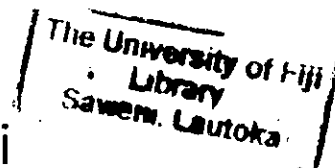




The University of Fiji

School of Science and Technology

Department of Computer Science/ Information Technology



ITC216

Software Design and Programming

Semester II, 2011

FINAL EXAMINATION PAPER

Time Allowed: 3 Hours [10 Minutes Extra Allowed For Reading the Paper]
Weighting: 50%
Total Marks: 100 marks.

Section A:

20 multiple choice questions - 20 marks

Section B:

5 Short Answer questions - 80 marks

Total 100 mark

Instructions

- Show your answers clearly in each question to gain maximum marks.
- You may ask for extra sheets from the supervisors if the need arises.
- Do not forget to write your name and ID number on all the extra sheet(s) attached.
- Programmable calculators are not allowed.

Section A: Multiple Choices (20 marks)

Identify the choice that best completes the statement or answers the question.

1. ____ is the detailed specification of how all the parts of a system will be implemented and coordinated.
 - a. System detailing
 - b. System design
 - c. Program detailing
 - d. Program design
2. System analysts sometimes ____ an existing system to get a better picture of its operation.
 - a. view
 - b. identify
 - c. outline
 - d. model
3. In the UML, a ____ block is called a protected node.
 - a. throw
 - b. try
 - c. sent
 - d. catch
4. A feature that adds to the UML vocabulary of shapes to make them more meaningful for the reader is called a(n) ____.
 - a. stereotype
 - b. use case
 - c. scenario
 - d. extension
5. ____ is the process of understanding and specifying in detail what an information system should do.
 - a. Information modeling
 - b. Systems analysis
 - c. Information building
 - d. Systems design
6. Sun ONE Studio and Microsoft Visual Studio .NET are examples of _____.
 - a. IDE
 - b. TPS
 - c. DSS
 - d. CASE
7. The ____ approach is an SDLC approach that assumes the various phases of a project can be completed entirely sequentially.
 - a. waterfall
 - b. artifact
 - c. prototype
 - d. spiral model
8. Which of the following models uses UML to draw system components?
 - a. Use case diagram
 - b. PERT chart
 - c. Gantt chart
 - d. Spiral model
9. Which of the following is an example of system scope in regards to a new inventory management system?
 - a. defining how much acceptance testing will be required
 - b. describing whether the project will include data conversion
 - c. describing whether the project will include staff training
 - d. defining the capabilities that need to be included
10. Object-oriented requirements models almost always include _____.
 - a. interaction diagrams and user interface storyboards
 - b. class diagrams and use case diagrams
 - c. location diagrams
 - d. activity diagrams

11. A(n) _____ is an occurrence at a specific time and place that can be described and is worth remembering.
- a. response
 - b. source
 - c. event
 - d. trigger
12. In a class symbol, the middle section lists _____.
- a. the attributes of the class
 - b. the name of the class
 - c. the methods of the class
 - d. the associations for the class
13. Which of the following notations denotes a one or more (mandatory) association in a class diagram?
- a. *
 - b. 1..*
 - c. 1
 - d. 1..1
14. A _____ is used to represent aggregation in a generalization/specialization hierarchy.
- a. diamond
 - b. triangle
 - c. filled-in diamond
 - d. dashed line
15. A(n) _____ provides an overview of all the use cases for a system.
- a. use case description
 - b. use case diagram
 - c. activity diagram
 - d. system sequence
16. In an SSD, the syntax for an input message is _____.
- a. the name of the message
 - b. the name of the message followed by the name of the actor in parentheses
 - c. the data parameters needed to identify the requested item
 - d. the name of the message followed by the input parameters in parentheses
17. A(n) _____ is a sequential set of connected states and transitions.
- a. lifeline
 - b. action-expression
 - c. message event
 - d. path
18. In a three-layer architecture, the _____ layer interacts with the database.
- a. view
 - b. data
 - c. middleware
 - d. business logic
19. During the design discipline, analysts extend the system sequence diagram by modifying the _____ object to include all of the interacting user-interface, problem domain, and database access objects.
- a. :System
 - b. :Object
 - c. :Domain
 - d. :Actor
20. The third compartment of a design class diagram contains the _____.
- a. parent class
 - b. attribute list
 - c. stereotype name
 - d. method signature information

Section B: Short Answer Questions (80 marks)

All questions are compulsory.

Question 01 (10 marks)

- I. Why Software Engineering is confused with Programming and what does Software Engineering rely on? (3)

- II. List down the tools that facilitate communication among the developers? (2)
- III. Why do we use Symbol Language to communicate our ideas in Software Engineering? List down one symbol language that we use in OOA/D? (3)
- IV. What are four major software development methodologies? (2)

Question 02 (10 marks)

- I. User story represents something a user would be likely to do in a single sitting at the computer terminal. User stories are written in a free-form, with no mandatory syntax, but generally they are fitting the form:
user-role + capability + business-value

Discuss what these three parts tell in a use case. (3)

- II. Differentiate between Concepts Attributes and Concepts Association with an example. (2)
- III. List different types of software testing and describe what cycle does testing methods follow? (3)
- IV. There are two types of requirements Functional and non-functional. Describe what does these two requirements do and what are some of the system properties of Non-functional requirements? (2)

Question 03 (20 marks)

Draw the sequence diagrams for the following user stories of ATM example.

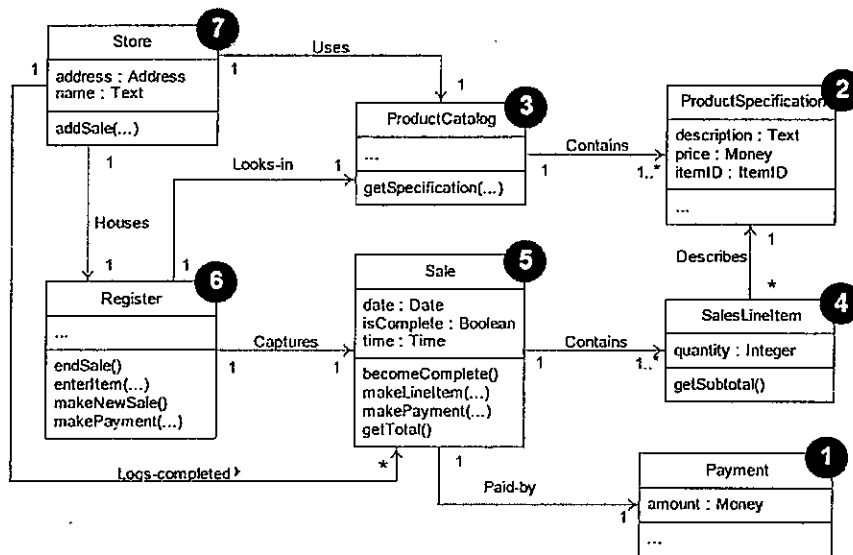
- I. **System Startup Use Case:** The system is started up when the operator turns the operator switch to the "on" position. The operator will be asked to enter the amount of money currently in the cash dispenser, and a connection to the bank will be established. Then the servicing of customers can begin. (5)
- II. **Withdrawal Transaction Use Case:** A withdrawal transaction asks the customer to choose a type of account to withdraw from (e.g. checking) from a menu of possible accounts, and to choose a dollar amount from a menu of possible amounts. The system verifies that it has sufficient money on hand to satisfy the request before sending the transaction to the bank. (If not, the customer is informed and asked to enter a different amount.) If the transaction is approved by the bank, the appropriate amount of cash is dispensed by the machine before it issues a receipt. (The dispensing of cash is also recorded in the ATM's log.) A withdrawal transaction can be cancelled by the customer pressing the Cancel key any time prior to choosing the dollar amount. (9)
- III. **An invalid PIN extension:** An invalid PIN extension is started from within a transaction when the bank reports that the customer's transaction is disapproved due to an invalid PIN. The customer is required to re-enter the PIN and the original request is sent to the bank again. If the bank now approves the transaction, or disapproves it for some other reason, the original use case is continued; otherwise the process of re-entering the PIN is repeated. Once the PIN is successfully re-entered, it is used for both the current transaction and all subsequent transactions in the session. If the customer fails three times to enter the correct PIN, the card is permanently retained, a screen is displayed informing the customer of this and suggesting he/she contact the bank, and the entire customer session is aborted. If the customer presses Cancel instead of re-entering a PIN, the original transaction is cancelled. (6)

Question 04 (25 marks)

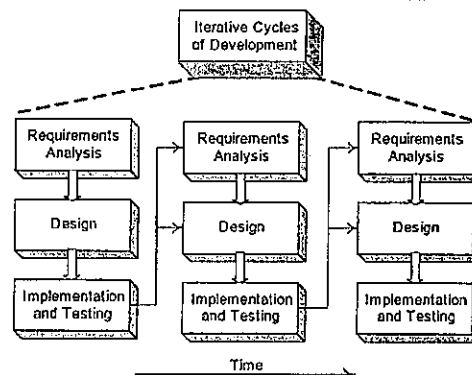
I. Implementation in an object-oriented programming language requires writing source code for: class and interface definitions and method definitions. For the given class diagram implement the source code for the following classes:

- Sales
- Register
- Product Specification
- Store

(10)

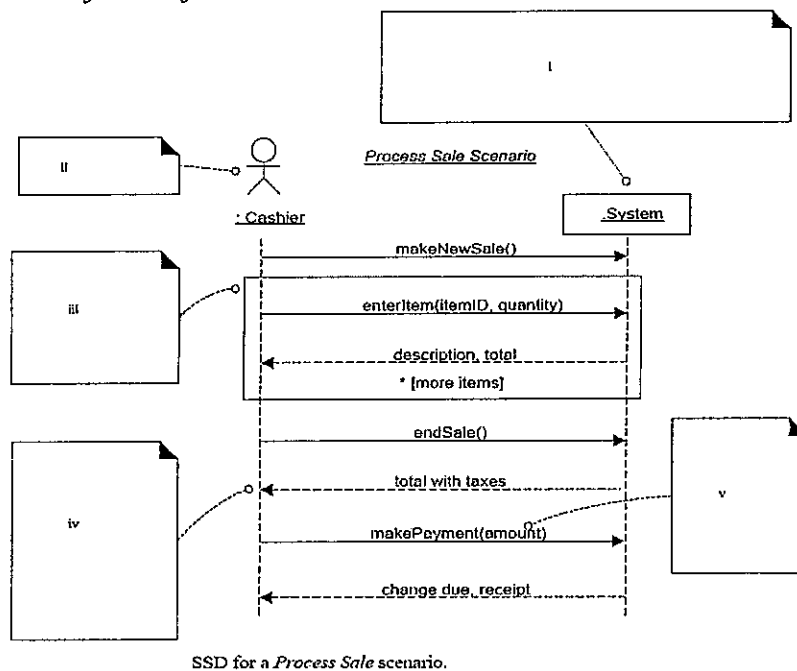


- An excellent practice promoted by the Extreme Programming (XP) method and applicable to the UP (as most XP practices are), is **test-first programming**. Describe what happens in this practice and what are some of advantages? (3)
- The use of statechart diagrams is emphasized for showing system events in use cases, but they may additionally be applied to any class. Differentiate between events, states and transactions. (3)
- The UML includes a general **dependency relationship**, which indicates that one element (of any kind, including classes, use cases, and so on) has knowledge of another element. List down why it is useful to have dependency relationship in class diagrams. (2)
- Explain what happens in the diagram below that is of iterative and incremental development process. Describe what happens at each of the stages from the beginning of the first iteration to the next and so on. (7)



Question 05 (15 marks)

- I. Label the system sequence diagram for the main success scenario of the *Process Sale* use case. It indicates that the cashier generates *makeNewSale*, *enteritem*, *endSale*, and *makePayment* system events. (5)



- II. The UP (and experienced iterative developers) recommends an iteration length between two and six weeks. What are the advantages of having short Iterations? Also A key idea is that iterations are **timeboxed**, or fixed in length. Therefore explain what happens during Time boxing. (3)
- III. A key insight regarding iterative development is to appreciate that these are only partially completed in the Inception phase, will be refined in later iterations, and should not even be created unless it is deemed likely they will add real practical value. And since it is inception, the investigation and artifact content should be light. What Artifacts May Start in Inception? (3)
- IV. A UP project organizes the work and iterations across four major phases. List down and explain these four phases. (4)