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System for registration and management of workers

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***Abstract*— Nowadays, almost all businesses, regardless of the number of employees, need to register and manage those employees, but the quality of registration and management depends on several factors. One of the most important factors is technology, which has revolutionized almost every profession and business. With the boom that technology has, businesses are moving from the more primitive way of storing data on paper to the more advanced one in computer programs such as Excel, etc., or programs that are created and intended for this topic, as it is in our case. This degree topic presents a web-based application that is efficient and secure for employee registration and management. The application will have a real-time database that will provide access at any time for the administrator to the data of the company's employees. The user interface of the application is designed to be easy to navigate and "friendly", it is also designed to adapt to different types of web browsers. Moreover, the application also includes the feature for generating detailed reports and extracting information specific to any workplace as needed. This project will be created using spring boot as framework for back end, thymeleaf and bootstrap for frontend and mysql for database.**

Keywords— System, registration, management, business, workers.

I. INTRODUCTION

In a time characterized by the digital age and the evolution of technology, every day the demand for support on digital platforms increases, where fast and efficient management of workers is essential for businesses to advance and be competitive in the market. The system will have a GUI as friendly as possible and the level of access to the system will be divided into different roles. An administration panel will enable the user to supervise workers' registrations in the most efficient way, behind the administration panel there will be two functional tables where sectors will be registered in one, if there is more than one, and in the other the workers are registered, the tables will be crud foam data that are found in the database of the application. The department table will include the attributes ID and the name of the department, while the employee table will have ID, first name, last name, age, phone number, nationality, salary and sector to which it belongs. The connection of these two tables will be one-to-many where a sector can have many workers, while the opposite does not apply. So, an employee can only have one sector, some of these attributes may not even be filled, for example, nationality may be left blank as this is also regulated by law. The level of access to the system will be divided into three different levels. The first role is employee (simple user), who can only view the data stored in the database. The second role is Manager where, in addition to being able to view the data, he can also add new data and update them. And the last role is Admin where there is no limit in functions.

For this project to be able to be published on the Internet, it must work through the www system, through various browsers that are on the Internet that display images, texts, videos, etc., so through these www browsers they can be connected to our application in the future.

II. PROBLEM STATEMENT

In contemporary organizations and companies, the use or adoption of HRMS has become ubiquitous, promising simpler processes and functions for managing workers to improve organizations. The goals of the system are to achieve various functionalities through this application to enable faster work, to increase performance efficiency and security for the decisions made and the greatest advancement of the organization. The studies will be based on the current requirements of organizations that use similar systems for registration and management of workers. Some of the main factors for the success of the system are: the continuous increase in performance, the addition of functionalities in the future and the updating of the technologies used to create the system.

Another key factor is the commitment of workers who are administrators of these systems, the dedication they have to work can lead to the development of the organization or the opposite can damage the organization. Many studies nowadays done on this topic are about the functionalities and benefits as much as possible, but they do not talk much about the psychological aspect of the workers, for example: how to be motivated as much as possible in this aspect. In addition, with the dynamics that technology has taken, many jobs or professions are moving from office work to remote work or work from home, as was the case of Covid-19 that was mentioned above, so this shows or should be an incentive to work a little more in terms of training workers' skills, why not also in terms of psychology. This research does not focus on the side of user training, but tries to provide the easiest and most satisfying interaction between users and the system through the interaction with the most refined technologies.

III. METHODOLOGY

In this study, a mixture of research methods was used for the impact that HRMS has on the productivity of organizations or companies. The mixed method of research allows the use of two methods of extracting information such as quantitative data and qualitative knowledge from the participants. In this study, the qualitative data were collected after an interview with a company in the city of Prizren, which is small in size with 18 employees, given what is considered quantitative. The company in question deals with the sale of building materials, but also with construction itself. After the interview with the owner of this company, I realized that from this company 8 of those workers work at the company's location and the other 10, divided into two groups of 5 people, work at the company's workshop. This has led the company to start using a computer system for employee management even though the number of employees is not that large, this has made the job of registering and managing employees much easier for the company. The system that this company uses is quite advanced, which for each worker who registers in the system is saved with personal data such as name, surname, salary and the work sector that will work, data that must be recorded during registration, but which also has optional data for marking or adding columns such as age, nationality, etc. In addition, the system automatically saves the date of registration during the registration of workers. For the easiest possible management of workers, their system has several advanced functions, for example, filtering workers based on a certain attribute. For everyone registered in the system, there is also the input of mistakes, whether they are good or bad. All these functionalities have made the owner of this company express himself very satisfied with the system and how much it has facilitated his work for the management of workers and shows that based on the development of his company, he plans to increase the number in the future of workers, but why not the addition of new sectors. The method of data collection was through conversation with the owner of the company and all these data were obtained with his permission, assuring him of confidentiality for the data of this company. This study used a mix of research methods for selection, analysis, ethical issues and data limitations.

IV. THE PROPOSED SYSTEM

HRMS or called in the Albanian language the human resource management system is a system or more precisely a software that is used for the registration of workers managing from the first step which is registration to salary management and other work cycles. Managers and HR staff are the primary users, given that they direct the day-to-day operations of the workforce and are responsible for compliance and performance reporting. However, HR is not the only department that benefits. Companies can empower managers and workers with self-service for shared tasks—an important point of departure for new hires. Managers can use an HRMS to generate data on workforce trends and their business implications [1].

Some of the main requirements included in the system are:

- Creation of departments
- Registration of workers
- CRUD forms for both tables
- Assignment of user roles

The flow of how the work of this system will be organized is divided into phases:

1. Using the Agile methodology
2. Structuring the database
3. Implementation of the project

Phase 1. Agile (Scrum)

Scrum is an Agile project management framework that helps teams' structure and manage their work through a set of values, principles and practices. Like a rugby team (from which it gets its name) training for the big game, scrum encourages teams to learn through experience, organize themselves as they work on a problem, and reflect on their wins and losses to continually improve [2]. Scrum as a method includes several stages such as:

1. The beginning
2. Planning
3. Implementation
4. Review
5. Publication

The project is organized in such a way that we first created a board (Trello) where we created all the tasks to manage the project creation process in the best possible way. Trello is a visual project management tool that helps individuals and teams organize and prioritize their work. It allows users to create boards to represent different projects, and within each board, users can add lists of five to represent different stages of a project and cards to represent individual tasks or ideas [8]. Users can add comments, attachments and deadlines to cards and move them from one list to another to reflect the progress of a project. Trello is designed to be user-friendly and flexible, making it a popular solution for individuals and teams looking to streamline their workflow [8]. Although Trello is more designed for scrum Kanban, it can also be used for agile as in our case. Each created task has its title and description. Each step is based on sprints, where tasks are initially added to the Backlog as shown in the figure:

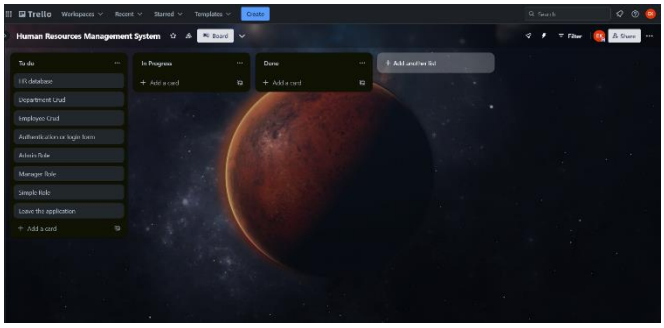

Figure 1. Tasks (Backlog)

For each task created in the backlog, there is a title and details that clearly show the requirements, for example the "department" task.

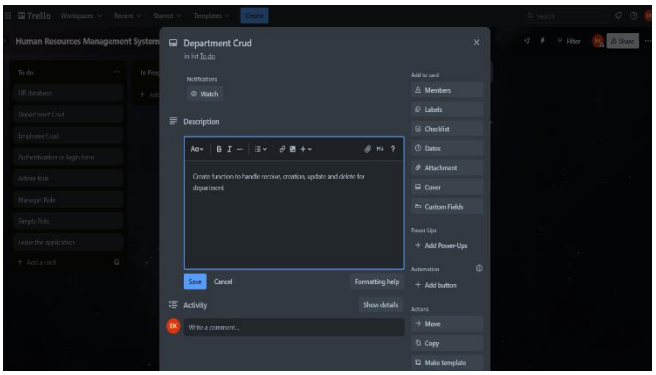

Figure 2. Details of tasks

The organization of the system is done in three sprints, the first sprint includes the structuring of the database, the second sprint includes the creation of crud tableau forms and in the last stage the assignment of roles for users.

The sprints are organized in three phases:

- To Do – tasks that are planned to be created,
- In Progress – task currently in process,
- Done – task completed.

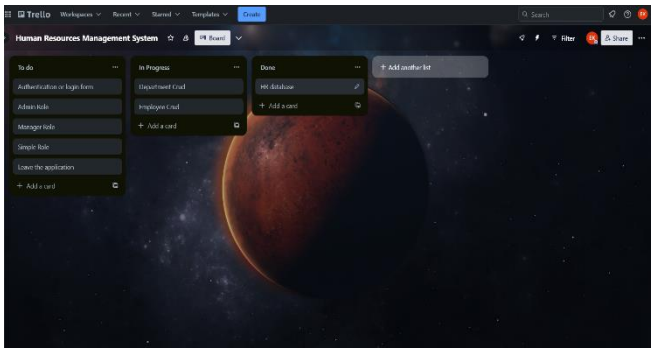

Figure 3. Phases of tasks

After the finalization of the project, all tasks will be placed in the Done phase.

The organization of the system in the second phase that was mentioned above is the creation or structuring of the database, the tables with the relevant attributes are listed below.

The Department table has the following attributes:

1. Department Id
2. Department Name

The Employee table has the attributes:

1. Employee Id
2. Employee Name
3. Employee Surname
4. Employee Age
5. Employee Salary
6. Employee Phone Number
7. Employee Email
8. Employee Nationality
9. Employee Department

The Users table has the attributes:

1. Username
2. Password
3. Enabled

The Authorities table has the attributes:

1. Username
2. Authority

The connection of these tables is done through the primary key and foreign key switches, the department table with the employee table has a one-to-many relationship where a department can have many employees, the department's primary key, which is the department Id, is connected to the employee's foreign key, which is the employee Department. Also, the user and authorities' tables have a one-to-many relationship where a user can have more than one role, so username in the users table is the primary key where it is related to the foreign key of the authorities' username. The following figure shows the structure of the database:

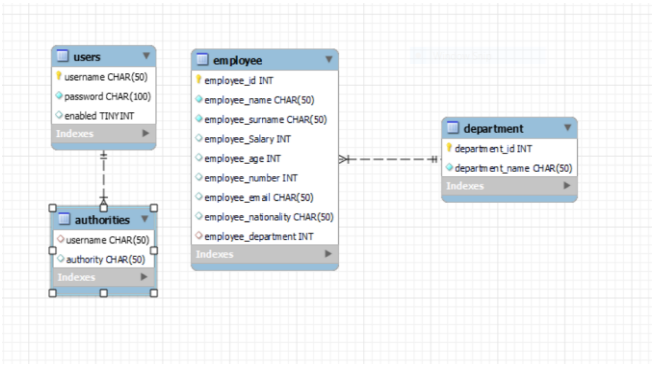

Figure 4. Structure of the database

The third and final phase of the project is the implementation of what the system's GUI will look like. The result of the system is divided into two parts, the first result will display the basic functionalities which are the department and employee tables with the crud form functions. Whereas, the second result will show a more advanced result of the application, which is also the final version of the system, in this result the addition of user roles has also been made. But before we start with the elaboration of the application, a brief description of the technologies used for the project will be made.

Spring Boot – Java spring boot is an open-source tool that makes it easier to use the Java-based framework for creating microservices and web pages. For any definition of Spring Boot, I have to start the conversation with Java – one of the most popular and widely used computer development languages for developing applications. Developers all over the world start their coding journey by learning Java. Flexible and user-friendly, Java is preferred by developers for a

variety of applications, everything from social media, web applications, and gaming applications to networking and enterprise applications [3]. Using the framework, large chunks of code are automatically added for developers to use and add new code as their needs dictate. These frameworks lighten the developer's load for almost any need, whether they are developing mobile apps and web apps or working with desktops and APIs. Frameworks make creating applications faster, easier, and more secure by providing code with reusable tools to help tie the various elements of a software development project together [3]. This is where Spring comes in. Spring is an open-source project that provides an efficient, modular approach to creating Java applications. The Spring family began in 2003 as a response to the complexity of early Java development and provides support for Java application development. The name spring usually refers to the application framework itself or the whole set of projects or modules. Java Spring Boot is specific module that is built as an extension of Spring [3].

MySQL – MySQL is the most popular open-source database in the world. Based on DB-Engines, MySQL ranks as the second most popular database, after Oracle database. MySQL supports some of the most popular applications, including Facebook, Twitter, Netflix, Uber, Airbnb, Shopify and Booking.com. Since MySQL is open source, it includes many features developed in close collaboration with users for more than 25 years. So, it is very likely that your favorite application or programming language is supported by MySql database [4]. MySQL is a rational database management system. Databases are the essential data store for all software applications. For example, whenever a user performs an Internet search, logs into an account, or completes a transaction, a database system stores that information so that it can be accessed by that user in the future [4]. A rational database stores data in separate tables instead of putting it all in one big repository. The database structure is organized into physical files optimized for speed. The logical data model, with objects such as data tables, views, rows, and columns, provides a flexible programming environment. You set rules that govern the relationships between different data fields, such as one-to-one, one-to-many, unique, required, or optional, and "pointers" between different tables. The database enforces these rules so that with a well-designed database your application will never see data that is inconsistent, duplicate. orphan, obsolete or missing [4].

Thymeleaf – Thymeleaf is a modern template engine for server-side Java, both for web and standalone environments, capable of processing HTML, XML, Java Script, CSS and even plain text [5]. The main goal of Thymeleaf is to provide an elegant and highly maintainable way to create templates. To achieve this, it relies on the concept of natural patterns to inject its own logic into template files in a way that does not affect the template being used as a design prototype. This improves design communication and bridges the gap between design and development teams [5]. Thymeleaf is also designed from the ground up with web standards in mind – especially HTML5 allowing you to create fully valid templates if that's what you need [14]. Out of the box thymeleaf allows you to process six types of templates, each of which is called a template model: Html, Xml, Text, Java Script, CSS, Raw [5].

Bootstrap – bootstrap is a free, open-source framework for web development. It is designed to facilitate the process of developing web pages that are also responsive, it is the first for mobile by providing a collection of syntaxes for template models [6]. In other words, bootstrap helps web developers build websites faster as they don't need to worry about basic commands and functions. It consists of scripts based on Html, Css and Js for various functions and components related to web design [6]. The main objective of bootstrap is to create responsive websites. It ensures that all interface elements of a website work optimally on all screen sizes [6].

Html – Html (Hypertext Markup Language) is the most basic building block of the web. It defines the meaning and structure of the content of web pages. Technologies other than Html are generally used to describe a web page's appearance/presentation (Css) or functionality/behavior (Java Script). "Hypertext" refers to the links that connect web pages to each other, either within a single web site or between web pages. Links are a fundamental aspect of the web. By uploading content to the Internet and linking it to sites created by other people, you become an active participant in the Word Wide Web [7]. Html uses markup to markup text, images, and other content for display in a web browser. Html markup includes special "elements" such as <head>, <title>, <body>, <header>, <footer>, <article>, <section>, <p>, , , <img >, <aside>, <audio>, <canvas>, <datalist>, <details>, <embed>, <nav>, <search>, <output>, <progress>, <video>, <ul>, <ol>, <li> and many others [7]. An Html element is separated from other text in a document by "tags", which consist of the name of the element inside a case-insensitive tag. That is, it can be written in uppercase, lowercase or mixed letters. For example, the <title> tag can be written as <Title>, or <TITLE>, or in some other form. However, the convention and recommended practice is to write tags in lowercase letters [7].

Css – Cascading Style Sheets is a style sheet language used to describe the presentation of a document written in Html or Xml (including Xml dialects such as Svg, MathMl or XHtml). CSS describes how elements should be rendered on screen, on paper, in speech, or in other media [7]. CSS is among the core languages of the open web and is standardized across all web browsers according to W3C specifications. Previously the development of different parts of the Css specification was done synchronously, which allowed versioning of the latest recommendations. You may have heard of Css1, Css2.1 or even Css3. There will never be a Css3 and Css4 instead, everything is now Css without a version number [7]. A part of the code for creating the application is presented in Appendix A where it shows how this application was created.

A. *Result A*

In the first result after starting the web application, the main web page or home page will appear, which contains some information and the navbar for navigating the system, which contains home page, department, employee, and in the second result, the option to logout will also appear. The following figure shows the view of the home page:

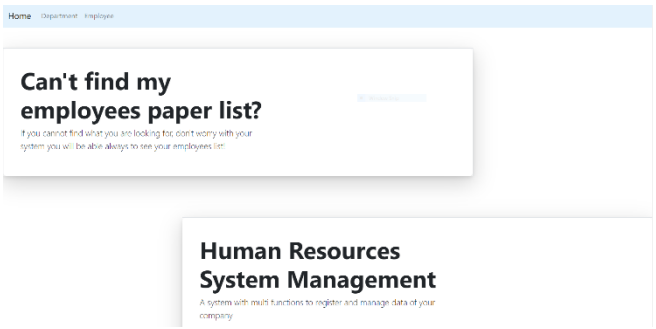

Figure 5. Home Page

From the home page, you can navigate through the navbar to department or employee, the first case to department where a list of several departments will appear "GET" with the id data and the name of the department, then there is an option with buttons that can do data update and data deletion. The figure below presents the complete list of departments.

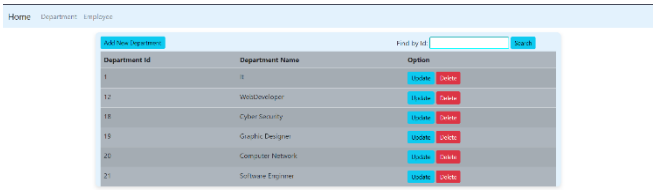

Figure 6. List and departments

From there the user can add "ADD" a new named department since the attribute department Id is generated automatically, it increases by one after each addition of the department.

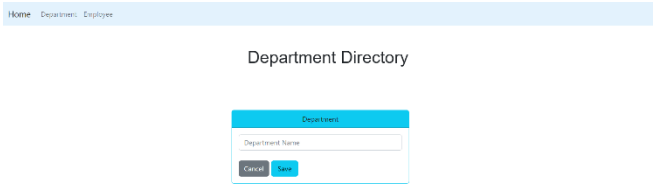

Figure 7. Addition of the department

This form also appears when pressing the "UPDATE" data update button, but in this case the form is filled with the current data stored in the database and the user selects which one he wants to modify.

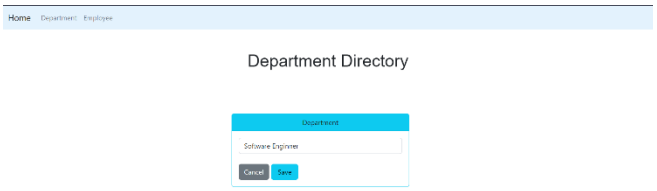

Figure 8. Department update

The figure above showed how the application looks when the department update can be done. While the following figure, i.e. figure 12, shows how to delete a "DELETE" department, since it asks the user if he is sure about the deletion.

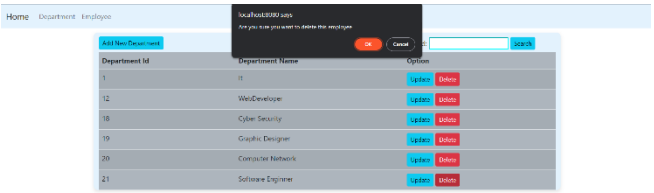

Figure 9. Deletion of the department

In addition to these, the functionality that a crud form has, there is also the option of filtering data, for example, in our case finding a certain department through ID.

Figure 10. Department filtering by ID

If they do not find any department with a given id in the table, no data is displayed. Then, from the department, we can navigate to employee, and the "GET" list with registered workers appears. The figure below lists all the workers stored in the database:

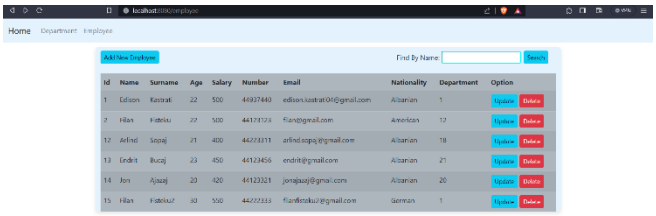

Figure 11. List of workers

Then, there is the option of adding workers with their data, as in the department, here too the id is generated automatically (increased by one). The next figure shows the "ADD" input form for adding workers to the database:

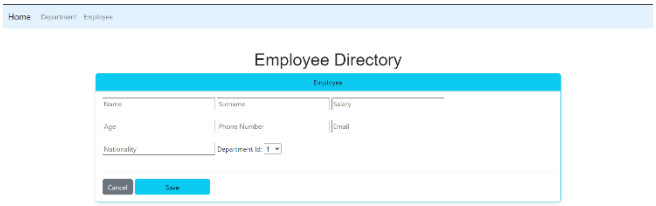

Figure 12. Registration of workers

After registration, those data can be updated, if desired, with "UPDATE" and here it is the same way, the input forms are filled with the current data, if any data does not change, it is saved again in the database.

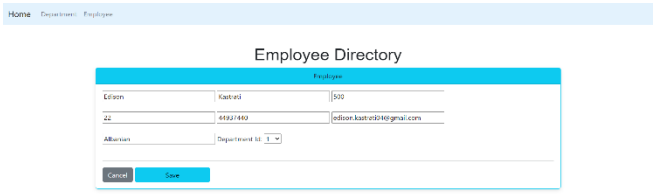

Figure 13. Updating workers' data

To complete the functionality of the crud form, there is the option of deleting workers "DELETE", which also requires confirmation for deletion.

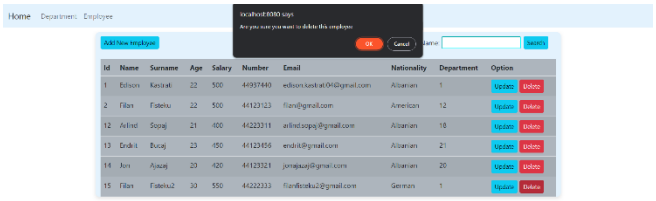

Figure 14. Deleting a workshop

As a conclusion of the first result, unlike the department table, which was filtering based on the department id, in workers there is a function for filtering workers based on name, so it shows more than one person if they have the same name

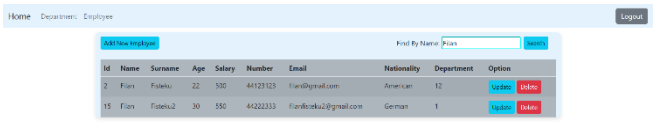

Figure 15. Sorting workers by name

B. Result B

In the second result, which is also the final result of the system, in addition to the functions mentioned above, the roles in the application have been added, more precisely, there are three roles:

1. Simple user
2. Manager
3. Administrator

In the first role as a simple user there is a limited number of functions that he can perform, with this role the user can access the system and see the lists of departments and workers, but in addition he can also add any department or workers. And finally, you can also use the filtering functions.

In the second role as a manager, we can say that this role is a step higher than the role of a simple user, since in addition to the functions mentioned above, I can also update the data of departments and workers.

The third and last role is administrator where there is no limit to system functions. He has access to each function, such as the complete crud form, get, add, update and delete, as well as filtering, so this role is different from the other, since I can also delete data in the system that affects the masts in the database.

Identification and authorization in the application is done through spring security, which offers an easy and fast way to access the application, the users and authorities' tables are the default that the spring boot code accepts, but if we want to name them according to our wishes then we need to write a few more lines of code to link them.

Table 1. Roles and limitations in functions

Role	Department	Employee
Simple user	Get, Add	Get, Add
Manager	Get, Add, Update	Get, Add, Update
Administrator	Get, Add, Update, Delete	Get, Add, Update, Delete

In this result, after starting the application, the login form appears to identify the user with the given username and password stored in the database. The figure below shows how the login form of the application looks like.

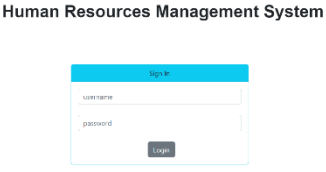

Figure 16. Login form

After the user enters the correct data, he is identified and allowed to continue, which is directed to the main page or home page. If the entered data is not correct with those stored

in the database, then an error or a message appears indicating that the data do not match, so they are invalid.

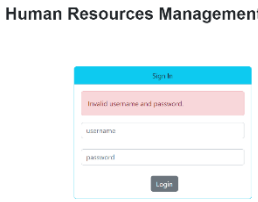

Figure 17. Data entered incorrectly in the login form

After going through the application identification process, there is a button to logout in the navbar or the top left part.

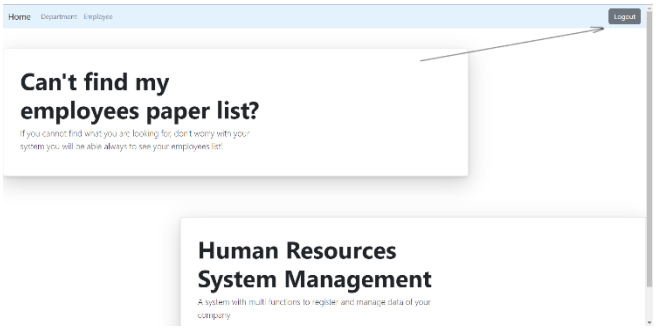

Figure 18. Logout button

After pressing that button, it goes back to the login form, where it displays a message that the logout has been successful, and if you want to enter the application again, you must enter your data.

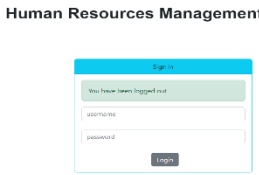

Figure 19. Logout me successful

If any of the users tries to do an action that their role does not allow, then the application will redirect them to the interface where it tells them that this action is not allowed based on their role and that they should go back.

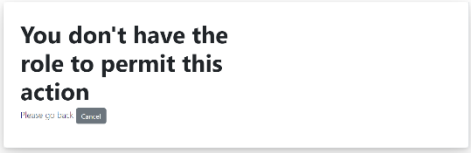

Figure 20. Role restrictions

V. CONCLUSION AND DISCUSSION

This project was based on the digitization of systems for registration and management of workers. This system is database based as every data in the system is stored and managed in the database. Based on the research done, it was concluded that these hrms systems have made a revolution in human resource management and how profitable they have been for companies, all thanks to technology. This created system does not differ much from the current systems since it was created in such a way as to follow the trend of the systems, since the collection of information is also done from the current systems that are on the market. The development of the application was done by framing the Srum (Agile) method where project management was achieved more easily. Special attention has been paid to the phases of analysis, design, implementation and testing. The technologies used in this application are chosen as desired, but also because they are widely used technologies in the market. But that this work can be achieved with the use of other technologies. In conclusion, we can say that the system meets the minimum expectations and is a safe and reliable system. It works adequately, but in the future, why not add other functions that help develop the system.

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