FREIE UNIVERSITÄT BOZEN
LIBERA UNIVERSITÀ DI BOLZANO
FREE UNIVERSITY OF BOZEN · BOLZANO

Fakultät für Informatik | Facoltà di Scienze e tecnologie informatiche | Faculty of Computer Science

MobileServices

Written Examination

September 9th, 2008

FIRST NAME		**LAST NAME**	
STUDENT NUMBER		**SIGNATURE**	

Instructions for students:

Write First Name, Last Name, Student Number and Signature where indicated. If not, the examination can not be marked.

Do not speak to any other student during the examination. If you speak to another student, your examination will be cancelled.

Use a pen, not a pencil.

Write neatly and clearly.

1. Enumerate the possible states of a MIDlet and write the two methods that when called by the application manager and the MIDlet will put the MIDlet in the "destroyed" state.

2. What does it mean that the MIDlet specifies the UI in an "abstract" way?

3. Make an example of location-based advertising applications. List its functions and explain the benefits for the clients and the service providers.

4. Commands added with `addCommand(Command cmd).` Are these commands added to a `Display` or to a `Displayable`?

5. Is a RecordStore owned by a MIDlet or can be shared by many MIDlets?

6. What is the "connection interface hierarchy"? Make two examples of connection interfaces belonging to this hierarchy.

7. The enumerateRecords() method of RecordStore, has three parameters, a RecordFilter, a RecordComparator, and a Boolean. Can you describe how these parameters are used in the enumerateRecords() method?

8. Assume that you are using 8 symbols and you are using a bandwidth of 2MHz ($2*10^6$Hz). Let further assume that there is no noise on the channel. What is the theoretical maximum data transfer available?

9. Considering the previous question and now assume that there is some noise in the channel with signal to noise ratio of 40dB. What is the maximum data transfer rate that can be achieved (use Shannon theorem)? Approximate the result using the following table:

$Log_2(x)$	x
3,32	10
6,64	100
9,97	1000
13,29	10000
16,61	100000

10. Imagine that while the GPS receiver generates the following sequence of bits 1100010110111010111 it receives the following sequence from one satellite 0111110111000101101. Let us assume that the receiver (and the satellite) generates one bit every 1/100 of sec (This is a simplified description as bits are generated at higher frequency). How far is the satellite from the receiver? The speed of light is $3*10^5$ km/s (approx.).

11. What is the function of a Criteria object when is passed to the constructor of a LocationProvider?

12. If A, B and C are wireless devices and A is hidden for C, can the simultaneous transmission of A and C create collisions at B? Motivate your reply.

13. Draw a scenario where A and B are hidden for C, C is hidden for B, but C is not hidden for A. Place the three devices on some points and draw a circle around a device to show its max transmission range.

14. What is the main advantage and disadvantage of time multiplexing? Explain these referring to GSM communication technology.

15. What is the difference between a physical and logical channel in GSM? Can a physical channel bring more data than a logical channel?

16. Are these two chip codes usable for simultaneous transmission (of two MSs towards a BTS) using CDMA?
    a. A (1, 1, -1, -1, 1, 1, -1)
    b. B (-1,1, 1, -1, 1, 1, -1)

Explain why.

17. Explain how authentication is performed in GSM. Explain the role of the A3 and A8 algorithms.