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CERTIFICATION OF ORIGINALITY

This is to certify that we are responsible for the work submitted in this project, that the original work is our own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

BIZIMANA Ibrahim

Signature …….

KAMARIZA Sandra

Signature …….

SHEMA Jolivet Gislain

Signature …….

Date: 15th January 2023

AUTHORITY TO SUBMIT THE PROJECT

In my capacity as a supervisor, I hereby authorize the students to turn in their project ready for presentation to the department.

Supervisor

Mr. Pelin MUTANGUHA

Date: 22/05/2023 Signature: 

Head of the Department (HOD)

Dominique HARERIMANA

Date……. Signature……...

DEDICATION

This research is entirely dedicated to our beloved parents, who have been a source of inspiration and strength when we felt like giving up, and who continue to provide moral, spiritual, emotional, and financial support.

To our brothers and sisters, relatives, friends, and classmates who offered words of wisdom and encouragement to help us finish this study.

Finally, we dedicate this book to the Almighty God, thanking you for your guidance, strength, mental power, protection, and skills, as well as for providing us with a healthy life. We provide you with all these options.

ACKNOWLEDGMENTS

It is one of the biggest clichés to give your boss a heartfelt "Big Thanks," but I feel compelled to do so to show how grateful I am for MUTANGUHA Pelin. I would want to express my gratitude to him for all his lectures as well as for his guidance and patience during the project.

Many thanks to the Almighty for everything he has done and is still doing, as well as to my family and friends for their continued support and belief in me.

Many thanks to Alex Ndibwami for believing in me and for his interest in this project, which was incredibly helpful and aided the design thinking process and produced many essential components for the finished product.

ABSTRACT

The current method of recording and managing the University of Rwanda, College of Science and Technology (UR-CST) module leaders' reports using spreadsheets is prone to errors and inconsistencies, making it difficult to ensure the accuracy and integrity of the data. Additionally, using spreadsheets is time-consuming, not user-friendly and can hinder module leaders from inputting and accessing the data in an efficient manner. This study proposes the development of a more efficient and effective solution for recording and managing module leaders' reports at UR-CST that addresses these errors, inaccuracies, and inefficiencies.

The proposed centralized system will include proper validation and error-checking mechanisms, increase transparency in the data, facilitate data management, organization, and storage, allow easy access and retrieval of data by authorized personnel, ensure data security and protection from unauthorized access or breaches, and create a user-friendly interface.

The study will use a combination of methods like requirements gathering, system design, implementation, testing, and evaluation. The results of this study will provide UR-CST with a more efficient and effective solution for recording and managing module leaders' reports, thus improving the accuracy and integrity of the data, and providing a user-friendly interface for module leaders.

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List of Abbreviations and Nomenclatures

CST	College of Science and Technology
HTTP	Hypertext Transfer Protocol
UR-CST	University of Rwanda College of Science and Technology
IT	Information Technology
JSON	Java script object notation
HOD	Head of Department
DTLE	Director of Teaching and Learning Enhancement
API	Application Programming Interface
DBMS	Database Management System
DFD	Data Flow Diagram
UI	User Interface
ERD	Entity Relationship Diagram
REST API	Representational State Transfer API
JS	JavaScript

CHAPTER 1. GENERAL INTRODUCTION

BACKGROUND OF THE STUDY

According to goal of the university of Rwanda (UR) seven years (2018-2025) strategic plan, "quality teaching and learning" which states the university will put emphasis on student learning and ensure pedagogical and assessment practices are fair and rigorous. The university will explore methods appropriate to teaching and learning in the national context and develop pedagogies that are informed by research. The strategies furthermore emphasize on the importance of excellence in teaching, learning and assessment and will put in place effective performance management to encourage and reward excellence, innovation, and creativity in teaching, in development, appraisal and promotion.

To manage performance, UR-CST lecturers must submit a weekly report on classroom activities, student attendance, mode of instruction, number of teaching hours, and course progress. The current system's weekly reporting system makes use of a spreadsheet that is shared with all lecturers in a specific department to fill out. Such reports provide clear insights into teaching progress and help the administration in charge make decisions based on this information.

However, because this spreadsheet system handles reporting by hand, there is a higher risk of error, inconsistencies, making it difficult to ensure the accuracy and integrity of the data, and restricting lecturers from performing certain activities such as inputting and accessing data in an efficient manner. This may lead to mistrust in the results and inefficiencies in the recording and management of reports.

Therefore, this report propositions an interactive design of web-based features that help lecturers to report efficiently their activities. A system's interface plays a crucial part to secure public access while enhancing user-friendly computational environment for end-users but at the same time, it should be easy maintenance for administers to handle.

The purpose is to expose lecturers and other relevant administrators to the reporting processes, including how to create accounts on the system, obtain HOD or DTLE approval before gaining full access to the entire system, and move on to make more activities. With the help of the system offered, professors or anybody else authorized to submit reports will be able to do so quickly, accurately, and efficiently. This will make it much simpler for the relevant authorities to manage the lecturers' teaching and performance.

1.1 PROBLEM STATEMENT

The current weekly reporting system in UR-CST, which utilizes spreadsheet reports, is time-consuming, prone to errors, and lacks real-time data visibility. These limitations impede the ability of UR-CST to effectively track and analyze key performance indicators, leading to inefficiencies and decision-making difficulties. The proposed solution is to implement a web-based weekly reporting system that addresses these limitations by providing real-time data visibility, reducing the potential for errors, and making the process more efficient. The aim of this research is to evaluate the feasibility of this proposed solution and determine the best approach for its implementation in UR-CST.

1.1.1 RESEARCH QUESTION

- What are the current problems and challenges faced by UR-CST in recording and managing module leaders' reports using spreadsheets?
- What are the requirements for a more efficient and effective solution for recording and managing module leaders' reports at UR-CST?
- How can technology be used to address the problems and challenges identified with the current system of recording and managing module leaders' reports at UR-CST?
- How does the proposed system compare to similar systems used in other institutions in terms of performance, security, and scalability?
- How effective is the proposed system in addressing the problems and challenges identified with the current system of recording and managing module leaders' reports at UR-CST?

1.2 General objective

A centralized system that will assist College of Science and Technology (CST) lecturers in making and manipulating their weekly reports more easily and securely. The centralized system will restrict access to weekly reports for all users who will be utilizing our system and will give a quicker approach to viewing reports, saving time for department heads.

This unified system will provide information to let the College of Science and Technology (CST) analyze and determine what progress was made throughout the week and by whom (Lecturers). The data provided by our system will aid the college in recognizing the strengths and weaknesses of the teaching system.

1.3 Specific objectives

The main objective of this project:

- Develop a system that mitigates errors and inconsistencies in the data through the implementation of robust validation and error-checking mechanisms.
- Devise a system that facilitates efficient data management, organization, and storage.
- Create a system that allows for easy access and retrieval of data by authorized personnel.
- Design a system that enhances transparency in the data, thereby enabling easy verification of the reports' accuracy.
- Create a user-friendly interface that is easy to navigate for module leaders and other authorized personnel.
- Implement a system that ensures data security and protection from unauthorized access or breaches.
- Evaluate the efficiency of the system in terms of time and effort required for recording and managing module leaders' reports.
- Include dashboards with analytics to allow for real-time monitoring and analysis of the data.

1.4 Scope of the project

The scope of the study includes an in-depth analysis of the current weekly reporting system in UR-CST, including its strengths, weaknesses, and limitations. The proposed web-based weekly reporting system will also be evaluated for its potential benefits, drawbacks, and feasibility. Data will be collected from key stakeholders, including management and staff, through interviews and surveys, to understand their perspectives on the current and proposed systems. A pilot test of the proposed system will be conducted to assess its effectiveness and gather feedback from users. The data collected from the current and proposed systems will be analyzed to determine the best approach for implementing a weekly reporting system in UR-CST. The final report will include a summary of the findings, recommendations for implementation and a plan for future research.

The study will focus developing the weekly reporting system of UR-CST and the comparison between the current spreadsheet-based system and the proposed web-based system.

CHAPTER 2. LITERATURE REVIEW

2.1 REVIEW

The research methodology for the weekly reporting system in UR-CST involves a comparison of the current system, which uses spreadsheet reports, to a proposed web-based system. The study will involve a thorough analysis of the current system, including its strengths and weaknesses, as well as an evaluation of the proposed web-based system to determine its potential benefits and drawbacks. The data collected will be analyzed using both qualitative and quantitative methods, including interviews with key stakeholders and a survey of users.

The study will also include a pilot test of the proposed system to assess its usability and effectiveness in practice. Overall, the goal of this research is to determine the best approach for implementing a weekly reporting system in UR-CST that is efficient, accurate, and user-friendly.

SPREADSHEET SYSTEM

(Narra, 2021) schools invest in digitized classrooms due to rapid changes in learning, instruction, and student engagement; this is a novel approach, as school management systems, despite their increasing use, can be overwhelming. Indeed, educational institutions may use open-source management or the integration of Excel templates to manage various administrative tasks and school operations; additionally, using these templates is free, they are ready-to-use, and feature-specific, according to (Narra, 2021) This system, on the other hand, has drawbacks such as a lack of encryption features for protecting sensitive data such as personally identifiable information. Even if your password-protect your spreadsheets, the inherent security features allow hackers to easily access your files. According to research conducted by the tech giant Cisco, Microsoft Office formats, including Excel, make up the most prevalent group of malicious file extensions in emails.

Furthermore, many organizations value Excel's ease of use and accessibility, according to a (Caspio, 2020)In contrast, managing, organizing, and analyzing large amounts of data necessitates the use of a more robust tool than an Excel spreadsheet. Most importantly, in a world where data integrity directly translates to organizational dependability, one of Excel's major flaws is its lack

of data integrity. Spreadsheets, for example, will accept your first name as your date of birth. 35% of users reported data errors in the most important spreadsheets they use at work, according to Ventana Research. "Spreadsheets aren't prone to errors, but their users are." Emma Brudner reports. Consequently, with so many edits and calculations going on at once, it's natural for spreadsheets to contain errors.

Spreadsheets are unusable, and there is no way around it. It is adaptable and well-known to many users. However, according to Emma Brudner (2022), using spreadsheets to manage customer information will result in inefficiency and, at worst, danger. Most users will be scrolling through hundreds, if not thousands, of rows and columns. Spreadsheets are challenging to consume and read. Furthermore, part of its unfriendliness As Emma Brudner points out, spreadsheets are difficult to visualize. Users can make charts and graphs, but the keyword is "create," as assembling data in spreadsheets is time consuming and frustrating. Most users can choose to skip this, as some believe it is unnecessary.

Besides, using an Excel spreadsheet requires no training; however, they can be more trouble than they are worth over time. The inability of spreadsheets to scale is a free limitation. When dealing with large amounts of data, spreadsheets reveal their limitations, according to (Caspio, 2020). Excel's format is 1,048,576 rows by 16,384 columns, so your datasets should fit within that limit. However, the organization will continue to grow, and such inadequacy in a large organization would be limited.

PROPOSED SYSTEM

According to (Bellana, 2021)Proper management means processing several tasks using software that perform specific tasks, with all the necessary features it improves work efficiency. Additionally, quality of work is an advantage of a web-based reporting software, all features are managed with great effectiveness to improve operations Information is inserted with high accuracy, automatic notification sending ensures that all tasks are performed accuracy reported by (TotalSchool, 2022)

The proposed system is a web-based system that will assist lecturers in quickly and easily creating teaching reports. (Joe, 2008)The precision of web-based software is also essential to its success.

Web-based reports are delivered in real time, the data is centralized and accessible from any computing device, and there are no outdated spreadsheet copies floating around, ensuring that your reports are always up to date. The proposed system will be able to provide lecturers with self-efficacy, real-time data, and automated processes, which will make their jobs easier and keep them interested in using the web-based system. Furthermore, the system's efficiency and accuracy are related to the fact that it is not susceptible to human errors, as it has error-checking mechanisms which improves the system's efficiency and effectiveness.

Furthermore, (Brudner, 2022)claims that web-based systems are ideal for growing organizations or organizations with a large customer base because these systems scale in accordance with the company's growth. In fact, the proposed system will be scalable as well; unlike the current system, it will not limit users in terms of how much data they can enter the system.

(Dallemand, Datumize, n.d.)recommends focusing on the needs of your users as well as your corporate goals when designing web-based systems and striking a balance between complexity and usability. Appropriate user flows and user requirements must be considered to meet user needs and demands while also meeting corporate requirements. Furthermore, a good user interface will improve the system's functionality first and foremost. The proposed system will be simple to use, with a simple and intuitive interface, a customizable dashboard that adapts to the viewers' needs, priority features on the dashboards, and simple system navigation. According to research, users prefer to focus on text rather than images on their first visit to a website or a system. As a result, the proposed title and header structure is well-organized to ensure that the user understands the content and meaning of a page.

When you use a spreadsheet reporting system or any other traditional reporting system, your data is vulnerable. Remember to always install the most recent security patches and updates. Otherwise, you risk someone gaining access to your computer and stealing your data. A web-based system, according to the (FormLinkSystem, 2019), is more secure. Data is password-protected, which means it can only be accessed by authorized individuals, and it is stored on servers with multiple layers of security. The proposed web system is also password-protected, allowing users to work without concern for data loss. Users will not have to worry about losing data if their computing devices are stolen because it is web-based

CHAPTER 3. METHODOLOGIES

3.1 INTRODUCTION

This research aims to study the current reporting system used in UR-CST and propose a new, web-based system to improve the efficiency and accuracy of the report system. The methodology for this research will involve a thorough analysis of the current spreadsheet-based system, including its strengths and weaknesses, as well as an evaluation of similar web-based systems to identify best practices and potential solutions. The proposed web-based system will be designed to address the identified issues and improve the overall report system. The research will conclude with a detailed implementation plan for the new system. Additionally, user feedback will be collected and analyzed to ensure the proposed system meets the needs of the users. The methodology will be conducted using a mix of both qualitative and quantitative research methods.

3.2 RESEARCH METHODOLOGY

According to Clarke, R.J (2005), there are four (4) main ideas when constructing research: exploring ideas, enquiring an issue, solving a problem, and making arguments that induce the author to seek external assistance. He also stated that there are two major research approaches: qualitative and quantitative methods

According to Hohmann (n.d.), a qualitative approach is used to investigate social and cultural phenomena, such as structured and unstructured interviews, focus groups, case studies, and diary accounts, among other things. To validate the feasibility and reliability of this project, the author employs methods such as interviewing experts to gain their understanding and requirements, as well as comparative studies on previous work by other authors.

According to Hohmann (n.d.), explains that quantitative methods are including surveys, laboratory experiments, econometrics, and numerical methods like mathematical modeling.

3.2 RESEARCH TECHNICS

3.2.1 Interview

Two sets of questions were generated after conducting in-person interviews with several staff members and asking them various questions about the present system. One was sent to the department head and lecturers, and the other to the Director of Teaching and Learning. The questions were divided into two sections: one elicited their experience with the existing system and how difficult it is to use daily, and the second elicited their thoughts on the proposed system and what they would want to see included in it.

3.2.2 Documentation

According to Singh (2022), proper documentation ensures that your research is accurate. For our research we have used different documentations, that we believe has added accuracy, authenticity to our research. The documentation has not only broadened our understanding of the project, but we also believe it will provide readers with reliability and transparency. See References

3.3 Research Setting

The research was carried out at the UR-CST, which is in the Nyarugenge district of Kigali City's Province. Lectures from all departments use a system to report weekly on the way of teaching, activities held in a session, how many assessments were provided; they report on everything they did during the session, including the number of hours that session lasted. They use an Excel spreadsheet to report.

3.4 The Study population and Sample

The study was conducted on a member of the UR-CST teaching faculty; lectures and HOD totaled 50. The study population included all staff members who used or interacted with the excel sheet daily. A convenient sample of 20 lectures and two HODs was chosen.

3.4.1 Sampling Criteria

Staff members that were selected had to meet the following criteria to be included in the sample, they had to:

- Be consenting to participate.
- Be of either Sex.
- Be mentally stable to consent to participate.
- Have used the system a numerous number of times.

3.5 Data Collection Instrument and Method

The interview was the most used data collection tool. Interviews were structured conversations in which one side poses questions and the other answers with information. We chose this method of data collection because it provides more depth than any other instrument.

Data was gathered through interviews to assess Lecturers' experiences and feelings about the current system. Interviewing was chosen because:

- It required less time and energy to administer.

- They assisted in catching both verbal and nonverbal cues, which helped capture their level of enthusiasm, discomfort, and so many others, which would not have been feasible utilizing other means.

- Some questions were closed which made it easier for people to compare their responses.

Aside from these benefits, for example, a query for anonymity can lead to decreased validity since participants may not reflect their genuine views but may respond the interviewer what they want to understand, resulting in the loss of vital information.

Questions were divided into two groups: one for department heads and lecturers and another for the director of teaching and learning. The questions were primarily organized, with a few unstructured ones thrown in for good measure. Structured questions required participants to answer questions based on options provided, whereas Unstructured questions required participants to

respond in their own words and provide details. Structured questions were used to help administer and analyze responses; these questions are also efficient in terms of time, and participants can answer Structured questions better than unstructured questions. For reference, see Appendix A.

3.5.1 Data Collection Procedure

In-person interviews were conducted. Participants (Heads of Departments and Lecturers) were located after school activities in their leisure time, and most interviews were planned via email with the Director of Teaching. Respondents were free to express their opinions during the interview, even on topics not covered in the discussed areas mentioned in paragraph 3.5.1. Finally, it should be noted that the conversations were pleasant and easy to follow.

3.2.2 Discussion of Results

I. Demographics Information

The demographics presented below are the findings of interviews with staff members, who were asked to score the criteria of both the existing and proposed systems on a scale of one to five.

Table 1 Demographic table

No	Criteria	Current System	Proposed System
1	Interaction	2	4
2	Performance	1	4
3	Easy-to-use	1	3
4	Open source	5	3

3.6 Development Methodology

Software engineering development methodology is called the "software development life cycle" (SDLC). There are a few things that may be done during program development to improve planning and management. It is also regarded as a stage in the life cycle of system development. Waterfall, prototyping, iterative and incremental development, spiral development, fast application development, extreme programming, and agile methodology are examples of common development methodologies.

Agile software development was chosen by the researcher for this project because it is better suited to its simultaneous use of iterative and incremental development.

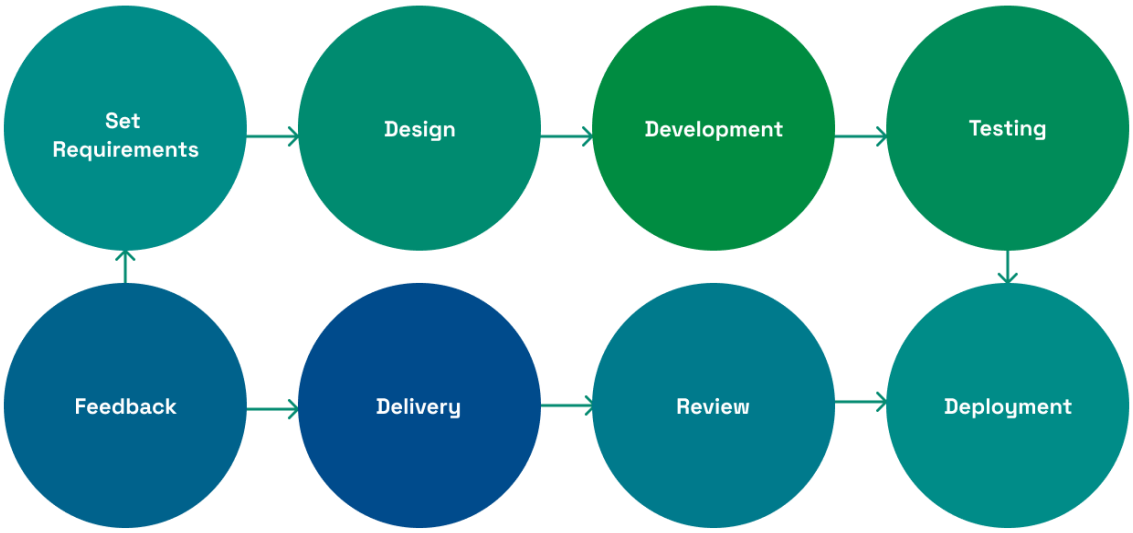

Figure 1 Agile methodology

Using agile methodology, the researcher was able to define directions on how to navigate in the system to achieve user satisfaction.

3.7 Data Analysis

During the research the cross-checking mechanisms for the data pertaining to each case study were of an evolutionary nature, i.e., the questions were clarified and refined during the process of gathering data. The key informants reviewed the interview results to ensure that the analysis results were correct, and meetings were also held with some key participants to allow them to reflect on the case in a larger and richer context.

Later, content analysis was used to analyze the data which was gathered from personal interviews. Moore and McCabe claim (2005). The main advantage of content analysis is that it assisted the researcher in reducing and simplifying the data collected, while also producing results that could be measured using quantitative techniques. Moreover, content analysis gave the ability to researchers to structure the qualitative data collected in a way that satisfies the accomplishment of research objectives.

3.8 Key Milestone

Table 2 Project Key Milestone

Num	**Milestone**	**Completion Week**
1	Requirement Gathering	Week 2
2	Proposal defense	Week 2
3	System Mockup design and Prototyping	Week 7
4	Progress report	Week 15
6	Complete testing of the system	Week 15
7	Project Submission and Presentation Week	Week 16

3.9 Gantt Charts

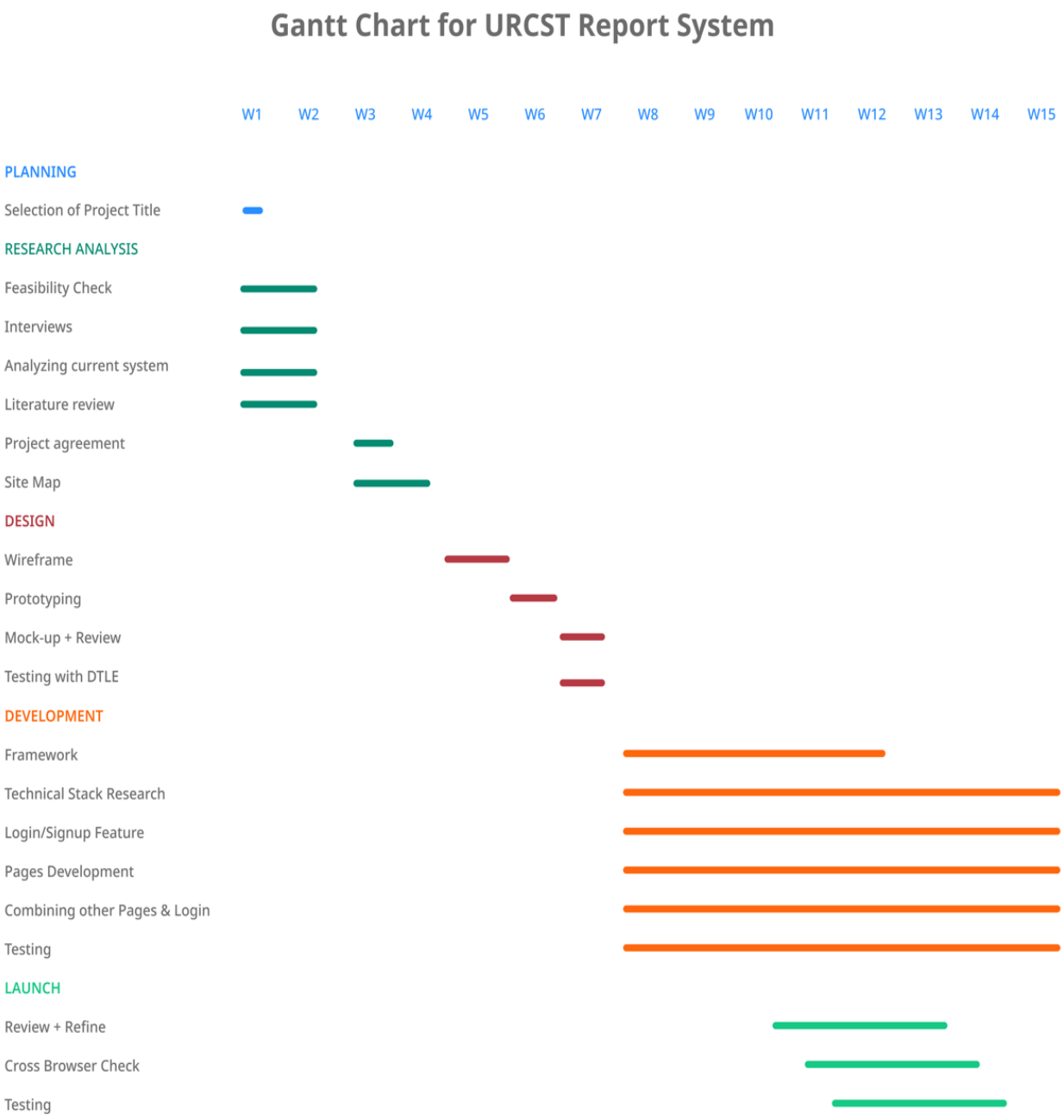

Figure 2 Gantt chart (Project timeline

3.10 TOOLS AND LANGUAGES USED TO BUILD SYSTEM

3.10.1 Figma

We have used Figma extensively in my work with system prototyping, creating, editing, and sharing high-fidelity wireframes and mockups. It helps us to iterate on designs efficiently with its intuitive interface, collaborative features, and ability to quickly create polished and professional-looking designs.

We have utilized React as a tool in the development of the frontend for the weekly reporting system. It allows for building reusable UI components and handling the state and logic of the application, making it an efficient and effective choice for designing the frontend of the system.

3.10.3 Postgres

We have used Postgres as open-source relational database management system to help in data storage and easy their management

3.10.4 Django

We have used Django in the backend design of the system, specifically utilizing the Django REST framework to design APIs that serve the frontend. It has allowed us for easy creation of RESTful APIs, which are essential for communication between the frontend and backend of the system.

We have used Postgres as open-source relational database management system to help in data storage and easy their management

3.11 Functional requirement

The functional requirements of the proposed system for recording and managing module leaders' reports at the University of Rwanda, College of Science and Technology (UR-CST) are as follows:

User Management. The system should have the capability to manage users, such as module leaders, with different roles and permissions, i.e., adding, editing

Data Entry. The system should allow module leaders to easily input and update their reports, including details on their teaching activities, mode of instruction, and plans for the following week.

Data Validation. The system should have proper validation and error checking mechanisms to ensure the accuracy and integrity of the data entered.

Data Retrieval. The system should allow authorized personnel to easily access and retrieve the data for analysis and reporting purposes.

Data Security. The system should have security measures in place to protect the data from unauthorized access or breaches, such as user authentication and encryption of sensitive data.

User-Friendly Interface. The system should have a user-friendly interface that is easy to navigate and understand for module leaders.

Reporting and Analytics. The system should provide the capability to generate reports and perform analytics on the data entered, such as tracking the progress of module leaders' reports over time

3.12 Non-functional requirements

Non-functional requirements are the characteristics of a system that are not related to its specific functionality, but rather describe how the system should behave or perform. They are also known as quality attributes, and they include:

Performance. The system should be able to handle a certain number of users, transactions, and data volume without experiencing significant slowdowns or crashes.

Scalability. The system should be able to easily accommodate an increase in the number of users, transactions, and data volume.

Security. The system should be able to protect the data from unauthorized access or breaches, such as user authentication and encryption of sensitive data.

Usability. The system should be easy to use and understand for the users, with a user-friendly interface.

Maintainability. The system should be easy to maintain and update, with a clear and well-documented codebase.

Reliability. The system should be dependable and available to users when they need it, with minimal downtime.

Portability. The system should be able to run on different platforms or environments without modification.

Extensibility. The system should be able to easily accommodate new features or functionality in the future.

Compliance. The system should comply with relevant laws, regulations, and standards.

3.11 Limitations

- **Limited time frame.** The research may be limited by a limited time frame to evaluate the current system, which could make it difficult to obtain a comprehensive understanding of its performance over time.

- **Limited user-friendliness.** The research did not fully evaluate the user-friendliness of the current system, and whether it is easy to use and navigate for the users.

- **Limited reporting and analytics**. The researcher did not fully evaluate the reporting and analytics capabilities of the current system, and whether it can provide useful insights and metrics on performance and data.

CHAPTER 4. DESIGN AND IMPLEMENTATION OF THE SYSTEM

4.0. INTRODUCTION

This chapter will provide in-depth information about the different stages of the project such as the design phase, where the system's overall structure and layout will be laid out, the analysis phase, where the system's performance and capabilities will be evaluated, and the implementation phase, where the system will be put into action and made available for use. The chapter will also provide details on how the system was developed, and what steps were taken to ensure its proper functioning.

4.1 SYSTEM DESIGN OVERVIEW

The System Design section provides a detailed overview of the design and architecture of the CSTUR Weekly Reporting System. This section includes diagrams such as the Dataflow Diagram, which illustrates the flow of data within the system, and the Context Diagram, which provides an overview of the system and its interactions with external entities, and the Entity-Relation Diagram, which explains the relationships between different components of the system. This section provides a comprehensive understanding of the system's design and architecture

4.1.1 Use-case diagram

In the case of the CST Weekly Reporting System, a user case diagram was used to clearly depict the various ways in which users would interact with the system, such as submitting weekly reports or viewing previous reports. This approach allowed us to identify the key functionality that the system needed to support and to understand the different user roles and their associated use cases. Additionally, the user case diagram helped us to identify any potential issues with user experience and usability. Overall, the user case diagram was a valuable tool in the development of the CST Weekly Reporting System, allowing us to effectively design and implement the system's user interactions.

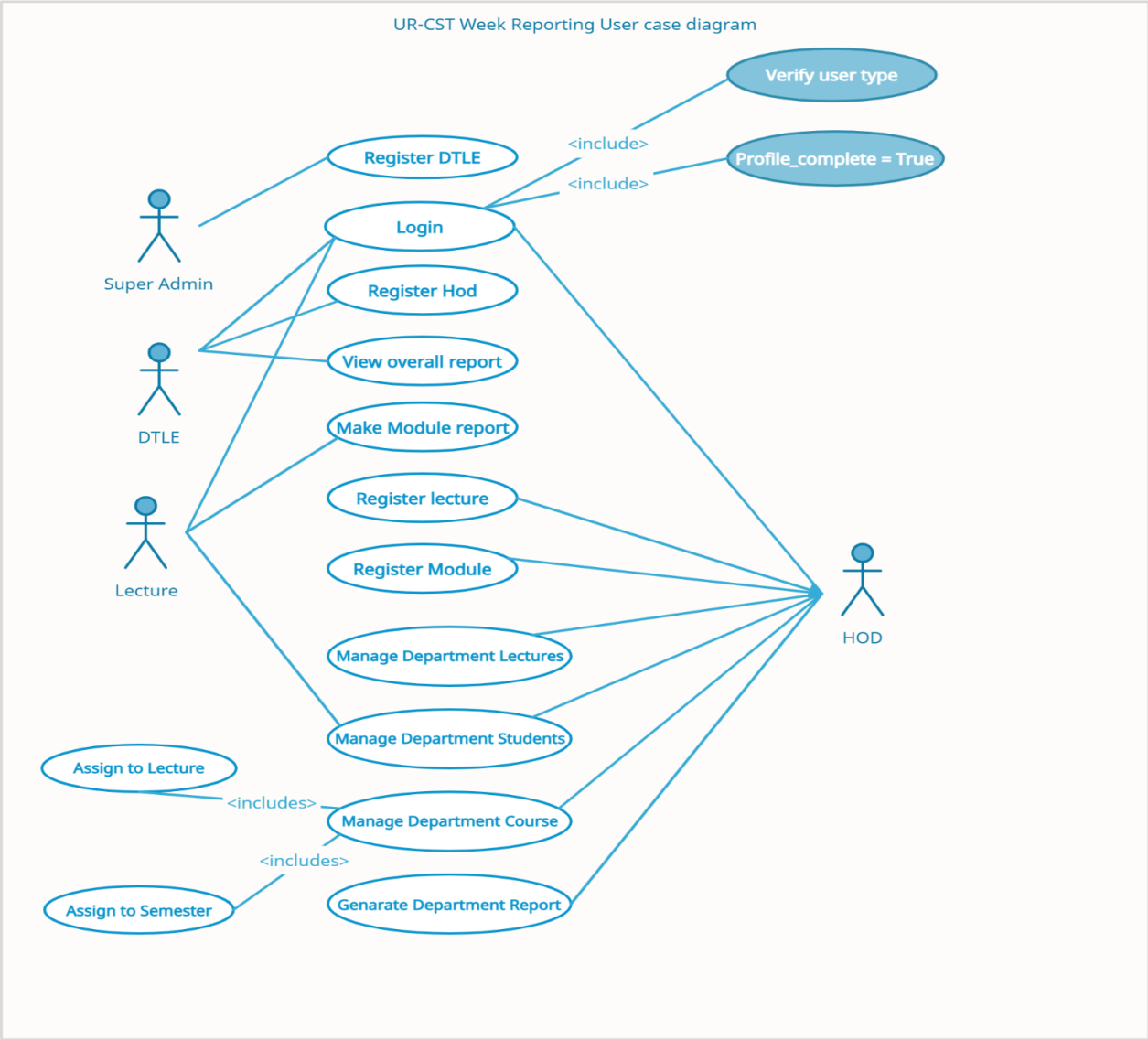

Figure 3 user case diagram for URCST weekly reporting system

4.1.2 Data flow diagram

The Data Flow Diagram (DFD) for UR-CST weekly reporting System shows the overall flow of data through the system. Its focus is to describe how the data moves in and out of the system.

4.1.2.3 Level 0

In the development of the CST Weekly Reporting System, we used level 0 dataflow diagrams to provide a clear and concise representation of the system's architecture and data flow. By using this

approach, we were able to identify the main inputs, outputs, and processes within the system, which helped to guide the development process. We also used level 0 dataflow diagrams to communicate and collaborate effectively with stakeholders, by providing a clear visual representation of the system's functionality. Furthermore, level 0 dataflow diagrams helped us to identify potential issues and areas for improvement early in the development process, allowing us to adjust and modifications as needed. Overall, level 0 dataflow diagrams played a crucial role in ensuring the success and efficiency of the CST Weekly Reporting System.

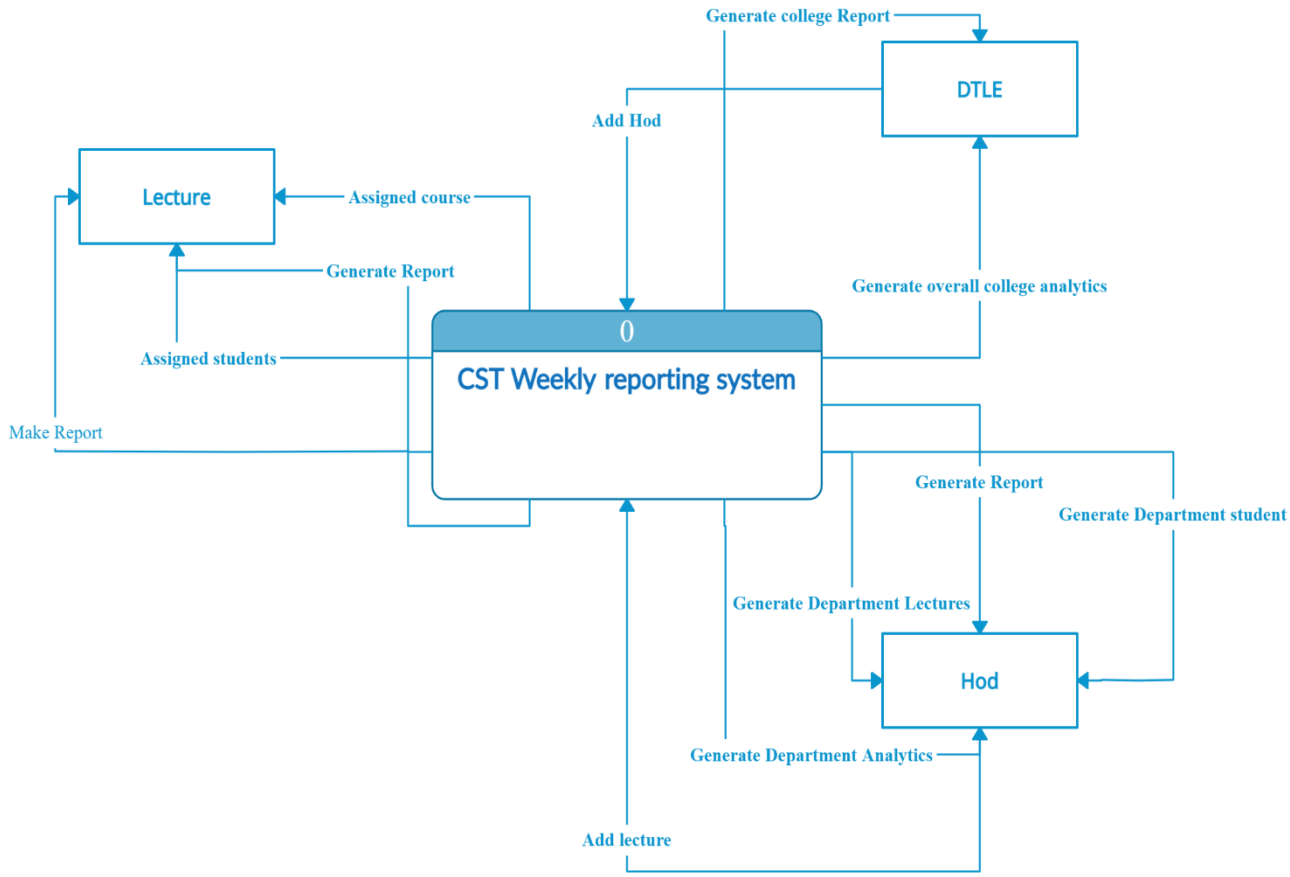

Figure 4 Level 0 diagram (Context diagram)

4.1.3 Entity Relation diagram

In the System Design of the CST Weekly Reporting System, we used a Relationship Diagram to clearly depict the relationships between different data elements, such as lecture,Students, Modules,DTLE,Departments, teaching modes and activitys and weekly reports. This approach allowed us to identify and organize the data elements that are needed to support the system's functionality and to understand the dependencies between them. Additionally, this representation helped us to identify any potential issues with data integrity and consistency. Overall, it was a valuable tool in the development of the CST Weekly Reporting System, allowing us to effectively design and implement the system's data architecture

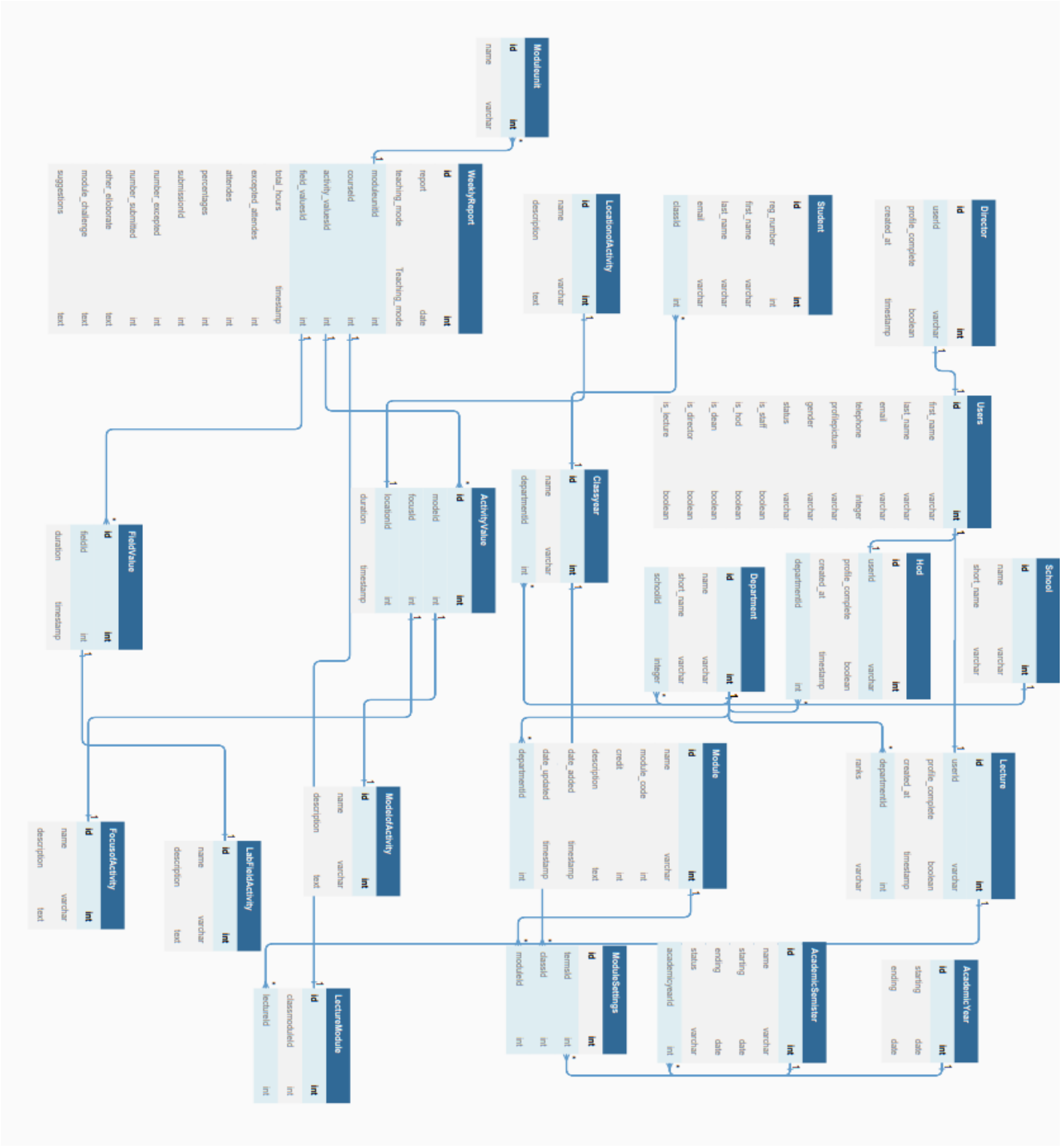

Figure 5 Entity relation diagram

4.2 SYSTEM IMPLEMENTATION

The implementation of the UR-CST Weekly Reporting System is the focus of this chapter. In this section, we will provide an overview of the various pages and features that have been created as part of the system. This section will include images that highlight the user interface and provide the reader with a visual representation of the system's design and layout. This section aims to provide an understanding of the development process and the results obtained, as well as a clear picture of how the system looks and functions.

4.2.1 API Documentation Screen

For documentation of API, we used the Swagger UI. It provides a clear and user-friendly interface for displaying the API's resources and methods, including the request and response format (such as JSON) and the available HTTP methods (such as GET, PUT, DELETE, and POST). The UI also facilitates API testing and debugging, making it a valuable tool for both developers and end users. Overall, the Swagger UI was critical in effectively documenting our API for our research project.

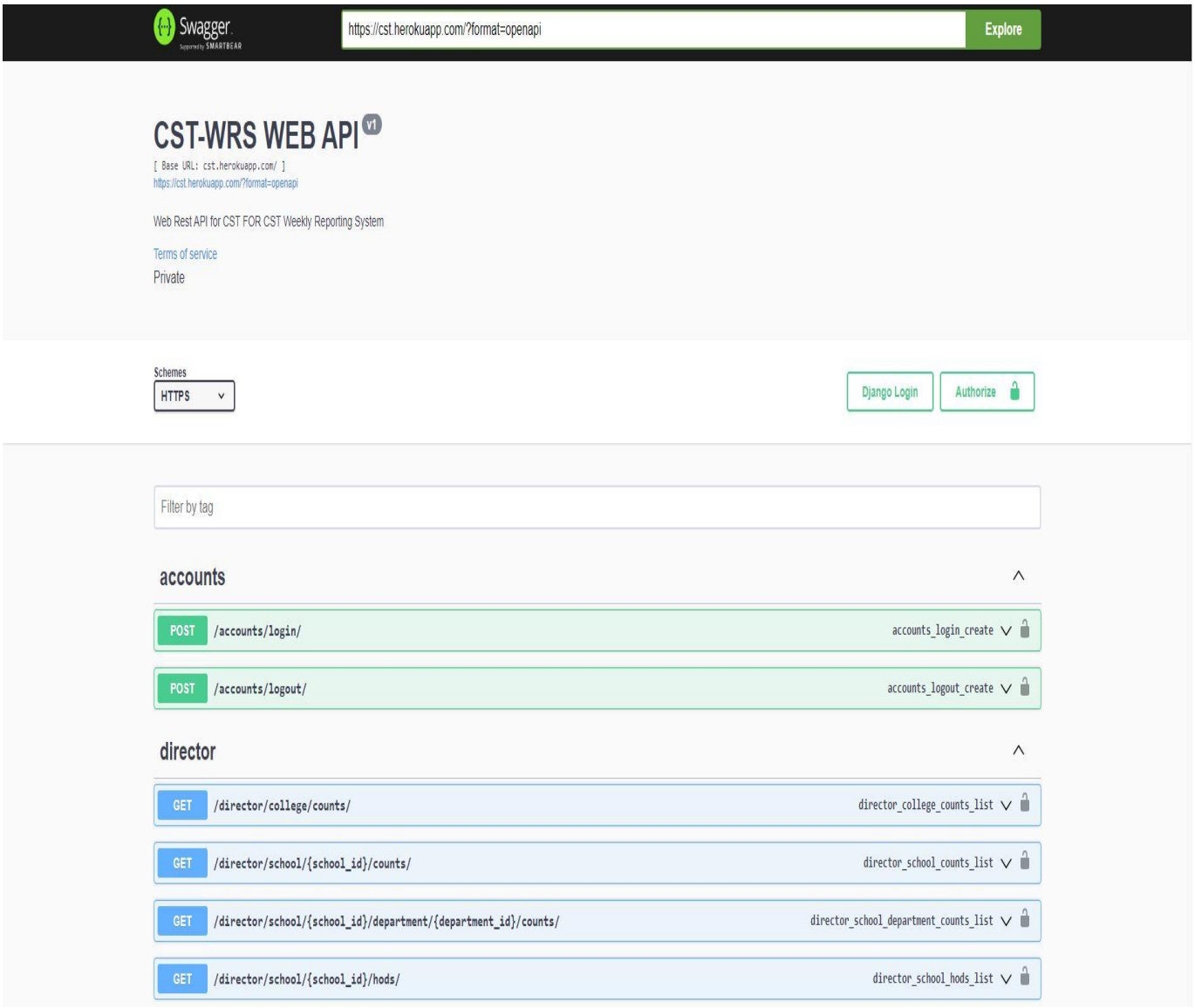

Figure 6 Swagger UI documentation screen

4.2.1 Login Screen

This login page is designed for different user types such as DTLE, HOD, and LECTURE. To be authenticated, users will need to provide their email and password as credentials. Lectures will only be able to login after they have been registered by the HOD. The HOD themselves will be registered by the DTLE and the DTLE will be registered by the super ADMIN. This login page will be used by all these different user types to access their respective accounts.

Figure 7 Login Screen

4.2.2 DTLE Dashboard Screen

The DTLE Dashboard Screen is a screen for college director of teaching and learning enhancement. It provides a comprehensive view of college data analytics, including information on the number of courses, lectures, and students. Additionally, it offers a detailed report on the total number of reports submitted in each week. The dashboard also includes a list of suggestions from lectures for improvements and areas that need to be addressed. To aid in data analysis, the dashboard also includes charts that provide insights into the most used teaching modes, such as online and face-to-face instruction. Additionally, the dashboard displays the most used mode of activity, focus, location, and lab field activities. Overall, the DTLE Dashboard screen is a powerful tool that helps college directors stay informed and make data-driven decisions by providing a comprehensive view of college data analytics.

Figure 8 DTLE Dashboard Screens

4.2.3 Hod Dashboard Screen

The Head of Department Dashboard provides an in-depth look at departmental data analytics. It provides information, such as the number of courses, lectures, and students. It also includes a list of lecture suggestions for improvements and areas that need to be addressed. The dashboard also includes charts that provide information about the most popular teaching modes, such as online

and in-person instruction. This screen is intended to assist the department head in remaining informed and making data-driven decisions by providing detailed information about the department's performance. The Head of Department Dashboard also allows you to track the department's progress and identify problem areas. Overall, it is a critical component of the system we designed for departmental data analysis and decision making.

Figure 9 HOD Dashboard Screen

4.2.4 Lecture Dashboard Screen

The Lecture Screen Dashboard is one of the features we developed to provide detailed information to lecturers. It displays both the total number of courses assigned to the logged-in lecturer and the total number of students enrolled within these courses. Additionally, the dashboard shows the overall course progress and teaching progress for each course assigned to the lecturer. It also includes data on the most common teaching modes, as well as the focus and location of activity across all courses. This enables lecturers to monitor their progress and make necessary adjustments. The Lecture Screen Dashboard is a powerful component that provides detailed information about their courses and performance to help lecturers stay informed and make data-driven decisions. It assists them in evaluating their teaching methods, identifying areas for improvement, and adapting to improve their teaching approach.

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Figure 10 Lecturer Dashboard Screen

4.2.5 Weekly Reporting Screen

The Weekly Reporting Screen is one of the screens in our system that allows lecturers and head of department to view all course reporting. It contains different filters to allow filtering by academic year, semester, and level. This helps in easily accessing the required information and saves time. The page shows a comprehensive view of all the courses reporting, the progress and activities of each course. The filter options allow users to quickly find the information they need, and the layout of the page makes it easy to understand and navigate. Overall, the Weekly Reporting Screen is an essential component of our system for monitoring the progress of courses, tracking the performance of lecturers, and making informed decisions.

Figure 11 Weekly reports Screen

CHAPTER 5. RECOMMENDATION AND CONCLUSION

5.1 CONCLUSION

In summary, this research aimed to study the current reporting system used in UR-CST and propose a new, web-based system to improve the efficiency and accuracy of the report system. Through a thorough analysis of the current spreadsheet-based system and an evaluation of similar web-based systems, it was determined that transitioning to a web-based system would provide numerous benefits, such as increased automation and data accuracy.

Additionally, a sample of 20 lecturers were interviewed to gather their feedback and insights on the current system and the proposed changes.

Based on the findings of this research, it is recommended that UR-CST should consider transitioning to a web-based report system. The proposed system is expected to improve the overall efficiency and accuracy of the report system, and the implementation plan provides a clear roadmap for the transition. Additionally, it is recommended that UR-CST continues to monitor and evaluate the new system to ensure it meets the needs of the organization and to make any necessary adjustments and consider adding new features in the future.

5.2 RECOMMENDATION

As part of future recommendations, the system will be upgraded to a mobile version of the web-based system to improve accessibility. Additionally, new features such as a timetable, attendance tracking, and report making capabilities for Head of department and Class representatives to increase the system's functionality. Improving the dashboard for administration and connecting the system to the official university portal for external users is also recommended.

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APPENDICES

APPENDIX A

Interview question

1. Can you describe your current experience using the spreadsheet-based reporting system?
2. What are some challenges you face when using the current reporting system?
3. How would a web-based reporting system benefit you and the department?
4. Can you think of any additional features that would be useful to have in a web-based reporting system?
5. How often do you use the current reporting system and for what purposes?
6. Can you describe any instances where the current system has caused delays or inaccuracies in your reports?
7. How important is it for you to have access to real-time data from the reporting system?
8. How do you think the transition to a web-based system will impact your work?
9. What kind of support or training do you think you would need to effectively use a web-based reporting system?
10. Are there any concerns or reservations you have about transitioning to a web-based system?

APPENDIX B

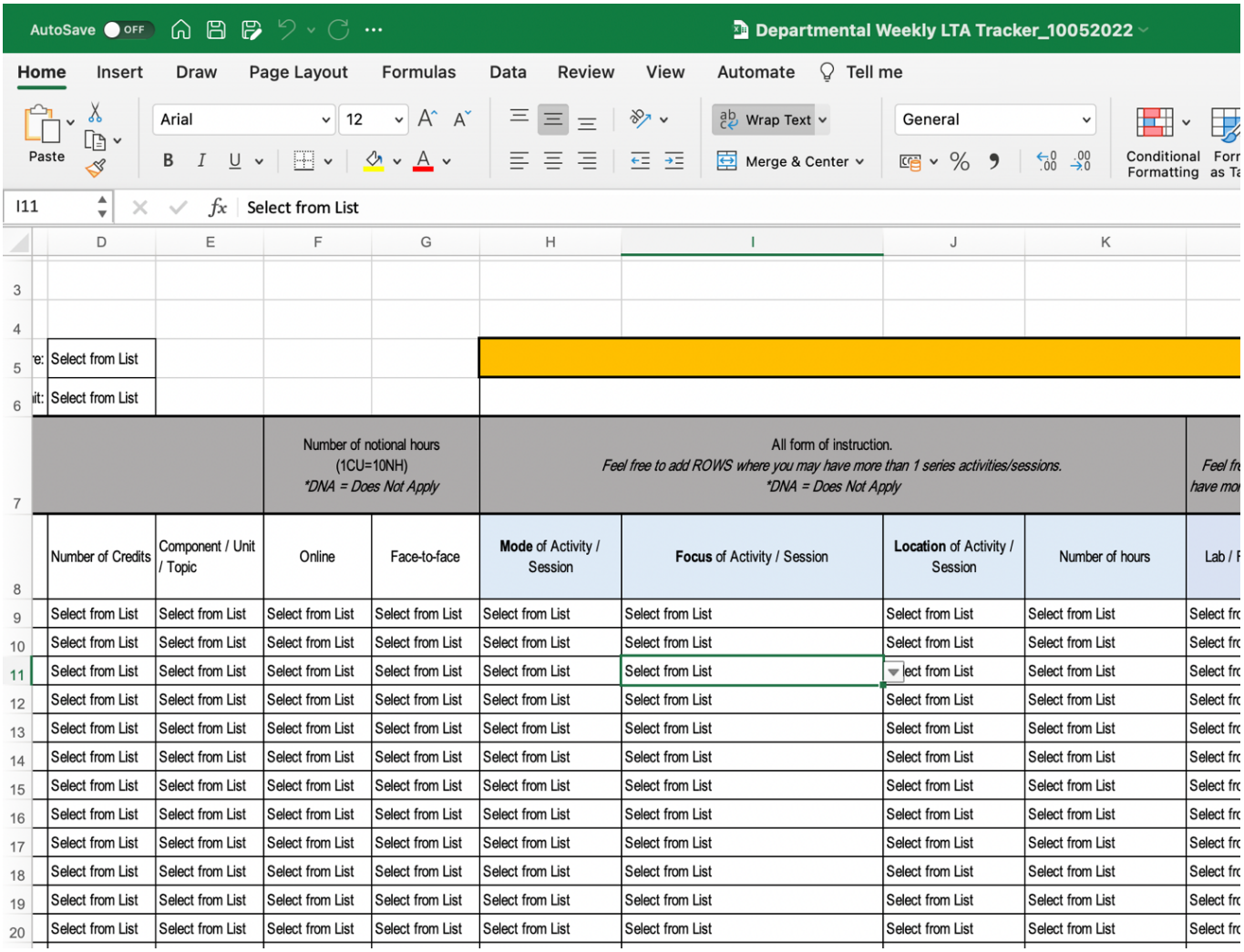

Figure 12 Weekly LTA Report Spreadsheet