

Total Hours Count: 156.25 hours

Week	Date	Hours		Week	Date	Hours
1	Mar-03	1.5		7	May-04	2
1	Mar-06	2		8	May-08	4.75
2	Mar-13	3.5		8	May-09	3.5
3	Mar-17	2		9	May-12	3
3	Mar-18	1.5		9	May-15	3.5
3	Mar-20	6		9	May-18	3
3	Mar-21	3		10	May-19	4
4	Mar-24	3		10	May-21	4.5
4	Mar-25	4		10	May-22	8.5
4	Mar-27	4		10	May-23	4
4	Mar-28	3		11	May-26	4
5	Mar-31	4		11	May-27	3
5	Apr-02	5		11	May-28	3
5	Apr-03	4		11	May-29	4.75
5	Apr-04	3		12	Jun-02	3
5	Apr-06	3.5		12	Jun-03	3
6	Apr-07	1.5		12	Jun-05	3.5
6	Apr-09	1		12	Jun-06	1.5
6	Apr-10	2		13	Jun-09	2
Break	Apr-14	2		13	Jun-14	3.25
Break	Apr-15	3		13	Jun-15	3
Break	Apr-16	3		14	Jun-16	3
Break	Apr-22	4.5				
Break	Apr-23	2				
7	Apr-30	2.5				
7	May-01	4				

Mar 3 2025

Total Hours: 1.5

Deciding Projects

Date/Time: Mar 3 || 2:30 PM - 4 PM

Weighing the options on choosing the RND Projects.

Decided to choose Network Performance Evaluation on Linux Operating Systems.

Factors that has led to make this decision:

- Wanted my final year project to be related to my major.
- Have interest in Linux Operating systems
- Would love to expand my expertise and skills related to linux

Mar 6 - Workshop 1

Total Hours: 2

R&D Workshop 1

Date/Time: Mar 6 || 2 PM - 4 PM

Notes

Project Proposal (10%)

- Upload in **Week 5**
- Presentation in **Week 6**

Mid-term Review (10%)

- Upload in **Week 12**
- Show and tell Team portfolio in **Week 13**

Workshops for Part 1 only from **Week 1 to 5 and Week 10**

Important things to do:

Kick off meeting

- Project scope
- Client
- mentor & offsite schedule
- Team Charter Sign off

Mar 13 2025 - Workshop 2

Total Hours: 3:30

Date/Time: Mar 13 || 12:30 PM - 4 PM

Notes

Meeting Schedule with Client and Mentor from 2PM - 2:30 was cancelled by Daniel (mentor), due to Schedule.

However, Met with the team to talk about the project.

Had discussions on what we will be doing and also some paperworks that we needed to address. The meeting with the team was before the workshop.

R&D Workshop - 2 hours

Notes from Workshop

Topic: Project Proposal

No Solo Work

- Quality and Learning from Each other

Project Proposal

- Collection of plans
- show project is necessary, feasible, and manageable
- No more than 10 pages

Project Requirement:

Minimum of 300 hours of effort per team member

Project Constraints

- Time
- Scope

Mar 17

Total Hours: 2

Off site individual hours

Date/Time: Mar 17 || 7:00 - 9:00

For Tomorrow Meeting

- Looked through the lecture slides to recap on what needs to be done.
- List down items that needs to be discussed
 - Team roles
 - How often will our team meet with the client/ mentor
 - Any specific questions to ask the client
 - Project Proposal
 - Milestones

I also review and wrote up the Team contract.

Just left with the team members to sign them.

- Reported the change of meeting time to the team, due to one member not free after 8pm.

Mar 18

Total Hours: 1.5

Off site Individual hours

Date/Time: Mar 18 || 7:00 PM - 8:30 PM

We had our team meeting online via Discord call

This was our very first meeting conducted, although we had met most of the members last week Thursday.

This was our first proper team members introduction.

I took the meeting minutes for this meeting and all the discussions were outlined and recorded in the minutes.

Summary:

- Team Leader appointed to Thomas
- Made up questions to ask Raymond and Danile (Client, and mentor)
- Assigned roles and responsibilities to work on the proposal and other project plan documents.

Mar 19

Total Hours: 2

Off site Individual hours

Date/Time: Mar 19 || 7:00 PM - 9 PM

Started drafting the Work Breakdown Structure

- It was not easy to work on this since, we haven't finalize our Methodology approach yet.
- We were sure to have iterations with different phases, but in terms of the terminology used for the name of each phases, it still needed review.
- I also helped go through other documents and make sure that I am up-to-date with the team progress and what needs to be done.
- Preparation and Researching on what to ask the Client.

Mar 20 - Client Kick Off + Workshop 3

Total Hours: 6

Meeting and Workshop 3

Date/Time: Mar 20 || 10:00 AM - 4 PM

From 10 - 11 AM

- We had our kick-off meeting with the client.
- We have new team member assigned to our team
- I helped record the notes for meeting minutes along with other team members.
- Ipv4 Team - Win, Zaf, Thomas
- Ipv6 Team - Larissa, Nathan, Charmi and Kylie

After the meeting

- Team had debrief on the meeting that we conducted.
- Go over things we needed to fix and assign new roles and responsibilities since we have new team member.
- I fixed up the WBS v1.0 but definitely could be better.
- We have new deadlines or due dates for the tasks
- Our main goal is to finish everything before the submission on 3rd of April.

Workshop 3

- Attended the workshop with some of the team members.
- Read through the lecture slides and ensure I understood the content.

Mar 21

Total Hours: 3

Off site Individual hours

Date/Time: Mar 21 || 1:00 PM - 4 PM

Working on the Project Tasks assigned to me

- I started working on reviewing and refining the WBS
- I also installed Microsoft Project needed for creating Gantt Chart - Helping Nathan
- In the proposal section:
 - Created the appropriate headers for each section
 - Reading thoroughly on the Project brief to really understand the objectives of the project.
- Creating a table to do a Team schedule.
 - Made a poll in our Team discord channel to know the availability of all team members.

Mar 24

Total Hours: 3

Off site Individual hours

Date/Time: Mar 24 || 2:00 PM - 4 PM

Continued working on the assigned tasks

- Made a table of Team schedule, noting down the weekly meetings
- Helped with structuring the Proposal document to make it look neat.
- Suggesting Team on the use of Appendixes, to attach all other related documents/ tables in there.
 - Made the formatting of the proposal, (Adding breaks, and Landscape orientation of the documents)
- Helped with other sections too.

Mar 25 - Individual Worklogbook

Total Hours: 4

Off site Individual hours

Date/Time: Mar 25 || 3:00 PM - 7 PM

Continued working on Proposal Document

- Did some researching on my own on the Functional Requirements/ Non-functional requirements
- Outside of the Proposal document, I researched on D-ITG Manual, and also I-Perf
- Installed D-ITG on my Ubuntu WSL to know the commands
- Tried setting up a VM with two ubuntu servers in an isolated network
 - Practiced Assigning Static IP address
 - Trying out different ways of sending and receiving packets

Mar 27 - Workshop 4

Total Hours: 4

Meeting and Workshop 4

Date/Time: Mar 27 || 12:00 PM - 4 PM

Conducted Meeting with Mentor

- Reviewed on the Proposal Draft
- Got feedback for improvement
- Told Danile on the Proposal Presentation booking for April 3rd for mock presentation.
- Suggested the Team to contact IT Senior Technician

Attending Workshop 4 - with some team members

- Team culture and Addressing conflict
- The main takeaway from the lecture:
 - Being responsible and working together towards the goal
 - Not to blame anyone but rather to reflect upon the mistakes and find ways to improve ourselves.
 - focus on building the team
 - have clear roles and spend time together
 - To have a conflict resolution process
 - Ensure to address any conflicts instead of avoiding them
 -

Mar 28 - Working on Proposal DDocument

Total Hours: 3

Off site Individual hours

Date/Time: Mar 28 || 2:00 PM - 5:00 PM

Working on Proposal document

- Creating a WBS diagram to showcase the different phases and the milestones
- Finalizing the Team schedule section
- Finalizing Rationale, Objectives, and the scope statement
- Ensuring that the Appendixes are formatted correctly and documents are being attached.
- Update with the team on the progress and help out others
- Tried sorting out the gantt chart and project schedule dates.

Mar 31

Total Hours: 4

Off site Individual hours

Date/Time: Mar 31 || 1:00 PM - 5:00 PM

Looking up some presentation Templates

- We have started our Initial Presentation Powerpoint Slide
- I wanted to change up the Slides Template so I looked around and suggested the Team two different templates to choose from.
- We assigned each team members who worked on their sections on Proposal
- I started adding some of my parts in the Presentation slides.
 - Mainly just the visual tables, diagrams, and some bullet points.
- Reviewing the Proposal document and fixing up for initial feedback.
- Recreating the WBS diagram to match the Project methodology.
- We changed our internal deadline set on April 3rd to April 6th.
 - The main due date of the Proposal submission

April 2

Total Hours: 5

Off site Individual hours

Date/Time: April 2 || 12:00 PM - 5 PM

Practicing for Mock Presentation Tomorrow April 3

- Wrote scripts for my section on what I will say
 - Practiced 30 minutes on the script so that I sound natural.
- Ensure the presentation was completed as a draft.
 - At this point we have not implemented the new slides template yet.
 - We decided to change to the new one after we finish our mock presentation and we when we got feedback.
- Ensure the proposal document is finalized
 - Included working on any incomplete section in the document
 - Gantt Chart + WBS (Finalizing)
 - Checking if the dates aligned
 - Checked if the Appendixes are correct and also the page layout are printable on A4.
- Team assigned me to print three copies of the Proposal document tomorrow before the Meeting with the clientn for the mock presentation.

April 3

Total Hours: 4

Mock Presentation and RND Offsite hours

Date/Time: April 3 || 11:30 PM - 4 PM

Mock Presentation

- Unfortunately Nathan and Charmi Didn't make it due to feeling sick
- I printed the proposal document which were more than 100 pages in total
- Mock Presentation with Daniel and Raymond.
 - Got a lot of feedback from the layout to improving the content details.
 - (All listed in the Meeting minutes)
- Got many feedback for the Proposal Document too
- We then met with Ramon IT senior Technician.
 - Talk about our project and also brief him on what we will need according to our technical requirements.
 - Asked if anyone was available the next day (Friday) to come to WZ LvL3 for the hardware.
 - I volunteered since i live closest to the campus

April 4

Total Hours: 3

RND Offsite hours

Date/Time: April 4 || 1 PM - 4:00 PM

Met up with Ramon in WZ Level 3

- I was there with Ramon to get our Team's Hardware, one monitor, keyboard, and the ethernet crossover cables.
- I took them to WZ lvl 7 to set up in our allocated deskspace.
- I also made sure that the ubuntu installed on the given computer was working.
- changing initial password
- Ensuring that everything was completed securely and appropriately.
- It took long, because there was also another group that was meeting with Ramon, and we were both getting our equipment, and hardware. Going to places, to get the monitor, and also waiting for Ramon.
- Meanwhile, I would make sure to do some work on the Proposal before submission.
- From the mock presentation yesterday, we got feedback from Daniel (mentor).
 - i made notes on what more needs to be done, and list them down so I know what to do for tomorrow.

April 6

Total Hours: 3.5

Off site Individual hours

Date/Time: April 6 || 8:30 PM - 12:00 PM

Today is the day for Proposal Submission

- We had some delays with our work, since most of us were busy with other courses assignments.
- I together with my team, spent the last minutes working on finalizing the proposal document.
- I was checking up all the sections as well as the appendix to make sure that they are up-to-date.
- I also make sure that all the sections are complete and ready for submission.
- We were able to submit on time.

Lesson Learnt

- I need to make sure to keep open communication with the team members consistently to ensure there is progress.
- I also need to make sure I allocate enough time for all the course assignments and balance out my schedule to prioritize the most important work first.

April 7

Total Hours: 1.5

Off site Individual hours

Date/Time: April 7 || 7:00 PM - 8:30 PM

Meeting for Preparing on Presentation

- Our team had a meeting online on discord
- We were planning to rehearse on our Presentation
- Due to our delay with proposal document
 - We couldn't finish the Presentation slides
- However, we continue doing our rehearsal and timing it to see how things are going
- We needed to improve some of our scripts to make sure we are within the time limit.
- Planned to have another rehearsal in the morning before the Real presentation **at WA Library (Room booked)**

April 9

Total Hours: 1

Off site Individual hours

Date/Time: April 9 || 8 PM - 9 PM

Final preparation for presentation

- Made sure the presentation slides was all completed and appropriate
- Rewrote my script
- Wrote keywords down as notes and practiced rehearsing myself.
- Going through proposal document to check if there is anything wrong
- Making sure I have full understanding of all other sections of the project proposal.

April 10

Total Hours: 2

Off site Individual hours

Date/Time: April 10 || 10:00 AM - 12:00 PM

Final Rehearsal for Presentation with The Team

Proposal Presentation with the moderator, client and supervisor

- We were asked questions about the project as expected.
- We also received a lot of feedback with regards to our proposal document and project planning.
- I acknowledged the mistakes we have done with some sections and noted down for revision after the meeting.
- Overall, we were told our proposal presentation was good and we are okay to continue onwards with the project.

Proposal Feedback (10/04/2025):

- Follow STLC methodology phases as it is
- Ensure the Schedule shows the iteration or some sort of way to tell that we would go back and forth through the phases
- Ensure that the Gantt Chart incorporates the technical aspect in all phases in Entry/ Exit Criteria
- The schedule show have the execution phase started before the end of first trimester
- Suggestion: While IPv4 does the execution, IPv6 can be upskilling. Vice versa.
- Some of the out of scope are actually within the scope (Assuming some of bullet points listed in the slide)

April 14

Total Hours: 2

Off site Individual hours

Date/Time: April 14 || 9:00 AM - 11 AM

Upskilling Plan

- I skipped the environment setup
 - I already have WSL installed in my windows from last semester Operating System course
 - I also have a fedora dual booted on my laptop
 - with QEMU virtual manager for running virtual machines
- I started off with looking into bash scripting.
- I used these websites:
 - <https://linuxcommand.org/>
 - <https://linuxjourney.com/>
- I was able to write simple bash scripts that prompts to run some basic commands such as moving/copying/ or creating folders.
- I learnt to write for loops and if statements too.

April 15

Total Hours: 3

Off site Individual hours

Date/Time: April 15 || 2:00 PM - 5 PM

Team meeting

- We had a team meeting online on discord
- Team lead wanted to check up on all team members with regards to the Upskilling plan

Individual Upskilling

- I look into downloading and installing the ubuntu server on my virtual machines.
- I tried network configuration for the ubuntu routers.
 - Setting up static IP address
 - Setting up routing for different networks

April 16

Total Hours: 3

Off site Individual hours

Date/Time: April 16 || 10:00 AM - 12 PM

Installing and Testing D-ITG

- Reading though the manual for D-ITG
- Figuring out how exactly are we going to use this tool to generate traffic.
- ITGSend is the command to use
 - Read through the parameters, and given examples in different use case.
- Executed some basic D-ITG commands to see how it works.
- The receiver end needed to have ITGRecv while the sender executes ITGSend with sets of specified paramters.
 - Destination Address
 - Packet rates
 - Time duration for sending packets
 - Protocol
 - Port
 - Logging files on receiver
- I also just practice the basic Ubuntu commands for navigating around the directories and creating scripts.
- Modifying permissions of the scripts and executing them.

April 22

Total Hours: 4.5

Off site Individual hours

Date/Time: April 22 || 4:00 PM - 8:30 PM

Team meeting with the members

- Discussed on what we have been doing so far in terms of upskilling.
- Discussion on starting the evalution runs for IPv4 Team. Meanwhile, for IPv6 Team to take care of the documenting and data analysing.

Upskilling

- Since I took a long break, I restarted my upskilling from scratch working on practicing the linux commands.
- I dived into trying out ITG and also looking through the Network configuration of the Ubuntu routers.
- I tried creating a script for automation on utilizing ITGSend for traffic generation to the receiver and logging it onto the receiver.

April 23

Total Hours: 2

Off site Individual hours

Date/Time: April 23 || 7:00 PM - 9 PM

Since we are planning to push the Test Execution Phase ahead of schedule.

- I look into setting up the Test environment setup.
- Before the break, we received the hardware from Ramon, IT senior technician, and I personally took the computers, monitor, keyboard.
- I created new virtual machines and go over installing the ubuntu, and reconfiguration for the IP address.
- Since I don't have personal hardware at my house, i create an isolated network in the virutal machine and assign to the Virtual machines.
- I then configured the netplan yaml files in the Ubuntu, and tested the connectivity by pining each other.
- I am confident in setting up the required network topology.

April 30

Total Hours: 2.5

Off site Individual hours

Date/Time: April 30 || 7:00 PM - 9:30 PM

Team Meeting After Break

- We had a discussion of what we all have done
- Team leader actually did a test run using his raspberry pis during the break.
- He set up a complete replica of the isolated network with the pis and ran the ITGsend and ITGRecv.
- He has also collected the log files and decoded them for data analysis
- We decided to have IPv6 Team do the data analysis on Excel to see how it will turn out.
 - Checking the performance metrics
 - Graphing them out
- Meanwhile IPv4 Team will finish the test environment setup by the end of the week.
 - I did the initial setup, but still need to complete the network configuration in our dedicated routers, sender and receiver. (WZLvl701)

After the meeting

- I make sure to review my notes to know what to do tomorrow for setting up the network configuration.
- I also look through our team portfolio and our Project proposal
- I check if there is anything that needs to be mentioned for next meeting.
- I also check if there is anything to ask the client about with regards to how he wants the data/ graph.

May 1

Total Hours: 4

RND Mentor/Client meeting and Offsite

Date/Time: May 1 || 12:30 PM - 4:30 PM

Before meeting

- Thinking questions to ask to client for clarification.
- Going through the milestones and tasks that we need to complete

Client Meeting at 1PM

- review over our progress with the upskilling
- Review over Proposal Feedback and confirming the detail
- Asking clarity on the functional requirements, whether we need to use the switch or not.(We decided on not using switch, but our original setup)
- Gathering more information regarding with the data and graphs (how the client wants)
 - In excel sheet
- Ask about the mid semester progress review since that was our next milestone.

AFter the meeting

- Stay at the lab to finish configuring the Test environment setup
- Assigned to look into NTP servers for time synchronisation.
- I had a read through but didn't have clear understanding yet.
- Completed the network configuration for ubuntu and tested by pinging sender and routers.
- installed SSH manually with the package from our hard drive mounted onto the router.
- Installed all the necessary packages required and perform sudo apt update.

May 4

Total Hours: 4

Individual Offsite hours

Date/Time: May 4 || 1:30 PM - 5:30 PM

Researching Network Time Protocol (NTP) server

- I spent time searching on NTP server and setting it up.
- Had some discussion with team leader for the NTP server and what really is needed.
- I learnt and acknowledged that NTP server will still is not the perfect Time synchronisation.
 - For that to happen, it will use PTP instead of NTP.
 - This would require additional costs and hardware such as GPS clock.
 - This is out of the scope.
- I look into what packages are needed, (the dependencies)
- How we can install it on our ubuntu servers.
 - How to configure it
 - How to test if it is working.
- Lastly i also tested on virtual machines that i have set up during the break for practicing
 - I was getting errors and I wasn't really sure why.
 - It must have been the differences of using virtual network interfaces and i figured that it was harder to implement it since the virtual machiens were using the local host machine's time.

Needless to say, I decided to test it out in our next LAB time (thursday).

I also looked into alternatives, such as Chrony

May 8 - Week 8

Total Hours: 4.75

Off site hours

Date/Time: May 8 || 12 PM - 4:45 PM

Team Meeting at WZ701

*IPv4 Team Work on Configuration of the computers**

What did I DO?

- Initial setup of NTP server using NTP
 - Ran into errors, NTP server wasn't working properly
 - Decided to use Chrony instead of ntpd or ntpsec
 - Responsible for testing it on VM over the weekend
- Troubleshooting the connectivity between all 4 computers
- Setting up SSH between the routers
 - This is because we only had one set of peripherals which we have to swap around to use.

Network Layout

PC1 (192.168.10.2) <--> Router1 (192.168.10.1/192.168.20.1) <--> Router2
(192.168.20.2/192.168.30.1) <--> PC2 (192.168.30.2)

Connectivity Summary

- Ping: Works between all devices (good)
- SSH connectivity:
 - R1 ↔ R2: Working bidirectionally (good)
 - PC1 → R1: Not working (problem)
 - PC2 → R2: Not working (problem)
- The issue specifically happens with packet forwarding enabled

To Do next Visit in WZ701:

- Pinging works, but SSH not working
- Checking SSH and Firewall configurations

- Packet forwarding may have broke SSH connectivity from the clients to directly connected routers.

Troubleshooting Steps

Verify firewall settings:

```
# On Router1 and Router2

sudo iptables -L -v

# Look for any rules blocking port 22 (SSH)
```

Check routing tables:

```
# On Router1 and Router2

ip route
```

Check logs for SSH connection attempts:

```
# On Router1 and Router2

sudo journalctl -u ssh
# or
sudo tail -f /var/log/auth.log
```

Check for port forwarding issues:

If you're using NAT (Network Address Translation), ensure SSH isn't being redirected:

```
sudo iptables -t nat -L
```

#But please test SSH to both routers on both of their IPs from PC1 before going through this.

May 9 - Time Synchronisation Testing

Total Hours: 3.5

Offsite hours

Date/Time: May 9 || 12AM - 3:30 AM

- Setting up Two ubuntu server VMs on virt-manager.
- Set up Isolated virtual network (No internet connection)
- Download Chrony Packages

```
sudo apt install chrony
```

- Switch to Isolated virtual network

Editing /etc/netplan/50-cloud-init.yaml file

```
sudo nano /etc/netplan/50-cloud-init.yaml
```

- Configure both server to have static ip address
 - server1: 192.168.10.1/24
 - server2: 192.168.10.2/24
- Disable dhcp4 and dhcp6

NOTE: I removed all packages related to ntpsec, since it was not working well. I test Chrony since it is newer and working.

```
sudo systemctl status chrony #Checking if running
```

```
sudo nano /etc/chrony/chrony.conf //edit config file
```

```
#Insert the following for NTP server (Server1):
```

```
local stratum 8 # Uses Local Machine's Time
```

```
allow 192.168.10.0/24 # Allow access for the network
```

May 12 - Testing SSH and Chrony

Total Hours: 3

Offsite hours

Date/Time: May 12 || 7 PM - 10 PM

Troubleshooting SSH across the network

It seems router 1 and router 2 SSH are working Fine.

The problem with sender and receiver is that the SSH wasn't initially installed. That is why it was not working.

We don't need SSH on them too so didn't bother installing them

Setting up Chrony server and clients

Installed chrony on all devices

Using Router 1 as NTP server

```
sudo apt install chrony

# checking status of chrony
sudo systemctl status chrony
```

```
timedatectl
```

```
sudo nano /etc/chrony/chrony.conf
```

```
#comment out all external ntp servers
```

For NTP server on (Router 1)

```
#add the following

local stratum 8 # Using local clock as references

# Allow NTP clients to access from the Local networks
allow 192.168.10.0/24
allow 192.168.20.0/24
allow 192.168.30.0/24
```

```
manual #No internet Sync, purely local
```

For NTP clients

```
# adding ntp server router 1's ip address
```

```
server 192.168.20.1 iburst
```

For verifying if Time is synchronizing

```
chronyc tracking
```

```
chronyc sources
```

```
chronyc sourcestats
```

For references click here:

[Verifying sources working](#)

Additional note:

I also added udev rules

```
sudo nano /etc/udev/rules.d/70-persistent-tethering.rules
```

```
#added the following line in the rule
```

```
SUBSYSTEM=="net", ACTION=="add", ATTRS{idVendor}=="04e8", ATTRS{idProduct}=="6864",  
NAME="usb0"
```

```
udevadm control --reload-rules
```

Before leaving, I did update and upgraded for all computers.

```
sudo apt update && upgrade -y
```

May 15

Total Hours: 3.5

Offsite Hours

Date/Time: May 15 || 12 PM - 3:30 PM

Network Performance Evaluation

Team meeting (IPv4 Team):

- Discussion with Team on the Data and how we will visualize the data.
- Ran the Ipv4.sh script that uses DITG to generate traffic with specific packet sizes and for both TCP and UDP.
- Try to find some sources on the reason behind inconsistent results or data
- Ideally we have planned to meet with the client to show the data we have got.
- The logs and data values shows that in run 5 of TCP for 256 packet size, there seems to be no packet sent or an error.
- The same for run 1 of TCP in 128 packet sizes, there is an anomaly with a huge difference in time delay.
- Through discussion, we came to agreement to research more about the performance metrics that we are evaluating
- We also need to consider defining what 95% confidence interval really means too.

May 18

Total Hours: 3

Off site hours

Date/Time: May 18 || 3:30 - 6:30 PM

Network Performance Evaluation

Purpose:

- Rerun the script for 128 and 256 packet size for both TCP and UDP.
- Reshare the logs to the team members after decoding the logs
- Help visualize the data into graph.

Researching:

- 95% confidence interval
- Looking into documentation for Chronyc NTP Time Synchronisation setup
- If there is any need to change the parameters of running the ITGSend..

Ran the script again but with an additionall parameter of:

```
-C 10000 # rate 10,000 packets/sec
```

May 19

Total Hours: 4

Off site hours

Date/Time: May 19 || 4:30 PM - 8:30 PM

Network Performance Evaluation

Data Analysis

Extracting data from the log files onto Excel for Data Visualisation in graphs.

The Script changes all files from .dat into .csv files

```
#!/bin/bash

mkdir -p csv/raw csv/delay csv/jitter csv/packetloss csv/throughput

# Convert raw .dat files in current directory
for file in *.dat; do
    [ -f "$file" ] || continue
    outfile="csv/raw/$(basename $file .dat).csv"
    awk 'NF { gsub(/[:space:]+/, ","); print }' "$file" > "$outfile"
done

# Convert metric files inside subfolders
for metric in delay jitter packetloss throughput; do
    for file in $metric/*.dat; do
        [ -f "$file" ] || continue
        outfile="csv/$metric/$(basename $file .dat).csv"
        awk 'NF { gsub(/[:space:]+/, ","); print }' "$file" > "$outfile"
    done
done
```

Performance metrics:

- **Delay**
 - Time taken for a packet to travel from source to destination.
 - Delay=Receive Timestamp–Send Timestamp
- **Jitter**
 - Variation in packet delay (how much delay changes over time)

- Throughput
- Packet loss

What is 95% confidence interval

range of values that you are 95% confident contains the true average of your measured data.

How to calculate it?

95% confidence interval

$$\bar{x} \pm t \cdot \left(\frac{s}{\sqrt{n}} \right)$$

$$\bar{x} \pm 2.201 \left(\frac{s}{\sqrt{12}} \right)$$

\bar{x} = mean

s = standard deviation

n = number of runs (sample size)

t = value from t -distribution table

→ confidence level (95%).

→ degree of freedom



To do: After 12 run for 1 packet size $df = n-1$

calculate mean and s.d.

$$df = 12-1 = 11$$

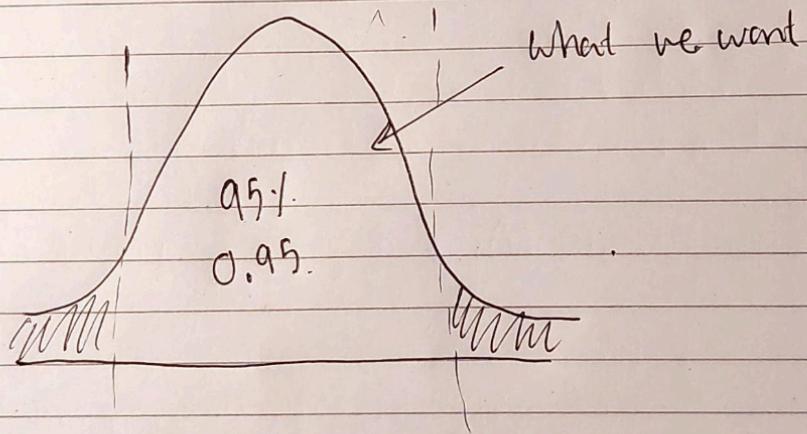
Find out the 95% confidence interval.

Check if any test fall outside 95% CI

According to t -distribution table

95% and $df = 11$

$$t\text{value} = 2.201$$



$$\text{Standard error} \Rightarrow \frac{s}{\sqrt{n}}$$

$$\text{Margin of error} \Rightarrow 2.201 \times \frac{s}{\sqrt{n}}$$

Lower bound

Higher bound

$$\bar{x} - t \times \frac{s}{\sqrt{n}}, \quad \bar{x} + t \times \frac{s}{\sqrt{n}}$$

I looked through the data and analyze the performance metrics, and also added formula in the excel to calculate the standard deviation, margin of error, lowest bound and highest bound to check if the average values of the performance metrics fall within or outside the confidence interval (CI).

Apparently after calculating the 95% confidence interval for each run of the packet size, there seems to be many runs that fell outside the interval.

Raise concern and awareness over this issue on using 95% confidence interval with the team.

Team concluded to have a meeting with client to better understand the confidence interval and see where to go onwards with our existing data.

May 21

Total Hours: 4.5

Off site Individual hours

Date/Time: May 21 || 1:00 PM - 5:30PM

Network Performance Evaluation

Purpose: Rerunning the whole script since there were some tests that fall outside of the 95% confidence interval

- I ran the ipv4.sh script for 12 packet sizes on both tcp and udp.
- Firstly, checked if the ntp server is working properly or not

Created python scripts:

- to read the logs and convert it into .csv files
- read .csv files and bundle the averages of each run of each packet sizes into Table.
- Label different table with IPv4 {Size} {Performance metric}
- Tried calculating the confidence interval and implementing it into the excel analysis filesheet.

May 22

Total Hours: 8.5

Off site Individual hours

Date/Time: May 22 || 12:30 PM - 6:00 PM

Network Performance Evaluation

What's Done today:

- Team meeting with members for catching up with the progress
- Client/Mentor meeting for updating the progress with First run on IPv4 Ubuntu, TCP & UDP
 - Confirm about confidence interval
- Week 10 Workshop From 2:00 - 4:00 PM

Rerunning the script

- Changes in the script with the arguments/ parameters

```
-c 1000000 # rate change to 1 million packets per seconds  
-t 10000 #time duration changed to 10 seconds instead of 31 secs
```

```
#May have to Look into using different ports  
#Look into running 10 runs simultaneously  
#Ignore the confidence interval for now and focus on the TCP
```

Workshop - Status Report / Show and Tell Presentation

- Project's progress against the project baseline.
- Learning outcome?? Technical and Non-technical skills learnt or achieved
- **How the work has been getting out and what kind of progress has been made?**
- Summary of Individual contribution
 - Who has worked on what in weekly basis
 - Clearly identified Who has done what
 - Table form
- How improve team performance for Part 2 ?
- **Schedule:**
 - High-level schedule for Part 2

Requirement:

- **Status Report**
 - no more than 2000 words
 - 5 pages including cover page

- **Presentation**

-1 slide only and 5 minutes

Date/Time: May 22 || 9:00 PM - 12 AM

What our script initially does is this:

- Decodes the log into individual .dat files and also .txt files
- Script for converting all of them into .csv files
- Script for reading all .csv files and importing data into one excel sheet.

This consumes a lot of time and resources for data analysis.

Goal: Export into Excel within one step after the logs.

Analysis

Analyzing what data do we need to collect from each of the Evaluation Runs:

12 Packet sizes

- 10 Runs
- Each Run
- Average Delay
- Average Jitter
- Average Throughput
- Average Packet loss
- Average Bit Rate

Created another script to help with exporting into txt files only that already shows the average performance metrics.

May 23

Total Hours: 4

Off site Individual hours

Date/Time: May 23 || 1:00 PM - 5:00 PM

Network Performance Evaluation

Goal Today:

- Rerun the script by testing out different scenarios
 - 10 runs simultaneously for each packet sizes
 - Running with packet rate "-C"
 - of 10 million packets per second
 - of 30 million packets per second
 - of 50 million packets per second
 - of 100 million packets per second (Decided not to pursue)

I figured out how to run simultaneously.

- Using multi-flow mode instead of single flow mode

Reference DITG Manual

Example scripts --> Into Research folder

Three different runs completed:

Run 1: Packet rate = 100000

Run 2: Packet Rate = 10,000,000 packets per sec

Run 3: Packet Rate = 50,000,000 packets per sec

Reorganizing the Team Portfolio

► **Suggested structure**

- • **Research and Upskilling**
 - Evidence of upskilling. Technology and tool selection research documents. Architecture, platform reports, usability reports, investigations, and feasibility assessments.
- • **Project Planning and Control**
 - Evidence of sound and effective planning and control processes, including rationale for project decisions. Versions of your proposals, reporting, and scheduling
- • **Teamwork and Communication**
 - Evidence of sound and effective communication and collaboration with team members, supervisor, client, stakeholders.
- • **Development Activities and Work Products**
 - Quality and completeness of all development activities and outputs. Quality and completeness of final product/s

May 26

Total Hours: 4

Off site Individual hours

Date/Time: May 26 || 12:00 PM - 4 PM

Network Performance Evaluation

Fixing Proposal and Starting with Status Report

Following is identified Feedback and Recommendations on our Proposal:

- Accurate naming of the phases according to STLC methodology
- WBS must show iteration between the phases for evaluation on different Linux Distros.
- Rationale:
Few errors in reference Terms of reference should be one paragraph the client request the objective a problem how the projects address the problem the methodology, the timeline. Don't need multiple headers for it.
- Risks:
 - Other risks to consider are the human aspects including working relationships, loss of interest, suitability of results such as accuracy, consistency, etc., need to be considered.
- Project Feasibility:
 - Based on the mentor's view, the students, based on their work so far can feasibly complete the project. Must provide the document which shows the quality assurance of the project feasibility
- Skills:
 - focus on understanding the project management and how does it fit with the project.
- Project Management Methodology:
 - Could be clearer on how the QA plan will fit in
- Project Schedule:
 - Clear tasks and activities for each of the phase
 - Recommended to begin as early as possible for technical side to minimize issues or risks.
- Scope
 - Can be more specific about "Tests"
 - Incorrect out of scope items
- Proof-editing is needed due to some typos

Reorganized the Team Portfolio 02 Planning - and- control folder

Organized the folders to match the milestones such as Proposal and Mid Term Review.

Some of the files were repeating and they were removed.

Version controls were applied throughout the documents.

Executed some more Runs in the mean time using different packet rates

so far we have done

Run 1: Packet rate = 100,000 packets per sec

Run 2: Packet Rate = 10,000,000 packets per sec

Run 3: Packet Rate = 50,000,000 packets per sec

New Runs:

Run 4: Packet Rate = 50,000 packets per sec

Run 5: Packet Rate = 1,500,000 packets per sec

Run 6: Packet Rate = 3,000,000 packets per sec

Run 7: Packet Rate = 5,000,000 packets per sec

Run 8: Packet Rates = 8,000,000 packets per sec

Run 9: Packet Rates = 1,000,000 packets per sec

May 27

Total Hours: 3

Off site Individual hours

Date/Time: May 27 || 2:00 PM - 5 PM

Network Performance Evaluation

I have spent time trying to fix up the scope statement accordingly to the feedback.

I have also check on other sections of the status report that needs to be completed.

We are just doing a draft so far to send to Daniel for review.

It was a lot of checking through the proposal and also organizing all the feedbacks that we received for improvement.

I also make sure to list down things that we have left to do.

May 28

Total Hours: 3

Off site Individual hours

Date/Time: May 28 || 7:00 PM - 10 PM

Network Performance Evaluation

Our team had a meeting together at 7PM, to talk about our progress with the status report. We also reassigned some roles and responsibilities of the sections to each team members.

We wanted to finish the draft tonight so that Daniel (our mentor) can review for us.

I worked on the WBS, and High-level WBS diagram, updating my team contributin and skills learnt.

I also reviewed other sections, and give clarification based on my undertanding of the requirements to my team members.

May 29

Total Hours: 4.75

Off site Individual hours

Date/Time: May 29 || 12:15 PM - 5 PM

Network Performance Evaluation

Our mentor called us for meeting on campus suddenly.

Our team members were not available on campus since we had no meetings planned.

As i lived nearby, I decided to go to campus to meet up with Daniel for feedback. I recorded the meeting and shared the findings and updated with the team.

Larrisa took the meeting minutes. Meanwhile, I ran more evaluation testing with different packet rates to find the optimal value.

We received the test plan excel doc from Daniel too

run 10: 60,000 packet rate

run 11: 70,000 packet rate

run 12: 150,000 packet rate

run 13: 120,000 packet rate

run 14: 200,000 packet rate

run 15: 500,000 packet rate

run 16: 300,000 packet rate

Decoded the logs and graphed them too.

Jun 03

Total Hours: 3

Off site Individual hours

Date/Time: June 02 || 6 PM - 9 PM

Improvement Based on Feedback

- Relistend the recording of the meeting with Mentor
- Fixing up the WBS diagram to show iterations between the phases.
- Fixing up the section for team meeting schedules to upload the table from Proposal and edit dates for Part 2
- Creating the Powerpoint Slide and adding the important layout
- Ensuring the Team Portfolio is organized.
- Ensuring the Worklogbook are up-to-date

Jun 05

Total Hours: 3.5

Off site Individual hours

Date/Time: June 05 || 10:30 PM - 2 PM

What did i do?

- Going through all the data for the Evaluation runs for IPv4 on TCP protocol (Ubuntu)
- Analysing the pattern and trends
 - Comparing the difference between the Network performance when using different packet rates.

All The Runs conducted:

Run 1: Packet rate = 100,000 packets per sec

Run 2: Packet Rate = 10,000,000 packets per sec

Run 3: Packet Rate = 50,000,000 packets per sec

Run 4: Packet Rate = 50,000 packets per sec

Run 5: Packet Rate = 1,500,000 packets per sec

Run 6: Packet Rate = 3,000,000 packets per sec

Run 7: Packet Rate = 5,000,000 packets per sec

Run 8: Packet Rates = 8,000,000 packets per sec

Run 9: Packet Rates = 1,000,000 packets per sec

run 10: 60,000 packet rate

run 11: 70,000 packet rate

run 12: 150,000 packet rate

run 13: 120,000 packet rate

run 14: 200,000 packet rate

run 15: 500,000 packet rate

run 16: 300,000 packet rate

Client Mentor Meeting at 1:00 PM

- The client is satisfied with the graphs that our Team have generated for IPv4
- We are good to start on the IPv4 UDP and also for the IPv6

Our Script used the actual IP addresses instead of "ipv4 and ipv6"

```
for i in fd00:0:0:30::2_*.log; do suffix="${i#fd00:0:0:30::2_}"; mv "$i"  
"ipv6_${suffix}"; done
```

```
for i in 192.168.30.2_*.log; do suffix="${i#192.168.30.2}"; mv "$i"  
"ipv4_${suffix}"; done
```

Jun 06

Total Hours: 1.5

Off site Individual hours

Date/Time: June 06 || 3:30 PM - 5 PM

Sending Raymond (Client) our data for IPv4 and Ipv6

- I compiled up all the evaluation runs that we have done as well as the data.
- I also made sure to label the tables appropriately.
- I made images of the graphs that shows the different performance metrics.
- I checked the data are correct and confirmed that it is for Ubuntu IPv4 and IPv6 TCP, and UDP.
- I also checked with my team on the graphs and wrote an email for Raymond.

Jun 09

Total Hours: 2

Off site Individual hours

Date/Time: June 14 || 8:45 PM - 12 AM

Team received message from Client on the data graph sent

- He replied saying it is looking good.
- Team decided to rerun the evaluation one more time and graph it to ensure that the data is consistent.

Status Report Document

- Since we have our presentation booked for Thursday
 - We needed to submit the Status report today.
 - I review the status report document
 - There were still unfinished sections so I decided to help in
- I also make sure to record the

Jun 14

Total Hours: 4

Off site Individual hours

Date/Time: June 14 || 8:45 PM - 12 AM

Finalizing Status Report

- Making sure the font sizes and fonts are aligned with all sections
- Adjusting Tables and pages layout.
- skimming through all sections to complete unfinished sections.

Finalizing Gantt Chart and WBS

- I refined the WBS high level diagram to look better
 - From Daniel's feedback on showing the iteration
 - I decided that it would be best to really align the phases that started together
 - Realistic to what we have been doing.
- I also make sure to discuss with the team on creating a new project schedule based on what we have done.
- Since our last project schedule has lots of assumptions on starting the execution part next semester
- But in actual, we made it to start this semester (from our feedback)
 - So that we know if anything is wrong we have time to sort it out.

Jun 15

Total Hours: 3

Off site Individual hours

Date/Time: June 15 || 2 PM - 5 PM

Finalizing New Project Schedule

- Helped with Finalizing the Gantt Chart
- Estimated the durations for each of the phases for the different OS
- Drafted the dates and also made sure to align it with our current schedule
- What we have completed so far
- Edited some of the tasks to make it more relevant to the phases
- Edited the Gantt Chart to ensure a realistic time schedule for our project

I also had a last review of the project status report

- Finalized the project status section
- Made last edits and proof reading of the document before submission.

Jun 16

Total Hours: 3

Off site Individual hours

Date/Time: June 15 || 2 PM - 3 PM

One more Evaluation Run for Ubuntu

- With packet rate of 120,000 packets per second
- I ran it again and I graphed it

Powerpoint

- I also changed the template of the powerpoint
- Made sure to add more visual images than words
 - Added Project Brief
 - Thought the technical infrastructure might be good but not confirmed yet.
 - WBS high level diagram
 - Our New Project Schedule
 - Ending Slide (not sure yet but maybe conclusion)