



# technology Association

# High Performance Android Dev in TaoBao

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# Agenda

- 淘宝客户端 Android
- 移动互联网客户端用户体验
- Performance —— 高性能应用的标准
- 淘宝如何面对挑战
  - 内存
  - 来自网络
  - 动画性能测试
  - 界面切换动画速度优化



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# What we have done

- 每日 400W UV
- ONE released per month
- 千分之三 的线上 Crash 发生率
- 支持 WEBP, 30% off in image size
- Improve in poor network
- Improving Page Switching Animation



- App运行在客户的设备上
- App是属于用户的，Web不是



# 运行在客户的机器上

- 用户使用时的感受
  - 你对家里的冰箱和办公室里的冰箱的需求，是不同的
  - App是属于用户的私人用品
- 千差万别的设备能力 = 不同的瓶颈
  - CPU, RAM, 屏幕大小, 操作性, 电量
- 运行环境的复杂
  - 用户的网络环境, 电量, 流量, 内存



# 我们对用户体验的理解

- 优先满足用户的基本期望  
先吃饱，后吃好，“上菜”速度一定要快
- 客户使用时的具体感受——换位思考  
简单，方便，稳定，快速
- 先满足哪一部分用户的期望?  
对功能补充和优化 vs 新功能开发时，请相信你的PD



- UIUE
- 保持可持续地开发效率是第一重要的事情  
DRY  
Focus On One Point
- 效率和兼容性 大于 速度
- 性能的四大金刚：稳定性，流量，速度，电量



性能

- 4大金刚



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好的软件结构保证优化 事半功倍

应用框架基础

Rich View

Data Provider

Push

TBWebview

API Request

Cache

Image Pool

Utility

OS Framework

MTop API, 3rd API

Server



- 我们花多少精力放在用户体验上呢?
  - 体验助产品领先竞争对手，但不能将产品变成用户需要的
- 细节重要，但不期望所有用户都感受到
- 团队的品味决定产品的品质，多使用好的产品

**30% we prefer**

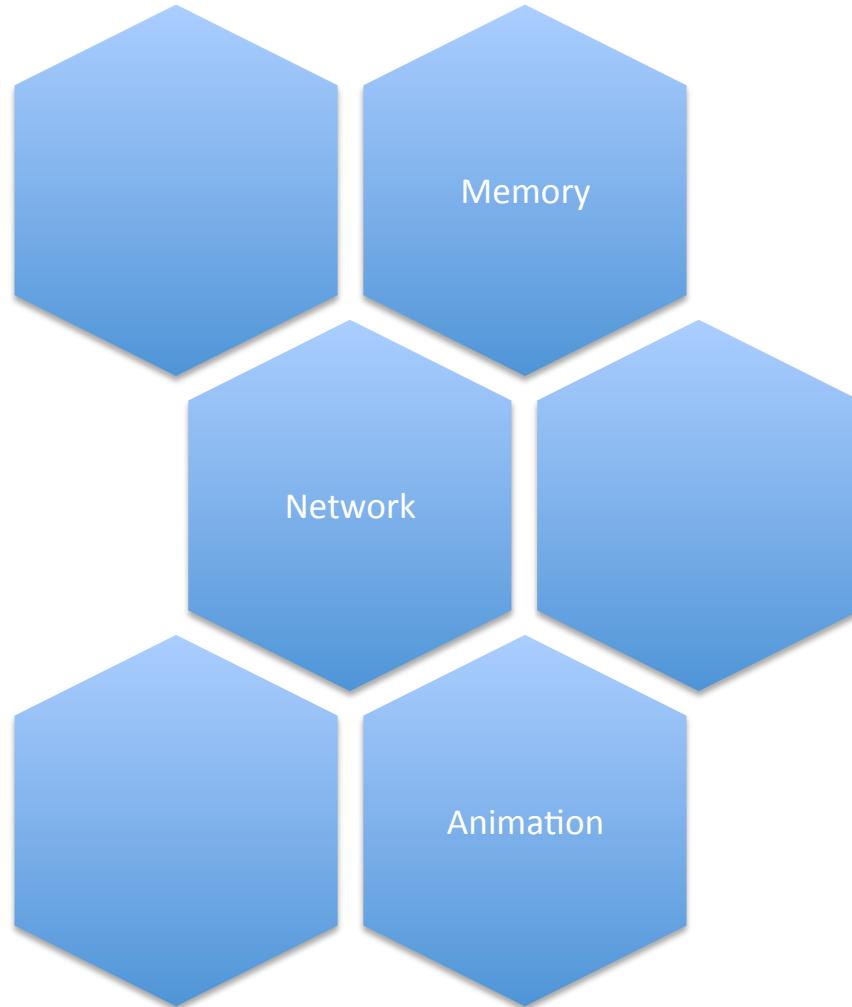


# Which Solution?

- Find Solution in Android SDK at first
  - If no, just waiting
  - If necessary, implement by yourself
  - TIP: Always follow Android Style



# 淘宝客户端实践

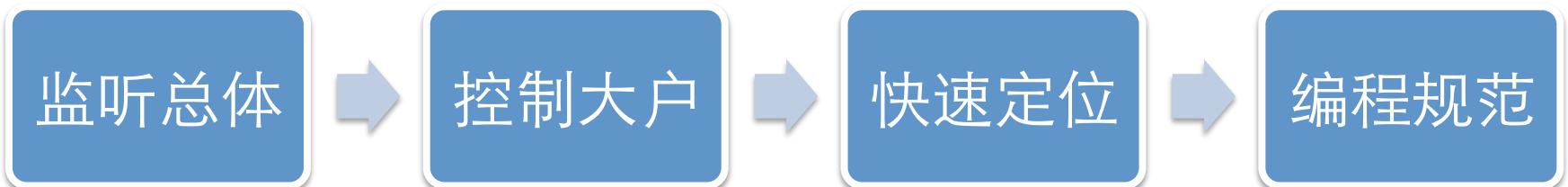




# Memory Case

- JAVA Garbage Collection can't do as effective as what C++ have done. But it take on high speed for development in most case.
- TaoBao app is a special case.
- Memory Impact for performance
  - Unstable in some of poor device by OOM
  - GC process always “impact” the animation of UI
  - NO Elegance, it is very important for developer!

# Overview



- Coder should know why and how we do this?
- Coder will be happy to save his time by our tools.



- Native Bitmap Checking
  - Image Pool
  - Bitmap Proxy
- Activity Checking
  - StrictMode
  - TaoBao Activity Monitor
- Don't transfer Big Object by Msg
- Set RAM Limitation for poor device



- Data shared between thread
- Set object null immediately
  - Skip Memory Allocation while list view Scrolling is not enough.
- Tools and Framework
  - MAT, DDMS
  - Perf tool by taobao
  - Native RAM Monitor
    - image pool & customized ROM to monitor bitmap and native RAM(skia)
  - BaseActivity, ImagePool, Cache

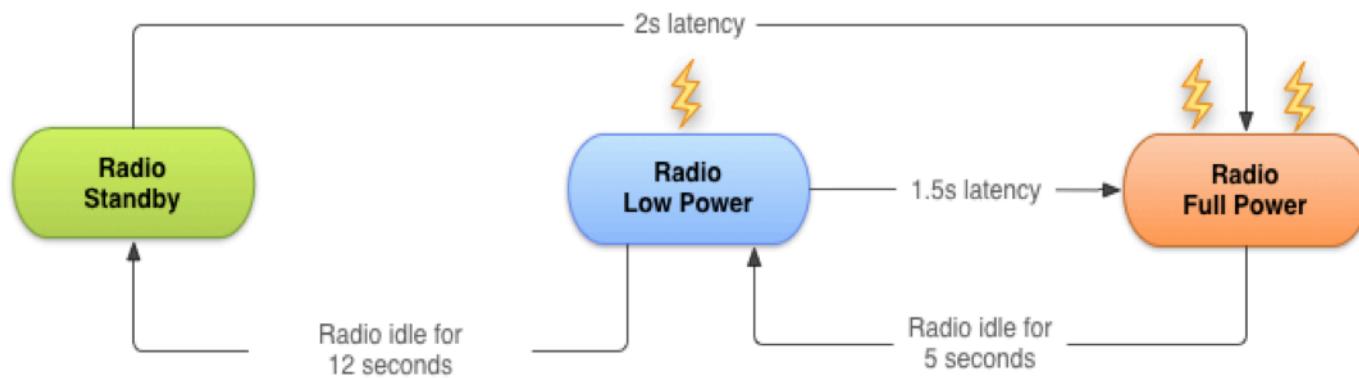


## 2, Network

- Limited bandwidth
- High latency
- Unstable

# Three States

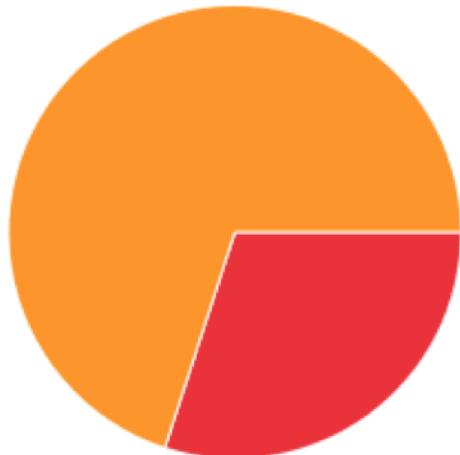
- Idle
- Full Power
- Half Power



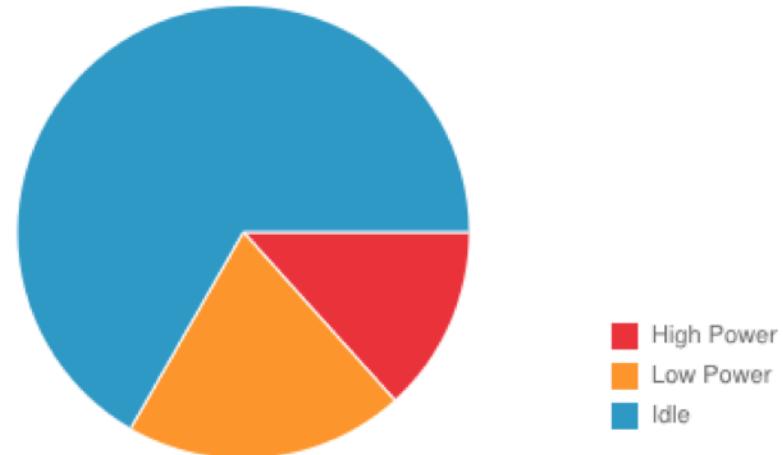
# Bundled Transfer

- 尽量把分散的网络连接集中起来，在一次网络请求中进行

Unbundled Transfers



Bundled Transfers



- 2G GPRS, 下载3个 150KB size的图片
- 顺序下载

15s

30s

44s

- 并发下载

28s

32s

37s



# Other optimization

- Inefficient Connections
  - Offloading to WIFI When Possible
  - Unnecessary refresh, Duplicate Content
  - Periodic Transfers
- No Multiple Simultaneous TCP Connections
- Use Cache-Control
- Pre-fetching(by Business)



- webp support
- Connection optimization in Mobile Network(Money and Power Save)
- Different image strategy in WIFI, 2G/3G
- Incremental decode while downloading
- 断点续传, uncompleted Image Cache
- Cache-Control for statistic resource
- Thread Pool



- ARO by AT&T
- DDMS
- Ref: [https://developer.att.com/developer/legalAgreementPage.jsp?  
passedItemId=9700312](https://developer.att.com/developer/legalAgreementPage.jsp?passedItemId=9700312)
- Ref:  
[http://developer.att.com/home/develop/referencesandtutorials/  
networkapibestpractices/](http://developer.att.com/home/develop/referencesandtutorials/networkapibestpractices/)  
[Top Radio Resource Issues in Mobile Application Development.pdf](http://developer.att.com/home/develop/referencesandtutorials/networkapibestpractices/Top_Radio_Resource_Issues_in_Mobile_Application_Development.pdf)
- Ref: <http://developer.android.com/training/efficient-downloads/efficient-network-access.html>



## 3，界面动画的优化

- 动画“快”不等于 体验好， 动画流畅是关键
  - 防止跳帧
- ListView 优化



- Activity Switching performance is bad
- Two Solution
  - Let your page into one Activity
  - Use Fragment



- 交互体验调整能让用户感受到体验提升
- 淘宝店铺 的动画效果优化
  - 让等待不那么无聊

# Layout

- Use Lint
- Layout Tree: Fewer is better, wide and flat
- 80 views is Good Number, but Google Market have more than 200+ views

Performance sensitive paths	
Measurement	onMeasure()
Layout	onLayout()
Drawing	draw() dispatchDraw() onDraw()
Events handling	dispatchTouchEvent() onTouchEvent()
Adapters	getView() bindView()

and you really, really want to avoid allocating memory.

Google I/O



# Performance Tools

- Find and locate Problem
- Frame Rate(FPS) for animation
- Memory Usage
- Layout Checking , use Lint
- Network Performance, use ARO and DDMS
- trace view
- Power Monitor



# Thanks

## Q&A

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