University of Washington
CSE 403 Software Engineering
Spring 2014

Final exam

June 6, 2014

Name: _____

CSE Net ID (username): _____

UW Net ID (username): _____

This exam is closed book, closed notes. You have **50 minutes** to complete it. It contains 26 questions and 8 pages (including this one), totaling 100 points.

Before you start, please check your copy to make sure it is complete. Turn in all pages, together, when you are finished. **Write your initials on the top of *ALL* pages** (in case a page gets separated during test-taking or grading).

When you are asked for multiple answers, give answers that are as different as possible, and give the most important answers.

Please write neatly; we cannot give credit for what we cannot read.

Good luck!

Page	Max	Score
2	12	
3	20	
4	18	
5	15	
6	15	
7	12	
8	8	
Total	100	

1 True/False

(2 points each) Circle the correct answer. T is true, F is false.

1. **T / F** A refactoring is generally motivated by some specific task it will make easier, as opposed to simply improving the code.

2 Multiple choice

(5 points each) Mark all of the following that can be true, by circling the appropriate letters.

2. The main goals of a code review are:
   (a) Is the code correct?
   (b) Is the code understandable?
   (c) Are the tests testing the right thing?
   (d) Producing new test cases
   (e) Producing fixes/patches for bugs
3. Circle all of the following that suggest a composition relationship and not aggregation (do not circle any that suggest both).
   (a) A "parent" element contains or owns zero or more "child" elements.
   (b) A strong life cycle dependency.
   (c) Shared possession.
   (d) At least one class in the relationship depends on the other (in the UML sense of dependency).
   (e) Both classes in the relationship depend on the other (in the UML sense of dependency).

3 Short answer

4. (4 points) Name two practices that increase the "bus number".

   (a) _____

   (b) _____

   (c) _____

5. (6 points) Give an example of a problem for which Amazon found that a non-technical solution was much more effective than a technical solution.

   Problem: _____

   Technical solution: _____

   Non-technical solution: _____

6. (6 points) Suppose that component A depends on component B. State Java code constructs that could cause this dependence. The answer should be English text, not code examples.

   (a) _____

   (b) _____

   (c) _____

   (d) _____

7. (4 points) The dependency injection design pattern adds ("injects") a dependency. Describe, in one phrase each, where/when the dependency does not exist and where/when it does exist.

   Does not exist: _____

   Does exist: _____

4 Design patterns

Give each answer in **one sentence** or less.

8. (4 points) Describe the most important difference between a library and a framework.

9. (4 points) Give two disadvantages of the direct instantiation model that can be solved by using the factory method or factory class patterns.

   (a)

   (b)

10. (6 points) Describe the two most important differences between composition and aggregation.

    (a)

    (b)

11. (4 points) A computer screen displays a set of nested elements (such as windows, panes, and buttons). Cocoa dispatches events from the inside out (visiting the smallest component first), whereas browsers dispatch events from the outside in (visiting the largest component first).

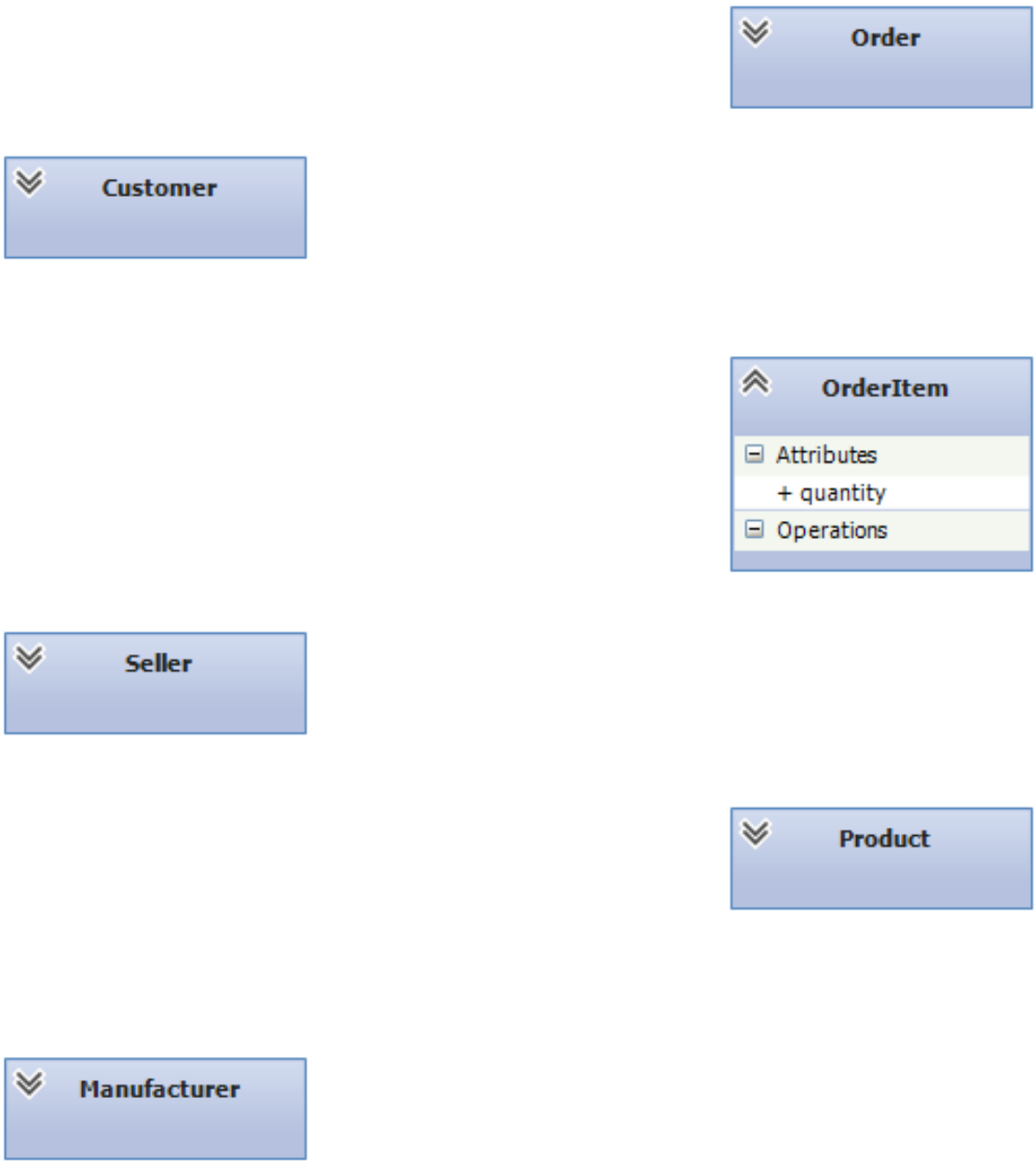
    State a design requirement that is convenient to implement in one of the models, but difficult or impossible in the other model.

    Model:

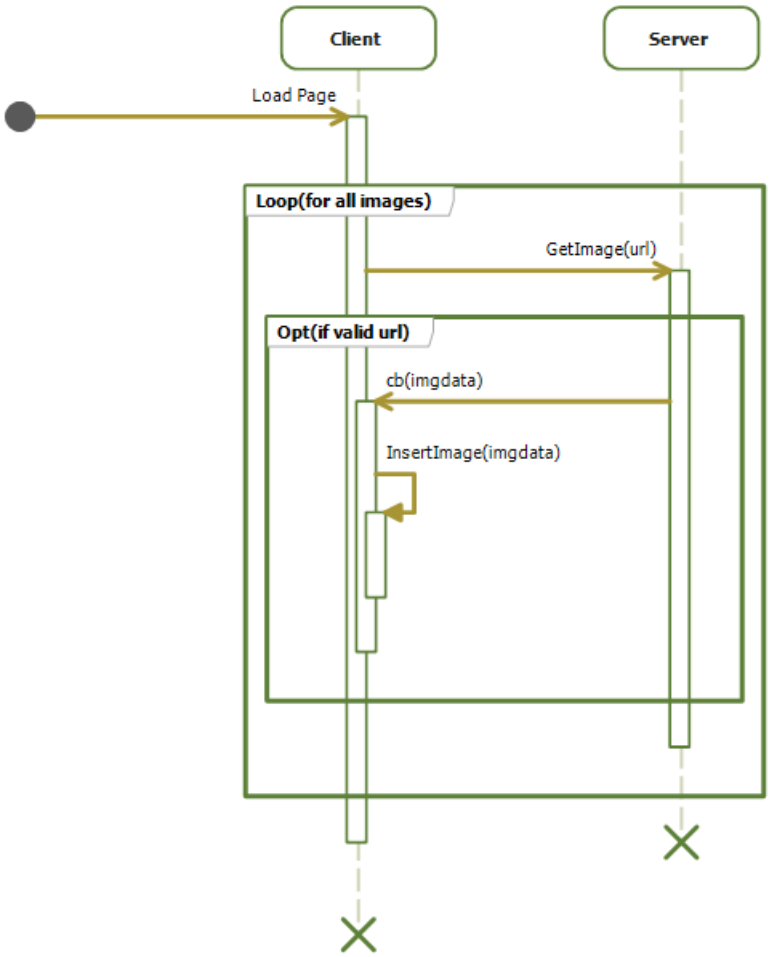
5 Design diagrams

12. (15 points) Draw the five most significant associations/dependencies (but no type relationships such as subtyping) between the classes shown. Do not add any new classes, and do not model anything other than associations. Add all multiplicities.

    You may add several words of description to a connector or a multiplicity if you feel it's necessary, but most full-credit solutions will not need any such description.



(15 points) Consider the following sequence diagram:



13. **T / F** The arrow from client to server models a call that blocks and then returns.
14. **T / F** The arrow from server to client models a call that blocks and then returns.
15. **T / F** The arrow from client to client models a call that blocks and then returns.

Is each of the following sequences a possible complete history of calls, immediately after Load Page? Calls to InsertImage are *not* modeled. Assume that the client and server are both infinitely multithreaded and that execution completes normally (without error).

16. **T / F** No calls.
17. **T / F** GetImage, GetImage, GetImage
18. **T / F** GetImage, cb, GetImage, cb, cb
19. **T / F** GetImage, GetImage, cb, cb, GetImage
20. **T / F** cb, GetImage, cb
21. **T / F** GetImage, GetImage, GetImage, cb, cb, cb

6 Software engineering methodology

22. (4 points) In his guest lecture, Dennis Lee noted that once a project becomes late, it is likely to become even later. What was his main explanation for this?

23. (4 points) If you discover a bug or other issue, you should fix it to improve your code quality. What are other engineering practices are essential to improving the code quality, typically *after* fixing the bug)?

    (a)

    (b)

24. (4 points) The primary purpose of code review is to improve the code (or design, or tests — whatever is being reviewed). State benefits of code review that do not improve such artifacts.

    (a)

    (b)

25. (4 points) State reasons that pair programming may deliver code with *more* functionality code than the same two people working independently.

    (a) _____

    (b) _____

26. (4 points) State reasons that pair programming may deliver code with *less* functionality than the same two people working independently.

    (a) _____

    (b) _____