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Higher Diploma in Science in Computing – Part-time – Year 1 – HDCSDEV

Semester Two Examinations – 2015/16

Wednesday 4th May 2016
6:30pm – 8:30pm

Advanced Programming

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Answer Question A and **one** other Question

Duration of exam: 2 hours
Attachments: none

Question A [60 Marks in total]

1. a) What is the worst-case complexity of the each of the following for loops and the worse case complexity of the overall method?

```
private void method() {
      for (i = 0; i < N; i++) {
            for (j = 0; j < N; j++) {
                  for (k = 0; k < N; k++) {
                        //sequence of statements
                  }
            }
      }
      for(l=0; l<N; l++){
            //sequence of statements
      }
}
```

[10 marks]

b) What would be the Big-O notation for the following tasks? Explain why this is the case.

i) Finding a specific word in an unsorted String array (i.e. String[N])

ii) Finding a specific word in an unsorted String matrix (i.e. array of arrays, String[N][N])

[10 marks]

2. What are the four basic things one must do when one is making a class serializable?

[15 marks]

3. Write Java code to cover the following lines of code with exception handling.

```
ArrayList<String> names = new ArrayList<>();
names.add("Paul");
names.add("Peter");
String name = names.get(3);
```

[10 marks]

4. List three of the six possible Thread States.

[5 marks]

Write the Java code for decreasing the priority of a thread.

[10 marks]

Answer Question B or C

Question B [40 Marks in total]

1. Explain the basic steps which are followed when using a socket in java. Eg, what is opened and closed, and in what order? Give a code example of a server-side socket application that waits for a client to connect on port 80 and serves a simple welcome message.

[20 marks]

2. Explain what changes to the code in part 1 would be required in order to implement the client side of this application.

[10 marks]

3. Give 2 advantages and 2 disadvantages of sockets.

[10 marks]

Question C [40 marks]

1. What are the three types of design patterns from the Gang of Four (GOF)?

[5 marks]

2. Provide the Definition, where it is used and benefits of the Observer pattern.

[15 marks]

3. Provide Java code for the Observer pattern. There is no need to implement a main class

[20 marks]