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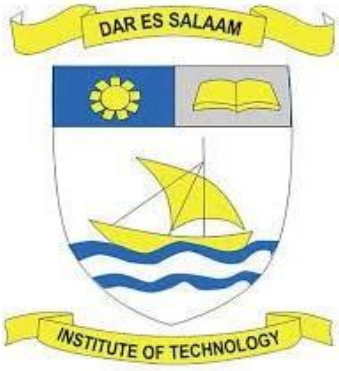

INDUSTRIAL PRACICAL TRAINING TECHNICAL REPORT

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NAME OF NDUSTRY /MINISTRY/COMPANY/ORGANIZATION:

e-Government Authority(e-GA)

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Signature……

Frank M Kessi

DATE: 16th October, 2022

Certification

I, the undersigned hereby certify that I have read, understand , and recommended the Dar es salaam institute of technology to accept this practical training report prepared by Frank M Kessi from **e-Government Research,Innovation, and Development Center(e-GovRIDC).**

Supervisor; Dr Malisa

Signature…….

Date:……..

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*F*irst of all, I would like to thank the almighty God for the gift of life, health and ability to conduct my practical training and for the accomplishment of this report from the first day of my training up to the end of the training within **e-GA**. He made everything possible and engagement in the works of this Industrial Practical Training (IPT) at **eGOVRIDC** a great experience.

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Last but not least, I would like to express lots of appreciation to my fellow IPT intake 2021/2022 for all the hard work and cooperation in the research process and implementation of this work.

ABSTRACT

For a student to acquire a Bachelor of Computer Engineeing(BENG-COE). He or she has to go undergo practical training in order to gain more experience. This can be done from a known organization which deals with different computing work, to satisfy this requirement I was trained at **e-Government Authority (e-GA)** at the **e-Government Research, Innovation and Development Center (e-GovRIDC).**

I joined **e-Government Authority (e-GA)** as a IPT Student (Industrial Practical Training Student) on 25th July, 2022 and got assigned to the Training and Seminar Management System for the period of 8 weeks.

This report is a great success of the practical training conducted at **e-Government Authority (e-GA)** at the department of **e-Government Research, Innovation and Development Center (e-GovRIDC)** as per **Collage of Informatics and Virtual Education (CIVE)**.

It comprises three chapters each explaining significant areas of Introduction and Organization structure, description of the activities performed and conclusion, challenges and Recommendation respectively.

ACRONYMS/ ABBREVIATION

LIST OF ACRONYMS

API	- Application Programming Interface
CCT	- Computing and Communication Technology
CPEs	- Continuing Professional Education
DICT	- Directorate of Information and Communication Technology Systems
eGA	- electronic Government Authority
eGovRIDC	- electronic Government Research And Innovation Development Center
G2B	- Government to Business
G2C	- Government to Customers
G2E	- Government to Employee
G2G	- Government to Government
GePG	- Government electronic Payment Gateway (
ICT	- Information Communication and Technology
IPT	- Industrial Practical Training
JS	- JavaScript
JSON	- JavaScript Object Notation
JWT	- JSON Web Token
NIT	- National Institute of Transport
OSAT	- Online Self Assessment Tool
TSMS	- Training and Seminar Management System
WebRTC	-Web Real-Time Communication
UAA	- User Authorization and Authentication

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CHAPTER ONE

1.0 Introduction

e-Government Research,Innovation, and Development Center(eGovRIDC) is the branch of **e-Government Authority(e-GA)** based on research and innovation on electronic solution that will solve the problems in government institutions and even direct to the citizens.

My arrival at the e-Government Research, Innovation and Development Center (e-GovRIDC), I was given a project that seek to find the solution of the existing difficulties to the society, whereby some researches were conducted from the similar existing systems.

The project was Training and Seminar Management System which simply concerned about providing a cloud service platform for training and seminars both online and physical also the platform provides the ability online assessment through different examinations to the staffs of a particular institute. In Training and Seminar Management System platform an institute can assess there staffs and can provide online training internal and external from the institute.

Training and Seminar Management System (TSMS) is an existing platform, in which it is owned by a single institute. And in the existing TSMS it does not provide an online platform for training and asses the institute staffs.

Therefore the main task was to develop a TSMS platform that will be a cloud based platform where any institute that would need to us the platform will use freely. And to add some innovate functionality such as online assessment and online training for all institute. The platform is Web based, technologies used are python with Django Framework for back-end services, GraphQl API ,JWT for authentication, Vue js for front-end, nest framework for generating gateway API, Webrtc for video conferencing, PostgreSQL for database.

Here are my tasks that were assigned in this project

- To Design the architecture for Client Management and Service Management
- Designing the database for the platform for OSAT
- implementation of back-end for Training Module. That is database and API for the tables
- Customization of Jitsi video Training

1.1 Organization Historical Backgrounds

The e-Government Authority (e-GA) was established in 2019 under the e-Government Act, No. 10 of 2019. It is a public institution mandated to coordinate, oversee and promote e-Government initiatives as well as enforce e-Government related policies, laws, regulations, standards and guidelines in public institutions.

e-GA is a succeeding institution to e-Government Agency which was a semi-autonomous institution established in 2012 under the Executive Agencies Act, No.30 Cap. 245 of 1997 with the mandate of coordination, oversight and promotion of e-Government initiatives.

Before the establishment of the Agency, ICT initiatives in the Government were coordinated and managed by the Directorate of Management of Information Systems (DMIS), now Directorate of Information and Communication Technology Systems (DICTS) under the President's Office, Public Service Management.

The Agency became operational effective in April 2012 and officially inaugurated in July 2012 and ceased after seven years of operation. The e-Government Act, No. 10 of 2019 stipulates the roles, functions and powers of the Authority for effective implementation of e-Government.

1.2 Objective of Field Attachment

- To understand and appreciate professional duties and responsibilities of personnel in the field.
- To increase knowledge and skills in area consistent with career goals and philosophy.
- To get experience of the work performed in the organization/company
- To understanding and conceptualization of professionalism / to gain deeper awareness of professionalism.
- To help student to determine the professional strengths and weakness.
- To help student to acquire new concept of delivery of service and to aid in providing for more knowledgeable professionals.

1.3 Type of Business/Organization And Major Product/Service

The e-Government Authority (e-GA) is an ICT service organization under the government responsible for providing a regulatory enabling environment to public institutions through coordination, oversight and promoting of ICT usage for improvement of service delivery in the public service.

The major Service provided by e-Government Authority (e-GA) is to promote and oversee ICT usage for improvement of service delivery in the public service.

1.4 Activities

The following are main tasks of eGA, from which other sub-tasks are generated

- Enhancing provision of sustainable e-Government services to Public Institutions
- Enhancing e-Government Research, Innovation and Development
- Enhancing compliance to policies, laws, regulations, standards, and guidelines related to e-Government initiatives in Public Institutions

1.5 Customers

The customers that e-GA deals with are different, and their demands of services are in different levels depending on the activities they perform. Its major customers are public institutions and citizen's. e-GA offers Government to Government (G2G) services so as to increase Public Institutions capacity to offer services to citizens (G2C), business (G2B), and Government employees (G2E). Furthermore, they aim at building capacity of Public Institutions to implement e-Government policies, strategies and other e-Government initiatives .

1.6 Organization Structure

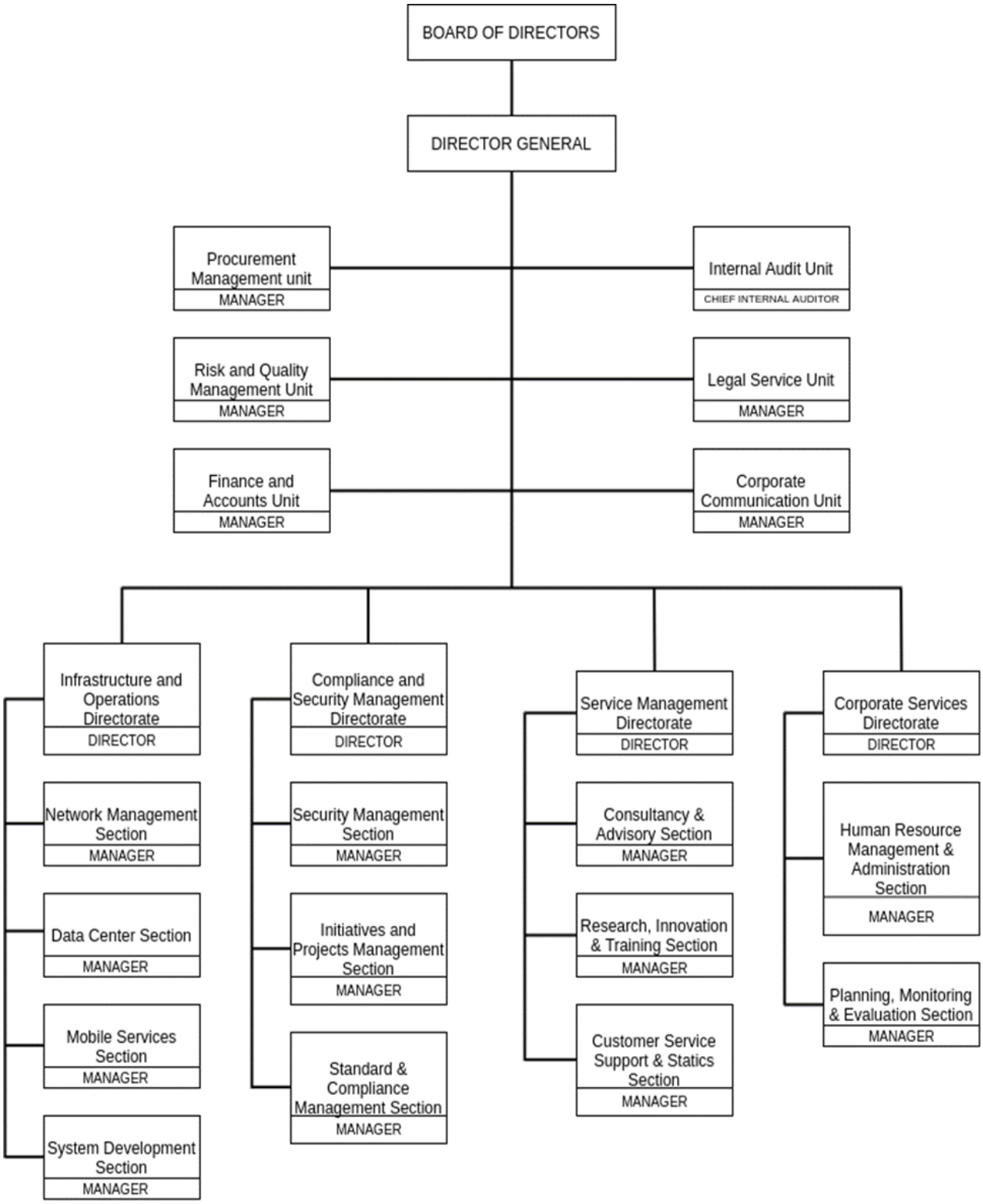

Figure 1: ORGANIZATION STRUCTURE

1.7 Vision,Mission,Objectives of the organization

1.7.1 VISION

To be recognized as a leading innovative institution, enabling the use of ICT for improving public service delivery.

1.7.2 MISSION

To provide a regulatory enabling environment to public institutions through coordination, oversight and promoting of ICT usage for improvement of service delivery in the public service.

1.7.3 OBJECTIVES

- Enhancing provision of sustainable e-Government services to Public Institutions
- Enhancing compliance to policies, laws, regulations, standards, and guidelines related to e-Government initiatives in Public Institutions
- Enhancing e-Government Research, Innovation and Development

1.8 Organization Core Value

The e-Government Authority has six core values that guide and direct the behavior of its employees at all levels. The values describe the culture of the workplace, ensuring that all employees and customers of the Authority have a common understanding of how they will be treated and what is expected from them.

- **Integrity**

  e-GA upholds the highest standards of conduct in all that it does in recognition that honest relationship and trust are essential for long-term organizational success.

- **Innovation**

  e-GA maintains organizational culture that values originality, invention and creativity, that nurtures these qualities through openness and reverence for innovation spirit

- **Customer Centric**

  e-GA is dedicated to help its external customers to achieve their business objectives by understanding their businesses and dependably delivering what they value most.

- **Team Work**

  e-GA is committed to common goals based on open and honest communication while showing concern and support for each other.

- **Collaboration**

  e-GA works as engaged partners with all Public Institutions and other stakeholders to openly share information, knowledge and best practices with the realization that it is dependent on each other for e-Government success.

- **Professionalism**

  e-GA maintains high quality work and delivers exceptional services to clients.

CHAPTER TWO:ACTIVITIES PERFORMED

2.0 BRIEF OVERVIEW OF THE UNDERTAKING

The main Objective of the project is to provide a cloud web base and mobile app platform for all institution to provide, attain and subscribe to all available online training and seminars or physical training and seminars and online examinations.

2.1 INTRODUCTION

This system is an enhancement of the current training and seminar management system which has been developed by the e-Government Authority to maintain records, provide training information and monitor the information of trainers and instructors regarding training, seminars, workshops, annual meetings, and sessions of systems and services of the e-government authority.

The enhancement to this current system aims to provide a cloud-based platform that is to be shared with various public and private institutions to coordinate training, seminars, and workshops, and also manage assessments for public and private servants.

This section mainly focuses on the main tasks performed during the practical including the requirements gathering, analysis, design and user interface implementation of the system.

2.2 PROBLEM IDENTIFICATION

There is lack of enough training and a standardized way of assessing and evaluating public servants, which leads to inefficient provision of public services due to a lack of qualified public servants. This project aims to provide a simplified way for managing and coordinating training and seminars for public servants, and also provide a tool for self-evaluation and assessment to public servants.

2.3 PROPOSED SOLUTION

Basing on the observed problem, a training and seminar management system was proposed to perform the following functionalities

- Provision of online training, seminars, workshops and awareness sessions to institutions' staff.
- Assist in assessment and testing of new hires

- Assist in the coordination of training and cross seminars amongst public and private sessions.
- Manage awareness sessions to civil servants, on wide ranges of fields such as work ethics, and technology awareness.
- Allow employees to be able to evaluate themselves, so as to test the alignment of their capabilities with the needs of their organizations and the society at large.
- Provide reports and data concerning the participation of employees in various seminars and trainings managed by the system

2.4 REQUIREMENTS GATHERING

The requirements of the system were mainly elicited from the features of the current system and the recommendations obtained from various stakeholders in order to improve the current system. These recommendations include the following:

1. The TSMS system should allow people who have registered in certain training to ask questions through the system for the relevant existing topic;
    - The system should allow participants to ask questions through the system based on the presented topic
    - The presenter should be able to see all the questions asked and have the ability to extract into excel or word document;
    - The presenter should be able to publish the answers to the question on the system and other participants can see all the answers given;
    - The system should enable the extraction of questions and their answers in various formats.

2. The system should enable the recording of online training and guidelines that will make it easier for any employee to get the training when needed (Video on Demand);
    - The system should be able to keep various training recordings through video;
    - The system can monitor/track the progress of the participant in the topic he started looking at;
    - The system allows the participant to ask a question/comment in the topic/video they are watching;
    - The system should have a report to show users who watched videos and finished with their institutions;

- The system can allow the organizer of the video/topic to put questions in the middle of the lesson or at the end of the lesson to be sure that the participants have listened to the video and understand.

3. The system can provide training completion certificates that can be used to obtain CPEs (Continuing Professional Education);
    - The system should be able to issue a certificate of participation in certain training/topics with the correct names of the participants;
    - The system should be able to maintain all the certificates that the participant has obtained through training in the system to facilitate their access in case they are needed;
    - The system should be able to keep records of all the training that the participant has participated in either physically or virtually;

4. The system should be able to prepare online quizzes or tests that will be used in various training
    - The system should be able to host online quizzes/tests (multiple questions or short answers);
    - The system allows the user to prepare questions and answers to the relevant question;
    - The system should be able to correct selective questions (Automated marking on multiple questions)
    - The system should be able to rank participants based on their performance

2.5 SYSTEM ANALYSIS

2.5.1 SYSTEM ANALYSIS

In the system analysis phase, we started with the conceptualization of the system and prepared a concept note, which described the conceptual overview of the project, project objectives, deliverables, scope, and limitations of the project. The following diagram summarizes the core components of the training and seminar management system.

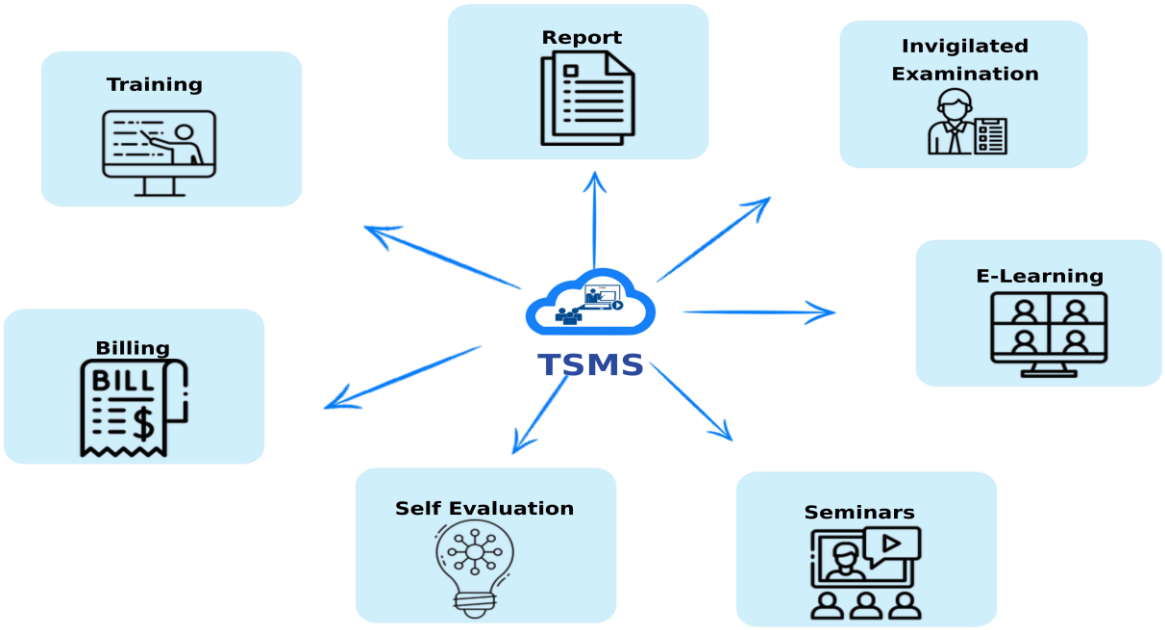

Figure 2: CONCEPTUAL DIAGRAM

Afterwards we proceeded to the conceptualization of the general architecture of the system and the architecture of each module which makes up the system. Below is the architectural diagram of the training and seminar management system.

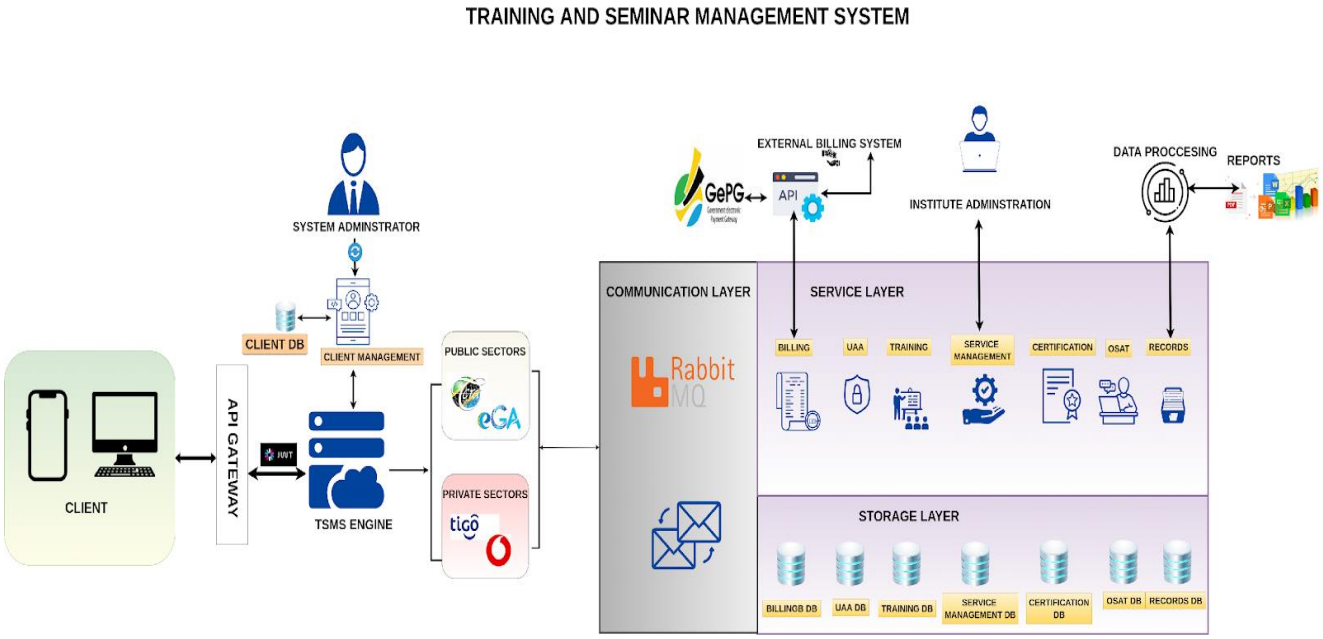

Figure 3: TRAINING AND SEMINAR MANAGEMENT SYSTEM

The architecture of the system follows the micro-services architecture standards, and has subdivided the system into 7 major services as explained below.

- **UAA**

  User Authentication and authorization service (UAA), deals with the authentication and authorization of users' access to other services. It also manages the assignment and setting of roles and permissions to various users if the system.

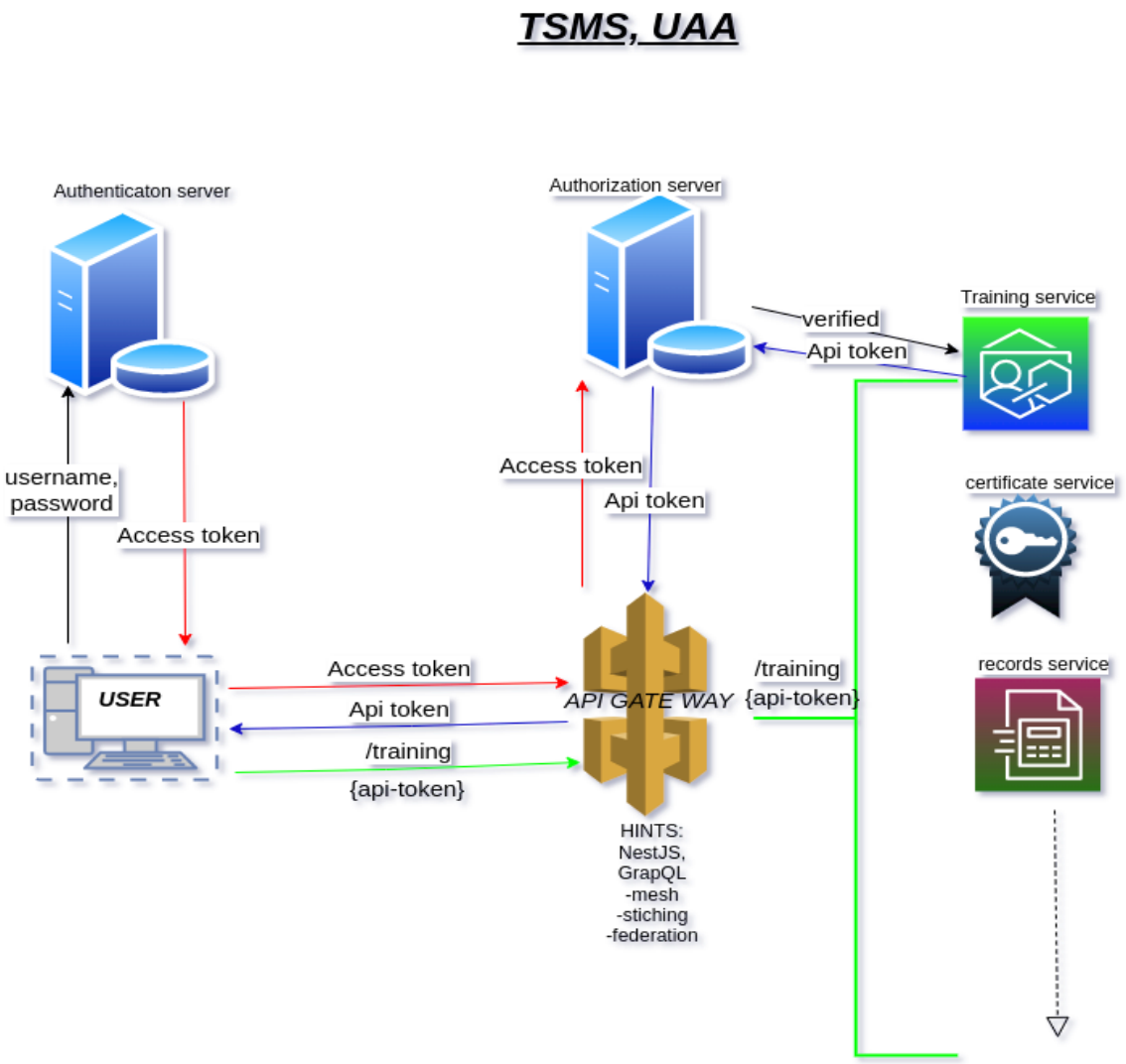

Figure 4: UAA ARCHITECTURE

- **CLIENT MANAGEMENT**

  This service allows the system administrator to manage the users of the system, including registration of new institutions to the system, editing institution details, removing institutions and assigning administrative roles and permissions to institution administrations.

- **SERVICE MANAGEMENT**

This service deals with management of all services provided by the system, and is performed by the institution administrators. It includes creation and mutation of services such as training, certifications, and examinations.

- **TRAINING AND SEMINARS MODULE**

  This service deals with the coordination of physical and online seminars amongst institutions registered in the system.

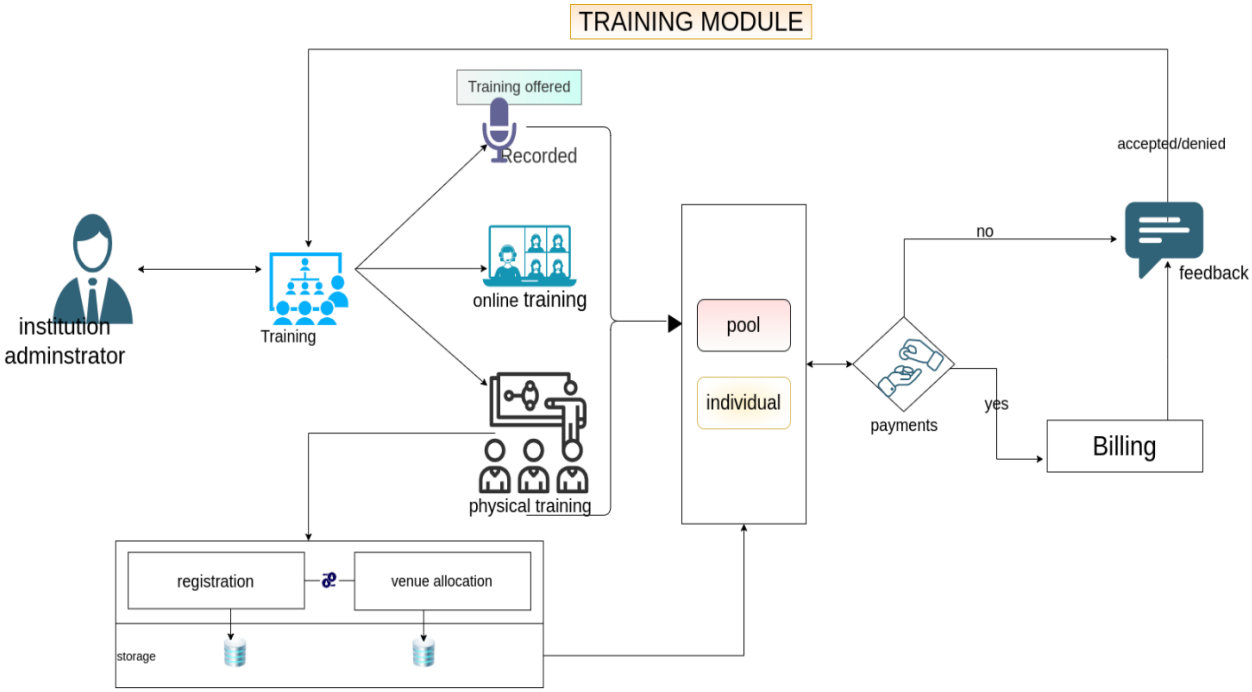

Figure 5: TRAINING AND SEMINAR MODULE ARCHITECTURE

- **CERTIFICATION MODULE**

This service deals with the management of certification to clients, including the provision of training, certified examinations, and issuing and storing of the clients' certificates

- **OSAT MODULE**

  This service provides an online assessment tool for providing both invigilated and open examinations to users of the system

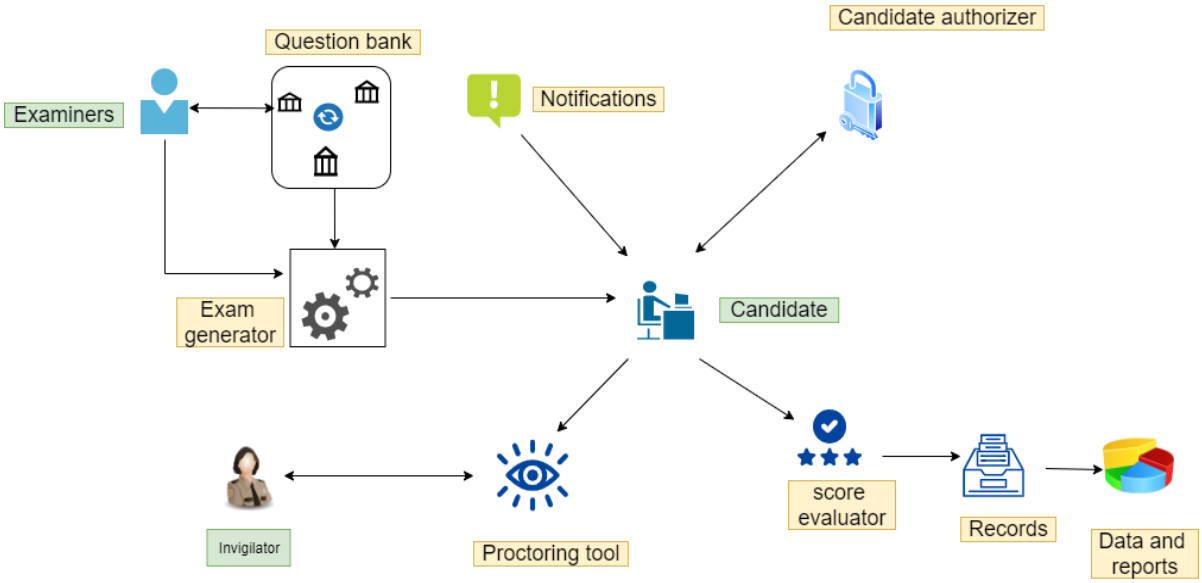

Figure 6: OSAT MODULE ARCHITECTURE

- **BILLING MODULE**

  This service handles billing for the services provided by a particular institution. It should be connected to the Government electronic Payment Gateway (GePG) or other external billing systems based on the settings of the institution.

2.5.2 SYSTEM USER CLASSES

The system will support seven types of user privileges, Custodian, Institution administrator, Examiner, proctor, Trainer, and employee. The description of users of the system and their characteristics are as described in the following table:

User Class	Characteristics
Institution administrator	➢ Creates the services that an institution is offering ➢ Customizes the services that an institution is offering, including: ➢ Schedule training, seminars, and examinations ➢ Allocate the trainers, coordinators, and examiners for training, seminars, and examinations respectively. ➢ Specify the venue allocation of the services ➢ Accept or decline requests for services from other institutions as they are or with modifications ➢ Request for services provided by other institutions ➢ Assign roles to members of the institution. ➢ View information and reports for various services provided by the institution.
Custodian	➢ Register a new institution to the system. ➢ Update the existing institutions' information. ➢ Remove the institution from the system. ➢ View institutions that are registered in the system. ➢ Verify registered institutions. ➢ Assign institution administration roles.

Examiner	➢ Feed questions to the institution's examination bank. ➢ Compose or set examinations. ➢ Mark and grade attempted examinations.
Examination candidate	➢ Choose the examination ➢ Do or conduct the examination ➢ View the results ➢ Get the certifications
Trainer	➢ View the services which have been scheduled ➢ Accept the schedule ➢ Report the services conducted ➢ Add comments
Trainee	➢ View the services ➢ Choose the service ➢ Enroll in the activities ➢ Pay for the services when necessary ➢ Receive the notification and confirmation
Proctor	➢ Invigilates examination

Table 1: DESCRIPTION OF USERS AND THERE CHARACTERISTICS

2.5.3 SYSTEM REQUIREMENTS SPECIFICATIONS

2.5.3.1 FUNCTIONAL REQUIREMENTS

I. The system should authenticate and authorize users to access services based on their privileges
II. The system should allow the administrator to add institution, update institution information, and assign privileges to institution administrators.
III. The system should allow institution administrators to create, manage and apply services in the system
IV. The system should provide online self-assessment tests and quizzes to clients, and manage invigilated examinations provided by an institution.
V. The system should maintain training records, provide training information and monitor the information of trainers and instructors regarding training, seminars, and workshops.

VI. The system should coordinate online training and seminars through video conferencing, provide access to prerecord training and seminars.

VII. The system should allow for institutions to provide certifications after training or examinations

VIII. The system should allow billing of services basing on the settings of the institution.

2.5.3.1 NON-FUNCTIONAL REQUIREMENTS

1. Performance requirements

1. The system should be able to process 90% of requests within 1 second.
2. The system should have the Largest contently Paint rating of fewer than 3 seconds.
3. The system should have the First Contently Paint of fewer than 3 seconds
4. The system should provide feedback to the user for requests whose response time exceeds 10 seconds
5. The system should have a First input Delay of fewer than 300 milliseconds

2. Usability requirements

This subsection describes the attributes that the system must have to ensure ease of use to the clients of the system

1. The system's graphical user interface should have no Cumulative Layout shift.
2. The errors associated with the billing transactions should not exceed 10 percent.
3. The user should be provided with a friendly user manual and be able to use the system effectively.
4. The system graphical user interface should be inclusive and not use cryptic icons that are hard for the user to understand.

3. Security requirements

This subsection specifies the following requirements associated with the degree of security of the system.

1. The system should remain resilient in the face of Cyber attacks.
2. The behavior of the system should be correct and predictable
3. The system must be available and behave reliably even under a Denial of service attack
4. The system should ensure the integrity of customers' account information
5. The system should be able to authorize requests from clients to access services of the system

2.6 BACK-END IMPLEMENTATION

The back-end of the training and seminars management system is implemented using Django a python framework for creating all logic for the module and for creation of the database . We implement the database using PostgreSQL database.

Technologies used in the Back-end implementation.

Category	Software used	Description
Logic and creation of API	Django Framework	Django is a high-level Python web framework that encourages rapid development and clean, pragmatic design.
API	Graph Ql	An open source query language for describing data in the API.

Table 2: TECHNOLOGY USED FOR BACK-END

CONCLUSION AND RECOMMENDATIONS

3.1 Conclusion

The practical training was beneficial and worth having since it not only decreased if not removed the knowledge gap I had, also made us ambassadors to educate and enrich those unaware or partially aware of the benefits of frequently being up to date with technology, aligning what is learn in school and what is needed in the real world. Also it has strengthened my capabilities in attaining tasks and duties assigned to me and relationship between staff members .

3.2 Recommendations

- I strongly recommend that new technologies be embedded in the university curriculum, such as Kubernetes, micro-services, containerization, server-less to mention a few.
- Places with such a clear definition of practical training should be readily proposed and made available to students.
- Apart from daily university teachings and classes, lecturers should impose industrial thinking skills.
- Mentor-ship programmers should be introduced, to give a chance to the students who aren't exposed to mentors during practical training to get to know the kind of thinking needed in the industry.
- A variety of hardware tools should be increased for more efficiency such as embedded and IoT tools.
    - On the side of the institute, I recommend that the training period should be reviewed so as students will have enough time to acquire more knowledge on what they learn in class and actual work done. The time of field practical training can be extended to the maximum time of not less than 4 months that will enable students to learn more practically and have enough time for their training.