INTERNSHIP AFFILIATION REPORT ON

Network Administration, IT Support and System Administration: Internship Experience at Palli Karma-Sahayak Foundation

An Internship Report Presented to

Department of Computer Science

Faculty of Science and Technology

American International University-Bangladesh

And Palli Karm-Sahayak Founation

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science in Computer Science and Engineering

Supervised By

Engr. Md. Sohel Rana

Submitted By

MD. MAHMUDUL HASAN

STUDENT ID: 22-46256-1

Semester: Spring 2025-2026

Palli Karm-Sahayak Founation

American International University-Bangladesh

LETTER OF SUBMITTAL

To,
Information Technology and Digital Solutions Department (ITDSD)
Palli Karma-Sahayak Foundation (PKSF)

I am pleased to submit my internship report titled "Internship at Palli Karma Sahayak Foundation" as a requirement for the Bachelor of Science in Computer Science and Engineering program at AIUB. This report presents the work I have completed and the experience I gained during my internship period.

I completed my internship at PKSF under the Information Technology and Digital Solutions Department (ITDSD). I would like to express my sincere gratitude to Department of Computer Science for its consistent support throughout my academic journey, my organization supervisor Engr. Md. Sohel Rana and the ITDSD team for their valuable guidance, support and cooperation throughout my internship.

This report highlights my activities in networking, system administration, monitoring tools and end user support, along with the knowledge I acquired and the challenges I faced while adapting to a professional environment. I have tried my best to present my learning and experience clearly and sincerely.

Sincerely,

MD. MAHMUDUL HASAN
Id: 22-46256-1

CERTIFICATE OF APPROVAL

This document serves as an official proof that Md. Mahmudul Hasan, under my direction, completed the internship at Palli Karma-Sahayak Foundation and prepared a report entitled "**Network Administration, IT Support and System Administration: Internship Experience at Palli Karma-Sahayak Foundation**" in partial fulfillment of the requirements for the degree Bachelor of Science in Computer Science and Engineering from American International University Bangladesh. To the greatest of my knowledge, this document has not been presented elsewhere and has been compiled with honesty and attention by Md. Mahmudul Hasan.

Supervisor

Engr. Md. Sohel Rana

Deputy Manager (IT)

System Administration and Maintenance,

Information Technology and Digital Solutions Department,

Palli Karma-Sahayak Foundation

PKSF Bhaban-1, Plot: E-4/B, Agargaon Administrative Area,

Sher-e-Bangla Nagar,

Dhaka-1207, Bangladesh

ACKNOWLEDGEMENT

First of all, I would like to express my gratitude to Almighty Allah for giving me the strength and opportunity to successfully complete my internship and prepare this report.

I would like to sincerely thank the **Faculty of Science & Technology**, American International University-Bangladesh (AIUB), for including internship as a part of the academic curriculum, which provides students with the opportunity to gain real-world experience and practical knowledge.

I am especially grateful to my organization, **Palli Karma-Sahayak Foundation (PKSF)**, for giving me the opportunity to complete my internship in the **Information Technology and Digital Solutions Department (ITDSD)**. This experience allowed me to gain valuable exposure to professional IT operations and organizational working environments.

I would like to express my heartfelt thanks to my industry supervisor **Engr. Md. Sohel Rana** and all the respected members of the ITDSD team for their continuous guidance, support and encouragement throughout my internship. Their practical insights and professional advice helped me understand technical concepts more clearly and improved my confidence in working in a real environment.

I am also thankful to **Faculty of Science & Technology & Office of Placement & Alumni** for providing guidance and direction in preparing this internship report.

Finally, I would like to thank all the individuals who directly or indirectly helped me during my internship and in completing this report.

TABLE OF CONTENTS

TOPICS	Page
I. Title Page	1
II. Letter of Submittal	2
III. Certificate of Approval	3
IV. Acknowledgement	4
V. Table of Contents	5
VI. List of Tables & Figures	6
1. Introduction	7
1.1 Rationale	
1.2 Background	
1.3 Objectives	
2. Activities	10
2.1 Work-Related	
2.1.1 Network Configuration	
2.1.2 Active Directory & Domain Controller (ADDC)	
2.1.3 DNS & DHCP	
2.1.4 Linux System Administration and Practical Usage	
2.1.5 Implementation of File Server (Samba)	
2.1.6 Web Server	
2.1.7 Email Server	
2.1.8 Nagios	
2.1.9 LibreNMS	
2.1.10 Website and Server Management Using Web Hosting Control Panel (aaPanel)	
2.1.11 Memory and Storage Management	
3. Constraints/Challenges	43
3.1 Identified/Observed in the Organization	
3.2 Academic Preparation	
3.3 Personal/Professional Skills	
4. Acquired Knowledge	47
4.1 Consequences to Organization	
4.2 Implications to University's Internship Program	
4.2.1 Practical Technical Exposure	
4.2.2 Workplace Readiness Skills	
4.2.3 Stronger Industry Integration	
4.2.4 Experience-Based Reflection	
4.3 Effects on Personal/Professional Skills	
4.3.1 Professional Communication	

4.3.2 Responsibility and Work Discipline	
4.3.3 Technical Awareness	
4.3.4 Adaptability	
4.3.5 Analytical Thinking	
4.3.6 Collaboration	
5. Concluding Statements	51
5.1 Summary	
5.2 Recommendations/Suggestions for Future Strategic Actions	
5.2.1 Organization	
5.2.2 University	
5.2.3 Personal/Professional	
6. Recommendation Letters	55
8. References	56

LIST OF TABLES & FIGURES

LIST OF TABLES	
Table 2.1.1: VLAN Allocation Table	14
Table 2.1.2: Sample IP Addressing Table	15
LIST OF FIGURES	
Figure 2.1.1.1: Basic Network Configuration	11
Figure 2.1.2.1: Server Manager Dashboard (ADDC)	17
Figure 2.1.3.1: DNS Server Configuration Showing the Forward Lookup Zone for pksf2.org.bd.	19
Figure 2.1.3.2: DHCP Scope Configuration Showing Automatic IP Address Allocation.	19
Figure 2.1.4.1: Linux File System Hierarchy	20
Figure 2.1.5.1: File Sharing Service Using Samba	23
Figure 2.1.8.1: Nagios Dashboard	31
Figure 2.1.9.1: LibreNMS Dashboard	34
Figure 2.1.9.2: LibreNMS Dashboard (specific device monitoring page)	35
Figure 2.1.10.1: aaPanel Dashboard	40

1. INTRODUCTION

1.1 Rationale

Internships are a great way to connect what I learn in the classroom to real world situations. Although the theoretical basis from a university program is important. Industry experience is crucial for gaining the knowledge and skills necessary to help navigate toward a successful profession. Internship is an integral part of the Bachelor of Science in Computer Science and Engineering (CSE) program at American International University Bangladesh (AIUB) and is required by the CSE program that is necessary to be done to prepare for a career. When students undertake an internship in an organization, they come across with the actual working environment which is a world apart from what they are being taught by the teachers.

I was inspired to apply for an internship at Palli Karma Sahayak Foundation (PKSF) due to my passion for computer networking and system administration. It was an admirable place to transform the concepts and theories. What I accumulated during my academic studies, practiced in reality. Especially in the sensitive field of system administration, network operations and management. The internship was crucial because it gave me first-hand experience of the difficulties and requirements to upkeep and configure an organization's computer systems, servers and networks.

In this report, I describe my internship experience by giving an account of the tasks, the technologies and tools I have used and the company's environment. It is a result of my dedication to meeting professional standards to sharpening my problem-solving techniques, and to gaining the kind of technical knowledge that network and administrative monitoring requires. The knowledge I acquired through this internship is extremely beneficial for my career growth. It has certainly deepened my understanding of technical and operational dimensions of the system administration and maintenance services.

1.2 Background

Palli Karma-Sahayak Foundation (PKSF) is one of the leading development institution in Bangladesh. It is established by government of Bangladesh to support poverty reduction, employment generation and sustainable socio-economic development through a wide network of partner organizations across the country. PKSF provides financial and non-financial services to underserved communities and plays a significant role in implementing development programs at the grassroots level. Over the years, the organization has expanded beyond traditional microfinance activities and incorporated innovation, digital systems, capacity development and data-driven management practices to improve efficiency and institutional effectiveness. Its structured organizational framework and growing emphasis on technology make it a highly relevant organization for internship learning and professional exposure.

A particularly important component of PKSF's operational structure is its Information Technology and Digital Solutions Department (ITDSD) which supports the technological backbone of the organization. The department is responsible for maintaining IT infrastructure, managing enterprise systems, supporting network operations, overseeing digital platforms, contributing to cybersecurity and system reliability. As PKSF increasingly adopts digital transformation initiatives, the role of ITDSD has become more critical in ensuring uninterrupted connectivity, secure data management, system integration and technology driven decision making. The department also supports digital platforms, internal portals, monitoring systems and evolving initiatives such as integrated decision support systems, which strengthen organizational coordination and operational transparency.

The role of ITDSD extends beyond technical support, as it contributes directly to the overall effectiveness of PKSF by enabling digital operations across departments and supporting the organization's long-term modernization goals. Through network administration, server management, system monitoring, cybersecurity practices and digital service management, the department helps ensure that PKSF's operational activities remain secure, efficient and resilient. Its functions are essential for supporting communication, safeguarding information assets, improving service delivery and sustaining the digital infrastructure required for a large and evolving institution like PKSF. For an intern, exposure to this department provides

valuable insight into how information technology supports not only organizational operations but also broader institutional and development objectives.

1.3 Objectives

The main objective of this internship report is to present a clear understanding of the practical knowledge and experience I gained while working in the Information Technology and Digital Solutions Department (ITDSD) at PKSF. This report focuses on how theoretical concepts from my academic studies were applied in a real organizational environment and how different IT systems support daily operations.

Specifically, the objectives of this report are to:

- Describe the practical implementation of core networking services such as Active Directory Domain Controller (ADDC), DNS and DHCP in an organizational environment.
- Explain the configuration and use of file sharing systems, particularly File Server using Samba and how they support data management and collaboration.
- Discuss the use of network monitoring tools such as Nagios and LibreNMS and their role in maintaining system performance and reliability.
- Highlight the importance of Linux-based systems, web servers and other infrastructure components used in daily IT operations.
- Explain the role of end user support and basic technical training in ensuring smooth workflow and improving user efficiency.
- Connect academic knowledge with real life practical experience and identify the differences between theoretical learning and professional practices.
- Reflect on the technical, professional and personal skills developed during the internship period.
- Provide suggestions based on my observations that may help improve both organizational practices and future internship experiences.

2. ACTIVITIES

This chapter describes the main activities I carried out during my internship at PKSF, particularly in the Information Technology and Digital Solutions Department (ITDSD). The work covered networking, system administration, IT infrastructure, user support, and other tasks that helped me understand how the department operates.

My work mainly involved observing, learning, and gradually taking part in technical tasks related to networking and system administration. This gave me a chance to apply concepts from my academic courses to actual IT operations.

2.1 Work-Related

Most of my work involved learning and observing technical activities related to networking and system administration.

2.1.1 Network Configuration

One of the first areas I have gained hands on experience was basic network configuration where I learned about IP addressing, network connectivity and how network devices such as switches and routers help maintain communication inside an organization as well as outside of the organization.

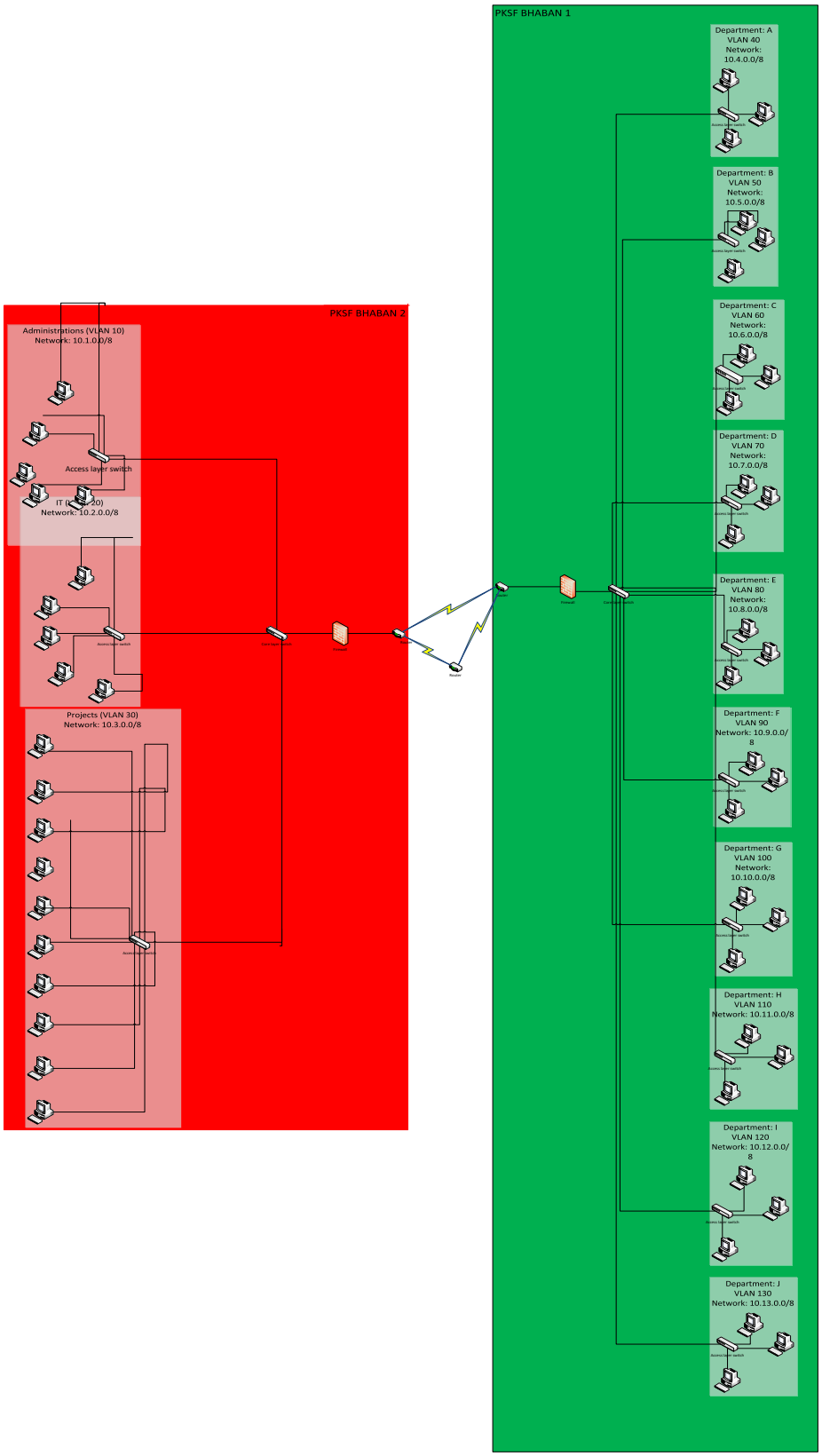

Figure 2.1.1.1: Basic Network Configuration

Inner Scope of the Network Infrastructure:

According to the dummy scenario which I have given to simulate, the inner scope of this network infrastructure focuses on the internal design and operation of the BHABAN 1 (AGARGAON) and BHABAN 2 (Shyamoli) of PKSF. It includes the deployment of access layer switches on each floor and department to connect end devices such as PCs, with proper VLAN configuration to logically separate departments while sharing the same physical hardware. Trunk links are configured between switches and routers to carry multiple VLAN. Inter-VLAN routing is implemented through router sub-interfaces, allowing devices from different departments and floors to communicate securely and efficiently. A structured IP addressing scheme is applied to each VLAN and default gateways are configured to ensure proper packet forwarding. Internal connectivity is verified through ping tests by confirming successful communication between all end devices across different VLANs within both offices.

Network Architecture Overview

The network infrastructure is designed using a hierarchical network model, where switching and routing devices are organized to support multiple departments and floors efficiently.

- The BHABAN 1 (AGARGAON) consists of:
    - 10 departments (Department A to Department J)
    - 100 employees
- The BHABAN 2 (Shyamoli) consists of:
    - 3 departments (Administrations, IT, Projects)
    - 30 employees

Both offices are interconnected using routers and dynamic routing is enabled using the Routing Information Protocol (RIP).

Networking Devices Used

Switches:

- Access Layer Switches are used on each floor and department to connect end devices such as PCs.
- Switches are configured to support Virtual Local Area Networks (VLANs).
- Each department is assigned a separate VLAN to:
    - Reduce broadcast traffic
    - Improve network performance
    - Enhance logical separation of departments

Key functions of switches in this network:

- VLAN creation and assignment
- Port-based VLAN configuration
- Trunk links for VLAN traffic forwarding

Routers:

- Routers are deployed at both the BHABAN 1 and BHABAN 2.
- They are responsible for:
    - Inter-VLAN routing
    - Inter-office communication
    - Running the RIP routing protocol

Key router functions:

- Routing traffic between VLANs
- Exchanging routing information dynamically using RIP
- Connecting the BHABAN 1 and BHABAN 2 networks

VLAN Design and Segmentation:

VLANs are implemented to logically separate departments while using the same physical infrastructure.

Location	Department	VLAN ID
BHABAN 1	Department A	VLAN 40
BHABAN 1	Department B	VLAN 50
BHABAN 1	Department C	VLAN 60
BHABAN 1	Department D	VLAN 70
BHABAN 1	Department E	VLAN 80
BHABAN 1	Department F	VLAN 90
BHABAN 1	Department G	VLAN 100
BHABAN 1	Department H	VLAN 110
BHABAN 1	Department I	VLAN 120
BHABAN 1	Department J	VLAN 130
BHABAN 2	Administrators	VLAN 10
BHABAN 2	IT	VLAN 20
BHABAN 2	Projects	VLAN 30

Table 2.1.1: VLAN Allocation Table

IP Addressing Scheme

A structured IP addressing scheme is used to avoid conflicts and support scalability.

VLAN ID	Network Address	Subnet Mask	Default Gateway
VLAN 10	10.1.0.0	255.0.0.0	10.1.0.1
VLAN 20	10.2.0.0	255.0.0.0	10.2.0.1
VLAN 30	10.3.0.0	255.0.0.0	10.3.0.1
VLAN 40	10.4.0.0	255.0.0.0	10.4.0.1
VLAN 50	10.5.0.0	255.0.0.0	10.5.0.1
VLAN 60	10.6.0.0	255.0.0.0	10.6.0.1
VLAN 70	10.7.0.0	255.0.0.0	10.7.0.1
VLAN 80	10.8.0.0	255.0.0.0	10.8.0.1
VLAN 90	10.9.0.0	255.0.0.0	10.9.0.1
VLAN 100	10.10.0.0	255.0.0.0	10.10.0.1
VLAN 110	10.11.0.0	255.0.0.0	10.11.0.1
VLAN 120	10.12.0.0	255.0.0.0	10.12.0.1
VLAN 130	10.13.0.0	255.0.0.0	10.13.0.1

Table 2.1.2: Sample IP Addressing Table

Inter-VLAN Routing:

- Inter-VLAN routing is performed using routers connected to switches via trunk links.
- Each VLAN has a corresponding router sub-interface configured with an IP address.
- The router sub-interface acts as the default gateway for devices within that VLAN.

This configuration enables communication between different departments and floors within the same office network.

2.1.2 Active Directory & Domain Controller (ADDC)

I worked with Active Directory Domain Services (ADDS) and Domain Controller configuration in a virtualized environment. Active Directory is commonly used to manage users, computers, devices, and network resources from a central location. It also helps administrators apply security policies and control access to organizational resources.

To begin the implementation, I downloaded the Windows Server 2019 ISO image and created a Virtual Machine at VMware Workstation with the following specifications:

- RAM: 16 GB
- Hard Disk: 500 GB
- Processor: 8 Cores
- Network Adapter Type: Bridged Adapter

Using the ISO file, I installed Windows Server 2019 and configured a static IP address (192.168.1.100) to ensure stable network communication. After the installation, I installed and configured the Active Directory Domain Services (ADDS) role and promoted the server to a Domain Controller.

During the configuration process, I created a new domain named pksf2.org.bd, with the NetBIOS Domain Name: PKSF2, and selected Windows Server 2019 as the Forest Functional Level. This established a centralized directory service environment for managing users and devices.

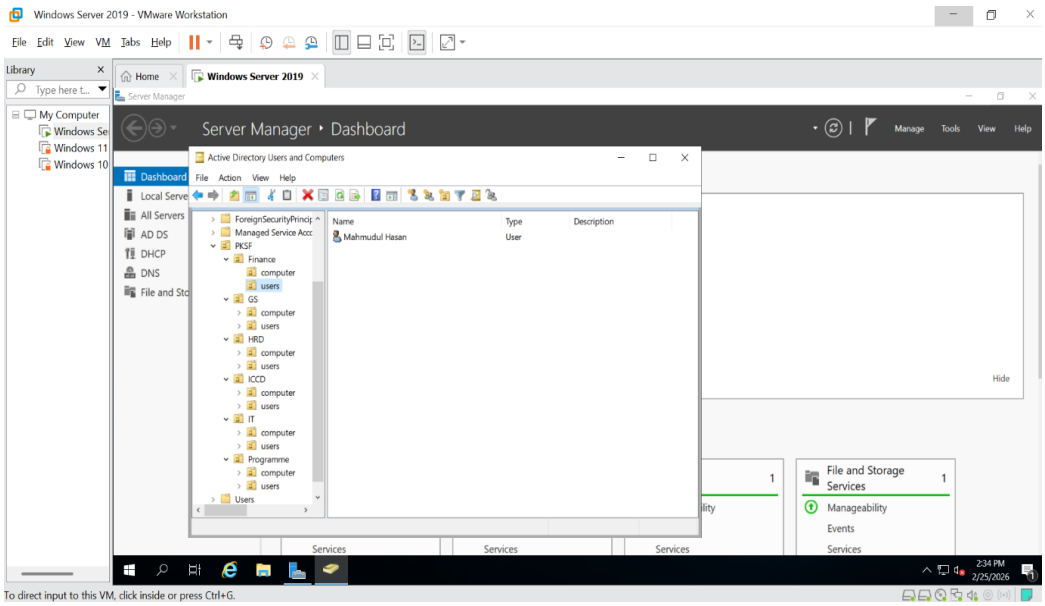

Figure 2.1.2.1: Server Manager Dashboard (ADDC)

To organize administrative management efficiently, I created several Organizational Units (OUs) including:

- Finance
- GS
- HRD
- ICCD
- IT
- Programs

Within these OUs, I created multiple user accounts and computer objects to simulate a real organizational structure. This hierarchical arrangement allows administrators to manage resources, permissions, and policies according to departmental requirements.

I also implemented Group Policy Objects (GPOs) to apply centralized configurations and security settings across users and computers. Group Policies are used to enforce organizational standards, improve security, restrict unauthorized actions, and ensure consistent system configurations throughout the domain environment. Through this activity, I learned how centralized management can simplify administration and enhance security in an enterprise network.

This hands-on experience provided me with a strong understanding of domain management, user administration, organizational structuring, and policy enforcement using Active Directory Domain Services.

2.1.3 DNS & DHCP

I worked with DNS (Domain Name System) and DHCP (Dynamic Host Configuration Protocol) on Windows Server 2019. These services are important for reliable network communication and for managing device connectivity in an organized way.
DNS is used to translate human-readable domain names into IP addresses, allowing users and computers to access network resources without memorizing numerical IP addresses. In an Active Directory environment, DNS plays a critical role because domain-joined computers use it to locate domain controllers, authenticate users, and access various network services. As part of my practical work, I configured the DNS Server role and gained experience in creating and managing DNS records. I also verified successful name resolution between servers and client machines within the domain environment.

DHCP is used to automatically assign IP addresses and other network configuration parameters, such as subnet masks, default gateways, and DNS server addresses, to client devices. This eliminates the need for manual network configuration on individual computers, reduces administrative effort, and prevents IP address conflicts. During the internship, I configured the DHCP Server role and created a DHCP scope to distribute IP addresses automatically to devices connected to the network.

After configuring both services, I tested and verified their functionality within the Active Directory domain environment. Client devices were able to obtain IP addresses automatically from the DHCP server and successfully communicate with domain resources through DNS name resolution. The integration of DNS and DHCP with Active Directory ensured smooth network operations, centralized administration, and efficient resource accessibility.

Through this hands-on experience, I developed practical skills in deploying, configuring, and managing DNS and DHCP services and gained a deeper understanding of their importance in enterprise network infrastructure.

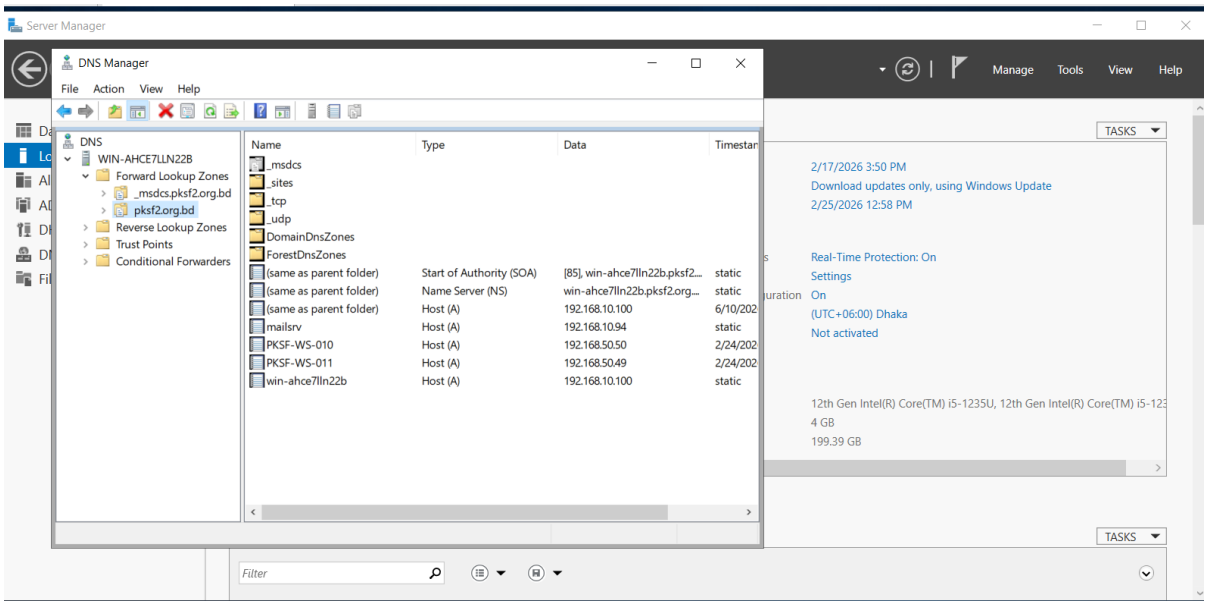

Figure 2.1.3.1: DNS Server Configuration Showing the Forward Lookup Zone for pksf2.org.bd.

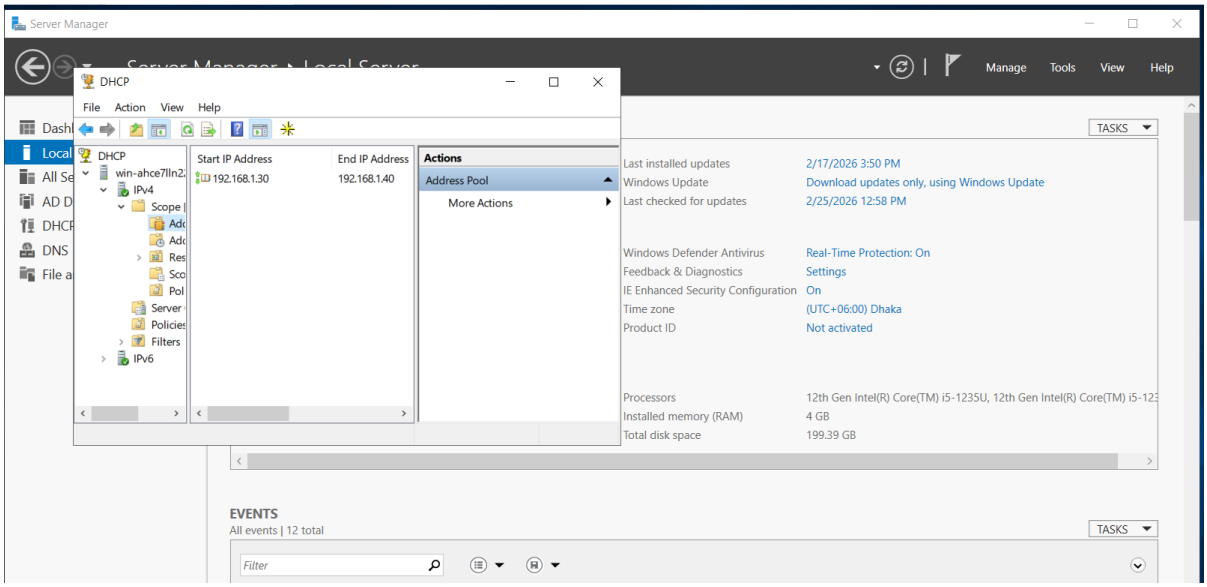

Figure 2.1.3.2: DHCP Scope Configuration Showing Automatic IP Address Allocation.

2.1.4 Linux System Administration and Practical Usage

I learned how Linux is structured and why it is widely used in enterprise environments. My work covered the Linux file system, its multi-user architecture, and the basic principles of managing files, processes, and system resources from the operating system.

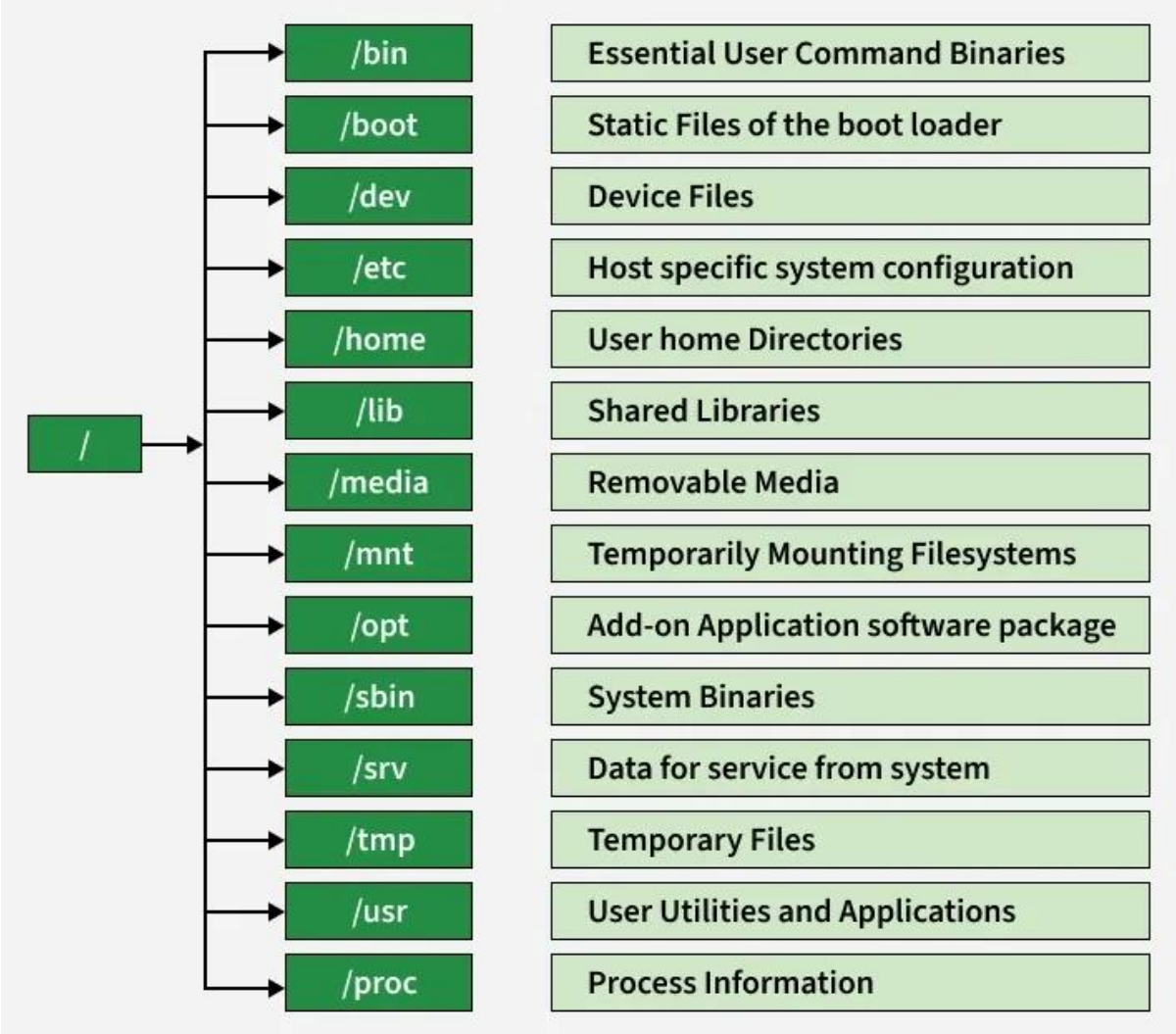

Figure 2.1.4.1: Linux File System Hierarchy

I also gained hands-on experience with the Linux command-line interface (CLI), which is a core part of system administration. I practiced essential commands for file and directory management, user creation, permission handling and system navigation. These activities

improved my confidence in working without a graphical interface and strengthened my ability to perform administrative tasks directly from the terminal.

In addition to general Linux usage, I applied my knowledge in practical office tasks such as disk management. I worked with checking disk usage, monitoring available storage and managing partitions. I also learned how to mount and unmount storage devices properly to ensure smooth system operation. These tasks helped me understand how storage resources are managed in real organizational systems to maintain efficiency and stability.

By the end of this work, I had a clearer idea of how Linux is used for server administration in a professional environment. It also improved my confidence with Linux-based systems and gave me a better foundation for future network and server management tasks.

2.1.5 Implementation of File Server (Samba)

I worked on deploying and configuring a File Server using Samba in a virtualized Linux environment. I created a virtual machine in VMware Workstation and installed Ubuntu Server 24.04 LTS. The VM was assigned 8 processor cores, 4 GB RAM, and 500 GB of storage. The network adapter was set to bridged mode so the server could communicate with client machines on the same network.

A File Server is a system that provides centralized storage and management of files over a network, allowing multiple users to access, upload, download, and share data securely. Samba is a widely used open-source implementation of the SMB/CIFS protocol that enables file sharing between Linux and Windows systems. File servers are essential in modern organizations as they support centralized data management, backup solutions, collaboration between departments, and controlled access to sensitive information. They are widely used in corporate offices, educational institutions, government organizations, data centers, and enterprise IT environments.

The configuration process began with updating system packages and ensuring network connectivity. The Samba service was installed using the Linux package manager and then

enabled to run at system startup. Necessary directories were created under the /srv/samba/ path to organize shared resources for different departments such as public, finance, and HR. Configuration and management tasks were performed using the vi editor, which allowed direct modification of system files from the terminal environment.

The Samba configuration file located at /etc/samba/smb.conf was edited to define shared resources, access permissions, and security settings. Each shared folder was configured with specific parameters such as path, browseability, read/write permissions, and user access restrictions. A public share was configured for general access, while department-specific shares (Finance and HR) were restricted to authorized users only. Linux users were created and mapped to Samba accounts to control authentication and access permissions.

After configuration, Samba users were assigned passwords using the smbpasswd command, and services were restarted to apply the changes. The configuration was validated using the testparm command to ensure there were no syntax errors. Network ports used by Samba (such as 137, 138, 139, and 445) were verified using the ss command, and firewall rules were adjusted to allow Samba traffic.

To test the functionality, shared folders were accessed from client machines using the SMB protocol. On Windows systems, the shared resources were accessed using the network path format \\server-ip or \\hostname, and successful file upload and download operations confirmed proper configuration.

Some of the major commands used during this configuration were:

```
apt update && apt upgrade -y
apt install samba -y
hostnamectl set-hostname fileserver
vi /etc/hosts
mkdir -p /srv/samba/public
mkdir -p /srv/samba/finance
mkdir -p /srv/samba/hr
chmod 777 /srv/samba/public
```

chmod 770 /srv/samba/finance /srv/samba/hr

vi /etc/samba/smb.conf

adduser financeuser

adduser hruser

smbpasswd -a financeuser

smbpasswd -a hruser

testparm

systemctl restart smbd

systemctl enable smbd

ss -tulnp | grep smbd

smbclient -L localhost

After completing the configuration, I had a better understanding of file server architecture, network file sharing, user authentication, and centralized data management. I also learned how Samba allows Linux and Windows systems to share files. The work improved my skills in Linux administration, access control, service configuration, and troubleshooting.

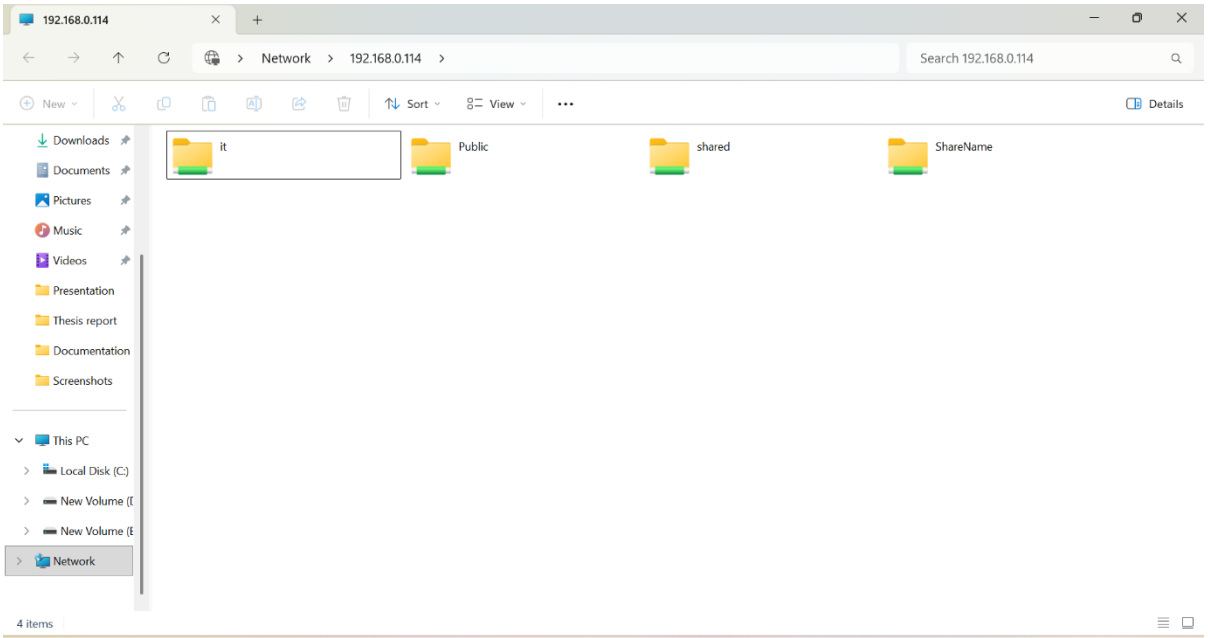

Figure 2.1.5.1: File Sharing Service Using Samba

2.1.6 Web Server

I also worked on a Web Server in a virtualized Linux environment. I created a virtual machine in VMware Workstation and installed Ubuntu Server 24.04 LTS. The VM used about 2 vCPUs, 4 GB RAM, and 40 GB of storage, with the network adapter configured in bridged or NAT mode. Apache HTTP Server (Apache2) was used for hosting the website, and I managed the configuration files with the vi editor.

A web server is a system that stores, processes, and delivers web content to users over a network using the HTTP and HTTPS protocols. It plays a vital role in modern information systems by hosting websites, web applications, portals, APIs, and online services. Web servers are widely used in corporate organizations, educational institutions, government agencies, e-commerce platforms, financial institutions, healthcare systems, and cloud computing environments to provide users with access to web-based resources and services.
The configuration process began with updating the operating system packages using the package management utilities and verifying network connectivity. A hostname was configured using the hostnamectl command, and the /etc/hosts file was modified to ensure proper hostname resolution within the network environment. After preparing the system, the Apache2 web server package was installed and configured. The Apache service was started and enabled to launch automatically during system startup using the systemctl utility.

To host web content, a dedicated website directory was created under the /var/www/ location. A sample web page was developed using HTML and stored as an index.html file. A Virtual Host configuration file was then created within the Apache configuration directory to define the website's document root, server name, logging parameters, and access settings. After completing the configuration, the website was enabled and the default Apache site configuration was disabled to ensure that requests were directed to the newly configured website.

The Apache configuration was validated using the configuration testing utility before restarting the service. Firewall rules were configured to allow HTTP and HTTPS traffic, and network ports were verified to ensure that the web server was actively listening for incoming client

requests. Finally, the website was tested through a web browser using the server's IP address and hostname, confirming successful communication between the server and client systems.

Some of the major commands used during the web server configuration process were:

```
apt update
apt upgrade -y
hostnamectl set-hostname webserver
vi /etc/hosts
apt install apache2 -y
systemctl start apache2
systemctl enable apache2
systemctl status apache2
mkdir -p /var/www/mywebsite
vi /var/www/mywebsite/index.html
vi /etc/apache2/sites-available/mywebsite.conf
a2ensite mywebsite.conf
a2dissite 000-default.conf
apache2ctl configtest
systemctl restart apache2
ufw allow 80/tcp
ufw allow 443/tcp
ss -tulnp
```

After completing the web server setup, I understood more clearly how website hosting, virtual hosts, service management, and web content delivery work. I also gained more confidence with Linux server administration, network service deployment, and troubleshooting.

2.1.7 Email Server

I worked on deploying and configuring an Email Server in a virtualized Linux environment. The server used Ubuntu Server 24.04 LTS in VMware Workstation, with Postfix handling mail transfer and Dovecot providing IMAP and POP3 access. I edited the configuration files with the vi editor, which also gave me more practice with command-line administration.

An Email Server is a network service responsible for sending, receiving, storing and managing electronic mail communications. It plays a crucial role in organizational environments by enabling secure and efficient communication among employees, departments, clients and external organizations. Email servers are widely used in corporate offices, educational institutions, government agencies, financial organizations, healthcare systems, and service providers for exchanging official information and maintaining communication records.

The configuration process began with updating the operating system and setting a proper hostname for the server using the hostnamectl command. The /etc/hosts file was modified to ensure correct hostname resolution within the network. Postfix was then installed using the package manager and configured by editing the /etc/postfix/main.cf file. Parameters such as myhostname, mydomain, mydestination, mynetworks, and home_mailbox were configured to define the server identity, trusted networks, and mailbox storage location.

After configuring Postfix, Dovecot IMAP and POP3 services were installed to allow users to access their email messages. The Dovecot configuration files were modified to specify the Maildir mailbox format and authentication mechanisms. Following the configuration, both Postfix and Dovecot services were restarted and enabled to start automatically during system boot.

To verify the functionality of the mail server, user accounts were created using the adduser command, and mailbox directories were configured. The mailutils package was installed to facilitate email testing from the command line. Test emails were successfully sent and received between local users, demonstrating the proper operation of SMTP, IMAP, and POP3 services. Open service ports were verified using the ss -tulnp command, and firewall rules were configured where necessary to permit mail-related network traffic.

Some of the major commands used during this configuration were:

```
sudo apt update && sudo apt upgrade -y
sudo hostnamectl set-hostname mailserver
sudo vi /etc/hosts
sudo apt install postfix -y
sudo vi /etc/postfix/main.cf
sudo systemctl restart postfix
sudo apt install dovecot-imapd dovecot-pop3d -y
sudo vi /etc/dovecot/conf.d/10-mail.conf
sudo vi /etc/dovecot/conf.d/10-auth.conf
sudo systemctl restart dovecot
sudo adduser user1
sudo apt install mailutils -y
```

This work gave me a practical view of email server architecture, mail delivery, mailbox management, service configuration, and troubleshooting. It also improved my understanding of how Linux-based mail services can support communication in an organization.

Network Monitoring Using Nagios and LibreNMS:

I worked with Nagios and LibreNMS to understand how network administrators monitor servers, network devices, and services. Nagios provided an alert-based approach for checking system health, while LibreNMS offered a graphical view of device performance. Working with both tools helped me understand how monitoring supports day-to-day network administration.

2.1.8 Nagios

Nagios is a powerful open-source IT infrastructure monitoring system used for continuous monitoring of servers, network devices, applications and services. It works by executing periodic checks on defined hosts and services and generating alerts when any abnormal condition is detected. Nagios plays a critical role in modern IT environments by ensuring

system availability, performance monitoring and early detection of failures such as server downtime, high CPU usage, disk space issues, network connectivity problems and service crashes.

It is widely used in corporate IT infrastructures, data centers, cloud environments, banking and financial institutions, telecommunication networks, educational institutions, government IT systems and web hosting environments. Nagios enables administrators to maintain system reliability, reduce downtime and ensure uninterrupted service delivery to users.

My configuration process began with preparing the AlmaLinux operating system installed on a VMware virtual machine. The system was first updated to ensure all packages were current as well as essential development tools and dependencies were installed. Network connectivity was verified to ensure proper communication between the monitoring server and target devices. A hostname was configured using the 'hostnamectl' command and basic system resolution was ensured through appropriate network configuration.

After system preparation, the Nagios user and required groups were created to manage permissions securely. The Nagios Core and Nagios Plugins packages were downloaded from official sources, extracted and compiled manually on the system. During installation, Apache web server was installed and configured to provide access to the Nagios web interface. The Nagios service and Apache service were enabled and started using the system management utility so that they automatically run at system boot.

To configure monitoring, Nagios configuration files were edited using the vi editor. The main configuration file "nagios.cfg" was modified to include a dedicated directory for host configuration files. A new directory structure was created to organize monitored devices efficiently. Host and service definitions were then created using custom configuration files. Where IP addresses, host names and service checks such as PING and SSH were defined. These configurations allowed Nagios to continuously monitor system availability and service health.

After completing the configuration, the Nagios configuration was validated using the built-in verification command to ensure there were no syntax or logical errors. Once validated, the

Nagios service was restarted to apply the changes. Firewall rules were configured to allow HTTP traffic so that the Nagios web interface could be accessed from client machines over the network. The system was then tested successfully by accessing the web interface using the server's IP address.

Some of the major commands used during the Nagios configuration process were:

```
dnf update -y
dnf install epel-release -y
dnf groupinstall "Development Tools" -y
dnf install httpd php gcc glibc glibc-common wget unzip gd gd-devel perl make -y
useradd nagios
groupadd nagcmd
usermod -aG nagcmd nagios
usermod -aG nagcmd apache
wget https://assets.nagios.com/downloads/nagioscore/releases/nagios-4.5.9.tar.gz
tar -xvf nagios-4.5.9.tar.gz
./configure --with-command-group=nagcmd
make all
make install
make install-init
make install-commandmode
make install-config
make install-webconf
htpasswd -c /usr/local/nagios/etc/htpasswd.users nagiosadmin
systemctl start httpd
systemctl enable httpd
./configure --with-nagios-user=nagios --with-nagios-group=nagios
make install
vi /usr/local/nagios/etc/nagios.cfg
mkdir -p /usr/local/nagios/etc/servers
vi /usr/local/nagios/etc/servers/localhost.cfg
```

```
/usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg
systemctl start nagios
systemctl enable nagios
systemctl restart httpd
firewall-cmd --permanent --add-service=http
firewall-cmd --reload
```

The Nagios web dashboard provides a centralized monitoring interface for real-time infrastructure management. It displays the overall health of the IT environment using a color-coded system where green indicates “OK,” yellow indicates “WARNING,” red indicates “CRITICAL,” and gray indicates “UNKNOWN.” The dashboard includes multiple sections such as a tactical overview, host status, service status, problem summary, notifications and performance reports.

From the dashboard, administrators can monitor the status of all connected devices, check service performance, identify failures and analyze historical data. It allows quick identification of issues and helps in taking immediate corrective actions. Alerts and notifications are displayed in real time, which enables proactive system management and reduces downtime.

Through this practical implementation, I developed a clear understanding of infrastructure monitoring using Nagios. I learned how systems and services are continuously checked, how configuration files control monitoring behavior and how the Nagios dashboard provides a centralized and real-time view of the entire IT infrastructure. This hands-on experience improved my skills in Linux system administration, network monitoring, service configuration, troubleshooting, which are essential for managing modern IT environments.

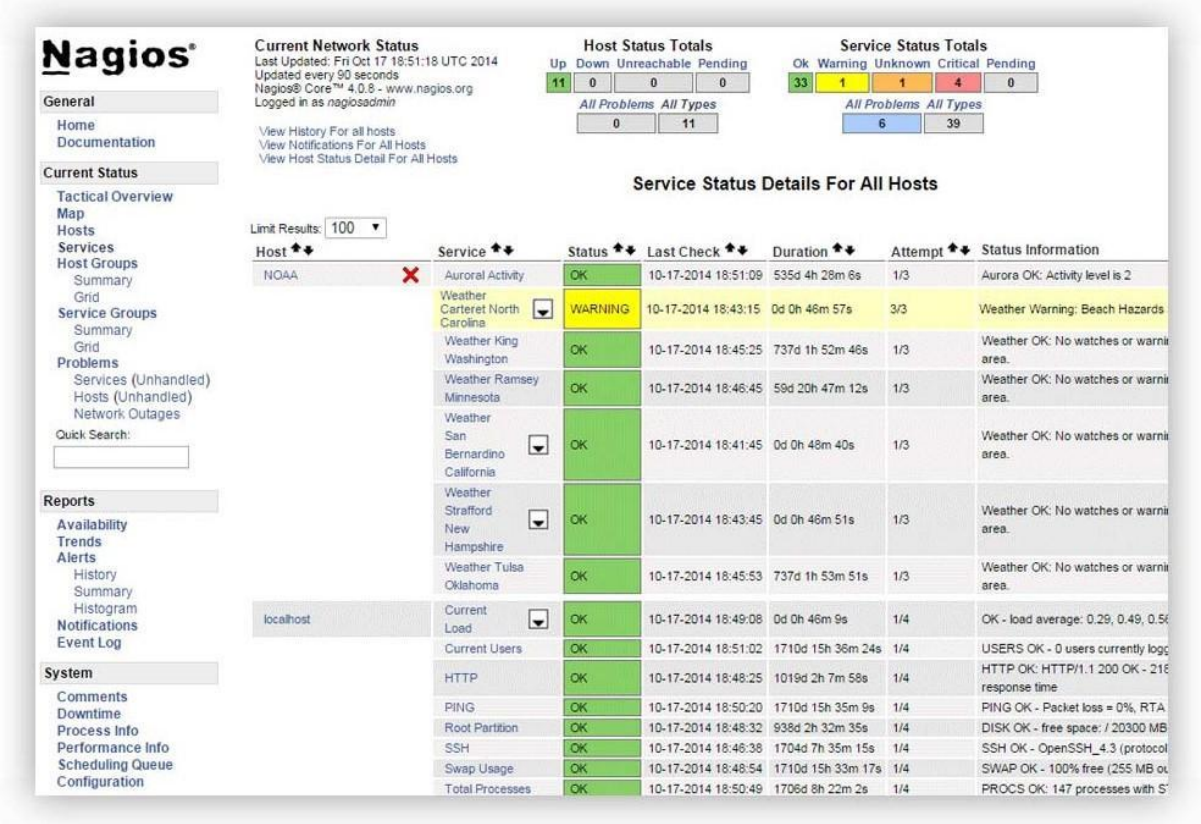

Figure 2.1.8.1: Nagios Dashboard

2.1.9 LibreNMS

LibreNMS is a powerful open-source network monitoring and management system designed to monitor network devices, servers, applications and various IT infrastructure components. It provides a web-based interface for collecting, analyzing and presenting information about network performance and device health. LibreNMS primarily uses the Simple Network Management Protocol (SNMP) to collect information such as CPU utilization, memory usage, interface traffic, bandwidth utilization, device availability and other performance metrics.

LibreNMS is widely used in enterprise networks, data centers, Internet Service Providers (ISPs), educational institutions, government organizations and other IT environments where centralized network monitoring is required. It helps network administrators identify network problems, monitor resource utilization, analyze performance trends, and detect potential failures before they significantly affect users.

My LibreNMS configuration process began with preparing an Ubuntu Server virtual machine in the VMware environment. The operating system was updated and the required software packages and dependencies were installed. The Apache web server, PHP, database server, SNMP services and other required components were configured to provide the necessary environment for LibreNMS.

A dedicated LibreNMS user and database were created to provide appropriate permissions and secure access to the monitoring system. The LibreNMS application files were then downloaded and placed in the appropriate web server directory. Required ownership and permissions were configured so that LibreNMS could properly access its configuration files and monitoring data.

After installing the required components, PHP and its necessary modules were configured according to the requirements of LibreNMS. The Apache web server was also configured to serve the LibreNMS web interface. During the configuration process, different PHP modules and Apache settings were checked and adjusted to resolve compatibility and configuration issues.

SNMP was configured as an important component of the monitoring environment. The SNMP daemon was installed and configured on the target Linux system so that LibreNMS could communicate with and collect monitoring information from the device. The SNMP configuration was tested using snmpwalk to verify that the required SNMP information could be successfully retrieved.

LibreNMS was then accessed through its web interface, where the initial configuration and database connection were completed. The monitoring server was configured to discover and monitor network devices. Devices were added using their IP addresses and appropriate SNMP credentials. Once a device was successfully added, LibreNMS began collecting information about its interfaces, traffic, system resources, and availability.

SNMP is one of the key technologies used by LibreNMS for network monitoring. It allows a monitoring server to communicate with network devices and retrieve information about their operational status and performance.

During my practical work, I used snmpwalk to test SNMP connectivity and retrieve information from monitored devices. This helped me verify whether the SNMP service was correctly configured and whether the monitoring server could communicate with the target device.

The successful execution of snmpwalk confirmed that SNMP communication was working properly and that the monitoring server could retrieve information from the target device.

LibreNMS uses Round-Robin Database (RRD) technology to store and process time-series monitoring data. RRD allows performance information such as bandwidth utilization, interface traffic, CPU usage and other metrics to be collected over time and displayed graphically.
The graphical monitoring information provided by LibreNMS makes it easier for administrators to identify performance trends, unusual traffic patterns, resource utilization, and potential network problems.

Some of the major commands and utilities used during the LibreNMS installation and configuration process included:

```
apt update
apt upgrade -y
apt install apache2 -y
apt install mariadb-server -y
apt install snmp snmpd snmp-mibs-downloader -y
apt install php php-cli php-fpm -y
systemctl status apache2
systemctl restart apache2
systemctl status snmpd
systemctl restart snmpd
```

Additional configuration was performed through the LibreNMS configuration files, Apache configuration, PHP configuration, database configuration and SNMP configuration files.

The LibreNMS web dashboard provides a centralized interface for monitoring network infrastructure. It displays information about monitored devices, device availability, interfaces, bandwidth utilization, CPU and memory usage, alerts and historical performance data.

The dashboard provides graphical representations of network traffic and system performance, allowing administrators to identify abnormal conditions and investigate network-related problems. The alerting system also helps administrators become aware of device failures, interface problems, high resource utilization, and other abnormal conditions.
Through the LibreNMS interface, administrators can view individual devices, monitor their interfaces, analyze traffic graphs, review alerts, and observe historical performance information. This centralized monitoring capability helps improve network visibility and reduces the time required to identify and troubleshoot infrastructure problems.

Working with LibreNMS helped me understand centralized network monitoring and SNMP-based device management. I learned how SNMP collects information from network devices, how snmpwalk can be used to check SNMP communication, and how LibreNMS presents traffic and performance data through graphs and alerts. I also worked with Apache, PHP, database settings, RRD-based monitoring data, and Linux troubleshooting.

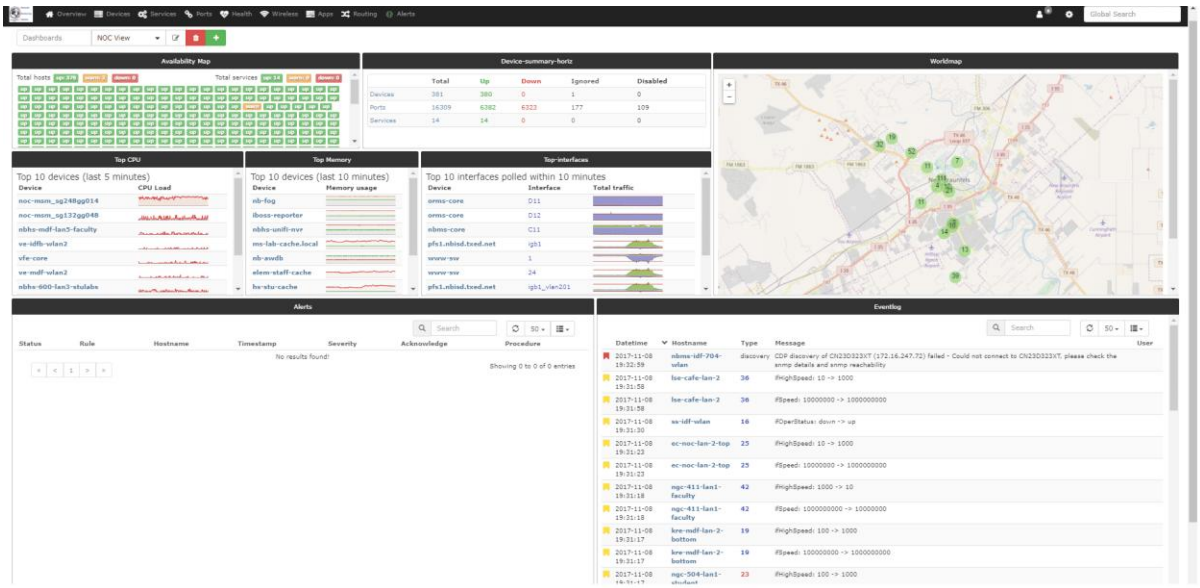

Figure 2.1.9.1: LibreNMS Dashboard

The figure below illustrates the LibreNMS monitoring dashboard used during my internship for monitoring only a single network-connected device. In this example, a Brother NC-9600h network printer was added to the LibreNMS monitoring system and its information was collected and displayed through the web-based dashboard. The system provides detailed information about the monitored device, including the system name, resolved IP address, hardware model, operating system, serial number, Object ID, uptime, device addition time, and last discovery status.

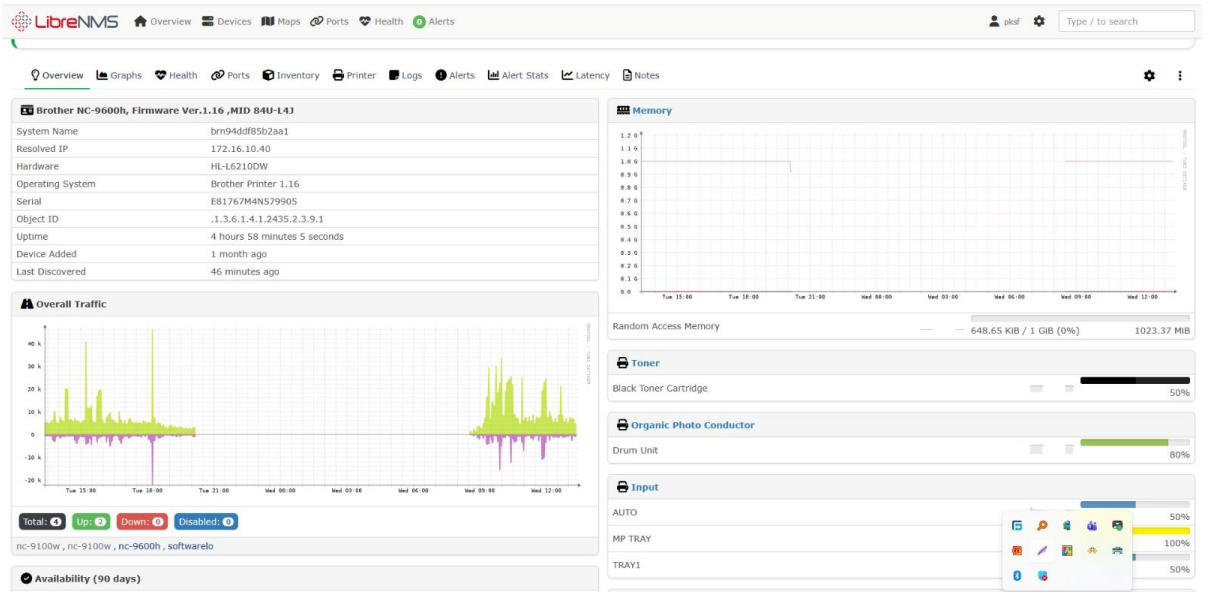

Figure 2.1.9.2: LibreNMS Dashboard (specific device monitoring page)

LibreNMS also provides graphical monitoring features that help administrators observe the performance and activity of a network device. As shown in the figure, the Overall Traffic graph displays the incoming and outgoing network traffic of the printer over a specific period. This information can help identify communication activity and monitor the network usage of the device. The Memory graph displays the memory utilization of the printer, allowing administrators to observe its resource usage and identify possible performance-related issues.

In addition to general device monitoring, LibreNMS collects information about printer-specific resources. The dashboard shows the status of the black toner cartridge, organic photo conductor or drum unit, and different paper input trays. Monitoring these resources is useful for detecting low toner levels, checking the condition of printer components, and ensuring that sufficient paper is available in the required trays. Such information enables administrators to take preventive action before a resource is completely exhausted or affects normal printing operations.

Through this practical activity, I gained hands-on experience in adding and monitoring network devices using LibreNMS. I also developed a better understanding of how SNMP is used to collect information from network devices and how LibreNMS presents this information through graphs and a centralized web-based monitoring interface. This experience demonstrated the importance of network monitoring in system administration, as it helps administrators monitor device availability, performance, resource utilization, and overall operational status more efficiently.

2.1.10 Website and Server Management Using Web Hosting Control Panel (aaPanel)

I used aaPanel as a web hosting and server management control panel. Its graphical interface made it easier to manage Linux server services without relying entirely on command-line commands. I explored website, file, database, and service management features.

I used aaPanel to create and manage websites on a Linux server. This included setting up a new site, configuring domain settings, and managing website root directories. I also worked with its built-in tools such as file manager and database (MySQL) management system. Through this, I learned how web applications are deployed and maintained in a real server environment.

aaPanel is an open-source web hosting control panel designed to simplify the management and administration of Linux-based web servers. It provides a graphical web-based interface through which administrators can manage websites, domains, databases, FTP accounts, SSL certificates, web server services, PHP versions and other server components without performing every administrative task manually through the command line.

aaPanel is useful in web hosting environments because it provides centralized management of multiple server components through a single interface. It can be used to manage web servers such as Apache and Nginx, create and configure websites, manage databases, install PHP versions and extensions, configure SSL certificates, and monitor basic server resources.
During the internship, I used aaPanel on a Linux server to see how a hosting control panel can simplify website and server administration. I worked with its web interface and explored how different hosting components and services can be managed from one dashboard.

My aaPanel configuration process began with preparing a Linux server environment in a VMware virtual machine. The operating system was updated and network connectivity was verified to ensure that the server could communicate with the required repositories and external services.

The aaPanel installation package was then executed on the server. During the installation process, the required components and dependencies were installed automatically. After successful installation, the aaPanel service was started and the web-based management interface became accessible through the server's IP address and the configured management port.

The initial aaPanel configuration involved accessing the management interface through a web browser and completing the required login and administrative settings. The dashboard provided access to different server management features, including web server configuration, PHP management, database management, website management, file management, SSL configuration, and server resource information.

One of the major advantages of aaPanel is its ability to simplify website and web server management. Through the dashboard, administrators can create websites, configure domains, manage website directories, and control web server settings.

I explored the process of creating and managing websites through the aaPanel interface. Website files could be uploaded and managed using the built-in file manager, while the web server configuration could be controlled through the panel. PHP versions and required PHP extensions could also be managed according to application requirements.

The control panel provides an easier alternative to manually editing multiple configuration files for common web hosting tasks. This makes it particularly useful for administrators who need to manage multiple websites and services efficiently.

aaPanel also provides tools for managing databases through its web interface. Administrators can create databases, configure database users, manage permissions, and perform basic database management operations.

During my practical work, I explored the database management functionality and observed how web applications can be connected to databases through the server environment. This helped me understand the relationship between web servers, PHP applications, and database systems in a typical web hosting environment.

aaPanel provides SSL certificate management features that simplify the process of securing websites using HTTPS. Administrators can configure SSL certificates for websites and manage HTTPS-related settings through the web interface.
SSL configuration is important for protecting data exchanged between users and web servers. The panel also provides access to various server management and security-related settings that can help administrators maintain a more secure web hosting environment.

The aaPanel dashboard provides basic information about server resources such as CPU utilization, memory usage, disk utilization, and network activity. This information helps administrators understand the current condition of the server and identify resource-related problems.

The centralized dashboard also provides quick access to installed services and applications. Administrators can start, stop, restart, or configure supported services through the graphical interface, reducing the need to execute individual commands for routine administrative tasks.

Some of the basic Linux commands used while preparing and managing the server environment included:

```
apt update
apt upgrade -y
systemctl status apache2
systemctl restart apache2
systemctl status mysql
systemctl restart mysql
php -v
df -h
free -h
```

lsblk

The aaPanel-specific configuration and management tasks were primarily performed through its web-based graphical interface.

The aaPanel dashboard provides a centralized management interface for Linux-based web servers. It presents commonly used server administration functions in an organized graphical environment.

From the dashboard, administrators can manage websites, databases, files, PHP versions, web server services, SSL certificates, scheduled tasks, and other server components. The dashboard also provides information about system resource utilization, allowing administrators to obtain a quick overview of the server's current condition.
The graphical interface reduces the complexity of routine server management tasks and allows administrators to perform many operations without manually modifying configuration files through the command line.

Through my practical experience with aaPanel, I developed an understanding of web server and hosting management using a graphical control panel. I learned how to manage websites, web server services, PHP environments, databases, files, SSL certificates, and basic server resources from a centralized interface. I also gained a better understanding of how different components of a Linux-based web hosting environment work together. This hands-on experience improved my practical knowledge of Linux server administration, web hosting, website deployment, service management, and basic server troubleshooting.

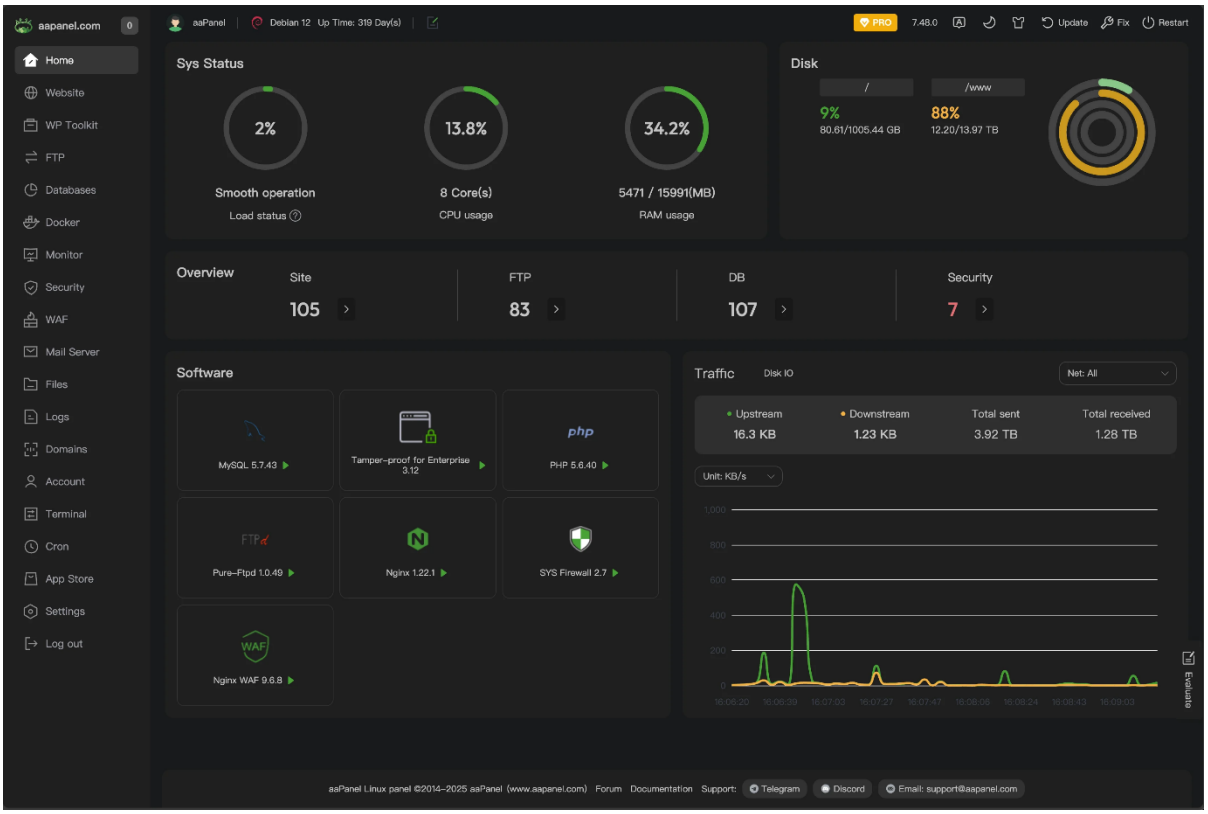

Figure 2.1.10.1: aaPanel Dashboard

2.1.11 Memory and Storage Management

I worked with memory and storage management in a Linux system. This included learning how disks are divided, how data is organized, and how storage space is managed for routine system operations.

One of the first things I learned was disk partitioning. A hard disk can be split into different sections called partitions, where each partition is used for a specific purpose. For example, the root (/) partition stores the main operating system files, /home stores user data, /boot contains boot files, and swap is used as virtual memory when RAM becomes full. Dividing the disk in this way keeps the system organized and improves management.

I also learned about two common partition styles: MBR and GPT. MBR is the older method and has some limitations, such as supporting fewer partitions and smaller disk sizes. GPT is the newer and more advanced method, which supports larger storage devices and offers better flexibility.

Another important topic was LVM (Logical Volume Management). LVM is a storage management system in Linux that allows administrators to manage disk space more easily. It works through three main parts:

i. Physical Volume (PV): the actual disk or partition
ii. Volume Group (VG): a combined storage pool made from one or more physical volumes
iii. Logical Volume (LV): virtual partitions created from the volume group

With LVM, storage can be expanded or reduced more easily compared to normal partitions. This is very useful in real environments where storage needs may change over time.

I also became familiar with Linux device names such as /dev/sda, /dev/sdb, and /dev/sdc, which are used to identify storage drives connected to the system.

In addition, I practiced basic administrative tasks such as checking disk information, creating partitions, formatting drives, and mounting them for use. These practical activities helped me understand how Linux handles storage resources in a structured and efficient way.

This work gave me a clearer understanding of Linux memory and storage management and its importance in system administration and server maintenance.

In addition, I was involved in end user support where I observed and helped with solving basic user side technical problems. This gave me a better understanding of troubleshooting and the importance of technical support in maintaining smooth daily operations.

Taken together, these activities improved my technical knowledge and gave me useful exposure to real-world IT operations.

2.2 Organization-wide

Beyond my direct technical activities, I gained understanding of how the functions of the Information Technology and Digital Solutions Department contribute to PKSF as a whole. The department supports the organization through network services, server management, user support, monitoring systems, and digital infrastructure that enable day to day operations across departments.

The areas I studied during my internship such as network configuration, Active Directory, monitoring tools, file services and server management demonstrated how IT functions support organizational productivity, security, communication and service continuity. I observed that these technical functions are not isolated tasks but are interconnected components that support the broader institutional objectives of PKSF.

Through this exposure, I gained valuable understanding of how a technical department operates within a large organization and how its activities contribute to the efficiency and reliability of organizational processes.

2.3 Other relevant activities

Besides my core technical activities, I was involved in several additional activities that contributed to my overall learning during the internship. One of these was assisting during training sessions related to basic office devices, simple network troubleshooting and basic security awareness. I supported various tasks during the sessions and observed how end users were guided on handling common technical issues and following basic security practices. This gave me useful exposure to user awareness activities and the importance of knowledge sharing in an organizational environment.

I was also involved in end user support related activities, where I observed and assisted in addressing basic user side technical issues. Through this, I gained a better understanding of common problems users face in daily operations and how timely support helps maintain smooth workflow.

3. CONSTRAINTS/CHALLENGES

During my internship at PKSF, I experienced a number of challenges that played an important role in shaping my learning process. Entering a professional environment for the first time was very different from my previous academic life. In university, most of my learning was based on theory and assignments. However, in a real organization tasks are more practical, responsibilities are shared among teams and work follows structured procedures. Because of this difference, I initially found it difficult to adjust.

These challenges were not negative experiences. They helped me understand the real expectations of a professional environment. They also showed me the gaps between my existing knowledge and the skills required in the workplace. By observing, asking questions, learning from my supervisors and colleagues, I was able to gradually overcome many of these difficulties. This process helped me grow both personally and professionally and made my internship experience more meaningful.

3.1 Identified/Observed in the Organization

One of the main challenges I faced was adapting to the structured working environment of PKSF. Unlike a classroom setting where tasks are relatively flexible, the organization follows formal procedures, rules and communication channels. Every activity is done in a systematic way. At the beginning, it was not easy for me to understand how everything works together. I needed time to learn how different departments coordinate with each other and how the IT and Digital Solutions Department (ITDSD) fits into the overall organization.

Another difficulty was understanding the workflow of technical tasks within the department. In a real organization technical work is not done randomly. It follows a planned structure. There are dependencies between different systems. For example, network configuration, server management and monitoring systems are all interconnected. Initially it was challenging for me to understand how each small task contributes to the overall system.

I also found it challenging to become familiar with the tools and systems used in the organization. Although I had studied some of these concepts before. Actually, seeing them in use in a professional environment was very different. Tools like network monitoring systems, server environments and administrative configurations require hands on understanding. At first, I needed time to understand how these tools work in practice and how they are used to maintain system stability and performance.

Another challenge was adjusting to the pace and expectations of the workplace. In a professional environment tasks need to be completed carefully and responsibly. Even small mistakes can affect larger systems. This created a sense of pressure, especially in the beginning when I was not fully confident in my abilities. However, this also helped me become more attentive and responsible in my work.

Training and knowledge sharing activities within the department were also new experiences for me. While I assisted during training sessions, I observed how technical knowledge is shared with end users in a simple and understandable way. Initially, it was challenging to follow everything but over time I learned how important communication and clarity are in such situations.

Overall, adapting to the organizational environment required patience and continuous learning. With time and support from colleagues I became more comfortable and started to understand how the department operates within the organization.

3.2 Academic Preparation

My academic studies in Computer Science and Engineering provided me with a strong theoretical foundation especially in networking, operating systems and basic system concepts. This background was very helpful during my internship because it allowed me to understand many of the topics I encountered. However, I also realized that there is a noticeable gap between academic learning and real-world application.

In university, most of the learning is focused on concepts and controlled lab exercises. But in a real organization systems are much more complex and interconnected. For example, I had

learned about networking and servers in theory, but I had very limited hands-on experience with enterprise level tools, real server environments and live monitoring systems. This made it difficult at first to fully understand how these systems are managed in practice.

Another challenge was working with technologies such as network monitoring tools, Linux-based systems and server configurations in a real environment. While I had basic knowledge about these topics, I was not fully confident in applying them without guidance. This created some hesitation when I was first introduced to these tools and tasks.

I also noticed that academic courses often do not fully cover practical issues such as troubleshooting real systems, handling unexpected problems or working within an organizational structure. In a real environment, problems do not always follow textbook examples. This required me to think more practically and learn how to approach problems step by step.

Despite these challenges my academic preparation was still very valuable. It helped me understand the basic principles behind the systems I was working with. Without that foundation it would have been much more difficult to learn new tools and technologies. The internship helped me realize that theory and practice must go together. Academic knowledge provides the base but practical experience is necessary to fully develop professional skills.

This experience has made me more aware of the importance of hands-on learning and has motivated me to focus more on practical skill development in the future.

3.3 Personal/Professional Skills

The internship also helped me identify several personal and professional skills that I need to improve. One of the most important areas was communication. In a professional environment, it is essential to communicate clearly with supervisors and colleagues. At the beginning, I sometimes felt hesitant to ask questions or express my thoughts. Especially when dealing with technical topics. Over time, I understood that asking questions is an important part of learning and I gradually became more confident in communicating.

Time management was another challenge. In university, I was used to flexible schedules but in a workplace, tasks need to be completed within specific timeframes. Managing time efficiently while learning new things was not always easy. I had to learn how to balance learning, observation and assigned responsibilities within a structured schedule.

Confidence was also an area where I needed improvement. When I encountered unfamiliar tools or systems, I sometimes doubted my ability to understand them. This hesitation slowed down my learning at the beginning. However, as I gained more exposure and experience my confidence gradually improved. I realized that it is normal to face difficulties when learning something new.

Problem solving skills were another important aspect. In a real working environment, problems can be unpredictable and may not have immediate solutions. I had to learn how to observe carefully, think logically and seek guidance when necessary. This helped me develop a more practical approach to problem solving.

Adaptability was also a key learning area. The ability to adjust to new tools, environments and expectations is very important in the IT field. During my internship I learned that being flexible and open to learning is essential for professional growth.

Overall, these challenges helped me understand my strengths and weaknesses. They encouraged me to improve my skills, become more confident and develop a more professional attitude. The experience I gained during this internship will be very helpful for my future career, as it has prepared me to face real-world challenges with a better mindset and stronger abilities.

4. ACQUIRED KNOWLEDGE

The internship at PKSF gave me the opportunity to move beyond classroom theory and see how IT systems operate in a real organization. As part of the Information Technology and Digital Solutions Department (ITDSD), I observed how networking, servers, monitoring, and user support work together to keep daily operations running. The experience showed me that real-world IT environments are more complex and interconnected than the examples normally used in class.

One of the main lessons I learned was that the different parts of an IT environment depend on one another. Networking, servers, monitoring systems, and user support all affect the reliability of the organization's operations. For example, a network problem can prevent users from reaching servers and can interrupt their work. Seeing these connections helped me understand why stable and secure systems are so important.

I also learned that professional IT work involves more than technical knowledge. Tasks are assigned through a defined workflow, reporting is important, and teamwork is necessary to complete work properly. This gave me a clearer idea of the discipline and responsibility expected in an IT workplace.

Overall, the internship gave me a balanced view of technical work and professional responsibilities. I improved my practical knowledge, became more confident, and developed a clearer direction for my future career in IT.

4.1 Consequences to Organization

Although my role was mainly focused on learning, I was able to support the ITDSD team in several small but useful ways. My involvement included network configuration exercises, server-related tasks, monitoring tools, and basic user support.

By following instructions and observing the team's workflow, I was able to assist with routine tasks and gradually take part in more activities. Work with Nagios and LibreNMS, for example,

helped me understand how systems are monitored and maintained. I was not responsible for major operations, but the experience showed me how continuous monitoring contributes to system stability.

I also assisted with basic end-user support. Helping users with simple issues and observing how technical problems were handled gave me a better understanding of the support process and helped the department with routine activities.

Another way I contributed was by assisting during training sessions. I supported different activities and observed how technical knowledge is shared with users. This helped in creating a better learning environment for users and strengthened the communication between technical staff and end users.

As an intern, I also contributed by bringing a willingness to learn and participate. Asking questions, observing procedures, and working with the team helped me become more involved in the department's daily activities.

My contribution was limited compared with the responsibilities of permanent staff, but the tasks I supported were useful for my learning and gave me a better understanding of how IT services support PKSF.

4.2 Implications to University's Internship Program

My internship showed me that there is a noticeable gap between academic learning and the practical requirements of an IT workplace. University courses provide the necessary theoretical foundation, but some practical skills are difficult to develop without working with real systems and real situations.

Based on what I observed, the university's internship program could be strengthened in several ways to prepare students more effectively for professional work.

4.2.1 Practical Technical Exposure

Students should be given more opportunities to work with real tools and systems during their academic studies. This includes hands-on practice with networking devices, Linux systems, servers, and monitoring tools. Practical lab sessions and project-based learning can help students become more confident before entering internships.

4.2.2 Workplace Readiness Skills

In addition to technical knowledge, students need to develop soft skills such as communication, teamwork, and professional behavior. These skills are very important in a workplace environment. Including activities like group projects, presentations, and real-life case studies in the curriculum can help students improve these skills.

4.2.3 Stronger Industry Integration

The university should build stronger connections with organizations like PKSF so that students can get more relevant internship opportunities. Industry collaboration can also help align academic courses with current market needs, making students more prepared for real jobs.

4.2.4 Experience-Based Reflection

After completing internships, students should be encouraged to reflect on their experiences. This can help them understand what they learned, what challenges they faced, and what skills they still need to improve. Reflection is important for continuous learning and personal development.

These improvements would give students stronger preparation for internships and future employment while helping reduce the gap between academic learning and industry expectations.

4.3 Effects on Personal/Professional Skills

The internship also had a positive effect on my personal and professional development. It helped me improve several skills that are important for working in an IT environment.

4.3.1 Professional Communication

During my internship, I had the opportunity to interact with supervisors and colleagues. This helped me improve my communication skills, especially in a professional setting. I learned how to ask questions properly, listen carefully, and express my thoughts more clearly.

4.3.2 Responsibility and Work Discipline

Working in an organization taught me the importance of responsibility and discipline. I learned to be punctual, follow instructions, and complete tasks carefully. This experience helped me develop a more professional attitude toward work.

4.3.3 Technical Awareness

My exposure to real systems and tools increased my understanding of how IT works in practice. I realized that real-world systems are more complex than what we learn in books, and this motivated me to learn more and improve my technical skills.

4.3.4 Adaptability

During the internship, I had to work with new tools and environments that I was not familiar with. This helped me become more adaptable and open to learning new things. I understood that flexibility is very important in the IT field.

4.3.5 Analytical Thinking

Observing how problems are identified and solved in a real environment helped improve my thinking ability. I learned to look at problems more carefully and think step by step before trying to solve them.

4.3.6 Collaboration

Working with a team helped me understand the importance of cooperation and teamwork. I learned that sharing ideas and working together leads to better results.

The internship improved both my technical knowledge and my professional skills. It gave me practical understanding, increased my confidence, and helped me develop a clearer idea of the kind of work I want to pursue in information technology.

5. CONCLUDING STATEMENTS

5.1 Summary

Looking back at my internship at PKSF, particularly in the Information Technology and Digital Solutions Department (ITDSD), I consider it an important part of my academic journey. It allowed me to see how concepts from networking, servers, and systems are applied in a professional environment and how those technologies support an organization's daily work.

During my internship, I was exposed to several important technical areas such as basic network configuration, Active Directory Domain Controller (ADDC), file server management, Linux systems, web server concepts, Samba, and network monitoring tools like Nagios and LibreNMS. I also had the chance to observe and assist in end-user support activities. These experiences helped me understand how different parts of IT infrastructure are connected and how they work together to keep systems running smoothly.

One of the most valuable things I learned was how an IT department functions within a large organization. I realized that the work of IT is not only technical but also very important for supporting communication, security, and overall productivity. I also learned that even small tasks, if done properly, contribute to the bigger system. This understanding helped me develop a more responsible and professional mindset.

At the beginning of the internship, I faced several challenges, especially in adapting to a new environment and understanding practical tasks. Sometimes I felt confused or lacked confidence when dealing with unfamiliar tools or systems. However, with time, observation, and support from my supervisors and colleagues, I gradually improved. I became more comfortable, more confident, and more willing to learn from every situation.

In addition to technical knowledge, this internship helped me develop important personal skills. I improved my communication, learned how to behave in a professional environment, and understood the importance of discipline and time management. I also learned how to work in a team and how to ask for help when needed.

The internship also gave me a clearer idea of my future career direction. I became more interested in networking and system-related work and was motivated to continue developing

my skills. The knowledge and experience I gained will be useful as I move into my professional career.

5.2 Recommendations/Suggestions for Future Strategic Actions

Based on my overall experience during the internship, I would like to share some suggestions that may help improve different aspects of the organization, the university's internship program, and my own personal development.

5.2.1 Organization

It would be helpful if there is a basic guideline or roadmap for interns at the beginning of the internship. This could include what topics they will learn, what tasks they may observe or perform, and what skills they are expected to gain. This will help interns stay more focused and organized during their internship period.

Provide More Hands-on Opportunities:

Although observation is very useful, giving interns more chances to perform small practical tasks under supervision can increase their confidence and improve their learning. Even simple tasks can make a big difference in understanding real systems.

Encourage Knowledge Sharing Sessions:

Regular short sessions where team members share their knowledge, experiences, or new technologies can be very beneficial. These sessions can help interns and employees learn from each other and stay updated.

Supportive Learning Environment:

Maintaining a friendly and supportive environment, where interns feel comfortable asking questions and learning from mistakes, is very important. My experience was positive in this regard, and continuing such an environment will benefit future interns.

5.2.2 University

The university should focus more on hands-on learning, especially in areas like networking, Linux, server management, and monitoring tools. Lab-based learning and real-life scenarios can help students understand concepts more deeply.

Prepare Students Before Internship:

Before sending students to internships, the university can arrange short training sessions or workshops to prepare them. These can include basic technical refreshers, workplace behavior, and communication skills.

Strengthen Industry Collaboration:

Building stronger relationships with organizations like PKSF can help create better internship opportunities for students. It can also help align academic learning with industry requirements.

Encourage Real World Projects:

Including more real-world projects, case studies, and problem-solving tasks in coursework can help students become more confident and job-ready.

5.2.3 Personal/Professional

Continuous Learning:

This internship made me realize that learning never stops, especially in the IT field. I plan to continue learning new technologies, tools, and concepts related to networking and system administration.

Improve Technical Skills:

I will focus on gaining more hands-on experience, especially in Linux, server management, and monitoring tools. I also plan to practice more so that I can become more confident in real situations.

Develop Communication Skills:

I will work on improving my communication skills so that I can express my ideas more clearly and interact more effectively in a professional environment.

Enhance Time Management:

Managing time properly is very important in a workplace. I will try to improve my time management skills so that I can complete tasks efficiently and stay organized.

Build Confidence and Adaptability:

I will continue working on my confidence and try to adapt quickly to new environments and challenges. I have learned that being open to learning is very important for growth.

In conclusion, my internship at PKSF has been a very valuable and meaningful experience. It helped me grow in many ways, both technically and personally. I am grateful for the opportunity to learn in such a professional environment. The knowledge, skills, and experiences I gained during this internship will guide me in my future career and help me become a better professional in the field of information technology.

RECOMMENDATION LETTER

PALLI KARMA-SAHAYAK FOUNDATION (PKSF)
www.pksf.org.bd

Date: **03 May 2026**

TO WHOM IT MAY CONCERN

I am pleased to recommend **Mr. Md. Mahmudul Hasan** and **ID-22-46256-1**, a student of Computer Science and Engineering at **American International University-Bangladesh**, who successfully completed his internship at Palli Karma-Sahayak Foundation from **January 29, 2026 to April 29, 2026** under my supervision in the IT Department.

During this period, he gained practical experience in Enterprise Networking, Network and Server Monitoring, Mail Services, and End-User IT Support. He was also involved in the installation and configuration of Windows and Linux servers, implementation of Open-Source solutions (including NMS, server services, and control panels), as well as Active Directory, Domain Controller administration, and domain policy management for users and computers.

Mr. Hasan demonstrated strong technical aptitude, professionalism, and a proactive approach to learning. His performance, discipline, and work ethic were commendable throughout the internship.

I strongly recommend him for any academic or professional opportunity and am confident he will be a valuable asset to any organization.

Sincerely,

03-05-2026

Engr. Md. Sohel Rana
Deputy Manager (IT)
System Administration & Maintenance
Palli Karma-Sahayak Foundation (PKSF)

PKSF Bhaban-I, E-4/B, Agargaon Administrative Area, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh
PABX: +88-02-222218331-33, 222218335-39
+88-02-222218341, 222218343
pksf@pksf.org.bd
facebook.com/pksf.org.bd
youtube.com/@PKSF1990

REFERENCES

[1] https://pksf.org.bd/

[2] https://en.wikipedia.org/wiki/Palli_Karma_Sahayak_Foundation

[3] https://www.linux.org/forums/#linux-tutorials.122

[4] https://www.aapanel.com/

[5] https://www.nagios.org/

[6] https://www.librenms.org/