



Android engineering for millions of users

Extended Google I/O Singapore
01 July 2017



Largest in SEA
>930,000
drivers in network



#1 e-hailing in SEA
45 Million
downloads

55 CITIES
7 COUNTRIES



third-party
taxi-hailing apps



private cars
& growing

All about..

Grab @Google I/O

Grab - Google I/O

Innovation is the ability to see change as an opportunity

In Android development, Google IO technological changes creates momentum for favourable transformations

There is a way to do it better

- Meet and listen top world engineers
- Discover and try latest releases
- Challenge your product: UI/performance reviews
- Hire talent



Sundar Pichai

Grab - Google I/O

Remarkable action items

- **Kotlin made first class citizen**
 - Grab fully commits on Kotlin
 - Ruslan Kim on Singapore Kotlin's dev group
- **Instant Apps**
 - Native Android apps, without the installation
 - Multi modular app, url communication
 - Arch refactor
- **Android architecture components**
 - A new collection of libraries for robust, testable, and maintainable apps.

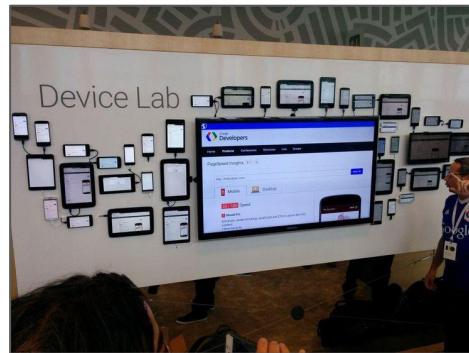


Jake Wharton

Grab - Google I/O

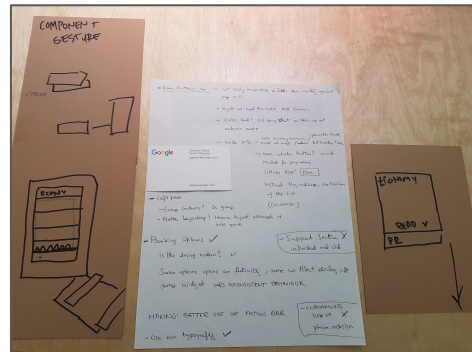
Benchmark your Android app

- UX / UI review
- Performance review



Outcomes for PAX Android

- **App has been re-designed** with latest UI and innovative custom made components
- **Re-architecture** and deep refactoring ground work
- **Security** enhancements
- More effective user communication



Google IO UX labs

All about..

Teams, sprint planning & QA

Cross functional teams

Organisational model

- Decentralized teams
- Multiple units with different domain expertise
- Rotation among these units

Benefits

- Development speed ↑
- Multiple domain knowledge
- Home - Office flexibility
- An expertise - Grab expertise



Work units

Rollout journey

Sprint planning

- **PM/PMO**
- **Engineering Manager**
- **QA**

Steps

- **Kick-off meeting with brainstorming session**
- **2 weeks sprint cycle**
- **Daily standups & desk checks**
- **QA**
- **Rollout - beta/release**
- **Retrospective**



Multiple Drop Off release

Assuring stability

QA testing (prevention)

- CI system
- Feature testing
- Automation (API)
- Regression (App automation + Manual)

Oncall engineers (reaction)

- Specialized vertical team
- Quick evaluation & reaction (crashlytics)
- Hotfix deployments
- Campaigns tracking
- Postmortem reports



QA sign off

All about..

Architecture, development

Grab Android architecture

ARCHITECTURE TIMELINE

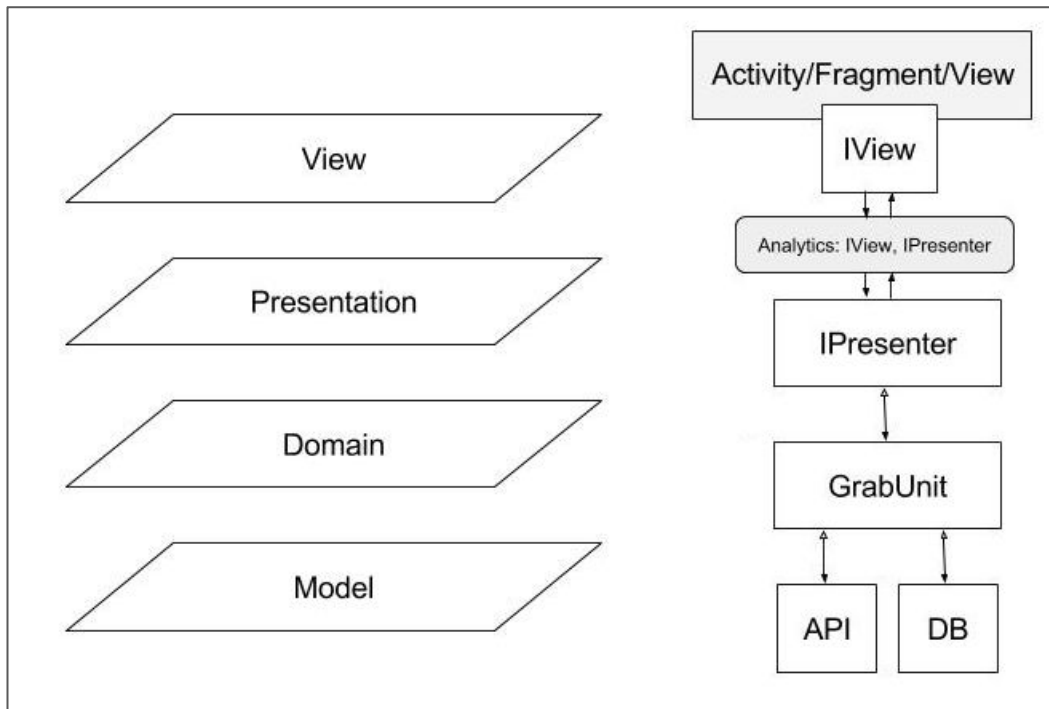
- MVP with EventBus
- MVP with DI and RxJava
- Clean Architecture + Kotlin
- MVVM (In considerations)

SINGLE MODULE

MULTI-MODULAR APPROACH

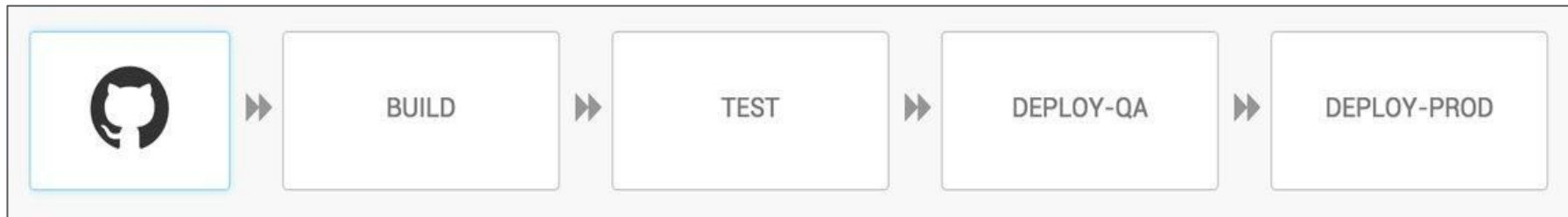
SYNCHRONOUS DB

ASYNC Encrypt DB (Using Rx)



Development Process

- Flag based feature development (custom WatchTower)
- Overseas contribution collision (Usa, Canada, Vietnam, India, China)
 - Quality standards for development
 - In depth code reviews
 - Mandatory unit testing
- A/B experiments (marketing, financial)



Source control

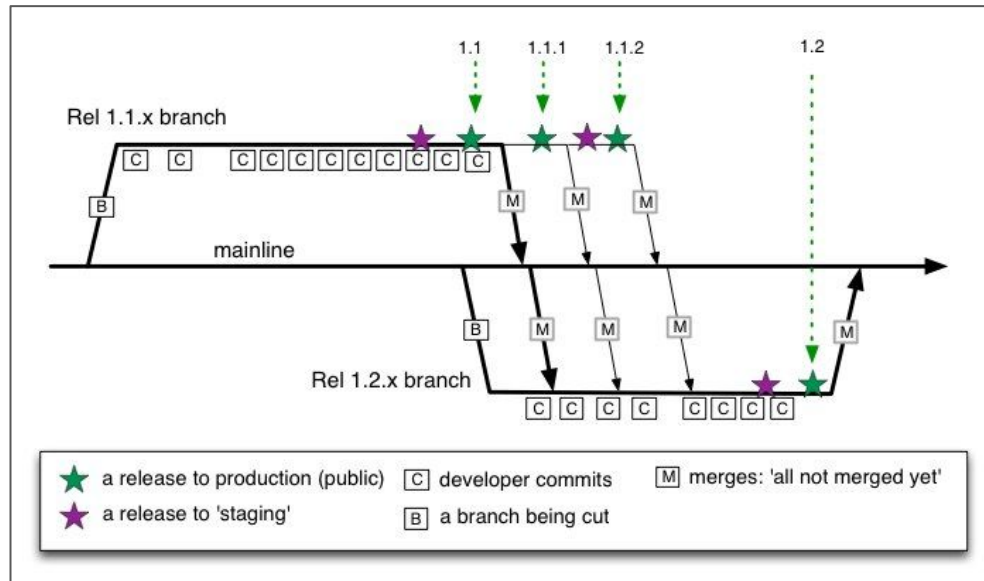
Allow hundreds of engineers to contribute simultaneously

Trunk methodology

- Feature are hotfix Based
- Develop is Master based
- Flagging for new features to periodic code push

Release manager

Engineering check upon readiness & feature activation



All about..

Vision and execution

Grab vision and execution

Solve critical transportation challenges

Grab's core product platform includes commuting solutions for drivers and passengers with an emphasis on convenience, safety and reliability.

Execution is key..... on mobile even more!

- **React fast:** MVP, while improving iteratively
- Enforce and **protect your business core**
- **A/B testing** and user feedback for revamping
- Early adopters on **latest technologies**



Security

Android security enforcements

Few months ago, Grab presented how to securely design and build Android applications.

Enforce security

- On your code
 - Reverse engineering
 - Apk tool
 - Pro guard and dex guard
- On your data
 - Cryptography
 - Keystore and fingerprint
- On your communications
 - Man-in-the-middle
 - Certificate pinning
- On Android OS
 - Rooting devices
 - Rooting detection

Wer rastet, der rostet

Hiring globally to... **Drive Southeast Asia Forward**





We're just getting started

ANDROID PAX
ENGINEERING