UNIVERSITY OF SCIENCE AND TECHNOLOGY OF HANOI

DISTRIBUTED SYSTEMS

PROJECT REPORT

TOPIC 4

HTTP OVER MPI

(ACT AS HTTP PROXY)

Group 3

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I. ABSTRACT

– This is group 4's report on the final project, which accounts for 40% of the total results of our “Distributed Systems” course. This course covers the most basic parts that we should know about distributed systems such as TCP, RPC, MPI file transfer, etc., guided and taught by Dr. Tran Giang Son.

– - In this report, we will explain in detail the system that our team presented in the Presentation and Demo section on Tuesday 22/02/2022: Introduction to the system; System analysis and design; Implementation; The results we get; Conclusion of the work and future work.

– - We would like to thank Dr. Tran Giang Son for giving us the opportunity to access a lot of useful knowledge and valuable practice sessions on Distributed Systems.

II. Introduction:

1. MPI's definition:

– The Message Passing Interface (MPI) is a standardized means of exchanging messages between multiple computers running a parallel program across distributed memory.

2. HTTP's definition:

– The Hypertext Transfer Protocol (HTTP) is an application protocol for distributed, collaborative, hypermedia information systems that allows users to communicate data on the World Wide Web.

– The original World Wide Web was created using HTTP and HTML to create the first interactive, text-based web browser. The protocol is still one of the most common ways to access the internet today.

3. What is HTTP proxy?

– HTTP proxy is a gateway that results from configuring a computer or browser. HTTP proxy used for:

+ Anonymizing a connection by hiding the real IP address.
+ Filtering content sent through HTTP or HTTPS.
+ Promoting security.

4. why do we need this project?

– The Message Passing Interface (MPI) is the industry standard for message passing between multiple computers and clusters. This factor provides a significant advantage in terms of developing a foundation for web-based computation in order to achieve global parallel processing. In the meantime, HTTP is widely used to transfer data and files over the Internet. In this project, we'll build some basic tools to apply MPI to HTTP in order to figure out what their connections are and how they can work together in specific situations.

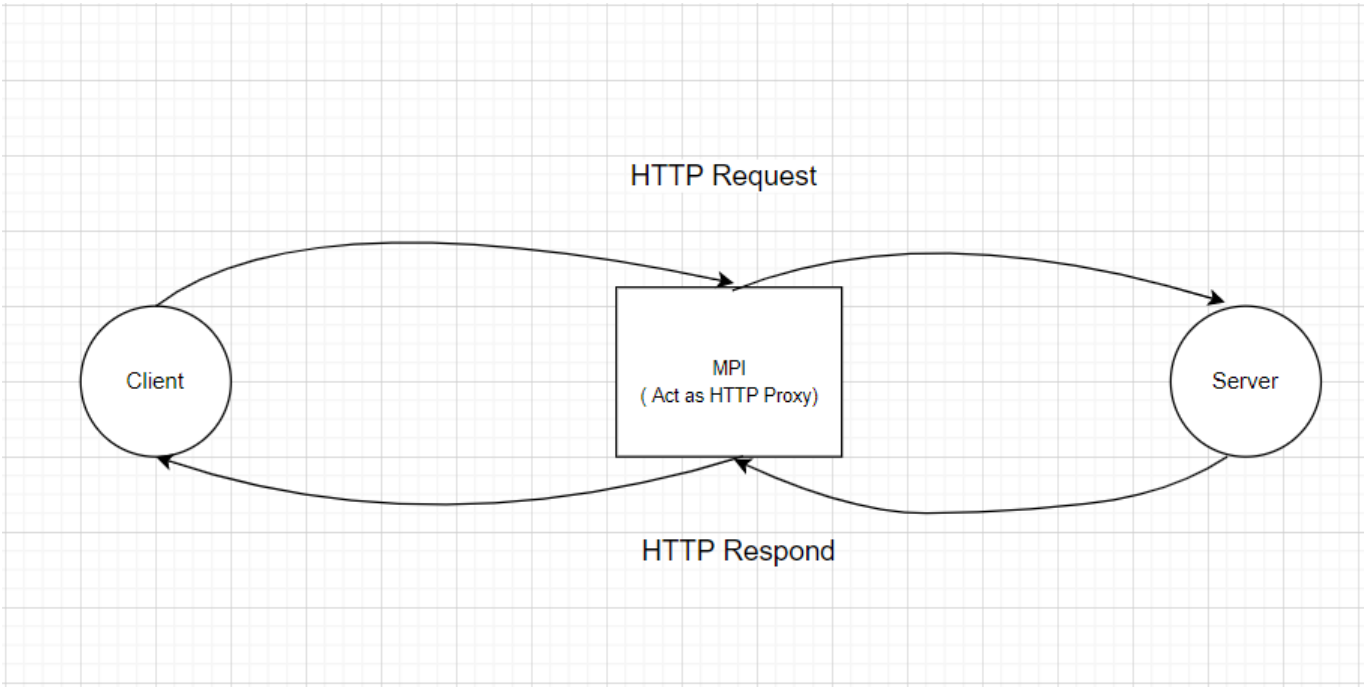
III. Analysis and Design

1. Analysis:

– HTTP proxy has the role of managing information of the server with end-to-end security before sending it to the client. Our work is to replace the HTTP proxy with MPI.

– The job that we first decided to do is to send information such as messages, pictures,... between client and server and we also apply MPI to carry out some applications with HTTP requests and respond to the web. But there are not so many articles and resources about this topic on the internet so it's very difficult for us if we keep following this way so we found out a solution: We will be able to send and receive information such as messages, pictures,.., it will have HTTP request and respond.

2. Design:



IV. Implementation:

1. File transfer using MPI can handle HTTP request and respond.

– Firstly, we tried to create an MPI system. This system can act as a transfer system. Through the MPI system, we can transfer files such as text file (.txt), image (.jpg), etc.

– Then we make an HTTP request for our system, by that through the MPI transfer system we can have HTTP request and receive HTTP respond.

– Every works we make are implemented in C

2. Proxy server

– Every computer on the internet has a unique IP address. Just like the post office knows your home address to deliver your stuff, by knowing your IP address, the internet can send the data to the correct computer.

– So what we do here is that we send the data from client to server through proxy.

V. RESULT

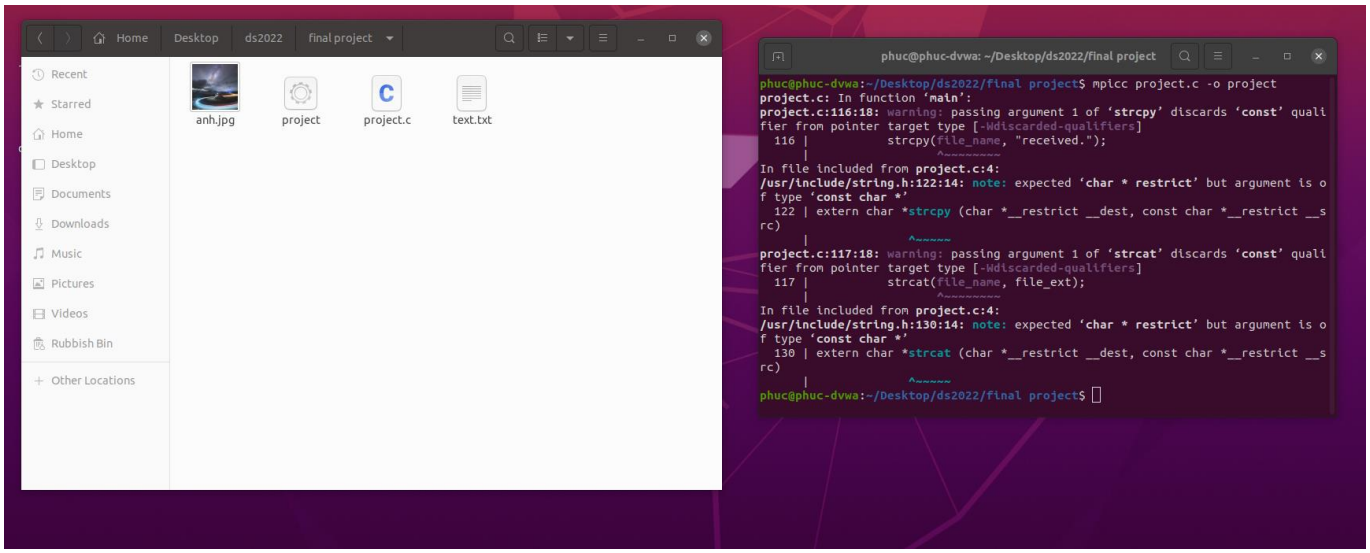
1. HTTP request:

– Firstly, use command mpicc (Compiles and links MPI programs written in C)

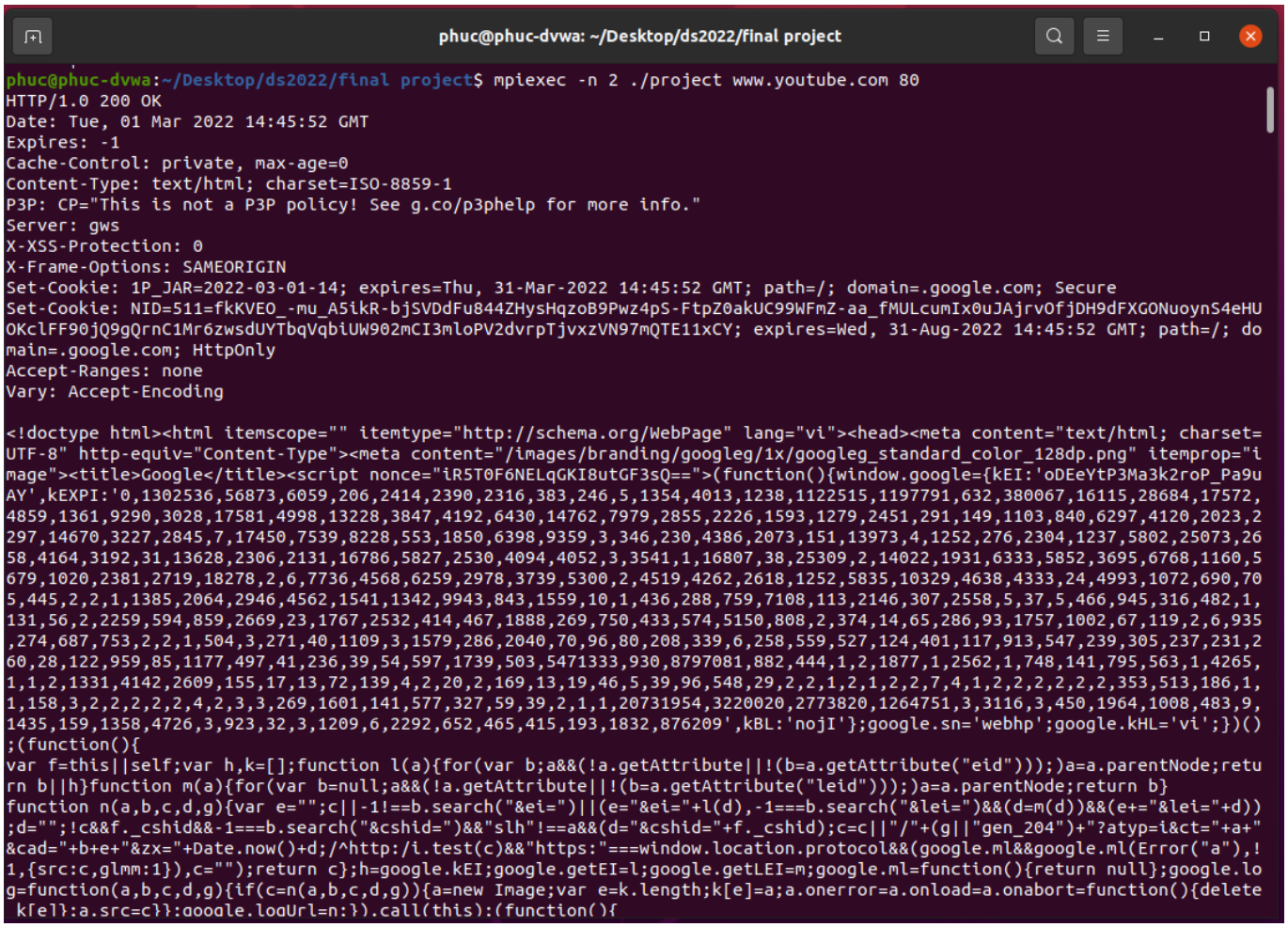
– Description

+ This command can be used to compile and link MPI programs written in C. It provides the options and any special libraries that are needed to compile and link MPI programs.

+ It is important to use this command, particularly when linking programs, as it provides the necessary libraries.



– Next, run with a website to see it HTTP request.(example www.youtube.com with port 80)


phuc@phuc-dvwa: ~/Desktop/ds2022/final project
phuc@phuc-dvwa:~/Desktop/ds2022/final project$ mpiexec -n 2 ./project www.youtube.com 80
HTTP/1.0 200 OK
Date: Tue, 01 Mar 2022 14:45:52 GMT
Expires: -1
Cache-Control: private, max-age=0
Content-Type: text/html; charset=ISO-8859-1
P3P: CP="This is not a P3P policy! See g.co/p3phelp for more info."
Server: gws
X-XSS-Protection: 0
X-Frame-Options: SAMEORIGIN
Set-Cookie: 1P_JAR=2022-03-01-14; expires=Thu, 31-Mar-2022 14:45:52 GMT; path=/; domain=.google.com; Secure
Set-Cookie: NID=511=fkKVEO_-mu_A5ikR-bjSVDdFu844ZHysHqzoB9Pwz4pS-FtpZ0akUC99WFmZ-aa_fMULcumIx0uJAjrvOfjDH9dFXGONuoynS4eHU
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Accept-Ranges: none
Vary: Accept-Encoding
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;(function(){
var f=this||self;var h,k=[];function l(a){for(var b;a&&(!a.getAttribute||!(b=a.getAttribute("eid")));)a=a.parentNode;retu
rn b||h}function m(a){for(var b=null;a&&(!a.getAttribute||!(b=a.getAttribute("leid")));)a=a.parentNode;return b}
function n(a,b,c,d,g){var e="";c||-1!==b.search("&ei=")||(e="&ei="+l(d),-1===b.search("&lei=")&&(d=m(d))&&(e+="&lei="+d))
;d="";!c&&f._cshid&&-1===b.search("&cshid=")&&"slh"!==a&&(d="&cshid="+f._cshid);c=c||"/"+(g||"gen_204")+"?atyp=i&ct="+a+"
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g=function(a,b,c,d,g){if(c=n(a,b,c,d,g)){a=new Image;var e=k.length;k[e]=a;a.onerror=a.onload=a.onabort=function(){delete
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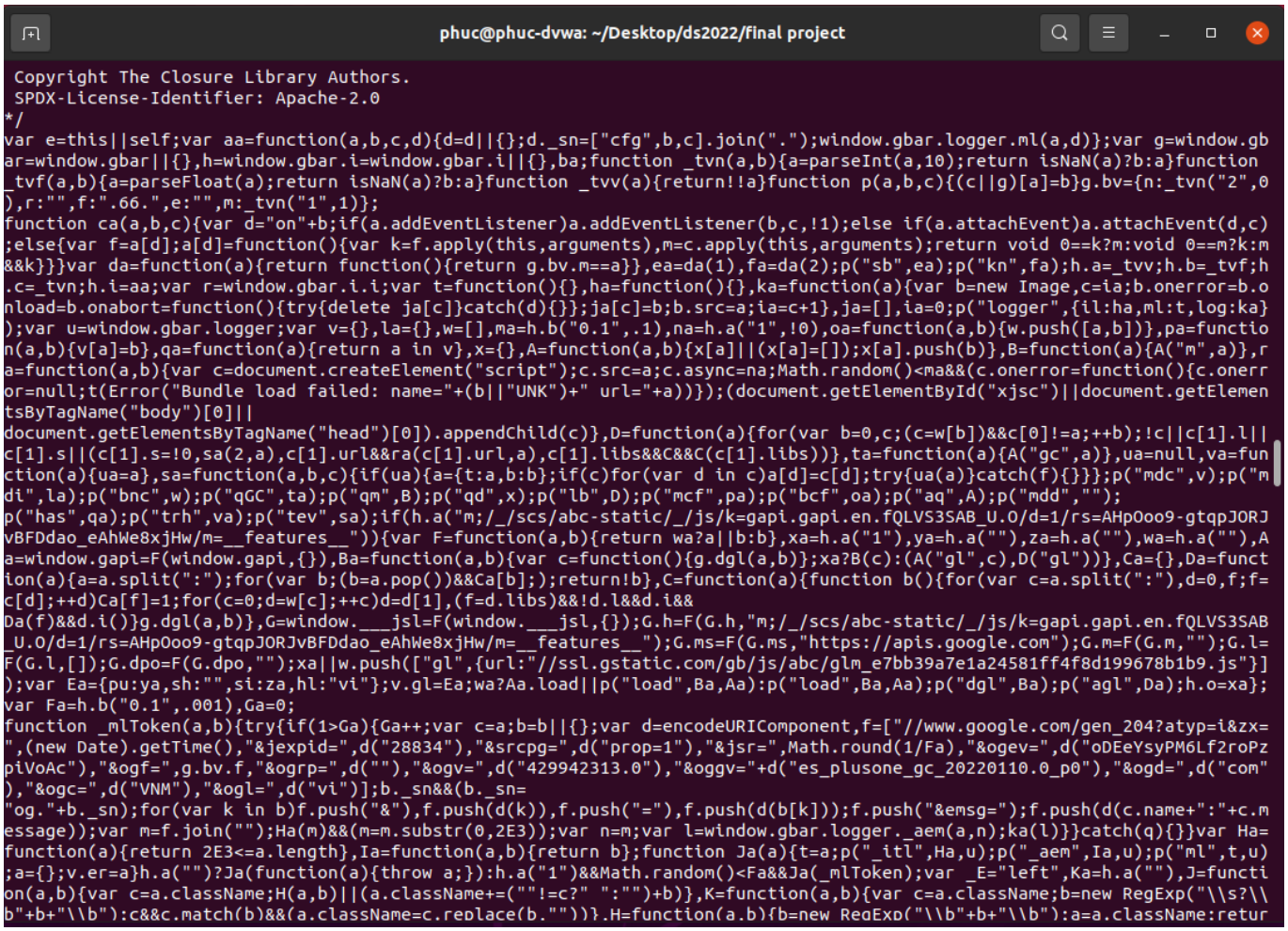
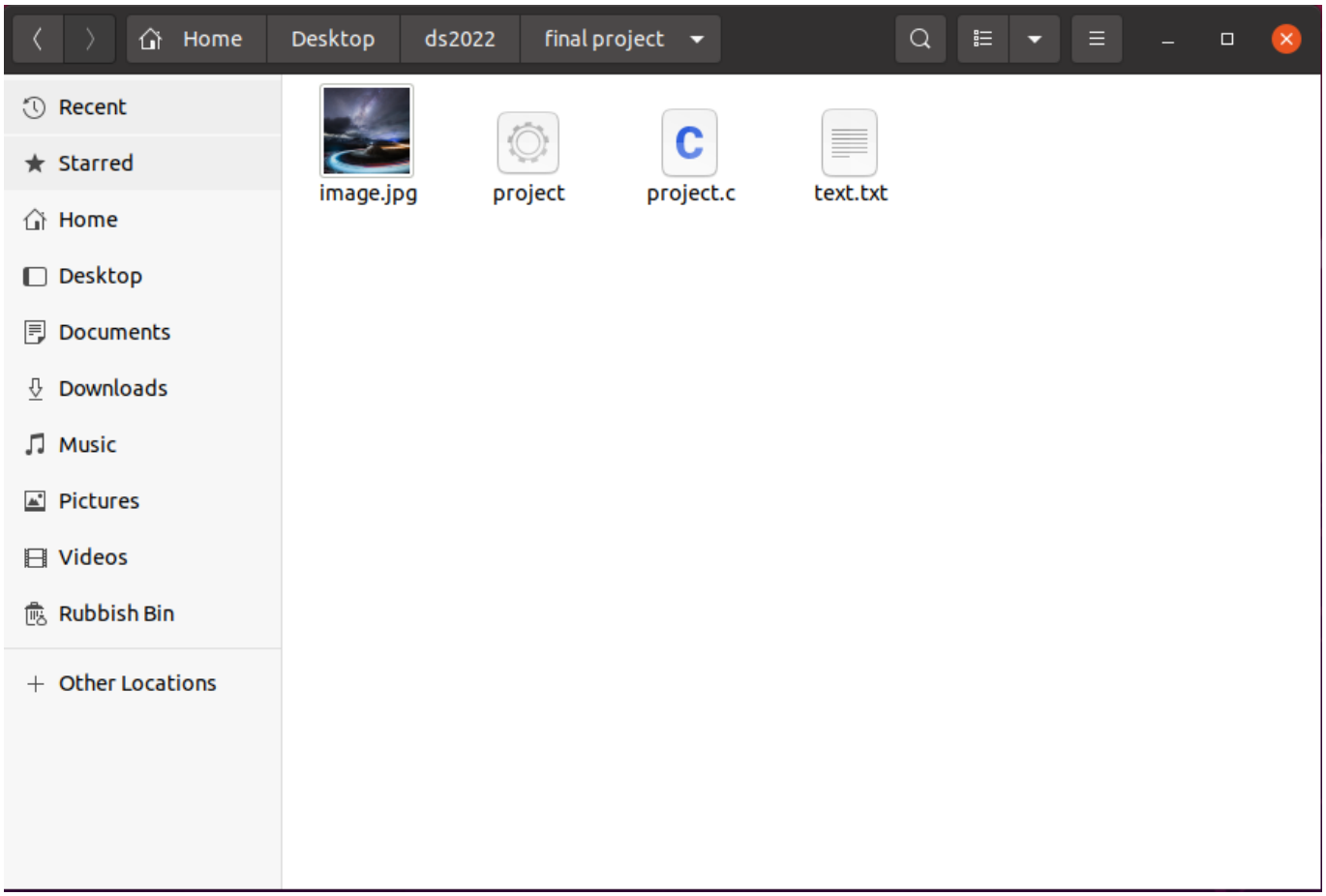
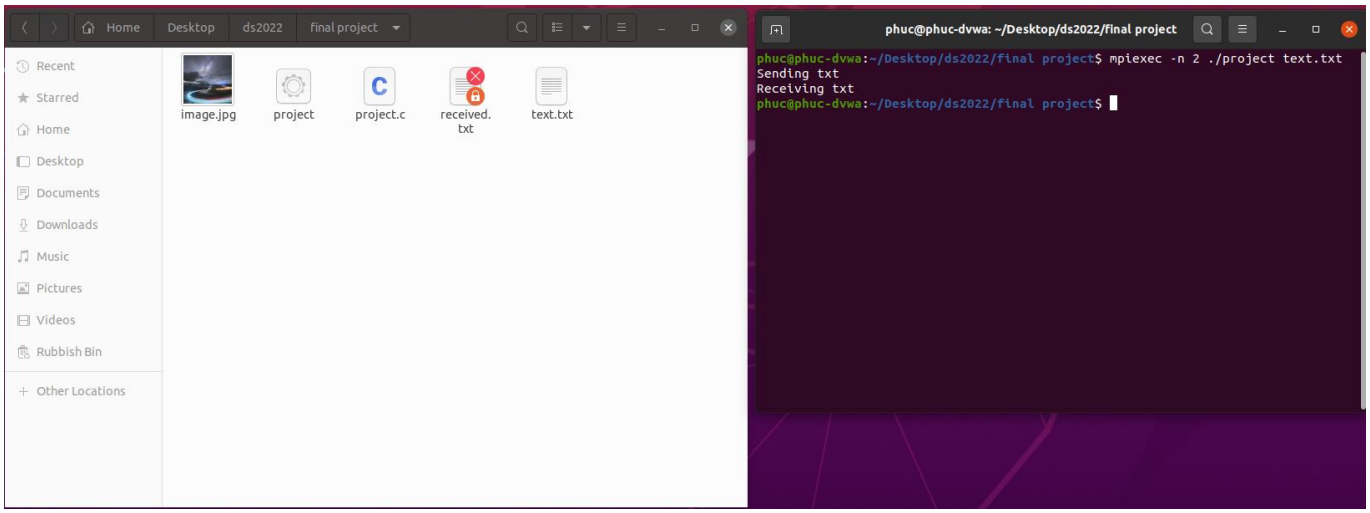

phuc@phuc-dvwa: ~/Desktop/ds2022/final project

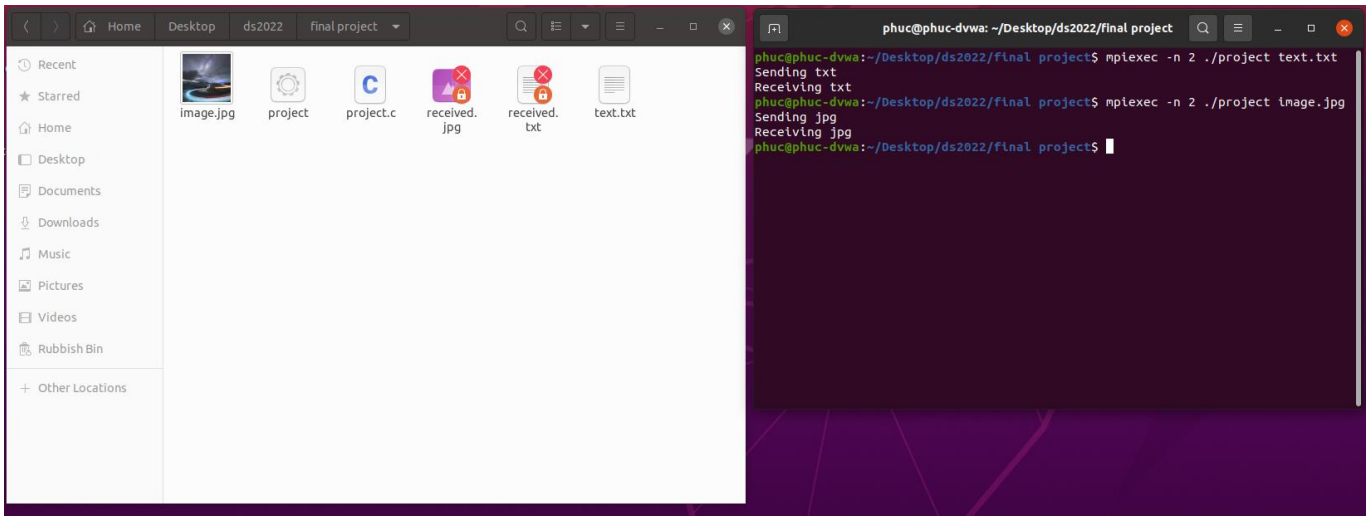
2. MPI File Transfer:

– Firstly, create 2 files send (in our project, we create one file text.txt and a file image.jpg)



– Next, use MPI to convert send file to receive file

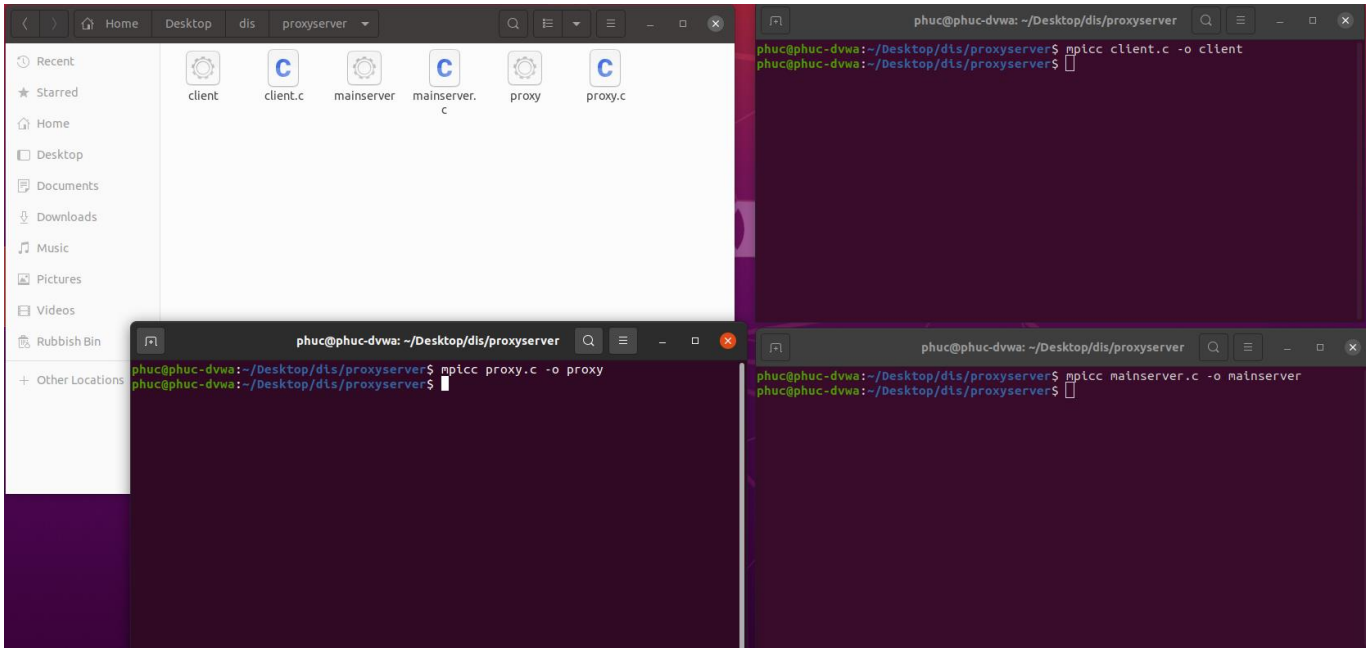




- Then we will get a file received.txt and a file received.jpg
- It only can be open under permissions of root

3. Simple proxy server.

– Firstly, use command mpicc (Compiles and links MPI programs written in C)

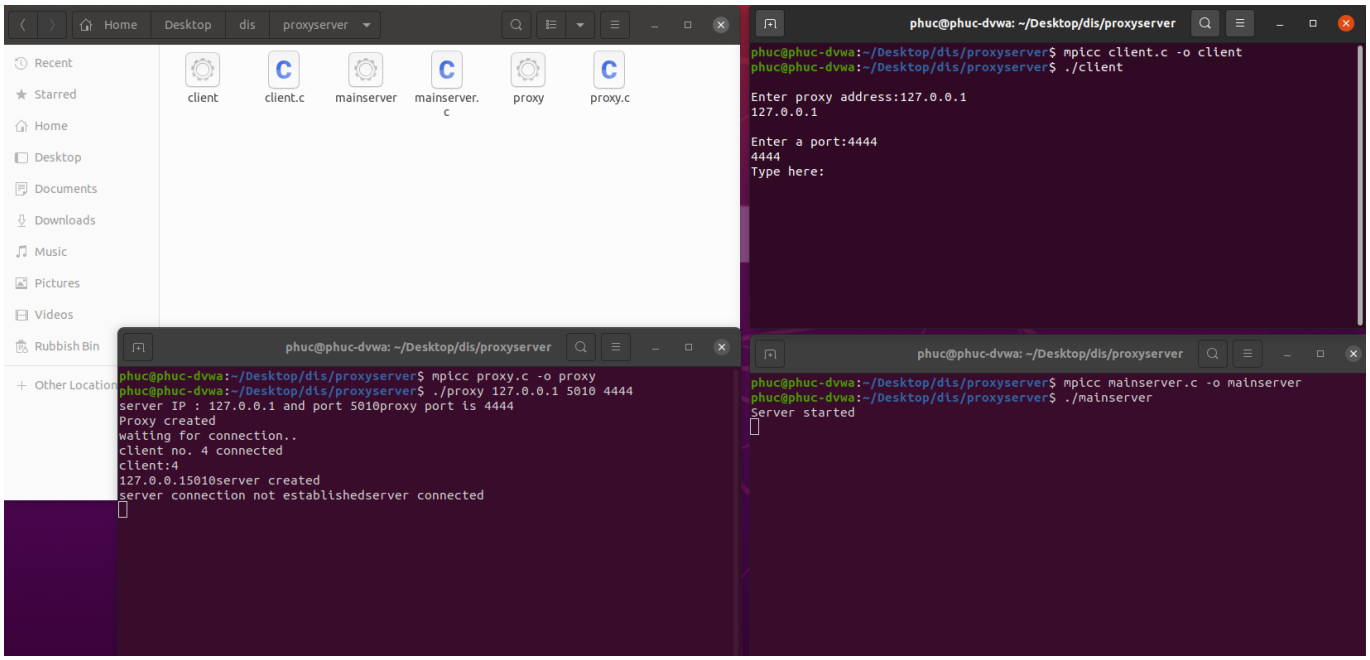


– Now run 3 files with code:

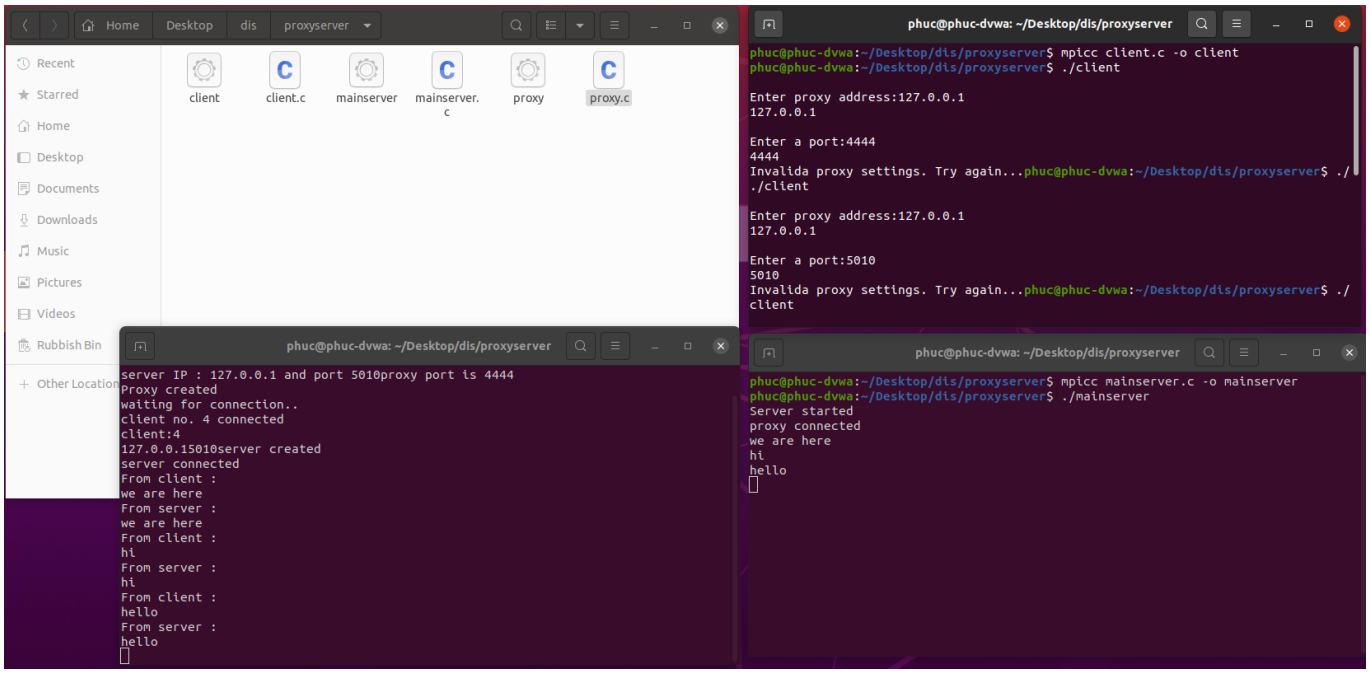
– $ ./mainserver

– $ ./proxy 127.0.0.1 5010 4444

– $ ./client



Enter some thing



The information entered from the client is sent through the proxy and then to the server

VI. Conclusion and future works

1. Conclusion

– In conclusion, MPI programming is a strong tool for parallel computing and its application with HTTP has a huge potential. Unfortunately, the purpose of this project is not achieved.

– Things we can do:

+ Files transfer can transfer file image, file text,...
+ The HTTP request works
+ Make a simple proxy

– Things we can not do:

+ Combine 3 things above
+ Connect server and client

2. Difficulties

– Throughout this project, we have encountered the following obstacles:

– **Human:**

+ Members of the group lack experience in the Distributed System. The limitation of knowledge and skill relating to MPI and proxy also set the group some difficulties when the members have to learn and do at the same time.
+ Members did not spend much time on doing the lab work of this course

– **Time Management:**

+ The primary obstacle for us was lack of time spent on the project.
+ This lack of time dedicated to the project was because of poor time management. We too focused on the previous Group Project

+ Moreover, there had been other time-consuming projects and labworks in other courses, which made the management harder.

3. Future work

– To further improve this project in the future, the following tasks need to be done:
  + Fulfill all the function.
  + Connect from client to server
  + Make a MPI acting as proxy

VII. References

1. What is a Proxy Server and How Does it Work? (varonis.com)
2. https://searchenterprisedesktop.techtarget.com/definition/message-passing-interface-MPI#:~:text=The%20message%20passing%20interface%20(MPI,computer%20%2D%2D%20are%20called%20nodes.
3. https://www.extrahop.com/resources/protocols/http/
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