MBARARA UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

INDUSTRIAL TRAINING REPORT AT CODINEX COMPUTERS LTD

BY AINOBUSINGYE PASCAL

2021/BCE/004/PS

Industrial Training Report submitted to the Faculty of Applied Sciences and Technology in partial fulfillment of the requirements for the award of Bachelors Degree of Science in Computer Engineering

Supervisor:

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DECLARATION

I AINOBUSINGYE PASCAL declare that all the contents in this report is my own work, obtained at the place of industrial training for the period of 10th June to 2nd August 2024 which is written in partial fulfillment of the requirements of the award of a Bachelor of Computer Engineering degree at DigBit Technologies and it provides a detailed account of activities, duties, projects that were carried out and experiences gained during the whole training period at the Exclusive Training which are explained in the following chapters as summarized below;. Any work that does not belong to me has been duly referenced.

Signature: …… Date: ……

AINOBUSINGYE PASCAL

2021/BCE/004/PS

APPROVAL

This is to confirm that this work has been submitted with the approval of the following supervisors.

Date: …… Signature: ……

NAMUGERA PETER

University Supervisor

Date: …… Signature: …….

MR. ASIIMWE ROBERT

ACKNOWLEDGEMENT

I begin by thanking the Almighty God who enabled me complete my internship successfully.

Special to thanks my supervisor Mr. Namugeera Peter and the entire team including Ssewante John Bosco, Emmanuel Akatuhebwa, Mr. Natamba Albert for their continuous efforts, guidance and various trainings throughout the industrial training process.

I also extend my sincere gratitude to my fellow internees including Ssekanyi Shadrack, Lomuro Joseph Kanjaga, Katusiime Clare and others for their cooperation they showed as far as team work is concerned. This made the training simpler and interesting.

ABSTRACT

This report documents the industrial training experience I undertook at Dig Bit Technologies, focusing on the practical application of computer engineering principles in a professional environment.

The internship provided an opportunity to bridge the gap between theoretical knowledge acquired during my studies and the real-world challenges faced in the field.

During the training period, I engaged in various activities, including database design for a school library management system, programming in Laravel, data analysis, and hardware repairs. Each of these tasks presented unique challenges that enhanced my technical skills and problem-solving abilities.

I also faced difficulties with initial database design, technical issues with training equipment, programming bugs, and data cleaning processes. Collaborating with colleagues allowed me to overcome these challenges, fostering a supportive learning environment that emphasized teamwork and communication.

The report also highlights the learning outcomes from the internship, showcasing significant professional growth through hands-on experience. Feedback from supervisors underscored my progress and provided valuable insights for future development.

Based on the challenges faced and lessons learned, recommendations were made for both the university and fellow students. Increasing the number of internship opportunities, encouraging proactive engagement during holidays, and enhancing support through seminars and workshops were suggested to improve the internship experience for future cohorts.

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LIST OF ACRONYMS

IT Information Technology

HTML Hypertext Markup Language

CSS Cascading Style Sheet

PHP Hypertext Preprocessor

SQL Structured Query Language

PC Personal Computer

API Application Programming Interface

RDBMS Relational Database Management System

IDE Integrated Development Environment

PS Photoshop

CMOS Complementary Metal Oxide Semiconductor

PCI Peripheral Component Interconnect

USB Universal Serial Bus

CAT Category

DHCP Dynamic Host Control Protocol

ISO International Organization for Standardization

MUST Mbarara University of Science and Technology

VGA Video Graphics Array

IP Internet Protocol

AP Access Point

WAMP Windows/Apache/MySQL/PHP

BIOS Basic Input Output System

PATA Parallel Advanced Technology Attachment

HDMI High-Definition Multimedia Interface

RAM Random Access Memory

ROM Read Only Memory

SATA Serial Advanced Technology Attachment

CHAPTER ONE: INTRODUCTION

Industrial Training is designed as a platform for students to adapt to the working environment outside. Industrial Training is also intended for students to apply what they have learned. Recognizing the importance of Industrial Training, Faculty of Applied Sciences and Technology (FAST) provides the opportunities for students of all programs to undergo Industrial Training.

Industrial Training at Mbarara University of Science and Technology is one of the compulsory courses for all students to fulfil the conferment of;

- Bachelor of Engineering in Electrical and Electronic Engineering (BEng. EEE)
- Bachelor of Biomedical Engineering (BME)

Industrial Training Objectives

Industrial Training is implemented to meet the following objectives;

i. To expose the students to the real working world before graduating.

ii. To provide an opportunity for students to relate the theoretical and practical understanding through industrial training programs in organizations where students are placed.

iii. To provide opportunities for private organizations, statutory bodies, government departments and non-governmental organizations to transfer experience and expertise to students working towards the creation of a professional worker.

iv. To establish and strengthen bilateral relations between MUST-FAST and the organization or firm involved in the industrial training program for mutual benefits.

CHAPTER TWO: COMPANY'S ORGANISATION STRUCTURE AND BACKGROUND.

INTRODUCTION:

Dig Bit Technologies has continued to grow and expand its services and technologies so as to be able to fulfil its mission and vision as extended more in this document below. The effective cause of the growth come from the famous slogan "Building you through technology".

Location: MBADIFHA Building Room 1-7, Akiiki Nyabogo Road opposite Steel and Tubes.

Contacts: Tel: 0750408383 OR 0773272803 / 0706882324

Email: support@digbittechnologies.net Website: www.digbittechnologies.net

Mission To create, add value and implement technological solutions.

Vision

To be a center of technology development at both national and international levels.

Core Values

We strongly believe in customer satisfaction, honesty, mutual respect, and walking the extra mile which is evidence in our attitude.

BACKGROUND:

Background DigBit Technologies is an ICT company which was founded by individuals from different backgrounds but with the same vision of making technology a way to the next generation world of better living. It was a year 2016 when four individuals started up DigBit Technologies. And its founders are:

Namugera Peter, He graduates with a Bachelor's Degree in Computer Engineering majoring in Computer Hardware from Mbarara University of Science and Technology.

Muhoozi Elias He is a Computer Engineer majoring in Data Communication. He graduated from Mbarara University with a Bachelor's Degree in Computer Engineering.

Amon Nuwahereza who graduated from Mbarara University of Science and Technology with a Bachelor's Degree in Physiotherapy.

Musinguzi Ivan James who has a Bachelor's Degree in Computer Engineering Majoring in Data Communication. He graduated from Mbarara University of science and Technology.

SERVICES;

Services DigBit Technologies offers a wide range of services to individuals, companies and the general public at large. Some of the services offered by DigBit Technologies are elaborated below.

Computer Software With the experienced staff at DigBit, all kinds of software programs are designed, developed, tested and implemented all over the world. The categorization of software falls under computer applications, mobile application, and web application and networking software's. DigBit Technologies has also got website hosting facilities and domain name purchase packages.

Embedded Systems From simple circuits design to robotics, DigBit technologies has all the needed equipment and personnel for embedded systems and robotics. And has also partnered with other innovation hubs like HiveColab to bring many projects to a success.

Computer Networks. DigBit Technologies has got a number computer networks professionals. The services offered here include: - Network design and simulation, LAN and WAN Management, Network installations and setup, Network testing, and all the need networking material sales and repair. Computer Sales and Repair DigBit Technologies imports new and used computer systems. Provision of quality computer sales, repair and maintenance service for individuals, companies and organization is one of the company's services.

ICT consultancy and Innovation, the major thing which has kept technology growing is the amazing innovations day after day. DigBit Technologies has got several services which help in growing technology, some of these are the provision of consultancy services and a well-equipped technology innovation hub.

COMPANY ORGANIZATIONAL STRUCTURE:

DigBit Technologies Organization Structure. Under industrial training, the student/intern works with the trainer/instructor. From the instructor there is a supervisor who shares views with the technical director. The technical director finally reports to the board of directors

CHAPTER THREE: INDUSTRIAL TRAINING ACTIVITIES

PROJECT: Development of School Library Management System

The main project assigned to me was the development of a School Library Management System using the Laravel framework. Building on my prior knowledge from a previous internship, this project was a comprehensive system aimed at streamlining library operations.

System Features

- **Student and teachers' Information Management**: The system captures detailed information about students and teachers, including personal details and borrowing history.
- **Book Management:** It maintains a database of books, tracking availability, and categorization.
- **Borrowing and Returning:** The system checks book availability and manages the issuing and return processes. It also calculates fines for overdue books, providing an automated way to manage penalties.
- **Reporting:** Generates reports on book circulation and student borrowing patterns.

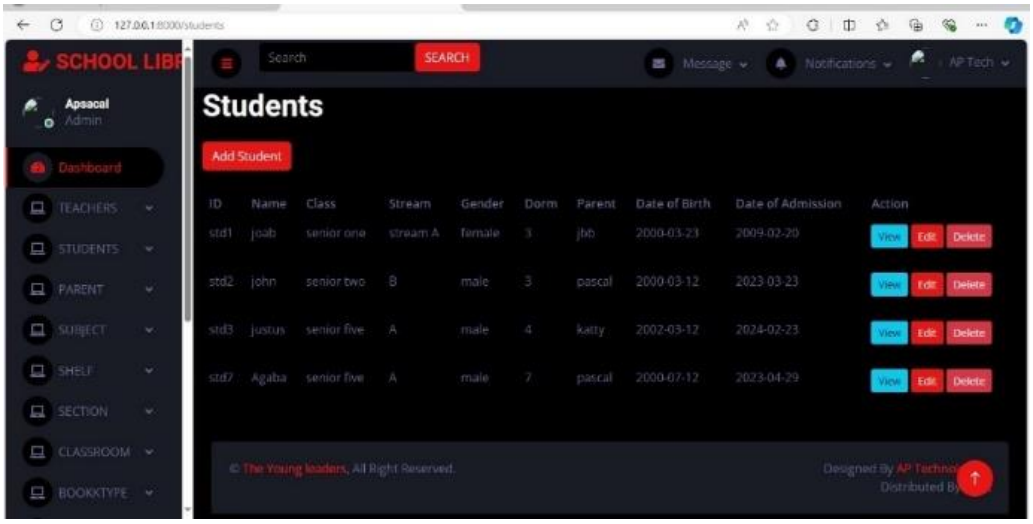

Figure 1:Showing student registration

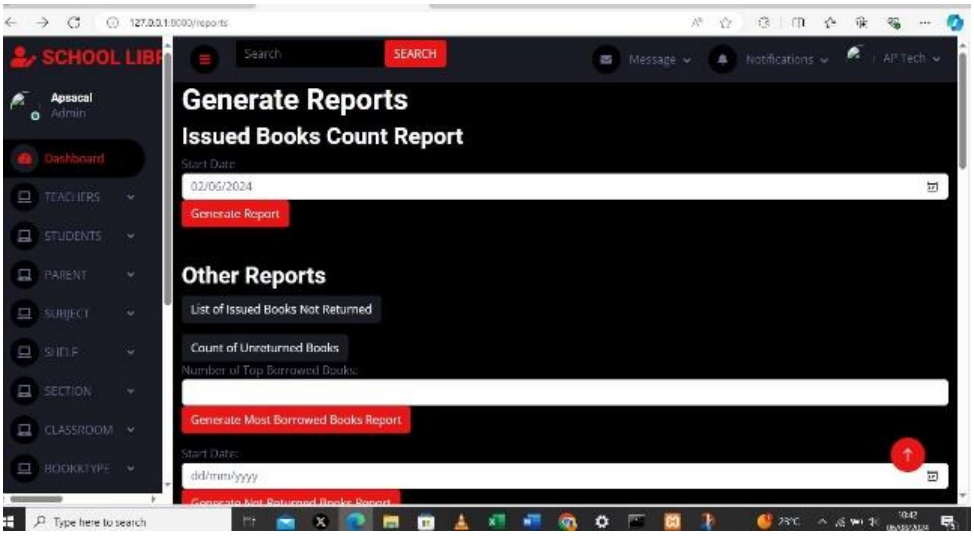

Figure 2:Showing reports

Key Technologies and Tools Used

Laravel Framework

Laravel is a PHP-based web application framework known for its elegant syntax and developer-friendly features. It provides a robust structure for backend development, simplifying tasks such as routing, authentication, and database migrations.

During the internship, Laravel was utilized for developing the backend of the School Library Management System. It handled the core business logic, including user authentication, managing book records, tracking issued books, and calculating fines for overdue returns. Laravel's MVC (Model-View-Controller) architecture facilitated a clear separation of concerns, making the codebase more organized and maintainable.

MySQL

MySQL is a widely-used open-source relational database management system (RDBMS). It is known for its reliability, robustness, and ease of use, making it a popular choice for storing and managing structured data.

MySQL was used to store all the data related to the School Library Management System. This included tables for student information, book details, issued books, and fines. The relational nature of MySQL allowed for efficient querying and management of data relationships, such as linking students to their borrowed books and calculating fines based on return dates.

HTML, CSS, JavaScript

These technologies form the backbone of web admin Dashboard development. HTML (Hyper Text Markup Language) structures the content of web pages, CSS (Cascading Style Sheets) styles and layouts the appearance, and JavaScript adds interactivity and dynamic features.

The admin Dashboard of the system was designed using HTML, CSS, and JavaScript to ensure a responsive and user-friendly interface. HTML was used to structure the web pages, CSS to style the application and make it visually appealing, and JavaScript to add interactivity, such as form validations and dynamic content updates. Together, these technologies provided a seamless and intuitive user experience.

Development Process

Project Proposal and Planning

The first step involved defining the project's objectives and planning its execution. This was critical for setting clear expectations and guidelines.

After discussions with my supervisors, I proposed the School Library Management System as the primary project for the internship. The proposal outlined key features such as student information management, book cataloging, book availability checks, and fine calculations for late returns. Additionally, the scope, timeline, and milestones were drafted, detailing the expected deliverables at each project phase.

System Design

The system design phase aimed to lay a strong foundation for the application by planning its architecture and user interface. It involved the following:

- **Database Schema Design:** Designed the database schema, defining the structure of tables and relationships between them. Key tables included students, books, issues, and fines. This schema ensured efficient data storage and retrieval.
- **Application Architecture**: Designed the application architecture using Laravel's MVC pattern. This included defining models for interacting with the database, views for the front-end, and controllers to manage the logic.
- **Wireframes and UI Design**: Created wireframes for the application's user interface, outlining the layout and navigation flow. This step ensured a coherent and intuitive design, providing a clear blueprint for admin dashboard development.

Implementation

The implementation phase focused on developing the application's core features and functionalities. It included the following:

- **Backend Development:** Developed the backend using Laravel, implementing essential features such as user authentication (registration and login), CRUD operations (Create, Read, Update, Delete) for managing books and students, and fine calculations for overdue books.
- Admin Dashboard **Development:** Built the admin dashboard using HTML, CSS, and JavaScript. This included creating pages for librarian login, book listing, book issue/return forms, and a dashboard for library management.

Testing

To ensure the system's functionality, reliability, and security, testing had to be done which involved;

- **Unit Testing**: Tested individual components and functions, such as database queries and business logic, to verify they worked correctly in isolation.
- **Integration Testing:** Tested the interaction between different modules, ensuring that they integrated seamlessly and that data flowed correctly across the system. For example, checking that issuing a book updated the availability status and recorded the transaction in the database.

Deployment

The system was later deployed on a local server that is XAMPP for demonstration and testing purposes. This involved setting up a local environment, configuring the server, and ensuring that the database was correctly linked and operational.

Additional testing in the deployment environment to identify and fix any issues that might arise in a real-world scenario was conducted. Feedback from supervisors and peers was collected to refine the system.

Printer Repair and Maintenance

The internship provided valuable hands-on experience in hardware maintenance, particularly focusing on printers. I was trained to diagnose and repair common printer issues, enhancing my practical skills in hardware troubleshooting.

I gained proficiency in identifying and resolving issues such as paper jams, toner problems, and connectivity errors and I also learnt how to disassemble and reassemble printer components safely.

I performed basic mechanical repairs, including fixing paper feed mechanisms, replacing toner cartridges, and cleaning print heads which helped me to understand of the internal workings of various printer models.

I also installed printer drivers on multiple operating systems, ensuring compatibility and functionality. I configured printer settings for optimal performance and connectivity.

I also learnt how to fix and resolve issues like faded prints, ink smudges, and misalignments. We conducted maintenance tasks, such as calibration and print head cleaning.

Training and Mentoring

A significant part of my role was mentoring and training fellow interns. This responsibility not only enhanced my technical expertise but also developed my communication and leadership skills.

I conducted and delivered in-depth sessions covering the fundamentals of Laravel, including its MVC architecture, routing, middleware, and database handling with Eloquent ORM. Provided practical exercises to build simple web applications, reinforcing the theoretical concepts.

I also educated interns on designing efficient databases, focusing on normalization, indexing, and query optimization. Taught SQL commands and best practices for database management and security.

I also introduced HTML and CSS, demonstrating how to create responsive and visually appealing web pages. Covered essential topics like grid systems, media queries, and basic JavaScript for interactivity.

The training sessions significantly improved the technical competencies of the interns where eight internees benefited from the training sessions. The collaborative learning environment fostered a sense of teamwork and mutual support, enhancing the overall learning experience.

Data Analysis and Visualization:

During my internship, I also immersed myself in data analysis, focusing on developing a robust skill set using Pandas, a versatile Python library. This activity covered various facets of data analysis, from understanding different data types to mastering the data analysis cycle. The experience also included practical training in data wrangling, qualitative data analysis, and key concepts crucial for data analysts. Below is a detailed account of the data analysis activity, outlining the skills and knowledge acquired.

The data analysis activity aimed to provide a holistic understanding of data management and interpretation. The training covered the entire data analysis pipeline, including data collection, cleaning, exploration, modeling, and reporting. The use of Pandas and other Python tools enabled efficient data manipulation and analysis, making it possible to derive meaningful insights from complex datasets.

Types of Data

A fundamental aspect of the training was understanding the different types of data, which play a crucial role in determining the analytical methods used and they include:

- Descriptive Data: This type of data provides summary statistics, such as mean, median, mode, range, and standard deviation. These statistics offer a quick overview of the dataset's central tendency and variability.
- Inferential Data: This data type involves making predictions or generalizations about a population based on a sample. Techniques such as hypothesis testing and confidence intervals are commonly used.
- Qualitative Data: Non-numeric data that describes attributes or qualities. It includes:
- Nominal Data: Categories without a natural order (e.g., colors, product types).
- Ordinal Data: Categories with a ranked order (e.g., customer satisfaction levels).
- Quantitative Data: Numeric data that can be quantified and includes:
- Discrete Data: Countable items (e.g., number of students).
- Continuous Data: Measurable quantities (e.g., height, weight).

Key Questions in Data Analysis

During the training, we focused on several critical questions that can easily help you to do a clear and effective data analysis and they included the following:

- What is the nature of the data?
- What patterns or trends are evident in the data?
- How can the data be summarized effectively?
- What inferences can be drawn from the data?
- How can the findings be visualized and communicated?

The Data Analysis Cycle

We also discussed about the data analysis cycle which is a structured approach to analyzing data and it consists of the following key steps:

Data Collection: Involves gathering data from various sources such as databases, APIs, surveys, and web scraping, ensuring relevance and accuracy.

Data Cleaning: The process of identifying and correcting errors, handling missing values, and addressing outliers, crucial for ensuring data quality.

Data Exploration: Conducting Exploratory Data Analysis (EDA) to understand the data's structure and relationships using visualizations, summary statistics, and correlation matrices.

Data Modeling: Applying statistical models or machine learning algorithms to analyze the data, including linear regression, decision trees, clustering, and classification.

Data Interpretation: Analyzing the results from data modeling to draw meaningful conclusions and assessing the model's accuracy.

Data Visualization: Creating charts, graphs, and other visual aids to represent the data and findings, crucial for communicating results to stakeholders.

Data Reporting: Documenting the analysis process, results, and conclusions in detailed reports and presentations.

Data Wrangling Process: Data wrangling involves preparing data for analysis by transforming and mapping raw data into a more useful format. The key stages in data wrangling include:

Discovery: Understanding the data sources, structure, and quality through data profiling.

Transformation: Converting data into the required format for analysis, including normalization, aggregation, and creating new variables.

Validation: Ensuring data accuracy and consistency through checks and corrections.

Publishing: Making the cleaned and processed data available for analysis, sharing, or reporting.

Essential Concepts for Data Analysts

I also learnt different essential concepts for data analysis which are very essential for deep understanding and performing effective data analysis. They include the following;

Understanding the Problem: Clearly defining the problem or research question and understanding the business context.

Setting Clear Metrics: Establishing criteria for measuring success and performance.

Gathering Data: Identifying relevant data sources and methods for data collection.

Cleaning Data: Preparing the data by addressing errors, missing values, and inconsistencies.

Analyzing and Mining Data: Applying statistical and computational methods to uncover patterns and insights.

Interpreting Results: Understanding the significance of the findings and drawing appropriate conclusions.

Presenting Findings: Communicating the results effectively through visualizations and reports.

Report Writing: Documenting the analysis process, methodologies, and conclusions in a comprehensive manner.

Data Sources

I also learnt different types of data sources which are essential for data analysis and also the types of data that can be stored there. They included the following;

Data Marts: Specialized subsets of data warehouses tailored for specific business units or departments.

Data Warehouses: Centralized repositories that store integrated data from multiple sources, optimized for query and analysis.

Data Lakes: Large storage systems that hold raw data in its native format, including structured, semi-structured, and unstructured data.

Data Pipelines: Automated workflows that transport data from sources to destinations, facilitating data processing and analysis.

Analysis of Qualitative Data

I was also trained on how to perform data analysis on qualitative data, which is non-numeric and which requires different analytical techniques. The process includes:

Arranging Data in Codes: Categorizing data into themes or codes to systematically organize and analyze it.

Taking Frequencies: Counting the occurrences of each code to identify common themes.

Using a 7-Point Scale: A method to quantify qualitative data, where responses are rated on a scale from 1 to 7. This helps standardize responses and allows for statistical analysis.

Tools and Technologies Used

Pandas: A Python library used for data manipulation and analysis. It provides powerful data structures like DataFrames and Series, essential for handling structured data.

Python: The primary programming language used for scripting and implementing data workflows. Python's rich ecosystem of libraries, such as Pandas, NumPy, Matplotlib, and SciPy, supports various aspects of data analysis.

Beyond the integration with Python, I developed significant skills in using Microsoft Excel for data analysis:

I learnt how to use pivot tables, a powerful feature in Excel that allows for dynamic data summarization and analysis. With pivot tables, I learned how to quickly reorganize data, filter large datasets, and generate insightful summaries by grouping and categorizing information. This capability was particularly useful for analyzing trends, comparing metrics, and creating detailed reports.

In addition to pivot tables, I also became proficient in creating different types of pivot charts, which provided visual representations of the data summaries. By using pivot charts, I could easily convey findings and trends in a more digestible format, making it easier to communicate insights to stakeholders or team members. These visual tools were essential for translating raw data into actionable information, allowing for more informed decision-making.

I also gained experience in converting comma-delimited data (CSV files) into Excel format. This skill is critical when working with data exported from various sources that need to be organized and analyzed within Excel. I learned how to import such data into Excel and then manipulate it to fit the desired format, ensuring that the data was clean and ready for analysis.

Data validation was another crucial aspect of my Excel training. I learned how to set up validation rules within Excel to ensure that the data entered met specific criteria. For example, I could configure cells to accept only integers, text, or date formats, depending on the type of data being collected. This practice is essential for maintaining data integrity and accuracy, as it prevents incorrect or inconsistent data from being entered into the system. By setting up these validation rules, I ensured that the data was reliable and suitable for further analysis.

The data analysis activity provided a comprehensive learning experience, equipping me with the skills needed to manage, analyze, and interpret data effectively. Through hands-on experience, I gained a deep understanding of the entire data analysis process, from data collection to reporting. The ability to work with various data types, apply appropriate analytical methods, and communicate findings clearly has significantly enhanced my analytical capabilities. This training has prepared me for future projects and roles that require a strong foundation in data-driven decision-making, enabling me to tackle complex data challenges and contribute valuable insights to business and research efforts.

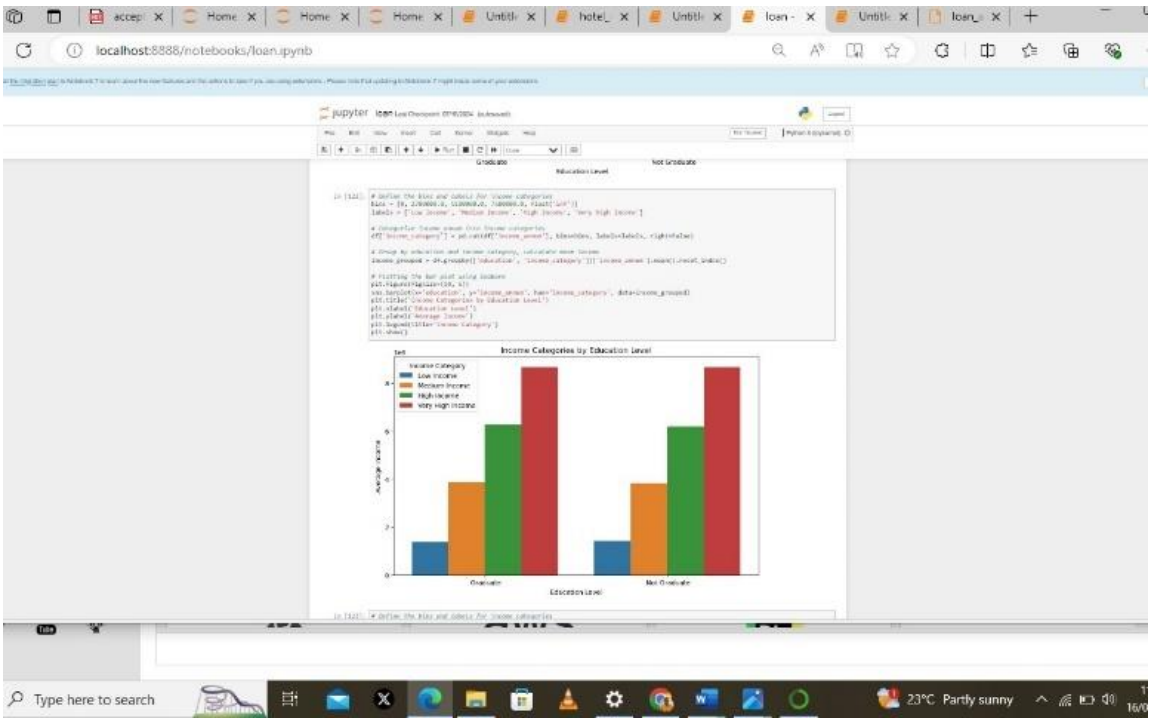

Figure 3:Showing Data Analysis

Video Editing with Wondershare Filmora 9

The internship offered an opportunity to explore multimedia production, specifically video editing. Using Wondershare Filmora 9, I learnt the fundamentals of video editing and created engaging video content. Some of the skills obtained include:

- Basic Editing Techniques: Mastered the basics of trimming, cutting, and arranging video clips to form coherent narratives. Applied transitions, effects, and filters to enhance visual appeal.
- Audio Synchronization and Editing: Edited audio tracks, adjusting volume levels and applying effects. Ensured proper synchronization between audio and video, enhancing the overall quality of the videos.
- Advanced Features: Experimented with advanced features like keyframing, green screen effects, and motion tracking. These skills allowed me to create dynamic and visually engaging content.

After obtaining some of the above skills, I applied them in editing an advertising video for Elite Motel Mbarara that I sent to the manager and appreciated my efforts and told me to create more for him.

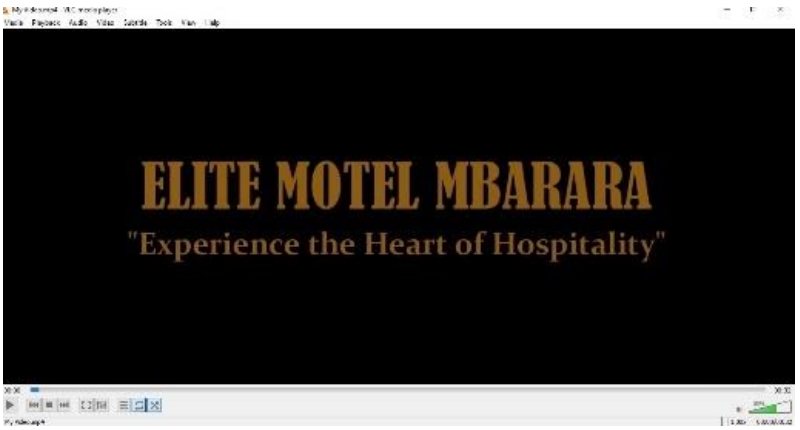

Figure 4:Showing video editing

Figure 5:Showing video

Graphic Design with Adobe Photoshop

I also practiced and improved my graphic design skills using Adobe Photoshop. The focus was on creating professional marketing materials and enhancing visual content. Some of the skills I improved on include:

- Poster Design: Designed promotional posters for Elite Motel in Mbarara. Worked on layout, color schemes, typography, and image manipulation to create appealing visuals that effectively communicated the desired message.
- Image Editing and Manipulation: Enhanced and retouched images, using tools like layers, masks, and adjustment layers. This included color correction, background removal, and creating composite images.
- Creative Design Concepts: Explored creative concepts in design, such as minimalism and retro design. This broadened my design perspective and improved my ability to cater to different client needs.

After the practice and improvement in the above skills, I designed fliers for Elite Motel Mbarara which was highly appreciated by the manager.

Figure 6:Showing graphic design poster

Fieldwork

During my internship, I was involved in various fieldwork activities that provided practical experience in networking, system installation, and hardware setup. These activities not only enhanced my technical skills but also gave me valuable insights into implementing IT solutions in

diverse real-world environments. Below is a comprehensive overview of the fieldwork activities and the tasks performed.

Networking and System Installation at Upland Pharmacy located in Taso Village, Mbarara city.

I travelled with Mr Natamba Albert to Upland Pharmacy where we aimed at connecting the computers to the internet network. The following activities were performed to achieve the goal of connecting the computers.

- Hardware Components: The setup involved using a router and Ethernet cables to establish a wired connection between two computers and the internet. The physical installation included running cables neatly to prevent tangling and ensuring secure connections to the router and computers.
- Router Configuration: sThe router was connected to the network and powered on. Using a web browser, I accessed the router's web interface by entering its IP address.
- Network Settings Configuration: The router's settings were configured to provide a secure Wi-Fi network. This included setting up SSID (network name), password protection, and selecting the appropriate wireless channel to minimize interference.
- Security Measures: We implemented security measures such as WPA2 encryption for Wi-Fi, changing the default router admin credentials, and enabling firewall features. Additionally, content filtering was set up to restrict access to unnecessary websites, ensuring that only work-related sites could be accessed.
- IP Address Management: We configured DHCP settings to automatically assign IP addresses to devices on the network, ensuring efficient management of network resources.

System Installation and Networking at a Pharmacy in Kabale

My second field was in Kabale where I travelled with Mr Albert Natamba to Amex Pharmacy located in Makanga hill in Kabale District where we had gone to do networking and system installation for a Go

click software that helps in keeping track of pharmacy sales and inventory and also automates report generation. The following activities were performed to achieve our goals:

Networking Setup:

We set up a network using a router and Ethernet cables to connect two computers to the internet. The router was configured similarly, ensuring a secure Wi-Fi environment with access restrictions.

Thermal Printer Integration:

Printer Setup and Configuration: A thermal printer was installed and configured to work with the pharmacy management system. The setup involved:

- Connecting the printer to the network switch with an Ethernet cable, ensuring communication with the connected computers.
- Installing the necessary drivers on the computers and configuring the printer's network settings.
- Conducting a test print to verify the setup and ensuring proper communication between the printer and the system.

System Installation:

Mr Albert directed me on how Laravel project can be installed on their computers and be managed. He also discussed with me how much they do charge which gave me more insight on how to market and sale software programs

Data Management:

After the installation of the system, it was the time to enter data for all medications into the system, ensuring accurate inventory tracking and operational efficiency. I was assisted by Gloria who is the pharmacist to ensure correct names, prices of different drugs are entered accurately.

Networking at Bureberezi Farmers and Traders' SACCO

Mr Albert and I also travelled to Bureberezi Farmers and Traders' SACCO where we aimed at internetworking two computers together with a printer.

Networking Setup:

Hardware Components: Implemented a network using a switch to connect two computers, creating a local area network (LAN) that facilitated communication and data sharing between the devices.

A thermal printer was connected to one of the computers for printing documents and receipts. The setup involved:

Using Ethernet cables to connect the printer and computers to the network switch.

Configuring the Printer: Setting up the printer's network settings, installing drivers, and verifying connectivity through a test print.

System Configuration and Setup:

Ensured all networked devices were properly configured, including setting up shared folders for easy file access and configuring network security settings.

These fieldwork experiences provided hands-on exposure to various aspects of IT infrastructure implementation, including configuring routers, setting up networks, integrating hardware, and managing software systems. These activities in different environments, such as pharmacies and financial institutions, demonstrated the diverse IT needs and challenges across industries.

The practical experience gained from these tasks significantly developed my technical skills and prepared me for real-world IT applications.

Hardware Troubleshooting and Repair Activities

During the internship, I gained practical experience in hardware troubleshooting and repair, which further broadened my technical skill set. Below is a detailed description of the hardware-related activities I undertook, including specific tasks and the knowledge acquired.

Laptop Troubleshooting and Repair

A client brought in a laptop that had an issue of not powering on. The laptop showed no signs of life when the power button was pressed.

I was informed about several potential causes for this issue. These included faulty RAM, which could prevent the laptop from booting if the RAM modules were loose or defective. Another possibility was a depleted or malfunctioning CMOS battery, which could cause power issues. Additionally, there might have been problems with the power supply, such as issues with the AC adapter or internal power components, preventing the laptop from receiving power. Finally, damage to the motherboard or other critical components could also lead to a failure to power on.

To troubleshoot the issue, I first performed a thorough visual inspection of the laptop's external and internal components, checking for any visible signs of damage or loose connections. After identifying no immediate visible issues, I proceeded to discharge the CMOS battery. The CMOS battery was removed to reset the BIOS settings, and I pressed and held the power button for approximately 30 seconds. This process, known as "power cycling," helps to discharge residual electrical charge from the capacitors.

After discharging the CMOS battery, I reinstalled it and reassembled the laptop. Upon pressing the power button, the laptop successfully powered on, indicating that the issue was likely related to the BIOS settings or a temporary power issue.

Computer Screen Blacking Out

Another client brought in a desktop computer that was experiencing intermittent screen blackouts. The screen would go black after a certain period, and the client had to restart the system to resume functionality.

Several potential causes were discussed for this issue. One possible cause was overheating, where the CPU or GPU could overheat due to inadequate cooling or dust accumulation, leading to automatic shutdowns or screen blackouts. Another possibility was an unstable power supply or insufficient power, which could cause the system to turn off the display. Additionally, the problem could be related to faulty or outdated graphics drivers or a malfunctioning graphics card, resulting in display issues. Finally, lose or damaged cables connecting the monitor to the PC could cause intermittent signal loss.

To address the issue, I began by inspecting the cooling system. I checked the cooling fans and heat sinks for dust buildup and ensured they were functioning correctly. The thermal paste between the CPU and cooler was also inspected for proper application and more was added. Next, I verified that the power supply was stable and sufficient for the system's components, checking all power connections for a secure fit.

I then examined the graphics card, reseating it in its slot to ensure a proper connection, and installed updated graphics drivers to ensure compatibility and stability. Lastly, I inspected all cables and connections between the monitor and the PC, replacing any loose or damaged cables.

After completing these checks and adjustments, the issue was resolved. The computer operated normally without further screen blackouts.

CHAPTER 4: CHALLENGES, SOLUTIONS AND RECOMMENDATIONS:

4.1 Overview of Challenges

During my internship, I encountered several challenges that significantly enhanced my technical and problem-solving skills. These challenges, which spanned various domains such as database design, hardware troubleshooting, programming, and data analysis, required me to adapt quickly and think critically. This chapter discusses the challenges faced, their root causes, the solutions implemented, and recommendations for future trainees to navigate similar situations effectively.

4.2 Detailed Description of Challenges

4.2.1 Technical Challenges

Database Design Issues: One of the most significant challenges was the initial design of the database for the school library management system. I created a database with fewer tables than needed, which limited the system's functionality. This issue hindered effective data management and user experience.

Programming Errors: Throughout the internship, I encountered various bugs during programming and training sessions. These errors often resulted in halted progress, requiring immediate attention to resolve.

Node.js Directory Issue: While training internees on Laravel, I faced a technical issue with one of their laptops, which couldn't locate the correct Node.js directory for Laravel's Jetstream plugins. This problem affected the training session's flow and required a prompt solution.

Data Analysis Challenges: In the data analysis process, I struggled with data cleaning, which is critical for ensuring reliable results. Inefficient data handling led to inaccuracies in the analysis.

Hardware Troubleshooting: Repairing a laptop presented additional technical difficulties. After removing the fibers connected to the keyboard and touchpad, I encountered challenges reattaching them, which complicated the repair process.

4.2.2 Operational Challenges

Time Management: Balancing multiple projects, such as database design, programming, and hardware repair, proved demanding. Each task required a different set of skills and focus, often leading to time constraints.

Resource Limitations: Access to necessary tools and equipment, particularly during the hardware repair and software installation processes, was sometimes limited. This lack of resources hindered timely project execution.

4.2.3 Interpersonal Challenges

Client Expectations: Managing client expectations was challenging, particularly when delivering complex projects. Clients often anticipated immediate results without understanding the intricacies involved in the technical processes.

Team Coordination: While working with team members like Emma and Peter, coordinating efforts during training sessions and troubleshooting could be difficult, especially under time pressure.

4.2.4 Learning Curve Challenges

Adapting to New Technologies: Mastering new tools, such as Laravel and various data analysis software, required significant time investment. The learning curve for these technologies initially slowed down my productivity.

Hands-On Experience with Hardware: Although I had theoretical knowledge of hardware repairs, the practical application of these skills in real-world scenarios, such as laptop repairs, demanded immediate learning and problem-solving.

4.3 Analysis of Challenges

4.3.1 Root Cause Analysis

Technical Challenges: The database design issues arose from a lack of comprehensive planning and understanding of the system requirements. Programming errors and technical issues, such as the Node.js directory problem, often stemmed from incomplete setups or misconfigurations.

Operational Challenges: Time management issues were primarily due to attempting to juggle multiple responsibilities simultaneously. Limited access to tools and resources also contributed to project slowdowns.

Interpersonal Challenges: Miscommunication among team members and clients, along with unclear expectations regarding project timelines, led to interpersonal difficulties and increased stress levels.

Learning Curve Challenges: The steep learning curve for new technologies and hardware repairs resulted from limited hands-on experience, which necessitated extensive practice and mentorship from colleagues.

4.3.2 Impact on Training

The challenges faced significantly impacted my learning experience. Technical difficulties enhanced my troubleshooting and programming skills, while operational and interpersonal challenges improved my project management and communication capabilities. Collaborating with colleagues like Emma, Peter, and Albert fostered a collaborative learning environment that deepened my understanding of debugging and problem resolution.

4.4 Solutions Implemented

Database Design Revision: After consulting with my supervisor, Mr. Albert, I revised the initial database design by adding necessary tables and establishing proper relationships. This change significantly improved the system's performance and functionality.

Troubleshooting Programming Issues: When faced with programming bugs, I adopted a collaborative approach by consulting colleagues who provided valuable guidance in troubleshooting and fixing the issues. This collaboration not only resolved the problems but also enriched my understanding of debugging processes.

Node.js Installation Resolution: For the technical issue with the Laravel training session, I ultimately reinstalled the Windows operating system on the affected laptop. This drastic measure resolved the Node.js directory issue and allowed the training to proceed without further interruptions.

Data Cleaning Techniques: To overcome data cleaning challenges, I sought assistance from Peter, who guided me through efficient techniques. This collaboration enabled me to refine the dataset, ensuring more reliable results for the analysis.

Hardware Repair Assistance: While repairing the laptop, I faced difficulties reattaching the fibers connected to the keyboard and touchpad. Peter assisted me in correctly reassembling the laptop, ensuring that all components functioned properly upon reassembly.

4.5 Evaluation of Solutions

The solutions implemented were largely successful in addressing the challenges encountered. Revising the database design led to improved functionality in the school library management system. Collaborative troubleshooting enhanced my programming skills, and reinstallation of the operating system allowed for smooth continuation of the Laravel training.

The guidance received from colleagues in both data analysis and hardware repair improved my efficiency and effectiveness in addressing complex problems. Overall, the solutions fostered a better learning experience and enhanced my ability to manage challenges in real-world technical environments.

4.6 Recommendations for Future Trainees

For future trainees, I recommend the following strategies for preventing and managing challenges:

Preventative Measures for Technical Challenges:

Conduct thorough research and planning for database designs and software setups to prevent configuration issues.

Familiarize yourself with the tools and technologies before hands-on application to minimize the learning curve.

Time Management and Resource Allocation:

Develop a detailed work plan for each project, with clear deadlines and priorities to avoid time management challenges.

Identify and secure necessary resources in advance, especially for hardware repairs and software installations.

Interpersonal and Client Communication:

Set clear expectations and timelines with team members and clients from the onset of each project.

Maintain regular communication to ensure alignment on objectives and to avoid misunderstandings.

Learning Curve Strategies:

Dedicate time outside working hours to mastering new tools or techniques through practice and mentorship.

Seek feedback from experienced colleagues or mentors to accelerate learning and avoid common pitfalls.

CHAPTER FIVE: EVALUATION OF TRAINING

5.1 Learning Outcomes

During my internship, I achieved several significant learning outcomes that contributed to my technical and professional development. These outcomes included:

Enhanced Technical Skills: I gained proficiency in database design, software development, and data analysis. My experience in revising the school library management system's database design improved my understanding of relational databases and their effective utilization in software applications.

Problem-Solving Abilities: Encountering and overcoming various challenges, such as programming bugs and hardware repairs, honed my problem-solving skills. I learned to approach issues methodically, seeking assistance when necessary and applying collaborative troubleshooting techniques.

Data Cleaning and Analysis: Through hands-on experience with data cleaning and analysis, I developed a more rigorous approach to ensuring data integrity. This skill is essential for producing reliable results in future data-driven projects.

Interpersonal and Communication Skills: Collaborating with colleagues like Emma, Peter, and Albert fostered my interpersonal skills. I learned the importance of clear communication and teamwork in achieving project goals and resolving challenges effectively.

Adaptability to New Technologies: My internship experience required me to adapt to new tools and frameworks, such as Laravel and data analysis software. This adaptability has prepared me for future roles in the rapidly evolving tech landscape.

5.2 Professional Growth

My internship experience significantly contributed to my professional growth in several ways:

Increased Confidence: Successfully navigating technical challenges and completing projects enhanced my confidence in my abilities. I became more assertive in sharing my ideas and solutions with team members and clients.

Broadened Skill Set: The diverse range of tasks I undertook, from database design and software development to hardware repairs and data analysis, broadened my skill set. This diversity has made me a more well-rounded candidate for future employment opportunities.

Networking Opportunities: Collaborating with experienced colleagues and supervisors provided valuable networking opportunities. Building relationships with industry professionals has opened doors for mentorship and future career prospects.

Understanding Professional Environments: My internship experience familiarized me with the dynamics of a professional work environment. I learned about project management, client interactions, and the importance of meeting deadlines—all crucial aspects of a successful career in technology.

5.3 Feedback from Supervisors

Throughout my internship, I received constructive feedback from my supervisors, which played a vital role in my development:

Technical Proficiency: Mr. Albert commended my ability to revise the database design effectively, noting the significant improvements it brought to the school library management system. His encouragement reinforced the importance of thorough planning and attention to detail in technical projects.

Collaboration and Teamwork: Emma and Peter provided positive feedback on my collaborative approach during troubleshooting sessions. They appreciated my willingness to seek assistance and share knowledge, which contributed to a supportive learning environment.

Problem-Solving Skills: My ability to address and resolve programming errors and hardware challenges was highlighted by my supervisors. They acknowledged my growth in troubleshooting and problem-solving, noting that I became increasingly resourceful over time.

Professionalism: My supervisors remarked on my professionalism in managing client expectations and communicating effectively with team members. They encouraged me to continue honing these skills, as they are crucial for success in any professional setting.

CHAPTER 6: RECOMMENDATIONS:

Based on the challenges encountered, experiences gained, and skills developed during my industrial training, I propose the following recommendations for both the university and my fellow students to enhance the internship experience and practical skill acquisition.

6.1 Recommendations for the University

Increase Internship Opportunities:

The university should consider increasing the number of required internships from two to at least three before graduation. This additional opportunity will allow students to acquire more practical skills and hands-on experience in their respective fields, better preparing them for the job market.

Encourage Internships During Holidays:

The university should promote the importance of seeking internships during holiday breaks. Rather than spending breaks at home, students can gain valuable experience by working with various companies. This initiative will help bridge the gap between academic knowledge and real-world application.

Provide More Seminars and Workshops:

The university should offer more seminars and workshops focused on engineering and related fields. These events will help students understand how to apply theoretical concepts learned in class to real-world scenarios. Active participation in internships and external training programs should also be encouraged.

Facilitation Support for Companies:

The university could explore providing facilitation fees to partnering companies that host interns. This support will incentivize organizations to accept more students for internships, thereby enhancing the opportunities available to students. Additionally, it would help alleviate the financial burdens students face, such as transport costs and accommodation fees.

6.2 Recommendations for Fellow Students

Seek Extra Internships:

Students should proactively seek additional internships, especially during holiday breaks. Taking the initiative to arrange their own internships with companies will provide them with more opportunities to develop practical skills and enhance their employability.

Consider Interning at Dig Bit Technologies:

I highly recommend that fellow students consider interning at Dig Bit Technologies. During my internship there, I encountered various challenges that not only enhanced my technical skills but also developed my problem-solving abilities. The supportive team, including colleagues like Peter and Emma, played a significant role in my learning, as they readily offered guidance in troubleshooting issues and refining technical skills. This collaborative environment fosters a strong learning culture that can greatly benefit aspiring engineers.

Utilize Holiday Periods for Internships:

Students should make appointments with companies to secure internships during holiday breaks. Instead of spending this time at home, utilizing it for gaining practical experience will significantly benefit their career prospects.

Engage in Relevant Seminars and Workshops:

Students are encouraged to participate in seminars and workshops offered by the university that relate to the engineering field. Engaging in these events will help them understand the practical applications of their theoretical knowledge.

CHAPTER 7: CONCLUSION:

The internship was a valuable experience that significantly enhanced my technical skills and problem-solving abilities through challenging projects like developing a school library management system and hands-on hardware troubleshooting. With support from supervisors and colleagues, I overcame various challenges, which deepened my understanding of the IT field. The experience not only solidified my technical foundation but also prepared me for future challenges, equipping me with essential skills to excel in the IT industry.

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APPENDICES

DigBit TECHNOLOGIES

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HUMAN RESOURCE DEPARTMENT

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18th /03/2024

AINOBUSINGYE PASCAL

MBARARA UNIVERSITY OF SCIENCE AND TECHNOLOGY

RE: INDUSTRIAL TRAINING PLACEMENT

We are pleased to inform you that your application for an internship at our esteemed company has been successful. On behalf of DigBit Technologies I would like to extend our warmest congratulations and welcome you to our team.

Your internship with DigBit Technologies will provide you with an excellent opportunity to gain practical experience in the IT field and enhance your professional skills. Throughout your internship, you will work closely with our experienced team members, who will provide mentorship and guidance to help you maximize your learning potential.

We believe that your skills and knowledge will make a valuable contribution to our company, particularly within our IT Department. We are excited to offer you an internship placement from June to July of this year.

Internship Details:

- Department: Information Technology
- Duration: June to July
- Facilitation Fee: 200,000 UGX

DigBit Technologies

Yours sincerely,

Ssewante Johnbosco

DIRECTOR HR TRAININGS

Digbit Technologies

Figure 7:Showing acceptance letter

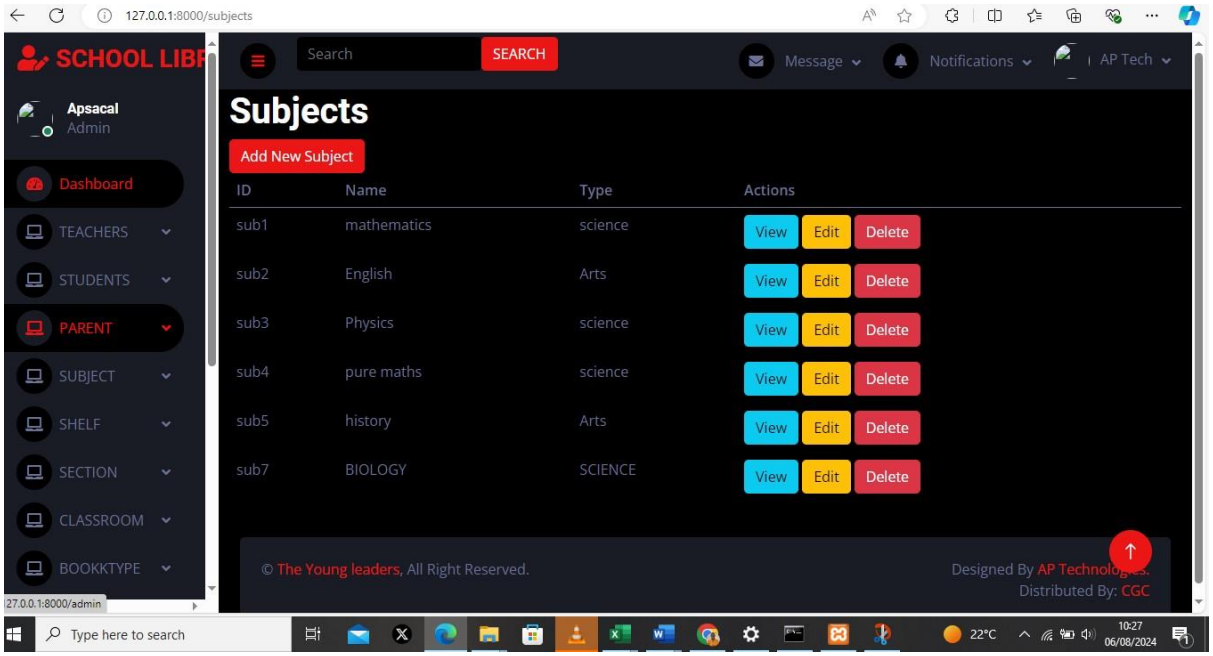

Figure 8:showing subjects