UNIVERSITY OF SRI JAYEWARDENEPURA

Faculty of Engineering

Module No. Industrial Training

TRAINING REPORT

Training Organization

Sri Lanka Telecom PLC – Headquarters

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Department : Computer Engineering

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Acknowledgement

I am profoundly grateful for the guidance and support I received from Sri Lanka Telecom PLC during my six-month internship program which was pivotal for the successful completion of my Bachelor of Science of Engineering (Hons) degree program as well as my professional career.

First, I wish to extend my heartful appreciation to Sri Lanka Telecom PLC, Headquarters – Colombo 01 for granting me the privilege to be a part of their esteemed organization. This invaluable opportunity has not only enhanced my knowledge but also allowed me to contribute meaningfully to the Cloud hosting and System Administration section of the company.

My deepest gratitude goes to my mentor and supervisor, Mr. Pamuda Balasooriya, Engineer – Digital Help Desk whose visionary guidance, insightful feedback, and unwavering support fostered an environment of growth and continuous learning. Their mentorship was instrumental in overcoming challenges and achieving key milestones during this internship.

I am equally indebted to Mr. Janaka Harambearachchi who is the general manager of Digital Platforms, business development section whose expertise and constructive input enriched my understanding of industry practices.

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Finally, I express my sincere thanks to Dr. Udaya Wijenayake, the Head of the Department in the Department of Computer Engineering, faculty of Engineering, University of Sri Jayewardenepura and all my mentors and lecturers, for their steadfast encouragement and guidance throughout my academic journey. Their support has been foundational to my achievements and aspirations.

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20/ENG/014

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Preface

This report outlines the details and insights gained during my six-month internship at Sri Lanka Telecom PLC – Headquarters, Colombo, which was an essential component of my BSc. Engineering (Hons) - Computer Engineering degree program at the University of Sri Jayewardenepura. As a trainee cloud engineer, I had the opportunity to immerse myself in a dynamic and cutting-edge technological environment, contributing to the company's cloud operations and system administration. This internship not only provided practical experience but also facilitated personal and professional growth, aligning with my career aspirations in cloud technologies.

My internship program started on 25th of June 2024 and it concluded on 26th of December 2024. My key responsibilities included hosting web applications on the Microsoft Azure cloud, resolving complex issues related to cloud hosting, and managing system administration tasks on private servers at SLT's own data centers. In addition, I was involved in troubleshooting virtual machine configurations and ensuring optimal performance within SLT's virtualized environments, using technologies such as VMware, Oracle, Azure, AWS, and NGINX. The hands-on experience with these platforms was invaluable in strengthening my technical acumen.

One of the most memorable aspects of my internship was the visit to the National Datacenter at Pitipana, a world-class facility that provided me with a deeper understanding of enterprise-level data management and infrastructure. This visit reinforced my interest in cloud technologies and the crucial role they play in modern telecommunications.

This internship was not only a mandatory requirement for completing my degree but also a transformative experience that solidified my interest in pursuing a career in cloud computing, particularly with Azure and AWS. During my time at Sri Lanka Telecom, I was inspired to pursue the Azure Administration certificate exam, which further enhanced my technical capabilities. The support and mentorship I received from the staff at SLT were instrumental in my growth, providing both encouragement and practical knowledge.

The insights and skills gained during this internship will undoubtedly shape my future career, and this report aims to reflect on my contributions, challenges, and the overall experience I had in this highly motivating work environment.

List of abbreviation

AWS – Amazon Web Services

AD – Active Directory

AAD – Azure Active Directory

API – Application Program Interface

AZ – Availability Zone

CGNAT – Career Grade Network Address Translation

CI/CD – Continuous Integration/Continuous Delivery

DGM – Deputy General Manager

DNS – Domain Name System

DR – Disaster Recovery

ELK – Elasticsearch, Logstash, Kibana

GM – General Manager

HTTP – Hyper Text Transfer Protocol

IDC – Internet Datacenter

IP – Internet Protocol

IPTV – Internet Protocol Television

ICT – Information Communication Technology

ISP – Internet Service Provider

NAT – Network Address Translation

PMM – Power Management Module

SKU – Stock Keeping Unit

SSL – Secure Socket Layer

TLS – Transport Layer Security

VM – Virtual Machine

VNet – Virtual Network

VPN – Virtual Private Network

Table of Content

Contents

List of figures

Chapter 1 : Introduction about the training institute

1.1 Sri Lanka Telecom PLC

1.1.1 Introduction SLT Mobitel

Sri Lanka Telecom PLC is the leading telecommunication and backbone infrastructure service provider in Sri Lanka, recognized for its extensive and reliable network infrastructure. It was started its operations in 1858 with the establishment of first Telegraphic Circuit between Galle and Colombo. In the same year, it established its first international Telegraph Communication between then called Ceylon and India. The SLT-Mobitel undergoes corporatization in 1991 and privatization in 2000 with the collaboration of Nippon Telegraph and Telephone Corporation (NTT). In 2008, NTT sold its stake in SLT to global telecommunications holdings N.V. of Netherlands which currently owns 44.98% stake in Sri Lanka Telecom whilst 48% is owned by the government of Sri Lanka and the rest is owned by general public. It has over 8000 employees currently working all over the country.

1.1.2 Principal lines of business

The Sri Lanka Telecom provides diversified services and a wide range of ICT solutions to its diverse customer base through the latest technologies. These cover, fixed and mobile telephony, broadband, data services, Internet Protocol Television (IPTV), cloud computing and hosting services, and networking solutions. SLT's primary strategic segments are:

- Fixed ICT operations
- Mobile ICT operations
- Other segment operations

1.1.3 Secondary lines of business

SLT focuses not only on ICT services, but also delivering products and services that utilize its core strengths, expertise, and assets. SLT offers the following services through its subsidiaries:

- IPTV services and content creation facilities
- Human Resources solutions
- ICT infrastructure and system integrator solutions
- Directory services
- Digital marketing solutions
- Tertiary educational services
- Healthcare channeling platform
- Submarine cable maintenance
- Software solutions

1.1.4 Vision Statement

All Sri Lankans seamlessly connected with world-class information, communication and entertainment services.

1.1.5 Mission Statement

Your trusted and proven partner for innovative and exciting communication experiences delivered with passion, quality and commitment.

1.1.6 Corporate Responsibility

With a legacy of over 160 years, SLT has consistently been recognized by the public and professional institutions as a trustworthy, transparent, and reliable organization. The company's mission extends beyond its core operations, encompassing initiatives that connect individuals, homes, and communities while prioritizing environmental and social sustainability. In addition, SLT actively supports community-based projects and environmental stewardship, reaffirming its role as a socially responsible corporate entity. These efforts aim to bridge the digital divide, enhance connectivity, and promote technological advancements, ensuring that every corner of Sri Lanka benefits from the power of digital transformation. SLT's key responsibilities include:

- Empowering Customers and Stakeholders
- Promoting Digital Integration
- Sustainability and Community Engagement
- Fostering Long-Term Relationships

1.1.7 SLT Data Center Infrastructure

SLT-Mobitel has several Data Centers situated at different locations including headquarter building – Colombo, Welikada and the latest and largest datacenter at Pitipana. There are two datacenters in 3rd and 5th floor of the headquarter building. SLT's Pitipana datacenter is a Tier 3 facility datacenter mainly provide co-location service as their primary service. Even in the midst of the industry's shift, SLT continued to strengthen the data centres as integral components of its overall IT infrastructure strategy.

1.1.8 SWOT Analysis of SLT

Strengths

- National telecommunications provider with over 160 years of history.
- Extensive infrastructure (e.g., Tier III National Data Center - Pitipana).
- Diversified product offerings (broadband, 4G, 5G, Fiber optics, cloud services, etc.).
- Skilled workforce and strong brand reputation.
- Sustainable and comfortable working environment.
- Working in Collaboration with giants in the IT infrastructure field.
- Ownership of 5 out of 6 Submarine Cable Infrastructure.
- The only ISP in Sri Lanka which provide Fiber optics Internet connection.
- The only Azure Stack provider in the country.
- 'Akaza' multi-cloud service.

Weaknesses

- High maintenance costs for infrastructure.
- Dependence on external technology providers.
- High employee turnover rate.
- Low attention in energy saving.
- Slower adaptation to the changing technology.
- More time spend to execute the decisions taken by the higher management.

Opportunities

- Most of the businesses' digital transformation in the IT sector.
- Increasing the use of IT infrastructure by many organizations and individuals.
- Government Policies Supporting Sustainable IT Infrastructure.

Threats

- Intense competition from other telecom providers.
- Economic challenges and fluctuating market demand.
- Introducing satellite-based Internet access to the public such as Starlink.

Chapter 2 : Training Experience

2.1 Introduction

My internship at Sri Lanka Telecom PLC commenced on the 25th of June 2024, with a warm welcome to the digital platform section in the department of business development. During my six-month internship at Sri Lanka Telecom, I gained a lot of experience in a diverse set of technologies such as Docker, Kubernetes, Jenkins, Azure cloud, AWS cloud, Networking resources, Firewalls, Internet, Data Centers, Servers, Cabling Systems, Hosting and many more. My supervisor was Engineer at Digital Help Desk – Mr. Pamuda Balasooriya.

It was a great pleasure to work under the guidance and supervision of a great team and the largest Internet Service Provider in Sri Lanka. Throughout my internship, I actively engaged in activities that enhances my technical skills and broadened my knowledge in the field of telecommunications and IT infrastructure. I diligently attended the office daily and actively participated in the weekly meetings held every Monday. With a strong commitment to completing my assigned tasks efficiently, I consistently sought feedback from my supervisor and expressed enthusiasm for taking on new challenges and responsibilities.

2.2 Hosting a simple web application in local network

In the first week of my internship, I was assigned a task to host a website on a local network using a Docker container. This required installing Oracle VirtualBox and Docker on my laptop, creating a virtual machine, and subsequently hosting the website. I thoroughly studied the requirements and initiated the task with enthusiasm. During the process, I encountered several challenges, which I addressed by utilizing online resources and seeking assistance from colleagues in the workplace. This experience not only enhanced my technical skills but also significantly improved my interpersonal communication abilities, as it involved active collaboration and problem-solving in a professional environment.

2.3 Working with Jenkins.

From the second week onward, I was assigned tasks related to hosting applications in the cloud, utilizing tools such as Jenkins to create automated CI/CD pipelines. During this phase, I gained valuable experience in scripting for automation, configuring build jobs, and creating virtual machines. The transition to cloud hosting work presented several challenges, particularly as I navigated the complexities of cloud infrastructure and automation processes. However, I approached these challenges systematically, employing engineering best practices and critical problem-solving techniques. With determination and guidance from my team, I successfully completed the tasks, further enhancing my technical proficiency and understanding of cloud technologies.

2.4 Zabbix monitoring tool

The cloud team was later divided into two groups: a DevOps team and an Operations team, which specifically focused on system administration. I joined the Operations team and continued my work in this area. In the Operations team, our primary responsibility was working with Zabbix, a comprehensive monitoring tool for server management. I spent considerable time learning and exploring Zabbix, performing tasks such as VM monitoring and configuring notifications based on predefined thresholds. This work lasted for about one and a half months. Additionally, I briefly explored other monitoring tools like Prometheus and Grafana to broaden my understanding of the available monitoring solutions. After gaining a strong grasp of Zabbix, I concluded my work with it. I also created a comprehensive documentation on Zabbix, detailing my experience and the steps involved in working with the tool. Here is the link to the document for further reference.

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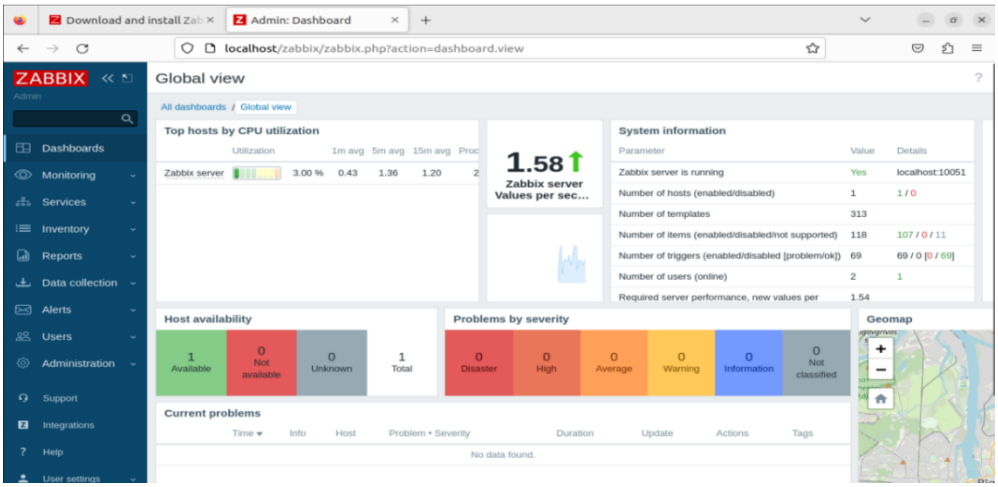

Image 01 : Zabbix dashboard

2.5 VMware ESXI and pfsense firewall

One of the most frequent tasks I engaged in during my internship involved working with VMware ESXi and pfSense firewall. I was responsible for creating multiple virtual machines on the testing server provided for trainees in the Digital Platform. Additionally, I configured NAT rules in pfSense to enable access to these resources. My role also involved managing and administering the testing server, where I diligently monitored the system and promptly troubleshot any issues that arose. This experience allowed me to gain extensive hands-on knowledge and deepen my understanding of VMware ESXi, pfSense, and system administration practices. Through consistent practice and exploration, I developed a strong technical proficiency in managing virtualized environments and network security.

I also created a detailed documentation on working with VMware ESXi and pfSense, outlining my experience and the steps I followed. Here is the link to the document for further reference.

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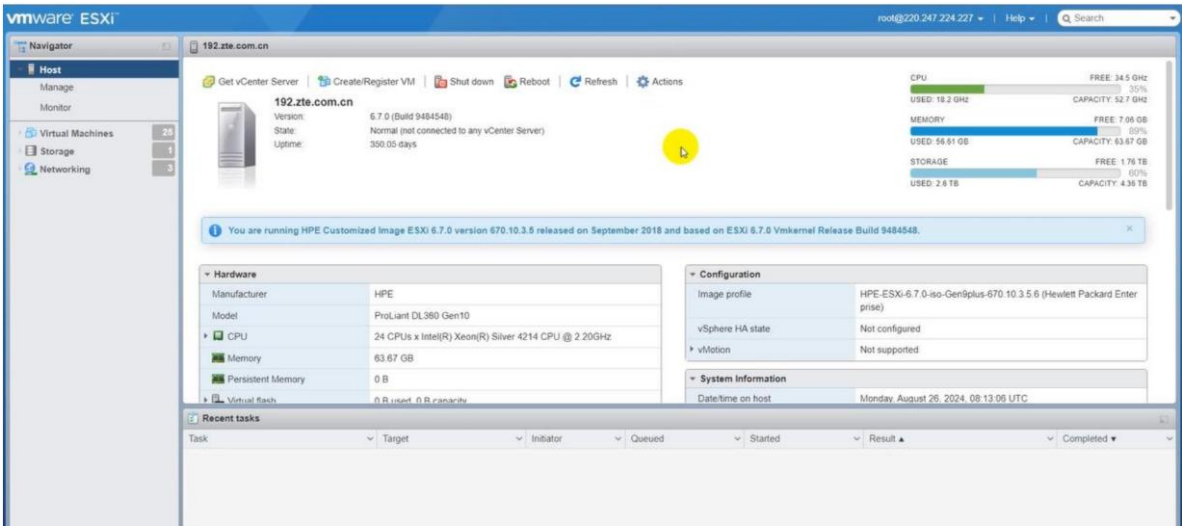

Image 02 : ESXI dashboard

2.6 Working with Microsoft Azure Cloud

After completing initial tasks, I began working extensively with Microsoft Azure Cloud. I referred to the official Azure documentation and followed a structured course to build my knowledge. My responsibilities included creating virtual machines and virtual networks, and hosting various applications using technologies such as Azure App Service, Docker, and Kubernetes on virtual machines. To further contribute, I conducted a knowledge-sharing session on hosting a web application using Azure App Service and authored several blog posts related to Azure technologies.

This phase of my internship provided a profound hands-on experience with Azure, allowing me to go beyond theoretical knowledge and put concepts into practice. I dedicated significant time and effort, working day and night to explore and master the platform. A significant milestone during this period was preparing for and attempting the Microsoft Azure Administrator – Associate Examination, where I gained valuable insights despite narrowly missing the passing score. My supervisor, Mr. Pamuda Balasooriya, greatly supported me during this time, even facilitating the integration of SLT servers with Azure through Azure Connect, providing a practical understanding of hybrid cloud environments.

Working with Azure spanned almost the entire duration of my internship at SLT, enabling me to develop a strong command over cloud technologies. This invaluable experience solidified my passion for cloud computing and provided me with an excellent foundation for further career development in this field.

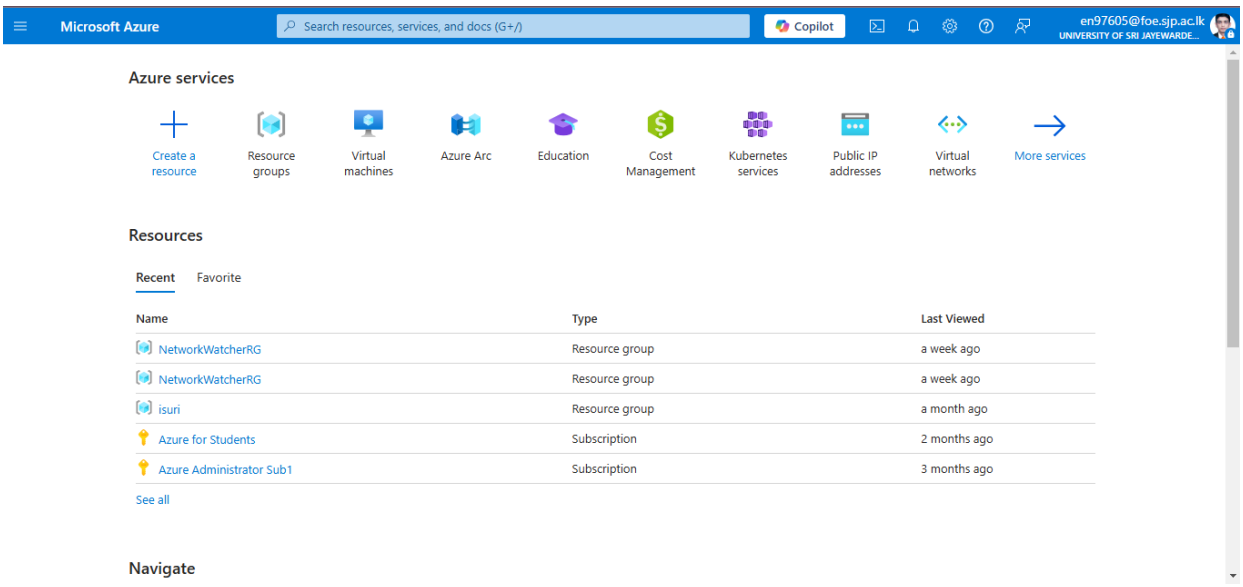

Image 03 : Azure portal

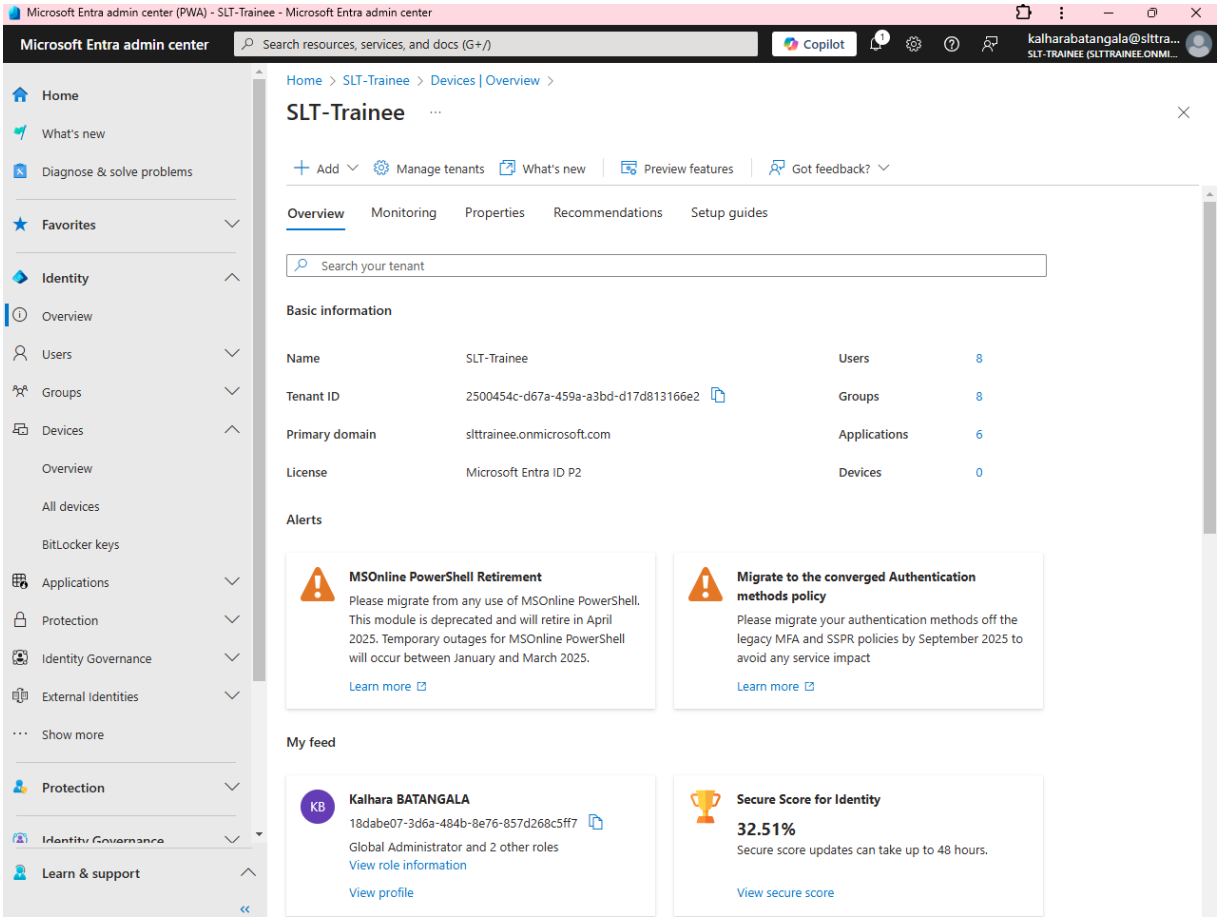

Image 04 : Microsoft Entra Admin Center

2.6.1 Hosting web applications

I hosted numerous web applications on SLT servers, as well as in Azure and AWS clouds, during my internship. Most of the hosting tasks were accomplished using Azure App Service, while Azure Virtual Machines (VMs) were occasionally utilized for specific requirements. Additionally, a couple of applications were hosted using Kubernetes, showcasing my versatility with container orchestration technologies.

Some examples of the hosted applications include a Node.js backend application, a React application, a Python project, and an Angular project, reflecting the variety of technologies I worked with. Throughout these tasks, I collaborated closely with my team and colleagues, ensuring the work was completed efficiently and met the set deadlines. This collaborative effort not only enhanced my technical expertise but also strengthened my ability to work as part of a team to achieve common goals.

2.7 Data Center Visit

In the latter part of my internship, I had the privilege of gaining invaluable experience through visits to SLT's datacenters, which are critical hubs for managing and maintaining the company's extensive IT infrastructure. Sri Lanka Telecom owns several datacenters, and our first visit was to the datacenter located on the 3rd floor of the headquarters building. This visit was guided by my supervisor and the Chief Engineer at IDC - SLT, who provided an in-depth explanation of the datacenter infrastructure, including its role in supporting cloud services, enterprise applications, and internet traffic management. The visit significantly enhanced my understanding of how datacenters form the backbone of modern IT ecosystems and their critical role in ensuring seamless digital operations for businesses and individuals.

The experience of visiting this datacenter was particularly enlightening, as it highlighted the interconnection between hardware resources such as servers, storage systems, and network equipment, and the software platforms that enable cloud computing and virtualization. By witnessing the physical setup, including the server racks, power systems, cooling mechanisms, and security measures, I was able to better grasp the practical aspects of managing cloud resources and ensuring the high availability and reliability of hosted services. This understanding was invaluable for my work in the cloud section, where I regularly dealt with hosting and maintaining applications.

A few weeks later, I had the exceptional opportunity to visit the National Datacenter in Pitipana, which is the largest datacenter in Sri Lanka and a flagship facility of SLT. This visit provided a holistic perspective on the scale, complexity, and criticality of datacenter operations. The National Datacenter serves as a central hub for hosting large-scale enterprise solutions, government applications, and high-demand cloud services. The staff conducted a comprehensive tour, explaining the sophisticated technologies and systems in place, including redundancy mechanisms, disaster recovery setups, and energy-efficient infrastructure. They also elaborated on how these components interconnect to deliver uninterrupted service even in the face of hardware failures or external threats.

One of the most remarkable aspects of this visit was gaining access to restricted areas, such as the panel room, which is typically off-limits to external visitors due to its critical role in power distribution and monitoring. Witnessing these operations firsthand offered me a rare and valuable opportunity to understand how datacenters ensure uptime and reliability, which are essential for maintaining customer trust in SLT's services.

The importance of these datacenter visits cannot be overstated. They allowed me to bridge the gap between theoretical knowledge and real-world applications. Understanding the physical and operational aspects of datacenters provided context for the tasks I performed during my internship, such as configuring virtual machines, setting up cloud environments, and monitoring systems. Additionally, the visits emphasized the interconnectedness of various teams—such as the cloud team, network operations, and system administration—and how their collaborative efforts ensure the smooth functioning of datacenters.

Overall, these visits reinforced my appreciation of the critical role datacenters play in enabling digital transformation, supporting enterprise growth, and ensuring national IT infrastructure resilience. They also deepened my understanding of how datacenter knowledge is essential for professionals in cloud and IT fields, as it equips them to design, deploy, and manage robust and efficient solutions.

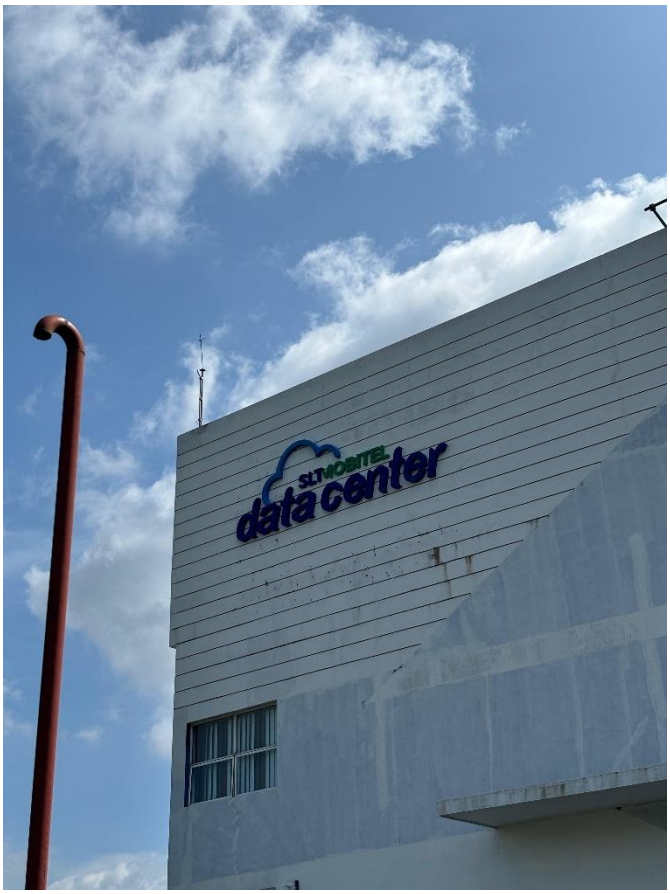

Image 05 : National Datacenter - Pitipana

Image 06 : Uptime Institute Certification for Tier III Facility

Image 07 : Uptime Institute Certification for Tier III Design

Image 08 : Inside of a Power Management Module (PMM)

Image 09 : Generator installed in generator room

Image 10 : Battery rack in battery bank

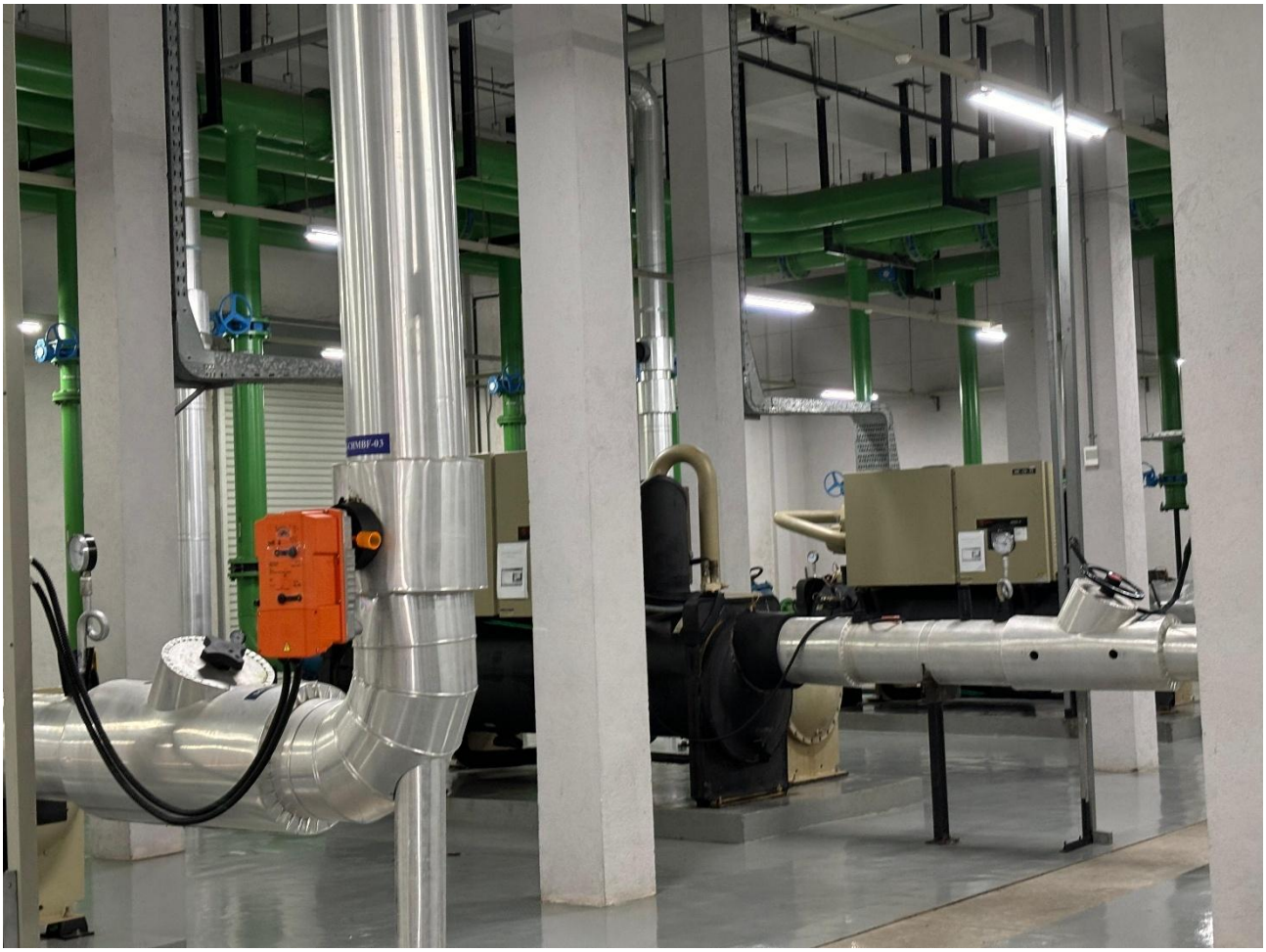

Image 11 : Inside of Chiller room

2.8 Working with Kubernetes clusters

After completing my work on cloud technologies, I transitioned to working with container orchestration tools, specifically Kubernetes, which plays a pivotal role in managing containerized applications at scale. To get started, I referred to the official documentation of Kubernetes and supplemented my learning with video tutorials to develop a solid foundational understanding of its architecture. This included concepts such as the control plane, worker nodes, pods, and deployments, as well as how Kubernetes automates application management tasks like scaling, self-healing, and load balancing.

With this basic knowledge in place, I moved on to practical implementation. I utilized Azure Virtual Machines to set up a Kubernetes cluster with three nodes, using Red Hat VM**s** as the underlying operating system. Setting up the cluster was a hands-on process that involved configuring the necessary components, such as the Kubelet, Kube-proxy, and API server, to ensure the nodes communicated effectively and operated as a cohesive system.

Once the cluster was operational, I began experimenting with deployments and pod management. I deployed several applications on the cluster to observe how Kubernetes manages resources and ensures high availability. One of the most fascinating aspects of this work was testing the self-healing capabilities of Kubernetes. For instance, I manually destroyed running pods within the cluster and observed how Kubernetes automatically restored the desired state by recreating the pods to match the deployment configuration. This dynamic and automated recovery process underscored the robustness and efficiency of Kubernetes in maintaining application stability.

Additionally, I explored the monitoring capabilities of the Kubernetes cluster, using tools to track the health and performance of pods, nodes, and deployments. These tasks provided a deeper understanding of how Kubernetes simplifies the management of complex containerized environments, making it an essential tool for modern DevOps and cloud workflows.

Working with Kubernetes was an incredibly engaging and rewarding experience, as it allowed me to combine theoretical knowledge with practical application. It also gave me insight into how container orchestration tools empower organizations to efficiently manage scalable, resilient, and fault-tolerant systems in production environments. This work further enhanced my technical skills and prepared me for advanced tasks in cloud computing and DevOps.

2.9 Introduction to ELK stack

Although relatively brief, one of the intriguing tasks during my internship involved working with the ELK Stack (Elasticsearch, Logstash, and Kibana). This was a completely new area for me, as I had never even heard of the term before being assigned this task. One of my supervisors requested that I create a virtual machine (VM) and install the ELK Stack on it. Despite my unfamiliarity, I eagerly accepted the challenge as an opportunity to learn something new.

To begin, I referred to online tutorials and documentation to understand the purpose and setup process of the ELK Stack. Following the instructions step by step, I successfully installed and configured the stack on the VM. Exploring its functionalities, I learned how Elasticsearch is used for indexing and searching data, how Logstash processes and transforms log data, and how Kibana provides a user-friendly interface for visualizing the collected data. This hands-on experience offered a glimpse into the potential of the ELK Stack for log aggregation, monitoring, and analytics in real-world scenarios.

As part of this task, I was also required to install RabbitMQ, another tool I had no prior knowledge of. RabbitMQ is a message broker widely used for asynchronous communication between distributed systems. To better understand how it functions, I integrated a user interface into the Ubuntu server, enabling me to access and manage RabbitMQ via a web browser. This made it easier to observe how queues and messages are managed within the tool.

Although my exposure to these technologies was brief, the experience was valuable in expanding my understanding of log management and message brokering systems, as well as enhancing my ability to adapt to unfamiliar tools and concepts. It also highlighted the importance of exploring and experimenting, which was made possible thanks to the encouragement and guidance of my supervisors.

2.10 Working with Windows Active Directory

Another significant task I undertook during my internship at SLT was working with Active Directory (AD) on Windows Server machines. This task provided me with valuable hands-on experience in managing and administering users and groups within an organizational setup. I began by installing Active Directory services, creating users and groups, and exploring the various administrative functionalities it offers. Active Directory is a critical tool widely used to centralize and streamline user management, ensuring that organizational resources are accessed securely and efficiently.

One of my key responsibilities involved enforcing password policies to enhance security and define access privileges for different user groups. Additionally, I had the opportunity to integrate these on-premises servers with Azure Active Directory (AAD) using Azure Connect, which bridges the gap between local infrastructure and cloud services. This integration allowed me to gain a deeper understanding of hybrid cloud environments and how they can be utilized to achieve seamless user authentication and efficient resource management across both on-premises and cloud systems.

This task not only improved my system administration skills but also solidified my understanding of identity and access management in a hybrid infrastructure. It demonstrated the importance of having a cohesive strategy for managing users and resources in a way that combines the strengths of on-premises servers with the scalability and flexibility of the cloud. Working with Active Directory and its integration with Azure was a fascinating experience that further enhanced my knowledge of IT infrastructure management and prepared me for future challenges in this domain.

2.11 Network troubleshooting

Another important aspect of my training at SLT was the extensive troubleshooting I had to perform on virtual machines (VMs) and network issues. These challenges were a regular part of my day-to-day responsibilities, requiring me to analyze problems, identify their root causes, and implement timely solutions. I often worked alongside my colleagues, whose insights and collaboration were invaluable in resolving complex issues.

This hands-on experience gave me an opportunity to experiment with new troubleshooting methods and apply problem-solving techniques to a variety of technical challenges related to computer systems. From diagnosing connectivity issues to addressing VM configuration errors, each task helped me develop a systematic approach to problem resolution. It also strengthened my technical skills in areas like networking, virtualization**,** and system administration, enabling me to handle real-world scenarios more confidently.

Overall, this troubleshooting experience not only enhanced my technical expertise but also improved my critical thinking and collaboration skills, preparing me to effectively tackle challenges in any professional IT environment.

2.12 Attending weekly progress meeting.

Every Monday morning, our team had a weekly progress meeting with the General Manager of Digital Platforms. These meetings served as a platform to discuss ongoing tasks, report on completed work, and assign new responsibilities. I attended all the meetings punctually, presenting updates on my progress and gaining a clear understanding of my next assignments.

During my internship, several projects were in progress, and as they neared completion in the latter part of my tenure, I was tasked with hosting these projects in the Azure cloud environment. This involved configuring cloud resources, deploying applications, and ensuring the hosted solutions met the required performance and reliability standards.

In addition to technical tasks, I was occasionally assigned to perform budgeting activities. For example, I prepared two separate budget reports for AWS and Azure, where I provided a detailed breakdown of estimated expenses for various cloud services. These reports were critical for decision-making related to purchasing cloud licenses and managing costs efficiently.

Another significant contribution was after my visit to the datacenter, where I compiled a comprehensive report based on my observations and the knowledge gained. This report provided detailed insights into the datacenter's infrastructure, operations, and its interconnection with cloud services. I presented this report to my supervisors, which further solidified my understanding of datacenter operations and its importance to cloud computing.

2.13 Ubuntu XRDP

While working with Ubuntu Server, there were instances where a graphical user interface (GUI) became necessary for specific tasks. In such cases, I installed a lightweight UI called XFCE using XRDP Server. This setup provided remote access to the server with a user-friendly interface, offering a practical alternative to working solely with the command line.

I found XFCE to be an excellent choice due to its simplicity and lower resource consumption compared to the more complex GNOME UI. This approach allowed me to efficiently manage tasks on the server while maintaining optimal performance, especially on systems with limited resources. Implementing this solution enhanced both my understanding of server configurations and my ability to adapt to various working environments.

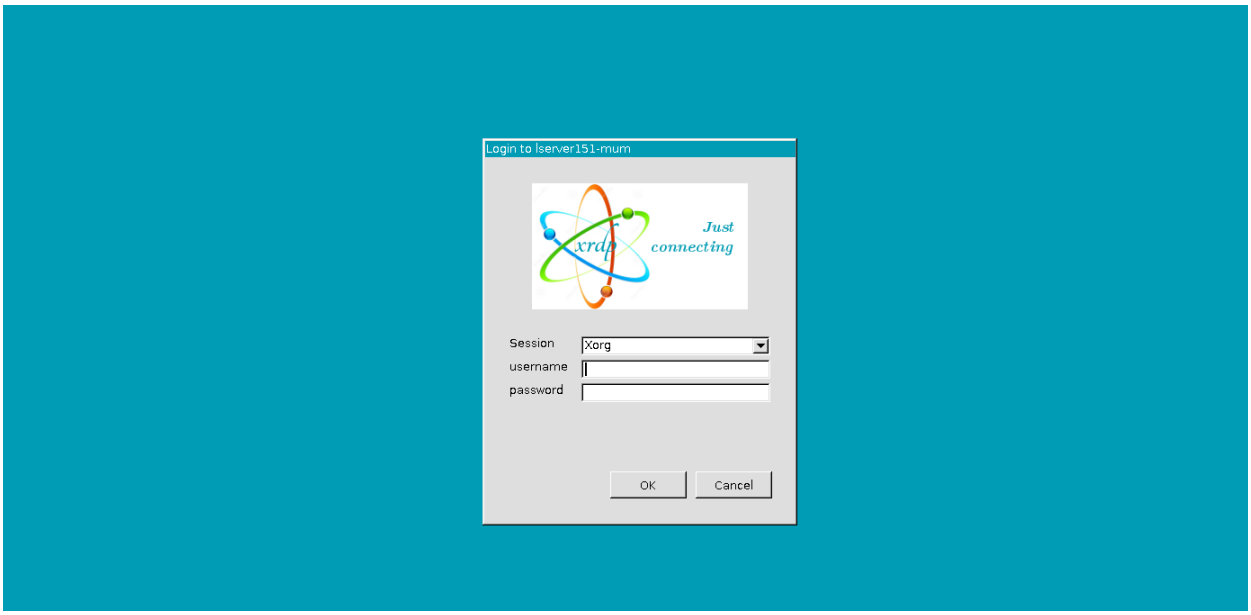

Image 12 : xrdp login Interface

2.14 System Administration

During my internship, I had the opportunity to install and work with a variety of operating systems, including Windows, Ubuntu, Rocky Linux, and CentOS. For most system administration tasks, I primarily utilized Linux systems due to their widespread use in the industry and their resilience against security threats. This hands-on experience allowed me to develop a deeper understanding of system administration and implement industry best practices effectively.

In addition to operating systems, I installed and configured several tools and platforms, such as MongoDB for creating Mongo clusters, RabbitMQ, and Docker. These tasks improved my ability to deploy and manage software environments. I also explored Kali Linux for network scanning and testing, focusing solely on learning and experimentation to expand my understanding of network security concepts.

This diverse exposure not only enhanced my technical proficiency but also strengthened my ability to handle various operating systems and tools with confidence in a real-world professional environment.

Chapter 3 : Conclusion

My six-month industrial training at Sri Lanka Telecom (SLT) has been an invaluable and transformative experience that significantly enhanced my technical knowledge, interpersonal skills, and overall professional capabilities. Throughout this internship, I had the opportunity to immerse myself in a wide range of technologies, tools, and tasks that are critical to the field of computer engineering, particularly in cloud computing, system administration, and telecommunication.

From the very first week, I was entrusted with hosting a website in a local network using Docker containers. This seemingly small task allowed me to familiarize myself with Oracle VirtualBox, Docker, and virtual machine setups. As the weeks progressed, I delved deeper into cloud computing, working extensively with Microsoft Azure to host applications, create virtual machines, build virtual networks, and explore Azure services like App Service, Docker, and Kubernetes. This hands-on experience equipped me with practical skills and a thorough understanding of cloud concepts, which I was able to apply effectively to real-world projects.

I also gained experience in container orchestration through Kubernetes, where I set up a three-node cluster on Azure using Red Hat VMs, monitored pods, and explored how clusters self-heal. Additionally, I worked with the ELK stack and RabbitMQ, which were entirely new to me at the time, broadening my knowledge of monitoring tools and message-broker technologies.

My role in the Operations Team further sharpened my skills in system administration and server monitoring. Using tools like Zabbix, I configured notifications and monitored virtual machines, gaining hands-on exposure to comprehensive monitoring tools. I also explored Prometheus and Grafana for similar purposes, further deepening my understanding of server and network management.

One of the highlights of my internship was hosting various applications both on SLT's private servers and in Azure and AWS environments. I worked collaboratively with my team to host Node.js backend applications, React apps, Python projects, and Angular projects. These tasks honed my teamwork, problem-solving, and time-management skills while ensuring that projects were delivered on schedule.

An exceptional experience during my internship was visiting SLT's datacenters at both the headquarters in Colombo and the National Datacenter in Pitipana. These visits offered me a rare opportunity to understand the infrastructure, operations, and security protocols of datacenters, which are pivotal in supporting cloud services and telecommunications. The insights I gained during these visits enhanced

my theoretical knowledge and tied them to practical applications, enriching my overall understanding of the field.

System administration was another area where I developed significantly, particularly in working with VMware ESXi, pfSense firewalls, and Active Directory. I installed and managed multiple operating systems, including Windows, Ubuntu, Rocky Linux, and CentOS, and used Linux for tasks requiring robust security and performance. Troubleshooting virtual machine and network issues was a frequent part of my work, which allowed me to refine my analytical thinking and engineering problem-solving skills.

Despite the rigorous nature of the internship, there were areas where I identified potential for growth. For instance, while I gained hands-on experience with technologies like Kubernetes and RabbitMQ, I realized the need to deepen my theoretical understanding of such tools. I also recognized a few gaps in my expertise in scripting and automation, which I aim to rectify during my final year of study.

From an organizational perspective, SLT provided an excellent training environment, offering abundant resources and support for interns to learn and thrive. However, I believe future trainees could benefit from a more structured mentorship program, with periodic check-ins and tailored guidance to align tasks with individual interests and learning goals.

On a broader scale, the collaboration between the University and NAITA could be strengthened by introducing pre-internship workshops focused on familiarizing students with basic industry tools and practices, which would help them hit the ground running during their internships.

In reflecting on my overall experience, I can confidently state that the internship exceeded my expectations. I gained not only technical expertise but also valuable soft skills, such as teamwork, communication, and adaptability. This period of industrial training has been a cornerstone in my journey toward becoming a competent and confident computer engineer, and I am truly grateful for the opportunity to work with SLT, the largest ISP in Sri Lanka.

Moving forward, I plan to build on the skills and knowledge I acquired during this internship to tackle more complex challenges in my academic and professional career. The lessons I learned, both technically and personally, will serve as a solid foundation as I continue to grow in this dynamic and ever-evolving field.

Reference

[1] Sri Lanka Telecom, “Data Center,” [Online]. Available: https://www.slt.lk/en/business/datacenter. [Accessed: Nov. 2, 2024].

[2] IBM, “Determining General Guidelines for Data Centers,” [Online]. Available: https://www.ibm.com/docs/en/psw/2.3.0.0?topic=determination-general-guidelines-data-centers. [Accessed: Nov. 2, 2024].

[3] Nebula, “SLTMoBitel,” *Nebula*. https://www.slt.lk/en/sme-micro-business/data-center-cloud-services (accessed Jan. 28, 2025).

[4] Nebula, “SLTMoBitel,” Nebula. https://www.slt.lk/en/business/products/akaza-multi-cloud-services

[5] https://www.facebook.com/TheServerAcademy, “Active Directory Console Overview - Server Academy,” *Server Academy*, 2025. https://www.serveracademy.com/courses/active-directory-fundamentals/active-directory-console-overview/ (accessed Jan. 28, 2025).

[6] Warley's CatOps, “ELK Stack: The Essentials of Elasticsearch, Logstash, and Kibana,” *Medium*, May 03, 2024. https://medium.com/@williamwarley/elk-stack-the-essentials-of-elasticsearch-logstash-and-kibana-3a09ff647352

[7] RedSwitches, “How to Install ELK Stack on Ubuntu 20.04 / 22.04 | Medium,” *Medium*, Jul. 24, 2024. https://medium.com/@redswitches/how-to-install-elk-stack-on-ubuntu-20-04-22-04-2c4f13a08c63 (accessed Jan. 28, 2025).

[8] P. Kashyap, “How to Install XRDP on an Ubuntu Machine: A Simple Guide,” *Medium*, Jul. 18, 2024. https://medium.com/@piyushkashyap045/how-to-install-xrdp-on-an-ubuntu-machine-a-simple-guide-1e229214aa36 (accessed Jan. 28, 2025).