

JIMMA INSTITUTE OF TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATICS

DEPARTEMENT OF INFORMATION SCIENCE

INTERNSHIP FINAL REPORT

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Company name JU ICT DO

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Duration of Internship Two Months

Jimma, Ethiopia

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EXECUTIVE SUMMARY

This report presents the internship project conducted at Jimma University, focusing on the design, configuration, and monitoring of a structured computer network using modern networking principles. The internship provided practical experience in planning, implementing, and testing, which improves connectivity, reliability, and scalability within the university environment. During the internship, I gained hands-on experience in network planning, subnetting, static routing, switch configuration, and VLAN management using simulation tools such as Cisco Packet Tracer. The project also emphasized the importance of network documentation. The internship helped bridge the gap between theoretical knowledge and practical application. It strengthened my technical skills, problem-solving ability, and understanding of enterprise network design. This experience enhanced my confidence in working with real-world networking systems and prepared me for future roles in network administration and IT infrastructure management.

ACKNOWLEDGMENT

I would like to sincerely thank the **Jimma University ICT Development Office (JU ICT DO)** for giving me the opportunity to complete my two-month internship. This experience allowed me to apply what I learned in class to real situations and helped me grow both technically and professionally. My special appreciation goes to **Mr. Dawit**, the supervisor of the ICT Development Office, for his guidance, support, and encouragement throughout my stay. I am also very grateful to **Mr. Ahmedin**, the Cisco Network lecturer and my mentor, for his valuable advice, technical assistance, and patience, which helped me successfully complete my project and understand networking concepts more deeply.

I would also like to extend my gratitude to the **Department of Information Science** at Jimma Institute of Technology for arranging this internship and giving me the chance to gain real-world experience. My heartfelt thanks go to **Yeshihareg temtim** my academic advisor, for her thoughtful guidance, follow-up, and feedback during the preparation of this report. Finally, I want to thank all the ICT staff and my friends for their cooperation, motivation, and support, which made my internship both productive and enjoyable.

LIST OF ACRONYMS/ABBREVIATIONS

JU Jimma University

ICT Information and Communication Technology

DO Development Office

LAN Local Area Network

VLAN Virtual Local Area Network

IP Internet Protocol

DHCP Dynamic Host Configuration Protocol

DNS Domain Name System

NTP Network Time Protocol

PC Personal Computer

TCP/IP Transmission Control Protocol / Internet Protocol



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1. INTRODUCTION

An internship is a period where students get the chance to experience real work life before graduation. It helps bridge the gap between what is learned in the classroom and what happens in the professional world. For many students, it's the first real opportunity to see how theories and concepts from school are applied to solve everyday problems. The internship program at Jimma University is designed to give students that kind of exposure practical experience that strengthens what we have already studied and helps us grow both technically and personally.

As part of my Computer Science program, I completed my internship from July 13 to August 31 at the Information and Communication Technology (ICT) Development Office of Jimma University. The ICT Development Office is the main department responsible for managing the university's network systems, servers, and communication infrastructure. It plays an important role in making sure that all campuses, offices, and departments stay connected and that digital services run smoothly.

During my internship, I was mainly involved in activities related to computer network design, configuration, and monitoring. I worked closely with ICT staff and participated in tasks such as configuring routers and switches, creating VLANs, assigning IP addresses, and using tools to monitor the performance and reliability of the network. I also helped in troubleshooting network problems and preparing documentation for configurations and addressing plans. These experiences gave me a clear picture of how large organizations manage their networks and the teamwork it takes to keep everything running properly.

Beyond the technical side, the internship taught me about the importance of communication, patience, and collaboration in a professional environment. I saw how technology supports every aspect of the university — from teaching and research to administration and student services. It was inspiring to see how the ICT team worked together to solve problems and make sure the system stayed reliable.

1.1.OBJECTIVE OF THE INTERNSHIP

1.1.1. GENERAL OBJECTIVE

Internships enable students to gain practical exposure and apply academic knowledge in a real organizational environment.

1.1.2. SPECIFIC OBJECTIVES

- ✓ Provide an opportunity to observe and participate in professional ICT operations.
- ✓ Develop the ability to apply classroom knowledge to practical situations.
- ✓ Improve technical skills in areas such as networking, system configuration, and monitoring.
- ✓ Build teamwork, communication, and problem-solving abilities.
- ✓ Foster professional ethics, discipline, and responsibility in a workplace setting.

1.2.SCOPE OF WORK

The internship was carried out in the Jimma University ICT Development Office (JU ICT DO), where I was involved in both technical and support activities related to network design, configuration, and monitoring.

- Network Configuration: Setting up routers, distribution switches, and access switches with VLANs, DHCP services, and routing protocols.
- Network Monitoring: Using monitoring tools to check connectivity, bandwidth usage, and device performance to ensure reliable communication.
- Troubleshooting and Maintenance: Assisting ICT staff in diagnosing and resolving network connectivity issues and performing regular maintenance tasks.
- Documentation: Preparing network diagrams, addressing plans, and configuration reports for future reference and improvement.

1.3.EXPECTED OUTPUTS

The internship was expected to result in the following outcomes

- ✓ To improve technical competence in network design, configuration, and monitoring.
- ✓ A comprehensive report documenting the work performed and knowledge gained.
- ✓ To enhance professional skills, including teamwork, communication, and time management.
- ✓ A better understanding of the structure and functions of the JU ICT Development Office.
- ✓ To increase readiness to work in real ICT environments after graduation.

1.4.BACKGROUND OF THE ORGANIZATION

Jimma University (JU) is one of the largest and most respected higher education institutions in Ethiopia. Established to promote excellence in teaching, research, and community service, the university plays a vital role in national development. It offers programs in various fields including science, technology, health, agriculture, business, and social sciences.

The ICT Development Office is one of the key administrative and technical departments of the university. It is responsible for planning, implementing, and maintaining the university's entire ICT infrastructure, including wired and wireless networks, servers, data centers, and digital communication systems. The office ensures that the university's academic and administrative operations run efficiently through reliable and secure ICT services.

1.5.MISSION OF THE ORGANIZATION

The mission of Jimma University is to provide quality education, conduct innovative research, and deliver community services that contribute to the social and economic development of Ethiopia.

The mission of the JU ICT Development Office aligns with this broader vision by striving to

- Provide reliable ICT services that support teaching, learning, and research.
- Ensure secure and efficient communication systems across all university campuses.
- Develop and maintain modern digital infrastructure to enhance productivity.
- Offer technical training and support to staff and students.

1.6.PRODUCTS AND SERVICES

The JU ICT Development Office offers a wide range of technical services, including

- Network design, installation, and maintenance for wired and wireless systems.
- Network monitoring and management to ensure continuous connectivity and performance.
- Server and data center management, including hosting and storage solutions.

- User support services, such as troubleshooting, software installation, and maintenance.
- ICT infrastructure planning and system upgrades to meet the university's growing needs.

I took a place within this office, where I was involved in network design, configuration, and monitoring activities aimed at improving the efficiency and reliability of Jimma University's ICT infrastructure.

2. SPECIFIC JOB INFORMATION

During my internship at the Jimma University ICT Development Office (JU ICT), I worked closely with the Network and Systems Administration Team, where I was involved in both technical operations and support activities. The internship offered me the opportunity to observe, learn, and participate in real-world ICT projects related to network configuration, monitoring, and troubleshooting.

2.1.MY ROLE

My role as an intern was to assist ICT professionals in daily network management and system support tasks. I participated in the configuration and maintenance of networking devices, contributed to monitoring ongoing network performance, and supported staff with connectivity-related issues. I was also encouraged to observe how new network infrastructures were designed and implemented for different university departments.

I served primarily as a technical assistant and trainee, learning how large-scale institutional networks are structured, secured, and maintained. Under the supervision of experienced ICT staff, I performed practical tasks and developed documentation for the work completed.

2.2.MY RESPONSIBILITIES

During my internship, I was assigned several responsibilities that strengthened my understanding of ICT operations

A. Technical Tasks and Responsibilities

- **Network Design and Configuration:** They gave us a project about Jimma university hospital network design which we were creating logical and physical network topologies using Cisco Packet Tracer. This included designing VLANs, assigning IP addresses, and configuring routers and switches.

- **Network Monitoring:** Participated in setting up and using network monitoring tools to check device status, bandwidth usage, and performance metrics. This provided insight into how administrators maintain stable network operation and detect faults early.
- **Troubleshooting and Maintenance:** Helped resolve connectivity issues and tested various network setups to ensure reliability. This involved verifying connections, checking switch interfaces, and identifying configuration errors.
- **Documentation and Reporting:** Recorded configuration details, addressing plans, and network diagrams for proper documentation. This improved my understanding of the importance of maintaining accurate technical records.

B. Other Responsibilities

In addition to technical tasks, I was also involved in

- Participating in team meetings and daily briefings to understand project goals, ongoing challenges, and progress updates.
- Learning ICT work ethics, such as punctuality, communication, and respecting data security and privacy policies.
- Observing workflow coordination, understanding how team members collaborate in managing different university campuses and departments.

2.3. OTHER RESPONSIBILITIES

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- Learning ICT work ethics, such as punctuality, communication, and respecting data security and privacy policies.

- Observing workflow coordination, understanding how team members collaborate in managing different university campuses and departments.

2.4.SKILLS AND KNOWLEDGE GAINED

The internship provided valuable exposure to professional ICT operations and helped me strengthen both my technical and soft skills.

Technical Skills Gained

- ✓ Practical experience in VLAN design, IP addressing, and router/switch configuration.
- ✓ Improved understanding of network protocols such as TCP/IP, DHCP, and static routing.
- ✓ Hands-on experience with network monitoring tools and interpreting performance data.
- ✓ Gained knowledge of troubleshooting methods, system documentation, and configuration management.

Professional and Soft Skills Gained

- ✓ Developed better teamwork and communication skills through collaboration with ICT staff.
- ✓ Learned time management and work discipline, ensuring punctuality and consistent progress.
- ✓ Strengthening problem-solving skills by analyzing and resolving technical issues efficiently.

2.5.APPLICATION OF COURSEWORK KNOWLEDGE

The knowledge gained from my university coursework was very useful during my internship. Courses such as Computer Networks, Operating Systems, Database Systems, and Network Security provided the foundational understanding I needed to perform my duties effectively.

- ✓ From Computer Networks, I applied concepts like subnetting, VLANs, and routing protocols.

- ✓ From Operating Systems, I used some command-line tools for network configuration and management.

2.6.PROBLEMS IDENTIFIED DURING THE INTERNSHIP

During my internship at the Jimma University ICT Development Office, I encountered several challenges that affected the smooth completion of some tasks

1. Short Internship Duration

The allocated time for the internship was too short to fully explore all technical areas and complete detailed practical projects.

2. Funding from the University

the funding for internship was too late and not enough for covering all mine expense.

3. Restricted Access to Detailed Information

As an intern, I did not always receive permission to view sensitive or detailed system configurations, which limited my understanding of some internal processes.

3. ACCOMPLISHMENT

During my internship at the Jimma University ICT Development Office (JU ICT DO), I accomplished several important tasks that allowed me to apply the concepts I learned in class to real networking projects. The focus of my work was on network design, configuration, and monitoring for a structured and efficient campus network.

3.1. PROJECT COMPLETED

One of my biggest accomplishments was successfully helping to design and configure a hierarchical network topology that included a Core router, two distribution switches (DS01 and DS02), and two access switches. I was involved in configuring VLANs for different departments such as ICT, Finance, HR, and Sales. Each VLAN was assigned to a specific department, which improved segmentation and security within the network.

I configured routers and switches with various settings such as hostnames, passwords, domain names, and NTP synchronization. I also worked on VLAN creation, trunk port setup, and static routing to enable communication between departments through the core router. Additionally, I set up DHCP services on distribution switches to automatically assign IP addresses to end devices in each subnet.

Another major accomplishment was implementing and testing a network monitoring setup to check device performance, uptime, and bandwidth utilization. This gave me valuable experience in understanding how monitoring systems help detect and solve network problems efficiently.

I also assisted in configuring access ports for different types of devices including computers, wireless access points, and IP phones ensuring that data, voice, and wireless VLANs were properly assigned and secured with port security features.

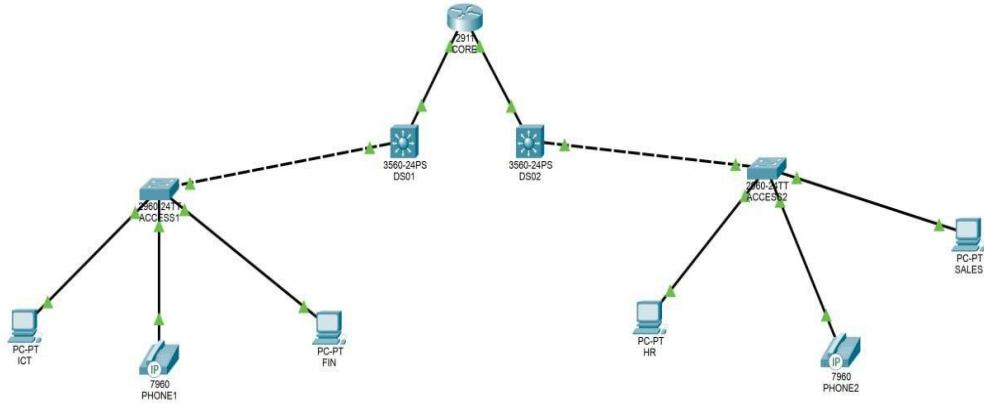


Figure 1:hierarchical network topology

```

DS01>enable
Password:
DS01#show vlan brief
-----  

VLAN Name          Status    Ports
-----  

1     default       active    Gig1/0/4, Gig1/0/5, Gig1/0/6, Gig1/0/7  

                   active    Gig1/0/8, Gig1/0/9, Gig1/0/10, Gig1/0/11  

                   active    Gig1/0/12, Gig1/0/13, Gig1/0/14, Gig1/0/15  

                   active    Gig1/0/16, Gig1/0/17, Gig1/0/18, Gig1/0/19  

                   active    Gig1/0/20, Gig1/0/21, Gig1/0/22, Gig1/0/23  

                   active    Gig1/0/24, Gig1/1/1, Gig1/1/2, Gig1/1/3  

                   active    Gig1/1/4  

10    ICT-Data      active
11    Finance        active
20    Voice           active
30    Wireless        active
99    Management      active
999   Native          active
1002  fddi-default   active
1003  token-ring-default active
1004  fddinet-default active
1005  trnet-default   active
DS01#show ip interface brief
-----  

Interface      IP-Address      OK? Method Status      Protocol
GigabitEthernet1/0/1  172.16.254.2  YES manual up        up
GigabitEthernet1/0/2  unassigned    YES unset up        up
GigabitEthernet1/0/3  unassigned    YES unset up        up
GigabitEthernet1/0/4  unassigned    YES unset down      down
GigabitEthernet1/0/5  unassigned    YES unset down      down
GigabitEthernet1/0/6  unassigned    YES unset down      down
GigabitEthernet1/0/7  unassigned    YES unset down      down
GigabitEthernet1/0/8  unassigned    YES unset down      down
GigabitEthernet1/0/9  unassigned    YES unset down      down
GigabitEthernet1/0/10 unassigned    YES unset down      down
GigabitEthernet1/0/11 unassigned    YES unset down      down
GigabitEthernet1/0/12 unassigned    YES unset down      down
GigabitEthernet1/0/13 unassigned    YES unset down      down
GigabitEthernet1/0/14 unassigned    YES unset down      down
GigabitEthernet1/0/15 unassigned    YES unset down      down
GigabitEthernet1/0/16 unassigned    YES unset down      down

```

Figure 2:vlan

```

GigabitEthernet1/0/15 unassigned YES unset down down
GigabitEthernet1/0/16 unassigned YES unset down down
GigabitEthernet1/0/17 unassigned YES unset down down
GigabitEthernet1/0/18 unassigned YES unset down down
GigabitEthernet1/0/19 unassigned YES unset down down
GigabitEthernet1/0/20 unassigned YES unset down down
GigabitEthernet1/0/21 unassigned YES unset down down
GigabitEthernet1/0/22 unassigned YES unset down down
GigabitEthernet1/0/23 unassigned YES unset down down
GigabitEthernet1/0/24 unassigned YES unset down down
GigabitEthernet1/1/1 unassigned YES unset down down
GigabitEthernet1/1/2 unassigned YES unset down down
GigabitEthernet1/1/3 unassigned YES unset down down
GigabitEthernet1/1/4 unassigned YES unset down down
Vlan1 unassigned YES unset administratively down down
Vlan10 172.16.10.1 YES manual up up
Vlan11 172.16.11.1 YES manual up up
Vlan20 172.16.20.1 YES manual up up
Vlan30 172.16.30.1 YES manual up up
Vlan99 172.16.99.2 YES manual up up
Vlan999 unassigned YES unset up down
DS01#show interface trunk
Port Mode Encapsulation Status Native vlan
Gig1/0/2 on 802.1q trunking 999
Gig1/0/3 on 802.1q trunking 999

Port Vlans allowed on trunk
Gig1/0/2 10-11,20,30,99
Gig1/0/3 10-11,20,30,99

Port Vlans allowed and active in management domain
Gig1/0/2 10,11,20,30,99
Gig1/0/3 10,11,20,30,99

Port Vlans in spanning tree forwarding state and not pruned
Gig1/0/2 10,11,20,30,99
Gig1/0/3 10,11,20,30,99

```

Figure 3:interface trunk

```

DS01#show running-config
Building configuration...

Current configuration : 3183 bytes
!
version 16.3.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname DS01
!
!
enable secret 5 $1$SmERr$6TOTcdccAsRgjFhWdKotY1
enable password 7 080D6B60
!
!
ip dhcp pool ICT-Data
 network 172.16.10.0 255.255.255.0
 default-router 172.16.10.1
 dns-server 8.8.8.8
ip dhcp pool Finance
 network 172.16.11.0 255.255.255.0
 default-router 172.16.11.1
ip dhcp pool Voicel
 network 172.16.20.0 255.255.255.0
 default-router 172.16.20.1
 option 150 ip 172.16.99.10
ip dhcp pool Voice
 network 172.16.20.0 255.255.255.0
 default-router 172.16.20.1
ip dhcp pool Wireless
 network 172.16.30.0 255.255.255.0
 default-router 172.16.30.1
ip dhcp pool Management
 network 172.16.99.0 255.255.255.0
 default-router 172.16.99.1
ip dhcp pool ICT
 network 172.16.10.0 255.255.255.0
 default-router 172.16.10.1

```

Figure 4: configuration

```

interface GigabitEthernet1/0/1
no switchport
ip address 172.16.254.2 255.255.255.252
duplex auto
speed auto
!
interface GigabitEthernet1/0/2
switchport trunk native vlan 999
switchport trunk allowed vlan 10-11,20,30,99
switchport mode trunk
!
interface GigabitEthernet1/0/3
switchport trunk native vlan 999
switchport trunk allowed vlan 10-11,20,30,99
switchport mode trunk
!
interface GigabitEthernet1/0/4
!
interface GigabitEthernet1/0/5
!
interface GigabitEthernet1/0/6
!
interface GigabitEthernet1/0/7
!
interface GigabitEthernet1/0/8
!
interface GigabitEthernet1/0/9
!
interface GigabitEthernet1/0/10
!
interface GigabitEthernet1/0/11
!
interface GigabitEthernet1/0/12
!
interface GigabitEthernet1/0/13
!
interface GigabitEthernet1/0/14
!
interface GigabitEthernet1/0/15
!
interface GigabitEthernet1/0/16
!
```

Figure 5:configuration

```

!
!
interface GigabitEthernet1/1/1
!
interface GigabitEthernet1/1/2
!
interface GigabitEthernet1/1/3
!
interface GigabitEthernet1/1/4
!
interface Vlan1
no ip address
shutdown
!
interface Vlan10
mac-address 0002.4a53.7301
ip address 172.16.10.1 255.255.255.0
!
interface Vlan11
mac-address 0002.4a53.7302
ip address 172.16.11.1 255.255.255.0
!
interface Vlan20
mac-address 0002.4a53.7303
ip address 172.16.20.1 255.255.255.0
!
interface Vlan30
mac-address 0002.4a53.7304
ip address 172.16.30.1 255.255.255.0
!
interface Vlan99
mac-address 0002.4a53.7305
ip address 172.16.99.2 255.255.255.0
!
interface Vlan999
mac-address 0002.4a53.7306
no ip address
!
ip default-gateway 172.16.99.2
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.254.1
!
```

Figure 6:configuration

```

DS01#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is 172.16.254.1 to network 0.0.0.0

  172.16.0.0/16 is variably subnetted, 6 subnets, 2 masks
C    172.16.10.0/24 is directly connected, Vlan10
C    172.16.11.0/24 is directly connected, Vlan11
C    172.16.20.0/24 is directly connected, Vlan20
C    172.16.30.0/24 is directly connected, Vlan30
C    172.16.99.0/24 is directly connected, Vlan99
C    172.16.254.0/30 is directly connected, GigabitEthernet1/0/1
S*   0.0.0.0/0 [1/0] via 172.16.254.1

DS01#show ip dhcp binding
IP address      Client-ID/          Lease expiration      Type
                  Hardware address
172.16.11.2     0090.0CE6.3793    --                  Automatic
172.16.20.3     000A.F3A6.D31B    --                  Automatic
172.16.20.2     0002.17AB.1BE1    --                  Automatic
172.16.30.2     0010.114E.826A    --                  Automatic

```

Figure 7:IP route

3.2.Task not completed

- Advanced security features (ACLs, firewall configuration).
- Full wireless network deployment.
- Implementation enterprise monitoring tools due to time and resource constraints.

4. REFLECTION

4.1. HOW THE INTERNSHIP FIT MY CAREER GOALS

This internship strongly aligned with my career goals of becoming a skilled network and systems administrator. Working in the Jimma University ICT Development Office gave me firsthand experience in the areas I am most passionate about network design, configuration, and monitoring. It allowed me to apply the theoretical concepts learned in my coursework to real technical environments, improving my ability to troubleshoot, plan, and maintain network systems. The experience confirmed my interest in pursuing a career in computer networking and IT infrastructure management.

4.2. CAREER GOALS AFTER THE INTERNSHIP

My career goals have not changed but rather become clearer and more focused because of this internship. I have developed a stronger desire to specialize in network engineering and cybersecurity. The internship made me realize that continuous learning and certification in these fields (such as CCNA, Network+, or CompTIA Security+) would further enhance my professional competence and career opportunities.

4.3. VALUE OF THE INTERNSHIP EXPERIENCE

This internship was extremely valuable both academically and professionally. It helped bridge the gap between classroom theory and practical application, giving me confidence in handling real-world ICT challenges. I learned the importance of teamwork, communication, documentation, and accountability in a professional setting. Additionally, working under experienced ICT professionals exposed me to modern technologies, monitoring systems, and best practices in network management.

4.4.CHALLENGES FACED DURING THE INTERNSHIP

During my internship, I encountered several challenges that tested my adaptability and problem-solving abilities

- Limited equipment and resources when performing certain configurations or tests.
- Network downtime and connectivity issues, which sometimes delayed progress and required troubleshooting.
- Time management difficulties when balancing multiple assignments and documentation tasks.
- Technical complexity of some configurations, which required additional learning and assistance from supervisors.

4.5.STRENGTHS AND AREAS FOR IMPROVEMENT (SELF-EVALUATION)

Strengths

- Strong commitment to completing assigned tasks responsibly and on time.
- Good teamwork and communication skills when collaborating with ICT staff.
- Positive attitude toward challenges and a strong willingness to learn.

Areas for Improvement

- Need to improve documentation skills by writing more detailed technical notes.
- Enhance scripting and automation skills for future network monitoring tasks.
- Learning and developing designing and configuring networks.
- Continue developing deeper knowledge in network security and cloud systems.

5. CONCLUSION

The internship at the Jimma University ICT Development Office was a valuable learning experience that significantly enhanced my understanding of computer networks and information systems. It allowed me to apply the theoretical knowledge gained from my coursework to practical, real-world situations.

Through my involvement in network design, configuration, and monitoring, I gained essential technical skills, improved my problem-solving ability, and learned how to work efficiently as part of a professional team. The internship also helped me appreciate the importance of proper network documentation, security, and performance monitoring in maintaining a reliable ICT environment.

In conclusion, this internship has prepared me for my future career in the ICT field by providing the skills, discipline, and professional exposure necessary to succeed in technology-driven workplaces.

6. RECOMMENDATIONS

6.1. Recommendations For Future Interns

For future software engineering and computer science interns, I recommend

- Start preparing early by reviewing core networking, operating systems, and database concepts before the internship begins.
- Be proactive and curious ask questions, observe how things work, and take initiative to assist in ongoing tasks.
- Document everything you do keeping notes of commands, configurations, and procedures helps in learning and future reference.
- Learn teamwork and communication, as these soft skills are just as important as technical knowledge.
- Use the opportunity to network professionally, build relationships with mentors, and seek feedback on your performance.

6.2. Recommendations For Improving the Internship Program

- Provide more structured orientation sessions at the beginning to help interns quickly understand the office workflow and tools used.
- Increase access to modern equipment and updated network devices for practical learning.
- Offer continuous feedback sessions to evaluate progress and identify areas of improvement.

REFERENCE

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