UNIVERSITY OF SWAZILAND

Faculty of Science

Department of Computer Science

SUPPLEMENTARY EXAMINATION 2009

Title of paper: **SOFTWARE ENGINEERING – II**

Course numbers: **CS452**

Time allowed: 3 hours

Instructions: Answer question 1 and <u>any 4</u> of the remaining 5 questions. Each question carries 20 marks.

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Question 1

A list making application is needed that allows the user to keep a list of items. For example, a user might use the application in order to make a shopping list. Each item in a list is simply a line of text typed by the user, such as the name of a product to be bought. The user may add a new item to the list or delete an existing item at any time.

a) State any 2 use cases of this application. [2]

b) Present an object oriented design for this application in the form of a detailed UML class diagram. In addition, write brief notes on the main classes, relations, attributes and behaviours shown in the class diagram. [8]

c) Draw sequence diagrams for each of the use cases you have identified in part a). [4]

d) Draw a labelled sketch of the window(s) used and the components/widgets they may contain. In addition, write brief notes on the purpose and ease-of-use of each component sketched. [6]

Question 2

a) With the aid of examples, explain the following relations as used in object oriented modelling:
   i.   Inheritance
   ii. Composition
   iii. Association [9]

b) Draw a UML State Diagram to specify the behaviour of a queue having a capacity of 10 items. [7]

c) What are CRC cards and how may they be used in object oriented analysis? [4]

Question 3

a) Explain the problems addressed by each of the following design patterns, as well as the solutions they provide:
   i. Proxy pattern
   ii. Command processor pattern   [8]

b) Define the 3 components of the Model-View-Controller (MVC) pattern. In addition, describe the most important messages sent between the components.   [6]

c) Suppose that the MVC pattern is to be employed in designing a simple text editing application. In addition to typing text, the user is allowed to give the following commands:

·Select either black or blue colouring for the text.
· View the document at either normal or high magnification. In the latter case, the characters will be displayed at double their actual size, but the user will be prevented from typing any further text until normal magnification is chosen.

   Describe the specific responsibilities of each MVC component in this application.
                                                                                   [6]

Question 4

a) Distinguish between software engineering toolkits, workbenches and environments.   [3]

b) With regard to the SCCS version control system:
   1. What are *s-files* and how do they help to reduce a project's disk-space usage?
   2. Describe any 3 of the main operations provided by SCCS.   [9]

c) Briefly describe any 4 functions provided by an IDE you have used during the implementation phase of software engineering.   [4]

d) Explain the purpose of *test drivers* and *bug trackers* in the testing phase of software engineering.   [4]

Question 5

a) Explain any 5 common guidelines for the design of good user interfaces.   [10]

b) Draw labelled diagrams of any 5 controls (widgets) that are available in a GUI toolkit you have used. In addition, state the main purpose of each.   [10]

Question 6

In relation to McCall's taxonomy of quality attributes:

a) Distinguish between quality factors and quality criteria.   [2]

b) Define the quality factors: *portability* and *reusability*.   [2]

c) Define the criterion of *modularity*. In addition, explain why modularity is said to contribute to both portability and reusability.   [4]

d) Select any 4 quality criteria and explain the steps you would take in order to quantify them in a software project.   [12]