SEG 2100
Software Design II

FINAL EXAMINATION

Length of Examination: 3 hours **Dec 9, 1999 9:30 a.m CBY D207**

Professor: Timothy C. Lethbridge

Family Name: _____

Other Names: _____

Student Number: _____

Closed book. Except that you are allowed:

- A dictionary (optional)

- A calculator

- One standard 8.5 by 11 inch sheet of paper (crib sheet), on which you may have written or typed notes on both sides (reproductions of course notes are *not acceptable*).

If you do not understand a question, clearly state an assumption and proceed.

Good luck!

Section A: Multiple Choice (16%, i.e. 2% each)

Circle the single best answer to each question. There is **only one best answer** for each question. Part marks may be given for answers which are good, but not the best.

1. Validation is:
   a) Testing
   b) Inspection
   c) Both testing and inspection
   d) Checking that the system conforms to its specifications
   e) Checking that the system conforms to the needs of the users

2. Black box testing is:
   a) Testing in a very 'dirty' (i.e. black) environment
   b) Testing a system from the top down, using stubs for lower-level functions
   c) Testing where you can look at the internals of a function as it is execting
   d) Testing only with knowledge of the expected inputs and outputs
   e) Testing of hardware devices that record data in aircraft

3. Risk management involves
   a) Evaluating risks and at the start of a project
   b) Evaluating risks and taking corrective action when you have completed design
   c) Evaluating risks and taking corrective action at frequent intervals
   d) Evaluating risks and writing reports about them
   e) Taking risky decisions

4. If you had a design decision to make where there were several alternatives, each differing based on a kind of cohesion, which alternative would you be more likely to favour: An alternative with:
   a) High sequential cohesion, but low functional cohesion
   b) High temporal cohesion, but low communicational cohesion
   c) High temporal cohesion, but low layer cohesion
   d) High layer cohesion but low temporal cohesion

5. The Waterfall model of software development
   a) Involves developing a series of protoypes
   b) Incorporates risk management
   c) Is considered the best way to develop software
   d) Suggests that one should perform the steps in a sequential manner without iterating.
   e) Does not allow one to correct any mistakes.

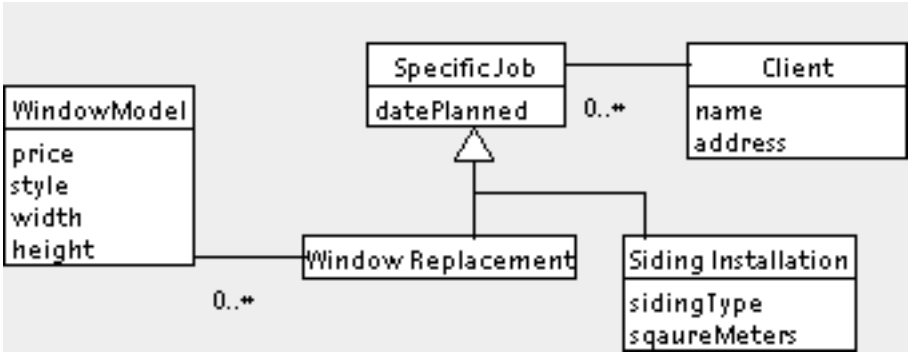
6. In UML, collaboration diagram:
   a) Shows the same information as a state diagram
   b) Shows the same information as a sequence diagram
   c) Shows the same information as a activity diagram
   d) Shows the same information as a class diagram
   e) Shows the same information as a deployment diagram

7. The analysis phase should take what percentage of the time of a typical project?
   a) 0.5%
   b) 1%
   c) 5%
   d) 15%
   e) 45%

8. The number of bugs remaining in software tends to be _____ the number of bugs found so far.
   a) Inversely proportional to
   b) The log of
   c) Unrelated to
   d) The square of
   e) Proportional to

Section B: Multiple Choice about Diagrams (14%, i.e. 2% each)

Questions 9 to 12 relate to the following class diagram



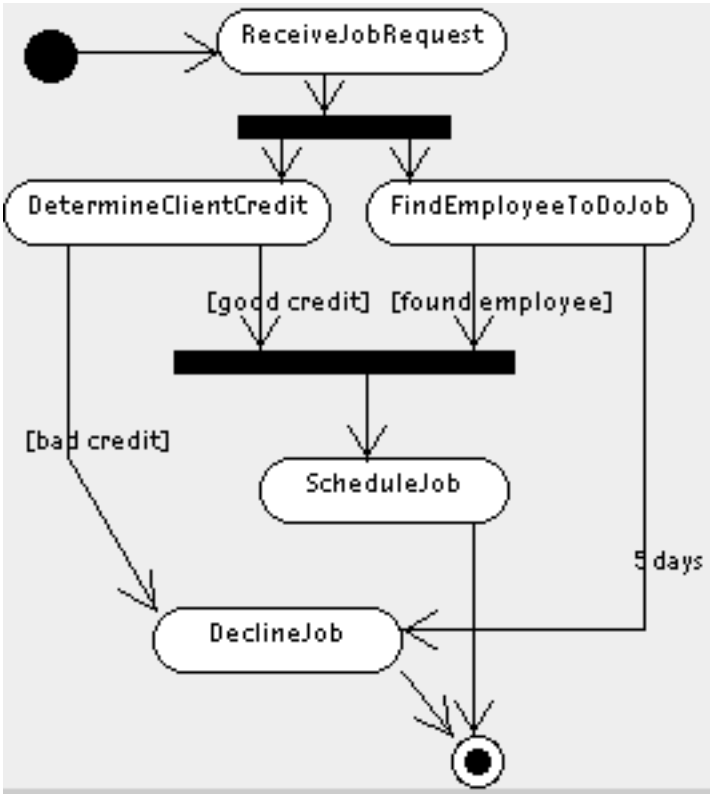
9. If datePlanned is declared as a private instance variable, then:
   a) It will not be inherited by WindowReplacement
   b) Methods of Client will not be able to access it directly
   c) Methods of WindowReplacement will be able to access it directly
   d) SpecificJob must be an abstract class
   e) More than one of the above is true

10. What changes should I make so that if a job requires several identical windows I can reduce the number of links between the WindowReplacement and WindowModel objects?
   a) Get rid of WindowModel and put its attributes directly in WindowReplacement
   b) Make the association between WindowModel and WindowReplacement many to many.
   c) Add an association class between WindowModel and WindowReplacement to contain the number of identical windows.
   d) Make the association between WindowModel and WindowReplacement many to many and add an association class to capture the number of identical windows.
   e) None of the above

11. Which of the following is true?
   a) 'name' could be a qualifier, and shown next to 'SpecificJob'
   b) I could get rid of the WindowReplacement class because it has no atributes
   c) I could use a diamond symbol to show that WindowModels are *part of* each WindowReplacement job
   d) More than one of the above is true
   e) None of the above is true

12. What instance variables should WindowReplacement have?
   a) datePlanned
   b) datePlanned and client
   c) datePlanned and windowModels
   d) datePlanned, client and windowModels
   e) windowModels
   f) datePlanned and windowModels

Questions 13 to 15 relate to the following activity diagram



13. The thick horizontal bar below ReeceiveJobRequest indicates:
   a) One or the other outgoing branch will be taken, but not both.
   b) Both outgoling branches must be taken in parallel.
   c) The two branches are performed sequentially, from left to right.
   d) The two branches are performed sequentially, in an undefined order..

14. The thick horizontal bar above ScheduleJob indicates that:
   a) ScheduleJob will take place when either [good credit] or [found employee] is true.
   b) ScheduleJob will take place when both [good credit] and [found employee] are true.
   c) ScheduleJob can take place when either [good credit] or [found employee] is true, but will normally require them both to be true.
   d) ScheduleJob with only be executed if DetermineClientCredit or FindEmployeeToDoJob return and error.

15. Which of the following is false?
   a) DeclineJob may end before FindEmployeeToDoJob
   b) DeclineJob may end before DetermineClientCredit
   c) ScheduleJob may end before DetermineClientCredit
   d) DetermineClientCredit may end before ScheduleJob

Section C: (24%, i.e. 2% for each blank)

The following six questions are to be answered using **no more than the space provided**.

16. The type of coupling in which information is shared via global variables is called *(2 marks)*

    _____

17. The goal of testing is: *(2 marks)*

    _____

18. In order to increase portability, one should decrease the coupling of a system to which types of things (we talked about 3 possible things, give two of them). *(4 marks)*

    • _____

    • _____

19. It is reasonable to stop testing when certain criteria have been met. These criteria include: 1) A set of test cases have been developed that thoroughly test the code, and 2) The test cases have all been executed. List two other criteria that should be met before we should stop testing. *(4 marks)*

    • _____

    • _____

20. When testing, what do you call a set of input values that should lead to the same set of instructions *(2 marks)*

    _____

21. A design document is intended to communicate your design decisions to implementers of the design, those who will need to maintain your design later, and those who will need to do what *(2 marks)*

_____

22. What are the two basic types of requirements:
(4 marks)

_____

_____

23. A use case is a typical interaction between…? *(2 marks)*

_____

24. A design document is intended to communicate your design decisions to implementers of the design, those who will need to maintain your design later, and those who will need to do what *(2 marks)*

_____

Section D: Written Questions (16%)

Question 25. Requirements (6 marks)

You are asked to add a feature to the SCSS so the user can list the senders of the last five messages he or she has received. The problem to be solved is that lots of users forget who sent them messages.

In half a page, outline your proposal for the requirements of this simple feature. Be concise but precise! Remember the important elements of a requirements document we discussed in class.

Question 26. Testing (10 marks)

A method called workingDays() takes as arguments two objects of class Date (date1 and date2). It returns an integer containing the number of working days between the two dates (the computation of the number of working days doesn't include date1 but does include date2, if the latter is a working day). Working days are Mondays to Fridays, excluding holidays. The list of holidays is contained in a file called holidays.txt.

Give a summary of the test cases you would need to run to verify the functioning of workingDays(). Use a table to present your answer, and give the reason for each testcase.

Section D: Modelling (30%)

For questions 27 to 29, the following instructions apply:
• Model the requested aspect of a system using an appropriate diagram.
• You will be marked on the appropriate choice of diagram as well as the content of the diagram.
• Add any necessary *comments* to your diagrams.
• You may have to use your common sense to fill in certain missing details.
• You are expected to use half a page per question.
• Use the back of pages, or scrap paper, for rough work.

Question 27 (10 marks) You are creating a system to manage hotels. Hotels contain rooms in which guests can stay. Some hotel rooms adjoin others (in other words, there are internal doors between them creating a suite. Guests can stay in either individual rooms or a suite. Each hotel room is assigned a quality level (e.g. a larger room or a room with a view would be better than a smaller room without a view). Each quality level has a maximum daily rate, although the rate that a guest pays may be less.

Question 28 (10 marks) A hotel clerk uses the following process when someone calls the hotel to make a reservation: First the guest is asked what nights they want to stay and for how many people. The clerk uses the system to verify that room(s) are available on those nights. If rooms are available, the clerk asks the guest if he or she is a Hotel Club member. If so, then the clerk types in the guest's hotel club member; immediately detailed information about the guest appears on the screen. If the guest is not a hotel club member then the clerk ask for basic information about the guest: Name, address, telephone number etc. Following verification of the guest's information, the reservation is completed.

Question 29 (10 marks) A hotel room at a given point in time may be vacant. If somebody then arrives and checks in, the room is then said to be occupied. A vacant room may also be reserved, meaning that it is set aside for a guest who is paying for it, but has not yet checked in. It is possible that the guest may never check in, but the room changes from 'reserved' to 'occupied' when the guest arrives. When a guest checks out, the room is said to 'need preparation'. Once cleaning staff have cleaned the room, it is normally designated as 'vacant'. Sometimes a room needs major maintenance (e.g. redecorating etc.); in this case, the room is designated as 'not in use'.

HAVE A GOOD HOLIDAY.