UNIVERSITY OF TORONTO
MISSISSAUGA
APRIL 2012 FINAL EXAMINATION

CSC 301H5
Instructor: Sills

Duration — 2 hours

Examination Aids: Course textbook, Object-Oriented Software Engineering, Stephen Schach
Course notes and any other course material

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*Do **not** turn this page until you have received the signal to start.*

The University of Toronto Mississauga and you, as a student, share a commitement to academic integrity. You are reminded that you may be charged with an academic offence for possessing any unauthorized aids during the writing of an exam, including but not limited to any electronic devices with storage, such as, cell phones, pagers, wristwatch calculators, personal digital assistants (PDAs), iPODS, MP3 players, or any other electronic device. Unauthorized calculators and notes are also not permitted. Please turn the electronics off and put all unauthorized aids with your belongings at the front of the room before the examination begins. If any of these items are kept with you during the writing of your exam, you may be charged with an academic offence. A ypical penalty may cause you to fail the course.

Please note, you CANNOT petition to re-write an examination once the exam has begun.

This final examination consists of two parts on 3 pages (including this one). *When you receive the signal to start, please make sure that your copy of the examination is complete.*

Choose the questions you answer as directed. Answer each question you choose as briefly but completely as possible.

Clearly indicate where you have written your answer to each of the questions you choose.

Each question is worth 5 marks. Answer 20 questions for a total of 100 marks.

Good Luck!

Part A [25 marks]

You are modelling phone networks.

There are landline and mobile phones. Mobile phones should not be confused with cordless phones.

Both types of phones use networks to relay the messages between the caller and the callee.

Landline phones use the Public Switched Telephone Network. The routing of calls is based on the digits in the phone number being called. When a caller dials a local number (both caller and callee are in the same exchange), the call is routed directly to the callee. (Phone numbers in the same exchange all have the same prefix and usually are all in the same geographical area.) If the callee is outside the local exchange, the switch checks whether there is a trunk circuit with capacity available. (A trunk is a circuit that can handle high call volume, that is it is capable of transmitting many, many calls simultaneously.) If there is a trunk with available capacity, the call is routed through the trunk circuit. If any circuit between the caller and callee is at capacity, a busy signal is returned. Otherwise, the callee acknowledges a go ahead, and the connection between caller and callee is established. There is a physical connection between phones. The connection is maintained until one or the other of the parties hangs up breaking the connection.

Mobile phones use a set of cells. A cell phone receives or transmits a call using radio waves from or to a cell in a network of cells. The call is relayed from a transmission cell tower to another tower or a base station. As the call is transmitted from cell to an adjacent cell, the mobile station searches for a channel and instructs the call to switch channels as the mobile station switches cells. From a base station, calls are transmitted over the Public Switched Telephone Network as with a landline call, by uplink from phone to base station or downlink from base station to phone.

All questions in Part A refer to the telephone networks described above. Make clear what part of the process you are modelling.

Pick **5 questions** from the following 6.

1. Write a use case description for one of the transactions.
2. Draw a use case diagram for the use case in question 1.
3. A service provider has capability for both cell phones and landline phones. Give an example class diagram that illustrates inheritance and polymorphism.
4. Draw a sequence diagram of a typical call from one phone to another.
5. Draw a state chart for a transaction.
6. Draw an example of an activity diagram.

Part B [75 marks]

Write your answers to the questions in Part B in a separate exam booklet.

Write all your answers double spaced.

The questions in Part B refer to your work on the Whist assignment unless specified otherwise.

If you are asked for an example, you may provide an example from yours or another team's solution. If a question is based on a method or example you did not use in your assignment, instead indicate how you could have used the method or provide an example you could have included in the assignment. Clearly indicate the context of each of your answers.

When different questions ask for examples choose them from different parts of the assignment or solution to illustrate you have an all round knowledge of the assignment and solution. If answers focus on a limited domain, only part marks will be awarded.

Pick 15 questions from the following 20 questions.

1. What event occurred at RIM on January 22? Speculate where in the software engineering life cycle the problem occurred that resulted in the event. Make a case for your answer.
2. Give an example of an object that includes responsibility for an action. Clearly indicate the object, the responsibility and the action.
3. Give an example of trade-offs made during the assignment.
4. What part of your solution could be reused? In what context? Be specific. What could not be reused? Why?
5. Why is high cohesion and low coupling advantageous? What did you do in your solution to increase cohesion and decrease coupling?
6. Where and how did you use inheritance and polymorphism in your solution?
7. Part of inspection is a checklist of potential faults based on previous faults in the project. Give five items that could be on the checklist.
8. Provide a good set of tests for deciding what player wins a hand. Provide a poor set of tests. Explain why one is good and one is bad.
9. Give examples of defensive programming in your solution.
10. How did your team deal with revisions and versions?
11. Give three examples of additions in your solution that aid in maintenance.
12. Give an example of dynamic binding. Why is dynamic binding a problem during testing and maintenance?
13. Give an example of each: adaptive, perfective and corrective maintenance in your assignment.
14. Give an example of an enhancement that could be added to the assignment. Where would it be added?
15. How can the order of testing reduce the need for stubs and drivers? Give an example.

16. Describe three strategies you implemented.

17. How would the solution change if extreme programming methodology was used? What did you do that agrees with XP methods? What did you do that disagrees with XP methods?

18. Draw the evolution tree life cycle for the steps in your assignment solution. Clearly label the location of each of the deviations. Which of the deviations are considered development, and which are considered maintenance?

19. Provide two examples of functional and two of non-functional requirements.

20. Pick a class from your solution and provide sample unit tests. Include and indicate which tests are boundary cases.

Total Exam Marks = 100