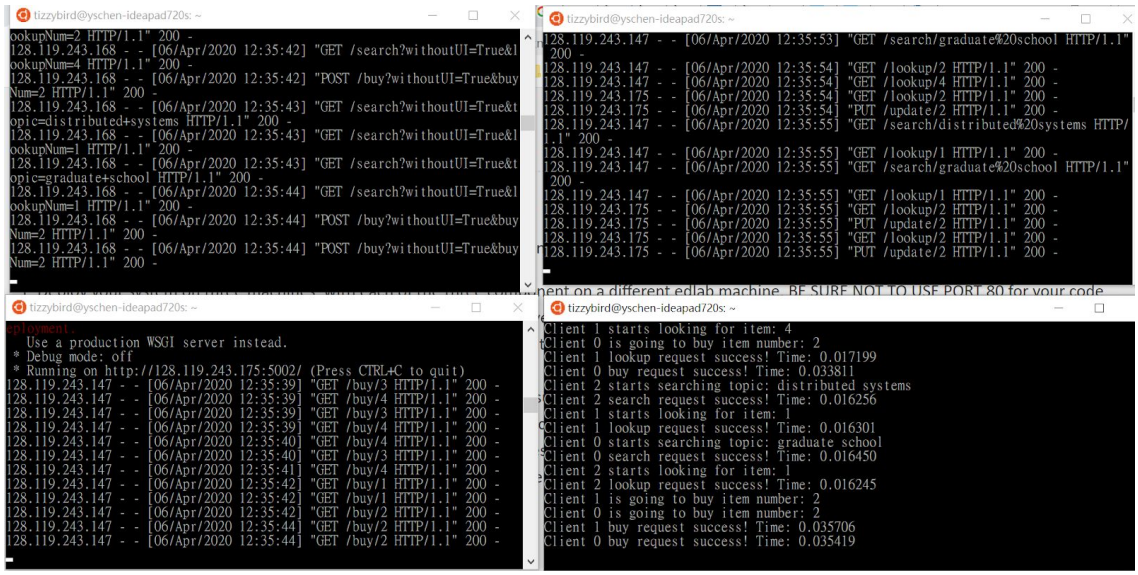
Output and Performance Report

1. Evaluation and Measurement

1.1 Evaluation on Edlab machines

Below picture is the output result of our program running on Edlab machines. The frontend (up-left), catalog (up-right) and order (down-left) servers were set up on elnux1, elnux2 and elnux7 respectively. The client (down-right) was running on elnux3. We can see that requests were first generated by clients and those requests were properly handled by other servers with required arguments set.



2. Performance

2.1 Average response time(ART) when running a single client

Below table contains average response time (millisecond, ms) results of different tiers for a single client (n=1) running 1000 sequential requests. As we can see, the buy request cost almost two times more than search and lookup request on the client and the frontend server. However, the time it costs is the same as the other two requests in the catalog server.

Function	Client (n=1)	Frontend server	Catalog server	Order server
search()	16.204	8.864	2.073	-
lookup()	16.071	8.947	1.636	-
buy()	31.348	24.196	1.877	16.731

2.2 Average response time(ART) when running multiple clients

Below tables are average response time (millisecond, ms) results with different number of clients. The overall response time increases as the number of clients increases, except for the catalog server. The phenomenon is probably because semaphores are applied on the catalog server in order to ensure data consistency, which means only one request is served each time. Therefore, all requests have to wait until the catalog server acquires and releases those locks. But for the catalog server, it always serves one request each time. That's why the response time doesn't increase in the catalog server.

Client number = 3

Function	Clients (n=3)	Frontend server	Catalog server	Order server
search()	21.738	10.934	2.461	-
lookup()	21.221	11.065	1.986	-
buy()	44.018	33.719	1.978	23.979

Client number = 10

Function	Clients (n=10)	Frontend server	Catalog server	Order server
search()	44.869	16.643	2.823	-
lookup()	43.995	17.007	1.998	-
buy()	102.175	75.762	2.047	60.118

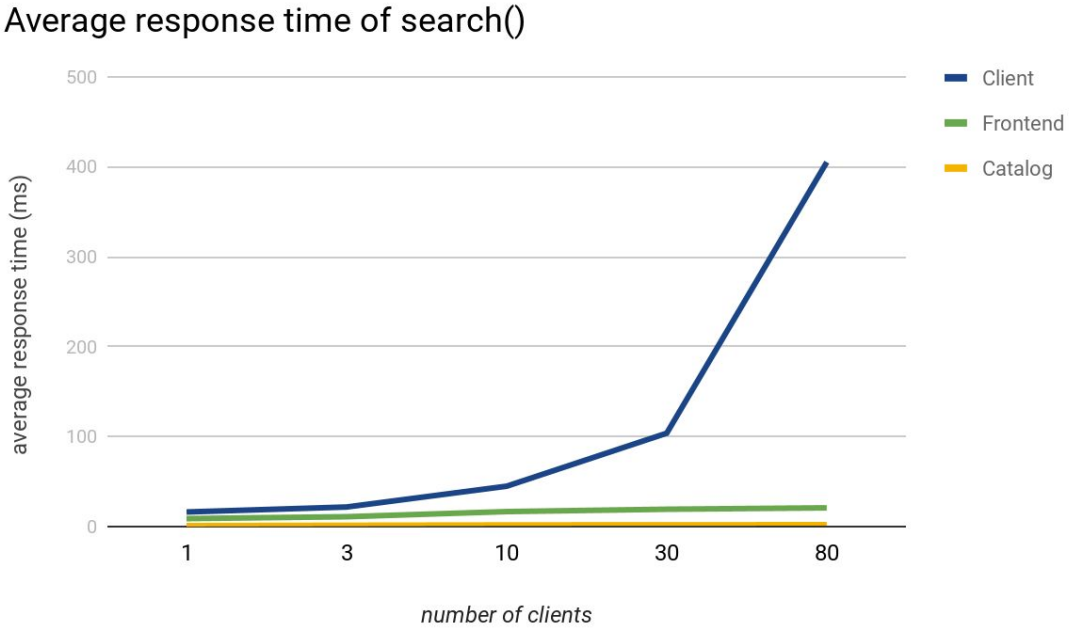
Client number = 30

Function	Clients (n=30)	Frontend server	Catalog server	Order server
search()	103.795	19.265	3.019	-
lookup()	103.693	18.824	2.118	-
buy()	377.694	291.306	2.038	273.237

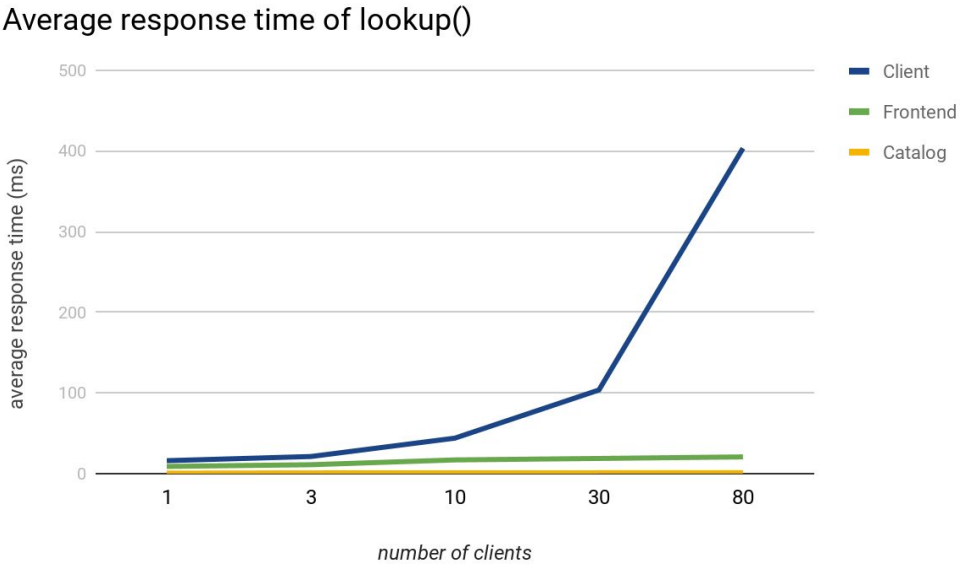
Client number = 80

Function	Clients (n=80)	Frontend server	Catalog server	Order server
search()	405.156	20.802	3.044	-
lookup()	403.366	20.742	2.153	-
buy()	693.852	303.225	2.059	284.191

The average response time of search() for clients surges quicklier than other servers.



Same thing happens on the lookup() function.



The average response time of buy() increases for clients, frontend and the catalog server.