BCS Bristol Autumn School

Testing your App

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Delivering tailored solutions for software testing and hardware verification
What we’ll cover

• Why test?
• Mobile testing challenges
• Developing a test strategy
• Testing different aspects of your App
Why test?

- Identifies bugs introduced in development
- Ensures there is no unwanted functionality
- Reduces development and schedule risk
- Reduces the cost of failure
- Confirms that the software works as desired
- Provides confidence in the software
- Measures quality, helping to decide when to release software to the market
And if you don’t …

Fail to do a good job of testing and your customers will end up doing it for you.

Customers expect an App to work ….. and when it doesn’t there are other options just a couple of clicks away.
No hiding place …..

Testing is not just about finding bugs

It’s about gaining confidence in the quality of your App
Mobile Testing Challenges
Device diversity and more

Web testing is a challenge

Mobile testing is even more of a challenge
And add to that …
With more challenges

- Rapidly changing landscape – new devices and OS versions
- Extreme time to market pressure for new apps and versions
- Frequent updates to 3rd party Apps
- Greater performance concerns – memory, CPU, power
- Lack of mature testing tools
Developing a Test Strategy
We all know this ....

Relative Cost of Defect Fix

1X  5X  10X  20X  50X  >150X

Requirements  Design  Code  Dev Test  Accept Test  Operation

Source: Boehm – Equity Keynote Address 2007
So shift ‘Testing’ left

Defect Detection Point

Requirements → High Level Design → Low Level Design → Code → Dev Test → Accept Test

Defects
Elements of a test strategy

- Take account of development flow and release phases
- Levels of testing
  - Unit
  - Integration
  - Application
  - End-to-end system
- Test exit criteria
- Test environment
  - Devices/emulators etc
- Test automation tools
- Resourcing
  - In-house/Outsourced/Crowdsourced
Test environment – devices

- Time/cost constraints and device availability limit devices to test on
- Master list of ‘must have’ and ‘good to have’ devices
- Group based on manufacturer/OS version/screen size etc
- Identify candidate device in each group
- Test on emulators until App stable
- Full test on real candidate devices
- Sanity test on other devices
Test environment – remote devices

- Subscription based SaaS
- Remote access to hundreds of real devices
- Connected to real networks around the world
- Record & play/keyword based scripting
- Detailed reports

Perfecto mobile
DeviceAnywhere
Test environment - emulators

- Access to a large number of device types/browsers
- Easily switch devices types
- Fully instrumented
- Lack quirks, faults and characteristics of real devices
Resourcing - crowdsourcing

- On-demand extension of testing resources
- For ‘in the wild’ testing
- Coverage across devices, networks, locations and languages
- Can be cost effective and quick
- Feedback analysis required

uTest
Testing Different Aspects of Your App
Unit testing

- Should be first priority
- Separate UI and app code logic to make unit tests more granular and faster
- Decouple unit tests from emulator to make faster

Roboelectric, JUnit (Android)
OCUnit, GHUnit, OCMock (iOS)
Application testing

- **Functional**
  - Does App perform intended functions?

- **UI**
  - Does it meet platform requirements etc?

- **Usability**
  - Is it easy to use/intuitive?

- **Localisation**

- **Performance/load**

- **Security**
  - Authentication, authorization, privacy etc
Manual testing

- Traditional method of mobile testing
- Manual execution of test cases
- Visual verification of results
- Repetitive and time consuming
- Prone to human error
- Can be costly and slow when frequent releases
- Still main option for UI, Usability, Performance/load and Localisation testing
Automated testing

• Primarily used for functional testing
• Define tests once & execute multiple times
• Useful for regression and cross-platform tests
• Can reduce effort/time to market
• No generic automation framework available for all mobile devices
• Some features can’t be simulated so will require manual testing
Test automation tools

- **Android**
  - Robotium (free)
  - MonkeyTalk (free)
  - QTP (paid)
  - Ranorex (paid)
  - eggPlant (paid)
  - DDMS (monitor CPU and memory)

- **iOS**
  - MonkeyTalk (free)
  - QTP (paid)
  - Ranorex (paid)
  - eggPlant (paid)
  - iOS Instrumentation (monitor CPU and memory)
Testing – the network challenge

- Multiple network technologies
- Protocol handling differences
- Mobile web proxies imposing restrictions
- Test over internet or LAN (network bypass) – emulators will do this
- Also some emulators can internet access mobile web proxy for testing
- Use real devices on location where possible
Security testing

• **Threat Modelling**
  – identifying possible attacks and defining controls to prevent them
  – prevent/detect/mitigate
  – defensive v adversarial

• **OWASP Mobile App Threat Model (beta)**
  • Open Web Application Security Project
  • Top Ten Mobile Risks
Threat modelling

MOBILE THREAT AGENT IDENTIFIER & TYPES

Thief/Stolen Device User

Machine

Browser Exe Script

Executes

Sends

Installed Malware App

Decompile

SMS

App

Wifi/GSM

Application Memory

Reads

Sends

Sniffs

Device User

Atacker

Codes
Security testing tools

- **Static analysis**
  - Clang static analyser (Objective C)
  - FindBugs (Java)
  - Veracode (all platforms)

- **Dynamic testing**
  - OWASP Zed Attack Proxy

- **Forensic analysis**
  - Android Debug Bridge
  - iPad File Explorer
  - SQLite Database Browser
And finally …
You are not alone

- Do not have the right tools to test (65%)
- Do not have the devices readily available (52%)
- Do not have the right testing process/method (34%)
- No mobile testing experts available (29%)
- Do not have in-house test environment (19%)
- Not enough time to test (18%)

World Quality Report 2012-13
Capgemini, Sogeti, HP Software
Testing your App

- Mobile App testing is challenging
- Focus on building quality and security in
- Develop a clear test strategy
- Make use of test automation
- Manual testing and real devices are part of every test strategy

*Don’t leave testing to your customers*
Thank you

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Checklists

• Android app testing check-list
  http://testeropine.blogspot.in/2012/10/testing-checklist-for-android-app.html

• iOS app testing check-list
  http://testeropine.blogspot.in/2012/10/testing-checklist-for-ios-app.html

• Scripts that automate many static security testing preparation tasks for both iOS and Android
  www.smartphonesdumbapps.com