

CpSc 372

Exam 2

Name _____

Answer any FOUR of the five questions. Place a large X on the question you are omitting. If you answer all five, the one on which you score the best will NOT be counted. All questions are counted the same: 25 points each. Answer all parts of each question.

You can not have a laptop in the exam. You may have the class notes, handouts, copies of submitted homework. You have from 8 am until 9:15am for the exam.

1. Concurrency and design
 - a. Describe the essential ideas of model checking. (You can answer even if you did not get Java PathFinder to work.) How does it differ from testing? How does it differ from program proof?
 - b. You may not have been able to run your design in the process simulator, SIMSE, but name the process model you were modeling (agile, iterative, etc.). How did you intend to differentiate that model from others in your simulation design?
 - c. Each mode encapsulates data and subprograms that are only active in that mode. This enhances which quality attributes? It degrades which ones?

2. architecture

- a. Describe a design that avoids deadlock among threads that share resources.
- b. The app you have been writing this semester plugs in to the top of the Android architecture. What kinds of things does that allow you to do in your app? What kinds of things can you not do?
- c. How does MVC illustrate loose coupling? High cohesion? Draw a sequence diagram for a scenario from your system.

3. Variation mechanisms

- a. Inheritance is an essential ingredient in making the plug-in design pattern work. How does it contribute to this pattern?
- b. An aspect is a variation mechanism that can be used both for static binding and dynamic binding. List one other variation mechanism (other than aspects and inheritance), classify it as either static or dynamic, and then explain why it is what it is (static or dynamic). What does this type of binding allow you to do with the plug-in?
- c. Test-first development is an agile development practice. Why is it considered agile? What benefits does test-driven development bring to a project?

4. Design by contract

- a. Explain what the “contract” in design by contract means. What benefit does design by contract offer? At what cost?
- b. A domain specific language (DSL) is particularly useful in a software product line organization. What are the advantages of a DSL? When is it more useful to use a general purpose language?
- c. RUP is an iterative incremental technique. How would design by contract be incorporated into a RUP-based process?

5. Software product line

- a. Strategic reuse in a software product line encompasses code but also architecture and design. What role does an interface play in promoting reuse?
- b. Describe the difference between a product architecture and a product line architecture.
- c. Consider the 4 major phases of RUP: Inception, Elaboration, Construction, and Transition. What is the role of testing in each of these phases? List the testing activities for each phase and the objectives of each of those activities.