



移动端稳定性监控平台建设

吴飞 货运研发部



▪ 个人简介

吴飞

2016

硕士研究生毕业

2016

同花顺

从事Mac桌面端产品研发

2018

美团

从事iOS平台产品研发

2021

货拉拉

从事基础设施建设相关工作



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01 建设背景与挑战

02 核心技术原理

03 成果与收益

04 总结与未来



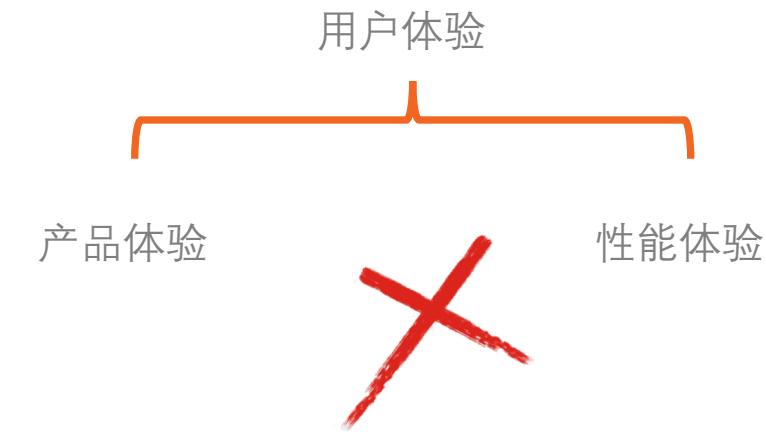
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01 建设背景与挑战



■ 建设背景与挑战

稳定性监控的重要性



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■ 建设背景与挑战



听说隔壁APP 200日活都接bugly

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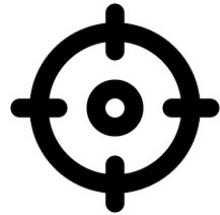
■ 建设背景与挑战

2013创立 66w+月活司机 950w+月活用户 352座内地城市

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■ 建设背景与挑战-现状



准确性

采集量
可信度



安全性

如何保障
业务敏感数据



可塑性

数据加工
日报 & 周报



工作效率

手工分配
告警失修



生态体系

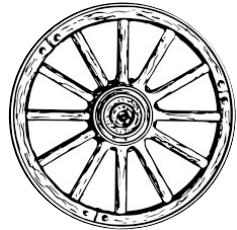
内部系统孤岛



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■ 建设背景与挑战-问题与挑战



造轮子

解决异常捕获



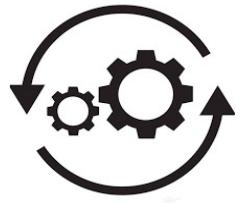
符号化

解决大量日志
可读性



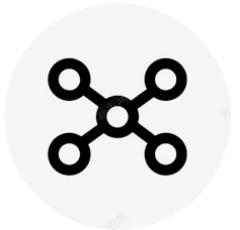
超越bugly

方向突破
如何做



自动化

符号表
打标 & 分配



打通系统

信息共享
形成生态

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02 核心技术原理



核心技术原理



原理

异常如何被捕获

设计

iOS稳定性监控设计

Abort

如何应对监控盲区

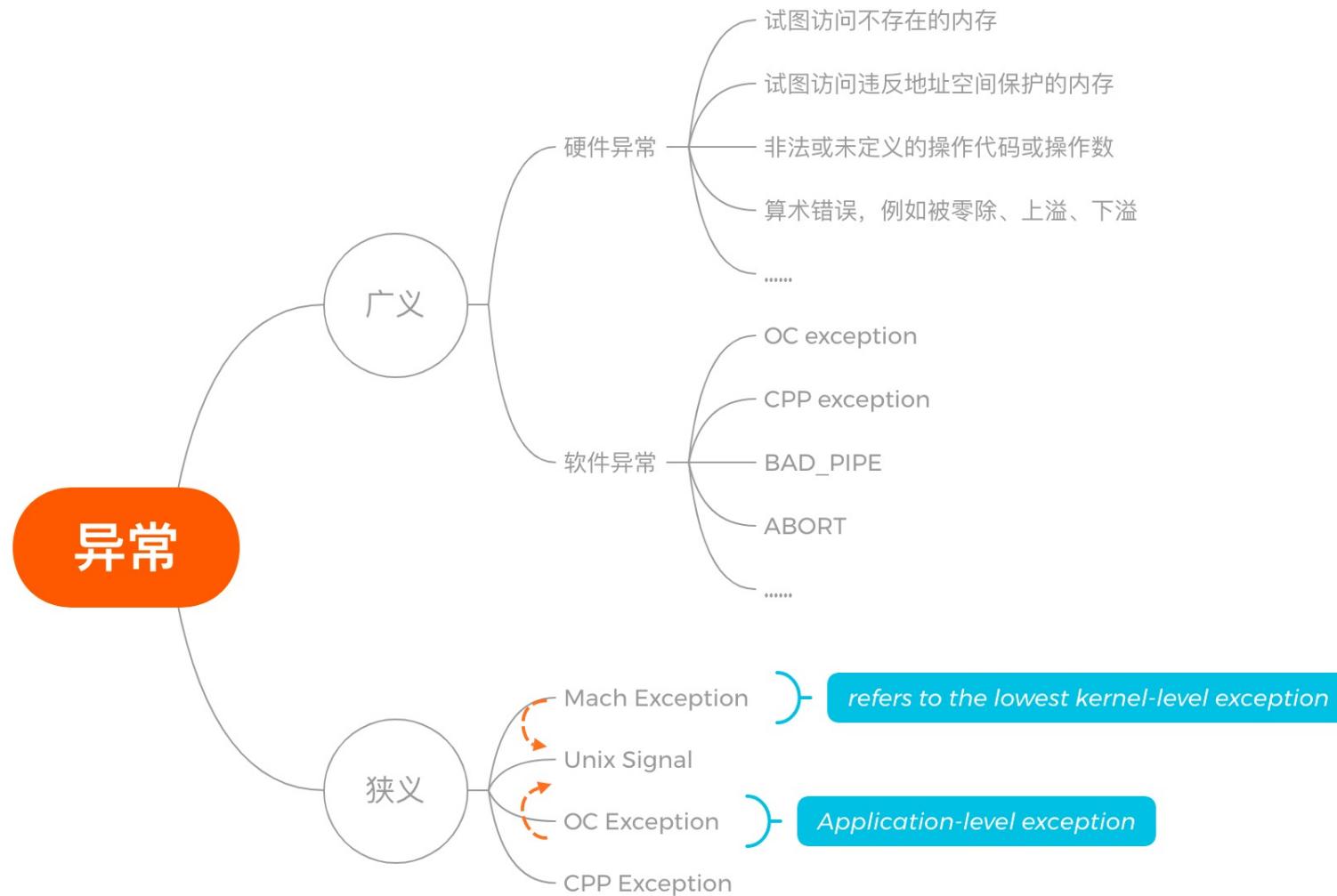
Symbol

在线符号化技术

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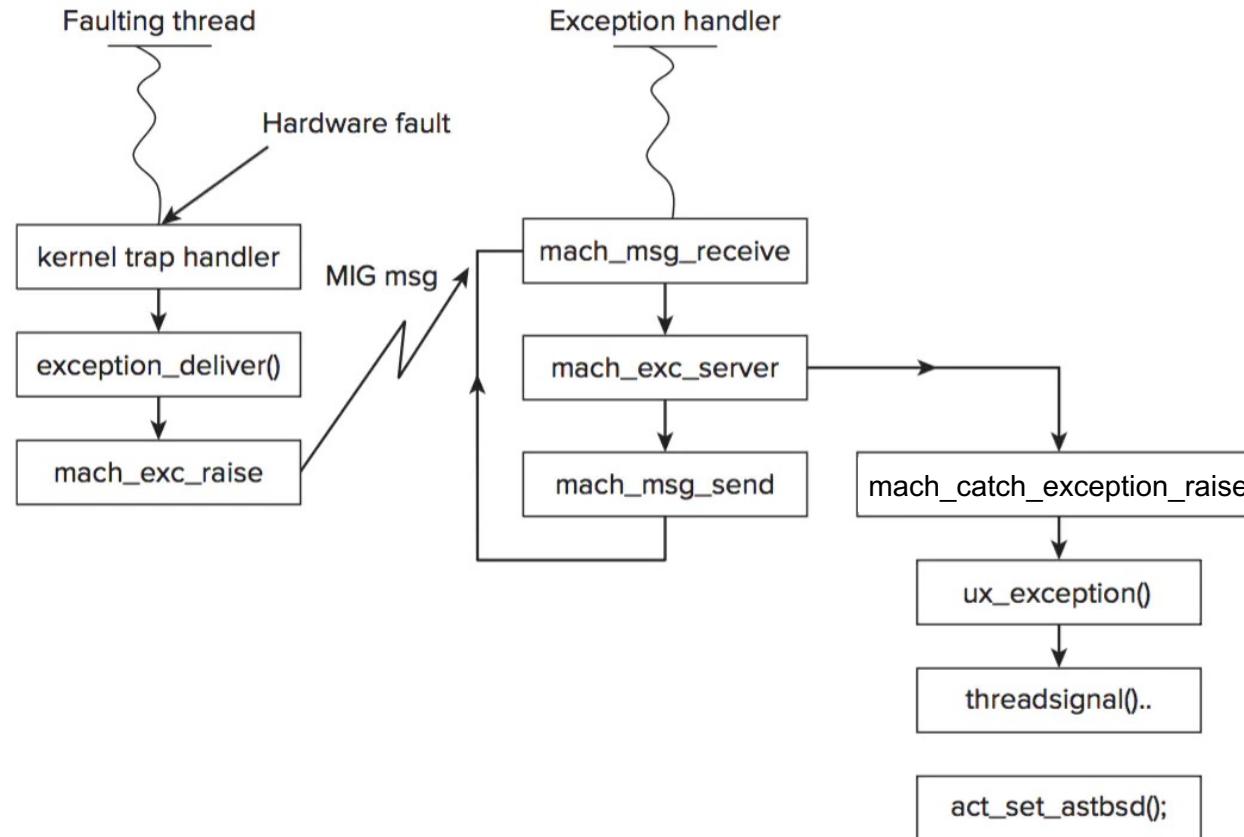
核心技术原理-异常捕获原理



拉货就找货拉拉



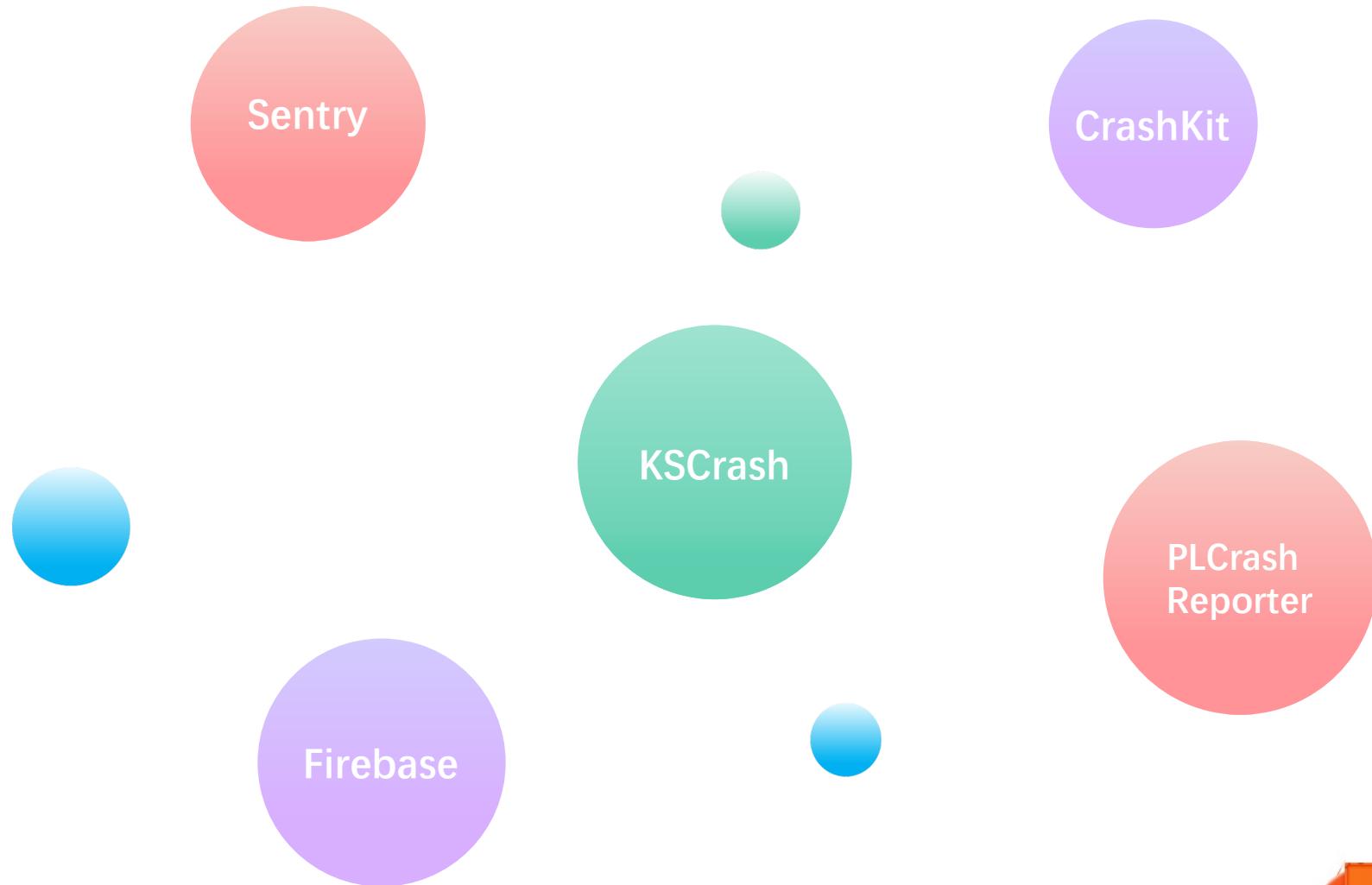
核心技术原理-异常捕获原理



拉货就找货拉拉



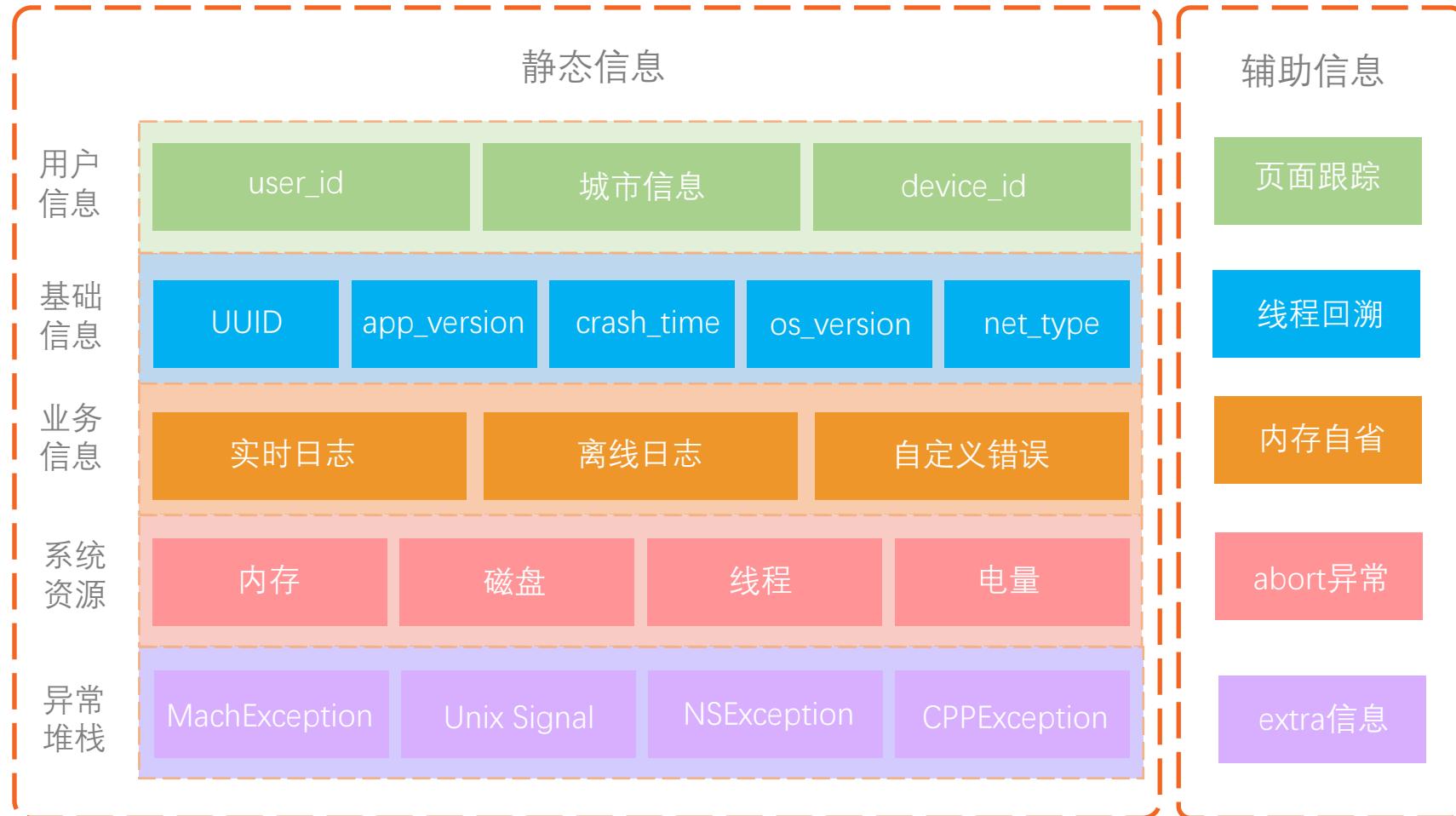
■ 核心技术原理- iOS稳定性监控设计



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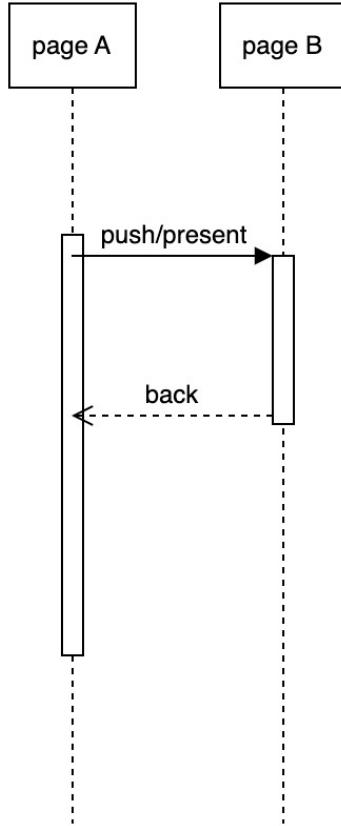
核心技术原理- iOS稳定性监控设计



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核心技术原理-页面跟踪



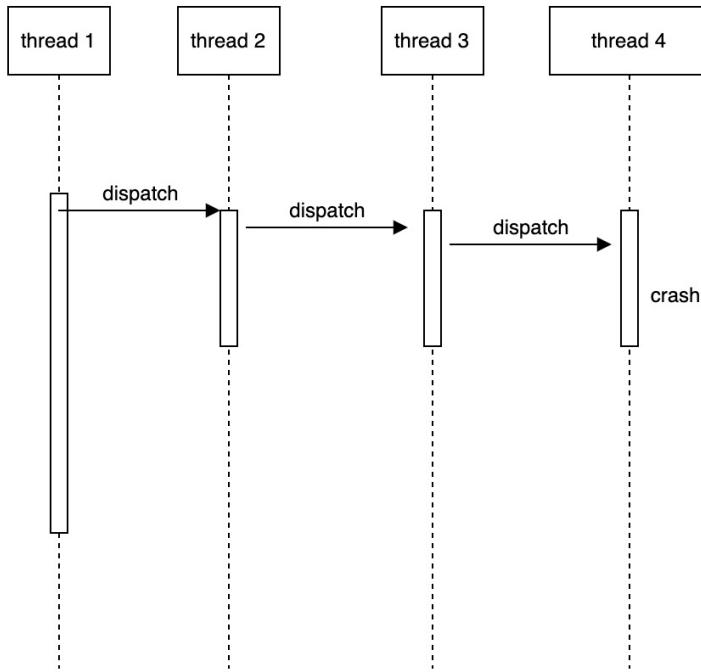
The screenshot displays a log of events with timestamps and corresponding actions:

```
2022-12-23 13:35:30 [enter background]AppState
2022-12-23 13:35:30 [enter foreground]AppState
2022-12-23 13:00:28 [enter background]AppState
2022-12-23 12:59:58 [enter foreground]AppState
2022-12-23 12:57:26 [enter background]AppState
2022-12-23 12:56:47 [ViewDidAppear]ETabBarOrderVC
2022-12-23 12:56:46 [ViewDidLoad]ETabBarOrderVC
2022-12-23 12:56:46 [ViewWillDisappear]HLLTabBarNewHome
2022-12-23 12:56:45 [ViewWillDisappear]ELaunchAdVC
2022-12-23 12:56:43 [ViewDidAppear]HLLTabBarNewHome
2022-12-23 12:56:43 [ViewDidAppear]HLLTabBarController
2022-12-23 12:56:43 [ViewDidLoad]HLLTabBarNewHome
2022-12-23 12:56:43 [enter foreground]AppState
2022-12-23 12:56:43 [ViewWillDisappear]HLLLaunchVC
2022-12-23 12:56:39 [ViewDidLoad]HLLTabBarController
2022-12-23 12:56:39 [ViewDidAppear]HLLLaunchVC
2022-12-23 12:56:39 [ViewDidAppear]ELaunchAdVC
2022-12-23 12:56:39 [ViewDidLoad]ELaunchAdVC
2022-12-23 12:56:39 [ViewDidLoad]HLLLaunchVC
```

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核心技术原理-线程回溯



```
1 Thread 1 Crashed:
2 0 H****Reporter_Example      -[DGGMockCrasher dereferenceBadPointer]
3 1 H****Reporter_Example      -[DGGMockCrasher mockCrashFromGCD]_block_invoke_5
4 ...
5 4 libdispatch.dylib           _dispatch_call_block_and_release
6 ...
7 10 libsystem_pthread.dylib   start_watthread
8 Enqueue backtrace:
9 0 H****Reporter_Example      -[DGGMockCrasher dereferenceBadPointer]
10 1 H****Reporter_Example     -[DGGMockCrasher mockCrashFromGCD]_block_invoke_4
11 ...
12 4 libdispatch.dylib          _dispatch_call_block_and_release
13 ...
14 11 libsystem_pthread.dylib  start_wqthread
15 Enqueue backtrace:
16 0 libdispatch.dylib          _dispatch_async
17 1 H****Reporter_Example     -[DGGMockCrasher mockCrashFromGCD]_block_invoke_3
18 ...
19 11 libsystem_pthread.dylib  start_wqthread
20 Enqueue backtrace:
21 0 libdispatch.dylib          _dispatch_async
22 1 H****Reporter_Example     -[DGGMockCrasher mockCrashFromGCD]_block_invoke_2
23 ...
24 11 libsystem_pthread.dylib  start_wqthread
25 Enqueue backtrace:
26 0 libdispatch.dylib          _dispatch_async
27 1 H****Reporter_Example     -[DGGMockCrasher mockCrashFromGCD]_block_invoke
28 ...
29 11 libsystem_pthread.dylib  start_wqthread
30 Enqueue backtrace:
31 0 libdispatch.dylib          _dispatch_async
32 1 H****Reporter_Example     -[DGGMockCrasher mockCrashFromGCD]
33 4 UIKitCore                  -[UITableView _selectRowAtIndexPath:animated:...:performCustomSelectionAction:] + 2187
34 5 UIKitCore                  -[UITableView _userSelectRowAtIndexPathPendingSelectionIndexPath:] + 381
35 6 UIKitCore                  -[_UIAfterCACommitBlock run] + 54
36 ...
37 17 UIKitCore                 UIApplicationMain + 123
38 18 H****Reporter_Example    main + 104
39
```

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核心技术原理-内存自省



Register & Stack Addresses:

```
{  
    "stack@0x1706a25a0": {  
        "address": 4339447346,  
        "type": "string",  
        "value": "-[MSDKDnsService  
cacheDomainInfo:]"  
    },  
    "stack@0x1706a2620": {  
        "address": 10058031520,  
        "class": "__NSStackBlock__",  
        "type": "objc_block"  
    },  
    "x1": {  
        "address": 4338232460,  
        "type": "string",  
        "value": "httpDnsResolver_A"  
    },  
    "x3": {  
        "address": 10804241280,  
        "type": "string",  
        "value": "UniTrust"  
    }  
}
```

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■ 核心技术原理-abort异常

异常监控盲区

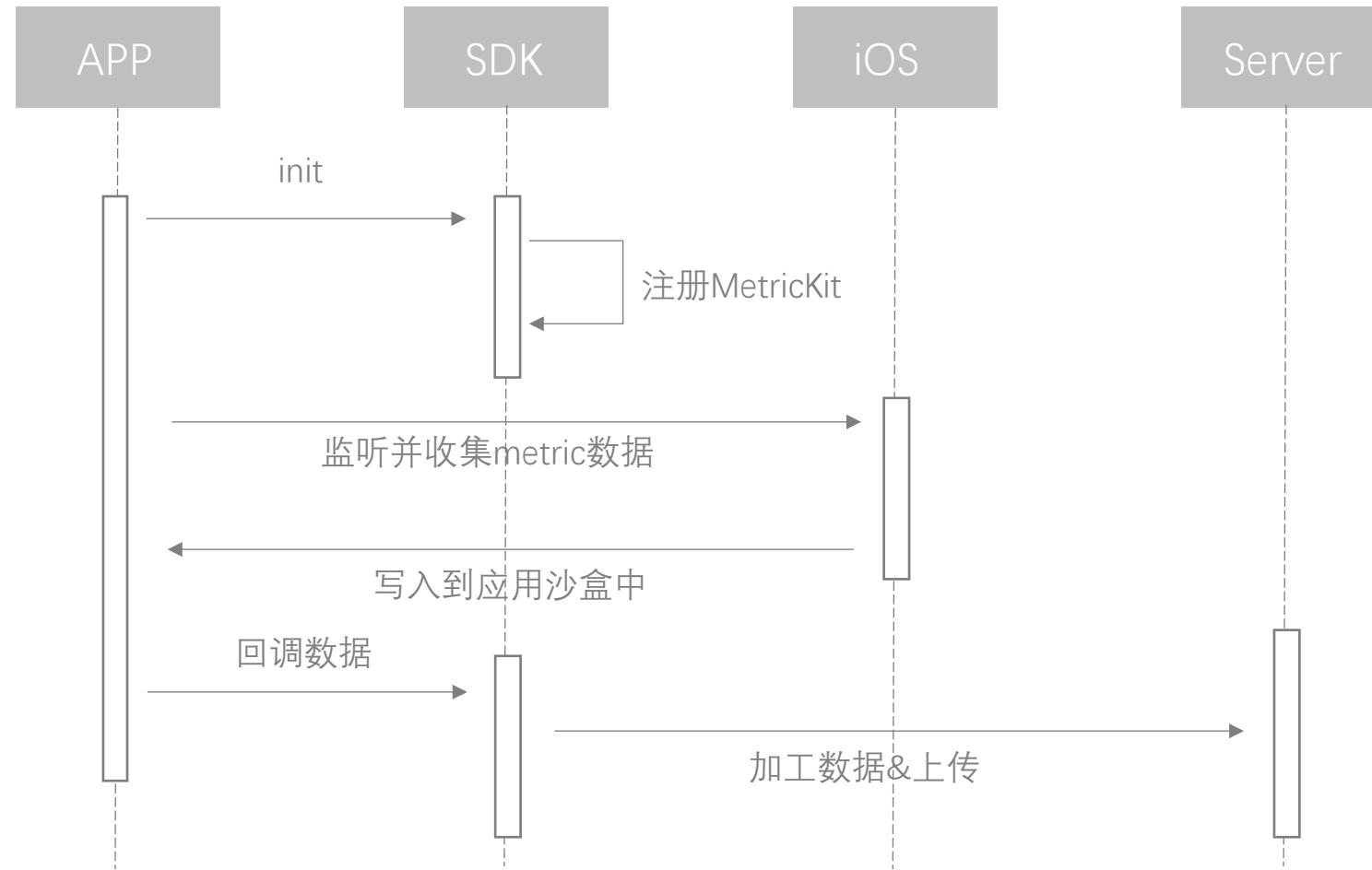


Watchdog + I/O异常 + CPU异常
SIGKILL

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核心技术原理-abort异常



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■ 核心技术原理-abort异常坑点



Crash

16.0.X系统缺陷
处理好系统兼容性



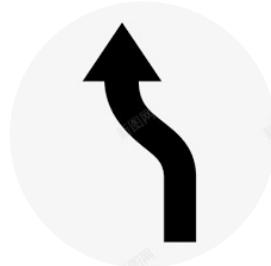
测试

时机 & 持久化



信息缺失

UUID & time &
userid & 加工



段迁移

包大小
偏移纠正

核心技术原理-在线符号化技术

什么是符号化？



Unsymbolicated

```
Thread 0 name: Dispatch queue: com.apple.main-thread
Thread 0 Crashed:
0 TheElements          0x000000010003fc20 0x100034000 + 48160
1 UIKit                0x0000000187480070 0x187438000 + 295024
2 UIKit                0x000000018747feb0 0x187438000 + 294576
3 QuartzCore           0x0000000184907404 0x1847f6000 + 1119236
4 libdispatch.dylib    0x00000001804fd1c0 0x1804fc000 + 4544
5 libdispatch.dylib    0x0000000180501d6c 0x1804fc000 + 23916
6 CoreFoundation        0x0000000181621f2c 0x181545000 + 905004
7 CoreFoundation        0x000000018161fb18 0x181545000 + 895768
8 CoreFoundation        0x000000018154e048 0x181545000 + 36936
9 GraphicsServices      0x0000000182fcf198 0x182fc3000 + 49560
10 UIKit                0x00000001874b2b50 0x187438000 + 502608
11 UIKit                0x00000001874ad888 0x187438000 + 481416
12 TheElements          0x00000001000393c0 0x100034000 + 21440
13 libdyld.dylib         0x00000001805305b8 0x18052c000 + 17848
```



Fully Symbolicated

```
Thread 0 name: Dispatch queue: com.apple.main-thread
Thread 0 Crashed:
0 TheElements          0x000000010003fc20 -[AtomicElementViewController myTransitionDidStop:finished:context:]
(AtomicElementViewController.m:203)
1 UIKit                0x0000000187480070 -[UIViewAnimationState sendDelegateAnimationDidStop:finished:] + 312
2 UIKit                0x000000018747feb0 -[UIViewAnimationState animationDidStop:finished:] + 160
3 QuartzCore           0x0000000184907404 CA::Layer::run_animation_callbacks(void*) + 260
4 libdispatch.dylib    0x00000001804fd1c0 _dispatch_client_callback + 16
5 libdispatch.dylib    0x0000000180501d6c _dispatch_main_queue_callback_4CF + 1000
6 CoreFoundation        0x0000000181621f2c __CFRUNLOOP_IS_SERVICING_THE_MAIN_DISPATCH_QUEUE__ + 12
7 CoreFoundation        0x000000018161fb18 __CFRunLoopRun + 1660
8 CoreFoundation        0x000000018154e048 CFRunLoopRunSpecific + 444
9 GraphicsServices      0x0000000182fcf198 GSEventRunModal + 180
10 UIKit                0x00000001874b2b50 -[UIApplication _run] + 684
11 UIKit                0x00000001874ad888 UIApplicationMain + 208
12 TheElements          0x00000001000393c0 main (main.m:55)
13 libdyld.dylib         0x00000001805305b8 start + 4
```

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■ 核心技术原理-在线符号化技术

为什么需要在线符号化？

仅仅依靠离线工具，无法应对大量日志、收集难、快速符号化等场景

必须依赖macOS系统，我司服务端基建几乎全部基于Linux，未来将面临问题：无法复用各种平台和框架，很高的机器成本&部署成本&运维成本。

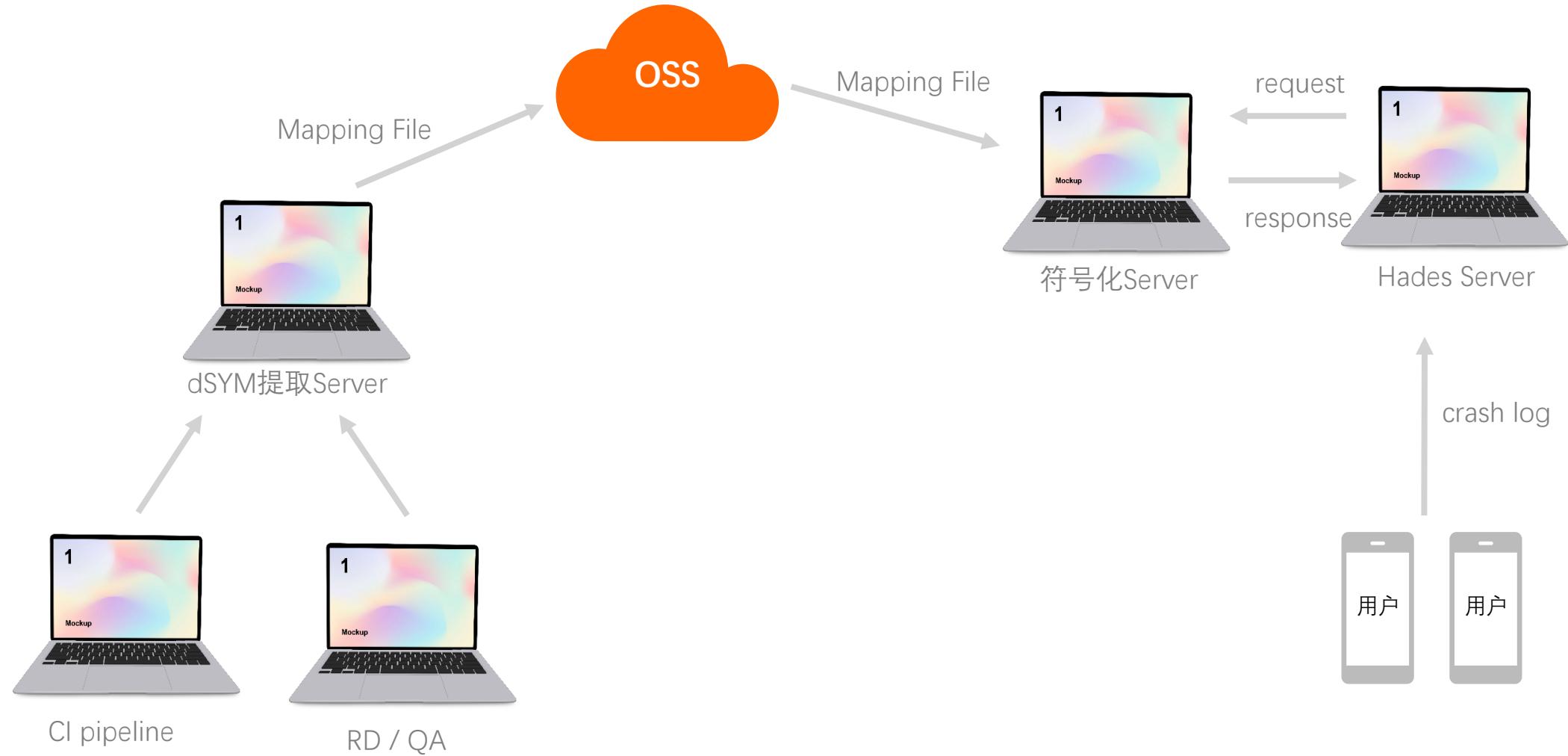
黑苹果

可以使用原生的符号化命令，没有兼容问题

- 系统、Xcode 更新麻烦，不好维护
- 虚拟机系统资源使用率低
- 在非苹果机器上运行不稳定
- 版权问题



核心技术原理-在线符号化技术



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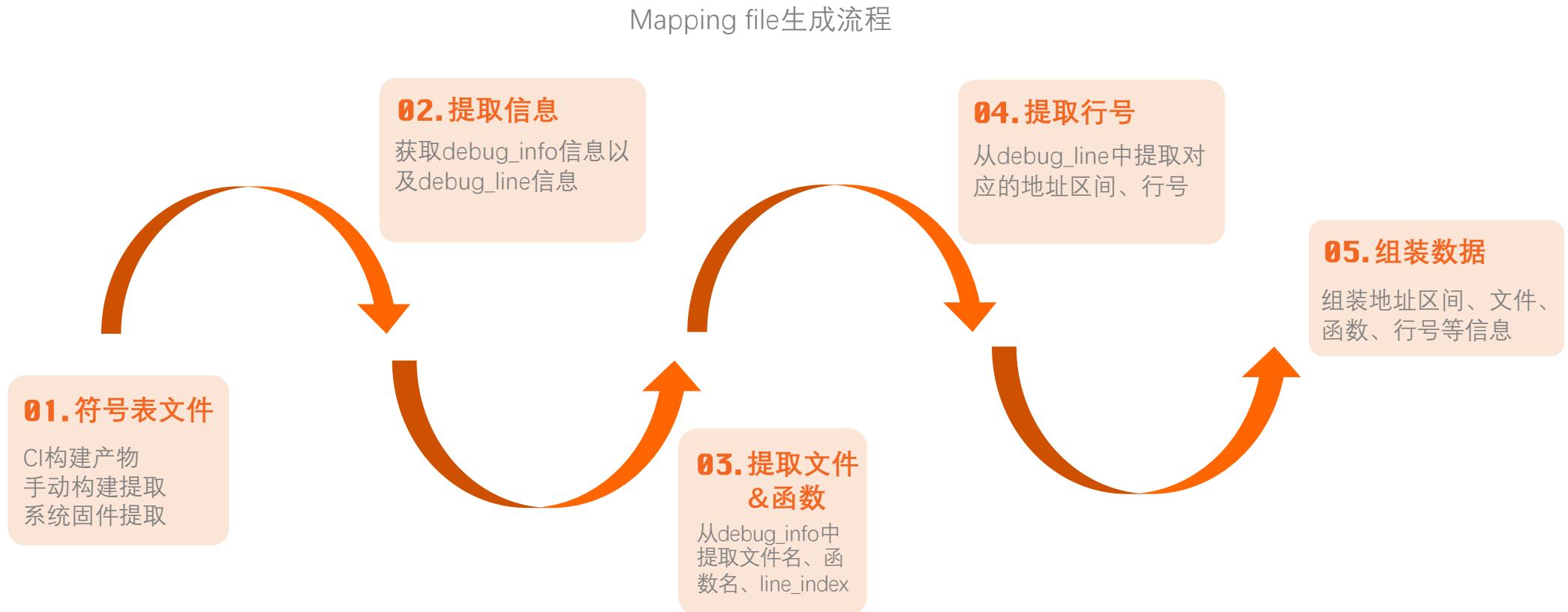
■ 核心技术原理-在线符号化技术

```
1 File: /Users/feiwu/Downloads/ios_820470c5bfffadfc4675e1a38bfc00ecc9_app-store.dSYMs/HadesCrashReporter.framework.dSYM/Contents/Resources/DWARF/HadesCrashReporter
2 Format: Mach-O/64-Bit
3 Arch: arm64
4 Symbols: 2628
5 Tool Version: 3.3.4
6 File Version: 1.4
7 UUID: d90f95e0494835ee9e8d910723170b28
8 Built Time: 2022-07-22 11:21:03
9 Symbol table:
10 7c8c 7c98 -[DGGCrashInstallation init] DGGCrashInstallation.m:15
11 7c98 7cb8 -[DGGCrashInstallation init] DGGCrashInstallation.m:17
12 7cb8 7cc4 -[DGGCrashInstallation init] DGGCrashInstallation.m:21
13 7cc4 7cd8 -[DGGCrashInstallation sink] DGGCrashInstallation.m:24
14 7cd8 7ce4 -[DGGCrashInstallation sink] DGGCrashInstallation.m:26|
15 7ce4 7cf4 -[DGGCrashInstallation sink] DGGCrashInstallation.m:26
16 7cf4 7cf8 -[DGGCrashInstallation sink] DGGCrashInstallation.m:27
17 7cf8 7d08 -[DGGCrashInstallation sink] DGGCrashInstallation.m:27
```

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核心技术原理-在线符号化技术



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■ 核心技术实现-在线符号化技术

```
address = runtime_address - load_address + vm_address
```

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核心技术原理-在线符号化技术

```
4 H*****Reporter 0x0000000104038bfc 0x104024000 + 84988

address = 0x0000000104038bfc - 0x104024000 + 0x0

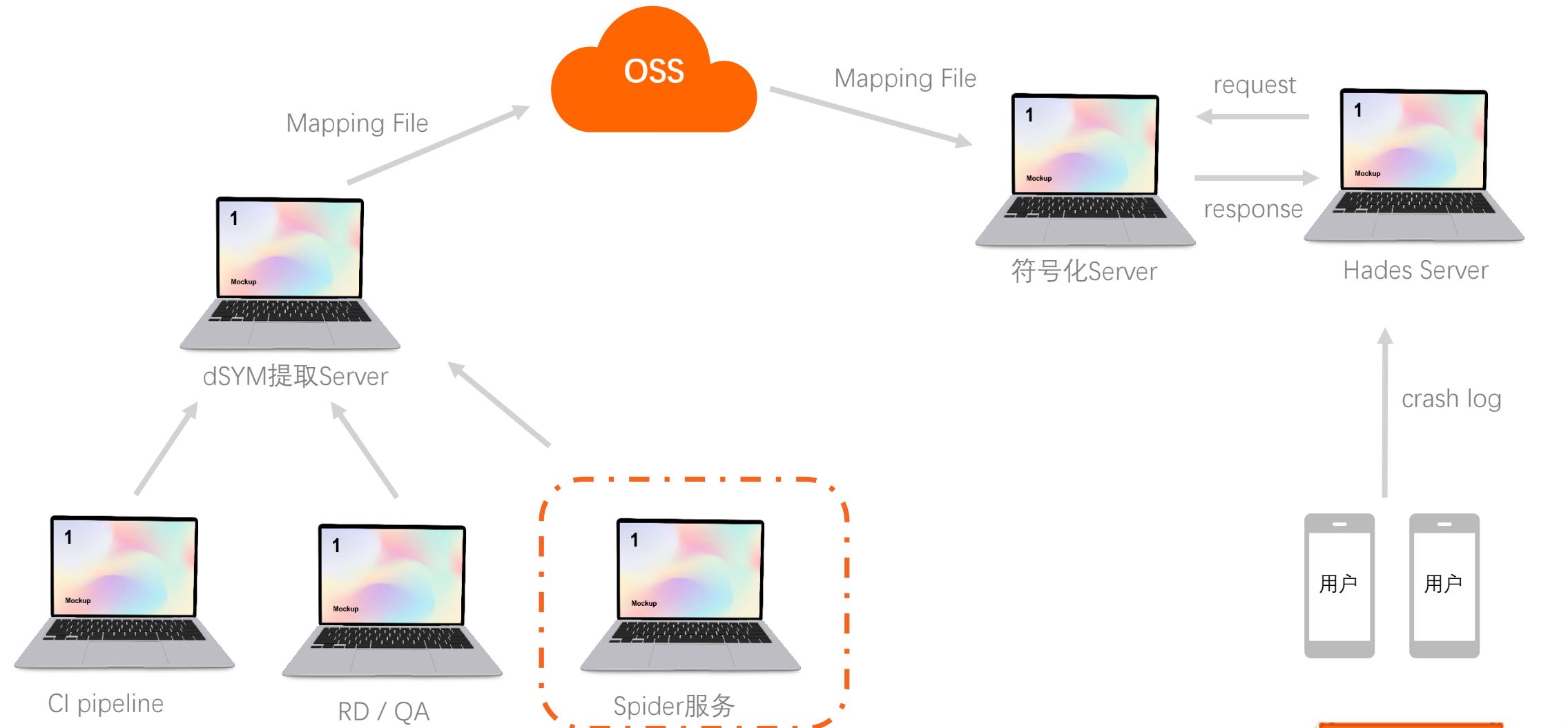
→ DWARF otool -l H*****porter | grep __TEXT -C 5
stroff 11888
strsize 18004
Load command 2
    cmd LC_SEGMENT_64
    cmdsize 952
    segname __TEXT
    vmaddr 0x0000000000000000 ←
    vmsize 0x000000000014000
    fileoff 32768
    filesize 116
    maxprot 0x00000005
-- ←
-- ←

→ DWARF size -x -m -l H*****porter
Segment __TEXT: 0x14000 (vmaddr 0x0 fileoff 32768) ←
Section __text: 0x8420 (addr 0x7bb8 offset 0)
Section __stubs: 0x354 (addr 0ffd8 offset 0)
Section __stub_helper: 0x36c (addr 0x1032c offset 0)
Section __const: 0x68 (addr 0x10698 offset 0)
Section __objc_methname: 0x2270 (addr 0x10700 offset 0)
Section __objc_classname: 0x16d (addr 0x12970 offset 0)
Section __objc_methtype: 0x30b (addr 0x12add offset 0)
Section __cstring: 0xecf (addr 0x12de8 offset 0)
Section __gcc_except_tab: 0x78 (addr 0x13cb8 offset 0)
Section __ unwind_info: 0x258 (addr 0x13d30 offset 0)
Section __eh_frame: 0x74 (addr 0x13f88 offset 32768)
total 0xc443
```

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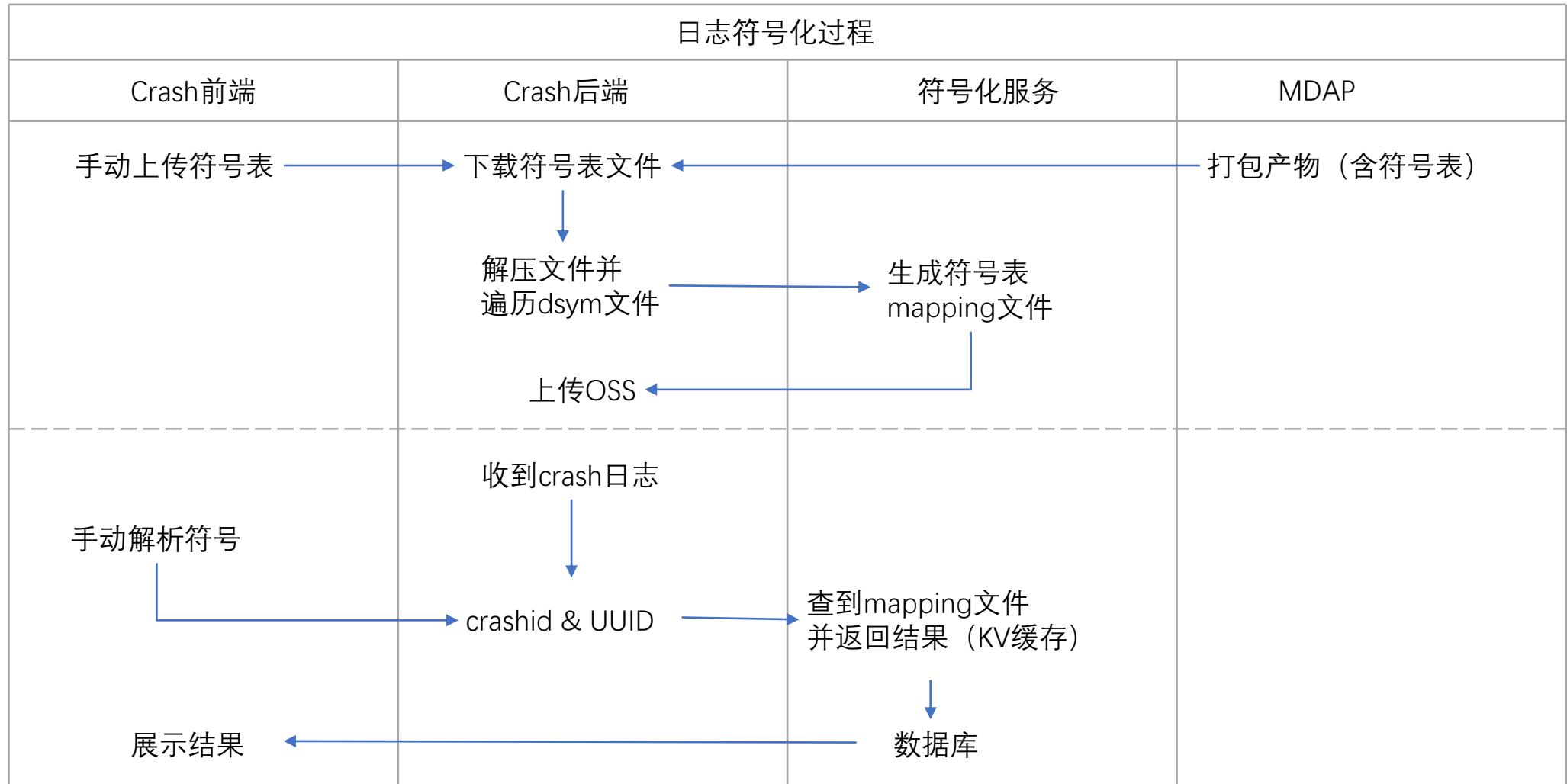
核心技术原理-在线符号化技术



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核心技术原理-在线符号化技术



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03 成果与收益



■ 成果与收益-捕获效果

捕获对比									
次数崩溃率	Bugly	0.01%	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%
	自研	0.06%	0.12%	0.05%	0.05%	0.06%	0.06%	0.06%	0.06%
设备崩溃率	自研	0.13%	0.09%	0.12%	0.13%	0.16%	0.20%	0.21%	
	自研	0.28%	0.38%	0.19%	0.19%	0.24%	0.22%	0.24%	
设备ANR率	自研	0.25%	0.21%	0.22%	0.25%	0.27%	0.29%	0.19%	
	自研	0.48%	0.59%	0.51%	0.45%	0.50%	0.51%	0.50%	

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■ 成果与收益-捕获效果

异常列表

崩溃 卡死 自定义错误 Abort异常

时间范围: 近7天 近30天 开始日期 ~ 结束日期 白 筛选维度: 全部类型 全部版本 全部设备 全部系统 全部状态 错误信息 输入搜索内容 处理人 标签

状态变更 共338条 < 1 2 3 ... 17 > 20 条/页

错误信息 错误次数 影响设备数 最近上报时间

#526628 <RBSTerminateContext| domain:10 code:0x8BADF00D explanation:process-launch watchdog transgression: application> :76839 exhausted real (wall clock) time allowance of 60.00... Thread 0 Crashed: 0 libobjc.A.dylib realizeClassWithoutSwift(objc_class*, objc_class*) 1 libobjc.A.dylib realizeClassMaybeSwiftMaybeRelock(objc_class*, mutex_ 2 libobjc.A.dylib realizeClassMaybeSwiftMaybeRelock(objc_class*, mutex_ 3 libobjc.A.dylib realizeAllClasses() 2023-01-01 18:30:00 × 未修复

AbortTypeCrash 3.2.84 ~ 3.2.88 + 添加标签

10倍+
单日捕获

22倍+
一周捕获

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成果与收益-告警

编辑告警计划

* 告警计划名称 * 崩溃类型

告警生效时间

采样周期(s) 静默更新时间间隔(s)

触发条件

And

崩渍率 > 0%

崩渍设备数 > 30

+ 添加条件

新版本监控

生效应用版本

接收者

是否开启告警 开启 关闭

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成果与收益-实时趋势



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■ 成果与收益-日报&周报

报告类型: 日报 周报 ① 日期范围: 2022-12-02 ~ 2022-12-31

⌚ 2022-12-31

数据生成时间	2023-01-01 00:30:04	启动次数	[REDACTED]	启动设备数	[REDACTED]
崩溃次数	[REDACTED]	崩溃设备数	[REDACTED]	崩溃率	[REDACTED]
崩溃设备率	[REDACTED]	涉及版本	6.2.42~6.3.9	ANR发生数	[REDACTED]
ANR发生设备数	[REDACTED]	ANR发生率	[REDACTED]	ANR发生设备率	[REDACTED]
ANR涉及版本	6.2.49~6.3.9				

[查看更多数据](#)

⌚ 2022-12-30

数据生成时间	2022-12-31 00:30:04	启动次数	[REDACTED]	启动设备数	[REDACTED]
崩溃次数	[REDACTED]	崩溃设备数	[REDACTED]	崩溃率	[REDACTED]
崩溃设备率	[REDACTED]	涉及版本	6.2.80~6.3.9	ANR发生数	[REDACTED]
ANR发生设备数	[REDACTED]	ANR发生率	[REDACTED]	ANR发生设备率	[REDACTED]
ANR涉及版本	6.2.48~6.3.9				

[查看更多数据](#)

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[Hades] 标签日报 - 货拉拉-企业版-iOS

● 您关注的标签有新的崩溃产生

► 应用名称: 货拉拉-企业版-iOS

⌚ 报告时间: 2022-12-18

● 标签: APM-OSS

次数崩溃率:

启动次数:

崩溃次数:

涉及版本: 3.2.60

设备崩溃率:

启动设备数:

崩溃设备数:

● 标签: APMSDK

次数崩溃率:

启动次数:

崩溃次数:

涉及版本: 3.2.60

设备崩溃率:

启动设备数:

崩溃设备数:

● 标签: mqtt

次数崩溃率:

启动次数:

崩溃次数:

涉及版本: 3.2.84

设备崩溃率:

启动设备数:

崩溃设备数:



■ 成果与收益-添加标签

标签管理

标签: 标签 状态: 全部 + 新增

#ID	标签	状态	创建时间	更新时间	操作
161	izer	状态	2022-12-26 14:38:41	2022-12-26 14:38:41	编辑 删除
158	图	状态	2022-12-19 09:49:07	2022-12-19 09:49:07	编辑 删除
154	it	状态	2022-12-13 10:26:05	2022-12-13 10:26:05	编辑 删除
153	gin	状态	2022-12-12 10:06:19	2022-12-12 10:06:28	编辑 删除
149	几	状态	2022-12-08 09:55:09	2022-12-08 09:55:09	编辑 删除
145	上	状态	2022-11-30 17:44:48	2022-11-30 17:44:48	编辑 删除

添加标签

* 标签: 标签

关键字: 关键字

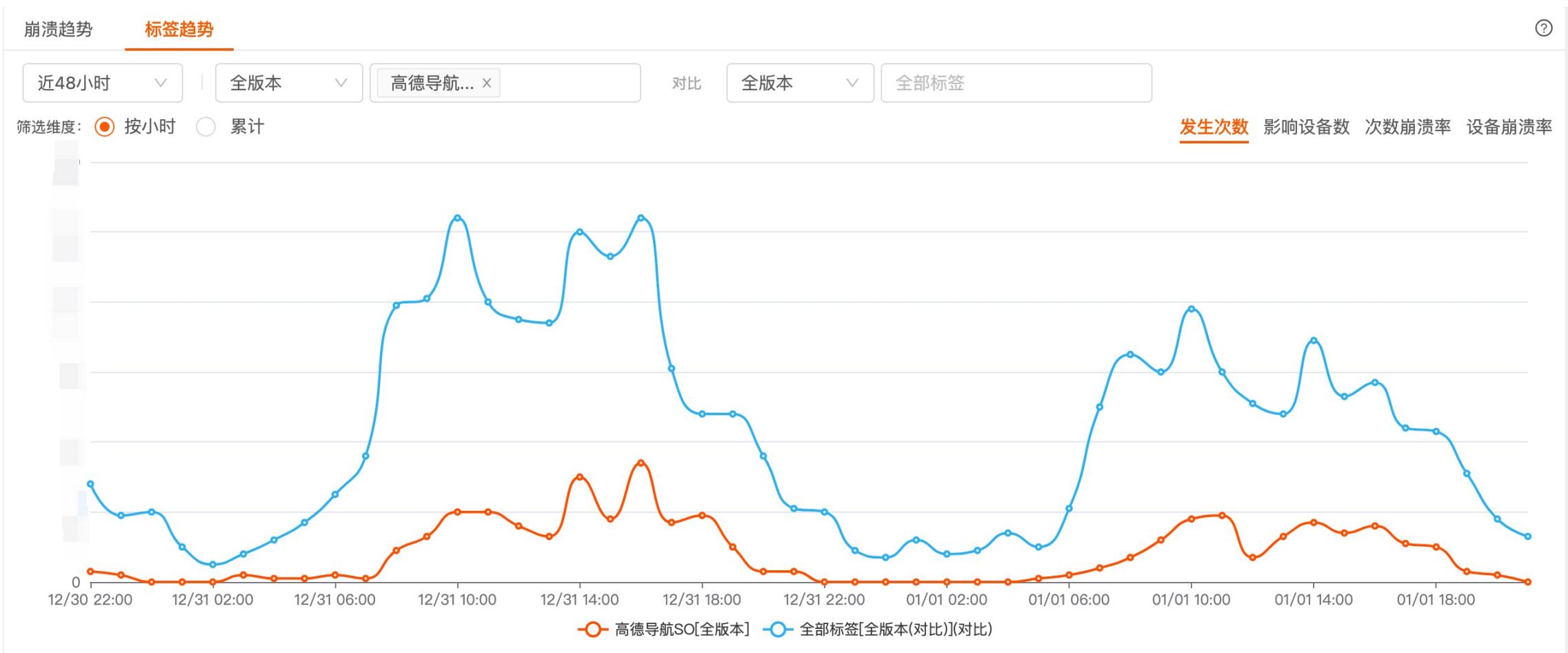
状态: 状态 禁用

[取消](#) [确定](#)

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成果与收益-标签趋势对比



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■ 成果与收益-异常分配

分配规则

规则名称: 规则名称

#ID	规则名称	创建时间	更新时间	操作

添加规则

* 规则名称: 规则名称

* 关键字: 关键字
注意: 关键字匹配不区分大小写

* 跟进人员: 跟进人员
注意: 非法的邮箱地址会被忽略

状态:
 状态 禁用

分配通知:
 状态 禁用

取消 确定

[Hades]异常处理分配通知

应用名称: 货拉拉司机端-iOS (AppStore)

同学, 您已被分配对 *** reason: EXC_BAD_ACCESS (SIGSEGV) 异常进行处理, 请及时跟进。

分配原因: 手工分配。

首次产生时间: 2022-12-27 14:42:27

末次产生时间: 2022-12-27 14:42:27

堆栈摘要

Thread 0 Crashed:

```
0 libobjc.A.dylib      _objc_release
1 CoreFoundation       _cow_cleanup
2 CoreFoundation       -[NSDictionaryM dealloc]
3 CoreFoundation       -[CFPrefsSearchListSource alreadylocked_getDictionary:]
4 CoreFoundation       -[CFPrefsSearchListSource alreadylocked_copyValueForKey:]
5 CoreFoundation       -[CFPrefsSource copyValueForKey:]
6 CoreFoundation       _76-[CFXPreferences copyAppValueForKey:identifier:container:configurationURL:]_block_invoke
7 CoreFoundation       __108-[CFXPreferences(SearchListAdditions) withSearchListForIdentifier:container:cloudConfigurationURL:perform:]_block_invoke
8 CoreFoundation       _normalizeQuintuplet
9 CoreFoundation       -[CFXPreferences withSearchListForIdentifier:container:cloudConfigurationURL:perform:]
10 CoreFoundation      -[_CFXPreferences copyAppValueForKey:identifier:con...]
```

点击查看

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■ 成果与收益-打标签&任务分配

<p>#380724 *** reason: EXC_BAD_ACCESS (SIGSEGV)</p> <p>Thread 0 name: [REDACTED]</p> <p>Thread 0 Crashed:</p> <p>0 libobjc.A.dylib _objc_release</p> <p>1 libobjc.A.dylib AutoreleasePoolPage::releaseUntil(objc_object**)</p> <p>2 libobjc.A.dylib _objc_autoreleasePoolPop</p> <p>6.2.56 ~ 6.3.8 h5video全屏 + 添加标签</p>	2023-01-02 08:18:14	处理中 处理人: [REDACTED] (6.ma)
<p>#261941 *** reason: EXC_BAD_ACCESS (SIGBUS)</p> <p>Thread 0 name: [REDACTED]</p> <p>Thread 0 Crashed:</p> <p>0 libsystem_platform.dylib _OSAtomicAdd32\$VARIANT\$mp</p> <p>1 HLLDriver _baidu_vi::CVTaskQueueThread::CancelGroup(_baidu_vi::CVTaskGroup*)</p> <p>2 HLLDrive _baidu_framework::CGridLayer::~CGridLayer()</p> <p>6.2.33 ~ 6.3.8 百度地图 + 添加标签</p>	2023-01-02 20:08:05	未修复 处理人: [REDACTED] (zhou)
<p>#280130 *** reason: EXC_BAD_ACCESS (SIGSEGV)</p> <p>Thread 0 name: [REDACTED]</p> <p>Thread 0 Crashed:</p> <p>0 libobjc.A.dylib _objc_retain</p> <p>1 HLLDrive -[HL [REDACTED] er obse [REDACTED] ieth:ofObject:change:context:] HLLA [REDACTED] .m:191</p> <p>2 Foundation _NSKeyValueNotifyObserver</p> <p>6.2.76 ~ 6.3.4 + 添加标签</p>	2023-01-02 17:20:53	已处理 处理人: [REDACTED] (tu)

标签 流转 处理人

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■ 成果与收益-符号化

```
1 // remark
2
3 Exception Type: EXC_CRASH (SIGABRT)
4 Exception Codes: 0x00000000 at 0x0000000000000000
5 Crashed Thread: 61
6
7 Application Specific Information:
8 *** Terminating app due to uncaught exception 'NSInternalInconsistencyException', reason: 'Modifications to the layout engine must not be performed from a background
9 thread after it has been accessed from the main thread.
UserInfo:(null)'
10
11
12 // 崩溃线程
13 Thread 61 Crashed:
14 0 CoreFoundation 0x00000001b8a39e88 0x1b8a30000 + 40584
15 1 libobjc.A.dylib 0x00000001b1d678d8 0x1b1d50000 + 96472
16 2 CoreLayout 0x00000001d52cce84 0x1d52bf000 + 56964
17 3 CoreLayout 0x00000001d52c3e60 0x1d52bf000 + 20064
18 4 UIKitCore 0x00000001bac0c3c 0x1babed000 + 867388
19 5 UIKitCore 0x00000001bac084c 0x1babed000 + 866380
20 6 UIKitCore 0x00000001bbc1e8d4 0x1babed000 + 16980180
21 7 UIKitCore 0x00000001bac7d3cc 0x1babed000 + 590796
22 8 UIKitCore 0x00000001bac71a8 0x1babed000 + 577960
23 9 HLLDriver 0x0000000106c69320 0x104ec8000 + 31068960
24 10 CoreFoundation 0x00000001b8a303a0 0x1b8a30000 + 41888
25 11 CoreFoundation 0x00000001b8a556d0 0x1b8a30000 + 153296
26 12 HLLDriver 0x0000000106c692d4 0x104ec8000 + 31068884
27 13 HLLDriver 0x0000000106c68ca4 0x104ec8000 + 31067300
```

处理前

```
12 // 崩溃线程
13 Thread 61 Crashed:
14 0 CoreFoundation
15 1 libobjc.A.dylib
16 2 CoreLayout
17 3 CoreLayout
18 4 UIKitCore
19 5 UIKitCore
20 6 UIKitCore
21 7 UIKitCore
22 8 UIKitCore
23 9 HLLDriver
24 10 CoreFoundation
25 11 CoreFoundation
26 12 HLLDriver
27 13 HLLDriver
```

____exceptionPreprocess
_objc_exception_throw
_NSISLinExpReplaceVarWithVarPlusDelta
-[NSISEngine withBehaviors:performModifications:]
-[UIView(AdditionalLayoutSupport) _switchToLayoutEngine:]
__45-[UIView(Hierarchy) _postMovedFromSuperview:]_block_invoke
-[UIView _postMovedFromSuperview]
____UIViewWasRemovedFromSuperview
-[UIView(Hierarchy) removeFromSuperview]
__41+[HLL r rem: newOn:]_block_invoke HL per.m:70
____NSARRAY_IS_CALLING_OUT_TO_A_BLOCK__
-[__NSArrayM enumerateObjectsWithOptions:usingBlock:]
+[HLLDT r removeAll wOn:] HL er.m:66
-[HLLDT r nt dealloc] HLLD ent.m:706

处理后

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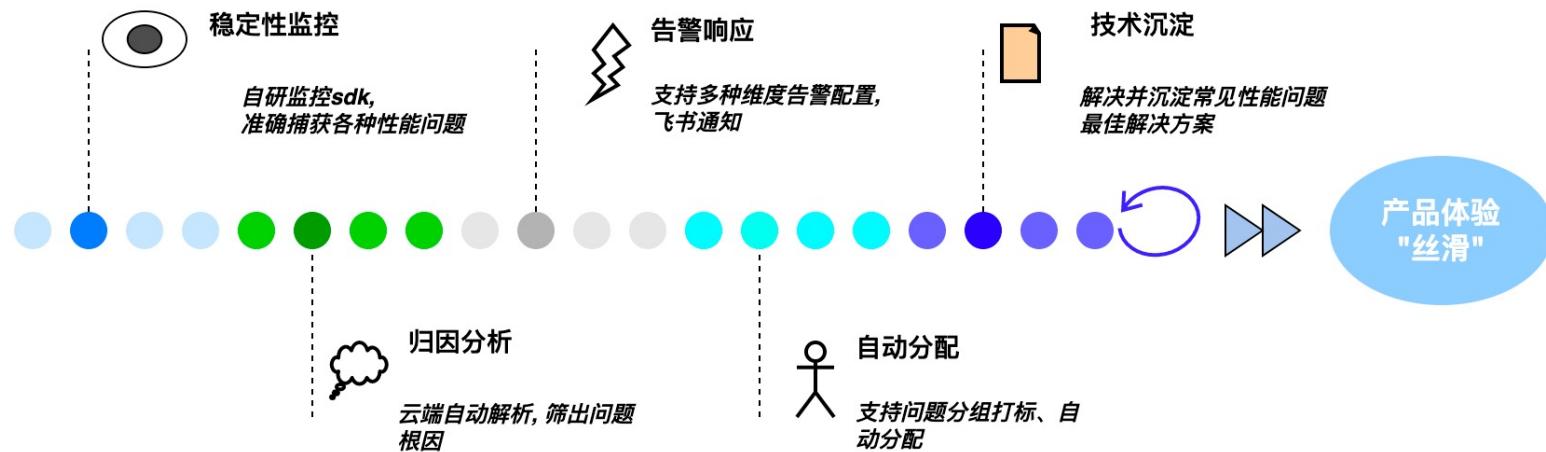


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04 总结与未来



■ 总结与未来



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■ 总结与未来

聚类能力

堆栈捕获

高级搜索

完善APM

卡死监控

线下工具

修复方案推荐

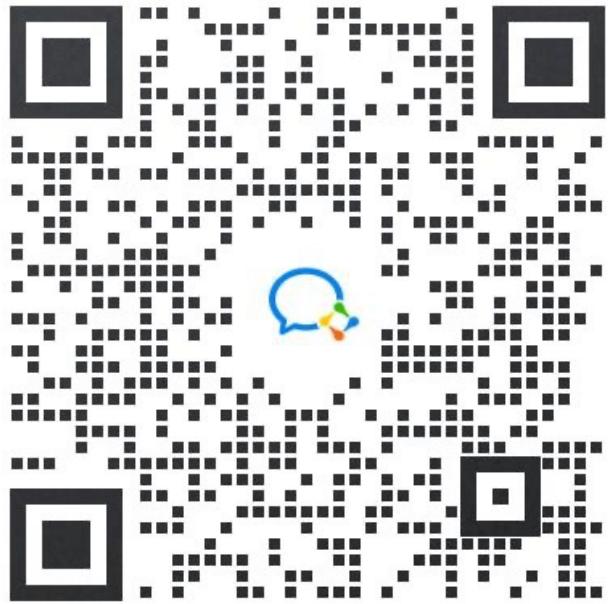
智能归因

解析小工具

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扫码加入官方微信群，与讲师继续交流技术

