How does the setState method work in Flutter?

setState notifies the framework that a StatefulWidget's state has changed, triggering a rebuild of its build method.

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What are keys in Flutter, and when should you use them?

Keys uniquely identify widgets, preserving state during rebuilds, especially in lists or when widgets move. Use ValueKey, ObjectKey, or GlobalKey for dynamic UIs.

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Explain the difference between hot reload and hot restart in Flutter.

Hot reload: updates the UI without resetting state, preserving app data.
Hot restart: rebuilds the entire app, resetting state.

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What is a BuildContext in Flutter, and why is it important?

BuildContext represents a widget's position in the widget tree, used to access inherited widgets or navigate.

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How do you handle navigation in Flutter? Explain Navigator.push and Navigator.pop.

Navigator.push adds a new route to the stack; Navigator.pop removes the current route.

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What are Future and Stream in Dart, and how are they used in Flutter?

Future represents a single async result;
Stream delivers multiple async values over time.
Used for API calls and real-time updates.

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How do you manage state in a Flutter application? Compare local state vs. app-wide state.

Local state uses *setState* for widget-specific changes; app-wide state uses Provider, Riverpod, or Bloc for *shared data*.

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What is the role of the pubspec.yaml file in a Flutter project?

It manages project **dependencies**, **assets**, and **configurations** like *app name* and *version*.

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How do you optimize the performance of a Flutter app?

Use const constructors, **minimize** rebuilds with const widgets, and **avoid** unnecessary widget nesting.

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What is the InheritedWidget, and how is it used for state management?

InheritedWidget shares data down the widget tree, accessed via **context.dependOnInheritedWidgetOfExactType.**

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Explain how to handle platform-specific code in Flutter (e.g., iOS vs. Android).

Use **platform channels** to **invoke** native code from Flutter.

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What is the purpose of the async and await keywords in Dart?

async marks a function as asynchronous;
await pauses execution ***until*** a Future completes.

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How do you implement animations in Flutter? Explain AnimatedContainer vs. explicit animations.

AnimatedContainer implicitly animates property changes;
Explicit animations use AnimationController for custom control.

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What are Slivers in Flutter, and when would you use them?

Slivers enable custom scrolling effects, used in CustomScrollView for complex layouts.

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How do you handle errors in Flutter when making API calls?

Use try-catch with Future and show user feedback via SnackBar or dialogs.

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What is the Provider package, and how does it simplify state management?

Provider is a dependency injection and state management library, simplifying app-wide state updates.

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How do you implement dependency injection in Flutter?

Use **Provider** or **get_it** to inject dependencies, decoupling services from widgets.

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What are CustomPainter and CustomPaint in Flutter, and when would you use them?

CustomPaint uses ***CustomPainter*** to draw custom graphics, used for unique UI elements.

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How do you handle localization in a Flutter app?

Use the **intl** package and **Localizations** to support multiple languages.

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What is the difference between mainAxisAlignment and crossAxisAlignment in a Row or Column?

mainAxisAlignment controls alignment along the primary axis (horizontal for Row, vertical for Column); **crossAxisAlignment** controls the perpendicular axis.

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How do you test a Flutter application? Explain unit tests vs. widget tests.

Unit tests verify logic;
widget tests check UI behavior. Use flutter_test package.

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What is the SafeArea widget, and why is it used?

SafeArea ensures content avoids notches and system UI elements.

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What is the difference between const and final in Dart?

const :

- creates compile-time constants.
- is for fixed values.

final :

- creates runtime-immutable variables.
- for values set once (e.g., API results).

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What are the types of memory in a Flutter app, and how are they managed?

Stack memory holds local variables; heap memory stores objects.

Dart's garbage collector frees unused heap memory. Dispose controllers to *prevent leaks.*

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What are the types of streams in Dart, and how are they used in Flutter?

Single-subscription streams allow one listener (e.g., file reading);
broadcast streams allow multiple listeners (e.g., WebSockets). Used for real-time UI updates.

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What is the lifecycle of a widget in Flutter?

StatefulWidget lifecycle:
createState, initState,
didChangeDependencies, build,
didUpdateWidget, deactivate, dispose.

Used to manage resources and UI updates.

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What is the difference between StatelessWidget and StatefulWidget?

StatelessWidget: is for static UI (e.g., fixed text) with no state, using a single build method. Use for performance with static content

StatefulWidget: manages mutable state, rebuilding via setState for dynamic UI like counters, for interactive features like user profile updates.

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