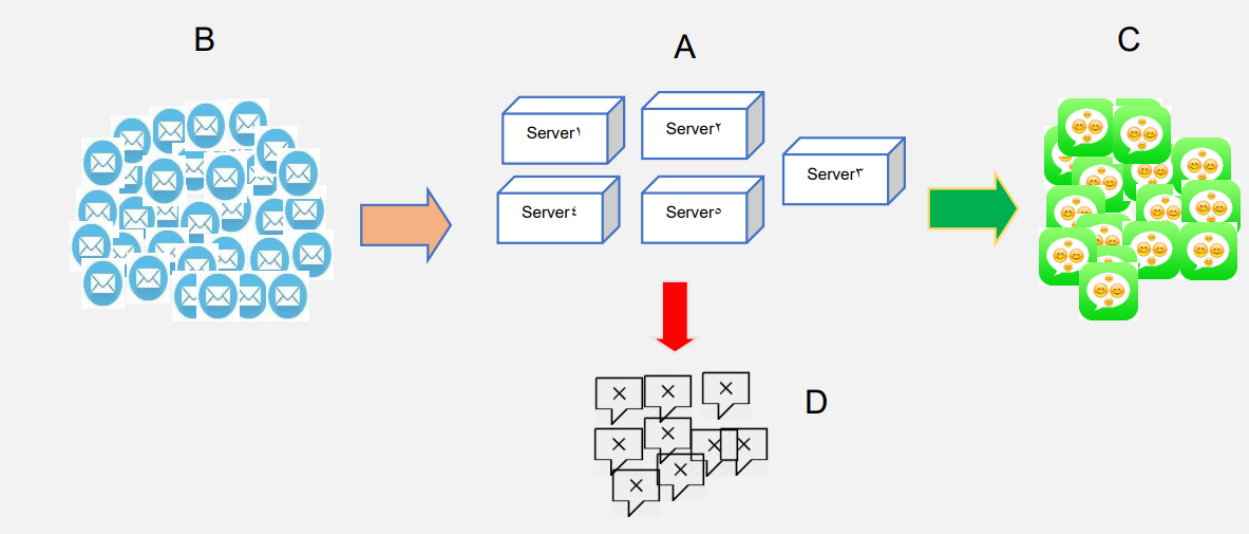
Note the following figure.




As you can see, there are five servers in our system. (A) Messages enter the system with a specific distribution (B) If there is an empty server to provide the service, a message is sent to the server to process that message and log it out (C) If there are two (or more) empty servers, a server will be selected to serve the message based on the following policies. If all the servers are being processed, the message is called missing (D) (ie the service failed.) The distribution of server service time is given in the table below. All distributions are exponential and only the averages are written in seconds.

Distribution of message entry: Exponential distribution with an average of 3.3 seconds

| Server | First | Second | Third | Fourth | Fifth |
|---|---|---|---|---|---|
| **Service time distribution** | 6 | 8 | 10 | 12 | 14 |

Consider the following four types of policies.

A: Rule Random (RR:) This policy randomly selects between empty servers when selecting a server.

B: Rule Idle Longest (LIR:) This policy selects an empty server that has been idle for the most part since the last end of service.

C: Rule Idle Shortest (SIR:) This policy selects an empty server when selecting a server that has been idle for less time since its last service.

D: Rule Idle Total Longest (LTIR:) This policy selects an empty server that has been idle for most of the time since the system was set up.

## Questions

1. In your opinion, which of the policies are fair. (For each argue without simulation and express it emotionally.)

2. Find the cold time of the system. (All the required outputs of the next part, regardless of the cold time.)

3. For each server we need to collect the total idle time in each cycle (every 1000 seconds) when the system is launched. Also, the percentage of service of each server in terms of number in each round must be specified. (For example, call 5 messages are served and server number one has served 2 messages. As a result, the service percentage of server number one is 40%). Now for each policy, simulate the given system in 1000 seconds. Repeat this 700 times. Collect the outputs each time and finally calculate the average and standard deviation of the outputs. Analyze the results and answer question number one again. Also compare the performance of servers that have different service speeds in different policies.

4. Compare policies A, B and C from different aspects. For each, give a practical example to implement it. For example, your opinion is that it is better to use RR in the bank because the employees will feel better !!