NEWCASTLE UNIVERSITY

SEMESTER 1 2009/10

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

SECTION A

Please answer EITHER Question 1 OR Question 2.

Question 1.

a) Give an account of the advantages and disadvantages of multi-touch interaction for individual and for collaborative applications. [12 marks]

b)

i) Briefly describe Zhang's framework for analysing relational information displays. [5 marks]

ii) Describe a relational information display, that includes dimensions with at least 3 different classes of scale, which either over- or under-represents information to some degree. [3 marks]

iii) Make a critical assessment of your selected display for question b) ii) (positives and negatives) from the point of view of its representational adequacy, and present an alternative design that overcomes shortcomings you identify. [5 marks]

Question 2.

a) Summarise the concepts of personal space, shared space and storage space in people's use of tables and briefly describe their significance for interactive tabletop design. [6 marks]

b) Describe the divide-and-conquer 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]

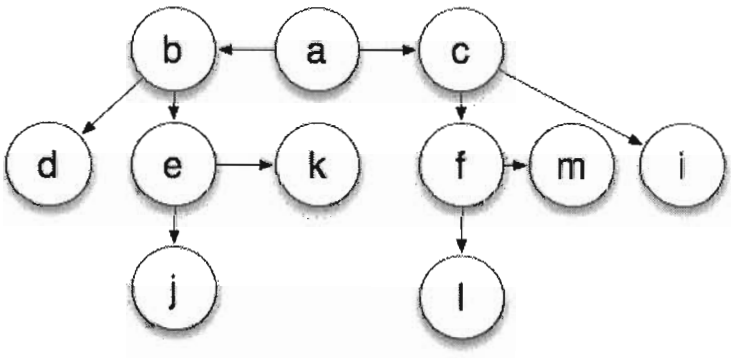

Figure 1. Binary tree for Question 2(b).

c) Consider the problem of selecting a usable graphical authentication scheme to replace traditional PIN-based authentication for a mobile phone targeted at users over 80 years old. Discuss the main alternatives and recommend one scheme (with justifications) based on your knowledge of both older users and graphical authentication. [9 marks]

SECTION B

Please answer EITHER Question 3 OR Question 4.

Question 3.

a) Define what *metaphors* are in the context of graphical user interfaces. Using the desktop metaphor, provide one example to highlight a benefit of using metaphors and one example to highlight a drawback of doing so. [6 marks]

b) You are given the task of designing a graphical user interface for a product information application to be used on a tabletop system in a shopping centre. You can make the following assumptions:

- the shopping application provides multiple people with simultaneous access to information about products;
- the application enables users to: (1) search for a particular product among the 10,000 carried by the shop; (2) access detailed (textual) information about the ingredients of each product; (3) pass products to other people who are using the system at the same time; (4) bookmark/store products they are interested in;
- the tabletop system has the following properties: (1) a rectangular colour-screen of about 4x3m (resolution 4000x3000 pixels); (2) the display is touch-sensitive (and supports multi-touch interaction); (3) a high-end PC with a powerful graphics card controls the display.

Using a rough sketch, briefly describe your design for this graphical user interface. Give a justification for the choices you make. [13 marks]

c) Interface migration and distributed interfaces are two distinct but related and potentially complementary concepts. Consider the aspect of information privacy in the scenario of using a mobile device with a public (touch-enabled) display. Briefly discuss the implications of using interface migration, distributed interfaces or a combination of both on privacy. [6 marks]

Question 4

a) Define the concept of *context*. Provide an example of a contextual factor that can impact the design of graphical interfaces, and briefly discuss how this factor could be accommodated for in a graphical interface. [6 marks]

b) You are given the task of designing a graphical user interface for a hand sanitizer dispenser system that is to be deployed in the waiting rooms of hospitals and GPs:

- the application runs on a public kiosk system (display size: 40×30cm, resolution: 1024×768 pixels, colour support; single touch support);
- the system asks the user a series of six questions about allergies and other health issues to ensure that it dispenses the right sanitizer; before dispensing hand sanitizer, it presents users with a summary view of their replies, which they have to acknowledge.

Using a rough sketch, briefly describe your design for this graphical user interface. Give a justification for the choices you make. [13 marks]

c) Briefly describe three means of interaction that could be used with a tabletop system. Evaluate their suitability in the context of a tabletop application, where users share items with each other in a public area and keep non-shared items in a private area on the tabletop. [6 marks]