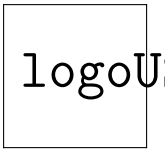
University of Science and Technology of Hanoi



Network Programming

Final Project Report

Load Balancer Programming

Group 2

Hanoi, June 2021

Contents

1 What is our project

1.1 About our group

- Dỗ Quang Hiếu - BI10-063 : programmer
- Nguyễn Khang Thái - BI10-158: report writer
- Lê Duy Anh - BI9-034: slide maker

1.2 Load balancer

Load balancer is used in the online storing network to control the flow of connections from Clients to Storage and Authentication servers. The main functionality is to forward messages from client to authentication and storage, and from those servers back to client.

Figure 1: Online storing network

1.3 Our load balancer

Our load balancer is simpler than a typical load balancer. It still can be used to forward messages from client server exactly as they were sent and to perform validity check on the server so that the requests are handled correctly. However, our load balancer works with only one client at a time and performs only one action at a time.

2 Why people need our project

Since our load balancer does have all the functions of a typical one, but in general, we still have:

- **Abstraction:** We can make clients "think" that they connect to the system.
- **Verbosity:** All of the transaction is logged.

3 How we created it

3.1 Approach

In this project, the following tools will be used:

- **Programming Language:** C
- **Virtual Machine:** DigitalOcean

Also, we created this project with:

- **Protocol:** TCP
- **Socket method:** Blocking
- **Mechanism:** Transfer exact messages
- A util file (**util.c**) contains all functions
- A main file (**main.c**) describes what the load balancer does.

3.2 util.h

Figure 2: util.h

3.3 util.c

This util file has functions to create server and client, accept connections, make files, make buffers and send wrappers.

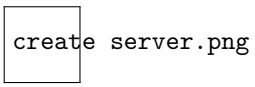


Figure 3: Function to create server

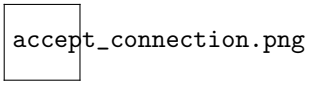


Figure 4: Function to accept connection between client, load balancer, storage and authentication

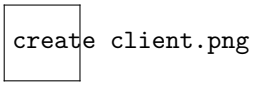


Figure 5: Function to create client

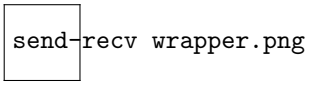


Figure 6: Functions to send and receive wrappers

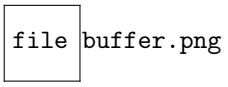


Figure 7: Function to make files and buffers

3.4 main.c

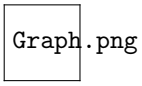


Figure 8: Functions of a load balancer

This load balancer has some basic functions:

- **auth_exchange (1, 2, 3, 4):** send U/P from the client to the authentication server and then send status valid/invalid from the authentication back to the client.
- **storage_exchange (5, 6, 7, 8:** send command from client to storage with the protocol of client or storage: send file's name or command's name, then send and receive their sizes, and lastly send and receive their content.

Figure 9: Function to exchange wrappers between authentication and client

Figure 10: Function to exchange wrappers between storage and client

Figure 11: Main function

4 Demonstration

With the projects of three other groups that created Client, Authentication server and Storage server, here is the demonstration of how our load balancer works in the online storing network.

auth_demo.png

Figure 12: Demonstration of exchanging between client and authentication server

storage_demo.png

Figure 13: Demonstration of exchanging between client and storage server

5 Summary

5.1 What we did

We made a "reverse proxy" that can act as the load balancer, because we used blocking method, not no-blocking.

5.2 What we could have done

This project creates a simple version of the load balancer. We could have upgraded this load balacer to:

- Handle multiple connections.
- Proper signal transfer protocol.