What is flutter?

- Flutter is open source technology that lets developer to create mobile (android & ios), desktop and web apps using a single codebase.

- It is not just framework or library it's complete ~~code~~ SDK. It was developed in May 2017 by google.

- Advantages of flutter.

1) It is free and fast.
2) single codebase for multiple plateforms.
3) Easy debugging
4) Automated testing
5) Highly customizable UI design.
6) Better performing with Dart, Skia & Devtool.

Flutter App lifecycle

1) Resumed:

The app is in foreground and receiving user inputs.

2) Inactive:

The app is in foreground but not receiving any user inputs i.e. when a phone call comes in.

3) paused:

The app is in background & not visible to the user.
i.e. user switches to another app.

4) detached:

The app is not running at all i.e. when user kills the app

Stateful widget lifecycle

1) Create state:

This method is needed to return an instance of State associated with widget.

2) init state:

It is called just before widget gets build. In this method we can initalize the variable, data, properties etc.

3) didchangeDependencies:

It is called when dependency of state objec changes via inherited widgets. It can be called multiple times.

4) build:

This method is used each time the widget is rebuilt

displays the UI on screen. It returns widget.

5) didupdateWidget :

It is helpful to unsubscribe the old wiget & subscribe new one if it is required. or you can say It is called whenever the widget configuration changes.

6) deactive :

It is used when state is removed from tree but current frame change can be re-inserted from another part.

7) dispose :

It is called when state object object is parmanently removed from tree.

- Hot Reload allows us to make changes in the code and see the immediate result.

It preserves the app state, so any UI changes will reflect immediately on the screen.

- Hot Restart rebuilds the entire app. It will destroys the preserved state value and set them to their default.

- provider package is used for state managment, It provides a way to pass the data between widgets without having use of constructor arguments.

- ValueNotifier class is used to create object that holds single value & Notifies its listeners when value changes.

- Stateless widget is used for creating widgets that don't require a mutable state.

It is build only once, It state will not change.

- Stateful widget is used for creating widget that requires mutable state.

means, It state we can change multiple time in its lifestyle.

- SetState() is used to update the state widget & trigger a rebuild of widget tree.

- markNeedsBuild() is used to mark a widget as needing to be rebuilt, but doesn't actually trigger it.

provider

- provider is basically wrapper around the inherited widgets that make it easier to users.

- It provides easy state managment technique.

- In provider, widgets listen to changes in state & update as soon as they are notified.

- So, instead of entire widget tree rebuilding, you can only update the affected widget.

Get X

- Get X is fast, stable and light state managment library in Flutter.

- It is powerful micro framework, using this we can manage states, make routing, show snackbars & even can perform dependency injection.

- In tween Animation, we have to define begining & end of transition & Framework itself calculate how to transition the widget.

- Flutter Activity is a class in Flutter Framework that represents a single screen.

- Flutter Activity is responsible for managing user interface, It uses Flutter's widget tree to build and display UI. and it can communicate with Flutter engine to manage app's rendering & animation.

- Flutter provides physics-based animations, including spring animation, & friction simulation.

- It is used to create animation that feel natural & responsive.

- async keyword is used to define Function that returns a Future, while async* is used to define Function that returns a stream.

- Stream can emit multiple values over time, while Future returns single value.

- Null aware operators allow you to make computations based on wheater value is Null or not.

1) ??

It is called if null operator.

Ex: b = a ?? hello

2) ?.

Ex: Final Value = person?.address?.street.

If any of the value is null then whole expression return null.

Types of testing in Flutter

1) Unit tests:

It is used for testing class or method.

2) Widget tests:

It is used for testing single widget. It ensures that widget's UI looks as expected & responds appropriately to events.

3) Integration tests:

It is used for test the critical Flows of entire app. It is important to check all widgets & services work together as expected.

- Navigator is a widget that manages navigation stack, It provides default implementation.

- Router is abstract class that define navigation behaviour. It is used to implement custom navigation behaviour.

- Streams are used to handle Asynchronous data in Flutter, It allow data to be transmitted continuously.

- Single Subscription stream deliver events sequentially. There can be only one listener throughout the sequence. i.e. reading a file.

- Broadcast stream deliver events to their subscribers.

- Widget tree is hierarchical structure that represents UI of application.

It consists of nested widgets, when we run the app the widget tree is traversed and each widget is rendered onto the screen in order.

- Push notification in Flutter can be implemented using combination of Firebase cloud Messaging & Flutter-local-notification package.

- First is used for sending Noti. to the app & second is used for display the notifications.

- Using Flutter_isolate package we can achieve background processing. It provides APIs for creating & managing isolates. isolates are lightweight threads that run independently of main thread.

- BuildContext are used to identify or locate widgets in widget tree. Each widget has its own BuildContext.

- Tree shaking is an optimization technique to remove unused module in bundle during build process.

It is dead code elimination technique.

- Pubspec.yaml allows you to define the packages your app relies on, declare your assets, version number and more.

- Flutter inspector is powerful tool for visulizing & exploring Flutter widget trees.

- key is unique identifier for widgets.

- keys are used by Flutter to determine which widget needs to be updated when widget tree is rebuilt.

1) Value key:

2) Object key

3) Unique key.

4) Global key.

- Dart uses the Fat Arrow notation (=>) to define single expression in a function.

- .then function will return after Future completes without an error.

- .whenCompleted will return function either Future completes with error or not.

- Define Async Function as variable

```
Future <void> Function ()

void function async {

  await future...

}
```

Onpressed : easyfunction

Firebase cloud Messaging is a service provide by google that allows you to send push notification to your users.

step-1 Create Firebase Project
Enable FCM in the app

step-2 If we want to send Notification to particular user then we can add device token.

step-3 Integrate Firebase in Flutter project & add credentials.

step-4 Setup message handler to handle incoming notification & perform actions based on notification payload.

JSON Serialization

- JSON Serialization is the process of converting Dart object to JSON string or vice versa.

- It is often used when working with APIs or databases that communicate data in JSON format.

- For manually parsing JSON Flutter provide built-in dart:convert package.

- For Automate serialization we have to add package json_serializable.

Dart Isolates

- Isolates provides a way to run multiple threads of execution concurrently.

- Each isolates has its own memory heap, which means data cannot directly shared but they can communicate with each other by sending messages.

- Isolates are ideal for parallel programming tasks

- There are two methods to create isolates in dart.

1) Using Compute
2) Using Isolate.spawn

- Freezed is a code generation package that helps you to create data classes in Dart.

- Freezed will automatically create all below things for your model class.
  - tostring() method
  - copyWith() method
  - toJson() method
  - hasCode getter variable.

- Factory keyword is used to identify default or named constructor.

- It is used to implement Constructor that decide wheater to return new instance or existing one.

we have to follow 2 simple Rule.
1) Return keyword need to be used.
2) It does not have access to this keyword.