CS542 Qualifying Exam
June 8th, 2012
Total 100 pts

Answer the following questions. Give as specific arguments as possible in your discussion.

1. Mobile platforms are very different from stationary computing systems, in that their network connectivity is not guaranteed to be always on and network path performance is most of the times much worse than the wired network. What are link-layer-specific measures to address the wireless network characteristics? Name two and describe in detail. (10 pts)

2. Modern smartphones come with a number of sensors. Among them, GPS plays an important role in location-based services. However, it consumes relatively high energy in comparison to other sensors. What mechanisms would you consider to leverage GPS energy consumption while still tracking the user location? (15 pts)

3. Personal mobile platforms are constrained by battery life, which in turn limits the amount of computing on the platforms. What mechanisms would you consider to compensate for limited computing power on the mobile platforms? (15 pts)

4. How would you build a groupware on top of mobile personal platforms? What are the features you consider employing and what are the technical challenges in implementing them? (20 pts)

5. Cutting the electricity consumption and in turn cost is a major issue on all computing platforms, from smartphones to data centers. What are the main differences in the energy saving approaches between smartphones and data centers? (20 pts)

6. Modern smartphones are typically equipped with multiple network interfaces, namely, WiFi, 3G, and Bluetooth. Both WiFi and 3G allow users to connect to the Internet. However, they have different characteristics with different trade-offs in performance and cost. If you are to design the networking component in a smartphone system, how will you balance the pros and cons of the two interfaces? (20 pts)