



用户行为轨迹回放



- 1 轨迹回放是什么**
- 2 做行为轨迹回放的意义**
- 3 类似系统的实现**
- 4 可行性分析**



前端痛点

- 我们的应用部署在客户端，当出现问题，不像服务端，问题发生在我们自己的机器上，前端没有用户日志，用户操作对我们来说是一个黑盒，只能通过提前做一些埋点或者用户反馈去推测问题发生并验证
- 前端环境过于复杂，不同型号的手机，不同的系统版本，不同的浏览器内核，不同的网络环境，如果不幸遇到偶发性问题，复现就变的难上加难，更不用说debug



用户行为轨迹回放

Sentry

logRocket

Rrweb



```
JS /static/js/main-legacy.da837200.js in Object.destroy at line 1:22005
1. <!doctype html><html lang="en"><head><script type="text/javascript">let HTML_START = +new Date()
2.   let time = '1600332528440'
3.   window.offlineVersion = '-1'</script><meta charset="utf-8"/><meta name="format-detection" content="telephone=no"/><meta name="version" {snip}

/static/js/main-legacy.da837200.js at line 1:154555
/shopee/shopee-kredit-live-id/whitescreen/1.0.4/whitescreen.min.js in o at line 1:30225
```

BREADCRUMBS

...	Show 5 collapsed crumbs	
🕒	fetch POST /credit/data/fe_rpt_recv [200]	17:01:42
🕒	xhr POST https://h5.shopeekredit.co.id/credit/insight/fe_chat [200]	17:01:42
🕒	fetch POST /credit/account/add_user_login [200]	17:01:43
📄	console report resource===== [Object Object],[Object Object],[Object Object],[Object Object],[Object Object],[Object Object],[Object Object],[Object Object],[Object Object],[Object Object],[Object Object],[Object Object],[Object Object],[Object Object],[Object Object]	17:01:43
🕒	fetch POST /credit/data/fe_rpt_recv [200]	17:01:44
🕒	fetch POST /credit/account/get_user_credit_status_scene [200]	17:01:44
📄	navigation to /home?channel=mepage from /index.html?offline_app=shopee-finance-credit-id&offline_app_ver=1.0.0?channel=mepage	17:01:44
📄	console report resource===== [Object Object]	17:01:44
🕒	fetch POST /credit/data/fe_rpt_recv [200]	17:01:45
🚨	exception TypeError: Cannot read property 'removeChild' of null	17:01:48

轨迹实现:

在错误发生时，将一段时间内用户操作上下文以及自定义事件上报。

Tips: 通过插件or配置，可以上传源码，上报具体接口信息等丰富功能



- 不够直观，上报信息过杂，难定性分析
- 需要针对性自定义上报
- 定制性不强



← http://localhost:3001/emergency

PLAYBACK

DEVELOPER

INSIGHTS

Network

Performance

PRO

View DOM

Filter network entries (e.g. method:POST /user/)

All

XHR

CSS

JS

Images

Fonts

Other

Status	Method	URL	0:06min	0:12min	0:18min	0:23min	0:29min	0:35min	0:41min	0:47min	0:53min	0:59min	1:04min	1:10min
200	POST	http://10.129.97.140:3900/mock/85/credit/data/fe_rpt_rcv												
200	POST	http://10.129.97.140:3900/mock/85/credit/data/fe_rpt_rcv												
200	GET	http://localhost:3001/static/js/Transaction.chunk.js												
200	POST	http://10.129.97.140:3900/mock/85/credit/pay/query_bill_txn_detail												
200	POST	http://10.129.97.140:3900/mock/85/credit/data/fe_rpt_rcv												
502	POST	http://localhost:3001/credit/insight/fe_chat												
200	POST	http://10.129.97.140:3900/mock/85/credit/data/fe_rpt_rcv												
200	POST	http://10.129.97.140:3900/mock/85/credit/data/fe_rpt_rcv												
502	POST	http://localhost:3001/credit/insight/fe_chat												

Logs

Details

Filter log entries

All

Logs

Warnings

Errors

Info

Debug

Redux

Navigation

pagehistory null

eventlist null

Warning: componentWillMount has been renamed, and is not recommended for use. See https://fb.me/react-unsafe-component-lifecycles ...

Warning: componentWillReceiveProps has been renamed, and is not recommended for use. See https://fb.me/react-unsafe-component-life...

Warning: Please use 'require("react-router-dom").Link' instead of 'require("react-router-dom/Link")'. Support for the latter will ...

Navigated to http://localhost:3001/emergency

pagehistory null

eventlist null

Warning: componentWillMount has been renamed, and is not recommended for use. See https://fb.me/react-unsafe-component-lifecycles ...

Warning: componentWillReceiveProps has been renamed, and is not recommended for use. See https://fb.me/react-unsafe-component-life...

Warning: Please use 'require("react-router-dom").Link' instead of 'require("react-router-dom/Link")'. Support for the latter will ...

Navigated to http://localhost:3001/emergency

Navigated to http://localhost:3001/select

Navigated to http://localhost:3001/emergency

pagehistory null

eventlist null

Warning: componentWillMount has been renamed, and is not recommended for use. See https://fb.me/react-unsafe-component-lifecycles ...

Warning: componentWillReceiveProps has been renamed, and is not recommended for use. See https://fb.me/react-unsafe-component-life...

Warning: Please use 'require("react-router-dom").Link' instead of 'require("react-router-dom/Link")'. Support for the latter will ...

Navigated to http://localhost:3001/home

code is 0 but result is void Object {code: 0}

Navigated to http://localhost:3001/check

Navigated to http://localhost:3001/check/detail

Navigated to http://localhost:3001/transaction/billDetail

uncaught at rootSaga at rootSaga at rootSaga TypeError: Cannot read property 'instalment_de

This session was recorded locally, the video may not include stylesheets or images. [Learn more.](#) ✕

00:00.000 / 01:10.233

1x 2x 4x 8x

SKIPPING INACTIVITY

CROP SHARE HELP

Pascal from LogRocket

Hi 🙌 Glad you got LogRocket recording your app! Now would be a great time t...



LogRocket

- 支持用户行为以视频形式回放
- 收集用户详细信息
- 回放资源加载
- DOM元素检查
- 提供性能分析

The screenshot displays the LogRocket web interface. At the top, there's a navigation bar with 'PLAYBACK', 'DEVELOPER', and 'INSIGHTS' tabs. Below this, a 'Network' tab is active, showing a list of network requests with columns for Status, Method, URL, and a timeline. A red box highlights the 'network' label in the timeline. To the left of the network view is a 'video' player area, also highlighted with a red box. Below the video player is a list of industries to choose from, with 'Banking Industry' selected. To the right of the video player is a 'console' log area, also highlighted with a red box, showing various log entries including warnings and navigation events. At the bottom, there's a playback controls bar with a timeline, play/pause buttons, and a 'SKIP INACTIVITY' button. A small notification bubble from LogRocket is visible in the bottom right corner.

本地开发的体验

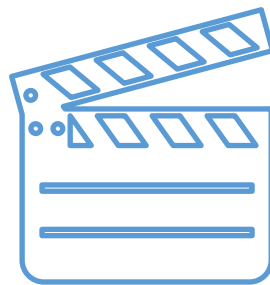


缺点:

收费！ 很贵！



- 开源
- 方便二次开发





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用户行为轨迹的意义

DEV

- Reproduce Bug, 实现远程debug
- 追溯线上的用户问题

PM

- 除了对数据定量分析, 提供定性分析能力
- 让用户面对面操作业务的成本高, 轨迹回放提供这种能力
- 用户最常登陆的页面? 退出率高的原因? 操作场景和使用习惯? 用户行为轨迹回放给UX优化提供最最贴近用户的素材

QA

- 对QA来说, 由于测试机器多, 遇到bug想录屏给dev时操作不方便
- 复现bug时, dev需要QA提供账号, 复现场景, 复现路径, 有了行为轨迹回放, we do not need anything!

Local

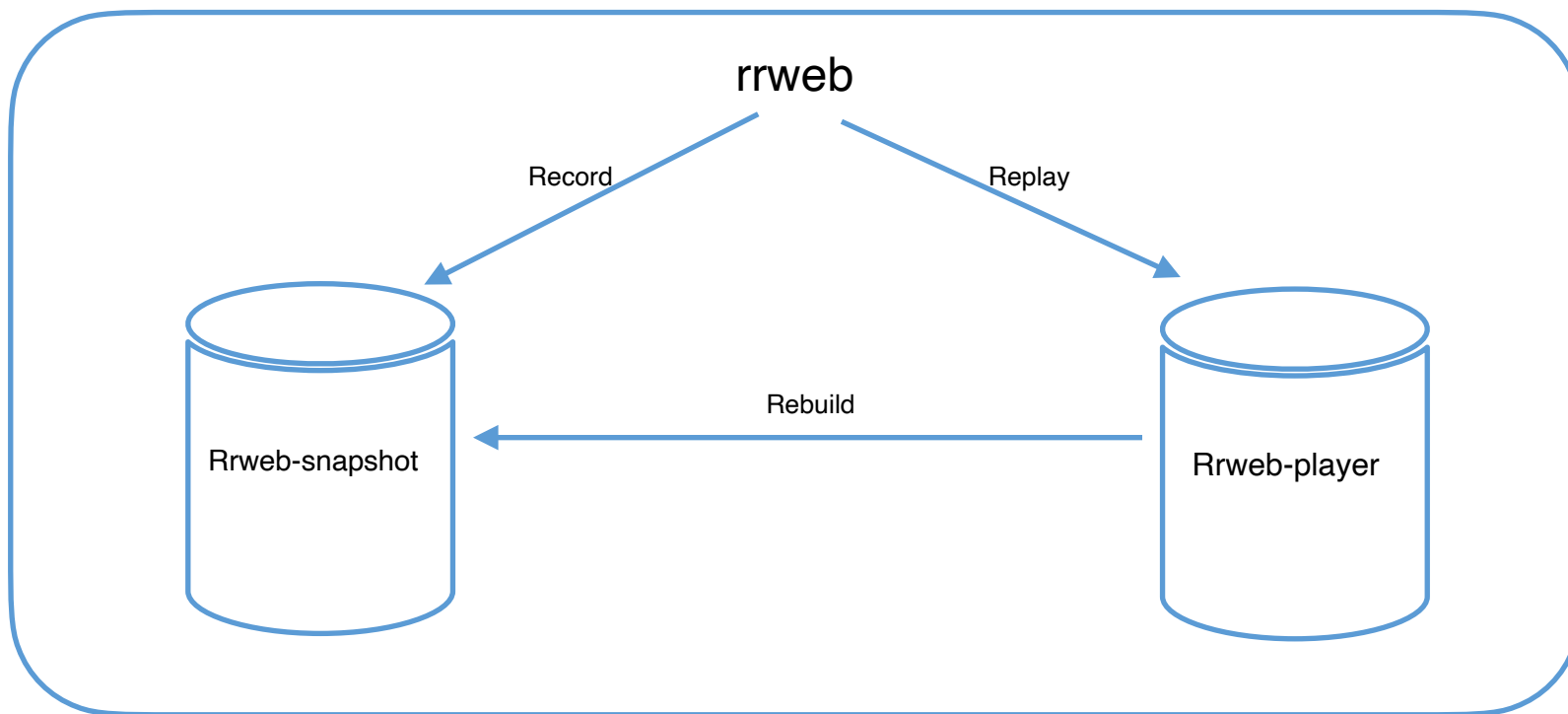
- 语言障碍, 沟通不方便, 使用用户行为轨迹回放, 减少local和dev的沟通成本



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1. Sdk通过序列化DOM，根据用户行为的上传快照
2. 后台侧根据上传的序列根据时间重建dom





序列化

增量快照

沙盒回放



序列化

如果在本地，可以直接对dom深拷贝形成一份快照，但是生成的dom不是可序列化的，且不能保存为文本格式进行传输(JSON)，所以需要DOM进行序列化处理

```
<html>
  <body>
    <header>
    </header>
  </body>
</html>
```

序列化

```
{
  "type": "Document",
  "childNodes": [
    {
      "type": "Element",
      "tagName": "html",
      "attributes": {},
      "childNodes": [
        {
          "type": "Element",
          "tagName": "head",
          "attributes": {},
          "childNodes": [],
          "id": 3
        },
        {
          "type": "Element",
          "tagName": "body",
          "attributes": {},
          "childNodes": [
```




rrweb 在特定时机会生成全量快照，之后会根据视图状态观察所有可能对视图造成改动的事件

- DOM 变动
 - 节点创建、销毁
 - 节点属性变化
 - 文本变化
- 鼠标移动
- 鼠标交互
 - mouse up、mouse down
 - click、double click、context menu
 - focus、blur
 - touch start、touch move、touch end
- 页面或元素滚动
- 视窗大小改变
- 输入

每一次视图变化都生成一个事件



```
{  
  type: EventType  
  timeStamp: number  
  data: {}  
}
```



沙盒回放

1. 禁止script执行

2. 避免链接跳转

3. css 等内联图片路径修改

4. hover等样式

5. 类播放效果

实现



1. 将script标签改为noscript，并在iframe中沙盒播放

2. 禁止a链接

3. 上报时将外部样式改为内联

4. 在发生hover等交互事件的dom元素添加类

5. 进度条拖动(分为两个part，拖动前同步播放，后面异步)



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收集rrweb的事件序列， 转成一个json， 上报到sentry attachments， 提供下载

memset

test-transaction

Fatal Error: EXCEPTION_ACCESS_VIOLATION_WRITE

Resolve

Ignore

Star

Share

Open in Discover

ISSUE #

RUST-5M

EVENTS

3

USERS

1

ASSIGNEE

Avatar

▼

Details

Comments 0

User Feedback 0

Attachments

Tags

Events

Merged

Similar Issues

All Attachments

Only Crash Reports

NAME	TYPE	SIZE	ACTIONS
b2f7ac6b-f2a1-464b-aeb9-93d810984f19.dmp May 27, 2020 6:20:52 PM UTC • 3bd48395b3dc42e7838e8dd70e73bf50	Minidump	177.4 KB	<div>Download</div> <div>Remove</div>
596ac524-7bbd-4b37-910a-a1e86cedf47c.dmp May 27, 2020 6:11:26 PM UTC • 7c592d7d2b1641dc834569b181257d59	Minidump	177.8 KB	<div>Download</div> <div>Remove</div>
f9990bc8-cd58-4ee4-ba45-c9c247848c3d.dmp May 27, 2020 6:09:03 PM UTC • 6ed93b3ef558411d8618780a7abd34dc	Minidump	182.2 KB	<div>Download</div> <div>Remove</div>



可行性分析

自研？



用户一次行为产生流量



可行优化点(maybe?)

- 减少用户规模
 - 数据记录在本地，通过indexDB/native-bridge 等方式存储在用户本地
 - 提供feedback页面，用户出现问题时，一键上传本地日志
 - 远程回溯分析
- 内部使用
 - 开发类似eruda的工具，提供QA/local使用，方便bug上报



Thanks!