

Concurrent and Distributed Systems (2018-19)
Assignment 2 (50% of Total CW Marks)

Submission Deadline: Monday Week 11 (8 April 2019 at noon)
Feedback: 15 working days after the submission

Submission Instructions:

This coursework has two questions each one representing a separate distributed system problem/development. The solution to each question (including appropriate code listings and screen shots, problems/issues encountered, program testing) should be documented on a written report.

The report, in PDF format, should be submitted to turn-it-in via Blackboard on or before the deadline.

The working implementation should be demonstrated during the laboratory session in week 11.

Question 1 – Client Server Software Development [60 Marks]

It is required that the server can provide some string operations
Consider the following communication activity between a Client and a Server:

“The client connects to a server and sends the server a string of variable length (that were requested from the user). The server reads the sequence of integer values, and when the client indicates that it has no more values to send the server takes these values it has received and sorts then in ascending order and returns these sorted values to the client. The client receives the sorted values from the server and displays them to the user.

- a. Design and develop a client that is able to communicate with the server.
- b. Design and develop an iterative server
- c. Design and develop a concurrent server
- d. Test both iterative and concurrent client/server systems developed

The design should show an outline of the Presentation/Application/Service logic via a class diagram for the client side and server-side code.

The implementation should show all java code developed

The testing should show the results from appropriate testing scenarios (with relevant screen dumps of actual results).

Assessment Criteria:

- I. Client design and development **10 marks**
- II. Iterative server design and development **15 marks**
- III. Concurrent server design and development **20 marks**
- IV. Testing and evaluation **10 marks**

V.Demo of Complete Client/Server System **5 marks**

Question 2 – Java RMI based Client/Server Development [40 Marks]

Develop a Java Remote Method Invocation (RMI) C/S System where the server makes the following functionality available via its interface for processing a sequence of integer values:

- i.returns the mean
- ii.returns the mode(s)
- iii.returns the median
- iv.returns the sorted list (ascending order)

for the integer values sent to it.

A connecting client can then use the methods provided by this interface. Test this system by developing a client that allows a user to access this functionality on the server.

(**Note1.** You should complete **Practical 9** before attempting this question.)

(**Note2.** You may wish to access <http://docs.oracle.com/javase/7/docs/technotes/guides/rmi/> for further information about RMI.)

Assessment Criteria:

- I.Development of server-side interface **5 marks**
- II.Development of server-side class that implements the Mathematical Function Interface **10 marks**
- III.Development of the Server program that instantiates a server object **5 marks**
- IV.Development of the Client program **10 marks**
- V.Documentation of System Testing **5 marks**
- VI.Demo of the Developed System **5 marks**

Note. Each Java program should be comprehensively tested, with generated output to illustrate the activity of the system. Also, as part of the testing documentation, comment on any problems or difficulties you encountered when attempting this assignment or any assumptions you made regarding the problems/solutions.