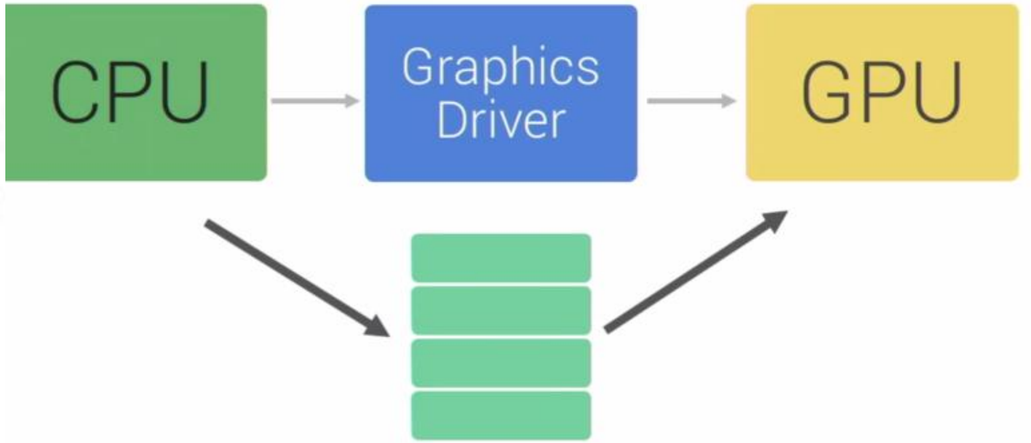
霍格沃兹测试学院-测试开发工程师的黄埔军校

cpu统计

MrDong

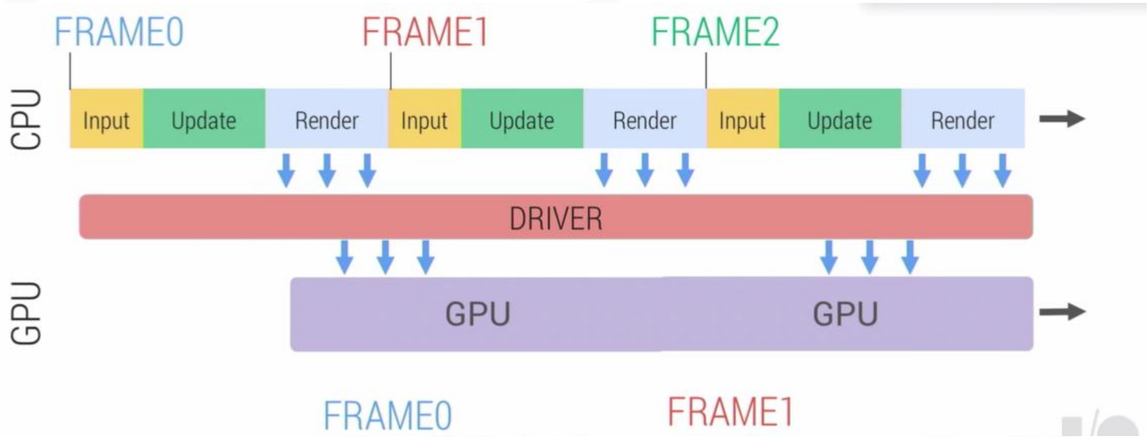
CPU与GPU的关系

- 图形API不允许CPU直接与GPU通信
- 通过中间层来连接这两部分



CPU与GPU的关系

- 中间层维护一个队列
- CPU把display list放入队列
- GPU从队列取数据进行绘制

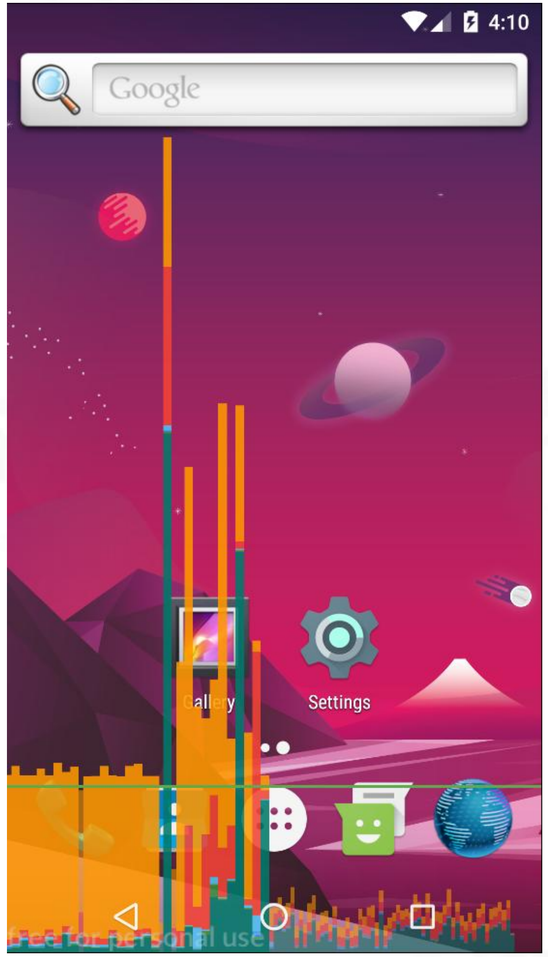


GPU渲染工具

- Android开发者工具提供性能调优工具
  - GPU渲染分析：GPU-RENDERING-PROFILE

GPR显示情况

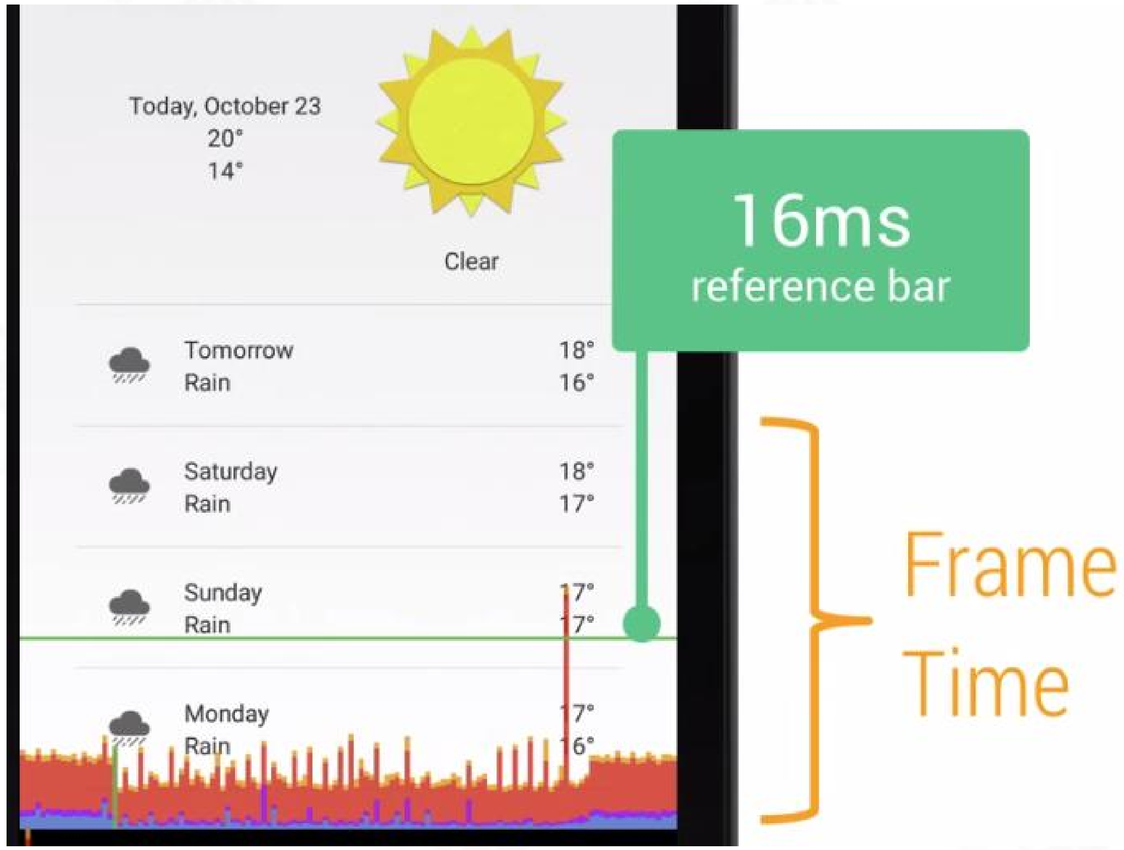

4:11
搜索股票/组合/用户/讨论
关注
推荐
热门
雪球 7x24
04:55 美股银行股盘前走高。瑞士信贷涨8.62%，德意志银行涨8.05%，瑞银涨7.97%，摩根大...
雪球热股
全部
涪陵榨菜 +10.01%
中国平安 +3.28%
蓝英装备 -9.46%
复星医药 +8.59%
中兴通讯 +4.21%
双汇发展 +6.35%
万马科技 -9.98%
行情
交易
我的


4:10
Google
Settings

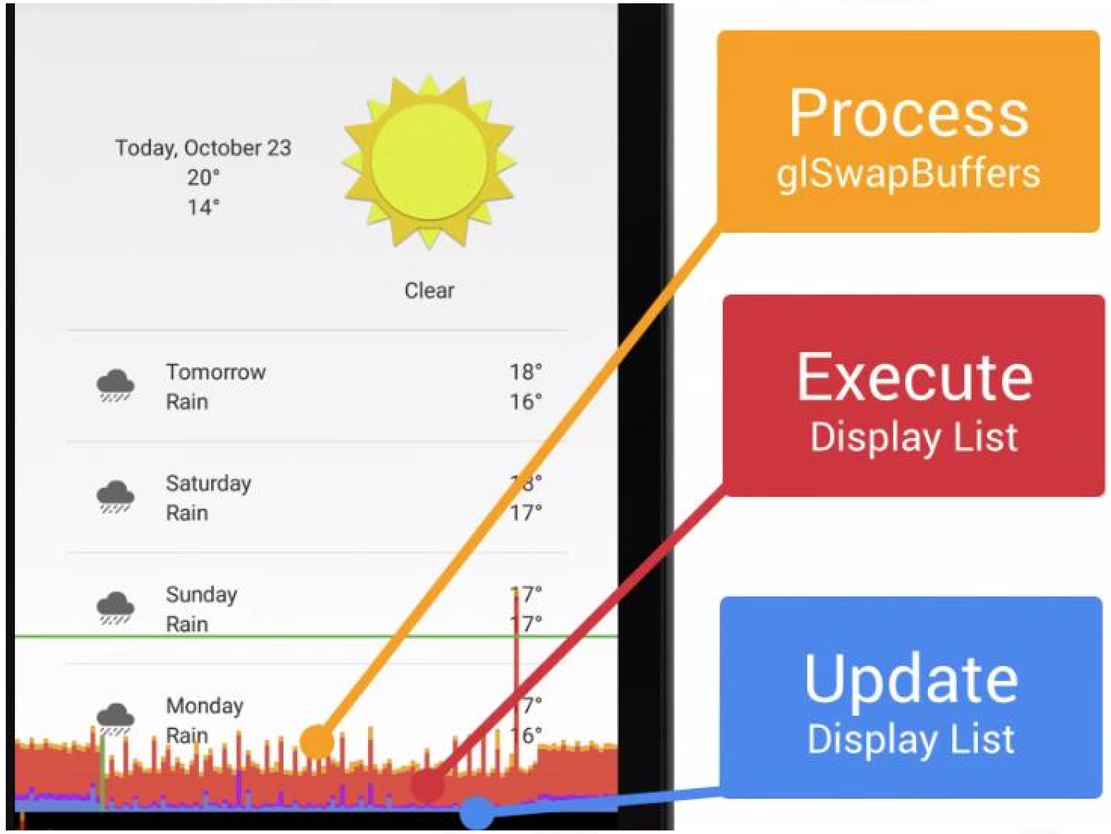
GPR显示内容

- 绘制每一帧所消耗的时间
- 不同的颜色代表UI绘制的不同阶段
- 并且在柱状图的中间还有一根绿色的横线代表16ms的绘制时间基准
- GRP会统计并显示app最近运行的128帧

显示解析

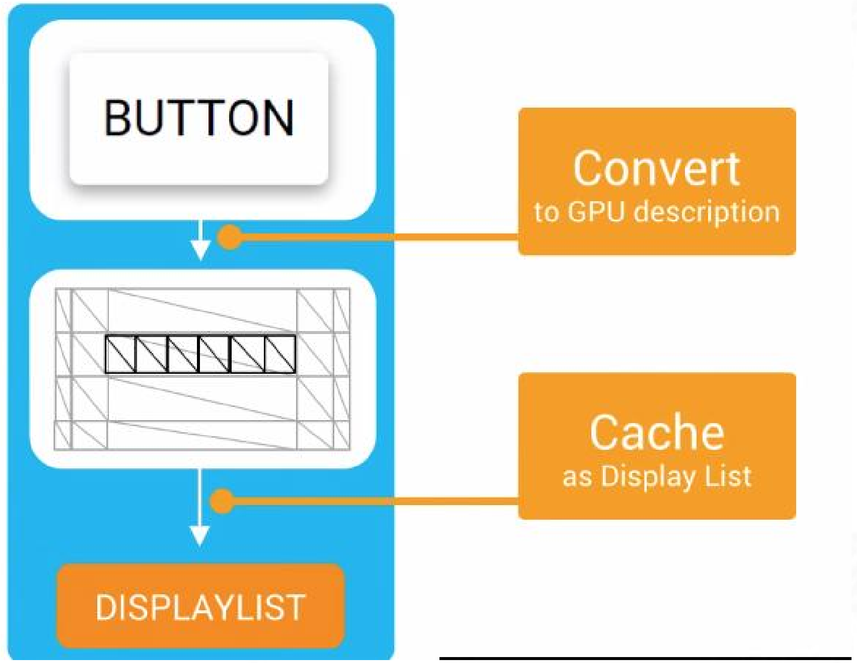

Today, October 23
20°
14°
Clear
Tomorrow
Rain
18°
16°
Saturday
Rain
18°
17°
Sunday
Rain
17°
17°
Monday
Rain
17°
16°
16ms
reference bar
Frame
Time

显示解析


Today, October 23
20°
14°
Clear
Tomorrow
Rain
18°
16°
Saturday
Rain
17°
Sunday
Rain
17°
Monday
Rain
Process
glSwapBuffers
Execute
Display List
Update
Display List

蓝色

- View 需要先转换为GPU能识别的格式
- 蓝色较高
  - view突然无效（invalidate）
  - onDraw函数中做了复杂的绘制逻辑



红色

- OpenGL处理DISPLAYLIST，将处理结果传递给GPU
- 红色较高
  - view过于复杂
  - view重复提交

橙色

- cpu在等待gpu完成工作
- 橙色较高
  - GPU任务太多，复杂的view绘制

不同颜色的意义

Component of Bar	Rendering Stage	Description
	Swap Buffers	Represents the time the CPU is waiting for the GPU to finish its work. If this bar gets tall, it means the app is doing too much work on the GPU.
	Command Issue	Represents the time spent by Android's 2D renderer issuing commands to OpenGL to draw and redraw display lists. The height of this bar is directly proportional to the sum of the time it takes each display list to execute—more display lists equals a taller red bar.
	Sync & Upload	Represents the time it take to upload bitmap information to the GPU. A large segment indicates that the app is taking considerable time loading large amounts of graphics.
	Draw	Represents the time used to create and update the view's display lists. If this part of the bar is tall, there may be a lot of custom view drawing, or a lot of work in onDraw methods.
	Measure / Layout	Represents the amount of time spent on onLayout and onMeasure callbacks in the view hierarchy. A large segment indicates that the view hierarchy is taking a long time to process.
	Animation	Represents the time it took to evaluate all the animators that were running that frame. If this segment is large, your app could be using a custom animator that is not performing well or some unintended work is happening as a result of properties being updated.
	Input Handling	Represents the time that the app spent executing code inside of an input event callback. If this segment is large it indicates that the app is spending too much time processing the user input. Consider offloading such processing to a different thread.
	Misc Time / VSync Delay	Represents the time that the app spends executing operations in between two consecutive frames. It might be an indicator of too much processing happening in the UI thread that could be offloaded to a different thread.

不同颜色的意义

墨绿色	MiscTime/VSync Delay	代表在连续两帧间的时间间隔,可能是因为子线程执行时间过长抢占了UI线程被cpu执行的机会.
深绿色	Input Handing	代表app在用户输入事件回调中花费的时间，这部分过高可能意味着app处理用户输入事件时间过长，建议将操作分流到工作线程.
绿色	Animation	代表为该帧内所有animator求值(属性动画中代表通过估值器计算属性的具体值)所花费的时间.如果这部分过高，代表自定义animator性能不佳或者更新view属性引发了某些意外操作.
淡绿色	Measure/Layout	代表了onLayout和onMeasure方法消耗的总时间，这段很高代表遍历整个view树结构花费了太多时间.

不同颜色的意义

深蓝色	draw	代表创建更新DisplayList的时间，过高代表在onDraw中花费过多时间,可能是自定义画图操作太多或执行了其它操作.
浅蓝色	sync&upload	向CPU传输Bitmap花费的时间,过高代表了加载了大量图形.
红色	command Issue	Android 2D渲染器向OpenGL发出命令绘制或重绘display lists 花费的时间，柱子的高度等于所有Display list绘制时间的总和.
橘色	swap buffers	代表cpu在等待gpu完成工作,如果过高代表GPU需要完成的工作过多.

参考阅读

- https://developer.android.com/topic/performance/rendering/inspect-gpu-rendering