

Evaluation Document

Q1. Does the latency of the application change with and without Docker containers? Did virtualization add any overheads?

Ans. The latency of the application does change with and without docker containers. As docker containers are their own entity, the latency while using docker containers goes up considerably. It is evident from the tables below. As we can observe tables 1 and 3, when services are running without docker containers latency is quite low but increases when they are run in containers. The average lookup and trade time are highest in the case of docker containers. Because dockers run in a virtual machine, the container operations are slower than the operations without docker.

Number of Clients	Average Lookup time (200 calls) in ms	Average Trade time (200 calls) in ms
1	0.56	1.62
2	0.71	2.02
3	0.88	3.03
4	1.28	4.09
5	1.68	5.33

Table 1. Latency with services and client on local machine

Number of Clients	Average Lookup time (200 calls) in ms	Average Trade time (200 calls) in ms
1	17.12	28.69
2	17.2	28.95
3	17.63	31.64
4	17.71	33.55
5	17.8	33.91

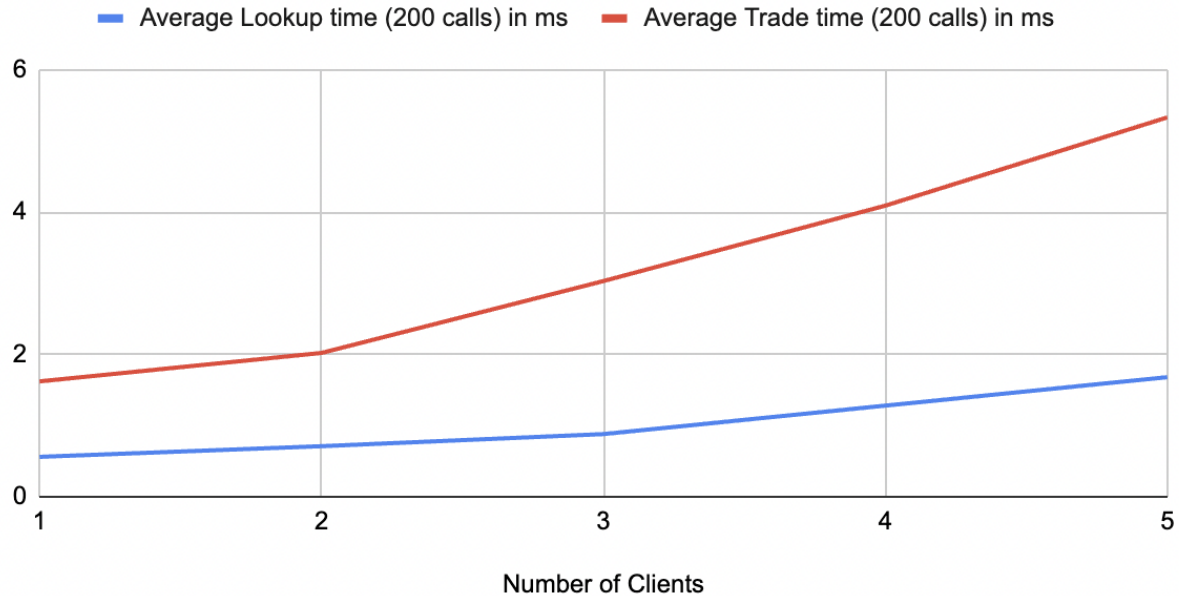
Table 2. Latency with services on edlab and client on local machine

Number of Clients	Average Lookup time (200 calls) in ms	Average Trade time (200 calls) in ms
1	6.4	20.65
2	5.8	19.56
3	5.64	21.34
4	5.12	20.38
5	5.14	20.4

Table 3. Latency with services running on docker containers and clients on host machine

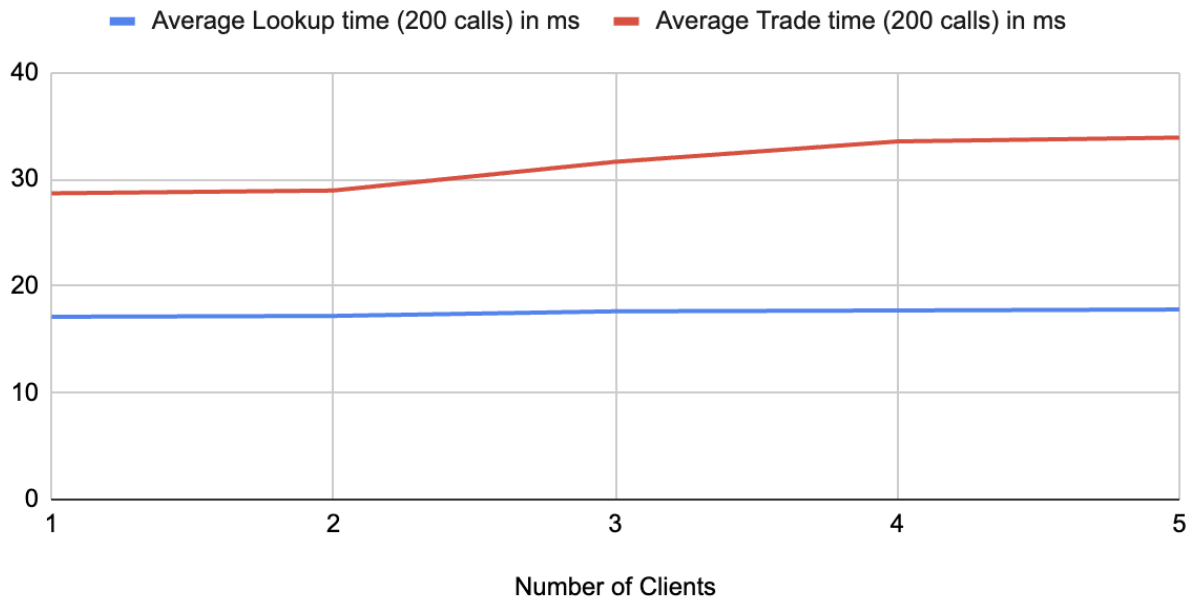
Graph 1. Latency with services and client on local machine

Average Lookup time (200 calls) in ms and Average Trade time (200 calls) in ms



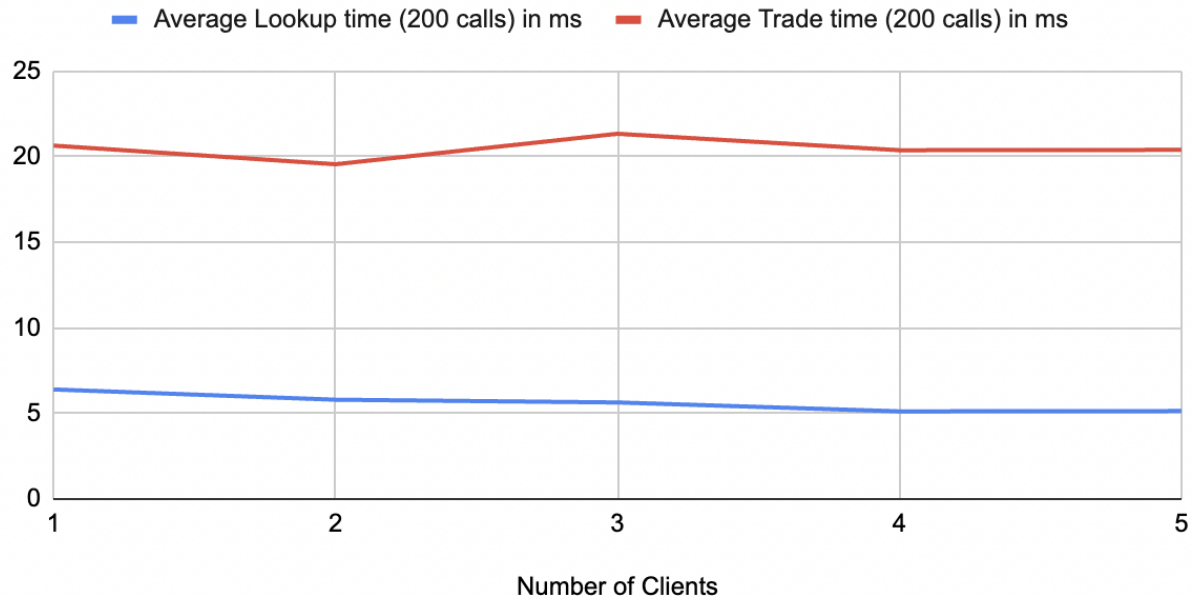
Graph 2. Latency with services on edlab and client on local machine

Average Lookup time (200 calls) in ms and Average Trade time (200 calls) in ms



Graph 3. Latency with services running on docker containers and clients on host machine

Average Lookup time (200 calls) in ms and Average Trade time (200 calls) in ms



Q2. How does the latency of the lookup requests compare to trade? Since trade requests involve all these microservices, while lookup requests only involve two microservices, does it impact the observed latency?

Ans. The latency of lookup is consistently lower than that of trade requests. This is because lookup requires only two microservices, whereas trade involves all three microservices, a lookup call and the time needed to write the updated data to the database file. Trade requests also involve write locks. These factors increase the latency of trade requests.

Q3. How does the latency change as the number of clients change? Does it change for different types of requests?

Ans. As the number of clients increases, the latency increases. This can be observed in the above tables and graphs. As the microservices use grpc, which has predefined max workers for its threadpool, if number of requests/calls from front end go above the maximum number of workers then they have to wait until workers are freed and are able to handle new requests. In addition to this there is contention to acquire read/write locks for database operations. This increases the latency. For trade requests the change in latency is larger than that for lookup.