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1. Flutter

2. “ 05 ” 2021 . 1656

3. 13 2021 .

3. Flutter. Bloc; Firebase;

4. ,

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4. Flutter

5. _____ , _____ , _____ , _____ , _____
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6. _____ , _____ .1) (_____)

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	Flutter		
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6		08.12.21-09.12.21	
7		10.12.21-11.12.21	

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: 59 ., 16 ., 1 .,

1 ., 22 .

FLUTTER, IOS, ANDROID, SDK, ., BLOC, API,
LAYOUT, UI, UX, FIREBASE, SQL, .

Flutter.

Flutter

Dart.

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ABSTRACT

Master's thesis: 59 pages, 16 figures, 1 tables, 1 appendices, 22 sources.

FLUTTER, IOS, ANDROID, SDK, FRAMEWORK, BLOC, API, LAYOUT, UI, UX, FIREBASE, SQL, WIDGET.

The major goal of this thesis is to develop a model of mobile application using the Flutter framework.

During the qualification work, a model of the application was developed for purchase in stores using the Flutter framework and the programming language Dart. The application corresponds to the latest trends in mobile development, modern technologies were used in the development.

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1.1			10
1.2			11
1.3			12
1.4			13
2			15
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4

	42
4.1	42
4.2	45
	50
	51
	53

API – (Application Programming Interface)

BLOC – (Business Logic Component)

HTTP – (Hyper Text Transfer Protocol)

SDK – (Software Development Kit)

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1.1

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iPhone Apple 2007 .

iPhone

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Android

2008

[3].

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2020 46,45%

[4].

2021

6,4

2026

7,5

[5]. Apple Samsung

1.2

Android iOS.

OEM-

[6].

[7].

Apple iOS, Google Android Windows Phone Microsoft.1.3.

[8].

1.3

3,5 2020

[9].

[10].

2,7 86%

2021

[11].

1.4

Android Java Kotlin, iOS Swift Objective-C. Java – , - Sun Microsystems (Oracle). Java , [12]. Kotlin – , - Java Virtual Machine JetBrains [13]. JavaScript Kotlin , LLVM. Kotlin , Kotlin Java, Kotlin Java. Swift – [14]. Apple iOS macOS (Cocoa Cocoa Touch Apple, Objective-C. Swift , Objective-C. Swift LLVM, Xcode 6 . Swift Objective-C, Objective-C – , - ,

Apple,
 Smalltalk [15]. , '
 Smalltalk – , Objective-
 C , -
 Objective-C. Objective-C GCC
 . Mac OS X
 (Cocoa) GNUstep- , -
 OpenStep.
 iOS (Cocoa Touch).

2

2.1

Flutter

Flutter –

Android iOS,

Dart,

Google [16].

Flutter

2015

Sky

Android-

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120

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2.0 (

2021

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Windows, macOS

Linux

Google Fuchsia (

Dart

JIT-

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App Store

iOS

Flutter

AOT-

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Dart,

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Dart,

Flutter,

Foundation,

(Flutter DevTools).

Flutter

C++,

Google Skia,

SDK

Android

iOS [17].

Foundation,

Dart,

Flutter

Flutter.

Flutter

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Apple). : Material Design (Google) Cupertino (Flutter

Foundation

Flutter – SDK- SDK [18]. –

, SDK –

Google Flutter -

(2.1):

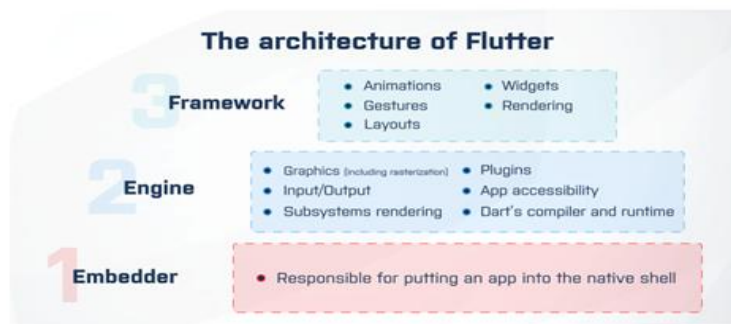
- Embedder;
- Engine;
- Framework.

Embedder

Android, Swift; Objective-C iOS; C++ Linux Windows). (Java

– C C++. Flutter

API. Dart.



2.1 – Flutter

Embedder

. Embedder –

Flutter

Flutter,

Flutter,

Flutter

Flutter

Google, Square,

eBay

Alibaba Group

Flutter.

Flutter

(2.2).

Flutter React Native,

7

«Hello world» –

iOS

Flutter

Google

, Google

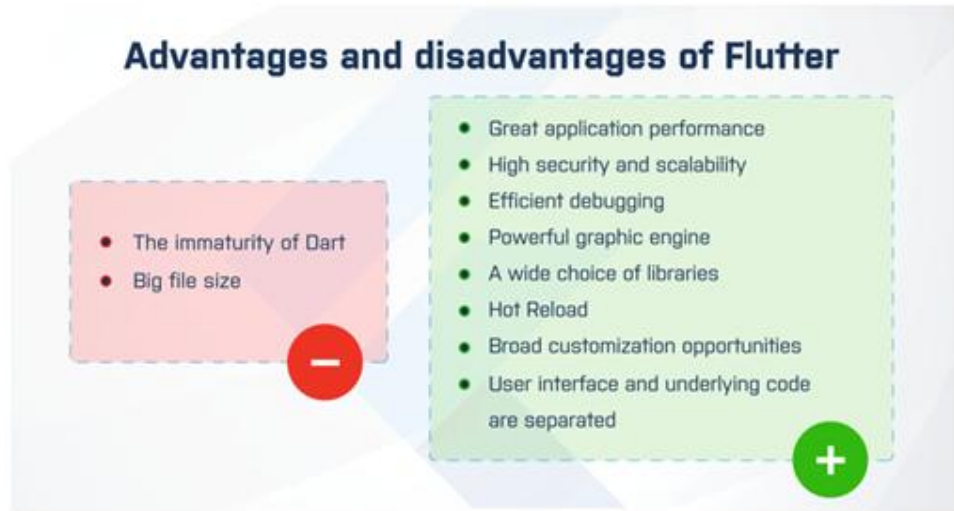
Flutter

Android,

iOS.

Dart

Flutter.



2.2 –

Flutter

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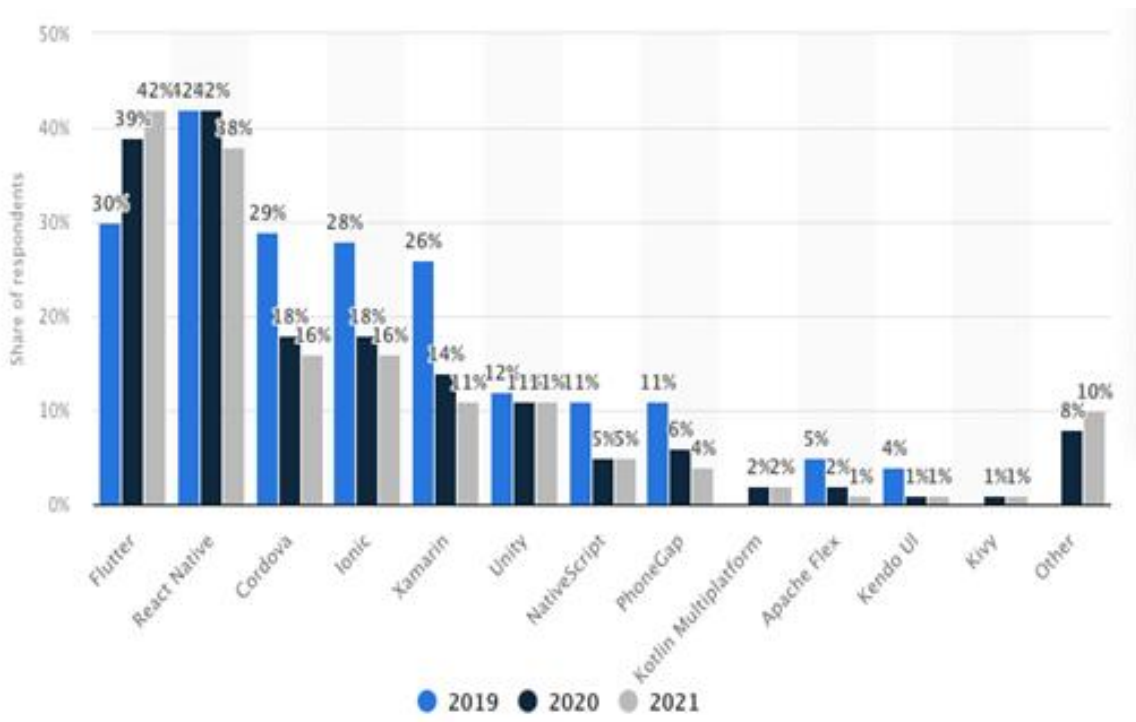
Flutter

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42%

Flutter.

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2.3 – Flutter

Android, iOS, 2020 24,5

41 600

96 000

2.3 Dart

Dart – , [19]. Google

Dart – , C. Dart , JavaScript.

GOTO , 10-12 2012 . Dart 1.0 14.11.2013. Dart , Dart

Dart VM Chrome. 2015 Dart 1.9, Dart JavaScript.

2018 Dart 2.0 , Dart 2.6 , dart2native. Linux, macOS

Windows. Android iOS. Dart , Dart SDK, Flutter, (,). Ecma International TC52 Dart, Dart JavaScript, - . Ecma International Dart

2014 107-

2014 . Dart.

Dart- : web, Stand-alone, Ahead-of-time compiled, Native.

Web: - Dart

JavaScript, Dart

« , , ».

» Dart -

: JavaScript

dart2js. Dart, JavaScript,

Dart.

JavaScript,

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JavaScript.

Stand-alone:

Dart

(SDK)

Dart,

Dart

, Dart SDK, Dart,

Dart SDK.

dart2js pub. Dart

Ahead-of-time compiled: Dart AOT-

().

Native: Dart 2.6 dart2native ,

. Dart 2.6

iOS Android Flutter.

2.4 BloC

BLoC (Business Logic Component) –

(BLoC) [20].

BLoC

Dart.

Google

Google

I/O 2019.

BLoC

Flutter.

BLoC

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. BLoC,

Flutter,

Flutter,

BloC

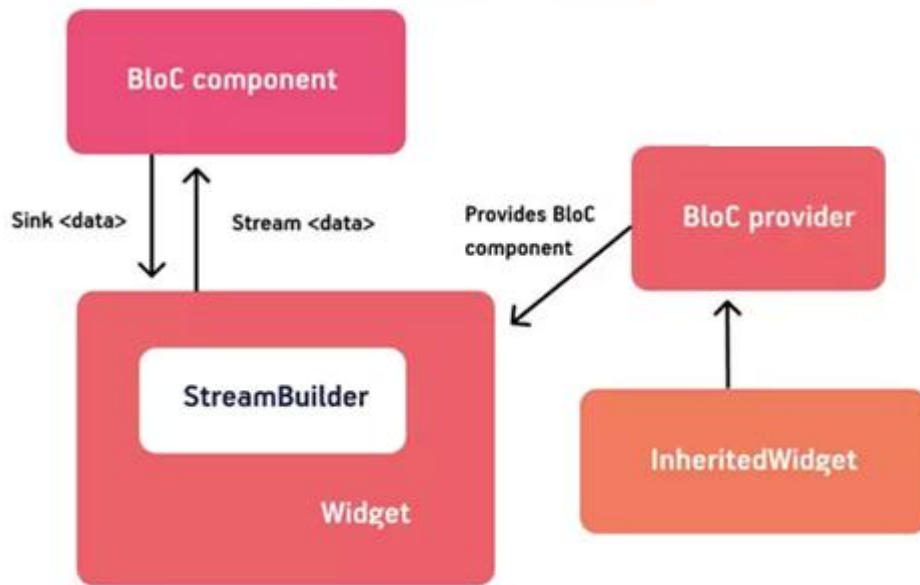
setState

BLoC

(2.4).

BLoC,

BLoC Architecture



2.4 –

BLoC

BLoC

BLoC.

BLoC –

UI.

BLoC

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BLoC.

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BLoC,

[21].

BloC

Flutter,

Flutter (

Flutter

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BloC

BloC:

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, API

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3

3.1

Flutter:

$$M = \{cp, UI, S_{API}, T, F\}, \tag{3.1}$$

cp (count platform) – ;

UI (user interface) – ;

S_{API} (service API) – ;

T (testing) – UI ;

F (functional) – ;

$$F = \{db, pn, pm, gps, t\}, \tag{3.2}$$

db (data base) – ;

pn (push notification) – ;

pm (payment methods) – ;
gps (global positioning system) –

3.2 User Interface

Flutter
2017 .

Flutter

Flutter –

UI

3.2.1

Flutter

- Single Child Widget;
- Multiple Child Widget.

Single Child Widget

«Center»

«Container»

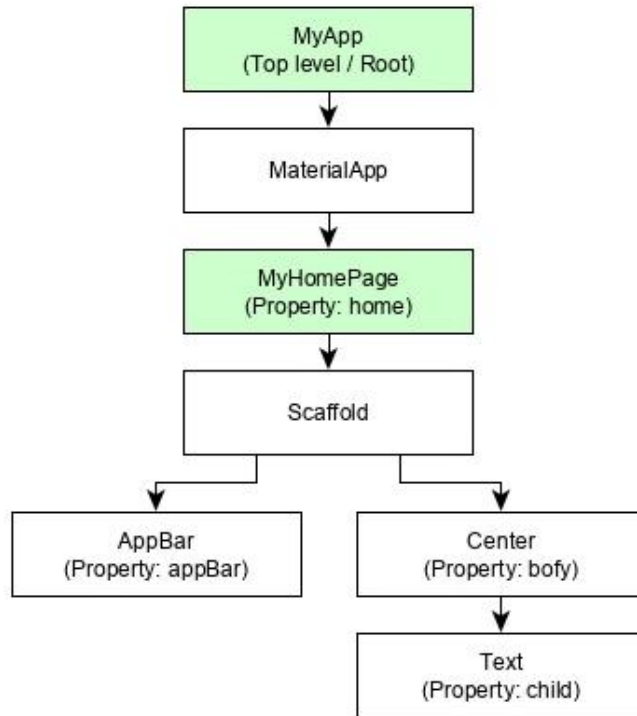
. Single Child Widget –

Multiple Child Widget

«Row»

«Column»

3.1



3.1 –

(3.1),

- MyApp –
Flutter, MaterialApp;

- MaterialApp home

```

    MyHomePage;
    - MyHomePage flutter,
Scaffold;
    - Scaffold – body appBar. body
    ,
appBar ;
    - Flutter,
AppBar Body Center;
    - Center Child,
    Text.

```

3.2.2

```

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    -
    - /
    .
    :
- Tap –
    ;
- Double tap – ;
- Drag – ,
    ;
- Pinch – .
Flutter
GestureDetector. GestureDetector – ,
    ,
Flutter
GestureDetector.

```

GestureDetector.

Flutter

- Dismissible – ;
- Draggable – ;
- LongPressDraggable – ;
- DragTarget – ;
- Scrollable – ,

3.2.3

Flutter ;

- ;

- Layout .

Flutter , – Android

iOS. Android

Android. Android

Material. iOS

Apple

- Scaffold;
- AppBar;
- BottomNavigationBar;
- TabBar;
- TabBarView;
- ListTile;
- RaisedButton;
- FloatingActionButton;

- FlatButton;
- IconButton;
- DropdownButton;
- PopupMenuButton;
- ButtonBar;
- TextField;
- Checkbox;
- Radio;
- Switch;
- Slider;
- Date & Time Pickers;
- SimpleDialog;
- AlertDialog.

Flutter

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, Flutter

layout

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layout

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- Container –

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BoxDecoration

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- Center –

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- Row –

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- Column –

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3.3 API-

API –

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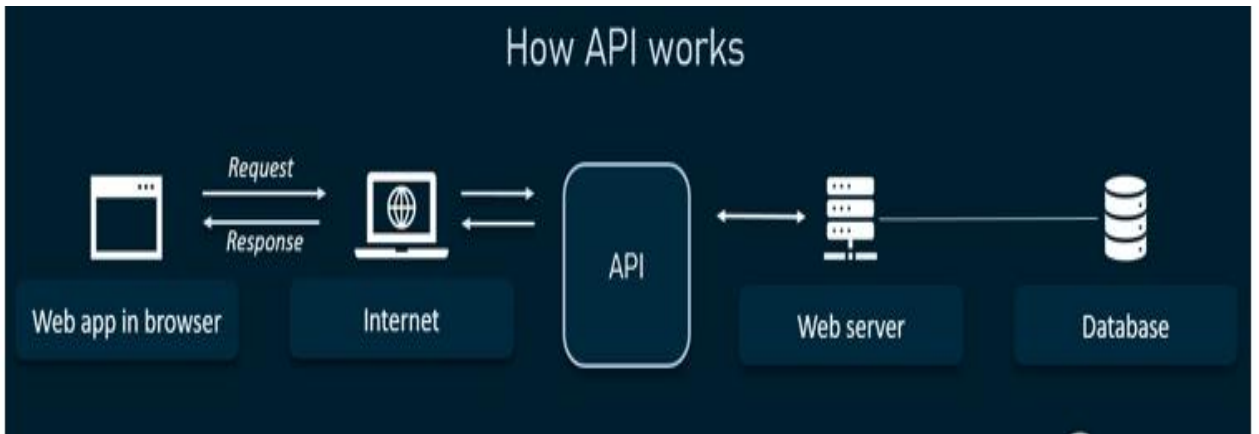
API, /

API.

API

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(3.2).



3.2 – API

API

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3.3.1 API

, API (3.3)

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API –

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API

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API.

API.

API

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API

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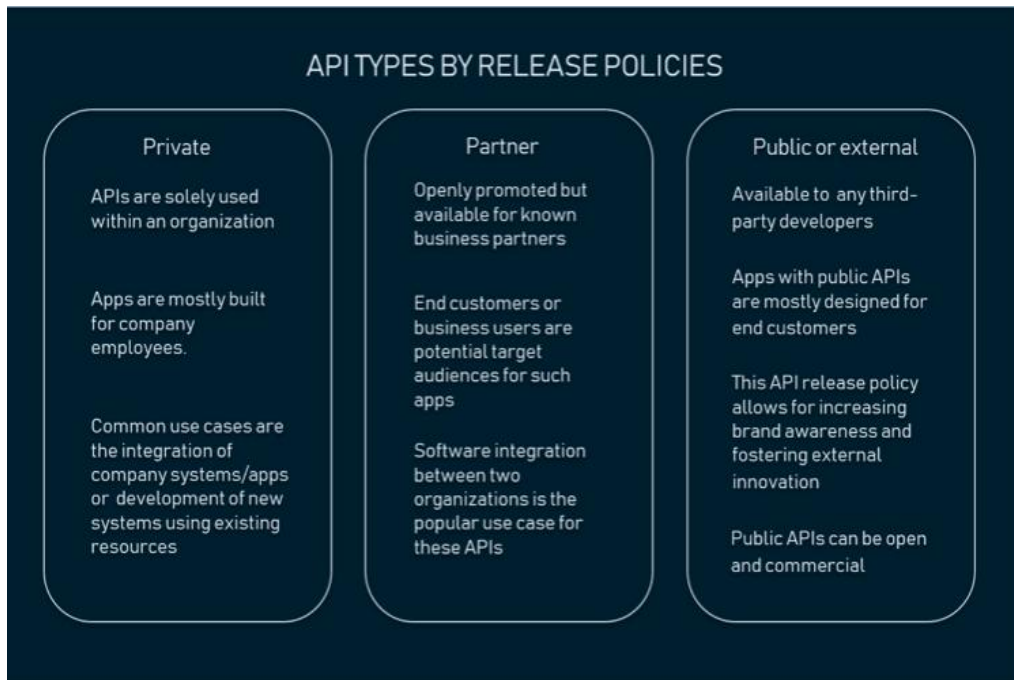
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API,

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3.3 – API

API – API

3.3.2 API

API

- API

- API

API, , API Windows Linux API (API API);

- Apple API macOS iOS

. API

Apple macOS

Cocoa.

iOS,

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Cocoa Touch – Cocoa;
- -API: API . -API
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-
(HTTP).
-API,
Flutter http HTTP. http –
,
REST.
http http
. http
HTTP- . http URL-
Dart Map ( , ). Http
async/await.
Http ( 3.1) :
- read – URL- GET
Future<String>;
- get – URL- GET
Future<Response>. Response – ,
;
- post – URL- POST,
Future<Response>;
- put – URL- PUT
Future <Response>
- head – URL- HEAD
Future<Response>;
- delete – URL- DELETE

```



```

Push-
    . Firebase Cloud Messaging (FCM) –
    ,
    Google.
    .
    push notification :
-   : Flutter SDK, 1.17.5,
    pub.dev –
firebase_messaging overlay_support;
-   Firebase ;
-   Firebase Cloud Messaging
    .
    Android :
-   Firebase Android
    : google-services.json
    android/app;
-   google-services
[YOUR_PROJECT]/android/build.gradle.
    ;
-
[YOUR_PROJECT]/android/app/build.gradle.
    iOS :
-   Firebase iOS :
    GoogleService-Info.plist,
ios/Runner.xcworkspace Xcode Xcode
ios/Runner.
3.4.3

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- Google pay;
- Apple pay;
- Stripe;
- PayPal;
- Razor Pay.

(3.1).

3.1 – ,

	1	2	3	4
Goole Pay		; ;		, 2,9%
Apple Pay		iOS; « »	Android;	3%
Stripe		; ;	; ;	2,9% \$0,30

3.1

1	2	3	4
PayPal	;	;	2,9% , \$0,30
RazorPay	;	;	2% ; 3%

3.4.4

GPS

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(GPS).

Location

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Flutter

Geolocator.

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Android

iOS,

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Dart

Flutter

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    Dart
    Flutter
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Flutter
    Flutter
    testWidgets
    :
-   :
- WidgetTester - ,
    pumpWidget
Flutter
    WidgetTester
    ;
-   ,
    3.2 3.3
    :
    UI
    .

```

3.2–

UI

```
testWidgets('finds a specific instance', (WidgetTester tester)
  async {
    await tester.pumpWidget(MaterialApp(
      home: Scaffold(
        body: Text('Hello'),
      ),
    ));
  });
```

3.3–

UI

```
testWidgets('Counter increments smoke test', (WidgetTester
  tester) async {
  // Build our app and trigger a frame.
  await tester.pumpWidget(MyApp());

  // Verify that our counter starts at 0.
  expect(find.text('0'), findsOneWidget);
  expect(find.text('1'), findsNothing);

  // Tap the '+' icon and trigger a frame.
  await tester.tap(find.byIcon(Icons.add));
  await tester.pump();

  // Verify that our counter has incremented.
  expect(find.text('0'), findsNothing);
  expect(find.text('1'), findsOneWidget);
});
```

4

4.1

4.1



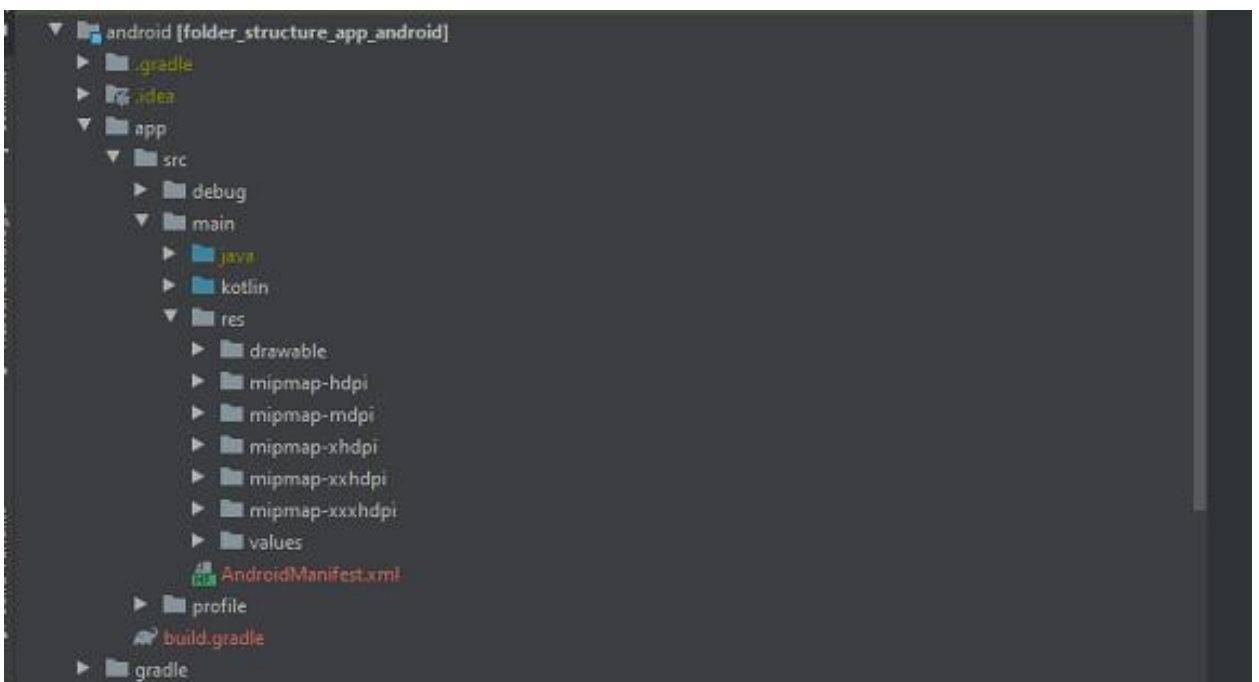
4.1 –

Android (4.2)

Android.

flutter.

android res
 AndroidManifest.xml. res
 AndroidManifest.xml
 SDK



4.2 – Anroid

IOS Android ,

dart iOS (4.3).

ios Assets.xcassests info.plist. Assets.xcassests

res Android.

info.plist AndroidManifest.xml,

SDK

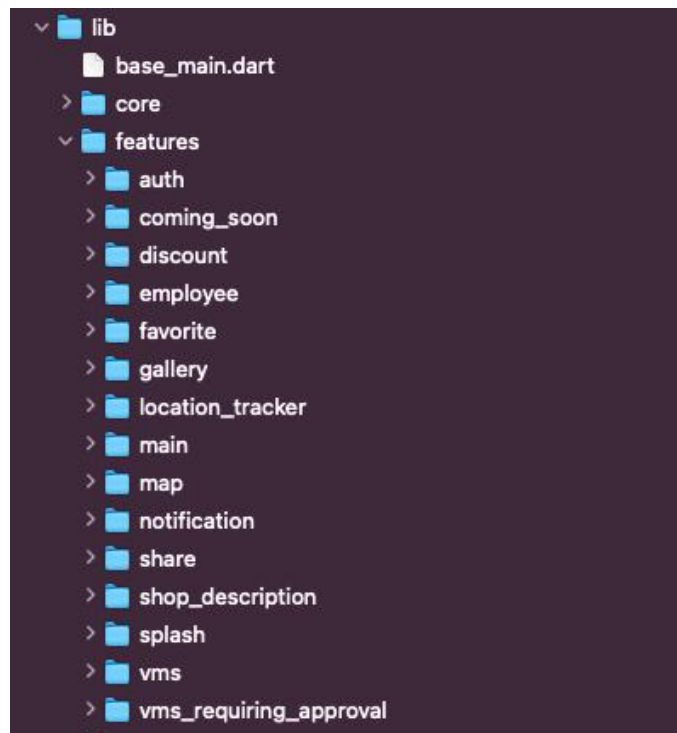
IOS,



4.3 – iOS

Lib – ,
 dart (4.4).

lib main.dart,

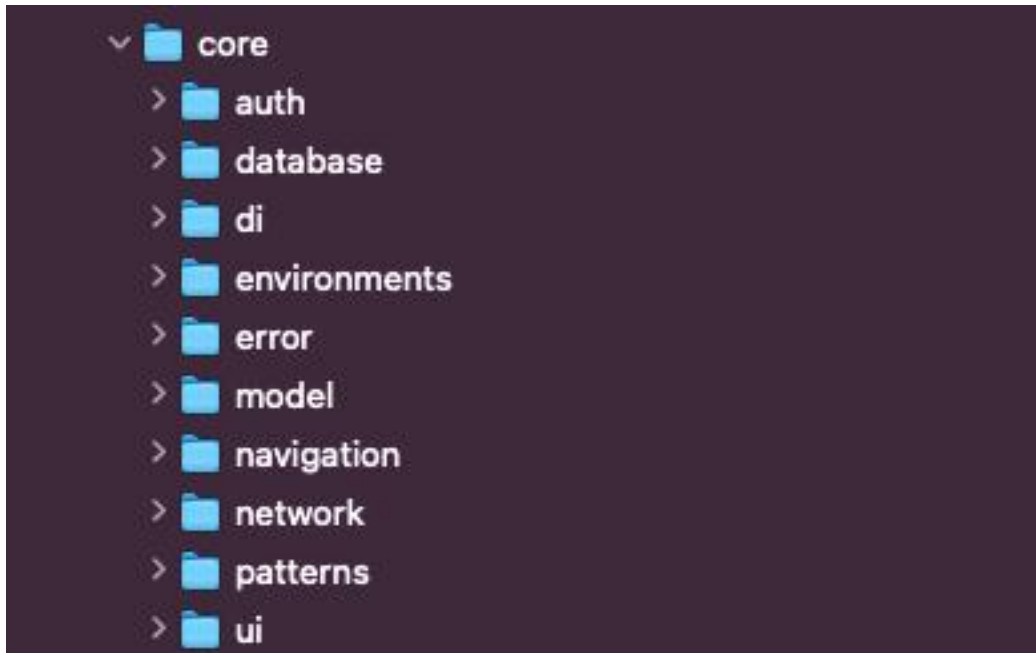


4.4 – lib

core - (4.5):

- Auth – ;
- Database – ;
- Di – ;

- Error – ;
- Navigator – ;
- Network – API ;
- Patterns – ;
- Ui – UI .



4.5 – core

4.2

4.6-4.9:

- :
 Firebase Auth
 Google Facebook (4.6,);
- (4.6,): ;
- (4.7,):
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-      (      4.7, ):
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      (      4.8, );

-      (      4.8, ):
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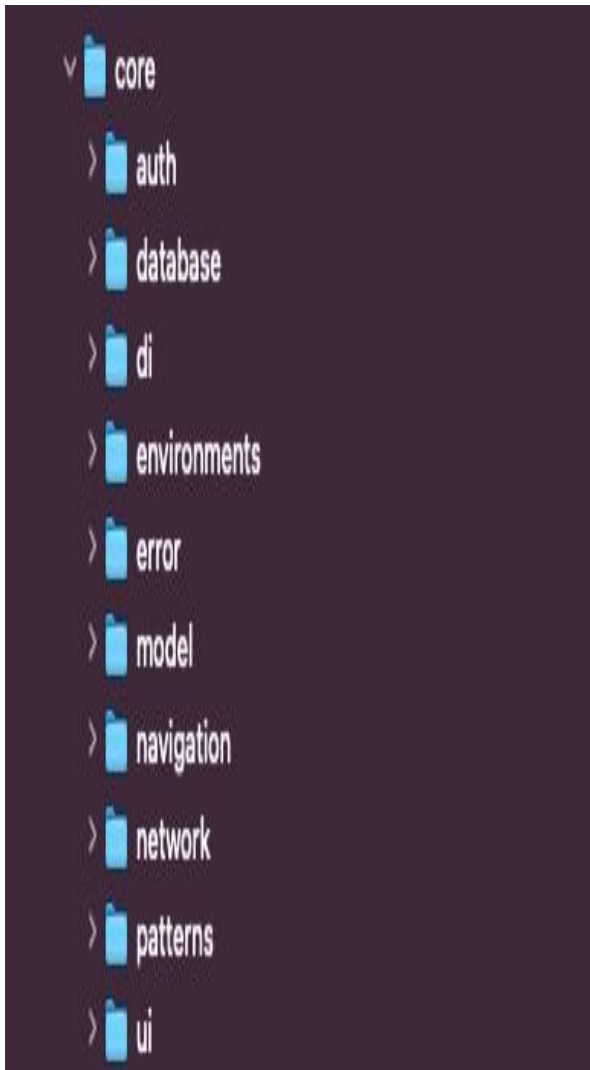
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Google

Apple Pay.



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4.6 -

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:)

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4.7 –)
 :)) ;
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(4.6,)

TextField

Firestore Auth.

(4.6,)

ListView

(4.7,)

ListView

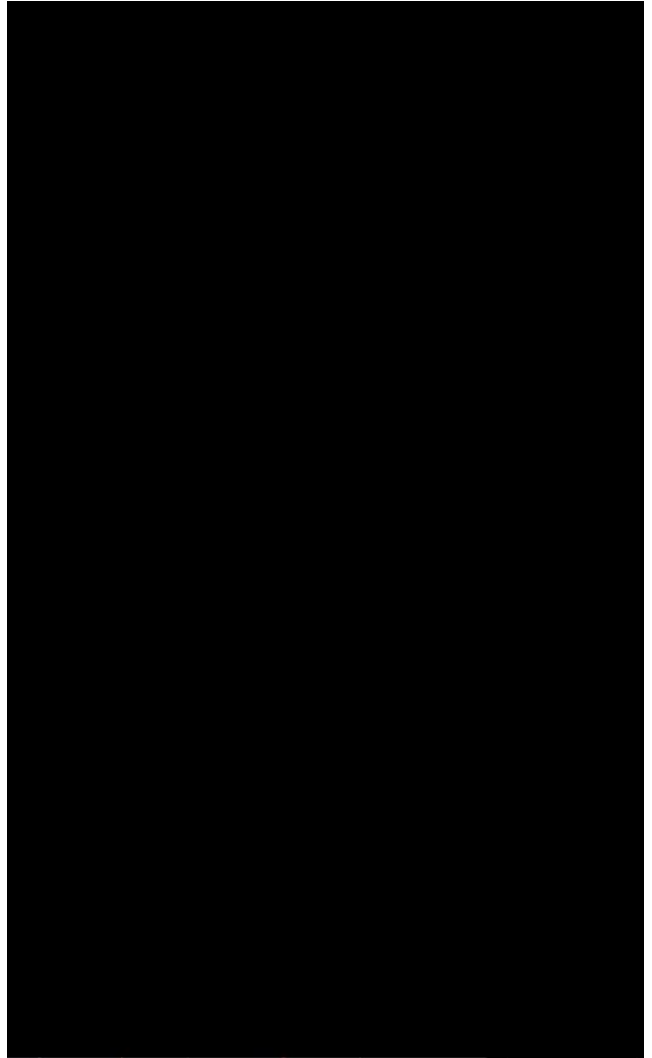
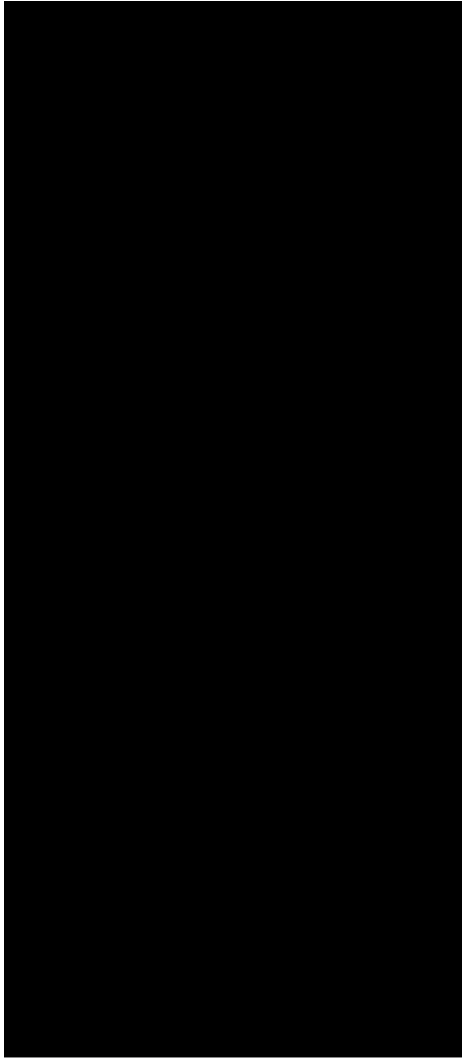
Row

IconView Text.

« » (4.7)

ListView.

TextField –



4.8 –)

:)

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)

«

»

(4.8,)

ListView,

IconView Text.

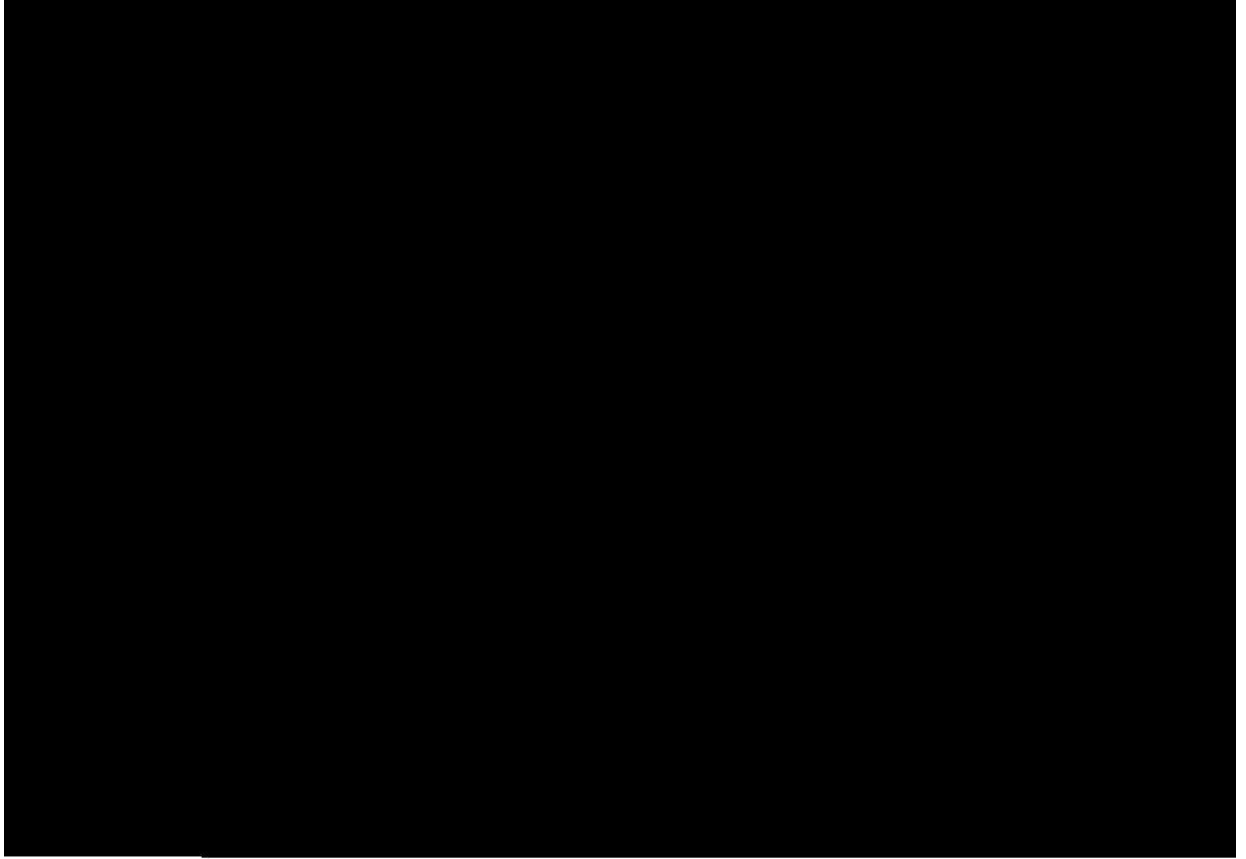
Firestore Database.

« » (4.8,)

MapView

AnnotationView.

SegmentControll.



4.9 –

Java, Kotlin, C#, JavaScript, HTML, CSS

Swift,

Flutter,

[22]

Flutter,

BloC.

1. . . . iOS macOS. 4- ., . . . : , 2018. 448 .
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Flutter. :
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4. - - - - . 2021. C. 99.