

Practice Final Exam

CS 128 · League
17 December 2004

You may not use any books or computers, and you may not talk with other students. Please write all your answers in the blue book, but turn in both the book and the exam paper when you are finished. You have 1 hour, 45 minutes.

- For each definition below, choose the one term to which it best applies. Your choices are:
aggregation association code review fault generalization maintenance
regression test sub-class super class unit test version control
 - _____ is one kind of verification that does not rely on *running* the program or system being verified.
 - _____ is sometimes called the “is a” relationship between classes: for example, an ELEPHANT *is a* MAMMAL, which *is an* ANIMAL. Another example: a SQUARE *is a* RECTANGLE, which *is a* SHAPE.
 - In a generalization relationship, the *more general* class is called the _____ .
 - The _____ phase consists of any work done to a system *after* it is already in use.
- Below is a UML class diagram for a course registration system (figure 1). Modify and augment the diagram to account for the following facts:
 - Some majors are offered in conjunction with more than one department.
 - Students must have just one major, but they can *minor* in many different programs.
 - A major consists of some set of courses.
 - Students may be undergraduate or graduate, U.S. citizens or international.
 - Graduate students may tutor undergraduate students.
 - The University has multiple campuses, and each campus has several schools.

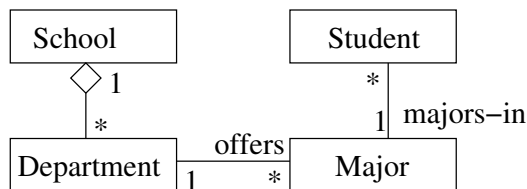


Figure 1: Class diagram for question 2.

- Figure 2 on the next page contains a collaboration diagram for a word-processing application.
 - Create a sequence diagram that illustrates the same interaction.
 - Would any of these classes benefit from introducing a new *super* class? What would it be?
 - Draw a class diagram to model the classes involved in this interaction. Include the methods in each class. Include the super class, if any, from part (b).

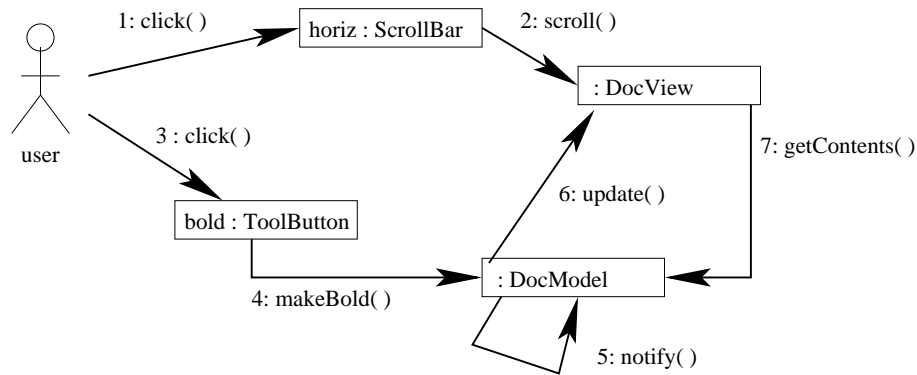


Figure 2: Collaboration diagram for question 3 on the preceding page.

4. What is the main difference between static and dynamic verification? Give one example of each kind.
5. As a test engineer for NASA, you have been assigned to test the following pseudo-code.

```

FUNCTION autoPilot (altitude, pitch : integer)
BEGIN
    IF altitude > 10000 AND pitch < 0
    THEN RETURN pitch / 2
    ELSE IF altitude > 5000 AND pitch < 70
    THEN RETURN pitch * 0.3
    ELSE IF pitch < -25
    THEN RETURN (- pitch) / 2
    ELSE RETURN altitude + pitch
    END
END
    
```

Your colleague suggests the following three test cases. Each case contains proposed inputs (values for altitude and pitch) and the expected output (return value).

altitude	pitch	return
10384	70	10454
986	-32	16
768	0	768

Do these three test cases produce good *coverage*? If not, suggest one or two additional cases that will make your testing more comprehensive. (Be specific: give proposed inputs and expected output.)

6. While studying system *design*, we learned that reducing coupling between components can improve the overall quality of the system. Explain the impact of coupling on system *maintenance* in particular.