CSE1325 OOP Final Exam

December 11, 2014

Name: UTA ID: 100

Instructions:

1. Read all of the instructions for each question and answer what is asked. Do not write down random stuff if you don’t know the answer.
2. All questions that have the same question number are related to each other. However, they are not all necessarily dependent on each other so you can skip around if needed.
3. The test is worth 100 points and there will be 10 points extra credit available.
4. If you have a question during the test, raise your hand and ask the proctor. You may or may not get an answer, but you won’t know unless you ask.

1.a. What characteristics of computer architecture, i.e what things about the computer, would lead you to consider the idea of using multi-threading in your Java program? List at least two computer characteristics that you would consider and describe how each of those characteristics would relate to the use of multi-threading. {5}

1.b. Describe the concept of a Java program “thread” in your own words. {5}

1.c. List and describe at least two Java built-in methods that could be used to allow multi-threading in a program. Tell what class the methods are in and describe each method in no more than two sentences for each in your own words. {8}

2.a. In a program with the need for a synchronized producer-consumer relationship between objects, what actions from each object would happen in what order if 4 items are produced and consumed in perfect order? List each action and its associated object on a separate line below. The first action is listed for you. {7 points}

Object Action

Producer produces item #1

2.b. In a program with the need for a synchronized producer-consumer relationship between objects, what should the consumer object do if the appropriate item is not available to be consumed?

Describe what should happen in words. {5 points}

3. Given the classes GUIGuessingGameTest and GameFrame on the handouts with the test, answer the following questions:

3.a. What is the game implemented by the program? Describe in words and be specific. {4 points}

3.b. Draw the GUI window that is shown after the user has entered a 4th guess of 392. Use light horizontal and vertical lines to show how the items line up with one another on the GUI. Put dimensions on the outside of your GUI window to indicate the height and width and the measurement unit of the overall window. {8 points}

3.c. Given the algorithm of the game, what is the maximum number of guesses needed to win the game, if every guess is made as efficiently as possible? How do you determine this number of guesses and what is the process used to decide what to guess each time? {7 points}

3.d. How do you test a piece of software repeatedly with the same values, when the code uses a random number generator to create a starting number for each run? {4 pts}

3.e. Given the data fields and layout for GameFrame and the addMyComponent method, what does the command

 addMyComponent( guessCountNum, 2, 3, 1, 1 );

cause to happen? Describe the information in the object data field that is used, at what location it is used, the sizes of the data in the layout, etc. {7 pts}

4. Fill in the blank with the capital letter of the phrase on the right that best relates to the word or phrase on the left. {2 points each; 10 points total}

 a. Multi-threading A. Data-generating object

 b. Producer B. Concurrency

 c. Lock C. Data-using object

 d. Synchronize D. Prevent simultaneous access

 e. Consumer E. Force ordered interactions

5. Given the classes MTF14 and MTF14Test on the handouts with the test, answer the following questions: [Note: These are exactly the same classes used on the midterm test.]

5.a. What does the method prAL in the test class do? Describe this method in terms of the real-life application that this program is modeling. {5 pts}

[Example: Don’t say “method prAL is checking to see if x is less than y and greater than k” . Say “method prAL is checking to see if x is within the bounds of legal values for this component. This component must have n digits and cannot start with 0. Therefore the lowest legal value is k and the highest legal value is y so x must be between them to be legal.”]

5.b. Explain why prAL is a static method. {3 pts}

5.c. Is there error checking done on input parameters to the constructor? Circle YES or NO

 If YES,

 list which parameters are error checked and explain why the others are not checked.

 If NO,

 explain whether or not this is appropriate for the particular task being performed.

 {5 pts}

5.d. For the parameter exC3, list and describe in words all the error checks that are performed in the set method for this parameter.

 {5 pts}

5.e. Given what MTF14 represents in the real world (as discussed in class after the midterm), write a few lines of code (a code fragment) that would implement at least one change that should be made to the code to handle a valid MTF14 object in the real world that is not handled currently. Also describe in words the reason for the change that you are making and also describe exactly where the new code fragment should be added to the MTF14 code. {6 pts}

6. Given the interface named *Prioritize* below that has a method called *determinePriority*, write an implementation of the method determinePriority that uses the two input values to return a priority value determined as follows:

 val1 is treated as a ranking value in the range of 1 to 5 with 5 being the highest rank and

 val2 used as a weighting in the range of 1 to 100 which will potentially reduce the ranking value

 The calculation of val1 \* val2 / 100 is done and

 returned by the method as a double priority value in the range of 1.0 to 5.0.

 {6 points}

public interface Prioritize

{

 public double determinePriority(int val1, int val2);

}

Extra Credit questions

XC1. Give an example of a situation in real-life where actions occur concurrently such that a computer simulation of that situation would need to have multiple threads to model it. Describe what would be running in each separate thread. {5 pts}

XC2. Considering the real-life application of the MTF14 objects today, what information does aC3 carry? Does aC3 carry the same amount of information now as it did when the system using it was developed? What used to be true about the aC3 information that is now no longer consistently true? {3 pts}

XC3. From the Java course this semester, what topic would you have liked to spend more time on or what topic was not covered that you would have liked to have covered about Java?

 {Any meaningful answer will receive 2 points. ANY answer will receive at least 1 point.)