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تطوير التطبيقات باستخدام Flutter

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Google Dev Library Contributor

Google Developers

Flutter

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Ask Me Anything

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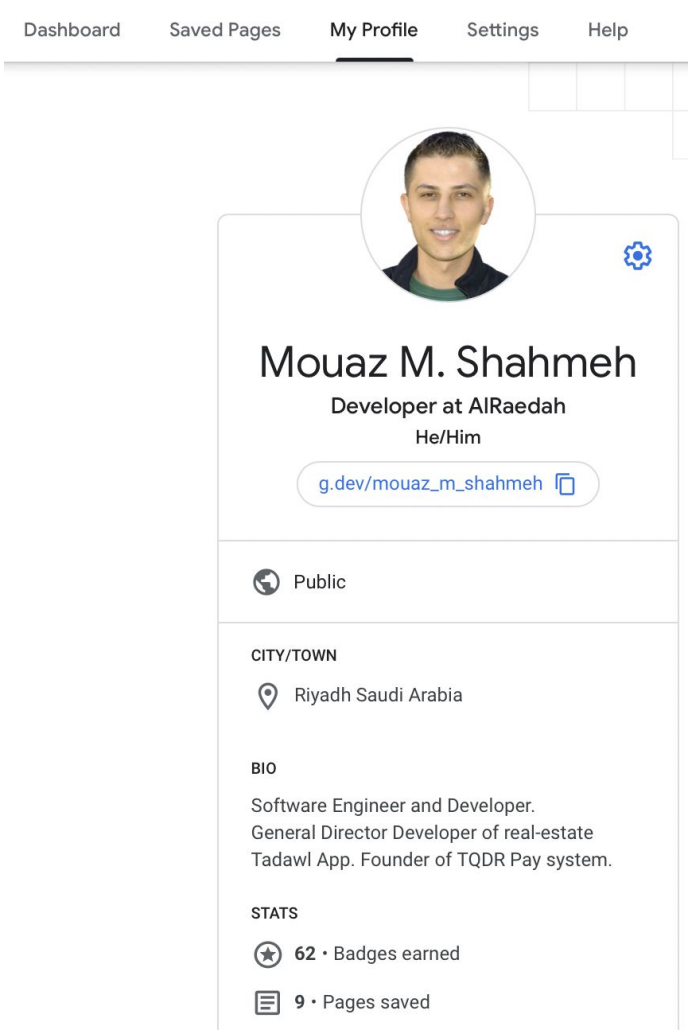
LINKS

- github.com/Eng-Mouaz-M-AlShahmeh
- linkedin.com/in/mouaz-shahmeh
- stackoverflow.com/users/18449528
- twitter.com/mouaz_m_shahmeh



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أهداف اللقاء

Flutter

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أهداف اللقاء

1. بناء تطبيقات بشفرة كود واحدة بلغة البرمجة DART ولمنصات عديدة
2. بناء تطبيقات تفاعلية ومتجاوبة لمقاسات الشاشات
3. التعرف على البرمجة الآمنة للقيم الفارغة
4. بناء تطبيقات جميلة وسريعة وبأداء أصلي بتقنية Flutter

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5. استخدام تنقل فعال بين شاشات التطبيق

6. اختبار التطبيقات بشكل حقيقي وتجهيزها للنشر في متاجر التطبيقات

7. إدارة البيانات في التطبيق بفاعلية والتعامل مع قواعد بيانات علائقية وغير علائقية

8. برمجة التطبيقات بأكواد نظيفة عن طريق إدارة الحالة

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محاور اللقاء

Flutter

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محاور اللقاء

1. مقدمة في Flutter
2. تهيئة بيئة التطوير
3. تشغيل أول تطبيق Flutter
4. Declarative vs Imperative

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محاور اللقاء

5 التصميم المتجاوب

6 Null Safety

7 State Management

8 المفاتيح - التنقل

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محاور اللقاء

9 خيارات قواعد البيانات

10 اختبارات الأداء

11 أنماط بناء التطبيقات

12 المشروع - ملخص ومراجع

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1

مقدمة في Flutter

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مقدمة في Flutter

What is Flutter?

Flutter is Google's portable UI toolkit for crafting beautiful, natively compiled applications for mobile, web, and desktop from a single codebase. Flutter works with existing code, is used by developers and organizations around the world, and is free and open source.

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مقدمة في Flutter

Hot Reload - Hot Restart

One Code Base (Dart)

بيئات تطوير منافسة cross-platform
(KMM - Xamarin - React Native)

تطوير التطبيقات الأصلي:
اندرويد (Kotlin - Java)
ابل (Objective C - Swift)

تطبيقات ثلاثية الأبعاد (Unity)

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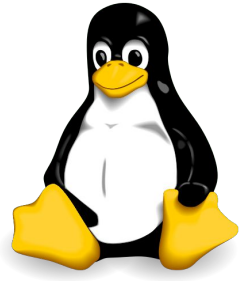
مقدمة في Flutter



تطبيقات الجوال (اندرويد - ابل)

تطبيقات سطح المكتب (ويندوز - ماك - لينكس)

تطبيقات الويب

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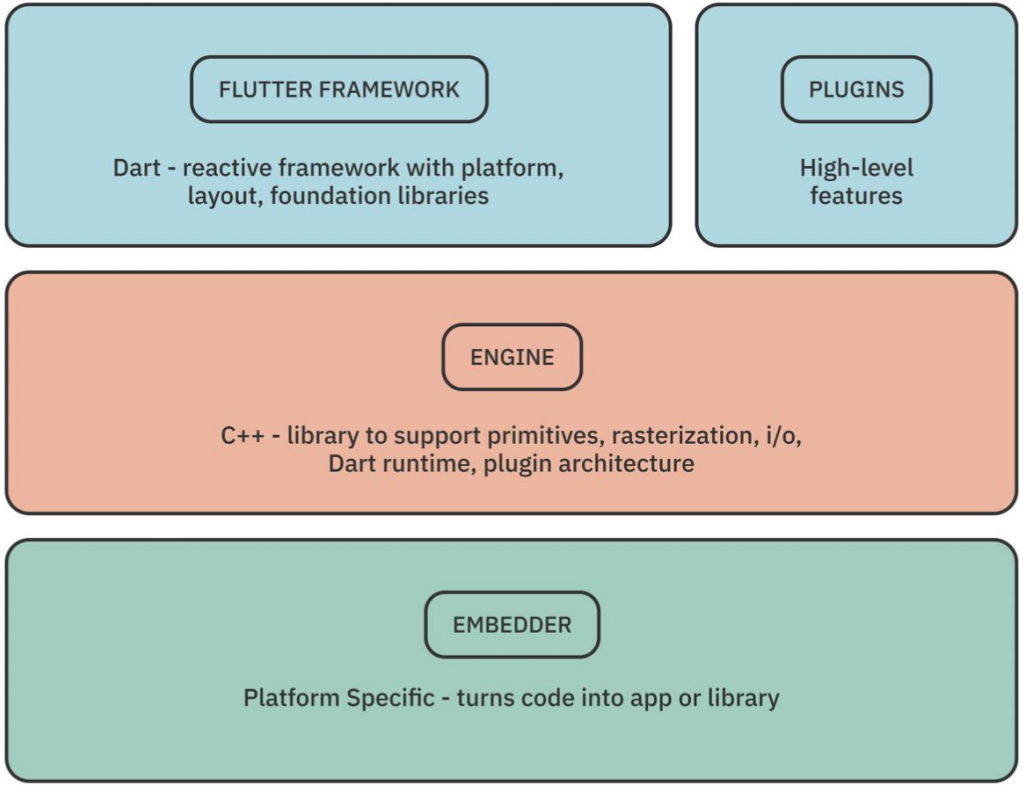
مقدمة في Flutter



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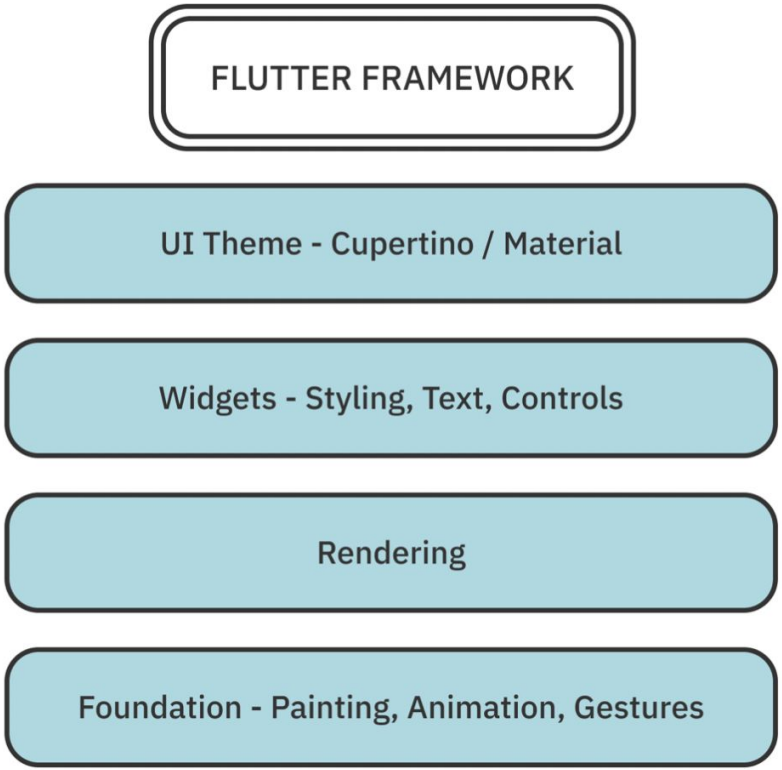
مقدمة في Flutter



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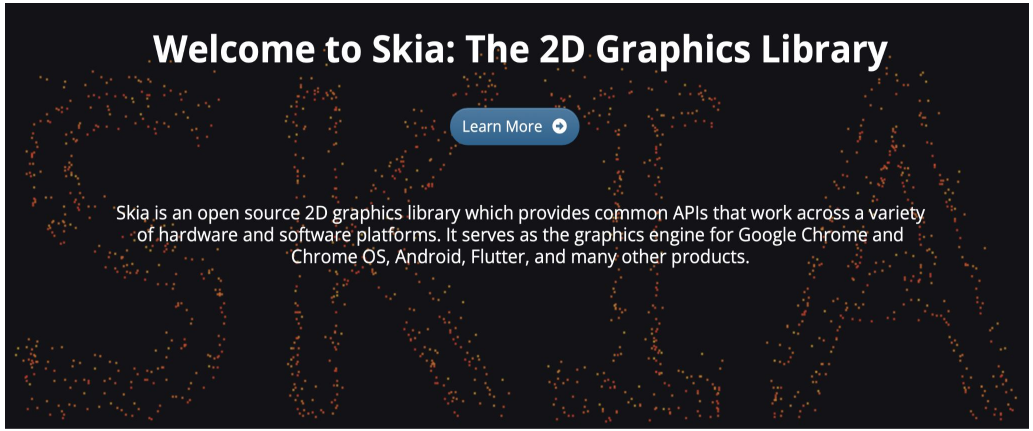
مقدمة في Flutter



Supported Platforms

Windows 7, 8, 8.1, 10
macOS 10.10.5 or later
iOS 11 or later
Android 4.1 (JellyBean) or later
Ubuntu 18.04+, Debian 10+, openSUSE 15.2+, or Fedora Linux 32+

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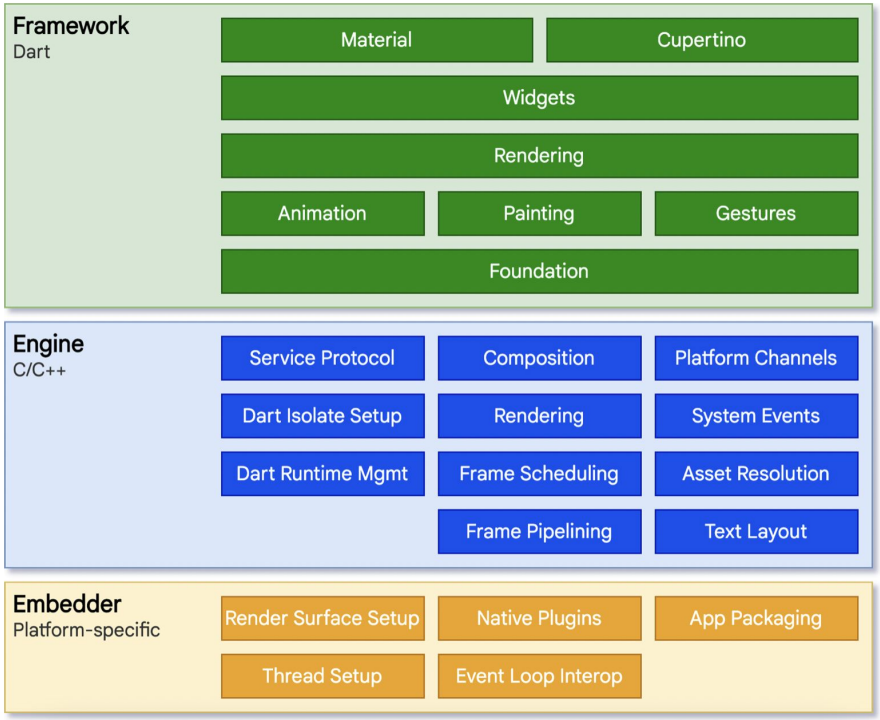
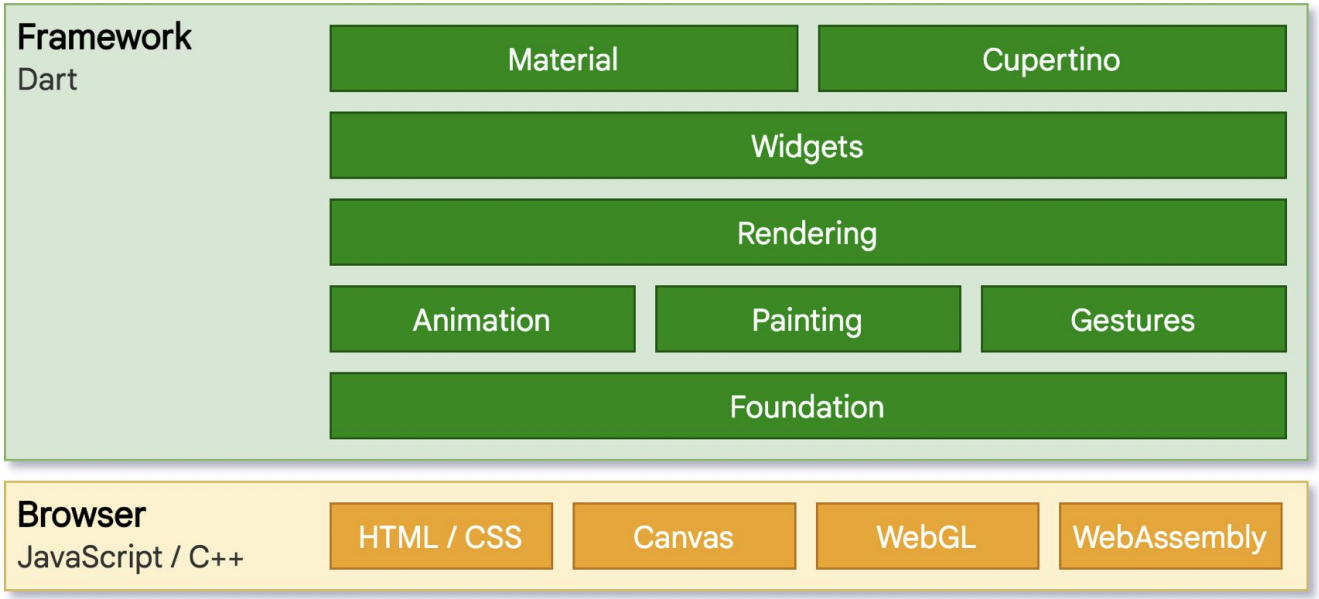
مقدمة في Flutter



مقدمة في Flutter

The web version of the architectural layer diagram is as follows:



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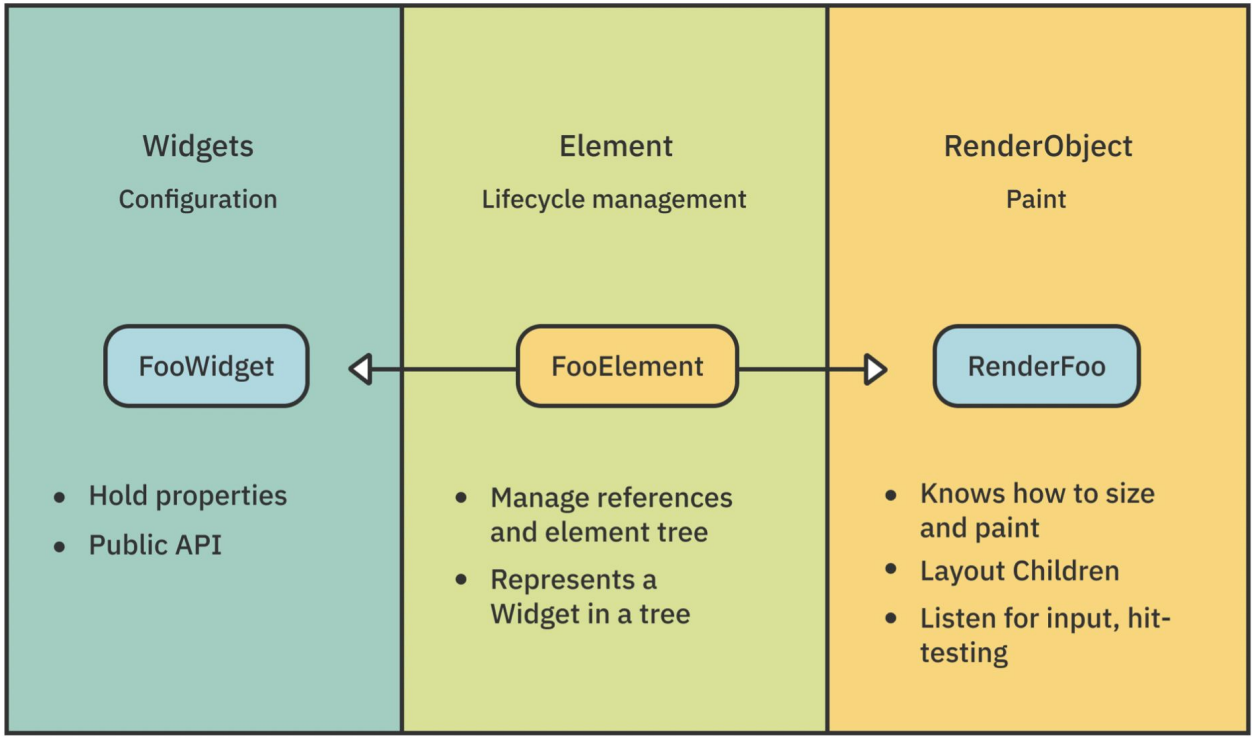
مقدمة في Flutter



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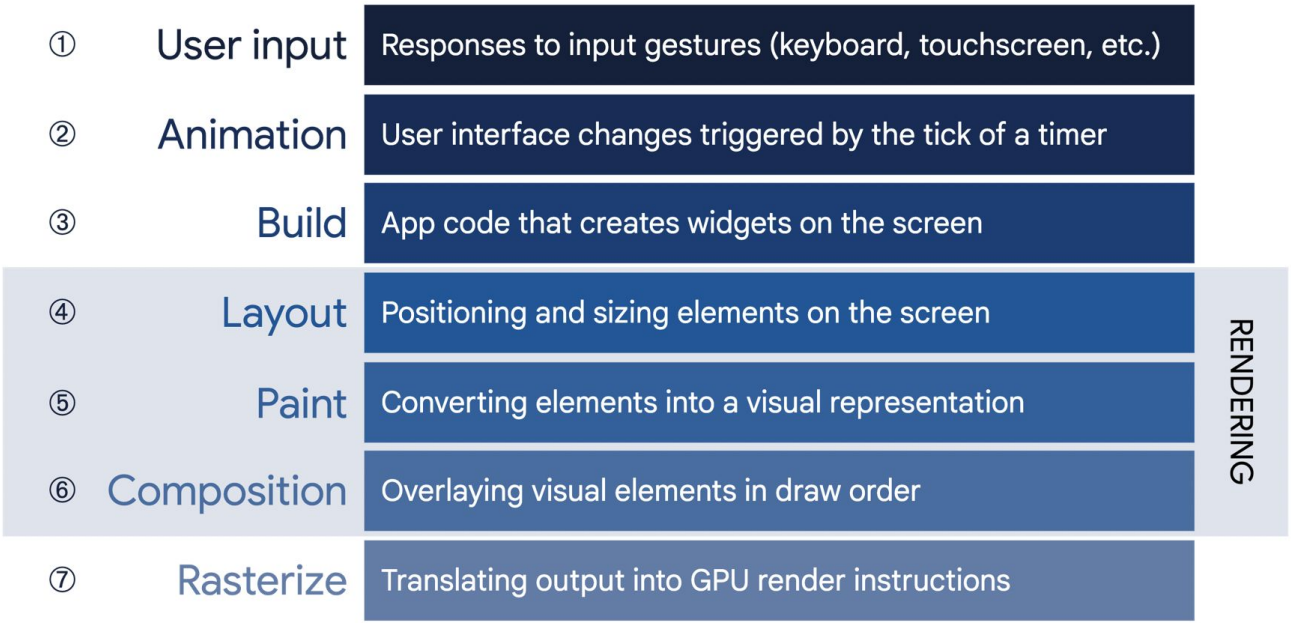
مقدمة في Flutter



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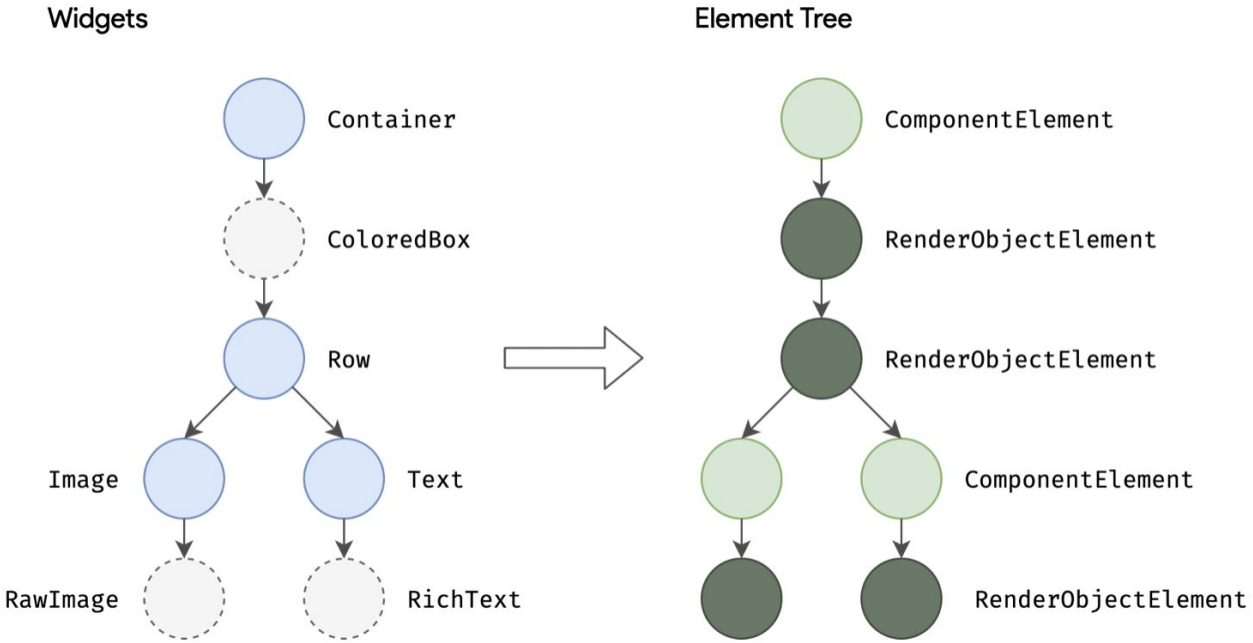
مقدمة في Flutter



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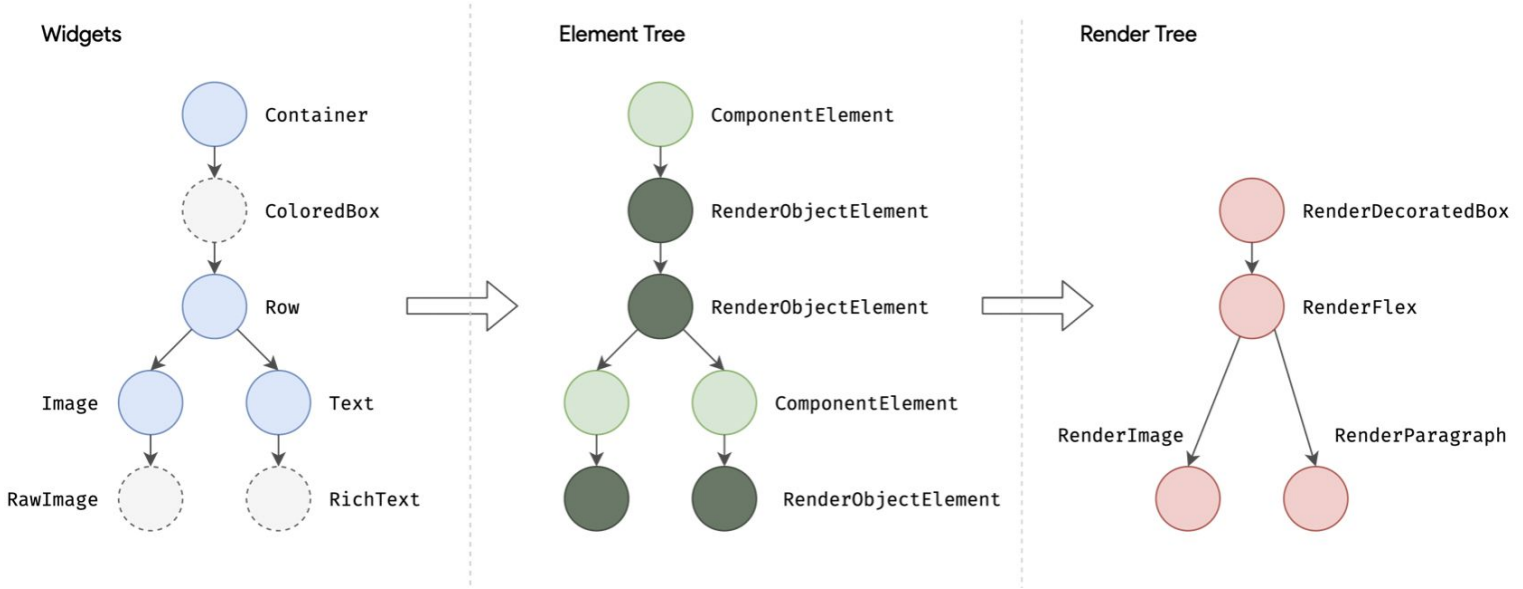
مقدمة في Flutter



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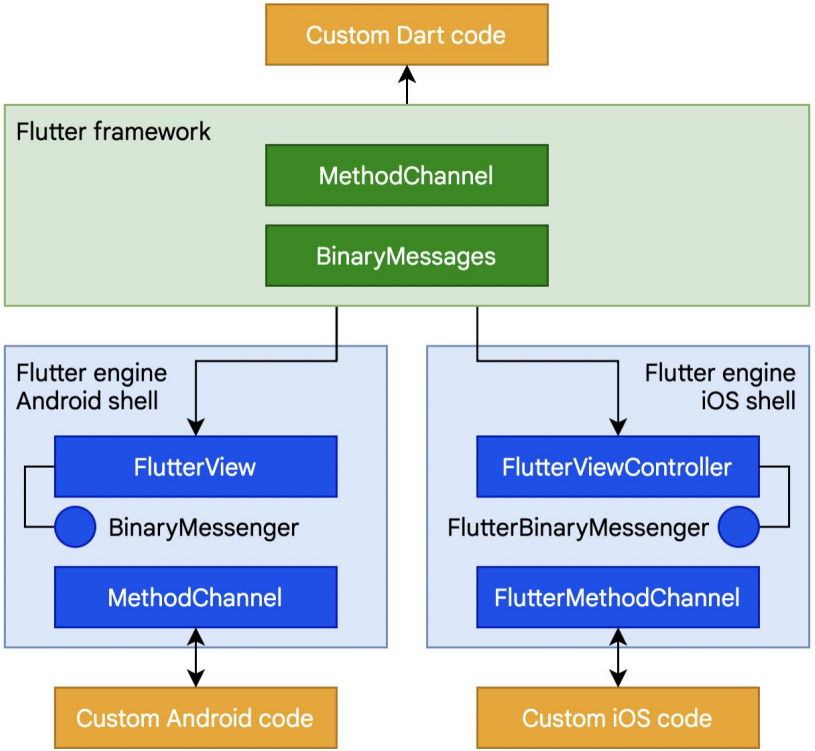
مقدمة في Flutter



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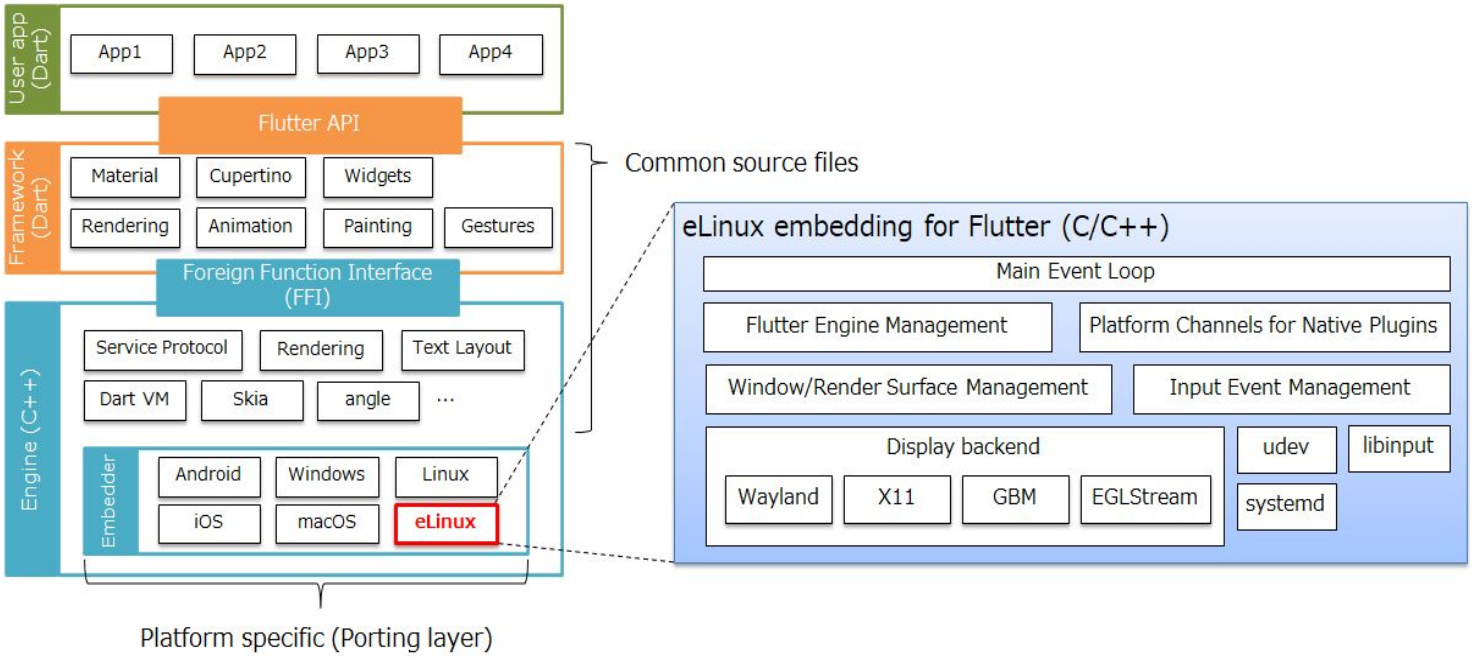
مقدمة في Flutter

جاري العمل في Flutter الآن في
أنظمة Embedder



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مقدمة في Flutter

جاري العمل في Flutter الآن في أنظمة Embedder

Tested devices

Board / SoC	Vendor	OS / BSP	Backend	Status
Jetson Nano	NVIDIA	JetPack 4.3	Wayland	✓
Jetson Nano	NVIDIA	JetPack 4.3	DRM	✓ (#1)
Raspberry Pi 4 Model B	Raspberry Pi Foundation	Ubuntu 20.10	Wayland	✓
Raspberry Pi 4 Model B	Raspberry Pi Foundation	Ubuntu 20.10	DRM	✓ (#9)
i.MX 8MQuad EVK	NXP	Sumo (kernel 4.14.98)	Wayland	✓
i.MX 8M Mini EVKB	NXP	Zeus (kernel 5.4.70)	Wayland	✓
RB5 Development Kit	Qualcomm	Ubuntu 18.04.05	DRM	✓
Zynq	Xilinx	-	-	Not tested
Desktop (x86_64)	Intel	Ubuntu 20.04	Wayland	✓
Desktop (x86_64)	Intel	Ubuntu 20.04	DRM	✓
Desktop (x86_64)	Intel	Ubuntu 20.04	X11	✓
QEMU (x86_64)	QEMU	AGL (Automotive Grade Linux) koi	Wayland	✓
QEMU (x86_64)	QEMU	AGL (Automotive Grade Linux) koi	DRM	✓

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مقدمة في Flutter

جاري العمل في Flutter الآن في أنظمة Embedder

TIZEN DEVICES مثال TOYOTA AGL

TIZEN™

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2

تهيئة بيئة التطوير

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تهيئة بيئة التطوير

مواصفات جهاز جيدة

تحميل Flutter SDK

تحميل برنامج أكواد

ابل (cocoapods) - اندرويد (JDK Java)

DartPad

GNU Emacs

Vim

Eclipse

android studio

Visual Studio Code

IntelliJ IDEA

Xcode

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3

تشغيل أول تطبيق

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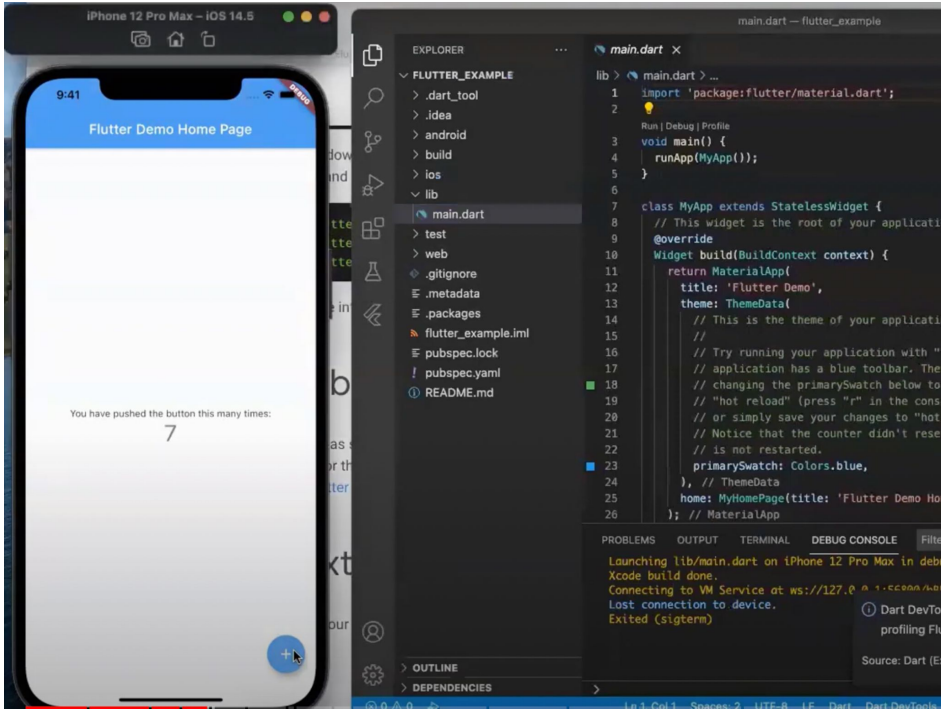
تشغيل أول تطبيق



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Declarative VS Imperative

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Declarative VS Imperative

Enum enhancement

Before: have to use extensions

```
enum Water {
  frozen,
...
  boiling;
}

extension Members on Water {
  int waterToTemp(Water water) {
    switch (water) {
      case Water.frozen:
        return 32;
...
    }
  }

  String convertToString() =>
    "The $name water is ${waterToTemp(this)} F.";
}

void main() { print(Water.frozen.convertToString()); }
```

Now: directly on enum. Can override.

```
enum Water {
  frozen(32),
...
  boiling(212);

  final int tempInFahrenheit;
  const Water(this.tempInFahrenheit);

  @override
  String toString() =>
    "The $name water is $tempInFahrenheit F.";
}

void main() { print(Water.frozen); }
```

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التصميم المتجاوب

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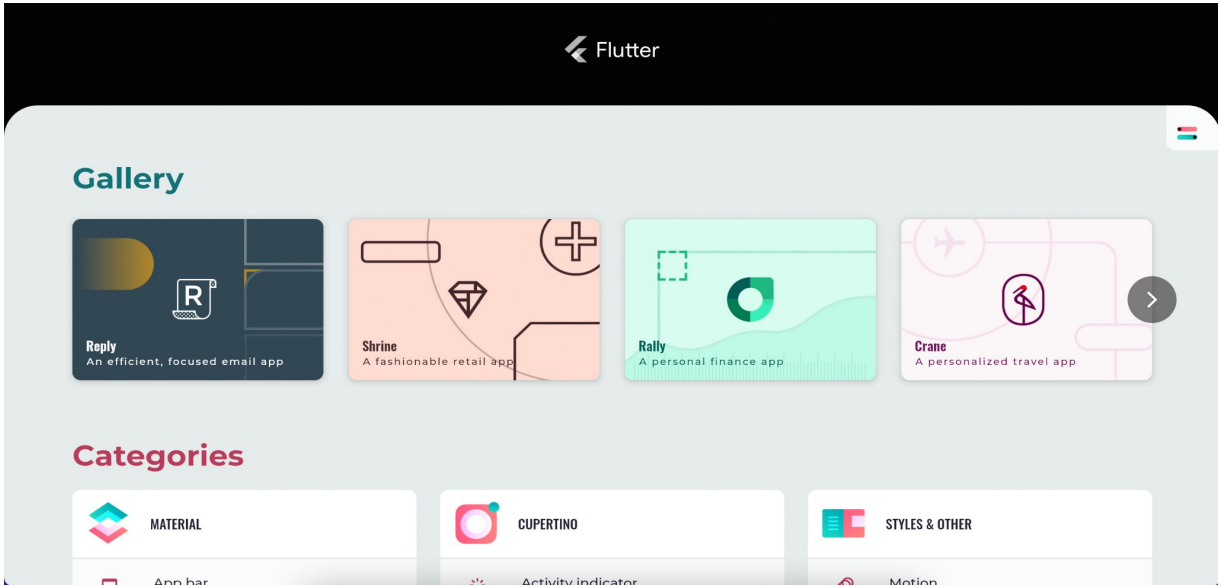
التصميم المتجاوب

MediaQuery.of(context)

Cupertino (apple)

Material (android) 3

gallery.flutter.dev



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Null Safety

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Null Safety

Sound null safety is available in Dart 2.12 and Flutter 2.

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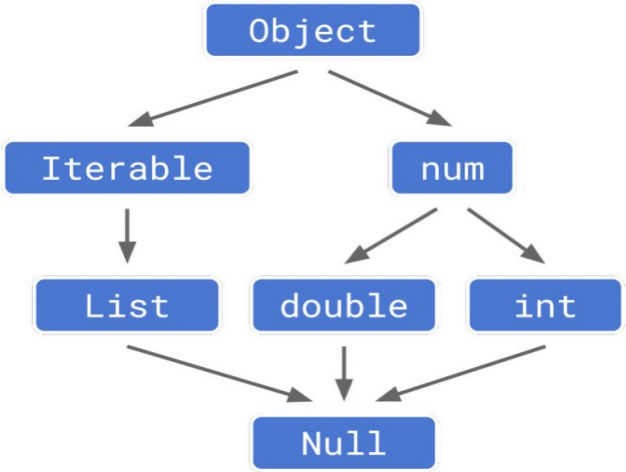
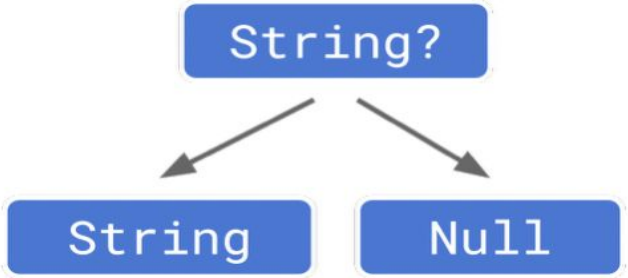
Null Safety

In type theory lingo, the `Null` type was treated as a subtype of all types:





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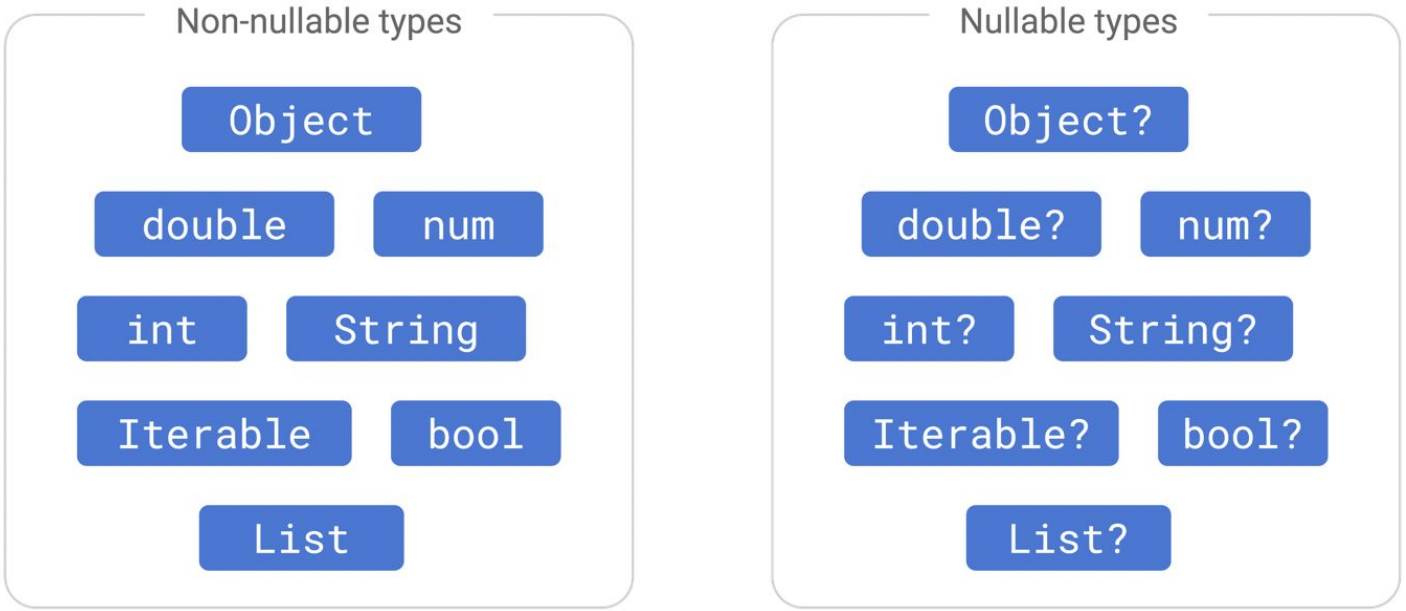
Null Safety



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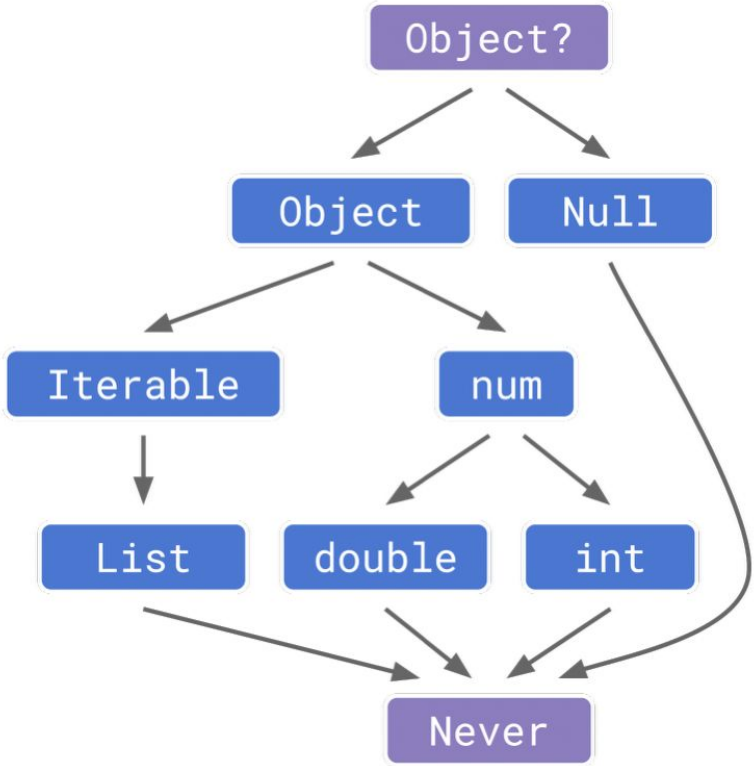
Null Safety



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Null Safety

- Types are non-nullable by default and made nullable by adding `?`.
- Optional parameters must be nullable or have a default value. You can use `required` to make named parameters non-optional. Non-nullable top-level variables and static fields must have initializers. Non-nullable instance fields must be initialized before the constructor body begins.
- Method chains after null-aware operators short circuit if the receiver is `null`. There are new null-aware cascade (`?..`) and index (`?[]`) operators. The postfix null assertion “bang” operator (`!`) casts its nullable operand to the underlying non-nullable type.
- Flow analysis lets you safely turn nullable local variables and parameters into usable non-nullable ones. The new flow analysis also has smarter rules for type promotion, missing returns, unreachable code, and variable initialization.
- The `late` modifier lets you use non-nullable types and `final` in places you otherwise might not be able to, at the expense of runtime checking. It also gives you lazy-initialized fields.
- The `List` class is changed to prevent uninitialized elements.

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State Management

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State Management

Provider
https://github.com/Eng-Mouaz-M-AlShahmeh/flutter_development_provider_example

Riverpod
https://github.com/Eng-Mouaz-M-AlShahmeh/flutter_development_riverpod_example

setState
(StateFulWidget, StatelessWidget, InheritedWidget)

GetX

Redux

Fish - Redux

BloC / RX
https://github.com/Eng-Mouaz-M-AlShahmeh/flutter_development_bloc_example

GetIt

MobX

Binder

Flutter

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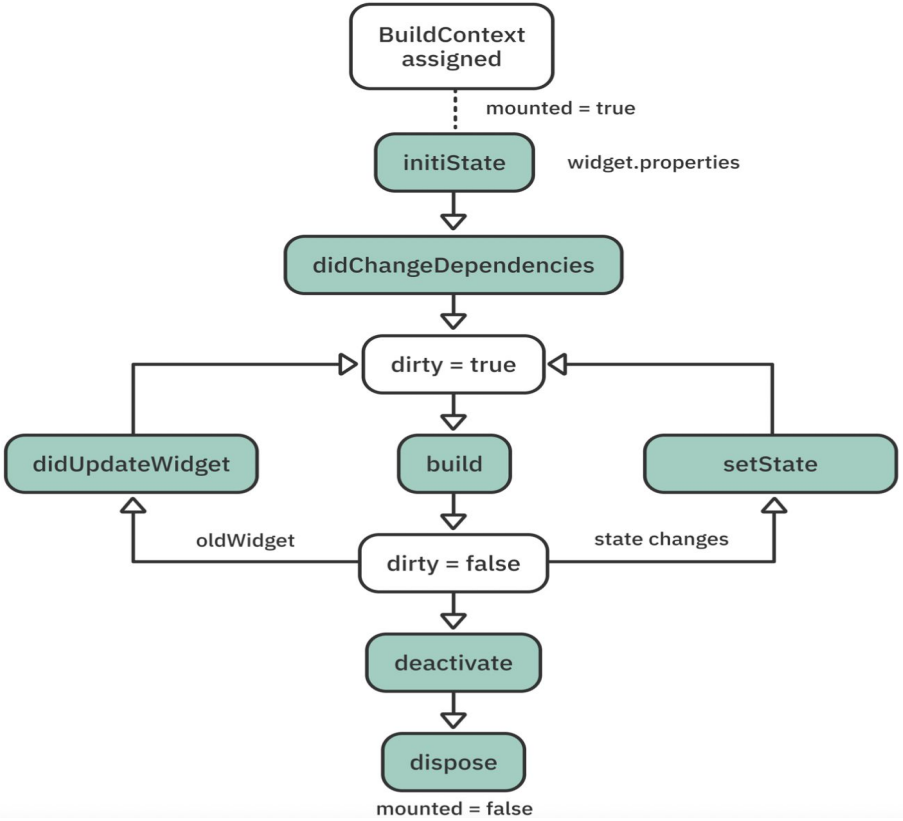
State Management

State Object Lifecycle



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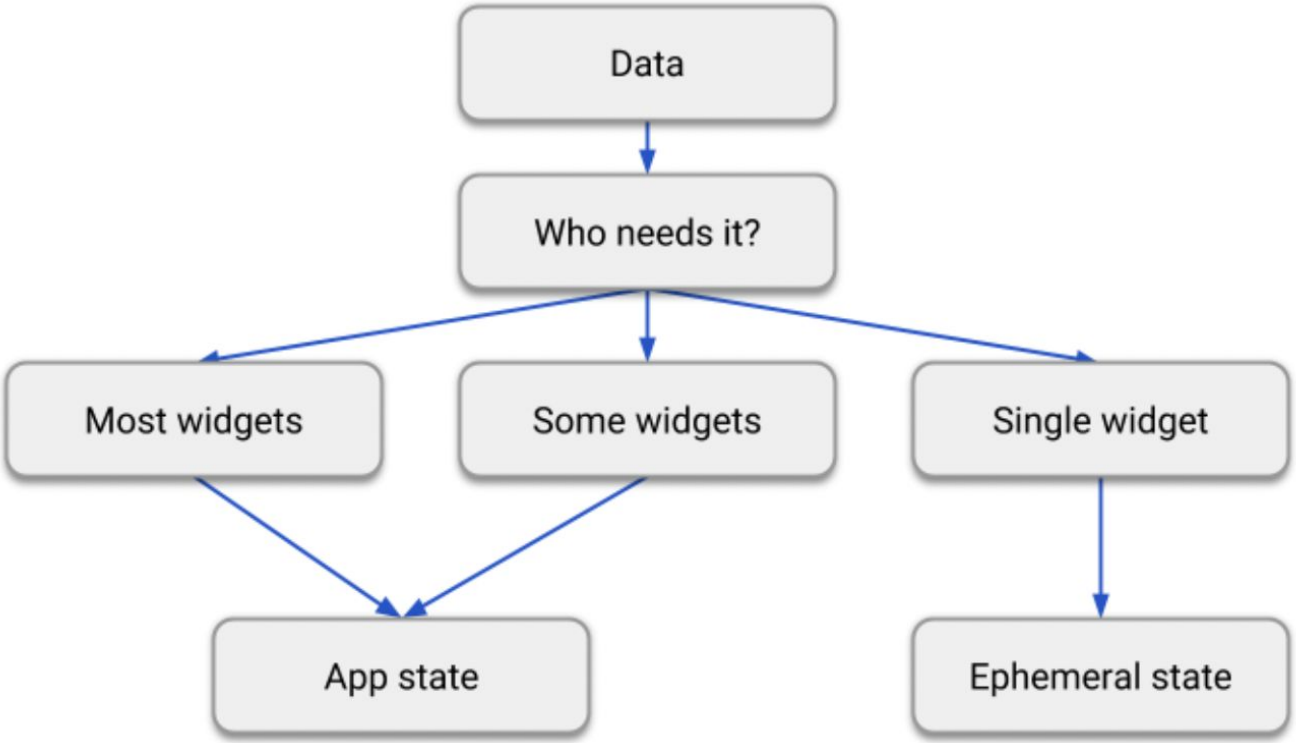
State Management



State Management

Ephemeral state

Ephemeral state (sometimes called *UI state* or *local state*) is the state you can neatly contain in a single widget.

This is, intentionally, a vague definition, so here are a few examples.

- current page in a `PageView`
- current progress of a complex animation
- current selected tab in a `BottomNavigationBar`

State Management

App state

State that is not ephemeral, that you want to share across many parts of your app, and that you want to keep between user sessions, is what we call application state (sometimes also called shared state).

Examples of application state:

- User preferences
- Login info
- Notifications in a social networking app
- The shopping cart in an e-commerce app
- Read/unread state of articles in a news app

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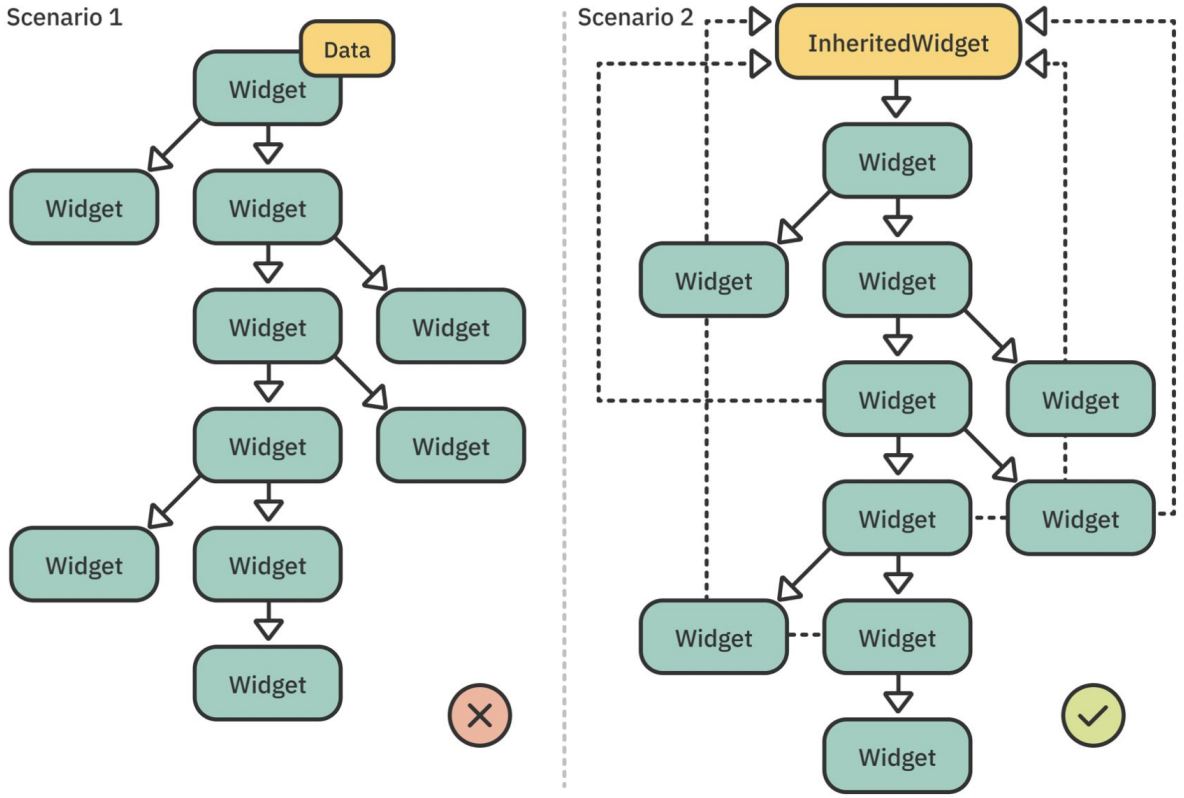
State Management



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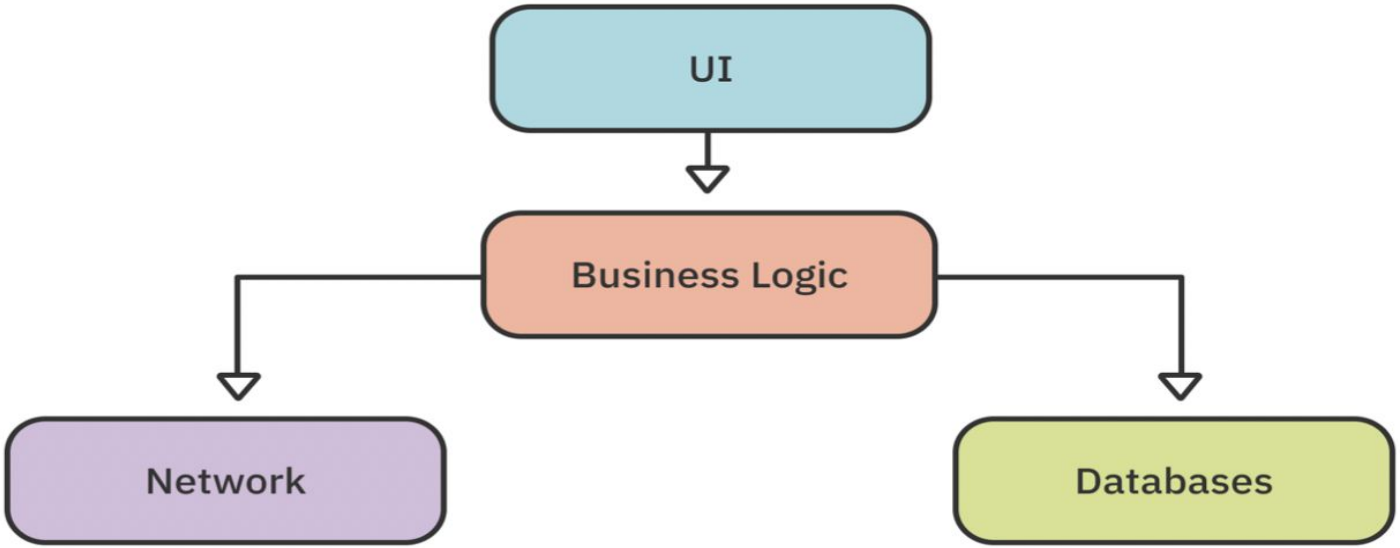
State Management



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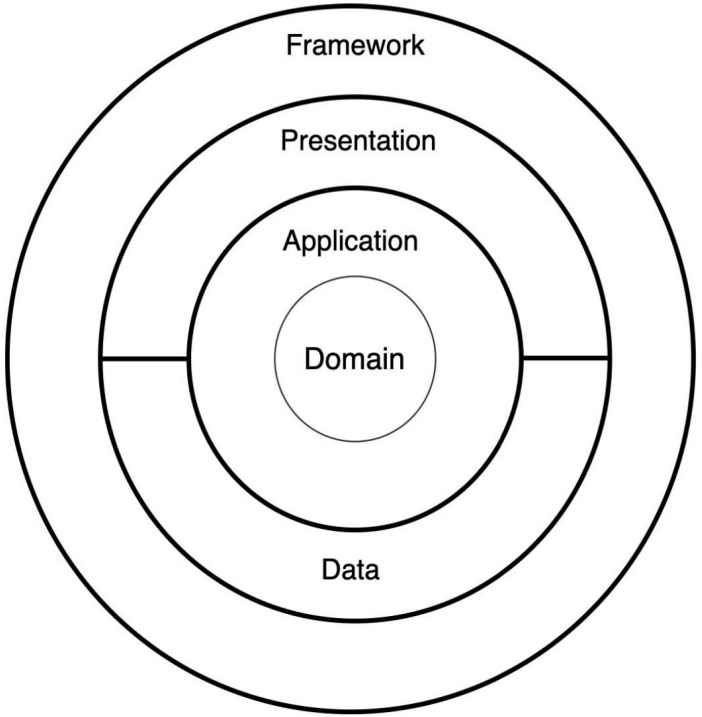
State Management

Clean Architecture



Enterprise Mobile Layering

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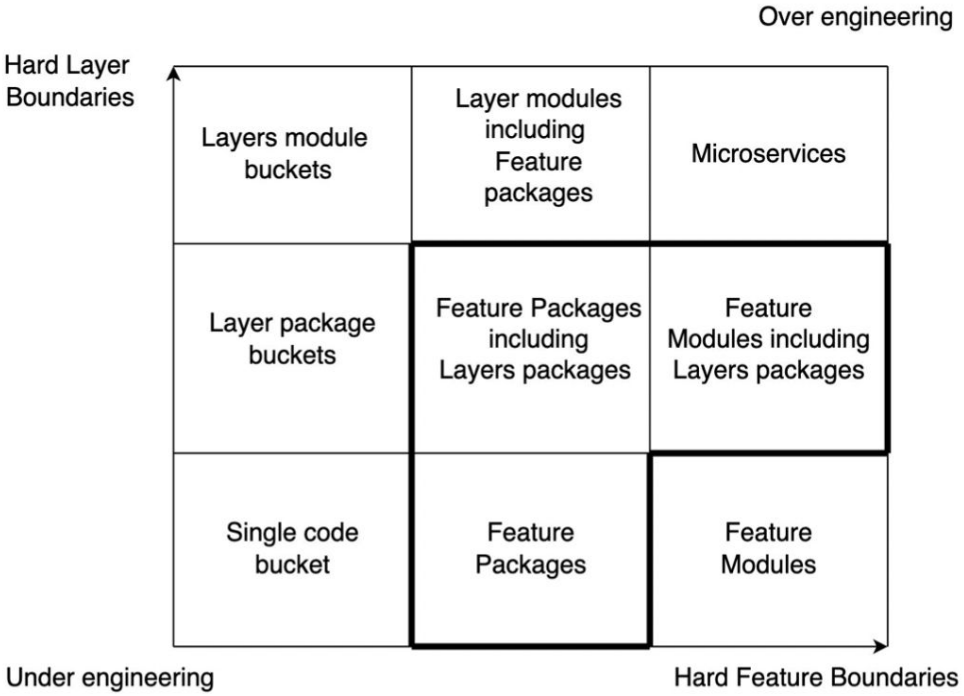
State Management

Clean Architecture



Architecture categorization based on boundaries.

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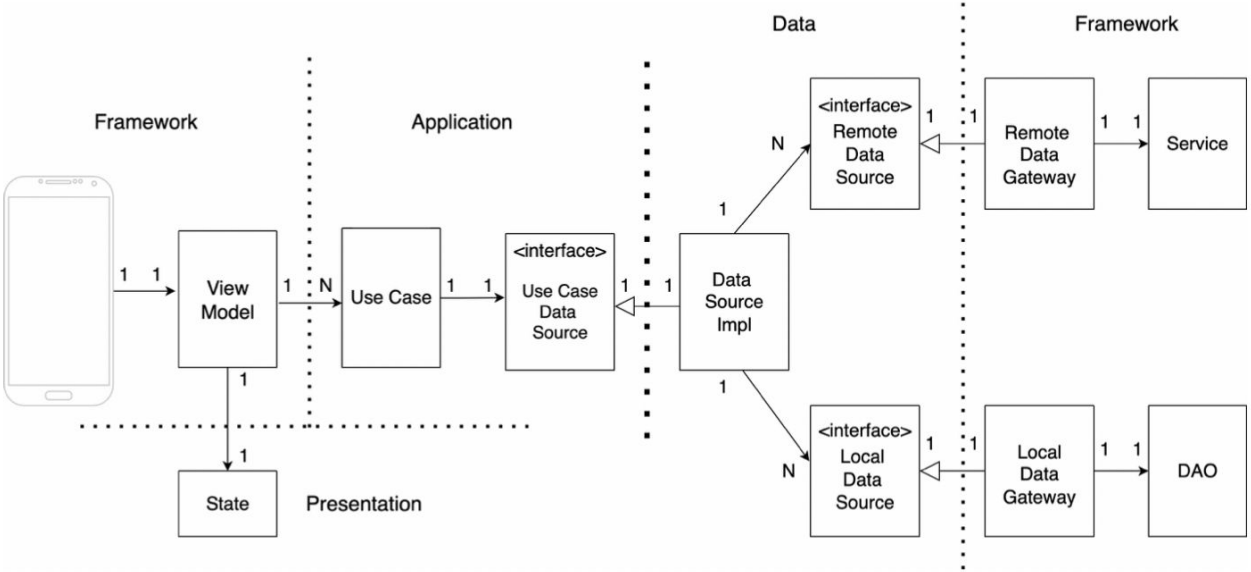
State Management

Clean Architecture



Microservices Architecture.

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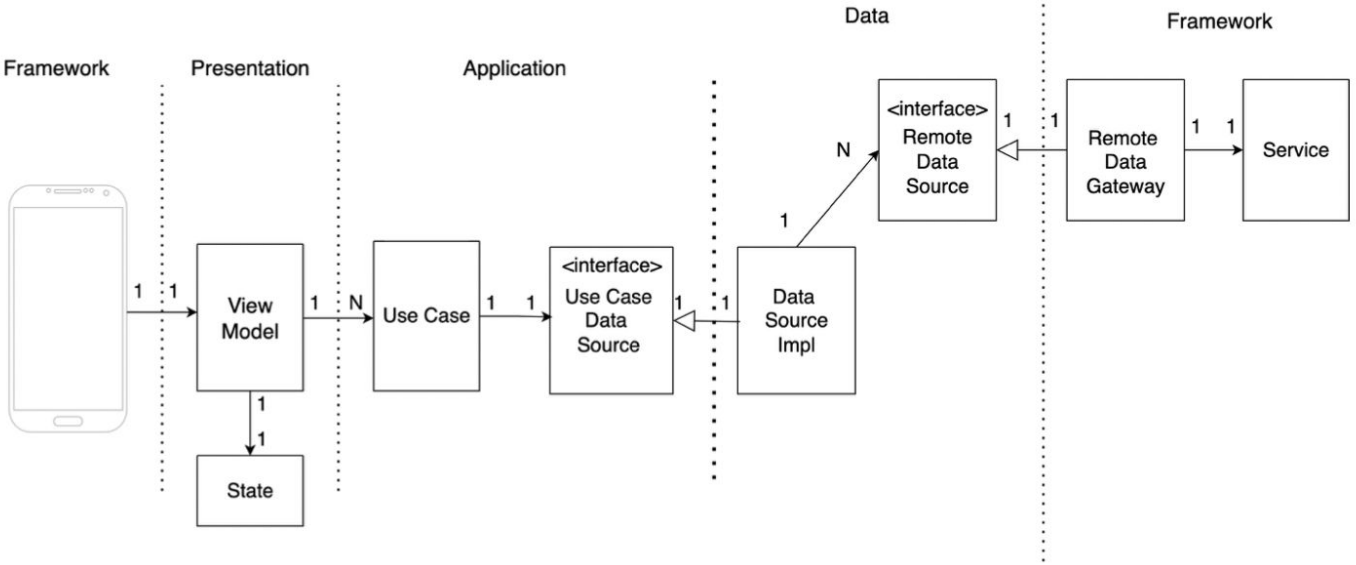
Clean Architecture



Pragmatic Clean Architecture.

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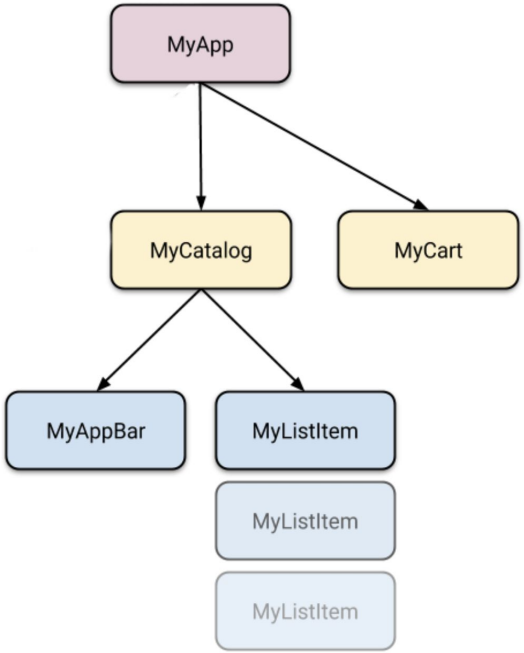
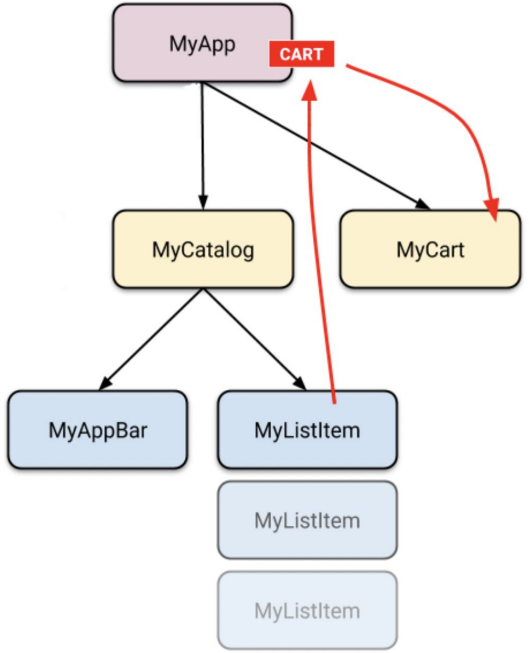
Provider





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State Management

Provider

```dart
class CartModel extends ChangeNotifier {
  /// Internal, private state of the cart.
  final List<Item> _items = [];

  /// An unmodifiable view of the items in the cart.
  UnmodifiableListView<Item> get items => UnmodifiableListView(_items);

  /// The current total price of all items (assuming all items cost $42).
  int get totalPrice => _items.length * 42;

  /// Adds [item] to cart. This and [removeAll] are the only ways to modify the
  /// cart from the outside.
  void add(Item item) {
    _items.add(item);
    // This call tells the widgets that are listening to this model to rebuild.
    notifyListeners();
  }

  /// Removes all items from the cart.
  void removeAll() {
    _items.clear();
    // This call tells the widgets that are listening to this model to rebuild.
    notifyListeners();
  }
}
```

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State Management

Provider

```
void main() {
  runApp(
    ChangeNotifierProvider(
      create: (context) => CartModel(),
      child: const MyApp(),
    ),
  );
}
```

```
void main() {
  runApp(
    MultiProvider(
      providers: [
        ChangeNotifierProvider(create: (context) => CartModel()),
        Provider(create: (context) => SomeOtherClass()),
      ],
      child: const MyApp(),
    ),
  );
}
```

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State Management

Provider

```
// DON'T DO THIS
return Consumer<CartModel>(
  builder: (context, cart, child) {
    return HumongousWidget(
      // ...
      child: AnotherMonstrousWidget(
        // ...
        child: Text('Total price: ${cart.totalPrice}'),
      ),
    );
  },
);
```

```
// DO THIS
return HumongousWidget(
  // ...
  child: AnotherMonstrousWidget(
    // ...
    child: Consumer<CartModel>(
      builder: (context, cart, child) {
        return Text('Total price: ${cart.totalPrice}');
      },
    ),
  ),
);
```

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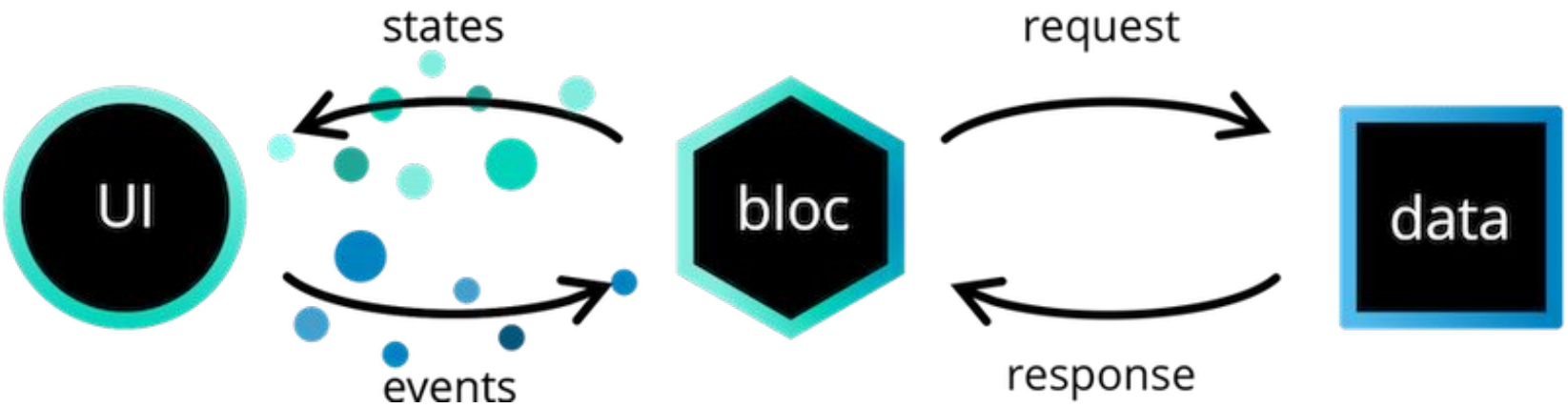
State Management

Bloc

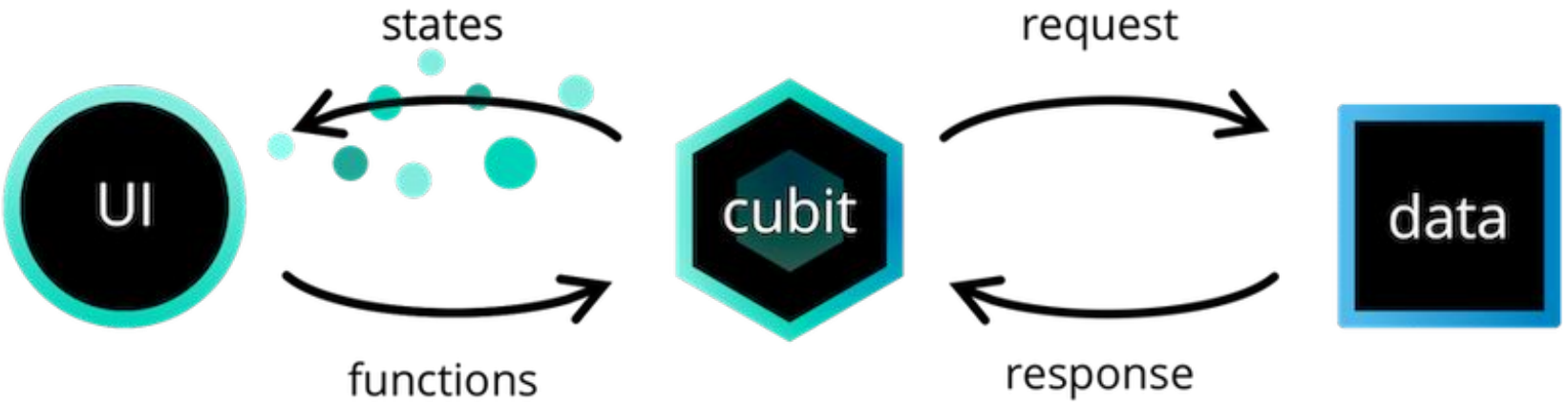
State Management

Bloc



State Management

Bloc



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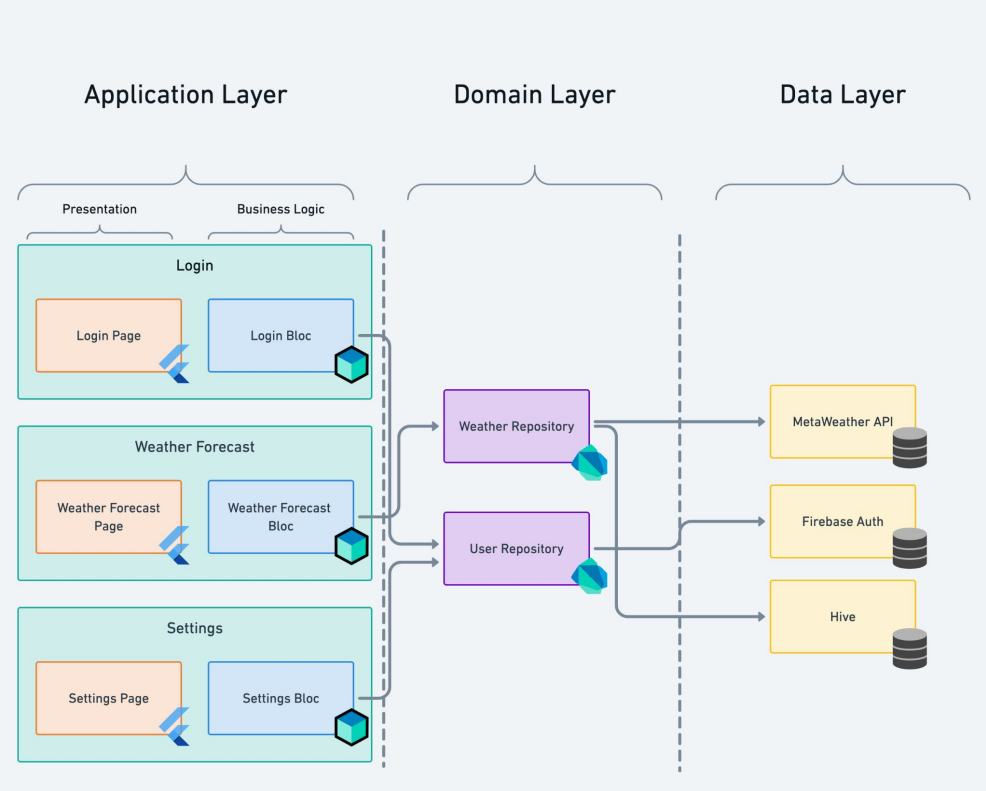
State Management

Bloc



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State Management

Riverpod

Provider Type	Provider Create Function	Example Use Case
Provider	Returns any type	A service class / computed property (filtered list)
StateProvider	Returns any type	A filter condition / simple state object
FutureProvider	Returns a Future of any type	A result from an API call
StreamProvider	Returns a Stream of any type	A stream of results from an API
StateNotifierProvider	Returns a subclass of StateNotifier	A complex state object that is immutable except through an interface
ChangeNotifierProvider	Returns a subclass of ChangeNotifier	A complex state object that requires mutability

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State Management

Riverpod

The `.family` modifier has one purpose: Getting a unique provider based on external parameters.

Some common use-cases for `family` would be:

- Combining FutureProvider with `.family` to fetch a `Message` from its ID
- Passing the current `Locale` to a provider, so that we can handle translations

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State Management

Riverpod

.autoDispose

A common use case is to destroy the state of a provider when it is no-longer used.

There are multiple reasons for doing so, such as:

- When using Firebase, to close the connection and avoid unnecessary cost.
- To reset the state when the user leaves a screen and re-enters it.

Providers come with built-in support for this use case, through the `.autoDispose` modifier.

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State Management

Riverpod

- **ref.read()**

As the name implies, we read a notifier and or its value and not trigger for changes. This is exactly the same thing we do when we use the Provider counterpart of context.read() or Provider.of(context, listen: false). This is very important as it gives us the possibility of accessing the provider and make changes outside of the build context that is, in the onTap() etc. Never call the ref.read() inside build context as much as it does not trigger rebuild of the widget when changes occur and could be seen as a way of preserving and reducing the number of useless UI rebuilds, it is highly contested against as the official docs for riverpod will say

State Management

Riverpod

- **ref.watch()**

This is probably the most versatile of them all. It is used to get the value of a provider and also watch for changes. It is typically used only inside the build method or inside another provider. Never use it inside any of the lifecycle methods like initstate or setstate as there will be deadlock and conflict since both may be triggering a rebuild of the widget and still depending on each other

State Management

Riverpod

- **ref.listen()**

This is a very useful one as it is similar in every way to ref.watch, but that it does not trigger a rebuild of the widget but instead it watches the provider and when a change occurs you can call a function. This is useful perhaps if for navigation etc.

State Management

Riverpod

- **provider.select()**

The other day I was having a conversation with a friend who brought to my attention from logs that riverpod with ChangeNotifier rebuilds a few more times than provider and bloc and more rebuilds when used am immutable state like with statenotifier. This is understandable as few numbers of rebuilds is not a stronghold that riverpod is proud of, but the solution it provides is geared at different difficulties. But if you are concerned about the number of rebuilds you can mitigate this with the select method. This works in that, in a state or class with more than one property, you can decide to listen to changes only from one or a few properties (the provider listens to the whole object by default).

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State Management

Riverpod

```dart
class BlueSquare extends ConsumerWidget {
  const BlueSquare({
    Key? key,
  }) : super(key: key);

  @override
  Widget build(BuildContext context, WidgetRef ref) {
    // But if you want only the size and dont want unnecessary rebuild when
    // color changes
    final size =
        ref.watch(blueSquareProvider.select((blueSquare) => blueSquare.size));

    return Container(
      width: size,
      height: size,
      color: Colors.blue,
    );
  }
}
```

8

المفاتيح

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المفاتيح

When? Adding - Removing - Reordering (collection of widgets of the same type of some state)

GlobalKey

LocalKey (
ValueKey('Mouaz Shahmeh') , ObjectKey(1, 2, 3, 4), UniqueKey(), PageStorageKey()scrollLocation)

Examples: ScaffoldKey and FormKey
https://github.com/Eng-Mouaz-M-AlShahmeh/flutter_development_keys_example

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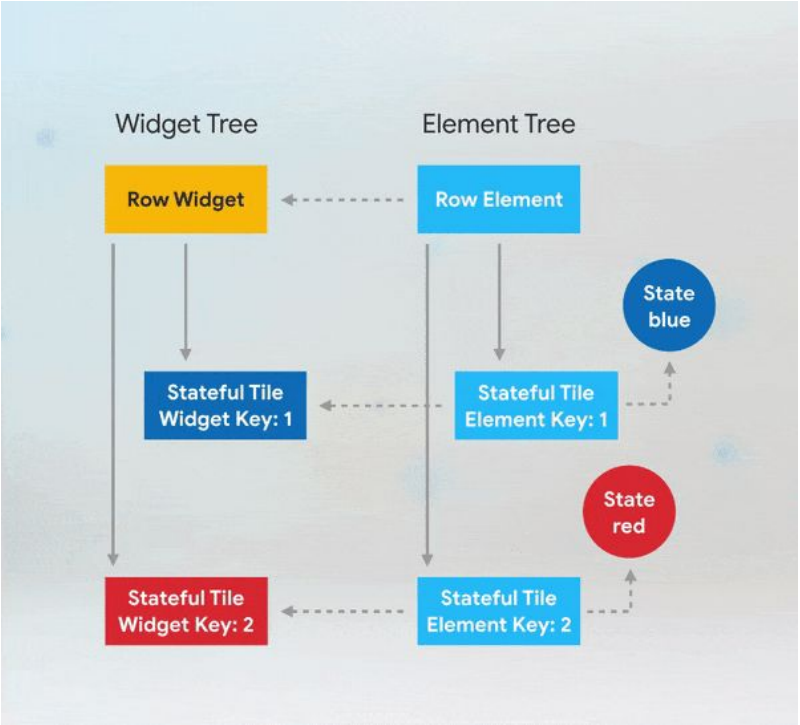
المفاتيح



9

التنقل

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التنقل

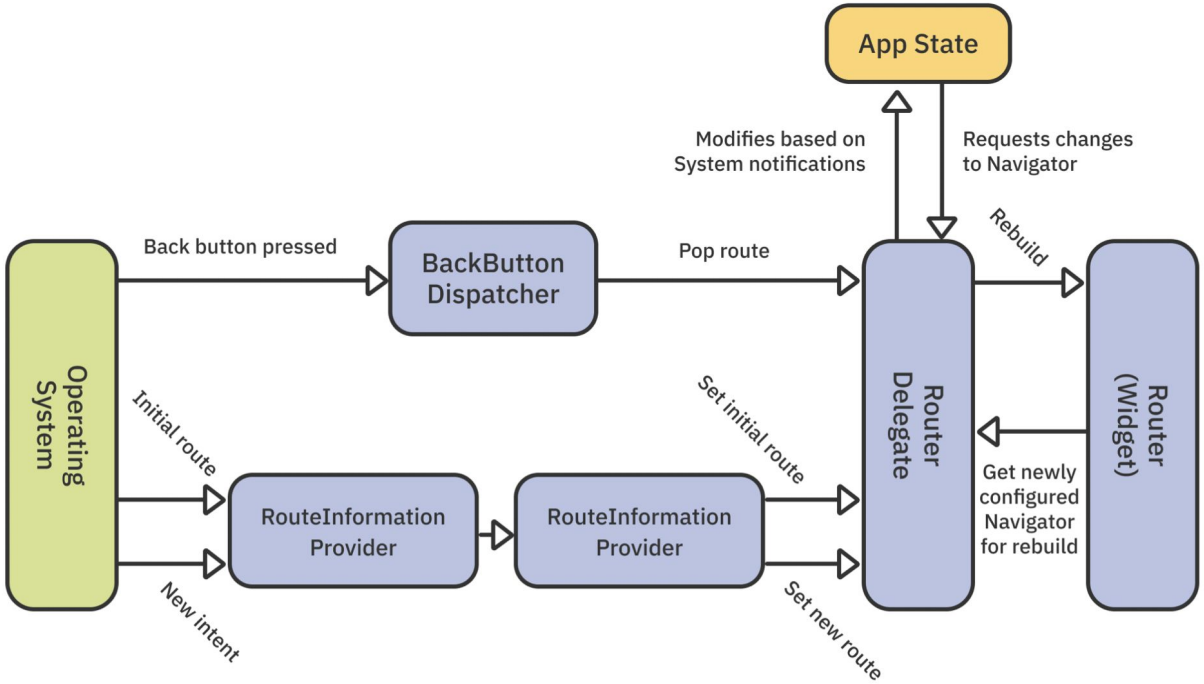
GoRouter (push - go) (Declarative navigation - no context)
https://github.com/Eng-Mouaz-M-AlShahmeh/flutter_development_gorouter_example

Navigator 2 (push - pop - pushReplacement - pushNamed - popUntill ...)

- https://pub.dev/packages/beamer
- https://pub.dev/packages/flow_builder
- https://pub.dev/packages/fluro
- https://pub.dev/packages/vrouter
- https://pub.dev/packages/auto_route

التنقل

Here are the new abstractions that make up Navigator 2.0's declarative API:



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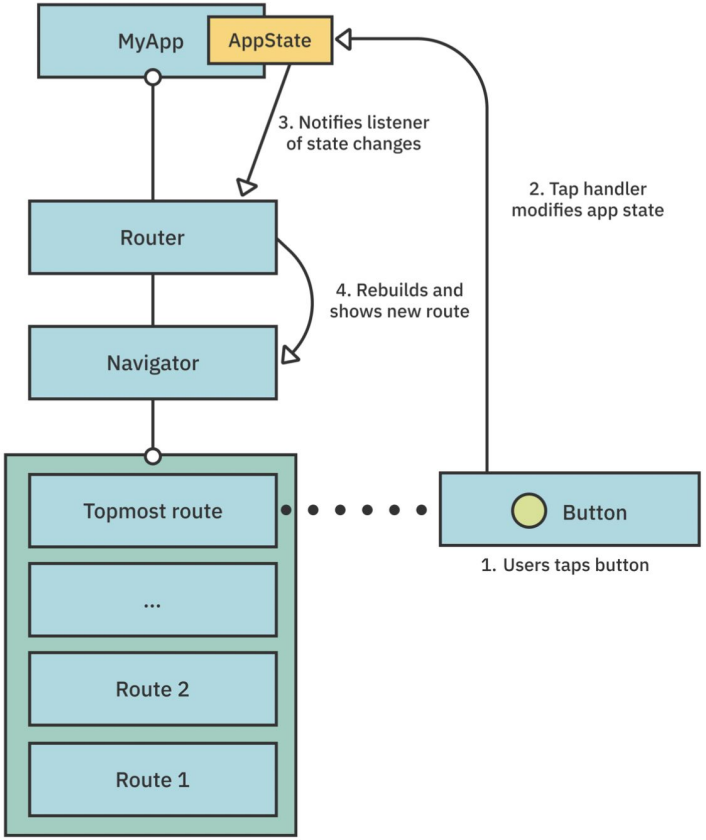
التنقل



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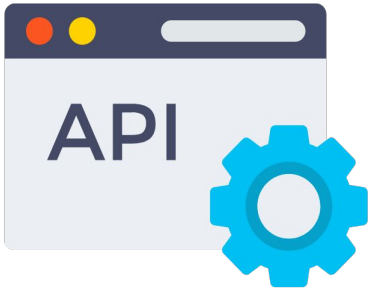
10

خيارات قواعد البيانات

خيارات قواعد البيانات

Firebase



Shared
Preferences

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خيارات قواعد البيانات

Firebase (FlutterFire) - BAAS (Backend As A Service)
https://github.com/Eng-Mouaz-M-AlShahmeh/flutter_development_firebase_crud_example

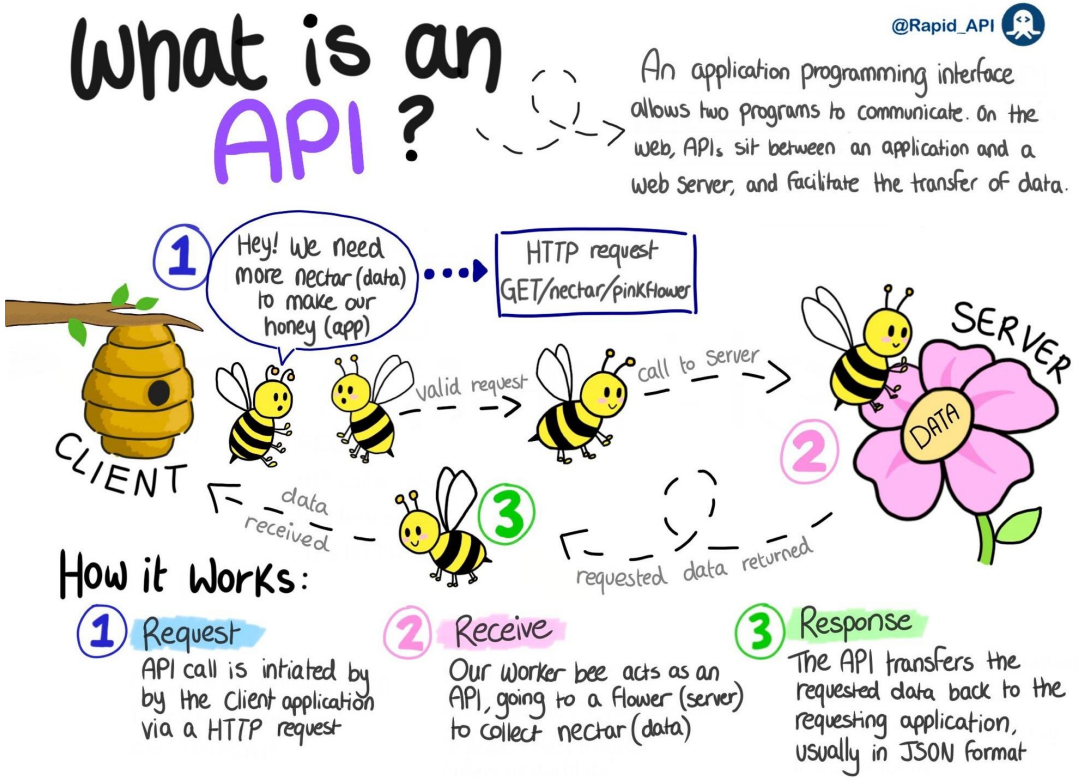
Supabase (PostgreSql) - BAAS (Backend As A Service)
https://github.com/Eng-Mouaz-M-AlShahmeh/flutter_development_supabase_crud_example

SqfLite - SqfEntity (local)
https://github.com/Eng-Mouaz-M-AlShahmeh/flutter_development_sqflite_crud_example

Shared Preferences (path)
https://github.com/Eng-Mouaz-M-AlShahmeh/flutter_development_shared_preferences_crud_example

API http (json)
https://github.com/Eng-Mouaz-M-AlShahmeh/flutter_development_api_http_crud_example

خيارات قواعد البيانات



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خيارات قواعد البيانات

DIFFERENT TYPES OF API

RapidAPI.com/hub
@Rapid_API

	REST	GRAPHQL	SOAP	RPC
STRUCTURE	FOLLOWS SIX ARCHITECTURAL CONSTRAINTS	SCHEMA AND TYPE	MESSAGE STRUCTURE	LOCAL PROCEDURAL CALLS
FORMAT	JSON, XML, HTML, PLAIN TEXT	JSON	XML	JSON, XML, FLATBUFFERS, ETC
ADVANTAGES	FLEXIBLE IN TERMS OF DATA FORMAT AND STRUCTURE	SOLVES OVER-FETCHING AND UNDER-FETCHING	HIGHLY SECURE AND EXTENSIBLE	LIGHTWEIGHT PAYLOADS MAKE IT HIGH PERFORMING
USE CASES	RESOURCES BASED APPS	MOBILE APIS	PAYMENT GATEWAYS	COMMAND-FOCUSED SYSTEMS

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خيارات قواعد البيانات

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11

اختبارات الأداء

Flutter

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اختبارات الأداء

Dev Tools

Flutter Doctor

Flutter Debug Mode (Code Trace)

Flutter

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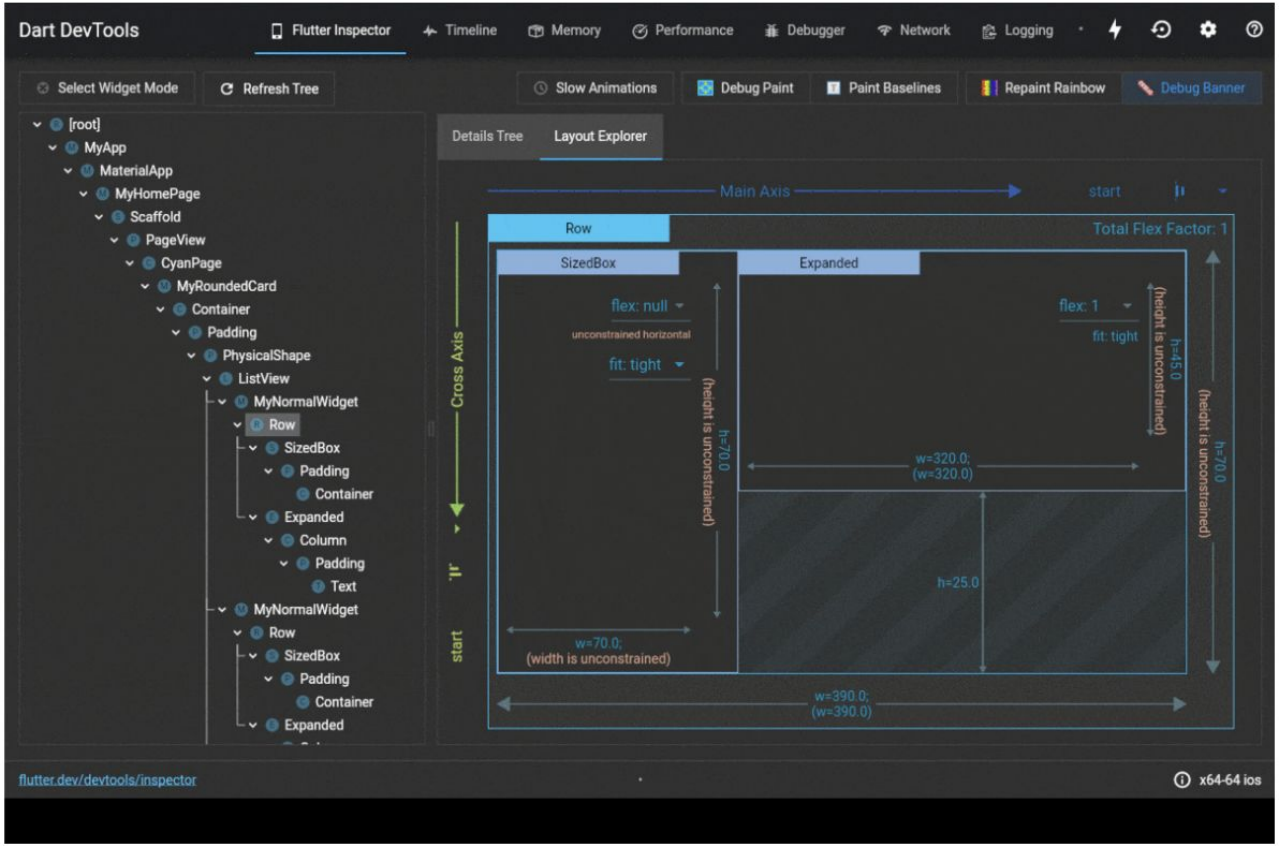
اختبارات الأداء



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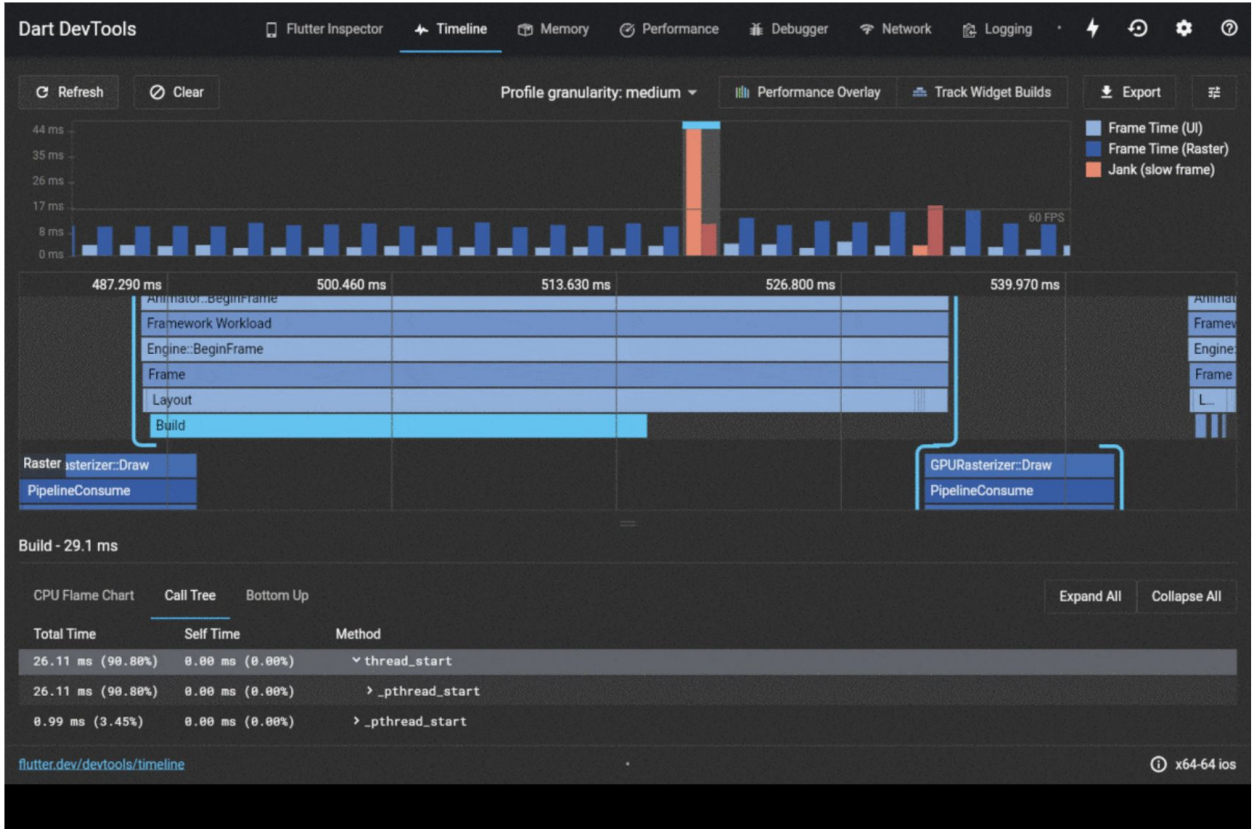
اختبارات الأداء



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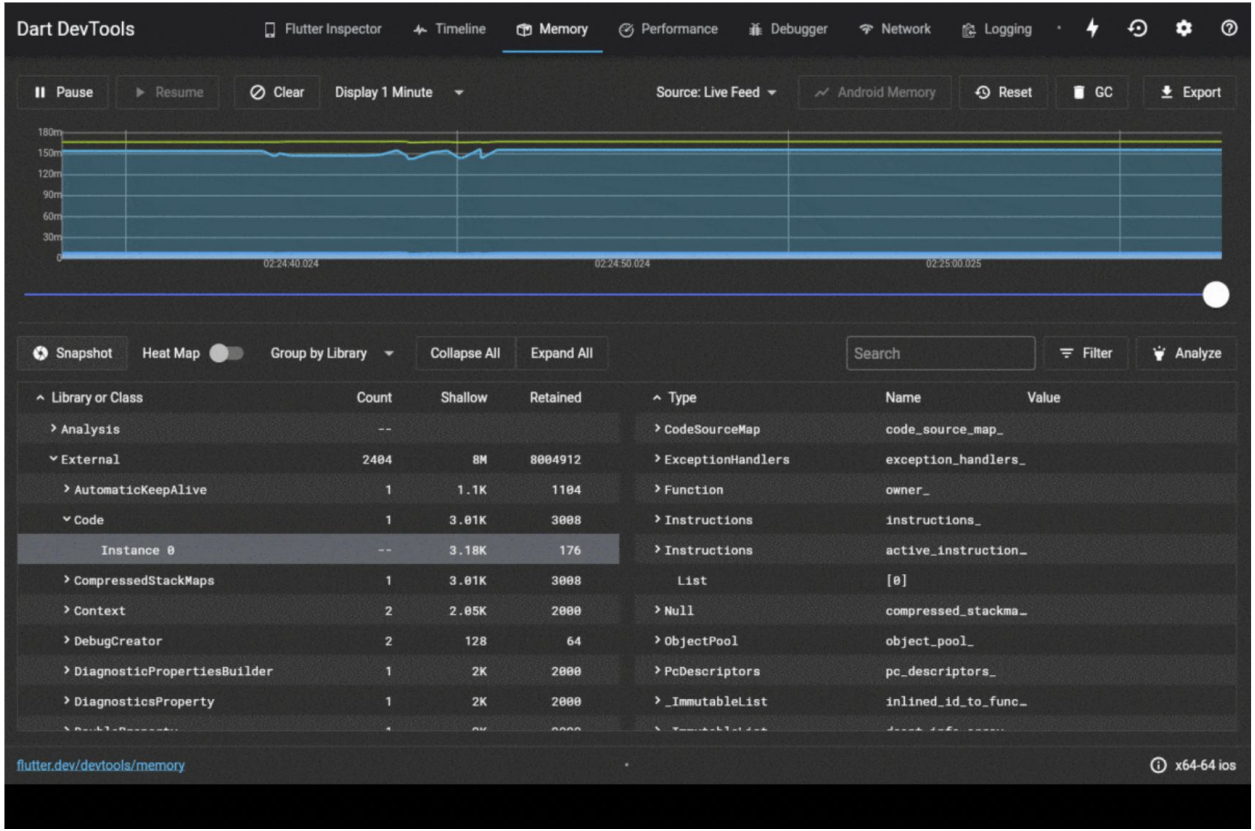
اختبارات الأداء



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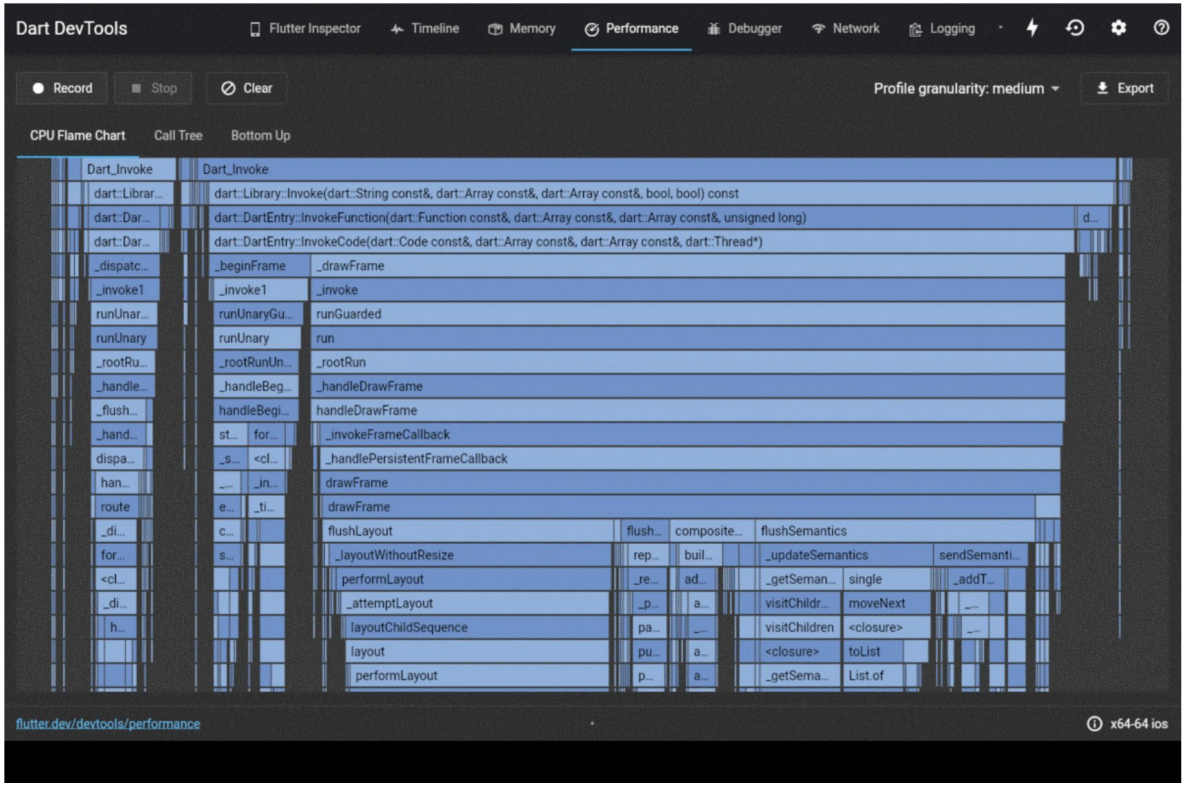
اختبارات الأداء



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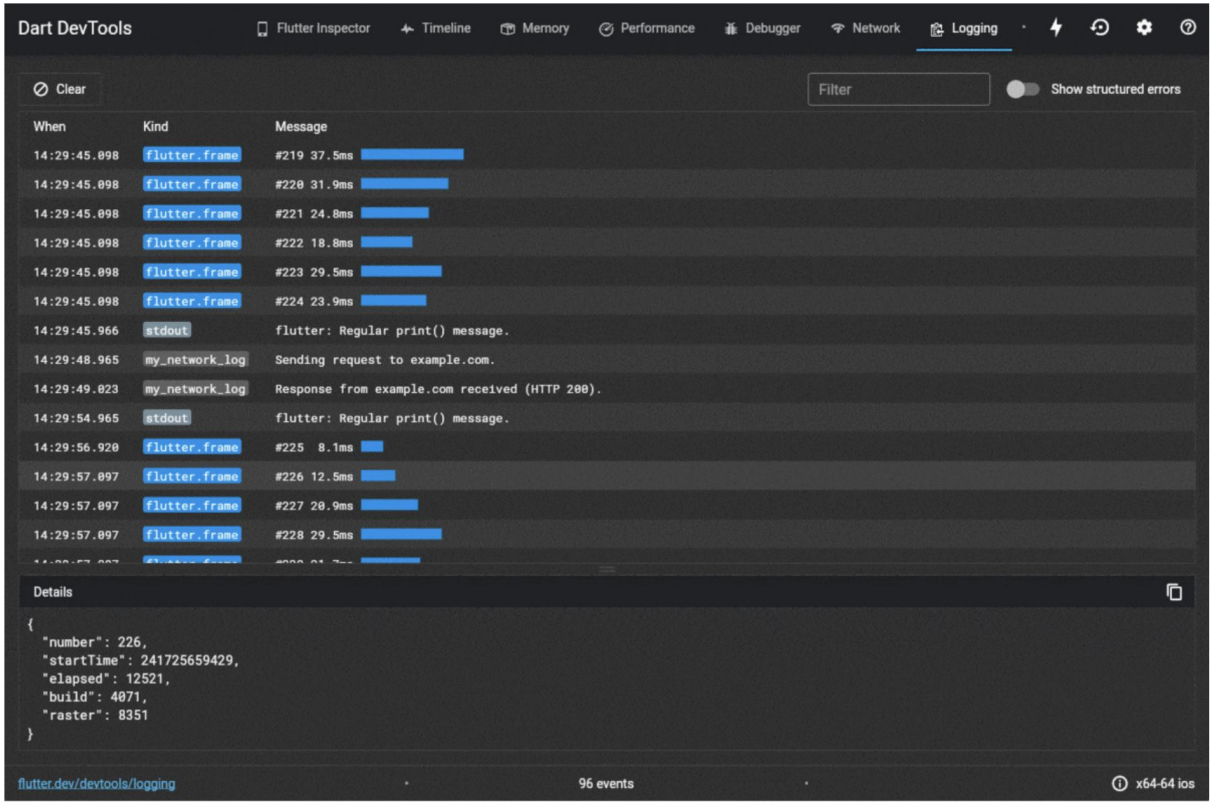
اختبارات الأداء



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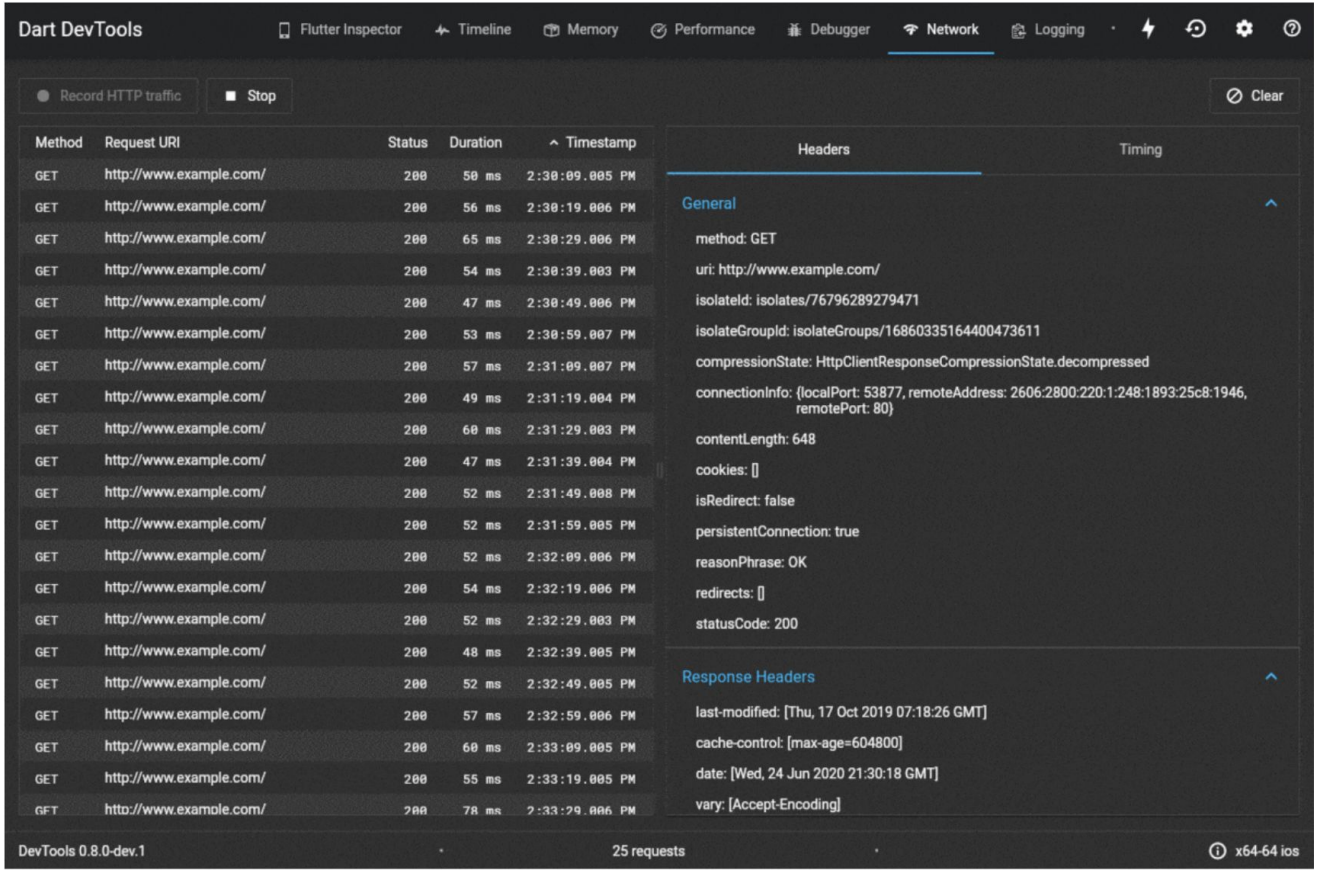
اختبارات الأداء



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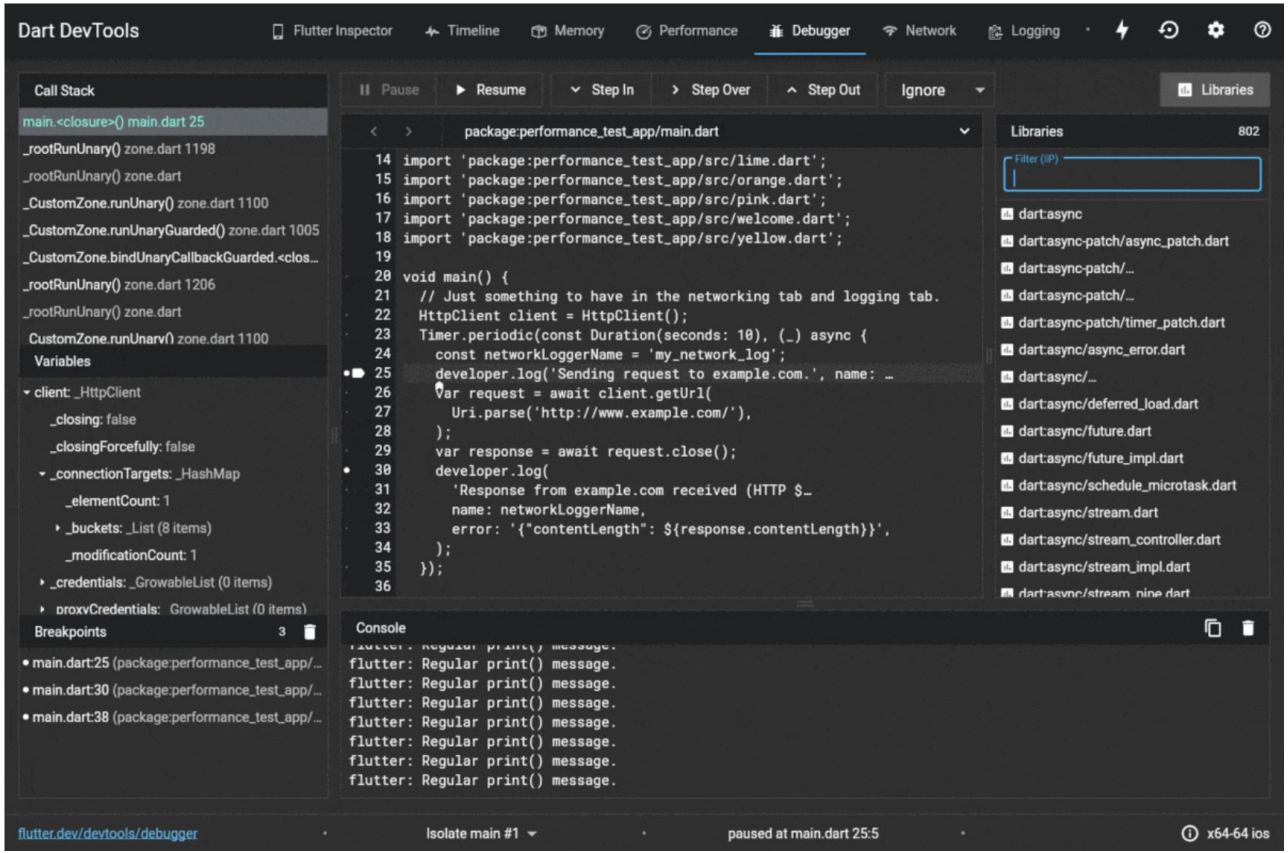
اختبارات الأداء



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12

أنماط بناء التطبيقات

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أنماط بناء التطبيقات

Debug (print - debugShowCheckedModeBanner - run - hot reload & restart - debug mode)

Profile (run - real performance - real device - hot reload & restart)

Release (archive in xcode - apk or bundle in android - app signing - unique id - play store - app store)

تطبيق عملي

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المشروع

Flutter

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تفاصيل المشروع

- عمل مشروع Flutter جديد باستخدام برنامج الأكواد واخر اصدار لـ Flutter SDK بدعم Null Safety.
- استخدام MediaQuery.of(context) في شاشات المشروع لدعم مقاسات الشاشات.
- استخدام واحدة من ادارة الحالة في التطبيق (provider - riverpod - bloc)
- استخدام GoRouter للتنقل بين الشاشات في التطبيق
- استخدام واحدة من خيارات قواعد البيانات لعمل عملية أو أكثر من عمليات CRUD (Firebase - Supabase - Sqfite or Sqfentity - api http - shared preferences)
- رفع المشروع في ريبو Github جديد .
- تصوير 3 شاشات من التطبيق على الأقل
- إرسال ايميل بعنوان "دورة تطوير التطبيقات باستخدام Flutter - الاسم الثلاثي" الى m.m.shahmeh@gmail.com

  إرفاق رابط الـ github ضمن الايميل

  إرفاق صور التطبيق بشكل ملف مضغوط (rar - zip)

13

ملخص ومراجع

Flutter

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ملخص ومراجع

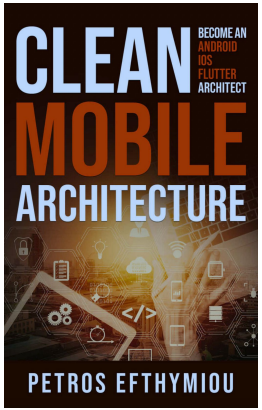
flutter.dev

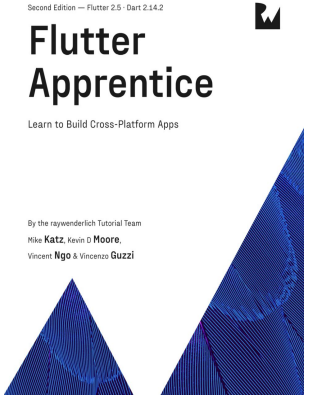
The Boring Flutter Development Show (Youtube)

Widget of the Week (Youtube)

pub.dev

fuchsia.dev (Zircon is Dart package)





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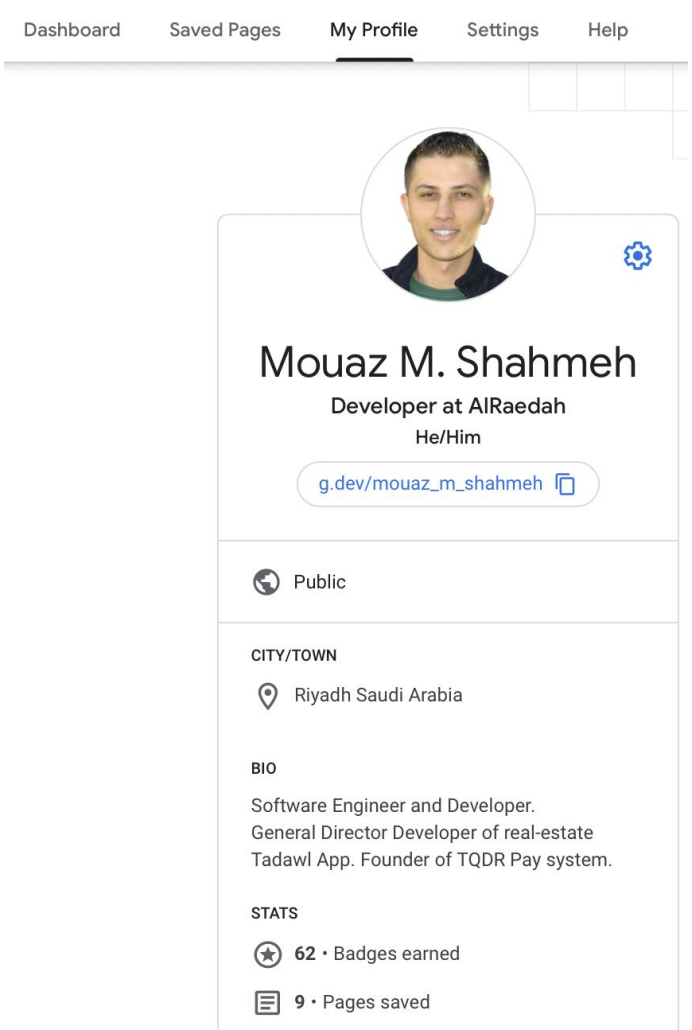
Ask Me Anything

m.m.shahmeh@gmail.com

g.dev/mouaz_m_shahmeh

LINKS

- github.com/Eng-Mouaz-M-AlShahmeh
- linkedin.com/in/mouaz-shahmeh
- stackoverflow.com/users/18449528
- twitter.com/mouaz_m_shahmeh



شكراً لكم