects**

- Integrating Firebase Cloud Messaging (Push Notifications)
- Implementing Background Services
- ⇒ Flutter Web & Desktop App Development
- ⇒ Deploying Flutter Apps (Play Store & App Store)
- 🗢 Capstone Project Build a Full-Fledged App
- (E-Commerce, Chat App, etc.)

### **Bonus Topics**

- Testing in Flutter
  (Unit, Widget, Integration Testing)
- ➡ Using AI in Flutter (Integrating ML Models, AI Chatbots)



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