Flutter - 跨平台开发框架

宁长胜

- 腾讯高级工程师
- NOW Android
- Android 6 years
- Flutter 1 year

人人网 renren.com

Baidu 百度

Tencent

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Flutter简介

- Google公司2015年推出的跨平台（Android & iOS）移动开发框架，使用 Dart 语言进行开发
- 目标是创建高性能、高稳定性、高帧率、低延迟的Android 和 iOS 应用，且体验与Native应用完全一致
- Google新一代操作系统Fuchsia的UI开发框架，Fuchsia 于2018年4月13日发布了官方文档
- 使用BSD-style license，目前版本是release preview 1

Google I/O 2018

Tue. May 8

2 PM
[Session] Customize Material Components for your product
Stage 6
Design Flutter

5 PM
[Session] Build great Material Design products across platforms
Stage 4
Design Flutter

Wed. May 9

8:30 AM
[Session] Code beautiful UI with Flutter and Material Design
Stage 3
Design Flutter

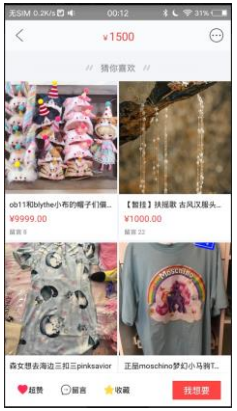
2:30 PM
[Session] Total mobile development made fun with Flutter and Firebase
Stage 6
Cloud Firebase Flutter

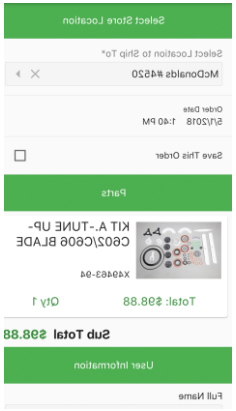
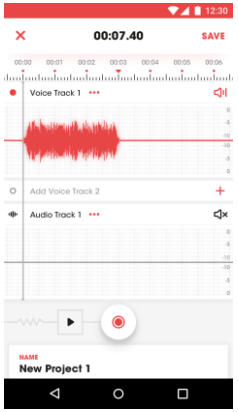
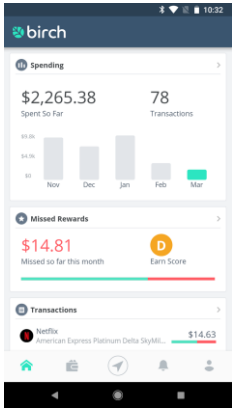
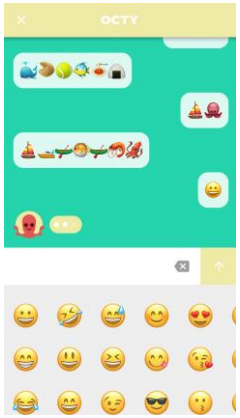
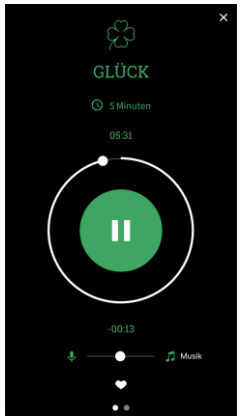
Thu. May 10

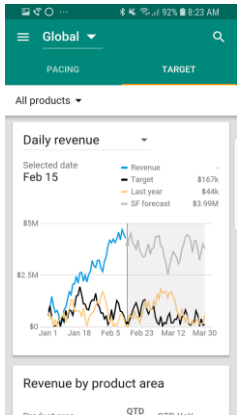
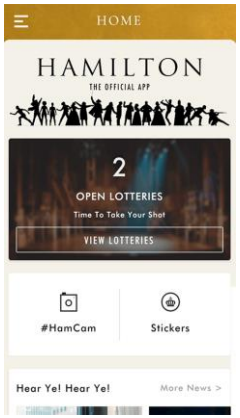
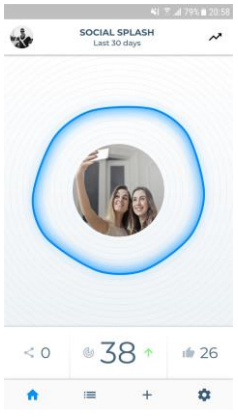
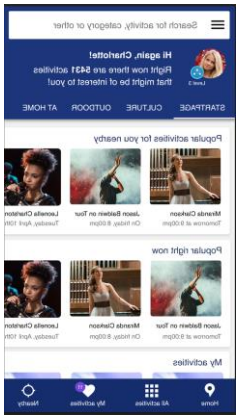
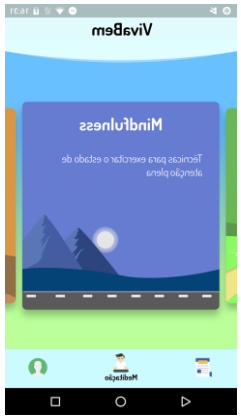
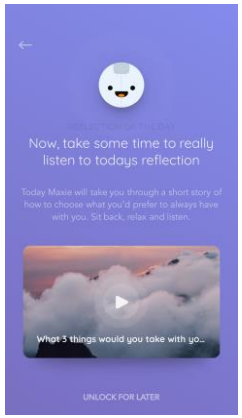
10:30 AM
[Session] Build reactive mobile apps with Flutter
Stage 3
Flutter

3:30 PM
[Session] Add Firebase to your cross-platform React Native or Flutter app
Stage 6
Firebase Flutter

代表性APP





00:07.40
SAVE
Voice Track 1
Add Voice Track 2
Audio Track 1
New Project 1

birch
Spending
$2,265.38
Spent So Far
78
Transactions
Missed Rewards
$14.81
Missed so far this month
Earn Score
Transactions


GLÜCK
5 Minuten
06:31
-00:13
Musik

动态
gakki
Destiny

Global
PACING
TARGET
All products
Daily revenue
Selected date
Feb 15
Revenue by product area

HOME
HAMILTON
THE OFFICIAL APP
2
OPEN LOTTERIES
Time To Take Your Shot
VIEW LOTTERIES
#HamCam
Stickers
Hear Ye! Hear Ye!
More News

SOCIAL SPLASH
Last 30 days
38
26


Mindfulness

Now, take some time to really listen to todays reflection
What 5 things would you take with yo...
UNLOCK FOR LATER

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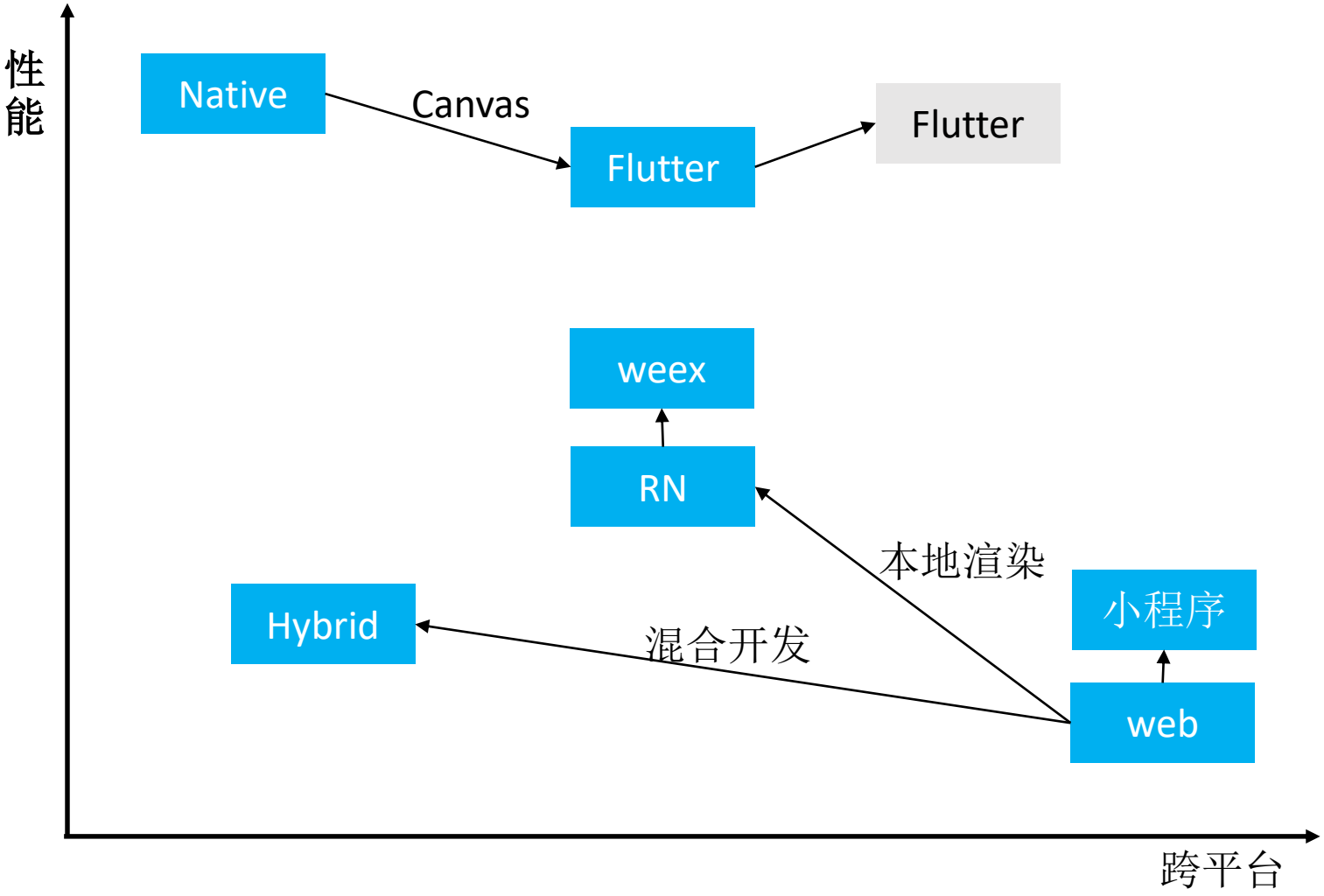
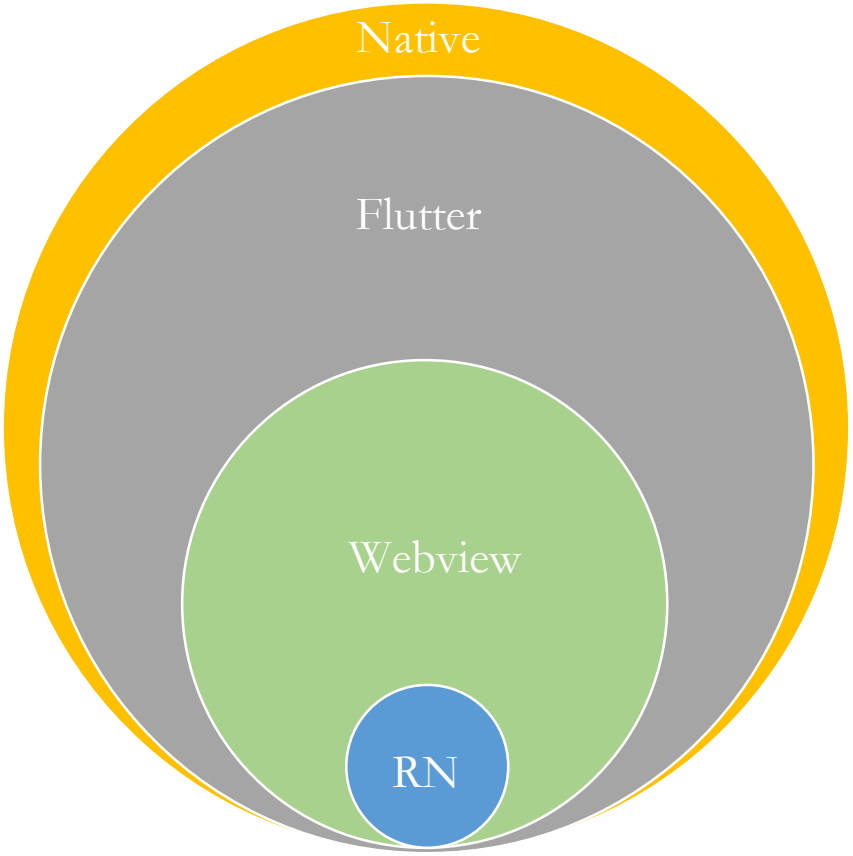
框架对比


性能
Native
Canvas
Flutter
Flutter
weex
RN
本地渲染
小程序
Hybrid
混合开发
web
跨平台

能力对比



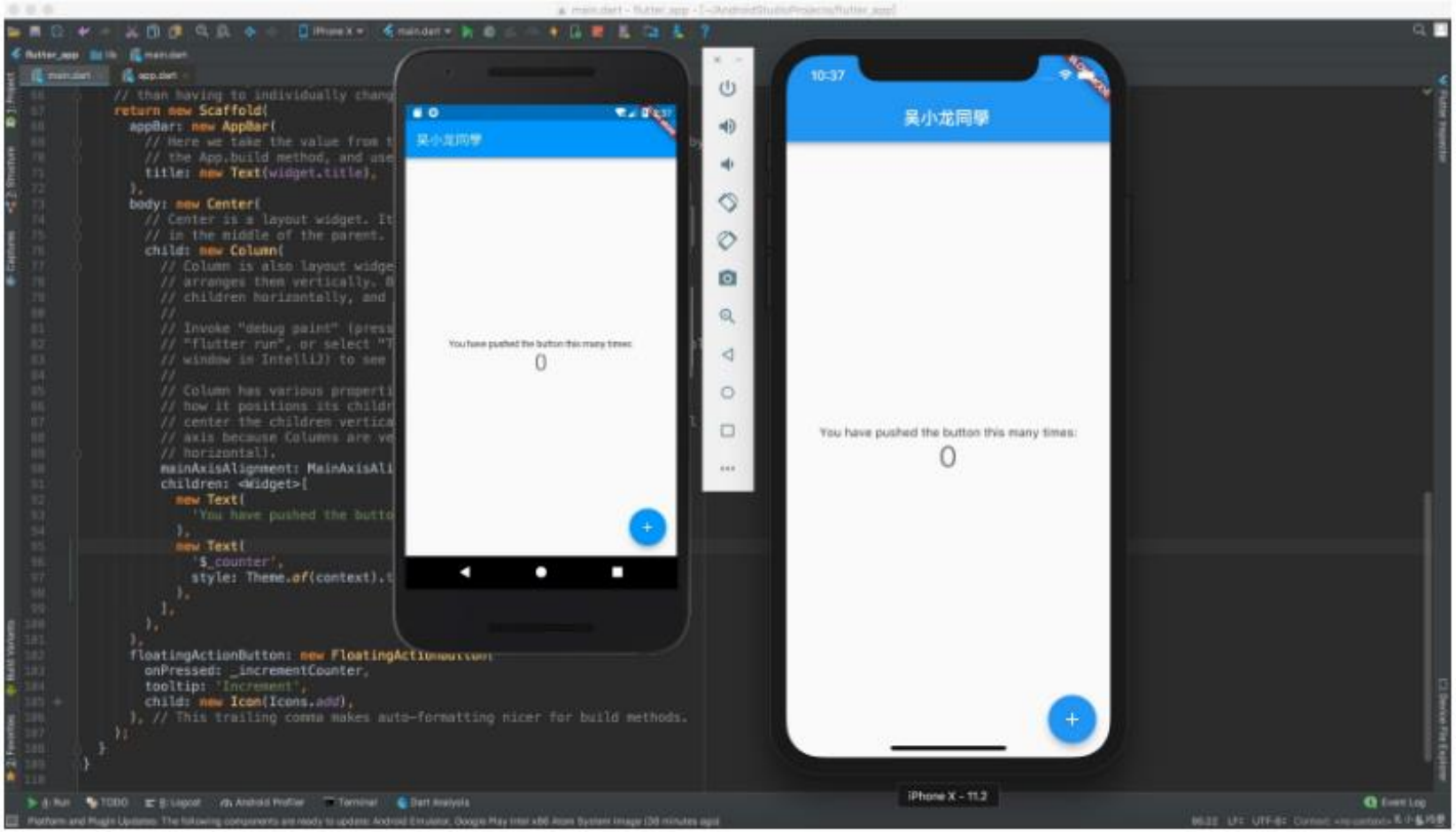
- 全功能体验

- 完整对齐Native的UI能力
- 可通过Native补充能力和三方库

- 仅能通过jsbridge扩展简单能力
- UI表现能力有限

- 能力仅为Webview的5%
- UI开发强依赖Native

跨平台


吴小龙同學
You have pushed the button this many times:
0
10:37
吴小龙同學
You have pushed the button this many times:
0
iPhone X - 11.2

敏捷研发-代码量少

一份代码在iOS和Android端都可运行

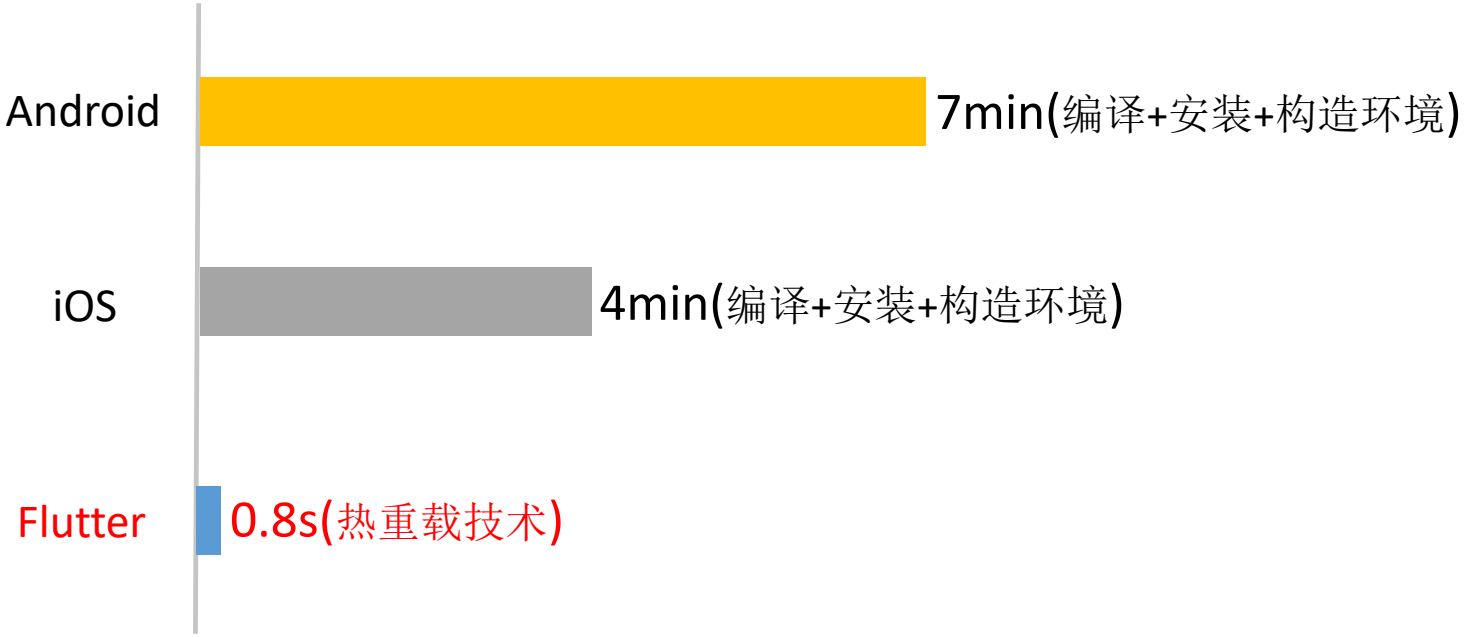
极限情况下
总代码量可减少10倍

最近有开发者用Flutter重新开发了APP，上架Google Play，并做了代码量对比

减少85%

	文件个数	代码行数
Native	Java:83, Xml:96	12716
Flutter	Dart:31	1735

敏捷研发-调试效率高



Fuchsia in AOSP

672686: Set GS register for Fuchsia — runtime/arch/x86_64/thread_x86_64.cc

Base gitiles → Patchset 4 gitiles | Download

```
37  41
38  42 void Thread::InitCpu() {
39  43   MutexLock mu(nullptr, *Locks::modify_ldt_lock_);
40  44
41  45 #if defined(__linux__)
42  46   arch_prctl(ARCH_SET_GS, this);
    47 #elif defined(__Fuchsia__)
    48   Thread* thread_ptr = this;
    49   zx_status_t status = zx_object_set_property(zx_thread_self(),
    50                                               ZX_PROP_REGISTER_GS,
    51                                               &thread_ptr,
    52                                               sizeof(thread_ptr));
    53   CHECK_EQ(status, ZX_OK) << "failed to set GS register";
43  54 #else
44  55   UNIMPLEMENTED(FATAL) << "Need to set GS";
45  56 #endif
```

master

189ee81

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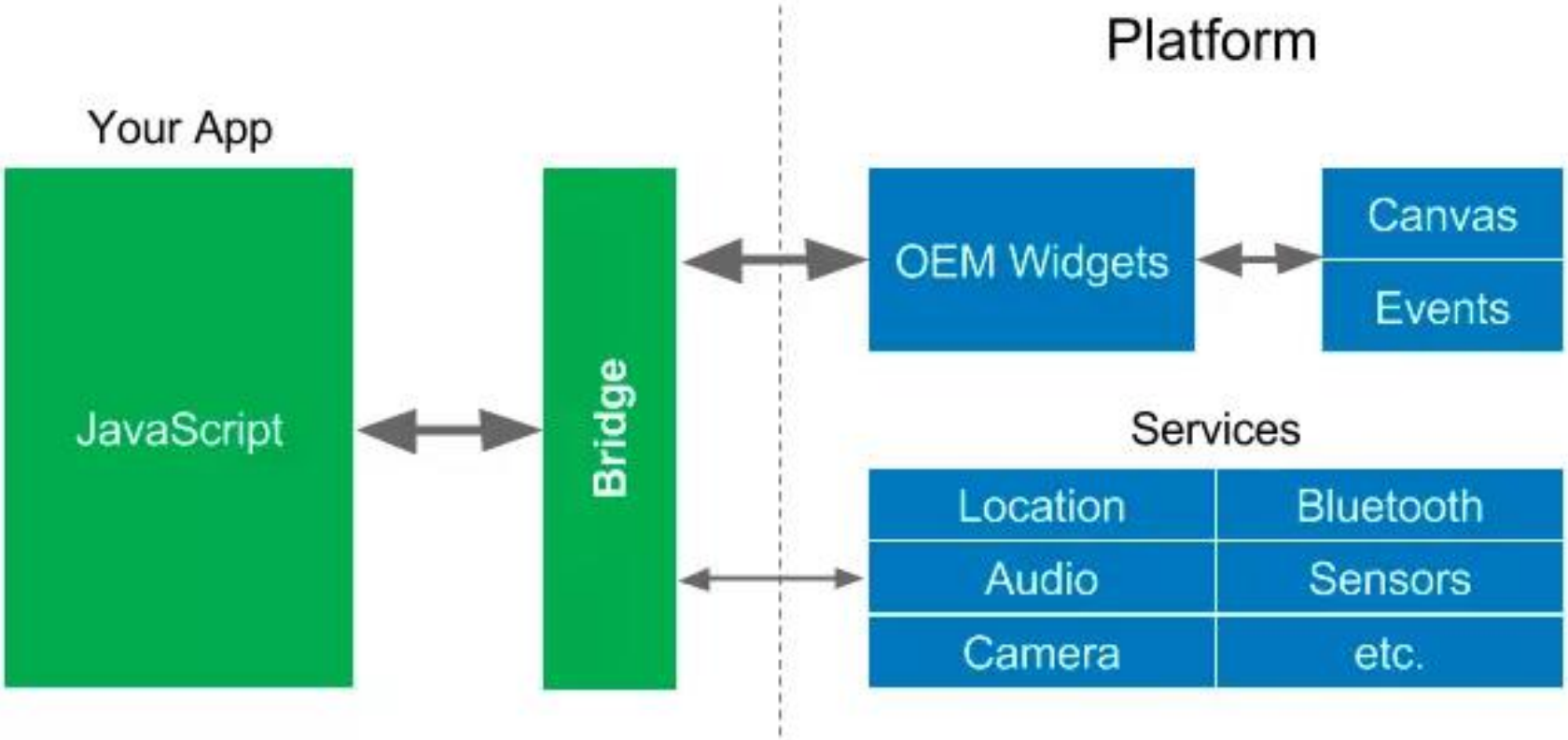
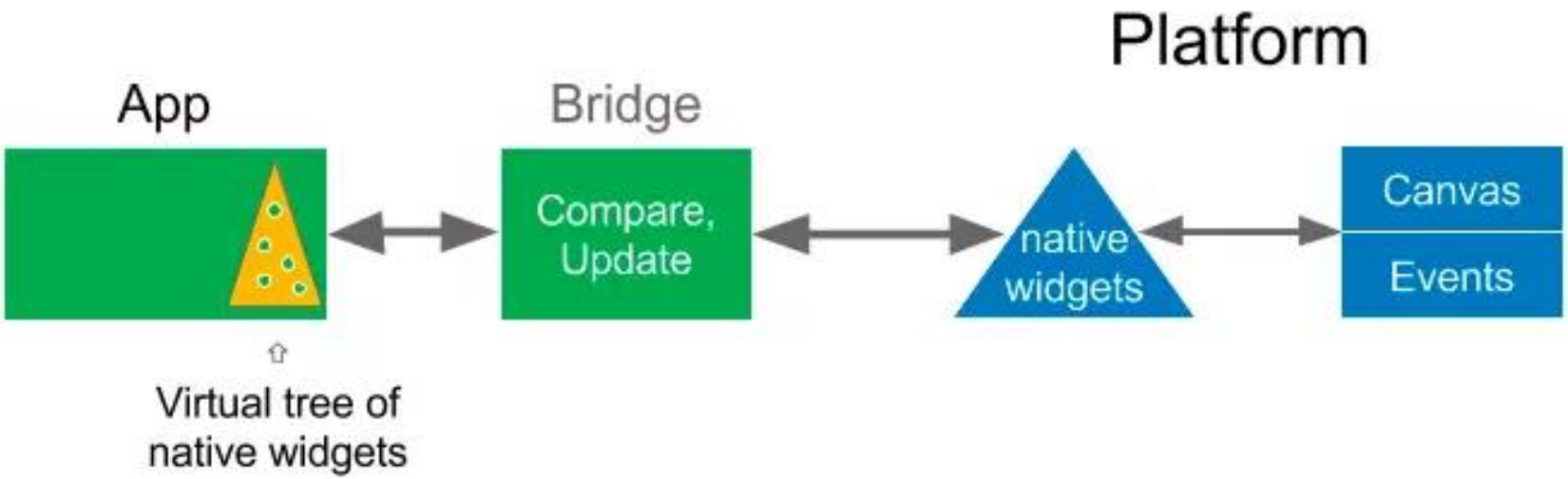
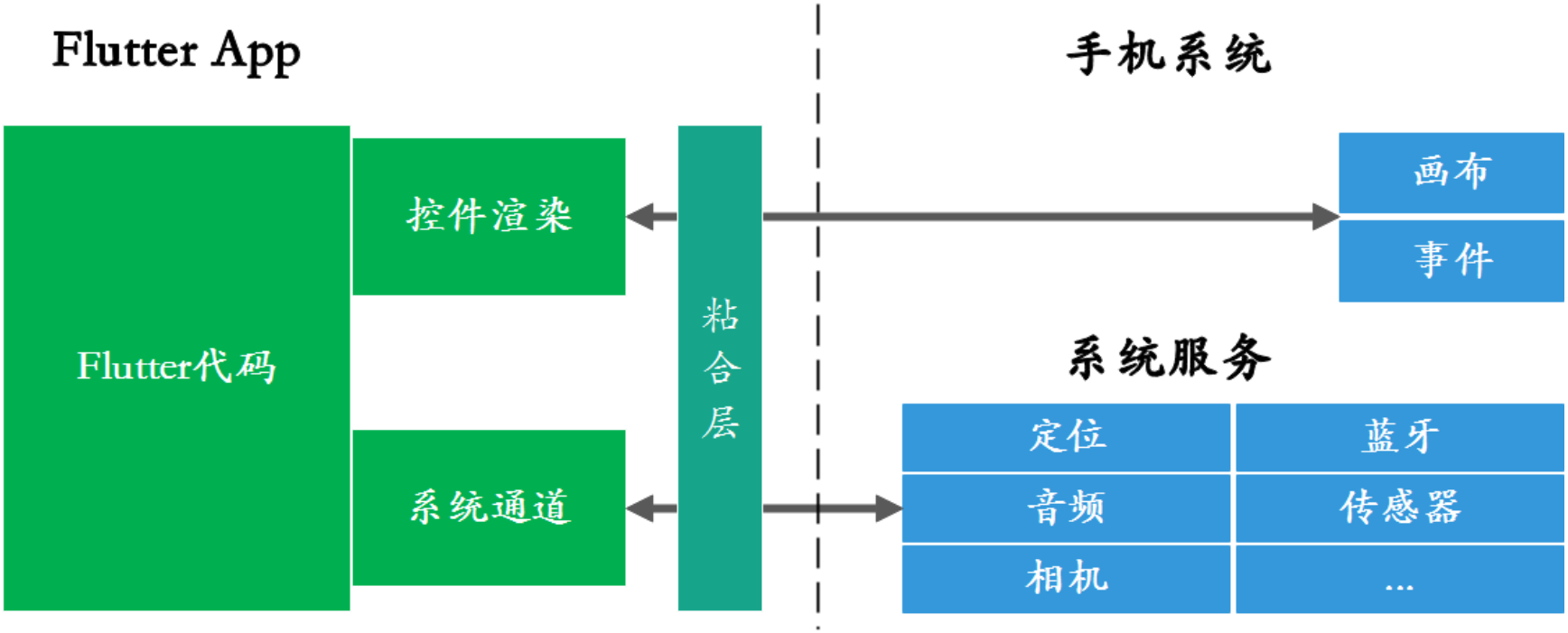
ReactNative



ReactNative

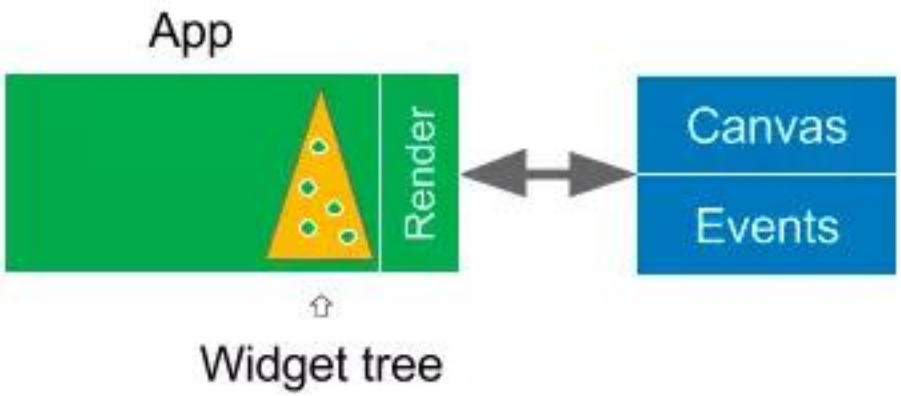


Flutter

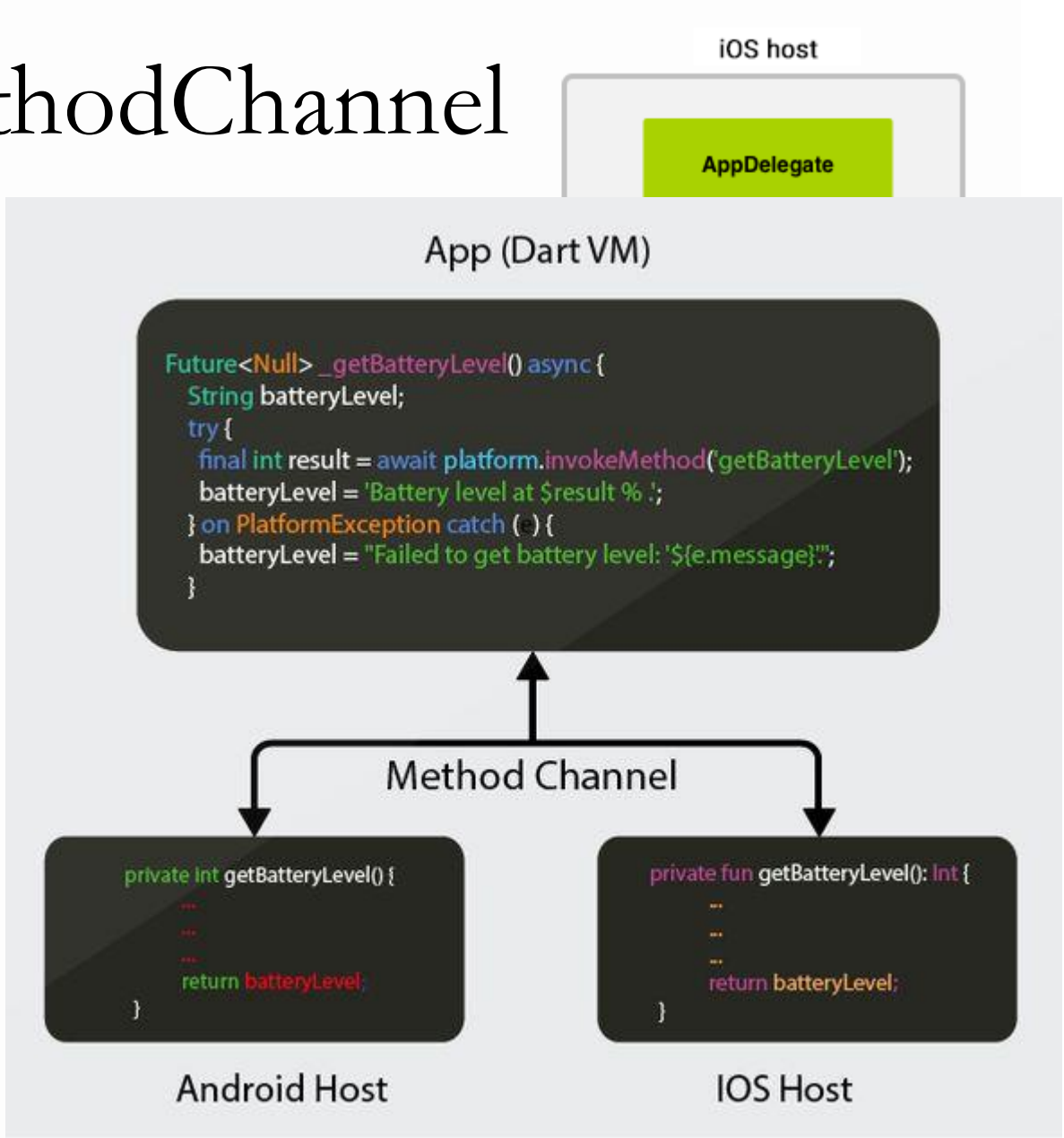


Flutter框架处理UI渲染部分，通过PlatformChannel调用系统能力

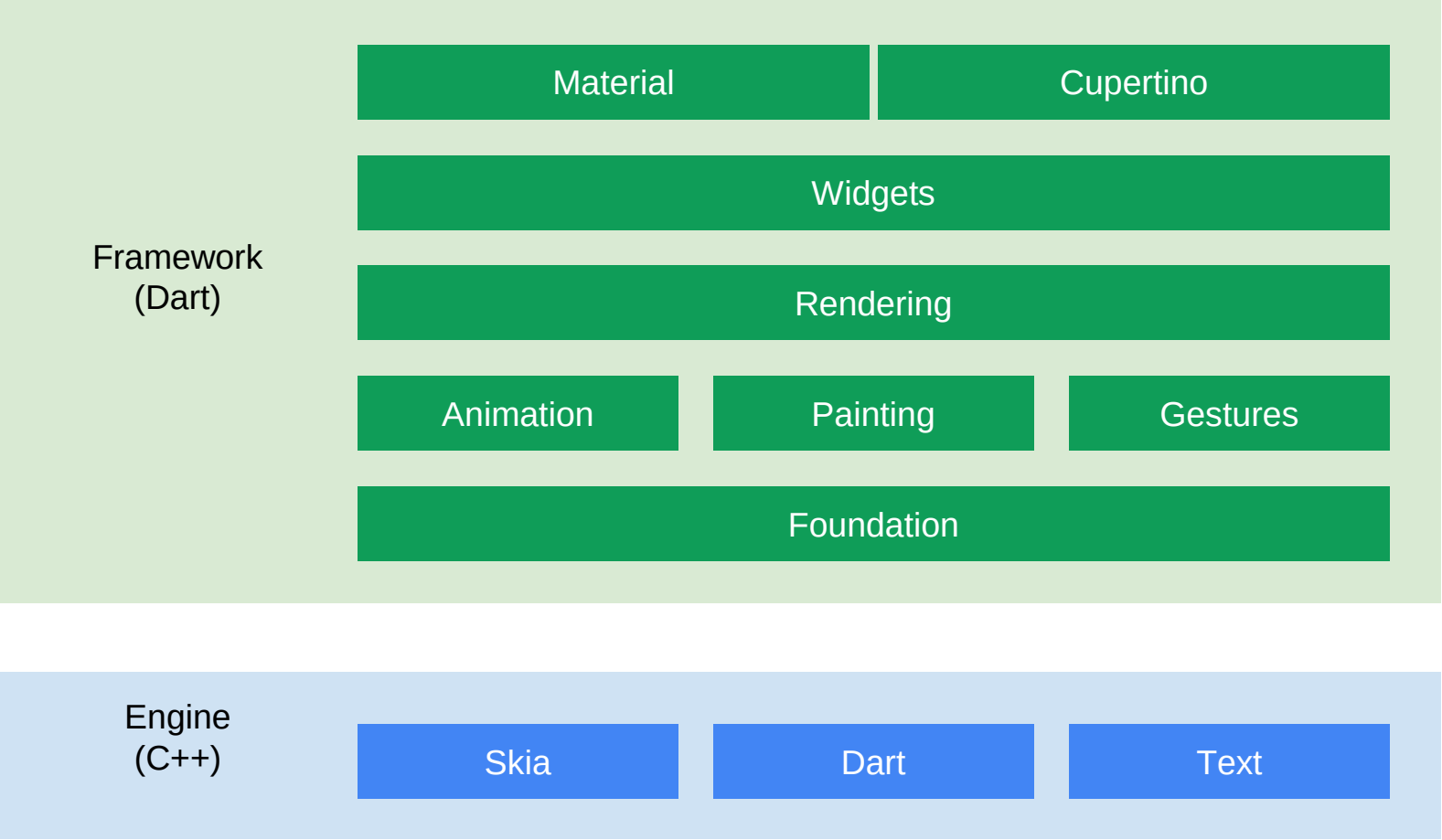
Flutter



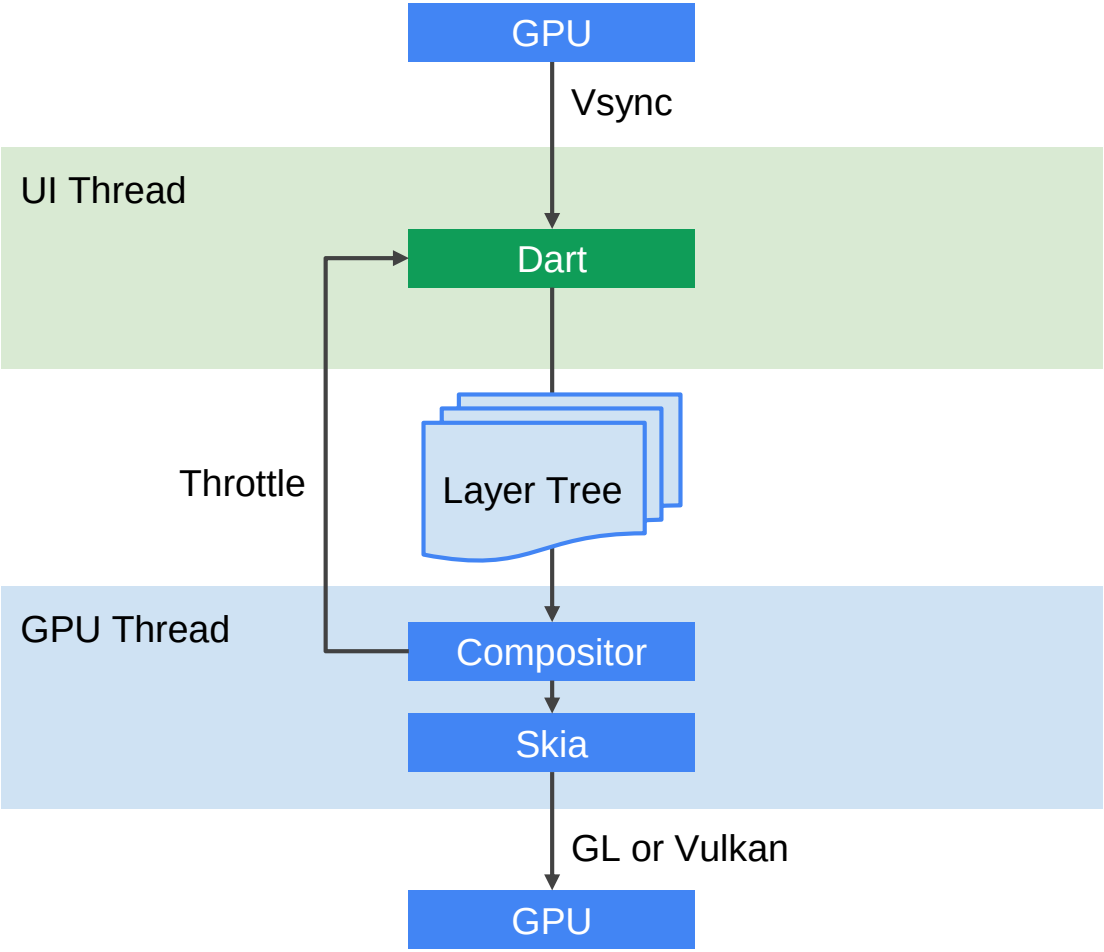
MethodChannel



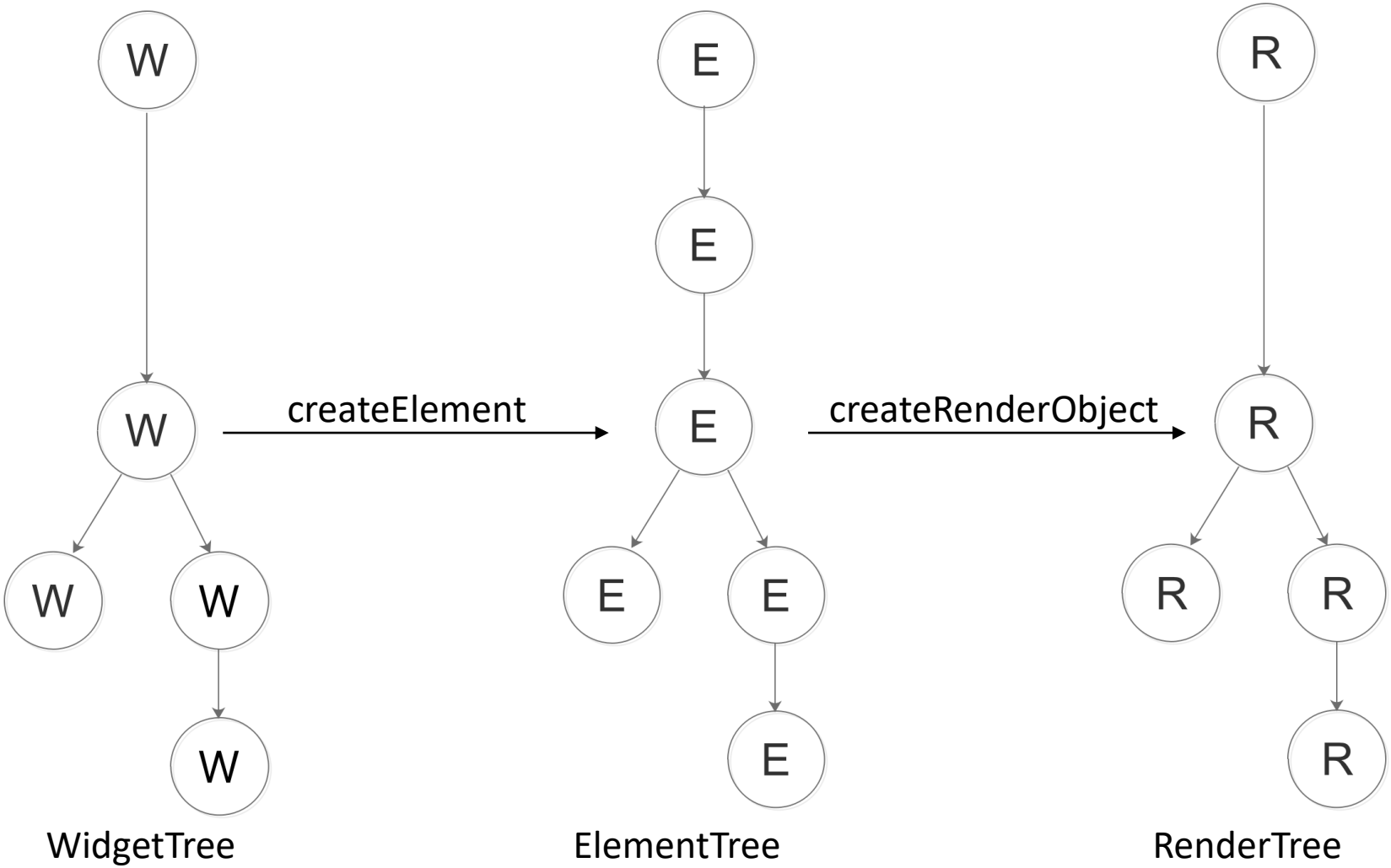
Flutter架构


Framework
(Dart)
Material
Cupertino
Widgets
Rendering
Animation
Painting
Gestures
Foundation
Engine
(C++)
Skia
Dart
Text

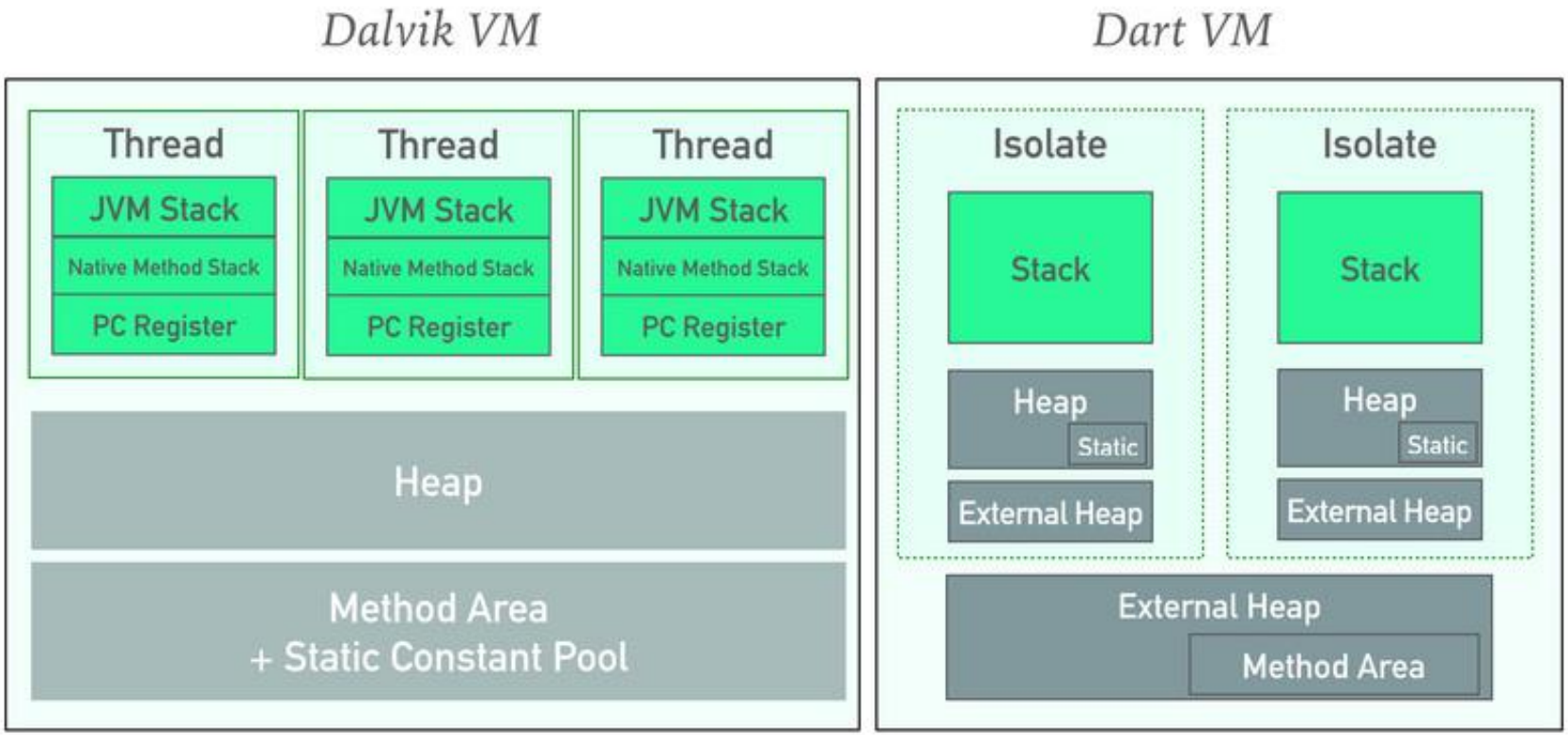
渲染流程


GPU
Vsync
UI Thread
Dart
Throttle
Layer Tree
GPU Thread
Compositor
Skia
GL or Vulkan
GPU

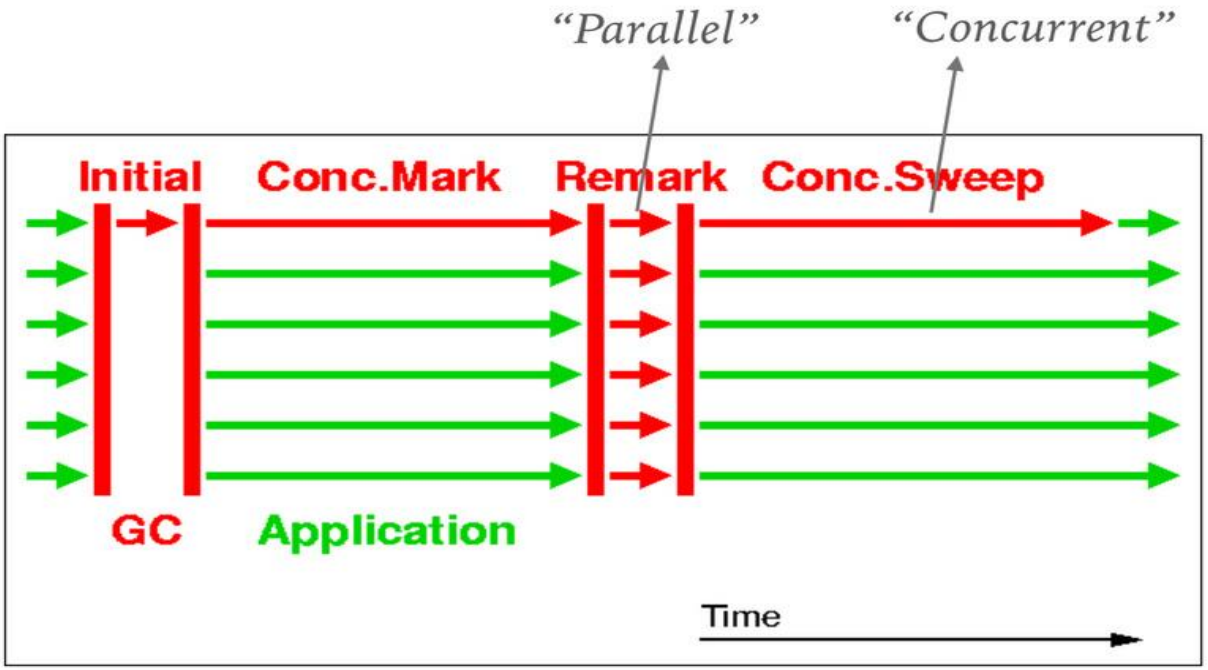
控件树

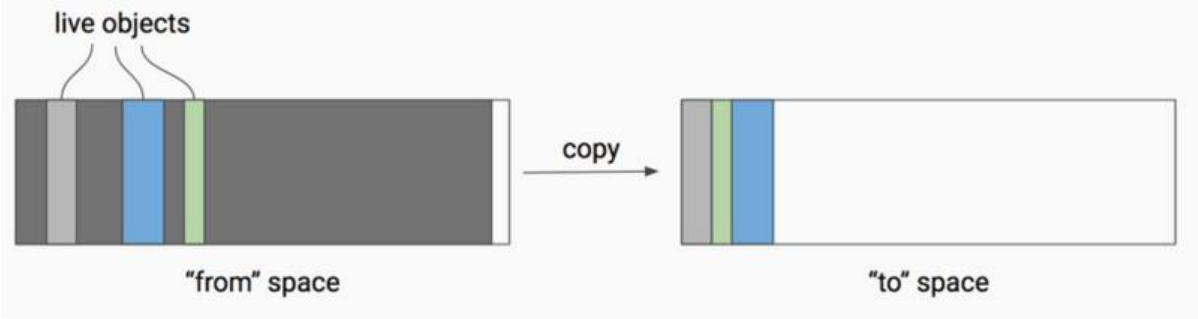

W
W
W
W
W
createElement
E
E
E
E
E
E
createRenderObject
R
R
R
R
R
WidgetTree
ElementTree
RenderTree

Flutter内存


Dalvik VM
Thread
JVM Stack
Native Method Stack
PC Register
Thread
JVM Stack
Native Method Stack
PC Register
Thread
JVM Stack
Native Method Stack
PC Register
Heap
Method Area
+ Static Constant Pool
Dart VM
Isolate
Stack
Heap
Static
External Heap
Isolate
Stack
Heap
Static
External Heap
External Heap
Method Area

Flutter内存回收





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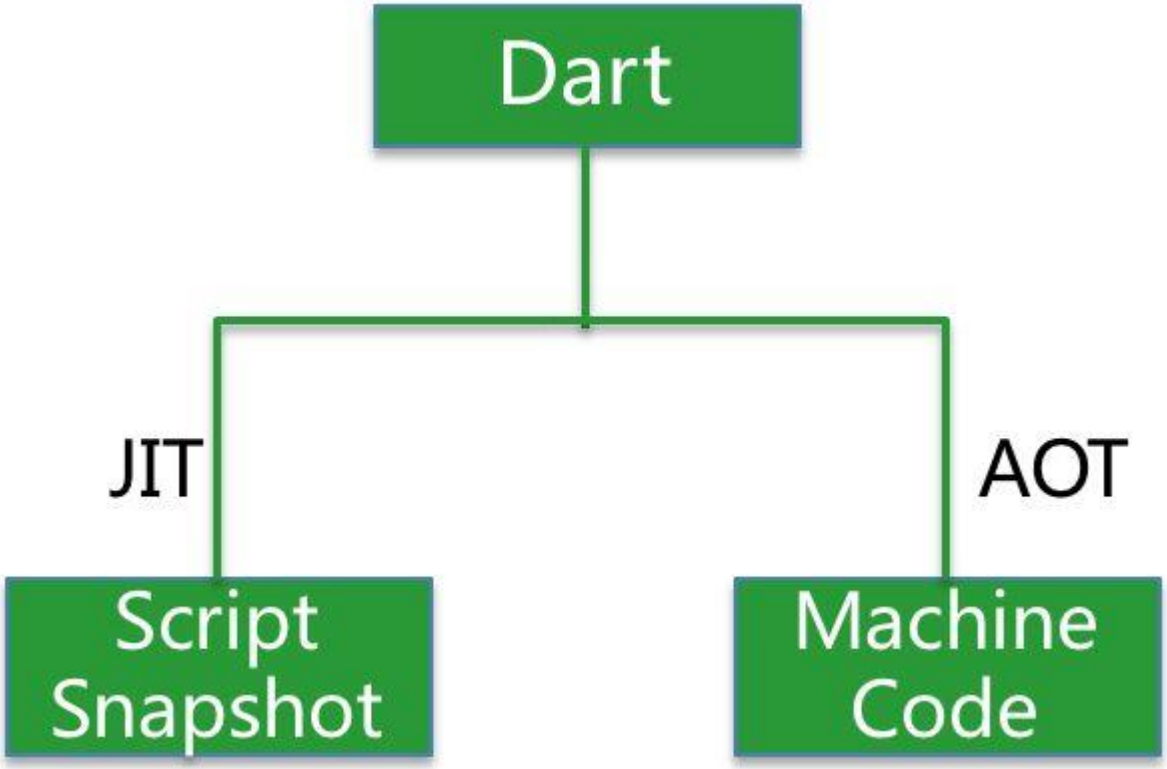
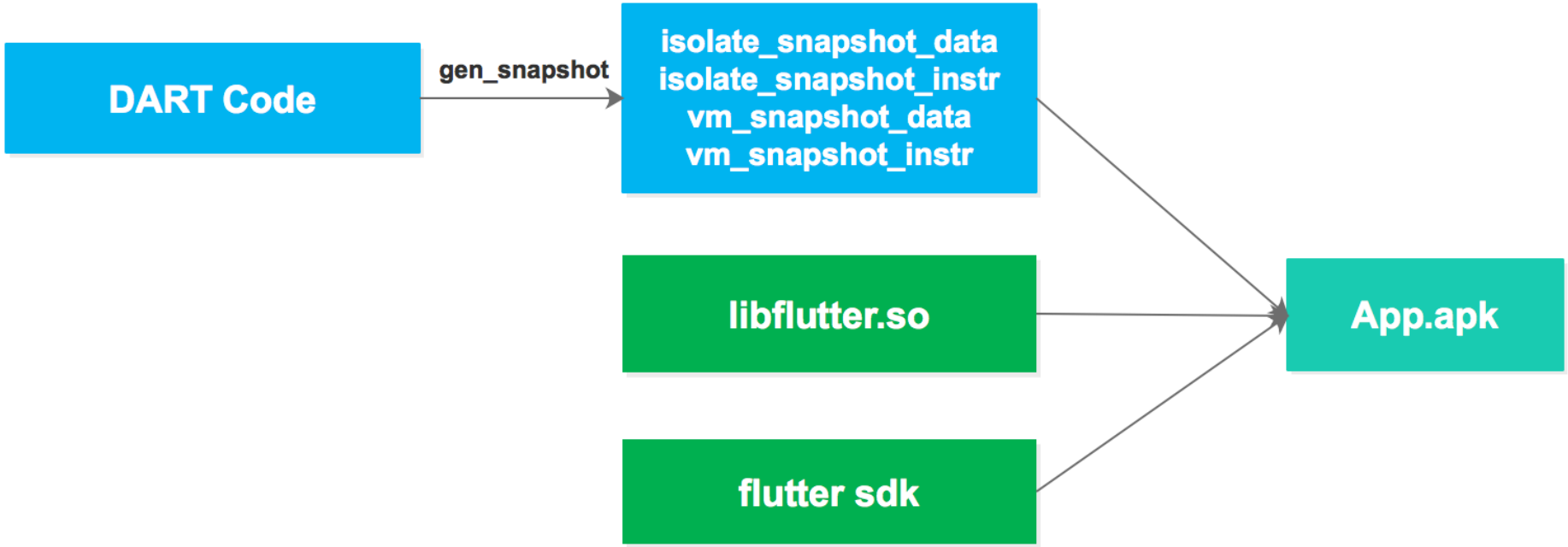
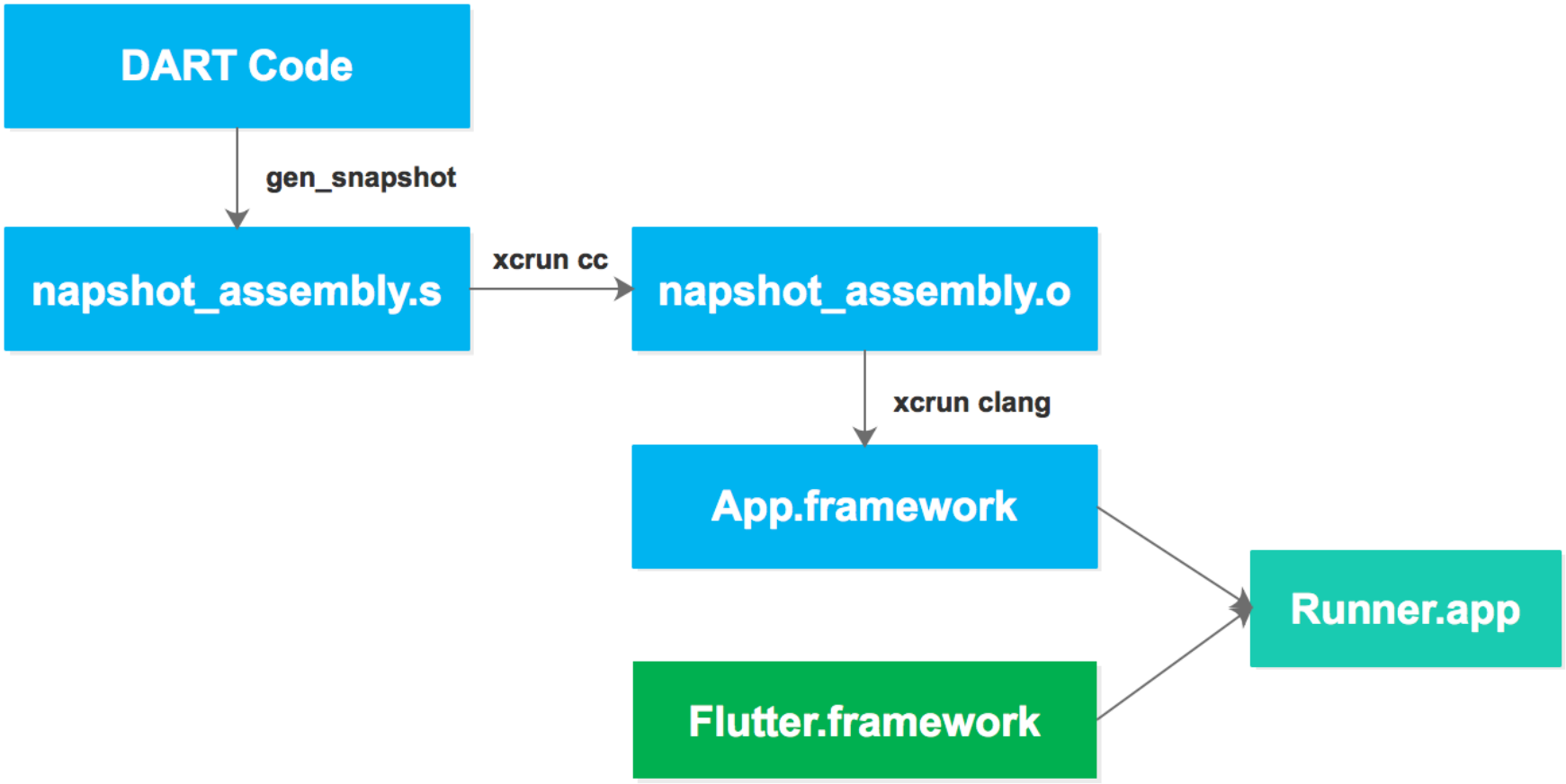
Flutter构建模式



Android构建流程



iOS构建流程


DART Code
gen_snapshot
napshot_assembly.s
xcrun cc
napshot_assembly.o
xcrun clang
App.framework
Runner.app
Flutter.framework

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性能对比

Android

	内存（初始）	CPU（滑动）	FPS（快速滑动）	冷启动	热启动	Bridge调用
RN	95M	50%	25	1050ms	600ms	15ms
Web	100M	50%	50	1200ms		50ms
Flutter	105M	25%	45	400ms	300ms	2ms-4ms
Native	100M	23%	50	300ms	200ms	0

iOS

	内存（初始）	CPU（list滑动）	FPS（快速滑动）	启动耗时	Bridge调用
RN	120M	40%	55	400ms	15ms
HTML5	120M	50%	50	550ms	50ms
Flutter	80M	30%	55	330ms	0.5ms
Native	120M	20%	58	300ms	0

Flutter in NOW

1.29.0.27	上报次数	出错次数	数据
init	23747815	10383	
flutter_launch	11238	0	432.72ms
native_launch	11402	0	357.34ms
wns_time	16423	0	357.14ms

Thanks