GROUP 15 CMPG 315
PROJECT DOCUMENTATION

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Overview and problem statement

This project requires the team to assist with the expansion of a company's business operations, and entails designing and implementing a new office network infrastructure. The current network infrastructure consists of only a business ISP fibre connection and a ONT. This provides minimal support the company's needs.

Our objective is to create a robust yet cost-effective network infrastructure that satisfies the company's needs and creates space to allow for future scalability. The network infrastructure must integrate the existing computer equipment from the old office with the newly purchased devices.

The company has additionally mentioned a need for a text messaging application to help establish internal communication. The application must be able to operate on Windows platforms; be portable for remote usage; and ensures open communication within the organisation.

Our task includes devising the network infrastructure and developing the messaging app in a way that aligns with the company's objectives and requirements, as well as with a focus on cost-effectiveness, scalability, and usability.

Group members' reflections on online courses

FC Venter (42468000)

The courses on time management, Git/GitHub, project management, and CISCO Packet Tracer provided valuable learnings and skill development. The "Time Saving" course highlighted the importance of investing time wisely by focusing on the present moment through activities like structured morning routines, working in uninterrupted chunks, taking breaks, and visual time mapping to optimize productivity.

The Git/GitHub courses enabled better collaboration and version control understanding. Learning Git commands like add, commit, checkout, as well as the staging area and branching allowed seamless project management, parallel work, and change merging. Utilizing Git with GitHub facilitates project showcasing and team coordination.

The project management course provided comprehensive knowledge on planning, executing, and monitoring projects using methodologies and tools like MSP and Primavera P6. This boosted professional confidence in implementing strategies for successful project outcomes and continuous improvement.

The CISCO Packet Tracer course developed technical networking skills through hands-on configuration and simulation. This improved problem-solving, critical thinking, attention to detail, and the ability to design, troubleshoot, and work with various networking protocols efficiently.

Overall, these courses enhanced time management, version control, project management abilities, and technical networking skills - critical competencies for personal and professional growth in today's fast-paced environment.

Cally Makhubele (43679714)

Through the time management course, I've learned essential soft skills that have improved my productivity and organization. These skills include prioritization, organization, self-discipline, goal setting, adaptability, effective communication, problem-solving, stress management, resilience, and empathy. They've enabled me to focus on important tasks, stay organized, stick to schedules, and adjust plans as needed.

In the courses "Git Started with GitHub" and "Git Expert," I have learned how to manage projects and work better with teams. I got better at organizing tasks, explaining technical stuff, adapting to changes, solving problems, and working together with others. These improvements helped me use Git and GitHub more effectively and be a better team player.

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Studying project management has equipped me with skills like effective communication and problem-solving, essential for streamlining operations and addressing challenges creatively, contributing to project success.

In my online packet tracing courses, I have learned that it is not just about knowing technical stuff. Skills like problem-solving, paying attention to details, explaining things clearly, managing time well, being patient, and always learning new things are important too. They help a lot in finding and fixing network problems, making the whole process easier.

Kayla Botha (34250174)

The time management course placed emphasis on beginning your day right so that you can set the right tone for the rest of your day. It also mentioned the importance of structuring your day according to which activities are most important, and which are time wasters that aren't helping you achieve your goals.

The first Git/GitHub course was like a crash course on all things GitHub. It provided me with a clear understanding on how to clone repositories, committing changes, pushing updates back to GitHub, creating local repositories and integrating Git into existing projects.

The second GitHub course covered some of the topics that were already covered in the first course, but some of the new soft skills I learnt included git revert and reset, a further understanding of branches such as how to edit and merge them. Additionally, I also learned how to streamline processes through SourceTree.

The project management course taught me that organization, planning, and risk management are among the most important aspects of project management/ Furthermore, I also learnt that clear communication and active stakeholder engagement ensures project success.

Lastly the Cisco Packet Tracer course taught me how to download the packet tracer, as well as how to navigate the interface of the application. It also taught me about different packet tracer file types and how to create a basic network.

Wian Otto (31868444)

I finished up five short courses that really changed how I approach work and our big group project. The first course was all about managing time better. It showed me some cool ways to plan out my days and weeks, so I can keep my eyes on the prize and not get lost in the small stuff. This was super helpful because I always felt like I was running around like a headless chicken before.

Then, I took two courses on GitHub, which was a game-changer for our group project. GitHub is this tool where we can all throw our code into one place, keep track of who did what, and work on the app together without stepping on each other's toes. It's perfect for our messaging app project, making things way smoother and keeping us all on the same page.

After that, there was this course on managing projects. It got into the nitty-gritty of planning a project, choosing what to work on, and making sure everything gets done when it's supposed to. This was super important for keeping our app project organized and making sure we're not just randomly doing stuff.

The last course I took was on using Cisco Packet Tracer. It's this software that lets you play around with network setups and see how devices talk to each other. This is super important for making sure our app can send messages back and forth without any hiccups.

MP Qongwani (40868117)

I gained knowledge on how to create repositories, push, pull, and store my code or information. I can manipulate the code using Visual Studio Code along with GitHub. I was even able to clone repositories and work on joint code with other people.

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Udemy's time management courses taught me essential techniques that organized my daily routines. I learned to identify priorities and streamline my workflow, which has significantly improved my productivity and ability to meet deadlines.

Through project management, I've gained a deep understanding of how to effectively plan, initiate, and execute projects. By grasping key elements such as defining scope and allocating resources strategically, empowering the team becomes instrumental in achieving optimal outcomes.

Using Cisco Packet Tracer, I developed strong problem-solving abilities and a passion for innovation. By designing and simulating networks, my analytical skills improved, allowing for effective troubleshooting. The practical experience contributed a lot to my creativity in finding innovative solutions to complex networking issues.

JJ Schoeman (34210164)

The short courses taught me a lot. The course about time management gave me a better idea of how to manage time better. I also learned to create better schedules to follow to get more done during the day.

The Git/GitHub course showed me easier ways to create repositories and ways to improve push and pull functionalities while using my preferred IDE. The git course was also very helpful to navigate repositories and git functions using a command window.

The project management course helped me to create timelines and complete tasks within those given timelines.

The packet tracer course showed me how to work with real world networks without having a real-world network to work on and showed me how real-world networks communicate with each other.

Overall, these courses contributed to a fun and insightful learning experience and helped to improve real world and digital skills by teaching and simulating different scenarios.

TP Nontejwa (30865287)

These courses have taught me a lot about version control, time management, and project management. Though I believe they are especially essential to personal development, these abilities can be applied in any industry. I can learn how to prioritize and set up my tasks to be more effective and efficient by practicing time management. I can trace many iterations of my work and learn how to manage changes with version control. This is particularly helpful while working on big projects or in collaboration with others. I can learn how to use project management to measure my work and divide complicated jobs into smaller, more manageable ones. In both my personal and professional life, I can use all these skills to further my own development.

Carla van der Bank (41060490)

For this project, we were instructed to participate in and complete five courses to help us complete the group project.

In the first course, we learned valuable skills such as time management and working towards goals. I learned about the importance of having a good morning routine and following the “SAVERS” formula. This course highlighted how you should invest your time, optimize productivity, and spend your time working on achieving your goals.

The two courses that I completed on GitHub showed us how to install and manage GitHub and introduced us to the environment of GitHub. This course allowed me to connect with my other group members regardless of our different time management skills and where we are, as we do not have to interact face to face to have an effective workflow. Understanding the GitHub interface allowed me to communicate clearly, organize projects efficiently, and allow for successful collaboration in any environment, like visual studious.

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The fourth course focused on project management skills. It provided insights into planning, executing, and monitoring projects, resource allocation, understanding project requirements, and achieving project goals. Additionally, we discussed leadership principles, collaboration, teamwork, and resource allocation to team members based on their skills.

Studying CISCO Packet Tracer improved my problem-solving and analytical skills. Designing and simulating networks fuelled my creativity and helped me contribute to successful projects.

In conclusion, after completing these five courses, I have improved my time and project management skills and developed the necessary skills to successfully use GitHub and the CISCO Packet Tracer to improve my communication productivity and problem-solving skills, to mention only a few things.

Work ethic

Introduction

This document outlines our team's commitment to effective communication, accountability, and professionalism throughout the project duration.

Communication

1. **Regular updates:** All group members are expected to give regular updates on their progress as well as report any challenges encountered via our designated communication channels.
2. **Transparency:** Any issues or problems should be communicated to the group as soon as possible for discussion and resolution.
3. **Active participation:** Each group member is expected to actively participate in any meetings, discussions, or work sessions.

Accountability

1. **Timeliness:** The group aims to complete all work in a timely manner by respected the deadlines set for each task.
2. **Quality:** Each team member is expected to provide work that is complete and accurate.
3. **Ownership:** Each team member should take ownership of their own responsibilities. If any issues arise, the team vows to resolve them as soon as possible.

Professionalism

1. **Respect:** We respect each other's opinions and contributions and allow space for constructive feedback in a respectful manner.
2. **Ethical conduct:** We adhere to ethical standards which include respecting intellectual property rights as well as including proper citations where necessary.
3. **Professional communication:** The team aims to uphold professionalism in all communication channels by providing clear, concise, and respectful communication always.

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Project's network topology description

1. **Access Layer**:
    - 18 smaller switches (Switch PT) are deployed, with each switch located in a separate room or area.
    - VLAN segmentation is implemented on each switch, resulting in 18 distinct VLANs, one for each room.
    - Each VLAN is isolated from the others, ensuring network security, and optimizing traffic within each segment.
2. **Distribution Layer**:
    - The Distribution Switch (DSW), a Cisco 3560-24PS, serves as the central aggregation point for connections from the 18 access layer switches.
    - Additionally, it connects to:
        - 18 smaller switches (Switch PT) in the access layer.
        - 1 router, providing connectivity to external networks.
        - 1 DHCP Server
    - VLAN configurations are managed on the DSW, ensuring proper segmentation and isolation between the access layer switches.
3. **Core Layer**:
    - While not explicitly mentioned, the Distribution Switch (DSW) may serve as the core layer device in smaller networks.
    - The router, connected to the DSW, provides core functionality by connecting the network to external networks, such as the internet.
    - It serves as the primary exit point for internet-bound traffic from the internal network, facilitating high-speed, high-redundancy connectivity.
4. **Servers**:
    - 1 server (Server PT) are connected to the Distribution Switch (DSW).
    - This server hosts DHCP.
    - It caters to the needs of the internal network while ensuring accessibility and reliability across the segmented VLANs.
5. **DHCP Relay**:
    - A separate server, acting as a DHCP relay, is connected to the Distribution Switch (DSW).
    - It forwards DHCP requests from clients in the access layer switches to the centralized DHCP server, ensuring efficient IP address assignment while preserving network segmentation.

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Network topology evaluation

Strengths:

1. **Scalability**: The network is designed to accommodate growth, with provisions for additional devices and users in each section. (Such as the use of DHCP Relay). This scalability ensures that the network can adapt to the company's evolving needs without requiring significant redesign.
2. **Segmentation**: Each section of the building is isolated from the others, preventing unauthorized access, and enhancing security. This segmentation helps maintain network integrity and confidentiality.
3. **Coverage**: The network provides comprehensive coverage throughout the building, including wired and wireless access points in each area. This ensures that users have reliable connectivity regardless of their location within the premises.
4. **Centralized Management**: By locating servers and major network infrastructure in the machine room, the network design centralizes management and administration. This setup simplifies maintenance and troubleshooting tasks for IT staff.
5. **Cost-effectiveness**: The network design aims to keep costs low while meeting the company's requirements. By leveraging existing hardware and optimizing resource allocation, the design minimizes unnecessary expenses.

Weaknesses:

1. **Single Point of Failure**: The network relies on a single ISP fibre line termination point in the machine room for internet connectivity. If this connection fails, it could disrupt internet access for the entire building. Implementing redundancy or failover mechanisms would enhance resilience against such failures.
2. **Security**: The network lacks robust perimeter security measures such as firewalls or intrusion detection/prevention systems. Implementing a firewall at the edge of the network would provide a barrier against external threats and unauthorized access attempts.
3. **Limited Guest Wi-Fi**: The provision for limited Wi-Fi access for guests in the reception/waiting area may not adequately meet the needs of visitors, especially if the company frequently hosts events or meetings with external participants. Increasing the capacity or coverage of guest Wi-Fi could improve user experience.
4. **Potential Network Congestion**: In high-traffic areas such as the open floor space, the substantial number of devices connected to wired access points may lead to network congestion and performance issues. Implementing Quality of Service (QoS) policies or upgrading network infrastructure could mitigate this risk.
5. **Reliance on Technicians' Office**: The technicians' office serves as a critical hub for network access and maintenance tasks. If this area experiences downtime or operational issues, it could impact the entire network's functionality. Ensuring redundancy and backup options for essential services in this office would enhance reliability.
6. **Limited Office Storage Access**: The storage space office in the upper left corner does not require network access. However, if future requirements change, implementing network connectivity in this area may involve additional costs and infrastructure adjustments.

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Remote connection

No solution for a virtual office environment was implemented, but the network's scalability allows for such a system to be implemented without many issues.

Some options include:

1. Virtual Private Network (VPN) Solution:

- A VPN solution allows remote users to securely access the company's network resources over the internet. This is achieved by establishing encrypted tunnels between the remote device and the corporate network.
- New Device: VPN Concentrator or VPN Server: This device manages incoming VPN connections from remote users and facilitates secure access to internal resources.
- Setup: Configure the VPN concentrator/server to authenticate remote users, establish secure VPN tunnels, and enforce access policies. Clients on remote devices will need to install VPN client software and authenticate with credentials provided by the company.

2. Virtual Desktop Infrastructure (VDI):

- VDI enables users to access their desktop environment and applications from any device with an internet connection. Instead of running applications locally, users connect to virtual machines hosted on servers in the data centre.
- New Device: VDI Server Infrastructure: This includes servers hosting virtual desktops (VDIs) and management software for provisioning and managing virtual desktops.
- Setup: Deploy virtualization software (e.g., VMware Horizon, Citrix Virtual Apps and Desktops) to create and manage virtual desktops. Users access their virtual desktops through a VDI client installed on their devices, which connects to the VDI infrastructure over the network.

3. Cloud-Based Collaboration Tools:

- Cloud-based collaboration platforms such as Microsoft 365 (formerly Office 365), Google Workspace, or Slack provide tools for communication, document collaboration, and project management.
- New Device: No additional hardware is required for cloud-based collaboration tools. However, users need internet access and appropriate licenses to use these services.
- Setup: Subscribing to a cloud-based collaboration service and configuring user accounts allows users to access collaboration tools from anywhere with an internet connection.

4. Remote Access VPN for Technicians:

- Since technicians may need to remotely access servers and network infrastructure from outside the office, a dedicated remote access VPN solution can be implemented.
- New Device: Remote Access VPN Concentrator or Firewall with VPN capabilities.
- Setup: Configure the remote access VPN concentrator/firewall to allow technicians to securely connect to the corporate network using VPN clients. Implement multi-factor authentication and access controls to ensure security.

Impact on Current Situation:

- The addition of a virtual office environment introduces new requirements for network bandwidth, security, and management.

- Increased Traffic: VPN connections and virtual desktop sessions generate additional network traffic, which may require bandwidth upgrades or Quality of Service (QoS) policies to prioritize critical traffic.
- Security Considerations: Secure VPN protocols, strong authentication methods, and encryption must be implemented to protect data transmitted over the internet.
- Management Overhead: Deploying and managing new virtualization and collaboration solutions requires IT resources and expertise. Proper configuration and ongoing monitoring are essential to ensure performance and security.

Budget for network

Cisco Catalyst WS-C2960S-24PS-L 2960S 24 GigE PoE 370W, 4 x SFP LAN:

R3900 .00 x 2
https://www.takealot.com/cisco-catalyst-ws-c2960s-24ps-l-2960s-24-gige-poe-370w-4-x-sfp-l/PLID94604154?gclsrc=aw.ds&gad_source=4&gclid=CjwKCAjwupGyBhBBEiwA0UcqaH_M7gIBgDg5DybZziZrL493z1I-nfLfBUB1-Vwm5-zoERdexPq8HhoCQPwQAvD_BwE&gclsrc=aw.ds

CISCO CATALYST 2960 8P:

R 803.85 x 18

https://shop.partserve.co.za/product/view/CISCO+CATALYST+2960+8P+CISCO29608PR/m/28978?srsltid=AfmBOopNpFYqnoAfvcl-i0KKhRQoc830P7SpxzP50sVStZMTrWKsKLQzSaE

Linkbasic 500M Drum Cat6 Solid UTP Cable, UTP-6500:

R 4,850.00 x 2

https://server-warehouse.co.za/500m-drum-cat6-solid-utp-cable.html?gad_source=1&gclid=CjwKCAjwupGyBhBBEiwA0UcqaCeR8JxxaBomaQ084Xx3_EuweSry-9z_af7L7EwAMr6Xr9gh9UOJIxoCtW8QAvD_BwE

TP-Link 300Mbps Wireless N Access Point | TL-WA801N:

R363.55 x 24

https://global.microless.com/product/tp-link-300mbps-wireless-n-access-point-tl-wa801n/?currency=usd

R 2 (3900) + R 18(R803.85) + R 2(4850) + R 24(363.55)

R7800.00 + R14 469.30 + R9700.00 + R8725.20

= R40 694.5

Labour:

https://mybroadband.co.za/forum/threads/cable-installation-cost.904638/

R600 p/h
~50 hours of work: 50 x 600 = R30 000

Total cost = R40 694.50 + R30 000.00

= R70 694.50

Cisco Catalyst WS-C2960S-24PS-L Switch (x2):

Price: R3900 x 2 = R7800

Performance: This switch offers 24 Gigabit Ethernet ports with Power over Ethernet (PoE) support, providing sufficient connectivity and power for devices such as IP phones, access points, and surveillance cameras.

Scalability: With 24 ports, this switch can accommodate a reasonable number of devices. It also has four SFP (Small Form-factor Pluggable) ports for uplink connectivity, allowing for expansion or connection to other switches.

Cisco Catalyst 2960 8P Switch (x18):

Price: R803.85 x 18 = R14,469.30

Performance: While these switches have fewer ports (8 ports), they still provide Gigabit Ethernet connectivity and PoE support. They are suitable for connecting devices in smaller rooms or areas.

Scalability: By deploying multiple switches across different rooms, the network can scale horizontally to accommodate more devices or rooms as needed.

Linkbasic Cat6 UTP Cable (2 x 500m drums):

Price: R4850 x 2 = R9700

Performance: Cat6 cables offer high-speed data transmission suitable for Gigabit Ethernet networks, ensuring reliable connectivity between devices.

Scalability: The 500m drums provide ample cable length for wiring multiple rooms or areas within the building. Additional drums can be added if further expansion is required.

TP-Link 300Mbps Wireless N Access Point (x24):

Price: R363.55 x 24 = R8725.20

Performance: These access points offer wireless connectivity at up to 300Mbps, suitable for basic internet access and wireless device connectivity.

Scalability: By deploying multiple access points throughout the building, coverage can be extended, and more users/devices can connect to the network wirelessly.

Considering the prices and the performance of these components, they offer a balance between affordability and functionality for building a network infrastructure. Additionally, the scalability provided by the switches and cables allows for future expansion as the organization grows or network requirements change.

Regarding labour costs, hiring a professional at R600 per hour for approximately 50 hours of work ensures the network is installed correctly and efficiently, minimizing downtime and potential issues.

Overall, while the initial investment may seem significant, the chosen components offer a robust and scalable network infrastructure that meets the organization's requirements for connectivity, performance, and reliability.

Reflection on Packet Tracer Network

FC, Carla, and Kayla worked on the designing the network topology in Cisco Packet tracer. It took some time to get to know Cisco, and how it works, but by using tutorials and YouTube videos, we figured it out. Designing the topology allowed us to apply theory knowledge that we've learnt through out the semester in CMPG 315 to design out network, and this reinforced our understanding of the course's content.

One of the main things we struggled with was creating the office layout in Cisco Packet Tracer. We initially imported the network layout as a photo into Cisco, but it was too small and would have been difficult dragging all the devices into the different sections. After some time, we redesigned the layout in Draw.io and then imported that file into Cisco.

Other than that, the designing took some time, and it's proven to be a tedious task.

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Reflection on Messaging Application

At the beginning of the project, we had a React Firebase tech stack which we switched to Python because of ease of use and the large number of libraries that are available for use. The team used TKinter and CustomTKinter for the front end, which was easy to use and easy to learn. Our application had a frontend that used Tkinter and CustomTkinter and the backend used Firebase admin to make queries to the Firebase database which allows up to 50,000 reads per day. Due to Firebase being owned by Google, it has a very secure encryption system using private and public keys. The most difficult part of the project was to get the listener to work this took us a few days to figure out, but the team got there in the end with hard work. The Team has learned a lot of new code and ways to approach difficult situations using problem-solving skills. After the project, the team would most likely use another tech stack for ease of use, because python is not made to be compiled the end program is very slow and takes a lot of time to read and write to the database.

Project timeline

February 28

Initial project meeting: Team members meet each other, and a general discussion takes place where project objectives, responsibilities, and rough deadlines are discussed.

March 5

Meeting: Each team member is expected to provide an explanation on the messaging application to demonstrate understanding.

March 15

Meeting: The individual Udemy courses are due. Team members are expected to provide constructive feedback on each reflection.

A general discussion should be held to resolve any challenges faced so far.

Each team member is expected to join the GitHub repository and familiarise themselves with push and pull request actions.

March 22

Meeting: Initial draft of the topological network design and messaging application design should be discussed.

Due date for the internal work ethic. Work ethic should be discussed, and feedback should be provided.

Draft timeline should be looked at and discussed.

April 3

Due date for final versions of each team members reflections, and the work ethic.

April 4

Submit draft versions of the reflections, timeline, and work ethic.

April 14

Progress meeting: General check up on everyone's progress. Look into any challenges found and attempt to resolve.

Discussions should take place regarding the current progress of the network topology as well as the messaging app design.

April 26

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Network topology draft version is due.

Meeting: Discussion regarding the network topology should take place. Final changes should be suggested.

April 29

Final version of the network topology is due.

May 3

Progress meeting: Progress on the messaging app development should be discussed. Changes should be suggested.

Check up if everyone is still happy with the progress made.

Network topology reflection should be discussed and drafted.

May 8

Draft version of messaging application is due.

Meeting: Discussion on the messaging application should take place. Changes should be suggested.

May 10

Final version of messaging application is due.

May 12

Progress meeting: Draft version of documentation is due. Draft version should be discussed, and any changes should be made in the meeting.

Messaging application reflection should be discussed and created.

May 14

Final version of documentation is due.

Presentation outline is due.

Meeting: Check if everything has been done for the project. Last changes to any work can be discussed and implemented.

May 15

Meeting: Presentation should be discussed and practiced.

May 16

Completion deadline.

Working procedure

Our group devised a meeting schedule to guarantee efficient communication and teamwork during the project. Every two weeks, we wanted to get together in person to talk about how everyone is progressing with each milestone and to address any new problems directly. In addition, we used Discord for in between meetings to address and problems that have arisen and needs to be taken care of immediately.

We also had a WhatsApp group with all the group members on to facilitate communication and the sharing of documents. It served as a hub for scheduling meetings.

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Continuous reporting

Meeting attendance

Date	Meeting Description	Attendance
March 5	Initial project meeting: General discussion of project objectives, responsibilities, and deadlines.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC
March 15	Each team member presents explanation on the messaging application.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC
March 22	Initial draft discussion of topological network design and messaging application design.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC
April 3	General check-up meeting and discussion on project progress.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC
April 14	Progress meeting discussing challenges and current network topology and app design progress.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC
April 26	Discussion regarding network topology and final changes.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC
April 29	Discussion regarding network topology and final changes.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC
May 3	Progress meeting discussing messaging app development progress and network topology reflection drafting.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC
May 8	Discussion on the messaging application and suggested changes.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC
May 12	Draft version of documentation discussion and messaging application reflection creation.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC
May 15	Presentation discussion and practice.	Joubert, Cally, Leece, Ruby, Carla, Kayla, Wian, FC

Meeting notes

1. **Initial Project Meeting (February 28):**
    - Introduction of team members and project objectives.
    - Discussion on responsibilities and deadlines.
    - Agreement on communication channels and meeting schedules.
    - Action items assigned for further planning.
2. **Meeting (March 5):**
    - Each team member presented on the messaging application.
    - Feedback provided on presentations.
    - General discussion to address challenges.
    - Reminder to join GitHub repository.

- Action items assigned for further development.

3. **Meeting (March 15):**
    - Individual Udemy courses due.
    - Constructive feedback provided on reflections.
    - General discussion to resolve challenges.
    - Reminder to join GitHub repository.
    - Action items assigned for collaboration.
4. **Meeting (March 22):**
    - Discussion on topological network and messaging app designs.
    - Internal work ethic discussed.
    - Draft timeline reviewed.
    - Agreement on next steps.
5. **Progress Meeting (April 14):**
    - Check-up on progress.
    - Challenges addressed.
    - Discussion on network topology and app design progress.
    - Agreement on adjustments.
6. **Meeting (April 26):**
    - Network topology draft version due.
    - Discussion on topology.
    - Final changes suggested.
7. **Progress Meeting (May 3):**
    - Discussion on messaging app development progress.
    - Suggestions for changes.
    - Check-in on team satisfaction.
    - Network topology reflection discussed.
8. **Meeting (May 8):**
    - Draft version of messaging application due.
    - Discussion on messaging app.
    - Suggested changes.
9. **Progress Meeting (May 12):**
    - Draft version of documentation due.
    - Discussion on documentation.
    - Messaging app reflection created.

10. **Meeting (May 14):**
    - Final version of documentation due.
    - Presentation outlines due.
    - Last-minute changes discussed.
11. **Meeting (May 15):**
    - Presentation discussed and practiced.

Responsibility assignments

Reflective essays – Each team member does it individually.

Timeline – Kayla

Cisco Packet Tracer (Network topology) – FC, Kayla, Carla

Messaging application coding – Leece, Cally, Ruby, Joubert, Wian.

Meeting minutes – FC

Documentation - Kayla

Presentation - Everyone

Task completion record

Reflective essays (everyone) – Done by 15 March

Timeline (Kayla) – Done by 4 April

Network topology (Kayla, FC, Carla) – Done by 29 April

Messaging application (Leece, Cally, Ruby, Joubert, Wian) – Done by 10 May

Documentation (Kayla) – Done by 15 May

Presentation preparation (Everyone) – Done by 15 May