

Department of Computer Science
COMP212 - 2023 - CA Assignment 2
Communication in Distributed Systems

Assessment Information

Assignment Number	2 (of 2)
Weighting	15%
Assignment Circulated	20th March 2023
Deadline	24th April 2023, 17:00 UK Time (UTC)
Submission Mode	Electronic via CANVAS
Learning outcomes assessed	(1) An appreciation of the main principles underlying distributed systems: processes, communication, naming, synchronisation, consistency, fault tolerance, and security. (3) Knowledge and understanding of the essential facts, concepts, principles and theories relating to Computer Science in general, and Distributed Computing in particular. (4) A sound knowledge of the criteria and mechanisms whereby traditional and distributed systems can be critically evaluated and analysed to determine the extent to which they meet the criteria defined for their current and future development.
Purpose of assessment	This assignment assesses the understanding of distributed communications via Java sockets and Java RMI.
Marking criteria	Marks for each question are indicated under the corresponding question.
Submission necessary in order to satisfy Module requirements?	No
Late Submission Penalty	Standard UoL Policy.

1 Objectives

This assignment asks you to extend the leader-election simulator that you have been developing in Assignment 1 **or** to develop a new implementation from scratch along the following lines: Make your simulator available over the network through either Java socket programming or Java RMI.

2 Description of coursework

In Assignment 1 you implemented in Java a simulator of two distributed algorithms for leader election in a ring network. In this assignment your task is to achieve remote access to your simulator, by which, one or more clients will be able to request and run experiments on these algorithms.

So, you are here asked to enrich your simulator with a networking component. In particular:

- Your simulator should be available on a server through the network, for clients to connect and request “simulation time”.
- Therefore, the core functionality of the simulator may remain the same, the difference is that now the user can request the simulation from a remote machine that can provide the main simulation functionality and/or the results of a requested simulation.

To achieve this functionality you are free to use **either** Java socket programming **or** Java RMI. It is not a requirement that many clients can run simulations in parallel, but if you wish you could try to also achieve this functionality. For this assignment it is sufficient that at any given time a single client establishes a “connection” to the server and executes its experiments. Moreover, you are allowed to have both the client and the server running on the same machine (connection to “localhost”), so that you don’t have to use two distinct machines communicating over the network in order to test your software. At the assignment’s entry on CANVAS you can find some very basic example programs that you could use as a template to get you started. Moreover, you are strongly encouraged to consult Oracle’s tutorials on Java sockets and Java RMI and especially their “getting started” examples (Sockets Knock Knock example and RMI compute engine, respectively).

- Achieving the basic network communication (that is, successfully establishing client-server connections and interchanging information between the two) is worth **30%** of the assignment mark.
- To obtain further **20%** a client should be able to trigger the execution of a simulation of any of the two leader-election algorithms (i.e., LCR or HS).
- Another **20%** shall be awarded if the client can also successfully obtain all experimental data/results of the simulation.

- It is a requirement that you also submit a report describing your developments and including some testing of your software (see the submission instructions in Section 3). (30% of mark)

3 Deadline and Submission Instructions

- The deadline for submitting this assignment is **Monday, 24th April 2023, 17:00 UK time (UTC)**.
- Submit
 - (a) The Java source code for all your programs,
 - (b) A README file (plain text) describing how to compile/run your code to produce the various results required by the assignment, and
 - (c) A concise self-contained report (at most 5 pages including everything) describing your software design, software testing, and conclusions in PDF format.

Compress all of the above files into a **single ZIP** file (the electronic submission system won't accept any other file formats) and **specify the filename** as *Surname-Name-ID.zip*. It is extremely important that you include in the archive all the files described above and not just the source code!

- Submission is via the “Assignments” tab of COMP212-202223 course on CANVAS.

Good luck to all!