Open University *of* Mauritius

BSc (HONS) COMPUTER SCIENCE [OUbs033]

BSc (HONS) APPLIED ICT WITH SPECIALISATION [OUbs017]

EXAMINATION FOR: June - July 2023

MODULE : Software Engineering [OUbs033214]
Distributed System [OUbs017224]

DATE : Friday 30 June 2023

DURATION : 2 Hours

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of **FOUR (4) QUESTIONS**.
2. Answer **ALL questions**.
3. Always start a new question on a fresh page.
4. Total marks: **100**

This question paper contains 4 questions and 5 pages.

ANSWER ALL QUESTIONS

QUESTION 1 [25 MARKS]

A use case diagram can portray the different types of users of a system and the various ways that they interact with the system. This type of diagram is typically used in conjunction with the textual use case and will often be accompanied by other types of diagrams as well.

a) Describe where it would be sensible to use the **<<include>>** relationship to structure a use case diagram and give an example (use-case) situation where it could be used.

(5 marks)

b) Describe where it would be sensible to use the **<<extend>>** relationship to structure a use case diagram and give an example (use-case) situation where it could be used.

(5 marks)

c) Describe where it would be sensible to use the **generalisation** relationship to structure a use case diagram and give an example (use-case) situation where it could be used.

(5 marks)

d) State **two (2)** advantages of the agile methodology.

(4 marks)

e) State **two (2)** disadvantages of the agile methodology.

(4 marks)

f) What is the main criterion for deciding whether or not to use the waterfall model in a software development project?

(2 marks)

QUESTION 2 [25 MARKS]

A computer system is required that will support the following small garage business.

Customers bring their cars to the garage for servicing and repairs. The attendant must check the car in, record details about the owner and the car, along with any specific customer requests. The workshop manager inspects each car and creates a job specification for it. He then schedules the job and assigns a mechanic to complete the specified tasks. During this process, if any new problems are discovered, a new job specification is created by the workshop manager before carrying out the work. When the job is finished, the mechanic completes a report detailing the time spent, work done, and materials used. This information is used by the attendant to create an invoice for the customer when the latter comes to collect his/her car.

a) Draw a suitable use-case diagram to represent the above system.

(10 marks)

b) Construct a Class Diagram for the above system using the UML notation. Include appropriate attributes and operations for each class.

(15 marks)

QUESTION 3 [25 MARKS]

a) The COVID-19 pandemic has accelerated digital transformation across almost every industry. According to you, why do you think there is a need for digital transformation in the software engineering sector?

(5 marks)

b) Imagine you are responsible for the implementation of a software project which is very critical. How would you ensure that the software will fit the required specifications?

(6 marks)

c) What is the difference between black box testing and white box testing?

(6 marks)

d) Why, according to you, there is a need for integration testing and what are the challenges of integration testing?

(8 marks)

QUESTION 4 [25 MARKS]

You have been awarded the contract to design the software for a bank's ATM cashiers. The initial statement of requirements is given below. Study it, and then answer the questions that follow.

The context is the software needed for an automatic cashier at the bank. The client can make the basic operations by himself, at the time he wants. He first has to enter his card in the machine and type his password (5 digits). The system will read the number on the card, search for the client account, and verify the password. The system must be menu-based so that users do not need any training prior to selecting operations from the menu. For simplification, we will have only three items on that menu: deposit money, withdraw money, and finish all operations. There can be any number of deposit and withdrawal operations before the call to "finish all operations" (which gives back the client card). When depositing money, the client should enter the amount, and then put the envelope in the machine. The system should add this amount to the client account and print a receipt. This amount cannot be withdrawn (partially or completely) on the same day. When withdrawing money, the client should re-enter his password if this operation is not the first operation done after entering his card in the machine. Then he should enter the amount (multiple of 20). The system checks that he has enough money in his account, removes this amount from his account, gives the cash, and prints a receipt. Notice that when checking whether or not there is enough money in the account, the system checks that there will be at least the amount deposited on that day in the account after the withdrawal operation. Because the Customer Service department does not like to keep customers waiting, operations should take no longer than 10 seconds. The Marketing department would also like the software to display ads while the customer is waiting for an operation to complete. The software shall be ready in December 2024, and shall not cost more than Rs 5 million.

a) Write down **three (3)** functional and **three (3)** non-functional requirements, quoted from the text above.

(6 marks)

b) Requirements should state what a system should do, without stating how it should be done. Why is this distinction useful?

(4 marks)

c) Why should stakeholders be consulted during the requirement engineering process? Suggest **four (4)** stakeholders of the system outlined in the above case study.

(4 marks)

d) Rewrite the following (vague) requirements so that they may be objectively validated.

i. The system should have a good response time.
ii. The system should be highly portable.
iii. The system must be reliable.
iv. The system must be operated with minimum training.

(4 marks)

e) List **four (4)** difficulties you might encounter during requirements elicitation and analysis.

(4 marks)

f) According to you, how software reuse can be beneficial to developers?

(3 marks)