

ReactNative实战优化之路

腾讯QQ空间 王少鸣

InfoQ ueve

促进软件开发领域知识与创新的传播



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ReactNative
Android Developer



mangosmwang(王少鸣)
QQ空间

About me

-15年 至今 [Qzone] 移动终端开发

负责 Qzone 玩吧业务，专注Hybrid开发，[QQ Js SDK] 研发负责人，专注 ReactNative在Qzone与手Q的应用和推广。

-14年 正式跨界移动端

负责碰一碰模块，后续带领团队完成语音广场的开发及微群组2.0上架

-13年 加入腾讯

Web前端开发，负责QQ空间Web前端研发工作，参与研发 [Qzone V8] ，经历了用户的井喷和Web技术的快速变革，主要完成V8升级引导过程。

智能终端 [Qrobot] 开发，负责机器内置帐号登录及监控视频上传，后续单人负责整个项目维护及上架。



mango(王少鸣)

1.关于ReactNative



What ReactNative

ReactNative 让开发者使用 JavaScript 和 React 编写应用，利用相同的核心代码就可以创建 基于Web，iOS 和 Android 平台的原生应用。Facebook 在 2015.9.15发布了 ReactNative for Android，把JavaScript 开发技术扩展到了 Android平台，至此已覆盖当流主流平台。

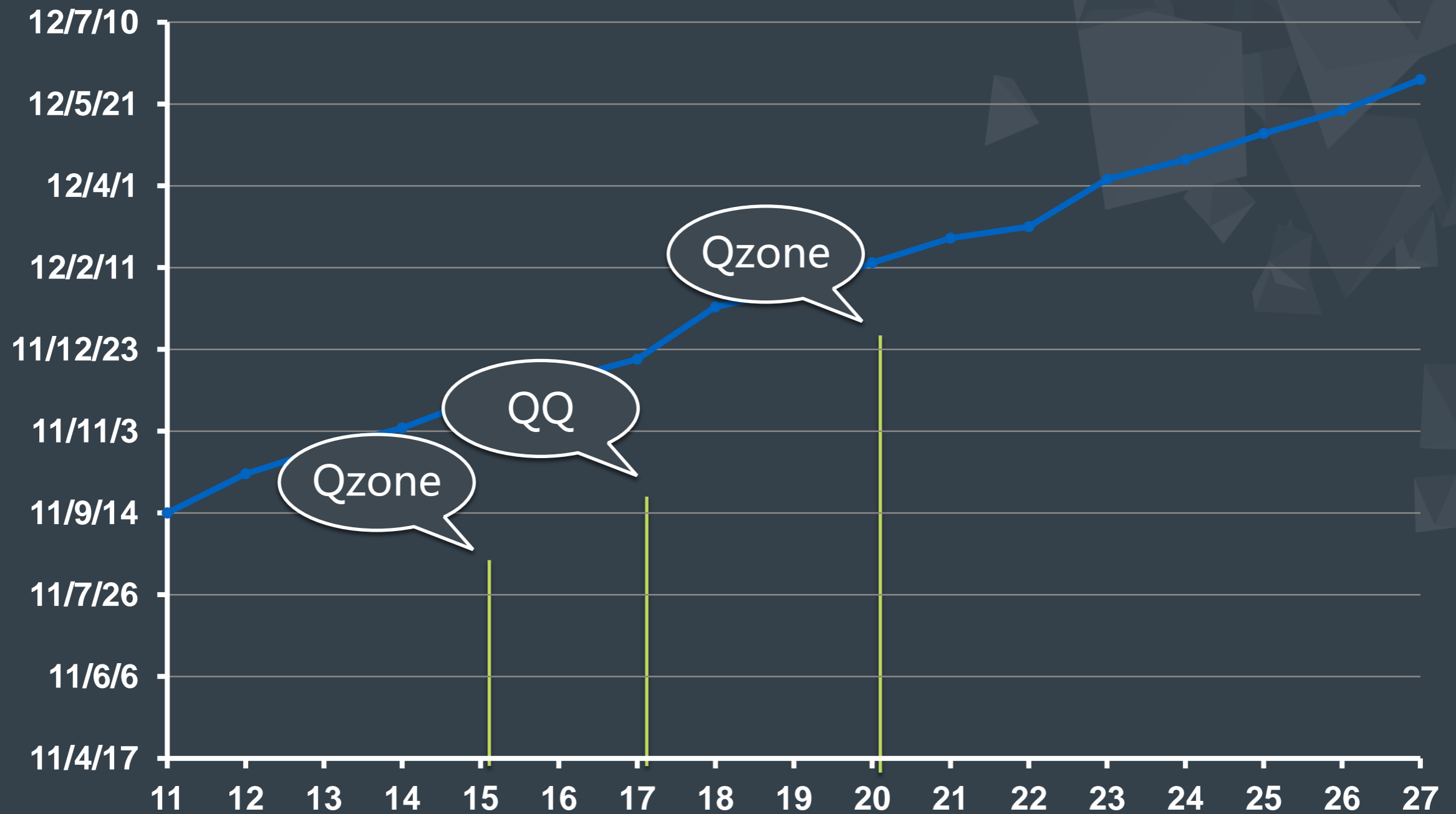


React Native

A FRAMEWORK FOR BUILDING NATIVE APPS USING REACT

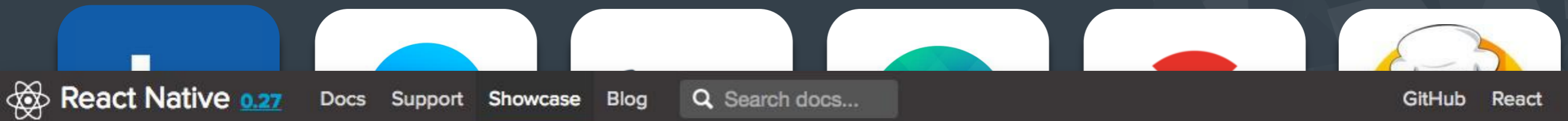
Learn Once , Write Anywhere

Version of ReactNative



两个版本/月

Who Use ReactNative



Pimmr
By Pimmr



Posyt - Tinder for ideas
By Posyt.com



Project September
By ProjectSeptember.com



QQ
By 邱俊



QQ空间
By 薛丰



QQ音乐
By 石玉磊



全民K歌
By 石玉磊



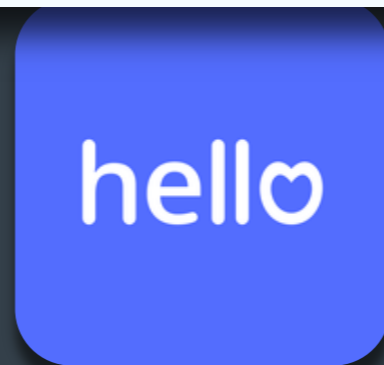
Reach24
IOS · Android
By Spritle Software



ReactTo36
By Jonathan Solichin



Reading
By RichardCao
[Blog post](#)



Who Use ReactNative Inside



话题圈

情侣空间

留言板



消息流

资料卡



K歌大赛页

ReactNative 优劣对比

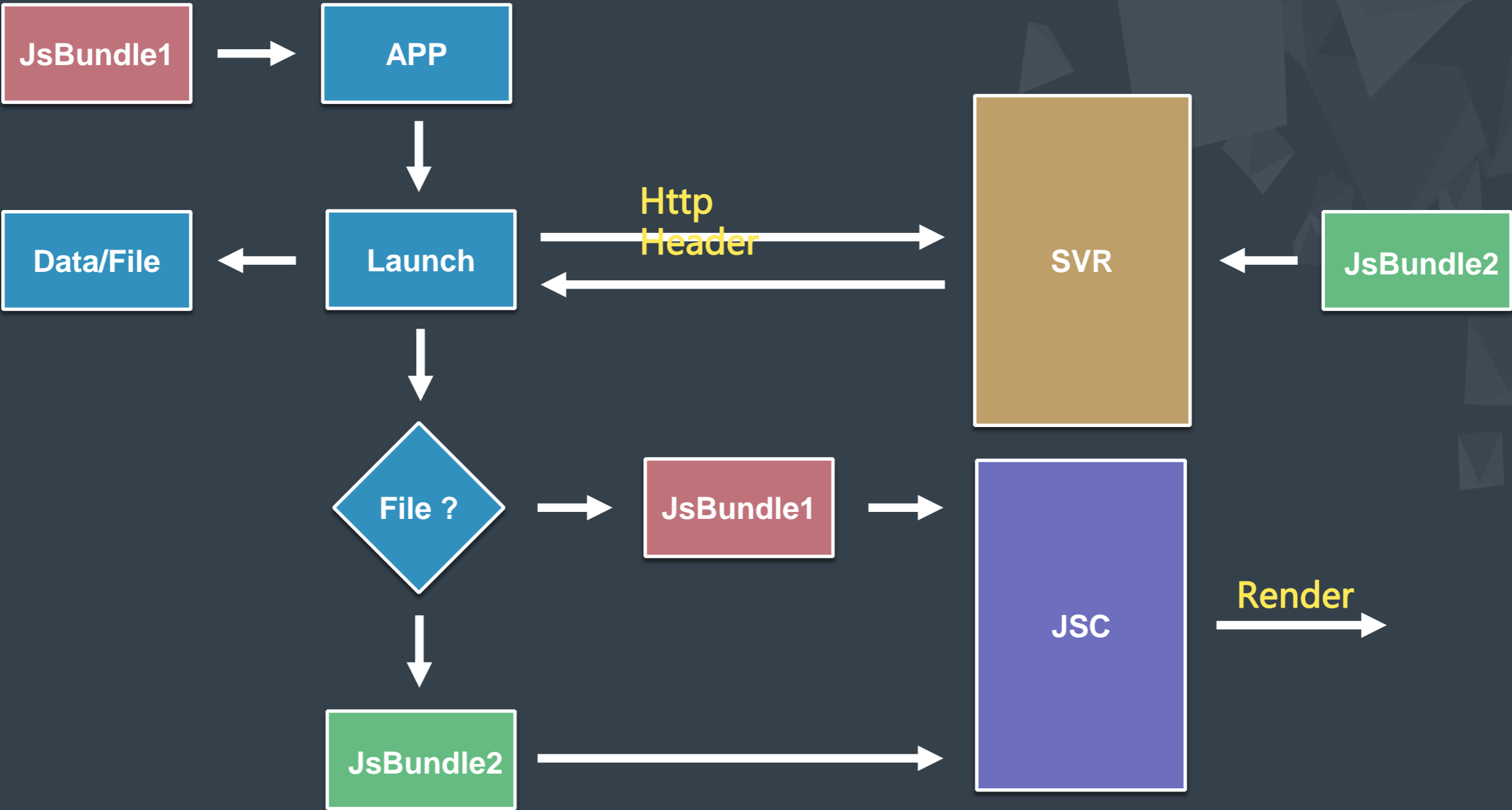
优势

- 原生控件的体验
- Web的版本节奏
- Web的开发效率
- 跨平台

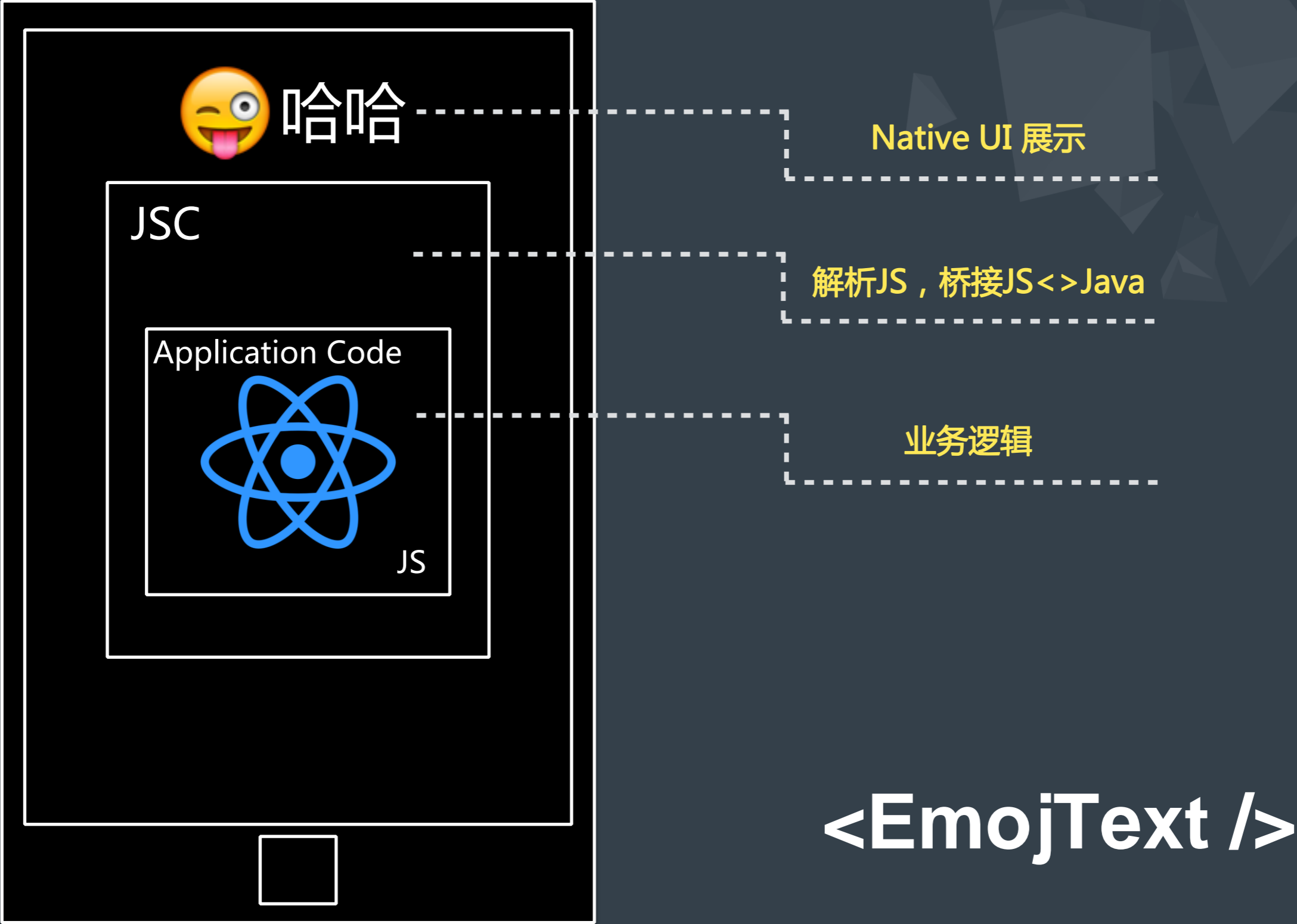
劣势

- 版本支持度 Android 4.1 (API 16) & iOS 7.0
- 项目尚不成熟，容易Crash，部分机器存在兼容性问题
- 性能，在高低端机呈现两极
- Android仅基于Gradle，目前业界较多大平台项目均基于 Ant，如Qzone，手Q等

ReactNative 整体流程



ReactNative 原理



ReactNative For Android 架构

Java

ReactCore

Fresco

OkHttp

Support

Utils

C++

{moduleID,methodID,args}

JSC

Bridge

JSLoader

Utils

{moduleID,methodID,args}

Js

{moduleID,methodID,args}

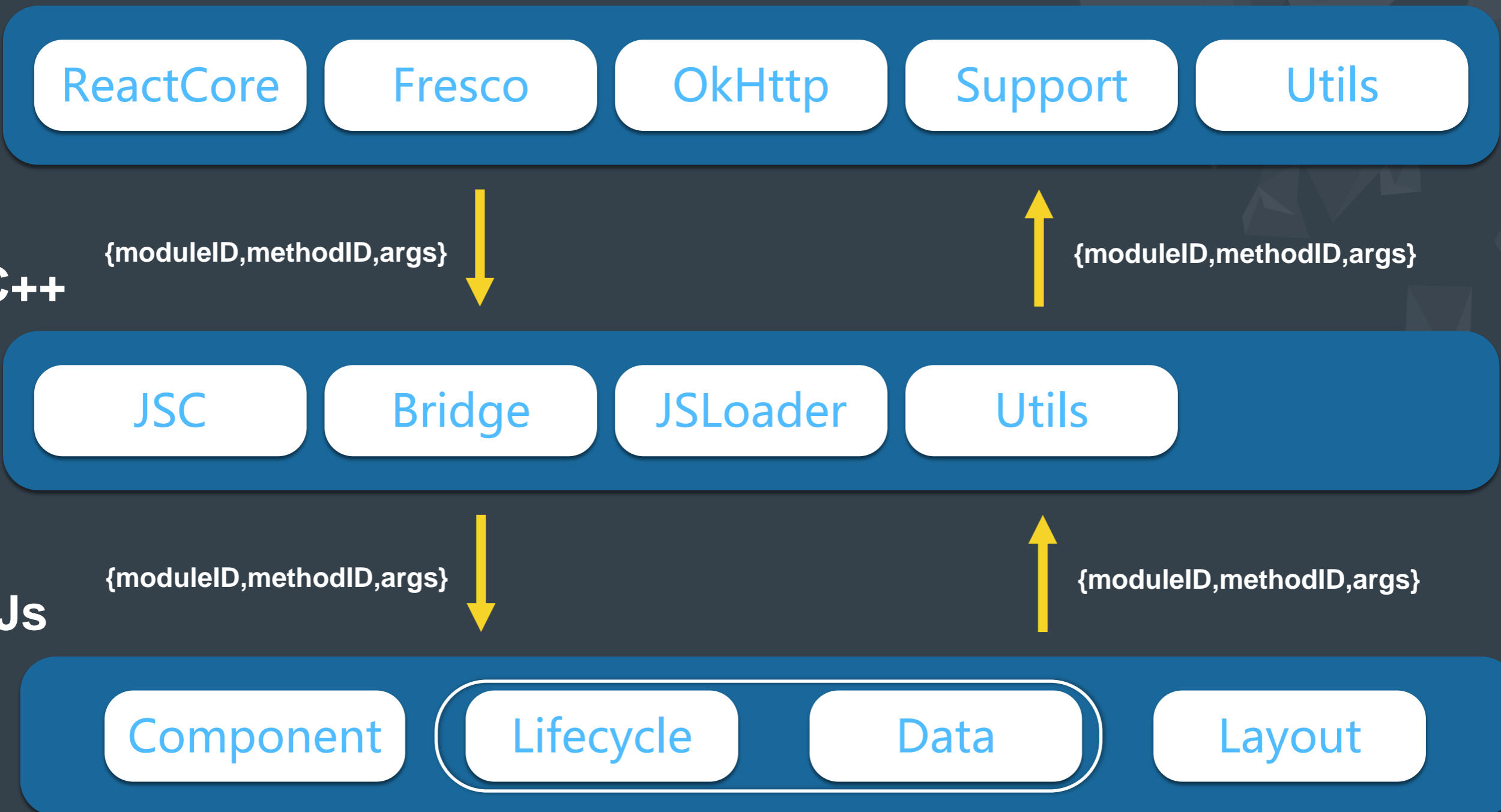
Component

Lifecycle

Data

Layout

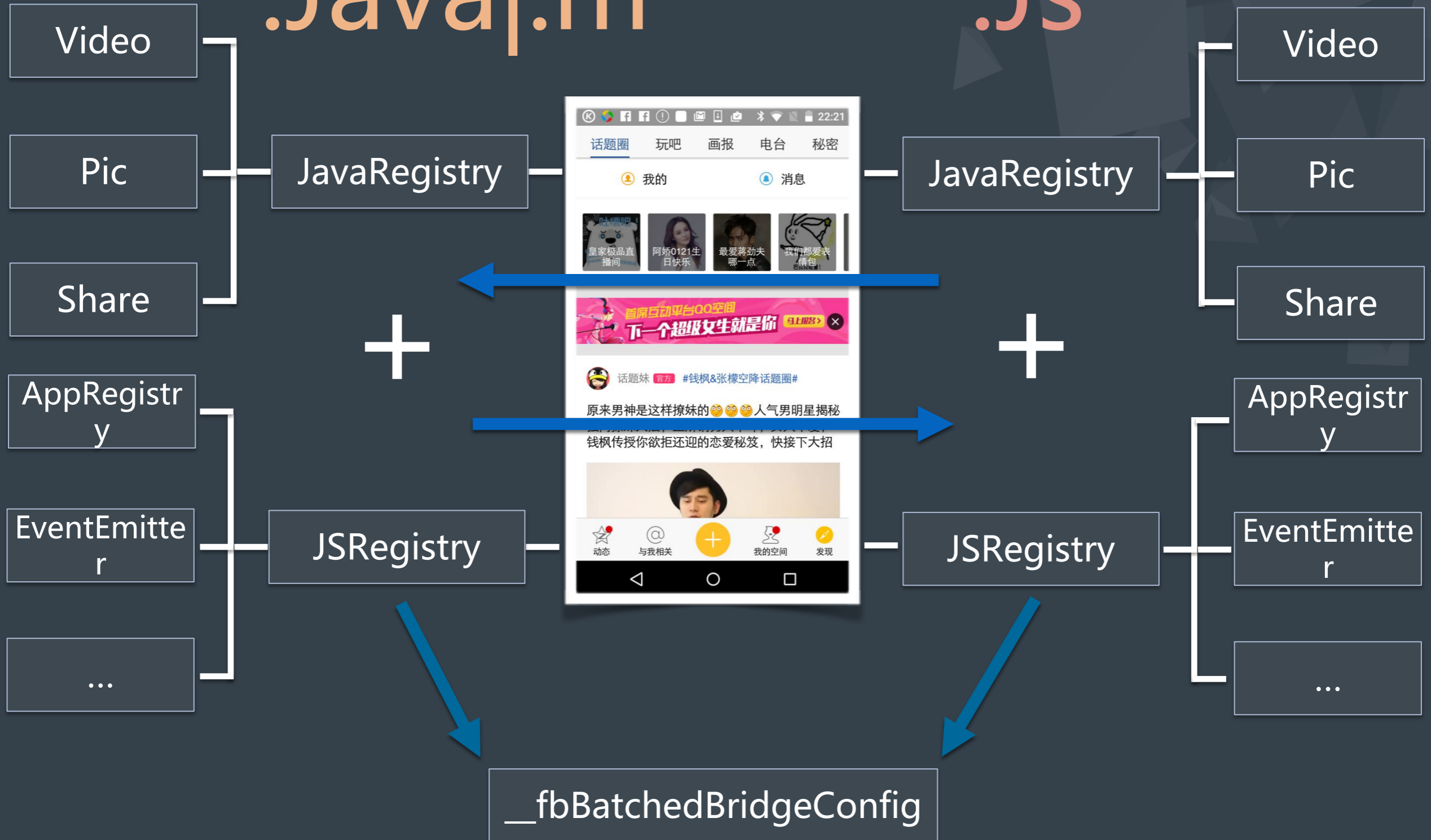
{moduleID,methodID,args}



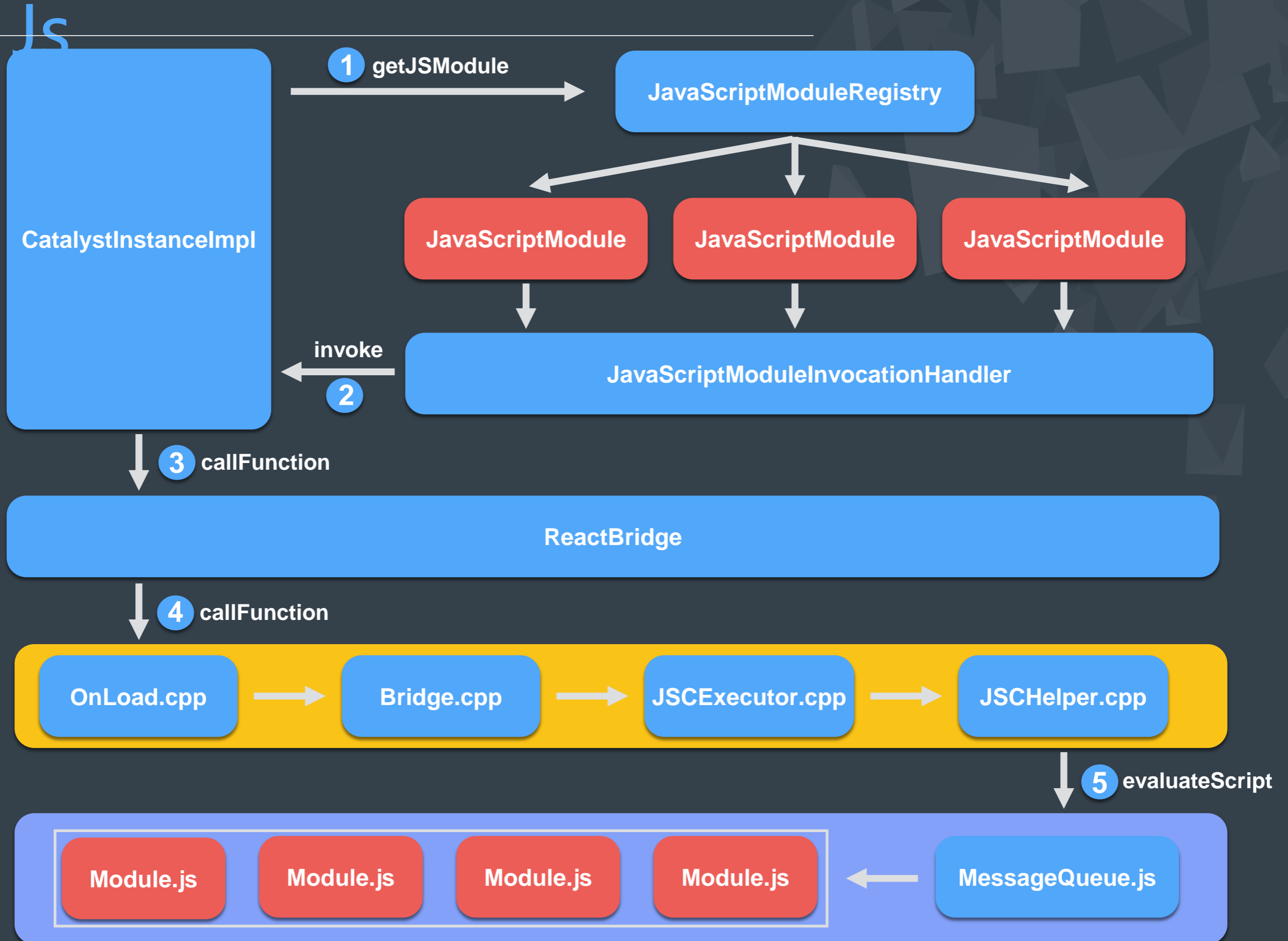
ReactNative 通信

.Java|.m

.Js



ReactNative For Android 通信 Java ->



ReactNative For Android Launch

```
var topicGroup = React.createClass({  
  render: function() {  
    return (  
      <Home />  
    );  
  }  
});
```

```
AppRegistry.registerComponent('topicGroup', () =>
```

```
mReactInstanceManager = ReactInstanceManager.builder()  
  .setApplication(getActivity().getApplication())  
  .setBundleAssetName("topicGroup.android.bundle")  
  .setJSMainModuleName("index.android")  
  .addPackage(mReactPackage)  
  .setUseDeveloperSupport(ReactNativeConfig.UseDeveloperSupport)  
  .setInitialLifecycleState(LifecycleState.RESUMED)
```

```
public void startReactApplication(  
  ReactInstanceManager reactInstanceManager,
```

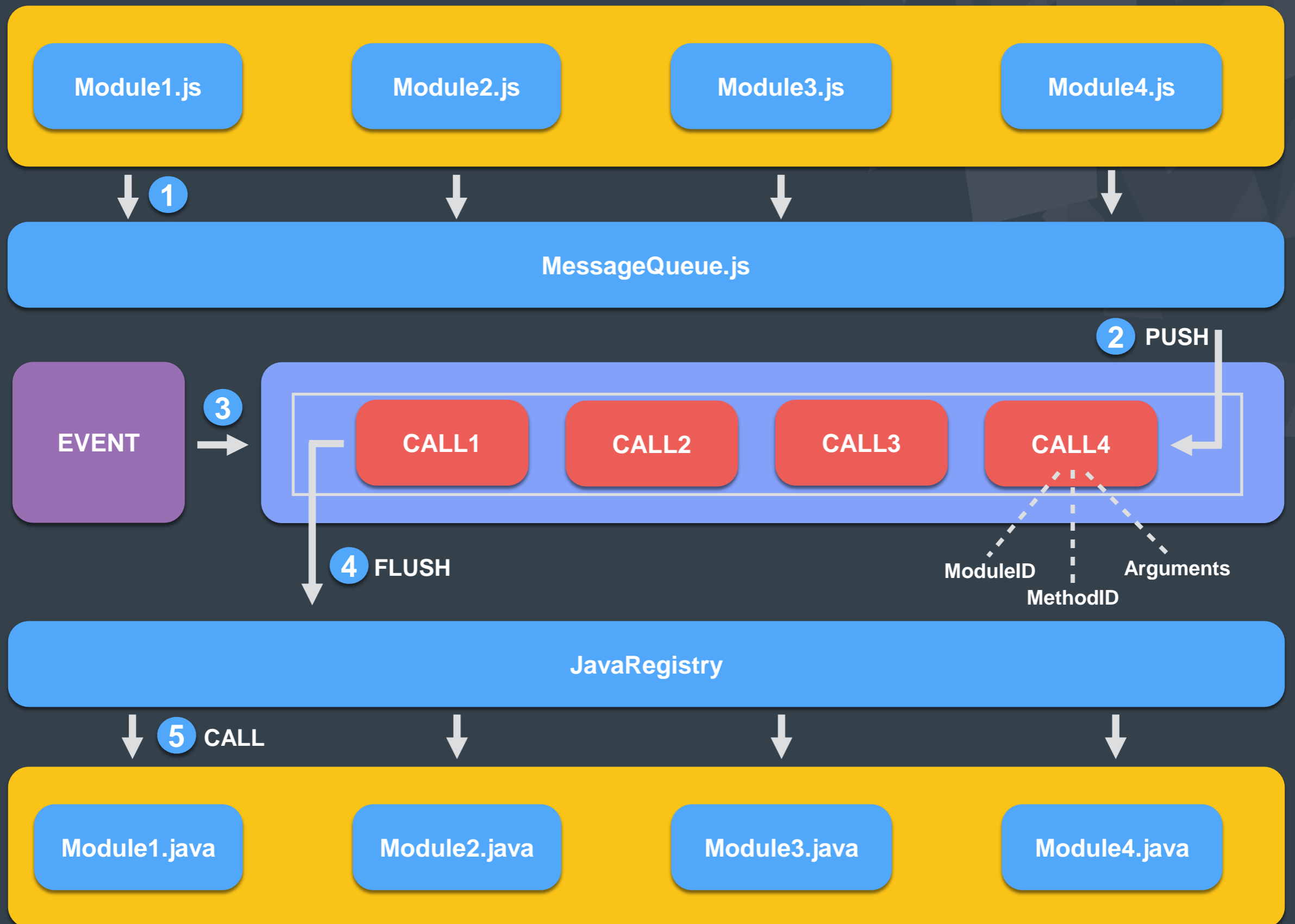
```
"topicGroup", null);
```

```
runApplication: function(appKey, appParameters) {  
  console.log(  
    'Running application "' + appKey + '" with appParams: ' +  
    JSON.stringify(appParameters) + '. ' +  
    '___DEV___ == ' + String(___DEV___) +  
    ', development-level warnings are ' + (___DEV___ ? 'ON' : 'OFF') +  
    ', performance optimizations are ' + (___DEV___ ? 'OFF' : 'ON'));  
  
  invariant(  
    runnables[appKey] && runnables[appKey].run,  
    'Application ' + appKey + ' has not been registered. This ' +  
    'is either due to a require() error during initialization ' +  
    'or failure to call AppRegistry.registerComponent.'  
  );  
  
  runnables[appKey].run(appParameters);  
}
```

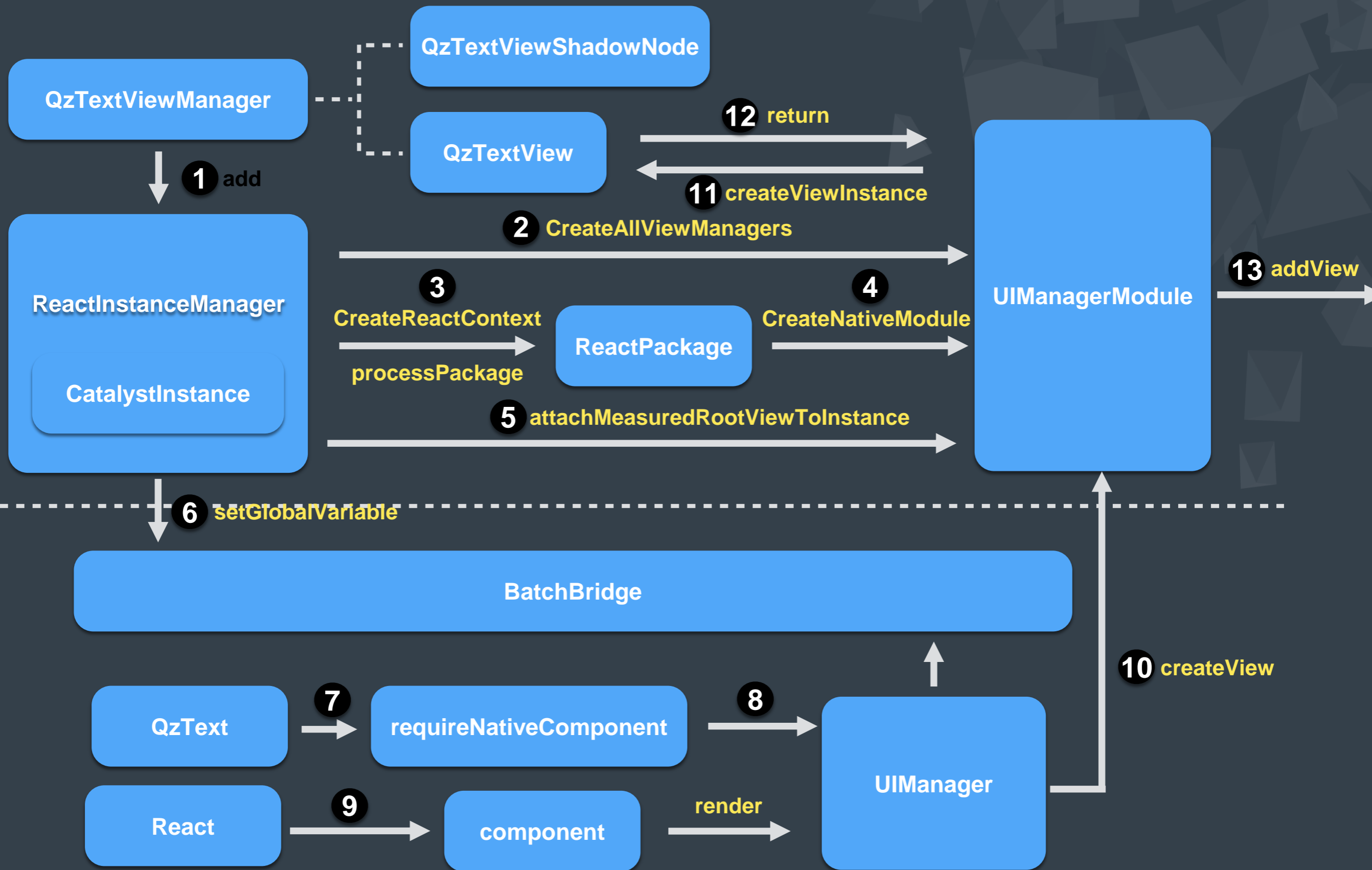
```
s) {  
  rootViewToInstance(  
    instance) {  
    d();  
  
    s going to be populated by the application content from JS  
  
    uler = catalystInstance.getNativeModule(UIManagerModule.class);  
    e.addMeasuredRootView(rootView);  
    ns = rootView.getLaunchOptions();  
    launchOptions != null  
    launchOptions)
```

```
String jsAppModuleName = rootView.getJSModuleName();  
  
WritableNativeMap appParams = new WritableNativeMap();  
appParams.putDouble("rootTag", rootTag);  
appParams.putMap("initialProps", initialProps);  
catalystInstance.getJSModule(AppRegistry.class).runApplication(jsAppModuleName, appParams);  
}
```


ReactNative For Android 通信 Js -> Java



从 <QzText> 到 QzTextView



2.从QQ空间到手机QQ



Pre Access to ReactNative

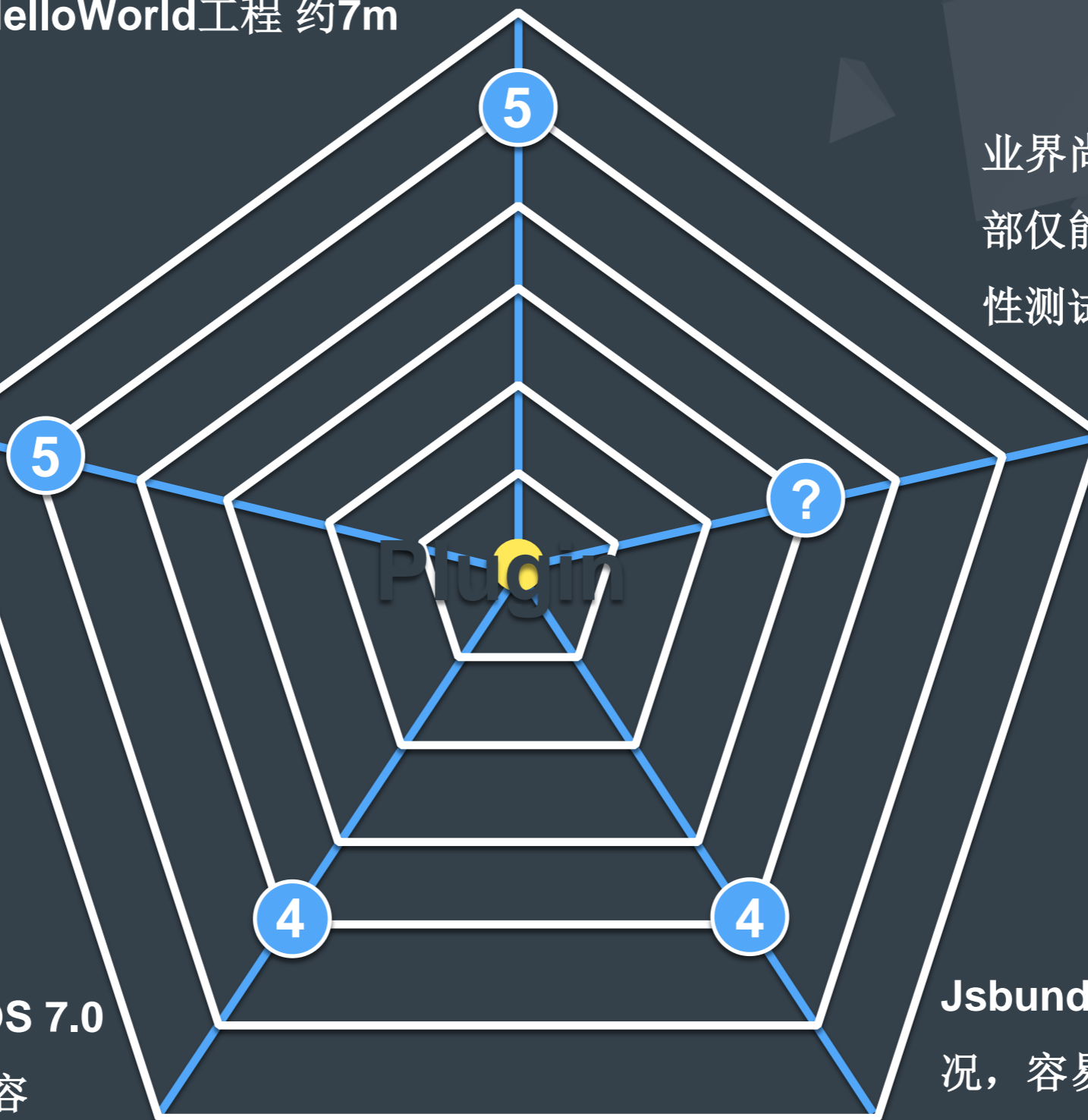
包大小
Android HelloWorld工程 约7m

业界尚未有真实外网数据，内部仅能通过大量机器进行稳定性测试，但未能覆盖所有机型

性能

稳定性

业界尚未有真实外网数据，仅靠实验室有限数据支撑



Android 4.1 (API 16) & iOS 7.0
Jsbundle与Native版本兼容
支持版本对机型兼容

Jsbundle可能发生被拦截等情况，容易导致Native Crash

兼容性

安全性

Qzone情侣空间RN改造

插件化

+

独立进程

+

云开关

APK预处理

Qzone切后台

Version

APK
需要更新

是

本地下载更新安装

Bundle预处理

点击我的空间

Header

bundle需要更新

是

本地下载更新
bundle

点击情侣空间

WNS开关

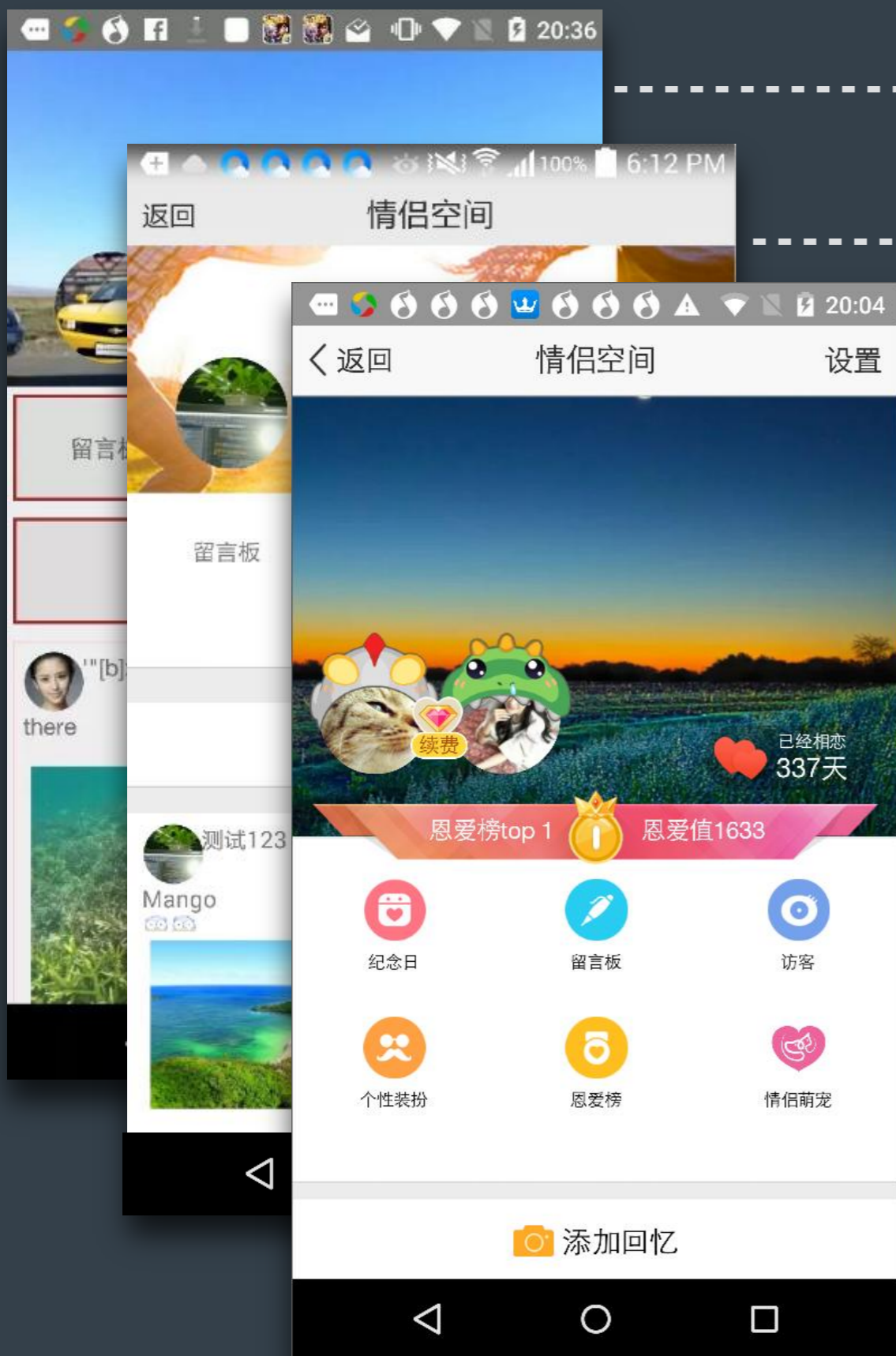
Platform

RUN RN APP

jsbundle

apk

情侣空间开发流程



2015.10.16

2015.10.30

2015.11.13



RN情侣空间性能瓶颈·首屏

	2G (无缓存,未启动插件进程)	WIFI (无缓存,未启动插件进程)	有缓存 (未启动插件进程)	2G (无缓存,已启动插件进程)	WIFI (无缓存,已启动插件进程)	有缓存 (已启动插件进程)
创建view开始	2.176s	2.085s	2.11s	0.142s	0.114s	0.112s
启动框架开始	2.211s	2.113s	2.14s	0.165s	0.125s	0.124s
启动框架完成	2.211s	2.113s	2.141s	0.165s	0.126s	0.125s
创建view完成	2.217s	2.121s	2.148s	0.167s	0.128s	0.127s
启动页面	3.456s	3.237s	3.202s	1.073s	1.198s	1.222s
拉取数据开始	3.581s	3.462s	na	1.19s	1.208s	na
拉取数据完成	7.702s	5.203s	na	4.324s	2.247s	na
渲染开始	7.703s	5.203s	3.352s	4.324s	2.248s	1.323s
渲染完成	8.343s	6.148s	4.091s	4.978s	2.824s	1.837s

插件及进程启动

RN上下文启动

首屏数据

Render

插件及进程启动 2.1s

+

RN上下文启动 1.1s

+

首屏数据 2s

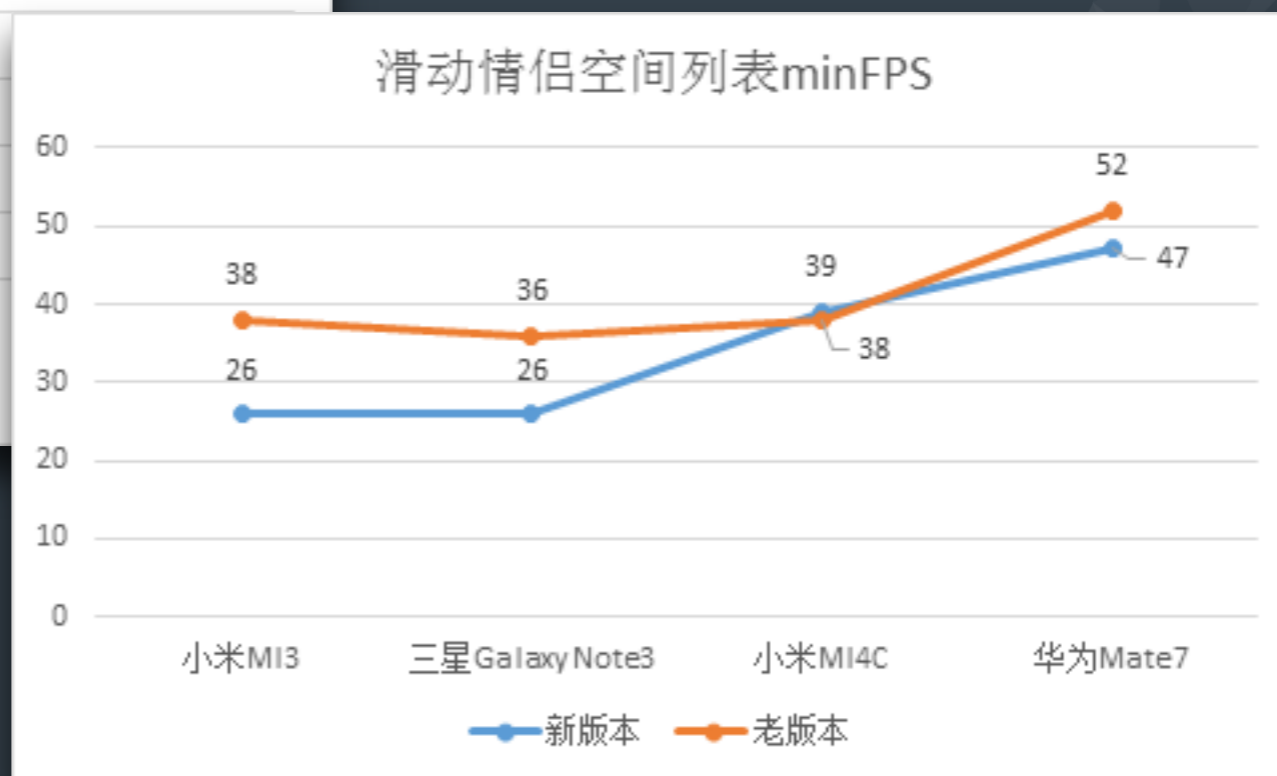
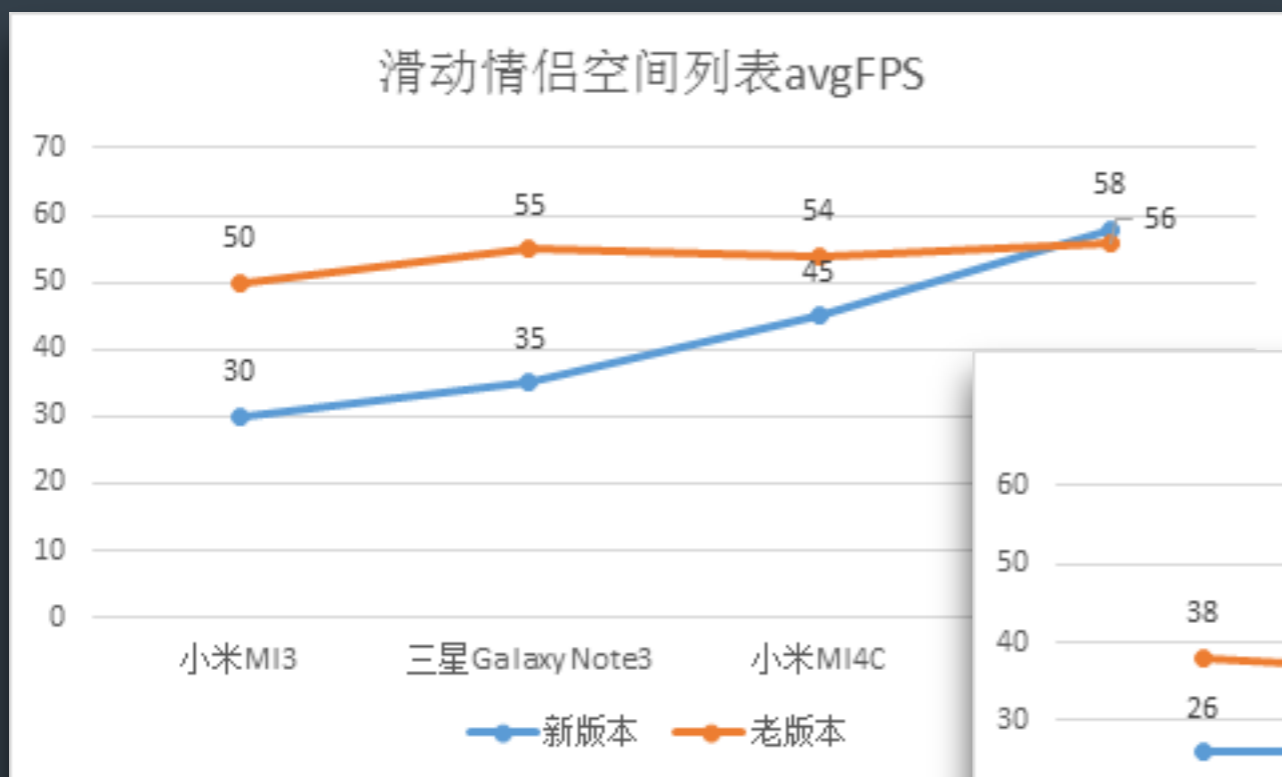
+

Render 0.9s

=

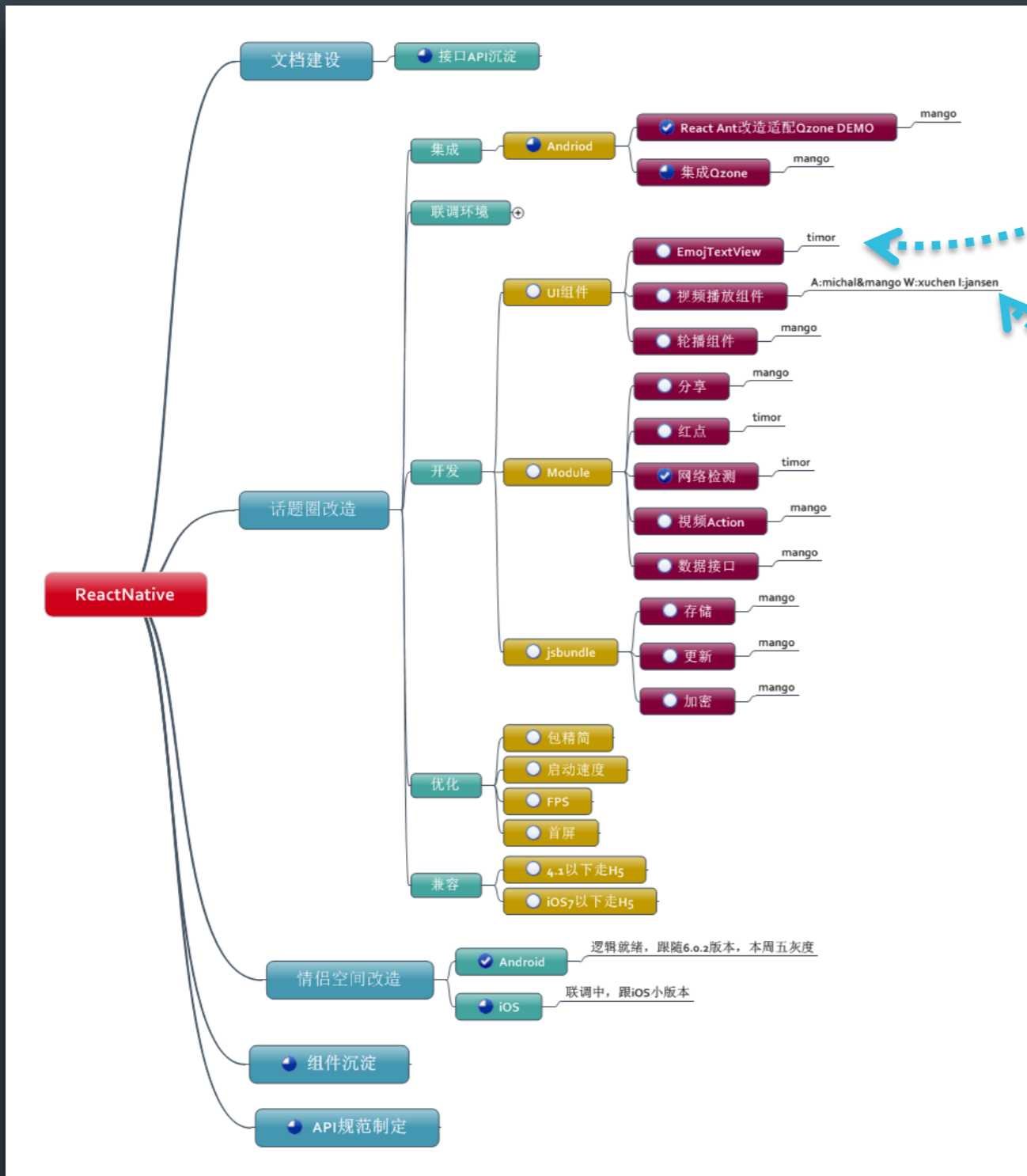
6.1s

RN情侣空间性能瓶颈·FPS

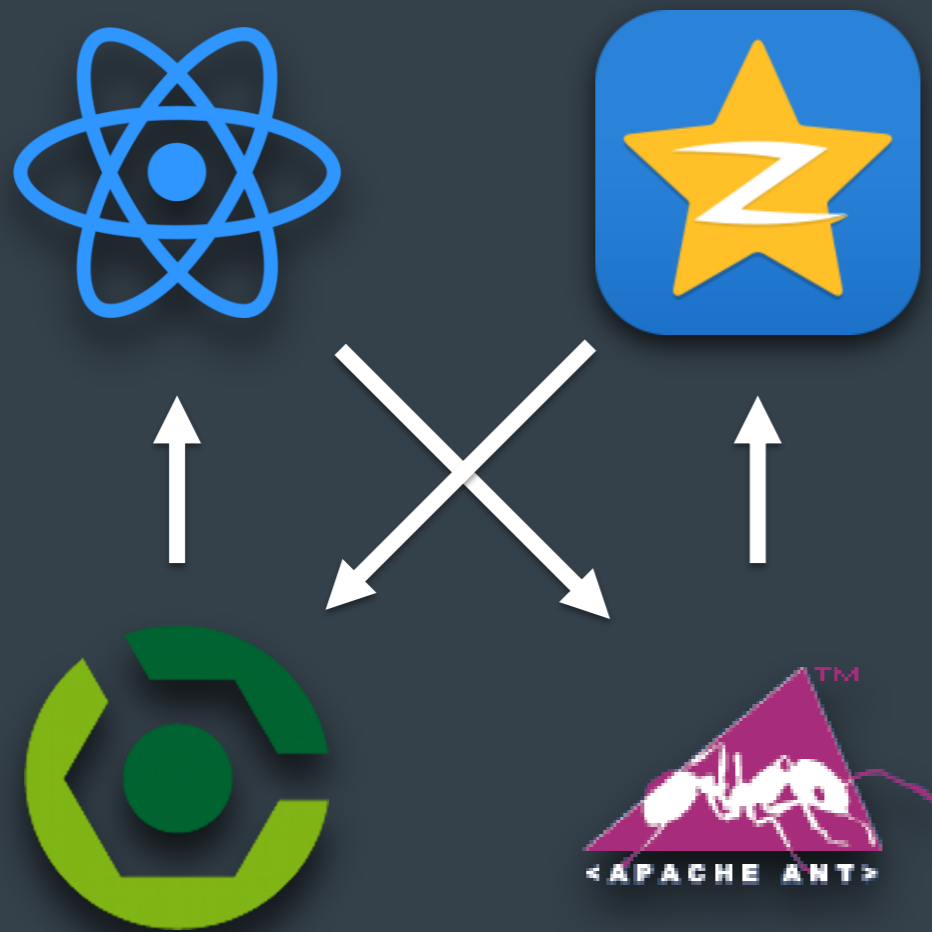


主观上没明显卡顿，中低端机对比老版本下降明显

RN话题圈业务开发·模块梳理



Ant or Gradle



8-14 D

- gradle资源编译问题
- gradle分包问题
- 资源混淆问题
- 补丁包代码插桩，资源插桩等未接入
- debug模式下某些变量的修改也需要加上
- 签名，checksum及其他还没想到的问题

结论：使用Ant来构建ReactNative

RN话题圈开发流程



Ant编译RNA

Compile Exception

- **Error:Android Dex: [react_native] Uncaught java.lang.IllegalArgumentException: already**

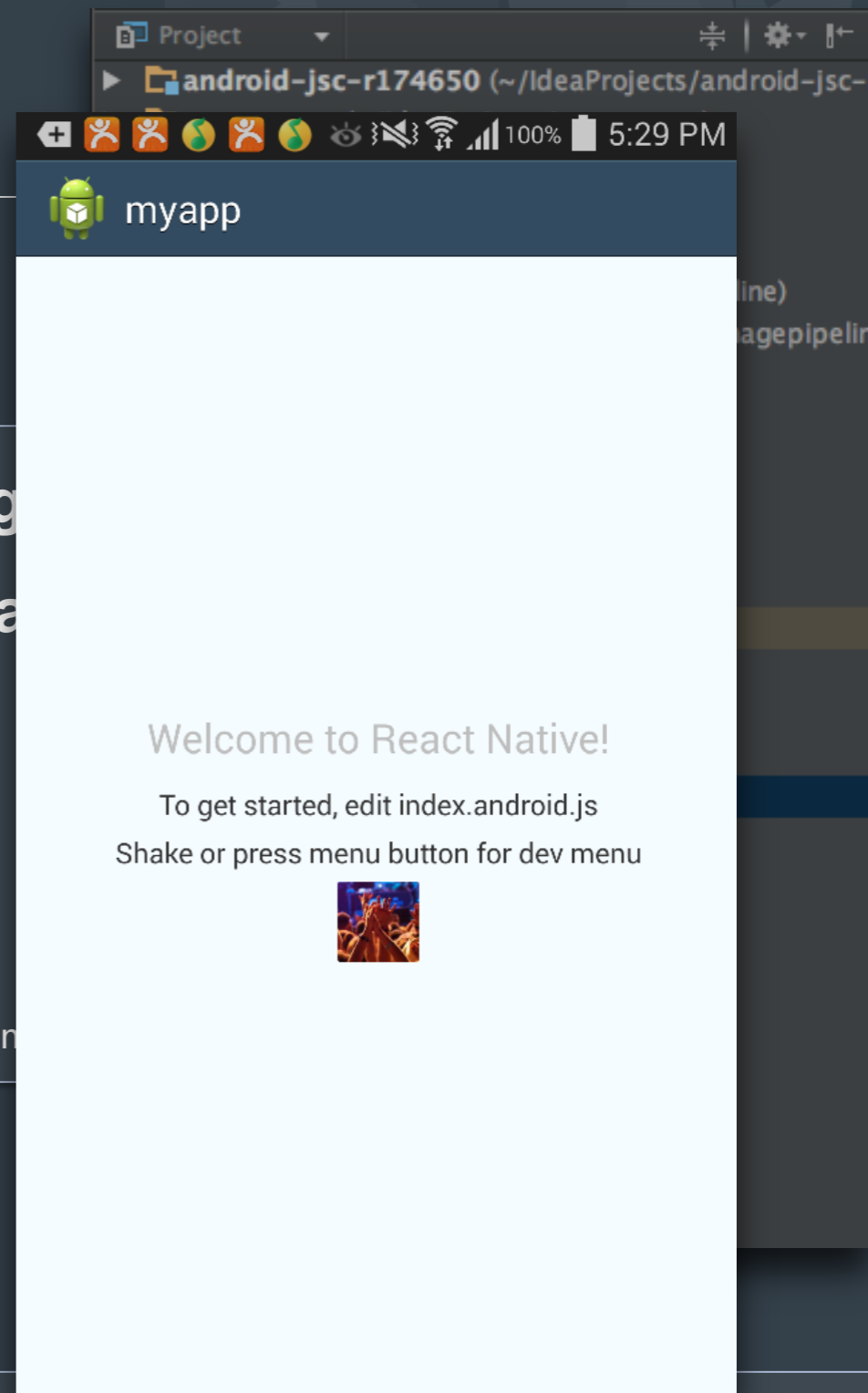
Lcom/facebook/react/BuildConfig;

解决方案 : 1.gen生成的BuildConfig与React本身jar包的BuildConfig冲突

2.将各模块改为lib模式

3.干掉各个jar包中的BuildConfig

drawee fbcore fresco imagepipeline imagepipeline-okhttp react , 以上6个n



Runtime Exception

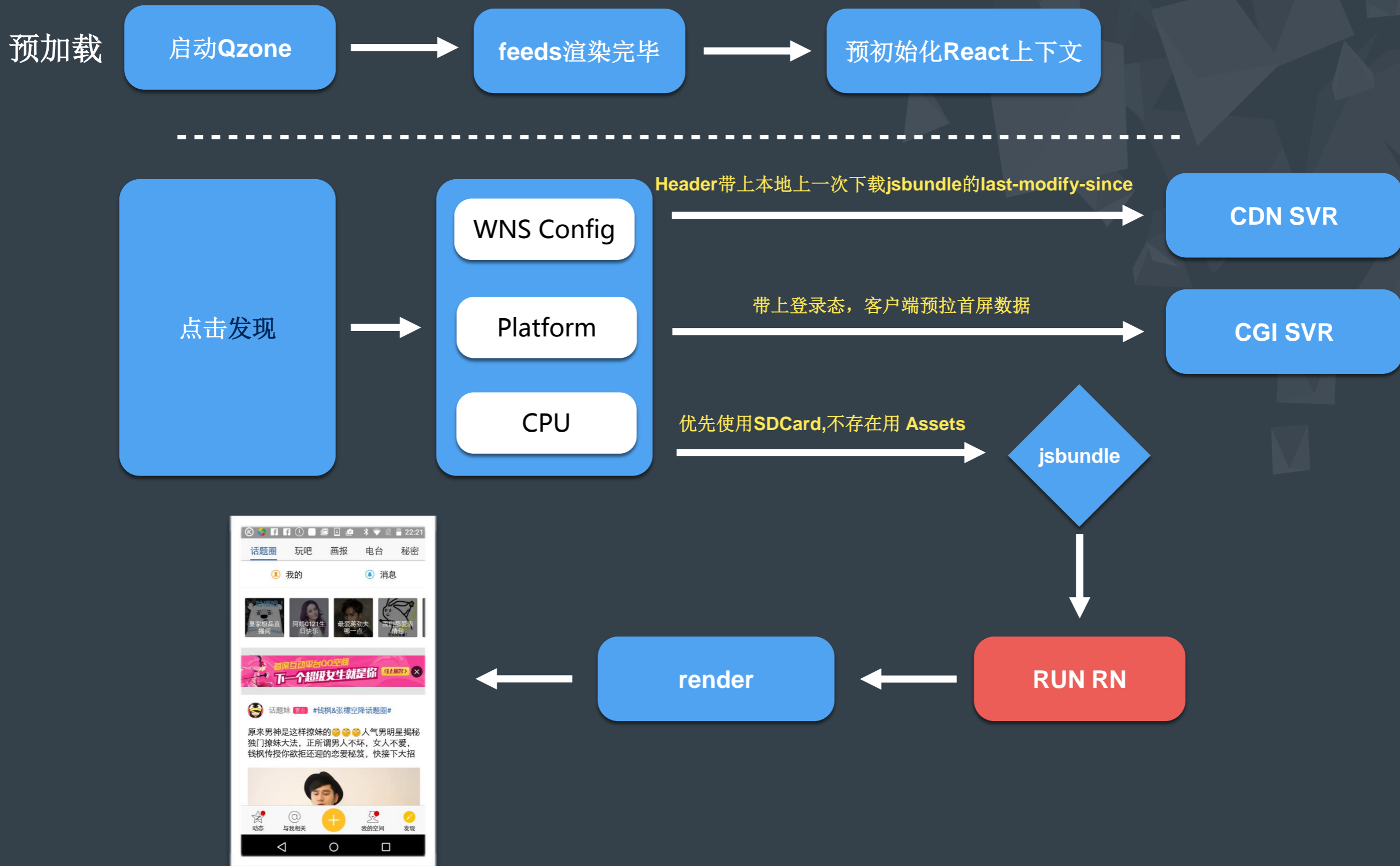
- **Error:Caused by: java.lang.VerifyError:com/facebook/react/views/drawer/ReactDrawerLayoutManager**

解决方案 : 将appcompat中的support v4 包以lib 工程的方式添加到工程中

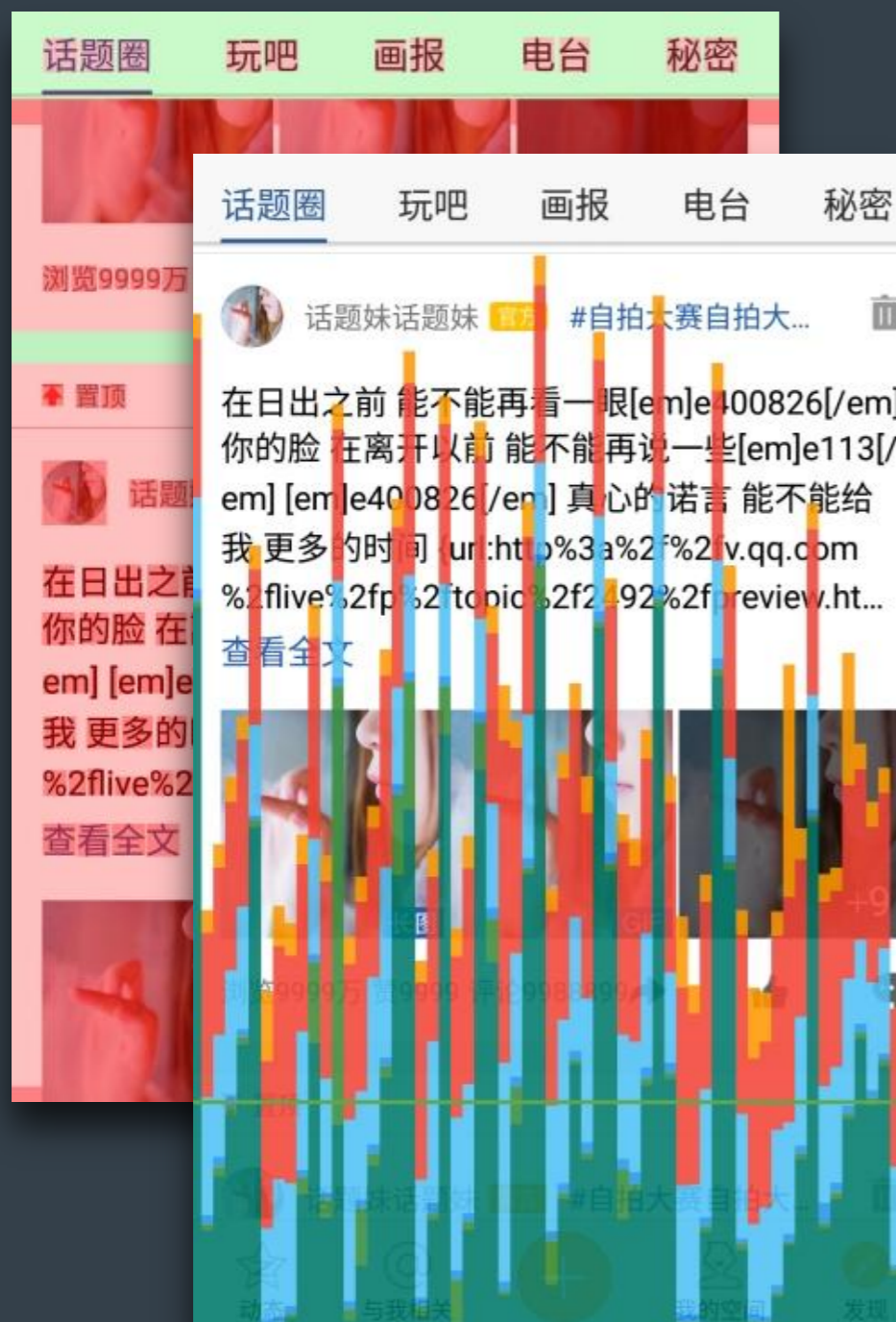
RN话题圈业务开发·接口制定

模块	接口名	接口参数及返回	iOS	Android
QzMain	getUserInfo	获取用户信息 @param {Object} params {Object}callback : 回调 QzMain.getUserInfo({ callback:{ code:0, msg:"SUCCESS", data:{nickName:"xxx"} } });	6.3	6.2
	getQua	获取QUA @param {Object} params {Object}callback : 回调 QzMain.getQua({ callback:{ code:0, msg:"SUCCESS", data:{qua:"xxx"} } });	6.3	6.2
QzShare	showShareMenu	调用分享弹框 @param {Object} params {Json}extra:预留参数, 目前可为空 QzShare.showShareMenu({ });	6.3	6.2

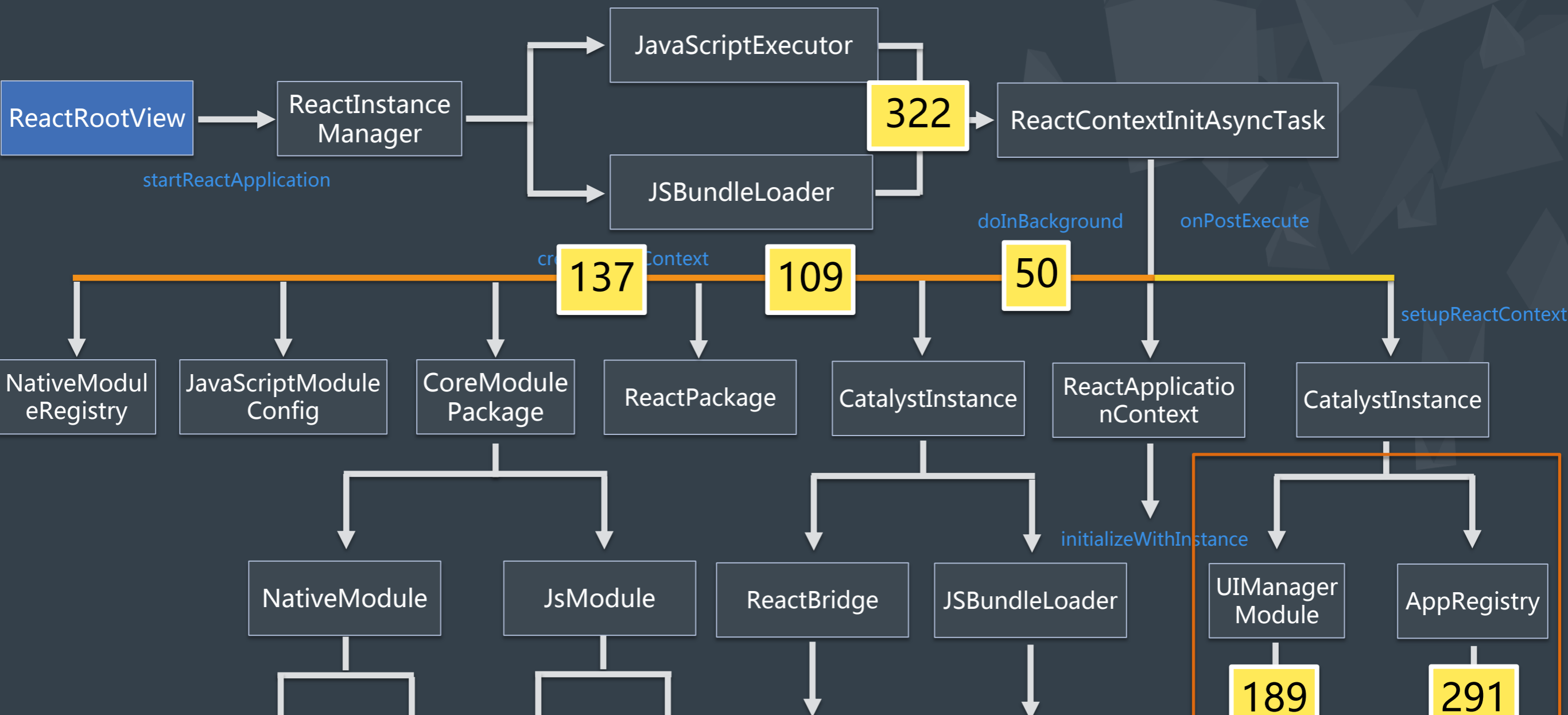
RN话题圈业务开发·整体流程



RN话题圈性能优化 · FPS



ReactNative For Android 启动



插件及进程启动 0s

+

上下文启动 0.48s

+

首屏数据 2s

+

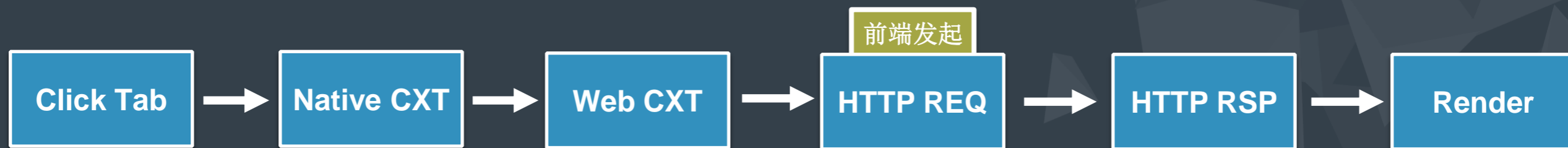
Render 0.9s

=

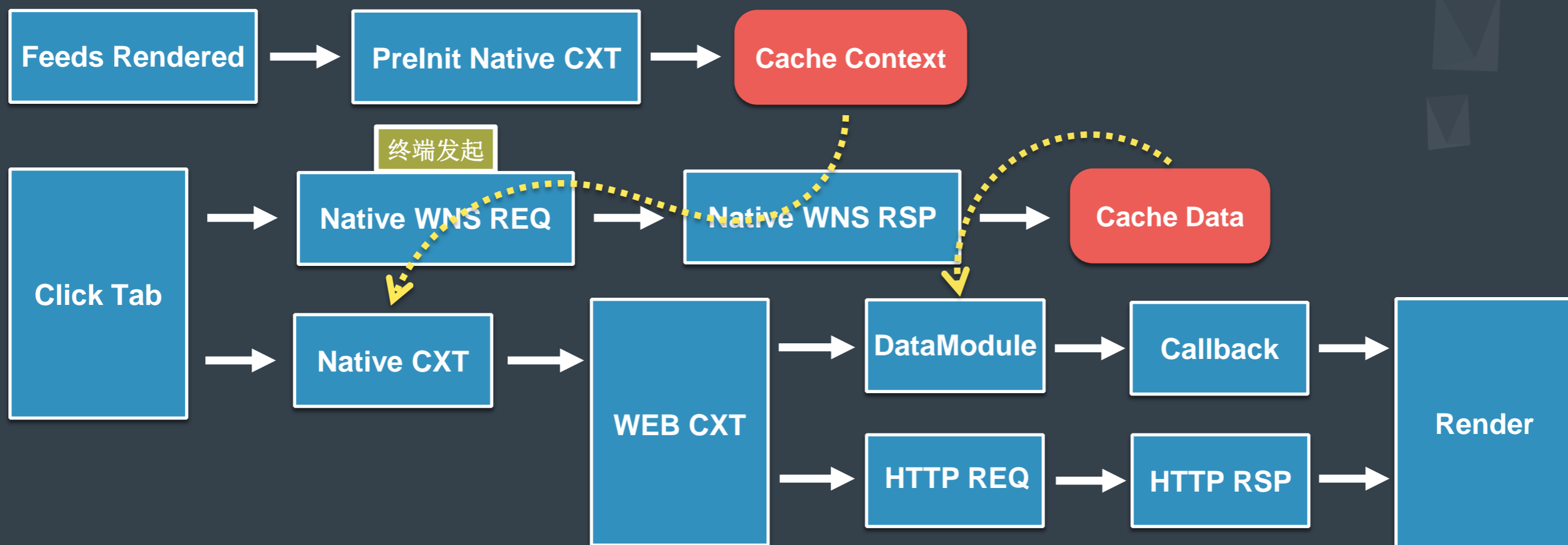
3.38s

RN话题圈性能优化·首屏数据加速

优化前



优化后



RN话题圈性能优化 · FPS

UI

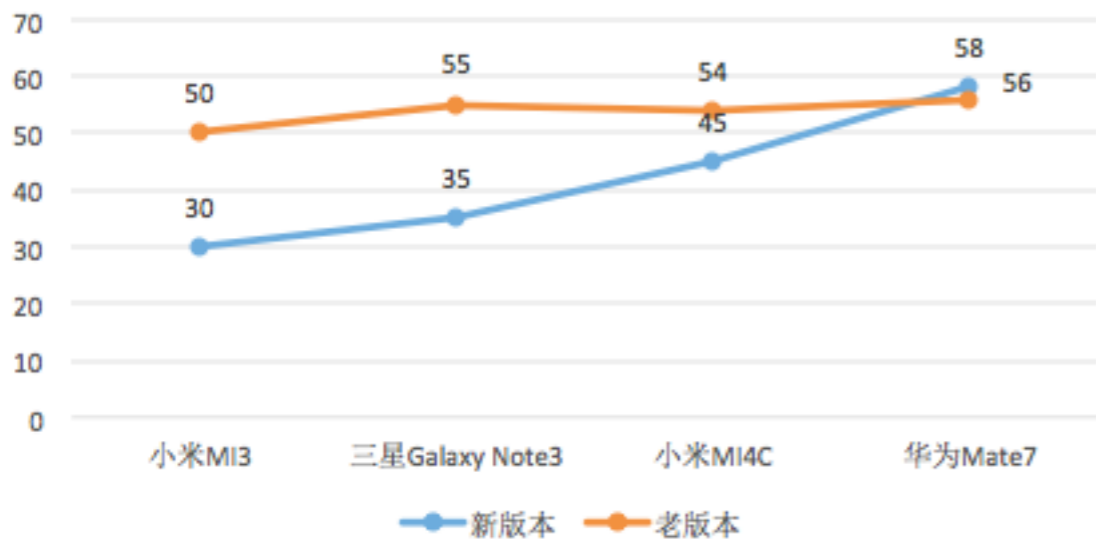
- 减少View层级嵌套
- 合理设置背景色透明

JS

- JS层使Listview控件渲染数据，废弃使用ScrollView控件
- 避免滑动做过多事情，减少JS线程掉帧

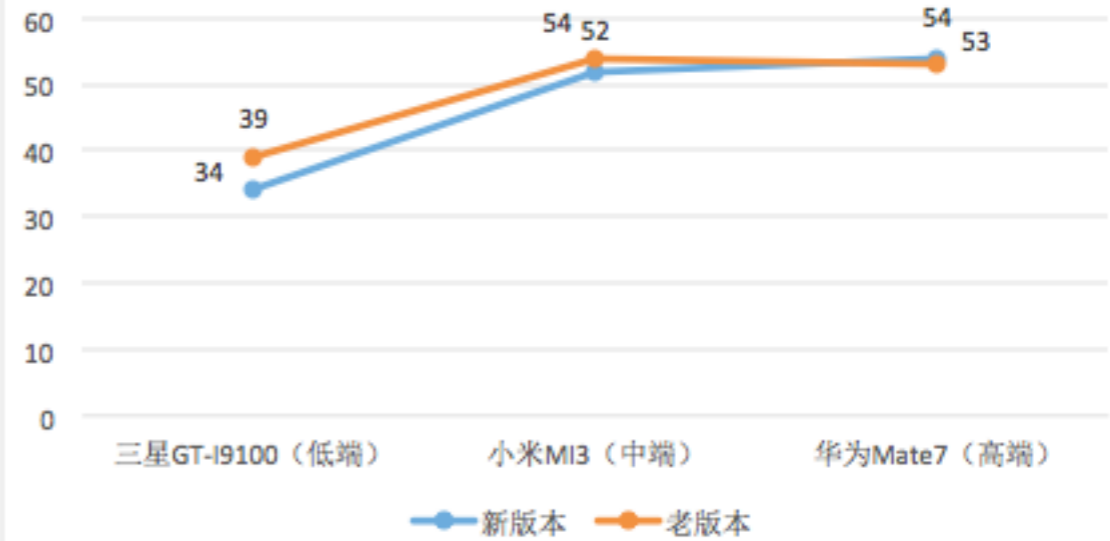
RN话题圈性能优化 · FPS

滑动情侣空间列表avgFPS



优化后

滑动话题圈列表avgFPS



高低端手机上差异明显，RN有明显的劣势

高低端手机上基本无差异

RN话题圈性能优化·包精简方案

   17.2M

SO

- ✓ 放弃对X86等支持
- ✓ 借用TBS能力，移除JSC

2.3 m

1.4 m

Java

- ✓ 去除暂时不需要Module&UIManager
- ✓ Release 去除Dev Support

120 k

Jar

- ✓ 对接平台网络库(WNS,MSF)，移除OKI
- ✓ 对接平台图片库(ImageManager)，移除Fresco
- ✓ 平台 Support 阉割库 复用补齐

627 k

1.1 m

Res

- ✓ 移除无用的Res文件，language val
- ✓ 平台 Support Res复用补齐

242 k

RN话题圈外网Crash

SO

● Cookie操作导致在so层SIGSEGV的crash

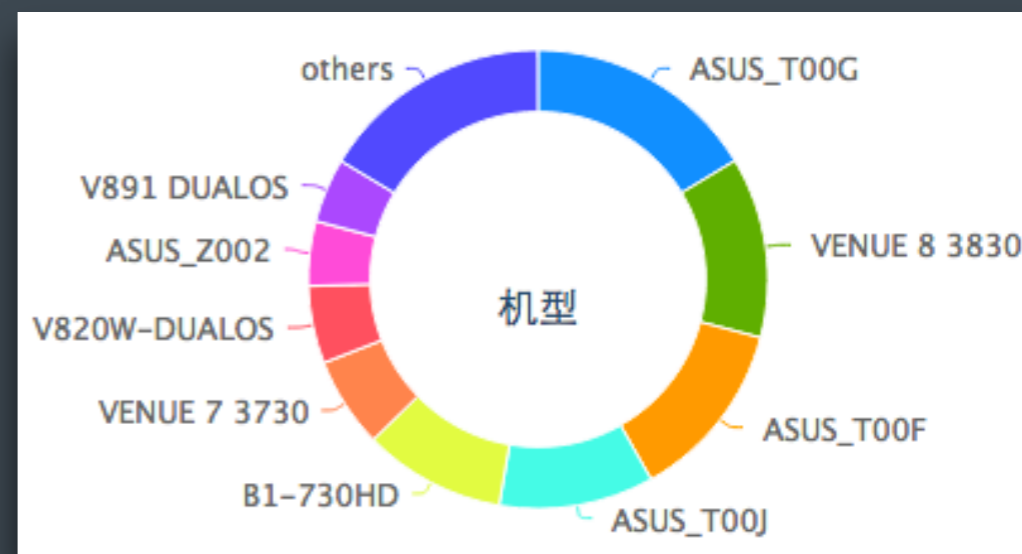
解决方案：1.(当前是通过直接修改源码屏蔽getCookie操作)

● So兼容问题导致crash

(42,478) could find DSO to load: libreactnativejni.so

(12,647) com.facebook.react.bridge.WritableNativeMap.void putString

解决方案：1.根据需要升级React版本。2.屏蔽机型。



Java

● AssertionError

解决方案：在正式发布需要去除，根治由Assert引起的Crash。

RN话题圈外网Crash

JS

● view property 转换导致Crash

(15,972) Error while updating property 'text' in shadow node of type: RCTRawText

(11,621) Error while updating property 'height' in shadow node of type: RCTView

● JsFrameWork Exception

(8,168)com.facebook.react.modules.core.JavascriptException: recordEndTouchData

```
public void updateViewProp(
    ReactShadowNode viewManager,
    CatalystStylesDiffMap styles,
    try {
        if (mIndex == null) {
            SHADOW_ARGC++;
            mSetter.invoke(viewManager, styles);
        } else {
            SHADOW_ARGC++;
            SHADOW_ARGC++;
            mSetter.invoke(viewManager, styles);
        }
    } catch (Throwable t) {
        FLog.e(ViewManager.class, "Error while updating prop " + mPropName, t);
        Log.e(ReactConstants.RN_SOURCE_TAG, "Error while updating property '" + mPropName + "' of a view managed by: " + viewManager.getName());
        // throw new JSApplicationIllegalArgumentException("Error while updating property '" + mPropName + "' of a view managed by: " + viewManager.getName());
    }
}
```

```
public void updateViewProp(
    ViewManager viewManager,
    View viewToUpdate,
    CatalystStylesDiffMap styles,
    try {
        if (mIndex == null) {
            VIEW_MGR_ARGS[0] = viewToUpdate;
            VIEW_MGR_ARGS[1] = styles;
            mSetter.invoke(viewManager, VIEW_MGR_ARGS);
        } else {
            VIEW_MGR_GROUP_ARGS[0] = viewToUpdate;
            VIEW_MGR_GROUP_ARGS[1] = styles;
            VIEW_MGR_GROUP_ARGS[2] = extractProperty(props);
            mSetter.invoke(viewManager, VIEW_MGR_GROUP_ARGS);
        }
    } catch (Throwable t) {
        FLog.e(ViewManager.class, "Error while updating prop " + mPropName, t);
        Log.e(ReactConstants.RN_SOURCE_TAG, "Error while updating property '" + mPropName + "' of a view managed by: " + viewManager.getName());
        // throw new JSApplicationIllegalArgumentException("Error while updating property '" + mPropName + "' of a view managed by: " + viewManager.getName());
    }
}
```

```
private void showOrThrowError(String title, ReadableArray details, int exceptionId) {
    if (mDevSupportManager.getDevSupportEnabled()) {
        mDevSupportManager.showNewJSError(title, details, exceptionId);
    } else {
        //throw new JavascriptException(stackTraceToString(details));
        Log.e(ReactConstants.RN_SOURCE_TAG, "JS EXCEPTION -> "+stackTraceToString(details));
    }
}
```

```
Log.e(ReactConstants.RN_SOURCE_TAG, "Error while updating property '" + mPropName + "' of a view managed by: " + viewManager.getName());
// throw new JSApplicationIllegalArgumentException("Error while updating property '" + mPropName + "' of a view managed by: " + viewManager.getName());
}
```

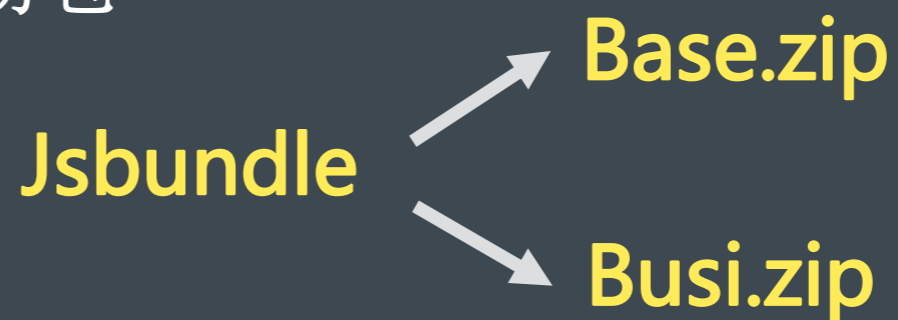
RN话题圈数据对比

话题圈对比项	ReactNative	H5(WNS-HTML)	H5
jsbridge调用耗时	185ms	417ms	421ms
wifi + Cache	1.504s	1.608s	2.781s
首屏			
wifi	2.875s	2.322s	2.868s
2g	5.93s	6.179s	12.65
AVG FPS	52	54	55
内存	81m	80m	80m
CPU峰值	57.9%	62.5%	53%
增加包大小	3.2m	0m	0m

结合版空间 留言板改造



○分包



○独立进程处理JNI

- So层占用内存无法释放

- AIDL转发JNI层接口

○APK离线包

包大小增量配额

RN留言板数据对比

留言板	Android(note3&Mi2)		iOS(5s)		
	RN	H5	RN	H5	
首屏	wifi + Cache	432.3	825.6	142.4	261.5
	wifi	1141.5	4084.2	1010.4	1669.8
	3g + Cache	430.2	1325.5	154.7	1166.8
	3g	10171.4	12387	10340	12613
AVG FPS	58	57	54.5	54.8	
MIN FPS	54	51	51	48	
CPU峰值	49%	35%	50.5%	54.5%	
Mem	161m	154.9m	185.7	145.3	
增加包大小	约30k(压后)	0	约97k(压前)	0	

3.再多说几句



ReactNative DEV Tools

ReactNative Tools

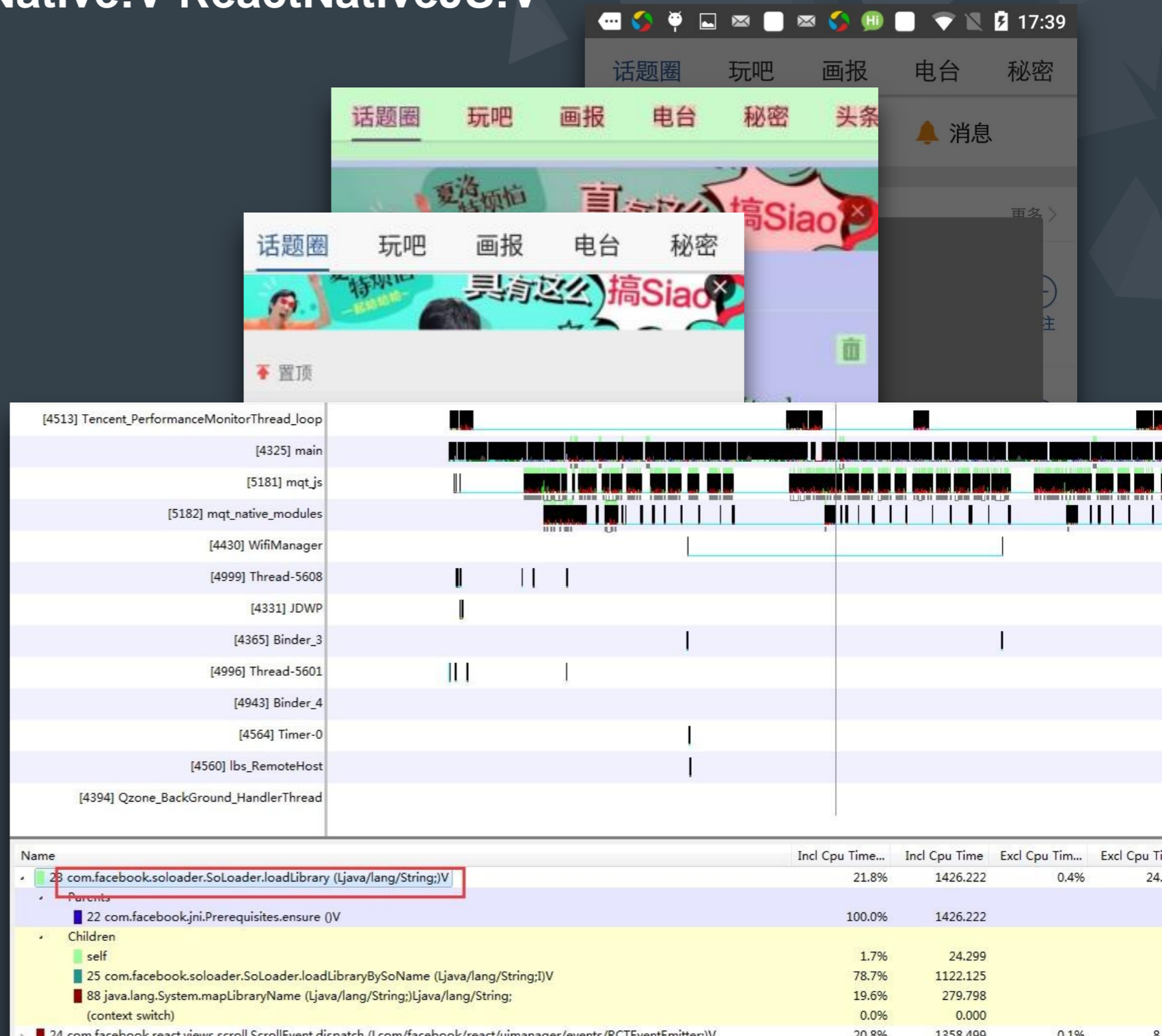
- adb logcat *:S ReactNative:V ReactNativeJS:V
- Developer menu.

System Tools

- 调试GPU过度绘制
- GPU呈现模式

Android Tools

- TraceView
- Memory Monitor
- TraceView
- SysTrace



小经验分享 · BUG

Problem

在小米系手机出现文字缺失情况，终端使用HierarchyView查看，发现宽度及文本正常，属于ROM级Bug。

Solution



```
58472
58473
58474 userInfoData.verify?React.createElement(Image,{style:styleFeedsList.feedsInfo_iconAuth,source:{uri:'http://qzonestyle.gtimg.cn/touch/proj-qzone-app/rn-
topic/image/feeds/v3/icon-auth.32@2x.png'}}):null,
58475
58476 userInfoData.official_icon?React.createElement(Image,{style:styleFeedsList.feedsInfo_iconTitle,source:{uri:userInfoData.official_icon}}):null,
58477
58478 React.createElement(TouchableOpacity,{style:styleFeedsList.feedsInfo_topicName,onPress:this.openTopic(feedData)},
58479 React.createElement(Text,{numberOfLines:1,style:styleFeedsList.feedsInfo_topicNameTxt,'#',feedData.topic.title,'#□'})),
58480
58481
58482
58483 React.createElement(View,{style:styleFeedsList.feedsInfo_bd},
58484 React.createElement(Text,{style:styleFeedsList.feedsInfo_time,util.transferTime(feedData.time,feedData.now)})),
58485
58486
```

Q&A



Thanks



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QQ空间