NEWCASTLE UNIVERSITY

SEMESTER 1 2010/11

GRAPHICAL USER INTERFACES

Time allowed – 1½ Hours

Instructions to candidates:

Answer ONE question from Section A and ONE question from Section B

Use separate answer booklets for each question

Marks shown for subsections are indicative only

[Turn over

SECTION A

Please answer EITHER Question 1 OR Question 2.

Question 1.

a) The development of capacitive sensing technology has meant that a whole generation of portable devices are now multi-touch enabled. However, multi-touch was originally conceived as an enabling technology for collaborative interfaces. Discuss the advantages and disadvantages of multi-touch interaction and illustrate the impact of these on individual and collaborative interfaces. [12 marks]

b) Consider the interface to a typical email application, such as Microsoft Outlook. Using Outlook, or another email interface that you are familiar with, as a specific example of such interfaces, describe in what ways these are inappropriate for healthy older users who are new to the use of computers (and the internet). Also outline elements of a better design for an email interface and explain why your proposal is more appropriate for such users. [13 marks]

Question 2.

a) There are three main genres of graphical authentication technique: (i) cued-recall; (ii) recognition; and (iii) recall. Briefly describe an example of each and describe their advantages and disadvantages compared to traditional alphanumeric passwords. [15 marks]

b) Describe the layering algorithm for drawing binary trees, summarise the properties of the drawings that it produces and demonstrate its operation on the tree shown in Figure 1. [10 marks]

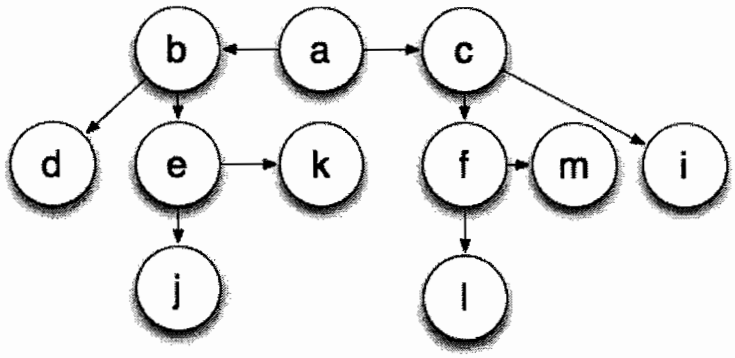

Figure 1. Binary tree for Question 2(b).

SECTION B

Please answer EITHER Question 3 OR Question 4.

Question 3.

a) Define the terms Ubiquitous Computing and Calm Computing, and outline the key difference between the two concepts. Using an example, briefly describe how the design of ubiquitous user interfaces is related to the design of mobile user interfaces. [6 marks]

b) A store plans to install a jukebox system, with which customers can select songs to play while they are in the store. A large public touchscreen is mounted inside a stand of the dimensions shown in Figure 2. The proposed design has the following elements:

- Users can select songs to play by typing in the desired title on their mobile phones; as they type the name appears on the public touchscreen in the text box to the left of the search button; when they hit return, the corresponding song will be added to the playlist.
- Alternatively, users can browse through the thousands of available songs using a widget in the top right corner of the public touchscreen. The widget slowly scrolls through the alphabet (from A to Z); when users tap it, it will display the list of available songs starting with the currently shown letter in the central area. Users can then tap the song they desire.
- The button in the top left corner displays the current playlist.
- The touchscreen has the following properties: (1) colour-capable, resolution of 1024×768 pixels; (2) supports multi-touch interaction; (3) a high-end PC with a powerful graphics card controls the display; (4) the connection to personal mobile phones is seamlessly established once users are within range of the system.

i) Identify three key weaknesses of this design and briefly explain what problems these might cause. [6 marks]

ii) Using a rough sketch, create an improved design and briefly explain how the user would interact with it. [7 marks]

iii) Provide a rationale why your design constitutes an improvement over the original design. [6 marks]

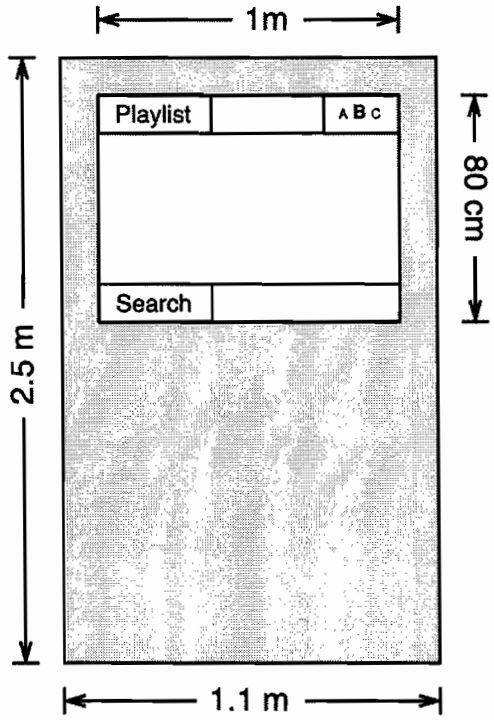

Figure 2. Jukebox system: stand housing a touchscreen for Question 3(b).

Question 4

a) Name three interaction techniques to make effective use of small screens. Pick one of these techniques and briefly outline how it could help or hinder the process of interface migration. [6 marks]

b) A restaurant wants to introduce an automated food-ordering system. Using projectors and cameras mounted above all the tables guests can order food and drinks using the interface shown in Figure 3. The proposed design has the following elements:

- The circular colour display (central white area) has a diameter of 1.1m and can show 800 (square) pixels along this dimension.
- Users select food by touching items displayed inside the menu box shown on the right. Selected items are then shown in the order box to the left. Touching items in the order box will remove them.
- To order their food, users can use the soft keyboard displayed in the bottom left corner to enter credit card information, which is displayed at the top of the screen. Pressing the order button, on the bottom-right of the interface, will send the order details and payment information to the restaurant's kitchen.

i) Identify three key weaknesses of this design and briefly explain what problems these might cause. [6 marks]

ii) Using a rough sketch, create an improved design and briefly explain how the user would interact with it. [7 marks]

iii) Provide a rationale why your design constitutes an improvement over the original design. [6 marks]

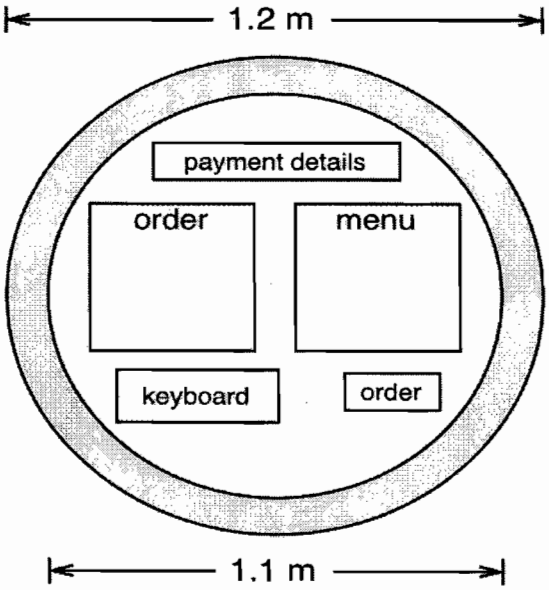

Figure 3. Automated food-ordering system for Question 4b).