Sistemas de Computação Móvel e Ubíqua 2017/2018

Exam: 4/07/2018
Duration: 2:00 hours
Closed book

1. As you know the GPS is a Global Positioning System that gives an absolute location. Describe how it works and how is possible to determine a global position with this system.

2. Some of the challenges faced by mobile computing are shared with the "traditional" distributed systems. However, mobile computing faces some novel challenges. Describe these new challenges.

3. What are the main factors to take into consideration when choosing a temperature sensor for a given project? You can use examples to justify and clarify your answer.

4. "A data acquisition system having smart sensors, which transmits data wirelessly can be said to be a Wireless Sensor Network". In this context there is always a tradeoff between energy efficiency and reliability/performance. Explain why and how to deal with possible problems.

5. What are the main limitations and difficulties of Wireless Technologies? Justify your answer.

6. In Wireless Links how do multipath effects affect the signal's quality? Justify your answer.

7. "The reason for WLAN client scanning is to determine a suitable Access Point (AP) to which the client may need to roam". The client can use two scanning methods, identify and describe each one of them.

8. "Caching can reduce the bandwidth requirement in a wireless computing environment as well as minimize the energy consumption of wireless devices". Explain a technique to maintain the coherency in caches in different devices.

9. Fog Computing is an architectural model for the Internet of Things. Give and describe an example where the use of this architecture is advantageous when compared with other architectural models.

10. A small company responsible for the management and maintenance of about 100 vending machines in an amusement park wants a system to facilitate their daily tasks. The machines are distributed in several points of the park. There are three distinct types of machines (bottled water, fresh fruit, and snacks) each type has a specific temperature to guarantee the good quality of the products. Each machine also needs to know how many items of each product it has in stock.

The system must be configured, monitored and controlled from a mobile device by the managers. It also must feature an emergency notification system that notifies the mobile devices when a machine temperature is outside the limits specified for that type of machine. The managers should also receive information when the stock of a product goes bellow a pre-defined threshold.
When a manager is going to solve an emergency he must log it.
At any time the managers can access the information regarding the state of the machine (on/off), its stock values and temperature conditions.
Present an outline of your system, describing its key software and hardware elements. Clearly define the sensors/actuators used (at each machine) and their control system, and the communication infrastructure; also present a short, but clear, explanation of your solution's software infrastructure and the interactions (communication) between its elements. Identify the main problems and restrictions/limitations of your proposal and justify all your options.