University of Washington
CSE 403 Software Engineering
Winter 2011

Midterm Exam

Friday, February 11, 2011

Name: ***Solutions***______________________________________

Initials: ____

UW net id: ____

UW id number: _______________________________________

This quiz is closed book, closed notes. You have **50 minutes** to complete it. It contains 35 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.**

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

Good luck!

Page	Max	Score
2	20	
3	18	
4	15	
5	9	
6	16	
7	14	
8	8	
Total	100	

1 True/False

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

1. **T/F** The number of modules in a system is one way to measure complexity of that system. ***True.***

2. **T/F** Checkboxes are a good way to present related choices only one of which can be true at a time. ***False. Checkboxes should be used to choices that are not mutually exclusive.***

3. **T/F** Design and architecture are often referred to as the "what" of the system and requirements as the "how". ***False. Requirements are the "what" and the design and architecture are the "how".***

4. **T/F** It is often better for the prototype to exceed the final product so that the users can see all the possible options the system could have. ***False. The user will likely be disappointed if the final product is worse than the first prototype. Developers must manage the expectations.***

5. **T/F** The study of how humans interact with computers is called LSD. ***False. It is called human computer interaction, or HCI.***

6. **T/F** The fact that paper prototypes don't look as good as prototypes made with a computer hurts the kinds of feedback developers can get from users, but they can be made so much faster that they are worth it. ***False. The fact that paper prototypes don't look very professional makes it easy for users to ask for changes and complete remakes. The user are less afraid to give negative feedback on a paper prototype than on a nicely made one.***

7. **T/F** Informal language is a typical and valid way to write down use cases. ***True.***

8. **T/F** Cohesion refers to how closely all the operations in a module are related. ***True.***

9. **T/F** While there are many models for the software development lifecycle, the staged delivery model is clearly the best. ***False. While the staged delivery model is often used in practice, there is no single best model. Every project must be evaluated on its goals and resources to select the most appropriate model.***

10. **T/F** Maintenance is one of the stages of software development. ***True.***

11. **T/F** UML is widely used in industry. ***True.***

12. **T/F** An architectural style can be expressed as a box and line drawing. ***False. An architectural style describes the properties of an architecture, such as "no more than three lines out of each box" or "no isolated boxes", but it itself cannot be expressed with boxes and lines.***

13. **T/F** One of the goals of specifying requirements is to be able to control the production and development of a system. ***True.***

14. **T/F** UML class diagrams are a good way to represent the algorithmic nature of the interactions between classes. ***False. UML class diagrams do not contain algorithmic details.***

15. **T/F** If I were to take the largest piece of software built thus far and retype it from scratch, it would take me around one year. ***False. For example, it would take me more than six decades to retype Debian 5.0.***

2 Multiple choice

16. (4 points) Which of the following statements is true about the spiral software development model? (Circle all that apply.)

    (a) At least some specification is written before any code.
    (b) Most specification is written before any code.
    (c) At least some implementation must take place before any tests are written.
    (d) Most tests are written before implementation takes place.

    a

17. (4 points) Some disadvantages of ad hoc development are: (Circle all that apply.)

    (a) Some important actions may go ignored.
    (b) It is easy to learn.
    (c) It is clear when to start and stop each task.
    (d) It scales poorly to multiple people.

    a,d

18. (4 points) Which of the following are properties of a good use case? (Circle all that apply.)

    (a) Starts with a request from the system to an actor.

    (b) Ends with the system producing all answers the actor asked for.

    (c) Is written from the actor's point of view.

    (d) Describes the internal activities the system must take to produce all the answers the actor asked for.

    b, c

19. (4 points) Which of the following are terms used when describing formal use cases? (Circle all that apply.)

    (a) Goal.

    (b) Actor.

    (c) Level.

    (d) Primary actor.

    a, b, c, d

20. (5 points) Which of the following are valid ways to avoid having a bad user interface? (Circle all that apply.)

    (a) Speak to experts who study user interfaces.

    (b) Build prototypes.

    (c) Limit the functionality the users can customize to minimize the interface.

    (d) Make sure the back end of the system works pretty well before presenting the user with the interface to avoid confusing the users with bugs and getting bad interface advice.

    (e) Talk to users.

    a,b,e

21. (2 points) When should a user interface include a tabbed pane? (Circle all that apply.)

    (a) Whenever there is too much information to show on one screen.

    (b) When there are multiple views that the user may want to switch between at any moment and be able to return to later.

    b

22. (5 points) In which of the following qualities does the SCRUM development process differ from all of the waterfall, spiral, and iterative development models? (Circle all that apply.)

    (a) The amount of team creativity and flexibility allowed.

    (b) When the project cost is set.

    (c) Ease of knowledge transfer.

    (d) How responsive the process is to the environment.

    (e) When the completion date is set.

    a, c, d

23. (2 points) What is the most common tool used in industry today for drawing architecture? (Circle only one answer.)

    (a) Microsoft Visio.

    (b) Microsoft PowerPoint.

    (c) Open source UML-based products.

    b

24. (2 points) Which of the following reasons was the highest contributing factor to the Three Mile Island catastrophe? (Circle only one answer.)

    (a) Insufficient automated testing.

    (b) A poor user interface.

    (c) The specifications did not describe the scenario that occurred.

    (d) The specification did describe the scenario that occurred but the software did not properly meet that specification.

    b

3 Short answer

Answer each question with **one sentence or phrase, or a short list**.

25. (6 points) Name three advantages of using decentralized version control (e.g., git or mercurial) over centralized version control (e.g., CVS or subversion)?

    - ***Allows the developer to checkpoint his or her code without needing an Internet connection.***
    - ***Keeps a more accurate history of the code revisions.***
    - ***Details the history of a large change (as opposed to a single commit).***
    - ***Better merging algorithms.***

26. (6 points) Consider the following scenario. Angel and Beatrice are working a software system and are using mercurial, a distributed version control system to manage their code. Beatrice pulls from the master repository and updates her working copy. She realizes there is a bug in the code and works to fix it. When she is finished, she commits her code. The next day, Angel begins working on the code by pulling from the master repository and updating his working copy. He too realizes the code has a bug (the same one Beatrice saw) and spends the whole day fixing it. What went wrong? Why didn't Angel benefit from Beatrice's work?

    Beatrice forgot to push her code to the master repository.

27. (4 points) When is a good time to do paper prototyping in the software development process?

    Prototyping should happen near the end of the requirements stage and beginning of the design stage.

28. (4 points) In Java, `Integer` is a subtype of `Number`.
`List<Integer>` is not a subtype of `List<Number>`. Why?
(Don't give a Java-specific answer; explain why Java *shouldn't* allow `List<Integer>` to be a subtype of `List<Number>`.)

    `List<Integer>` does not support the operation `add(Float)`, but `List<Number>` does.

29. (6 points)

    Sometimes, sequence diagrams can be somewhat similar to the actual code. Why not just code up the algorithm? Why bother with sequence diagrams?

    A good sequence diagram is higher-level than real code and it is (1) language-agnostic, (2) can be read by and written by non-programmers, (3) easier to do in a team, and (4) can allow seeing many objects at one time on the same page.

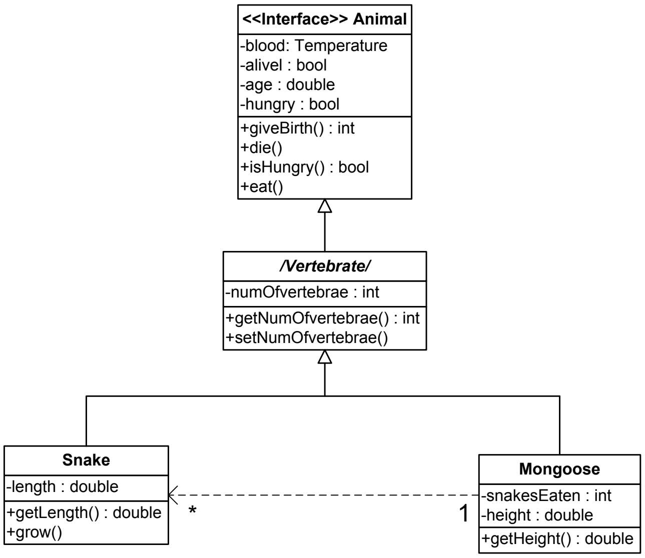
30. (4 points) What are two aspects of a software system design that are explicitly omitted from a UML class diagram?

    - ***Timing/ordering of calls; in fact, all dynamic information. More generally, information that appears in other UML diagrams such as sequence diagrams.***
    - ***Implementation details such as algorithms, data structures, and the actual code.***
    - ***Implementation language.***

    Things like user manual, webpage, requirements, etc. are part of your project but are not part of the design.

4 Reasoning

Consider the following UML class diagram.



31. (1 point) What is the relationship between `Vertebrate` and `Animal`?

    `Vertebrate` is a subclass of `Animal`.

32. (1 point) What is the relationship between `Snake` and `Animal`?

    `Snake` is a subclass of `Animal`.

33. (2 points) What is the **association type** between `Mongoose` and `Snake`?

    Dependency association.

34. (1 point) According to the class diagram, can 2 mongooses eat 1 snake?

    No. The relationship between `Mongoose` and `Snake` is one-to-zero-or-more.

35. (3 points) Identify one thing wrong with this diagram.

    Because `Animal` is an interface, the relationship from `Vertebrate` should be dashed.

End of quiz.
Make sure that you have written your initials on the top of ALL pages.