SCC311 Coursework Part 3 Specification

Due: Friday Week 9 through Moodle
Marking: Your assigned Lab session Week 10
Total mark allocation: 45%

You are asked to justify and enhance your distributed auctioning system.

Level 6: Design (15%)

This element of the coursework relates to your overall design to date and how well-argued it is. You need to present an **architecture diagram** as a PDF. We will ask you about the rationale behind your design decisions.

Level 7: Active Replication (15%)

To ensure a larger scale use of the auctioning system, you are required to enhance the availability of your system by using replication techniques.

You should implement an **active replication system** to meet these requirements, thereby increasing both dependability and scalability. Please refer to the lectures for the definition of active replication.

Auction data (such as the list of available auction items, the current highest bid for each item, etc.) are held by replicas. The server implementation should have at least **three replicas** and allow the user to easily **add** a new replica.

All replicas must maintain a **consistent view** of the auction data. JGroups can be a useful tool for this purpose. However, you are free to employ other means to implement group communication or other forms of reliable indirect communication among replicas.

Level 8: Fault Tolerance (15%)

Servers may crash unexpectedly due to either hardware or software faults. Your solution should be able to handle such failures. As long as one replica remains alive, the auctioning system should continue to function correctly. You should be prepared to justify your choice of design for failure detection and handling.

For demonstration purposes, your solution must allow the marker to kill an arbitrary replica, either via sending a command to a replica manager or by closing the console window where a particular replica process runs. Ideally, you want your system to start with 3 replicas (say A, B, and C), add another replica (D), kill all original replicas (A, B, C) and have the system continue to function properly.

Marking Scheme

Level 6	
Architecture diagram	5 marks
Design rationale	5 marks
Use of layering and tiering	5 marks
Level 7	
3 working replicas	5 marks
Effective use of JGroups / other IC	5 marks
Ability to add another replica	5 marks

Level 8

Handle single replica failure	5 marks
Handle multiple replica failures	5 marks
Handle complete replica turnover	5 marks