Mobile Applications: What is Your Testing Strategy?

SQuAD Conference
September 14, 2015
Jeff Tatelman
Agenda

- Speaking the same language
- Testing Types & Challenges
- Deriving your Testing Strategy
Speaking the same language
Mobile Applications Platforms

- **Native** mobile applications are directly installed on the mobile device while mobile web pages can be viewed from any mobile device.

- **Hybrid** apps are when a native “wrapper” is used to standardize interaction with web content.

- **Mobile Web** applications display conventional HTML/CSS websites in the mobile browser. These sites normally have a simplified interface for ease of use on smaller device
Test Environments

- Mobile Testing Cloud – a centralized repository of testing devices available over inter/intranet
  - Onsite Cloud
    - Inside firewall
  - Offsite Cloud
  - Bring your own devices
Network Virtualization

- The process of combining hardware and software network resources and functionality into a software administered virtual network.
- Allows simulating a variety of network conditions to explore impact on application under test.
Crowdsourcing

- Obtain (information or input into a particular task or project) by enlisting the services of a number of people, either paid or unpaid, typically via the Internet.

- Socializing Mobile Testing on different devices and locations
Mobile Testing Types & Challenges
50% of consumers will delete a mobile app if they encounter a single bug…”

Business Wire, February 2014

Consumers will abandon an app in 3 seconds or less…”

HP Enterprise 20/20, October 2014
Maintaining Continuity

- Layout issue
- OS issue
- Network issue
- Authentication issue

Device incompatibility

- Error message on iPhone 3G
- Error message on Android

OS issue

- Error message on iPhone 4S

Network issue

- Error message on iOS

Authentication issue

- Error message on Android
Connectivity Testing

- **Challenge:** How do I test to make sure my application will work when not in ideal “in house” testing conditions?

- **Resolution:** Simulate different conditions to test how your application responds to different connection types. This can be done by emulating the network connection type or by using real devices in the field.

  Example: crowdsources

- **Tip:** You don’t have to test every single scenario, a simple 3 point scale test is usually sufficient (great connection, OK connection, and really bad connection)
Latency Testing

- **Challenge**: How does latency affect my application and underlying application infrastructure?

- **Resolution**: Use Network Virtualization to simulate latency, packet loss and throughput and analyze the impact on the application. Issues with latency can cause the application to perform slowly or incorrectly.
Interoperability Testing

- **Challenge:** How do I test how my app recovers from external interruptions?

- **Resolution:** Perform Exploratory Testing – how the app recovers from unintentional interruption (loss of network, other app pushes, calls texts, alarms, screen timeout) within eco system of the mobile OS.
Infrastructure Testing

- **Challenge:** Which layers of my application do I test within the application infrastructure?

- **Resolution:** Analyze how the app was developed and check the lowest level with functional level tests and reduce unnecessary retesting.
  - Ex. A “hybrid app” that is simply a wrapper for web service calls don’t need to be functionally tested as thoroughly if the APIs have already been tested.
Native Device Testing

- Challenge: How to I test all the different devices to test my native application?

- Resolution: Even though carriers and manufacturers have different phone models, some are extremely similar. Identify the differences between carriers and manufacturers among devices and focus your testing on those that show differences.

- Tip: Where does this knowledge come from? An experienced Mobile Testing Partner can help determine these differences and help target mobile devices to test.
Who Are Your Customers?

- **Market Research**
  - Mix of surveys and polls for internal users to the engagement of marketing firms for larger, external audiences
  - Inaccurate method of determining a user base.

- **Mobile Device Detection**
  - Reliable and dynamic way of determining what devices your audience is using.
  - Website or through an app.
  - Solutions range from
    - what mobile devices are being used
    - granular details such as manufacturer and model of the device.
### Where do I Begin?

<table>
<thead>
<tr>
<th>Real Devices</th>
<th>Emulated Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros</strong></td>
<td><strong>Cons</strong></td>
</tr>
<tr>
<td>Do not give false positives since they are the devices consumers use</td>
<td>Expensive</td>
</tr>
<tr>
<td>Test factors like battery life, network traffic</td>
<td>Can be lost, broken, stolen, or otherwise left inoperable.</td>
</tr>
<tr>
<td>Test the true user experience</td>
<td>Only one person can use at a time</td>
</tr>
<tr>
<td>Simulate interrupts such as a text message or a call</td>
<td></td>
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</tbody>
</table>
Real vs Emulation Best Practices

- A hybrid approach that is leaning toward real devices is applied when testing mobile devices.
- Emulators should be applied where appropriate for their few advantages over real devices.
- It is very important to be as close to real conditions as possible when testing making real devices the ideal choice in most situations.
## Where do I Test?

<table>
<thead>
<tr>
<th><strong>Onsite Cloud</strong></th>
<th><strong>Offsite Cloud</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost</strong></td>
<td><strong>Cost</strong></td>
</tr>
<tr>
<td>- Less costly long term</td>
<td>- More costly</td>
</tr>
<tr>
<td><strong>Availability</strong></td>
<td><strong>Availability</strong></td>
</tr>
<tr>
<td>- Both On-site &amp; Cloud</td>
<td>- Cloud only</td>
</tr>
<tr>
<td>- More control</td>
<td>- Dependent on a vendor</td>
</tr>
<tr>
<td><strong>Maintainability</strong></td>
<td><strong>Maintainability</strong></td>
</tr>
<tr>
<td>- Difficult to maintain</td>
<td>- Less to maintain</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td><strong>Environment</strong></td>
</tr>
<tr>
<td>- Non-tool dependent</td>
<td>- Tool dependent</td>
</tr>
</tbody>
</table>
What Real Devices Do I Test?

- Create a representative sample for each application
- Test on enough devices to cover at least 80 percent of what is used by the customer
- New devices may release at the rate of about three to four each and every quarter.
What is My Device Priority?

- Prioritize devices based on Mobile Device Detection
- OS Versions between devices when looking at Market Share
- Narrow down prioritization to a specific manufacturer
  - OS is going to be fairly similar on different devices from the same manufacturer
  - Because of the similarities, you don’t need to necessarily test all devices from the same manufacturer
- If you don’t know your apps market share, do at least 1 iOS and 1 Android device and go with the most popular accordingly to global Market Share.
What Testing Parameters Do I Need?

- Devices – Different physical hardware configurations (iPhone 5, Galaxy S5)
- Network Connections – Wifi, 3G, LTE (latency)
- OS – Android, vs. iOS
- Screen Resolution - iPhone 3: 320x480  iPhone 6 1920x1080
# Pulling it All Together

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Test Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Device</strong></td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>iPad</td>
<td>x</td>
</tr>
<tr>
<td>iPhone 4g</td>
<td></td>
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<tr>
<td>iPhone 5</td>
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</tr>
<tr>
<td>Nexus 5</td>
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<tr>
<td>Samsung Galaxy S5</td>
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<tr>
<td>Nokia Lumia</td>
<td></td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td></td>
</tr>
<tr>
<td>10” 1920x1080</td>
<td>x x x</td>
</tr>
<tr>
<td>5” 1920x1080</td>
<td>x x x x x x x x x</td>
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<tr>
<td><strong>Browser</strong></td>
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<td>Safari</td>
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<td>Windows Mobile IE</td>
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<td><strong>Carrier</strong></td>
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<td>A T &amp; T</td>
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<td>T-Mobile</td>
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<tr>
<td>Android 2.3.3</td>
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<tr>
<td>Windows Mobile</td>
<td></td>
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<tr>
<td><strong>Network</strong></td>
<td></td>
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<tr>
<td>CDMA / GSM</td>
<td>x x x x</td>
</tr>
<tr>
<td>LTE / WIMAX</td>
<td>x x x x</td>
</tr>
</tbody>
</table>
How Do I Test?

**Functional Testing**
- Check the functionality of the application at different layers (GUI, API, Mobile Web)
- Should happen every time you test mobile
- Try to look at performance, even if at a very limited level

**Performance Testing**
- Should always be done, may not take much time
- Can be done with software or via Crowdsourcing
- Check Network Conditions (Network virtualization)

**UAT**
- Can use Crowdsourcing or internal employees (wide internal release)
- Device validation automation/manual run
- Smoke testing on as many devices as you can
Should I Automate?

- In a complex testing environment, where there are multiple devices across several networks it is most appropriate to implement an automated environment.

- Some benefits of automated testing are the ability to run tests quickly, cost effective, team results sharing.

- The ability to reuse is the number one benefit of implementing an automated testing environment. While the initial setup may take some time, in the long run the tester will benefit in the simplicity of running multiple iterations of tests.
  - Ex. Apps which require a significant amount of data input by the user.
Mobile Testing Strategy Summary

1. Start with emulators
2. Move to real devices
3. In-network testing
4. Test in the user’s physical environment
Summary

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