Track 7

Technical task (pre-requisite for the interview):

Consider a server that handles client requests. Request might be READ or WRITE, and each such request has ADDRESS and SIZE attributes, meaning a client demands SIZE bytes starting from ADDRESS to be read or written respectively. The server processes requests according to following rules:

- **Server occupancy is limited:** N requests at max can be processed simultaneously. If a new request arrives when a number of requests in process is equal to N, this new request is not started unless some request is completed.
- **Sever has ordering rule:** if there is *active* (in progress) WRITE request targeting SIZE bytes starting from ADDRESS, server holds any new inbound request that overlaps with this address range unless that active request is completed.
    - *Example*: when REQ1 = WRITE(ADDRESS=100, SIZE=10) is processed by a server, and REQ2 = READ(ADDRESS=105, SIZE=10) arrives, REQ2 execution will not be started until REQ1 is completed.

Let the request processing time (latency) be simulated by the formula

LATENCY = SIZE * BASE_LATENCY

Where BASE_LATENCY = 1 usec for WRITE and BASE_LATENCY = 2 usecs for READ.

Tasks:

(1) Develop a program that simulates this server behavior for a pre-recorded request sequence. Use a "trace" from Table 1 as the workload for simulated server, test N=1, N=5, N=10.

(2) Collect and output request processing statistics: median, average, min and max total latency for READ and WRITE requests. Note: total latency counting starts at the time when request arrives to a server (column "Timestamp" in Table 1).

Table 1. Request trace to be used for server model tests

Request ID	Timestamp (usec)	Request type	ADDRESS	SIZE
0	3	READ	1024	5
1	5	READ	2048	5
2	7	WRITE	2048	10
3	9	WRITE	2052	10
4	12	READ	2048	4
5	13	WRITE	1024	1
6	15	READ	512	10
7	16	WRITE	256	20
8	18	WRITE	260	5
9	20	WRITE	512	7
10	24	WRITE	1024	10
11	25	WRITE	1024	10
12	26	WRITE	1024	10
13	29	READ	512	2
14	31	READ	2048	15
15	32	WRITE	784	6
16	35	WRITE	512	3

17	38	READ	256	4
18	39	WRITE	256	6
19	40	READ	256	10
20	41	READ	260	5
21	45	READ	270	5
22	46	READ	280	5
23	47	WRITE	1000	20
24	48	WRITE	1010	20
25	50	WRITE	1020	20
26	55	READ	1000	30
27	57	READ	1000	30
28	58	WRITE	2052	10
29	59	WRITE	2048	4
30	60	READ	1024	1
31	62	WRITE	512	10
32	64	READ	256	20
33	68	WRITE	260	5
34	70	WRITE	512	7
35	71	READ	1024	10
36	72	READ	1024	10
37	73	READ	1024	10
38	74	READ	512	2
39	75	READ	2048	15
40	76	WRITE	784	6
41	77	WRITE	512	3
42	78	WRITE	1024	10
43	79	READ	1024	10
44	82	READ	512	2
45	87	WRITE	2048	15
46	89	WRITE	784	6
47	91	READ	512	3
48	95	WRITE	256	4
49	96	WRITE	256	6