

University of Dhaka
Department of Computer Science and Engineering
CSE 4211: Distributed Systems Lab

Assignment Code: A3

Assignment Title: Replicated Server and Load Balancing

Date of Assignment: 3/9/2016

Last Date of Submission: 5/9/2016 for Tuesday Group and 6/9/2016 for Wednesday Group

Objectives:

The objective of this assignment is to write a replicated server cluster and associated clients. There will be a Master server responsible for receiving requests from clients, load balancing and distribution of request to the Worker servers. The Worker servers will simply receive the requests from the Master server and send the reply. The clients are not aware that there exist replicated Worker servers and they will only communicate with the Master. No assumption must be made about the existence of the Workers from the client's perspective.

For this assignment the requests will be a simple square operation. The client will send integers to the server and the server will return the square of that integer. But to simulate the load, every server will wait for 1 second before replying with the square value.

The client will run an automated loop of 50 plus iterations. In each iteration, it will send a square request to the server. After the loop is completed, the client will wait for a user input to start the process all over again. You MUST keep the code modifiable so that the number of iteration can be altered on demand. Once the reply is received, the client will display the sent and received values together as well as making a log of the communication.

Each Worker will have a buffer of 10 slots to receive requests from the Master. If the buffer is full, the Worker must notify that to the Master and stop receiving requests. If the buffer is empty once again, the Worker will notify the Master and start receiving requests again. The Master itself will have a buffer of 50 slots to receive all the request coming from clients. After receiving the requests, the Master will evaluate which Worker is available and delegate the request to that Worker. If the buffer at the Master is full, the Master will start dropping the requests. The buffer size MUST be kept modifiable for on demand testing.

The servers and clients will run forever. There is no need to stop them.

You will be assessed based on the following criteria.

I. Server:

- a. The Master is responsible for receiving requests, load balancing, delegating work to the Workers and replying to the clients.
- b. The delegation MUST be done carefully so that the work is distributed properly. There should be no idle Workers and overloaded Workers.
- c. The Worker only receives requests from the Master, waits 1 second and replies with the square value.
- d. All server code MUST be modifiable.
- e. Transparency should be absolute. No client should be aware of the existence of the Workers.
- f. There MUST be three or more Workers.

II. Client:

- a. The client should connect with the Master and request for the square value of the integer it is sending.
- b. The client will run a loop of specific iterations and after finishing it should wait for the user to start the process again.
- c. There MUST be a three or more clients.

- d. The client code MUST be modifiable.

III. Technicality:

- a. Your code should be legible.
- b. Your code should be able to run Master and Workers separate machines and multiple clients on separate machines.
- c. The code MUST be portable.
- d. Your system MUST be able to balance the load and perform properly.

Marks:

- 1) Your code will net you 60% marks.
- 2) The rest of the marks (40%) will be distributed via Viva and Testing.

Deliverables:

- 1) A single package containing all necessary files, codes and instructions for running the program on a generic machine.

The deliverables are to be sent in a single compressed package by email. The compressed filename must be of the format: [Roll No.]_[Assignment Code].

Submission Format:

The assignment must be submitted by email. The email must have the following formatting. The submission will not be accepted if the format is not in the correct order.

Subject: [Assignment Code] [Assignment Title] [Roll No]

Body: Assignment Code

Assignment Name

Roll No.

Date of Assignment

Date of Submission

- 1) Attachment: A single package containing all necessary files, codes and instructions for running the program on a generic machine. The compressed filename must be of the format: [Roll No.]_[Assignment Code].

Example Format:

Subject: [A3] [Replicated Server and Load Balancing] [SH – 017]

Body: Assignment Code: A3

Assignment Name: Replicated Server and Load Balancing

Roll No. SH – 017

Date of Assignment: 3/9/2016

Date of Submission: 5/9/2016

Attachment: SH-017_A3.tar / SH-017_A3.zip

Penalty:

- 1) **Plagiarism:** If it can be proven beyond reasonable doubt that the assignment code(s) was plagiarized, the code will be invalid and no marks will be attributed.
- 2) **Late Submission:** Failure to submit the assignment on time will result in 50% cumulative reduced mark which will be activated each week after the original submission date has passed.