MOBS 2013

Break-Out Sessions
Process

- Workshop participants were given two post-it notes where they had to write their name and a challenge for engineering mobile-enabled systems.
- Based on the card sorting technique, they placed each post-it note either next to a related set of post-it notes or by itself if there was no relationship to existing post-it notes.
- The resulting groups were the breakout groups.
- Each group recorded and presented the results of their discussions related to state of the practice, challenges, and potential solutions.
Group 1: Quality Assurance
Transcript of Post-It Notes

- Effectiveness of common security tactics in mobile environments — e.g., how to facilitate large scale mobile networks while simultaneously mitigating the “opportunistic bad actors” who would utilize the openness of the network to influence a negative outcome
- Rapid creation and validation of mobile systems
- Fault-tolerance — gracefully addressing network and battery problems
- Maintain QoS over time in such dynamic environments
- Domain-specific software QA for MOBS: process, metrics, software quality standards
Group 2: Interoperability
Transcript of Post-It Notes

- In a heterogeneous mobile environment, how can we encourage/enforce/standardize data formats and data accessibility? To what degree should we seek after common standards?
- Mobile device and data interoperability
- How to deal with the heterogeneity across platforms
- Multi-device support for app developers
- Consistency across different devices — what are cost-effective protocols to enable communications across platforms?
- Making sense of the data collected by smartphones
- Framework for integrating mobile systems into an environment
Group 3: Architecture and Design
Transcript of Post-It Notes

- Design and architecture of mobile systems
- Design and architecture of “advanced” mobile systems: mobile cloud, Internet of Things
- What are best practices for controlling and denaturizing the large amounts of data generated by mobile-enabled systems?
- Reliable and trustable methods for measuring energy consumption
- Scaling from the “nodes” to the “system”
- Model-based/driven approaches for MOBS
- Discovering, offloading and using proximate computational nodes to alleviate some of the battery usage and increase computing power — finding “super nodes”
- How to apply the concept of dynamic architectures to mobile cloud computing
- Inferring situation/context and applying it to big data
- Mobile green software best practices (design, development, test …)
- How to measure the ground truth for energy consumption and overhead introduced by instrumentation
- Given the battery limitations of mobile devices, how to extend the mobile experience?
- Ability for context-aware mobile systems to discover available sensors and their parameters and integrate them into the environment
State of the Practice

- Current state of the practice is device-centric
  - Focus is on quality attributes of the device (unit) or apps running on single devices, e.g.
    - Energy efficiency
    - Physical security of the mobile device
    - Secure coding guidelines
    - Responsiveness
  - The focus is not on the mobile-enabled system as a whole, where the device is just a part of the system

- Many developers are taking advantage of the “non-critical” status of apps and the speed of the app market
  - Bugs and flaws are “acceptable”
  - Patches are easy to push out using the app store model
Challenges

- How can we begin looking at the attributes of mobile-enabled systems where the end device is just an actor / unit?
- What are the attributes of interest for mobile enabled systems?
  - Fault tolerance
  - End-to-end security and privacy
  - Consistent quality of service
  - Interoperability
- What do these attributes mean specifically in the context of mobile-enabled systems?
- How can we balance system attributes with the fast-paced mobile “market” ecosystem?
Potential Solutions

- Develop models and metrics for attributes of interest
  - Leverage best practices for highly-distributed systems
  - Validate the models

- Take those metrics back to improve the processes that will ensure successful development

- Balance this with the fast “turn around” needed
  - Dynamic mobile app market
  - Business agility
  - Mobile “Market” Ecosystem as a system attribute
MOBS 2013
Break-Out Session Report

MOBILE DEVICE AND DATA INTEROPERABILITY
DATA INTEROPERABILITY
Standards

- Current state
  - JSON
  - REST

- Challenges
  - Mismatches across devices and platforms
  - Communication between apps
  - Syntax issues

- Should there be a single regulating body for standards?
Data Management

- Privacy concerns
  - Extremes: irrelevant and creepy
  - Happy medium?
- Unexpected interaction between apps
  - Photo sharing
  - Contact information
- How to handle privacy controls
  - Frequency
  - Granularity
DEVICE INTEROPERABILITY
Multiple Platforms

- Sometimes have to pay for same app multiple times
  - Exception: Netflix
  - Goal: buy once, use anywhere
  - More of a business issue than technical
- Different screen resolutions among devices
- Different operating system versions
Emerging Opportunities

- Standardized APIs, such as PhoneGap
- Model-driven engineering
  - Domain-specific languages
  - Specify once, generate anywhere
- Design for energy savings
  - Discovery of generic patterns
Conclusions

- Latest version of platform dependency problem
- Data interoperability also not new
- Ubiquity of devices is new
- Public doesn’t always understand technical issues
ARCHITECTURE AND DESIGN OF MOBILE-ENABLED SYSTEMS
Is the Architecture of a Mobile System Domain Specific?

- As an example, what is the difference between mobile apps for disaster management vs. mobile apps for healthcare domain?
- Concerns and quality attributes may vary
  - Healthcare — privacy
  - Disaster Management — disconnected operations and energy
- Is the impact of the domain significant?
Characteristics of Mobile Nodes

- All types of nodes (active and passive) should be considered
- Smartphone, robots, sensors, actuators, drones, RFID tags …
- I/O (network)
- Storage
- Computing power
- ….
Variability

- Context – the environment, social context, other systems …
- Domain (healthcare, disaster, military, personal, finance …)
- Network (disconnected, high speed, access to cloud, topology, …)
- Hardware (form factors, supported sensors, vendors, …)
- OS and API (Android, iOS, Windows, ROS …)
- User interface (embedded mobile nodes may not have any user interface vs. a mobile app may have a sophisticated user interface)
- Quality attributes and architecture drivers
- Data (type, volume, velocity …)
- Combination of the above factors
- …
Challenges

- How do we deal with this variability?
- How do we address architecture styles and tactics of MOBS systems?
- How to model “heterogeneity” of mobile nodes?
- How to address additional dimensions of each “quality attribute”?
- How to model and design “emergent” behavior?
- How to deal with the dynamic architecture of these systems?