

**Faculty of Arts and Science  
University of Toronto**

**Midterm Test**

**Department:** Computer Science  
**Instructor:** John Mylopoulos  
**Date and Time:** 6:10pm, Monday February 25, 2002

**Conditions:** Closed book  
**Duration:** 50 minutes

**This test counts for 20% of your final grade**

**Name:** \_\_\_\_\_

(Please underline last name)

**Student Number:** \_\_\_\_\_

**Question Marks**

1. \_\_\_\_\_/20

2. \_\_\_\_\_/20

3. \_\_\_\_\_/30

4. \_\_\_\_\_/30

**Total** \_\_\_\_\_/100

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**1. [Short Questions; 20 marks total]**

**(a) [Software lifecycle – 5 marks]** Describe *in words* (no diagram!) the waterfall lifecycle model. In what way(s) is the waterfall lifecycle model different from other lifecycle models?

**The waterfall lifecycle model includes phases: system engineering, requirements analysis, design, testing, construction, installation, and maintenance.**

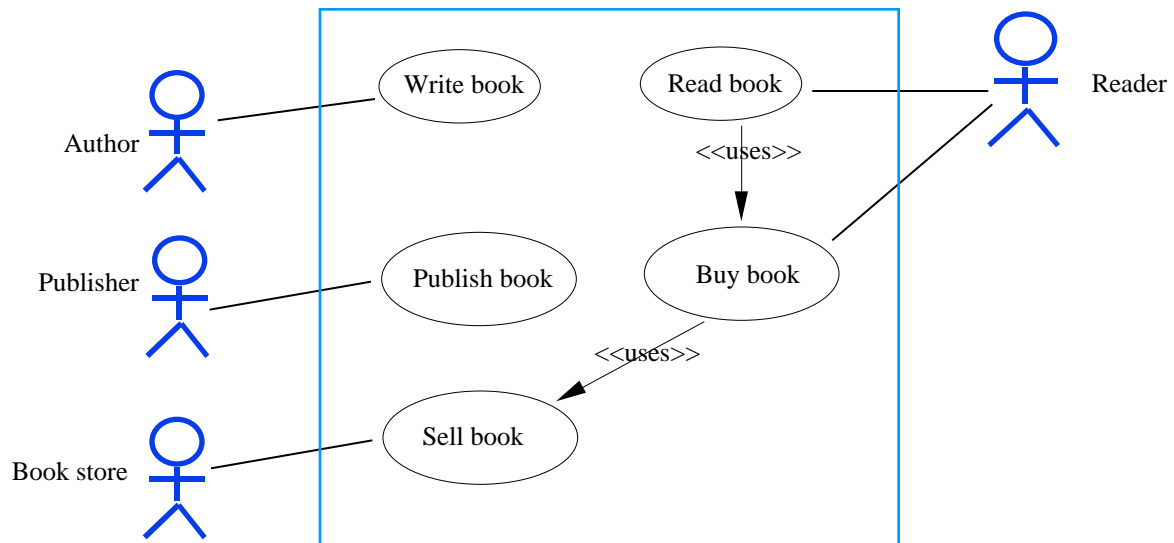
**Its distinguishing feature is that work on each phase is supposed to be complete before moving onward. Backward moves are only allowed to the previous phase.**

**(b) [Feasibility Study – 5 marks]** Assume that someone announces a gift of \$1,000,000 to the University (to be used for student bursaries!) The gift is to be given to the University in two years. Assuming a discount rate of 5%, calculate the present value of the gift. You may assume that  $1/1.05 = 0.952$

**$0.952 * 0.952 = 0.906$ . Hence, the present value of the gift is \$906,000**

## 1. [Short Questions; continued]

(c) [Use Case Diagrams – 5 marks] A book is written by an author, published by a publisher, sold by a book store, and read by a reader. Moreover, for a reader to read a book, she must buy it from a book store that is selling it. Draw a use case diagram for this scenario, showing relationships between different use cases.

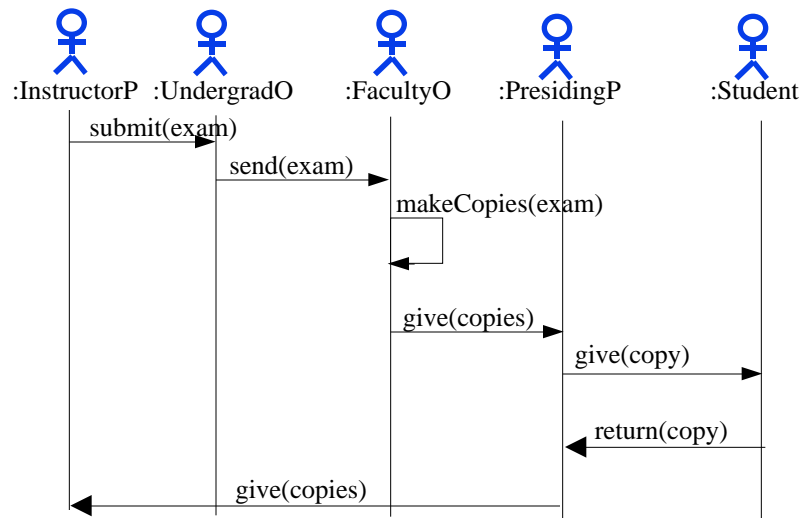


(c) [Business Processes – 5 marks] Give an example of a business process for a University setting such as the University of Toronto.

**To give a course, an instructor must prepare lecture material, get TAs assigned by her department, arrange for the TAs to do tutorials and mark assignments, prepare assignments, give assignments, answer questions about the assignments or the lecture material, mark the midterm and the final exam, assign marks to all students enrolled in the course.**

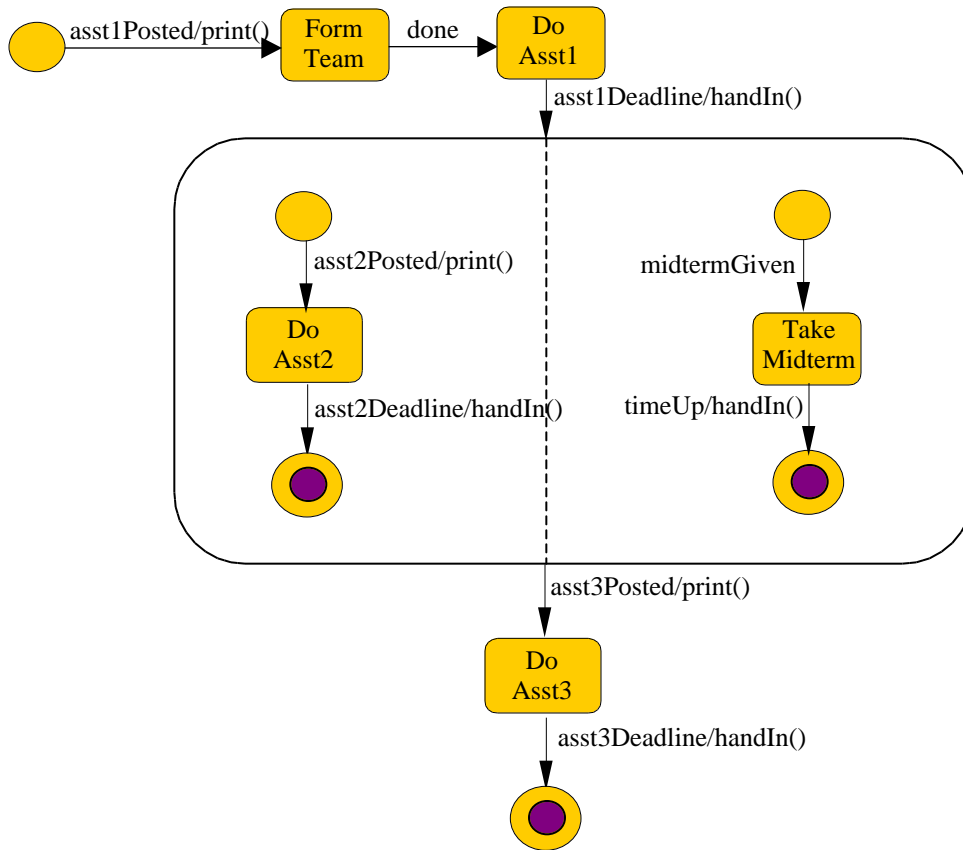
2. [Sequence Diagrams; 20 marks] A final exam for a given course is prepared by the instructor of the course and submitted to the DCS undergraduate office by March 20. The undergraduate office sends all exams to the Faculty of Arts & Science office where copies are made. On the day of the exam, copies are given to the presiding officer who takes them to the room where the exam is given. The students write the exam on an exam copy, and return to the presiding officer at the end of the exam. The written exam copies are given to the instructor for marking.

Draw a sequence diagram that captures this description.

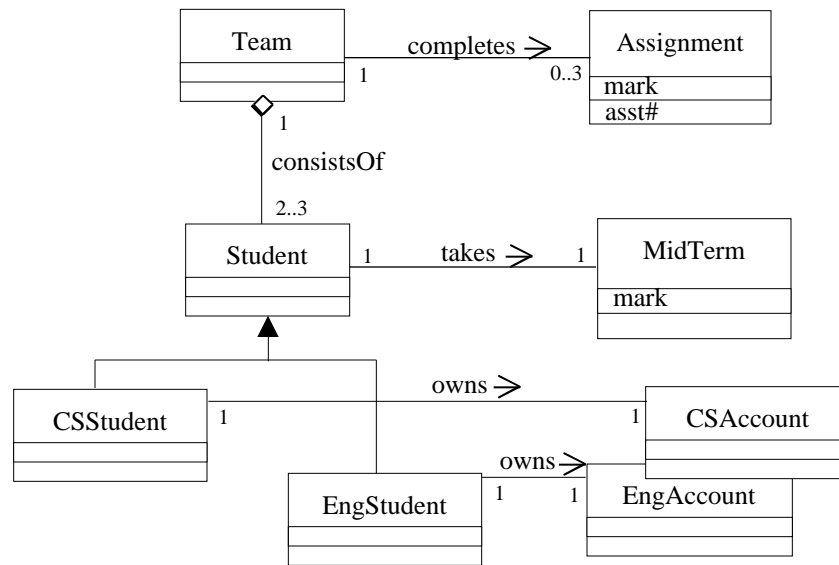


3. [State Diagrams; 30 marks] To take CSC340, a student must go through the following process. When the instructor posts assignment 1, each student must form a team, do the assignment and hand it in. When assignment 2 is posted, each student works on it with her team; in parallel, when the midterm is made available, each student writes it. After both assignment 2 and the midterm are done with, each student waits for assignment 3, and when it is available, does it with her team. (No final exam in this version of CSC340!)

Draw a state diagram that models this process. Make sure to model activities (e.g., doing an assignment, writing a test) as states, not transitions.



4. [Class Diagrams, 30 marks] Draw a class diagram (with attributes, where appropriate) that describes entities and relationship relevant to the process of question #3. In particular, students are members of teams. Each team has 2 or 3 members. Each team completes 0 to 3 assignments. Each student takes exactly one midterm test. Computer Science students have a single account on the CDF facility, while each engineering student has an account on the Engineering facility. Each assignment and midterm is assigned a mark.



(Scratch paper)

(Scratch paper)