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A SOFTWARE DEVELOPMENT OF MONITORING AND EVALUATION SYSTEM FOR THE MUNICIPAL PLAN AND DEVELOPMENT COORDINATOR (MPDC) OF MUNICIPALITY OF ARINGAY

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In Partial Fulfillment of the Requirements for the Course
CSPC 112 Software Engineering 2

Submitted to: Dr. Raymund E. Dylan
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Chapter 1
Introduction

One of the most pressing challenges in the planning and development field is providing critical data to guide strategic planning, creating and implementing activities and projects, and allocating and re-allocating resources in the most effective and efficient methods.

The study of Yunusa (2020) concluded that of all the constraints and challenges to planning and development of projects and programs in Nigeria, dictatorship of planning is the most serious challenge. Furthermore, Sorona (2019) identifies communication, training, interpretation of important prescripts, inadequate resources/appropriate resource allocation, and effective participation of relevant stakeholders as difficulties to the planning and development working ground.

Project management, on the other hand, according to Siles (2021), must provide a proven approach for accurately and efficiently completing projects of any size and complexity. More importantly, careful planning creates a realistic strategy that aids in the management of risks and the reduction of costly adjustments late in the project. Likewise, benefits occur only when organizations consistently apply standard methodologies and principles on all projects.

On the other hand, Kishimba (2019) published a study titled Monitoring and Evaluation System: Develop Evaluation Planning Documents, which provides an overall framework for assessments across several programs or

multiple evaluations of a single program (e.g. process evaluation; impact evaluation). It also includes a program theory and logic model, as well as information on data sources and management methods. As a result, monitoring and evaluation became part of the development and planning process. Miller (2020) stated that monitoring and assessment aid in the development of the school's future. The school's administration has devised a strategy for filling up the gaps and covering the areas that need to be covered, as well as a proper balance between met targets and future assessment possibilities.

Furthermore, Aceituno et al. (2017) found that conducting human subjects research projects in low-resource settings presents unique logistical hurdles, and obtaining high-quality data is typically a concern. Moreover, complete monitoring and evaluation helps with participant recruitment, retention, and safety, as well as sample and data quality. In addition, Egesah(2017) attested that Monitoring and Evaluation helps project managers in keeping track of the implementation of the projects and its prudence in the utilization of the resources. It provides decision makers with a strategy to plan for sustainability of the projects and guidance for future endeavors. Sustainability is key to stakeholders who in real sense need to be involved throughout the project and program cycles. According to him, the Kenya Government Constituency Development Fund (CDF) projects contribute immensely in initiating and implementing sustainable development projects in all parts of Kenya, and it is essential to track processes and impact of such

projects so they adapted the system which could give them a reliable and precise result.

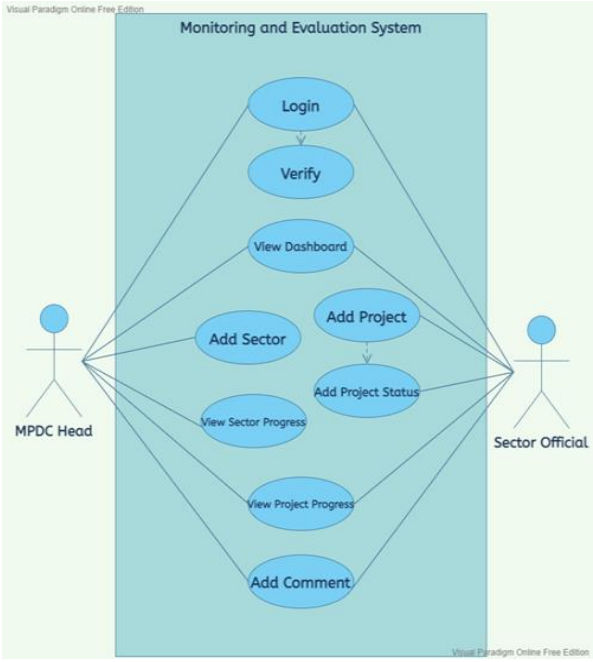
The aforementioned scenarios are most commonly encountered in the Planning and Development Coordinator area of local governments, specifically at Municipal Planning and Development Coordinator of Aringay local government unit, as this sector has been discovered to be the backbone of the local government unit. They also create comprehensive plans and development planning papers and monitor and assess the city's different programs, projects, and activities. As a result of their collaboration, their work got increasingly sophisticated.

Thus, a monitoring and evaluation system was proposed to meet MPDC's needs. The system focuses on tracking the performance of each sector in the local government, particularly the progress of the plans or projects that each sector is working on. It also suggests an evaluation system to assist MPDC in determining whether the said plan or project, specifically its financial allocation, is reliable.

Chapter 2
The Developed System

A. Functional Requirements

A.1 Use Case Diagram



This diagram shows the behavior system consisting of two actors, the (1) MPDC Head and the (2) Sector Official.

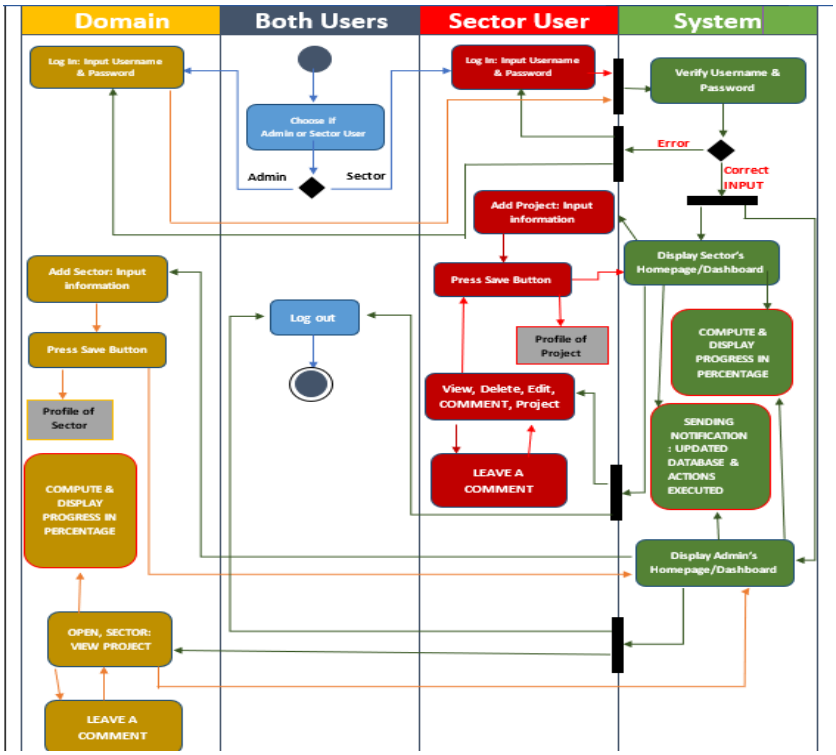
The MPDC Head should log in as admin, and the system will require the username and password. While the Sector Official should log in as a user or sector, the system will also request the sector name and the password.

A successful login will lead to the dashboard. The MPDC Head is in charge of adding a sector and assigning them their name, code, and password before creating the sector account.

The Sector Official can now log in to the system using the identification provided by the admin. And a project will be added to the dashboard, with its description (project title, duration, and budget allocation). The official can also update the project status in either to-do, doing, or done.

Both actors can view the status and progress of the project and can also comment on the project.

A.2 Activity Diagram



This MPDC Monitoring and Evaluation System's Activity Diagram explains how the system's activities flow and shows the action of both *users* (Admin and Sector's User) towards the system. How they interact with each other and how the system monitors the projects. Major activities are explained below:

Log-in Activity:

The log in page allows the user to choose between User and Admin before entering information needed like username and password. These actions are done by both users. The system verifies the input from the user: either admin or sector's user, which are the *username and password*. If the inputs are correct and verified, the system will display the dashboard, else the system will show an error message and you have to fill out with correct information. Take note that the Admin account is already registered when developers give the system to the client.

Admin Dashboard Activity:

The admin is the evaluator or checker of project progression. In this dashboard, the add sector button is provided. Admin will click that add button and the system will show a form that needs to be filled out. It's like adding a worker in a store that will do a specific task or like adding a student in Google Classroom that could access some features or an exclusive function for the students who are added in the system's database.

The admin can add, edit or update, delete a sector and can leave a comment for the special evaluation of the sector's projects. Admin's dashboard shows a percentage of progress of a sector or sector's projects. The progress percentage is a result based. It depends on the numbers of undone projects and the number of done projects.

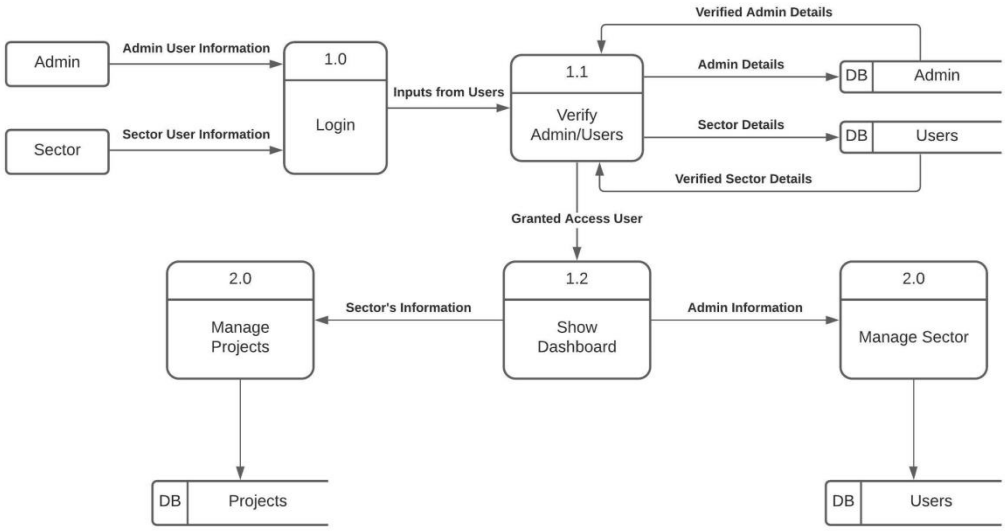
Sector's Dashboard Activity:

New sector has an empty project in its dashboard, there is an add button to add a project. The system will show a window that contains a form. The sector

user will input the information that is required by the system. Once the user fills out the form, he/she can press the save button and the project will appear on the sector's dashboard. The sector's user can edit, delete, or update the status of a project.

The system shows a percentage of progress based on the project's status (To Do, Doing, Done) and will inform both users by sending a notification. Both users can Log out to end the activities daily.

A.3 Data Flow Diagram

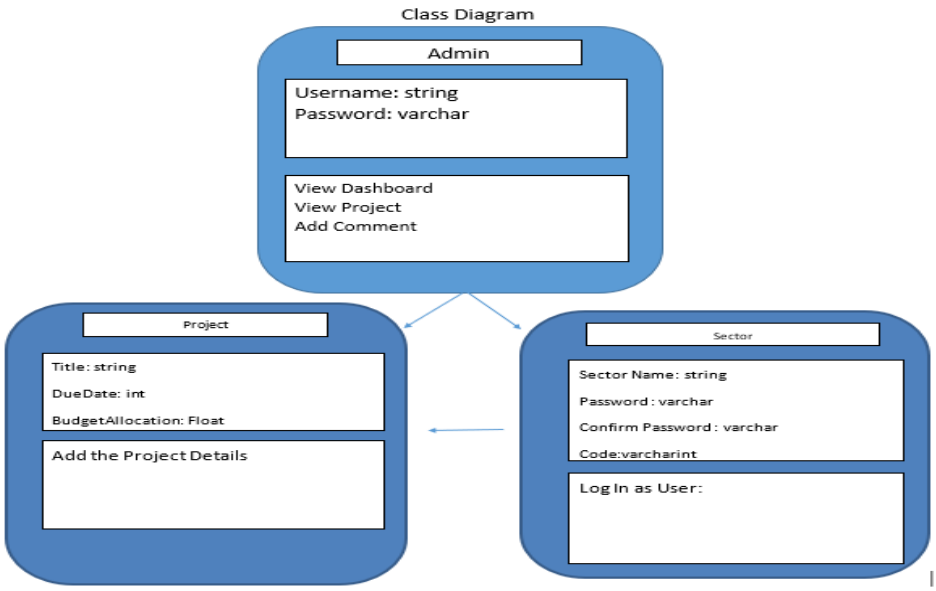


This data flow diagram (DFD) maps out the flow of information for the MPDC system. It is used to define symbols like rectangles, circles and arrows, and short text labels, to show data inputs, outputs, storage points and the routes between each destination.

In this diagram, it will show how data is used to execute a process and how it is used by the user to interact with the system. Sector and Admin are both

users that they need to login to, these inputs will be verified through accessing the database and comparing the inputs to the data saved in the database.

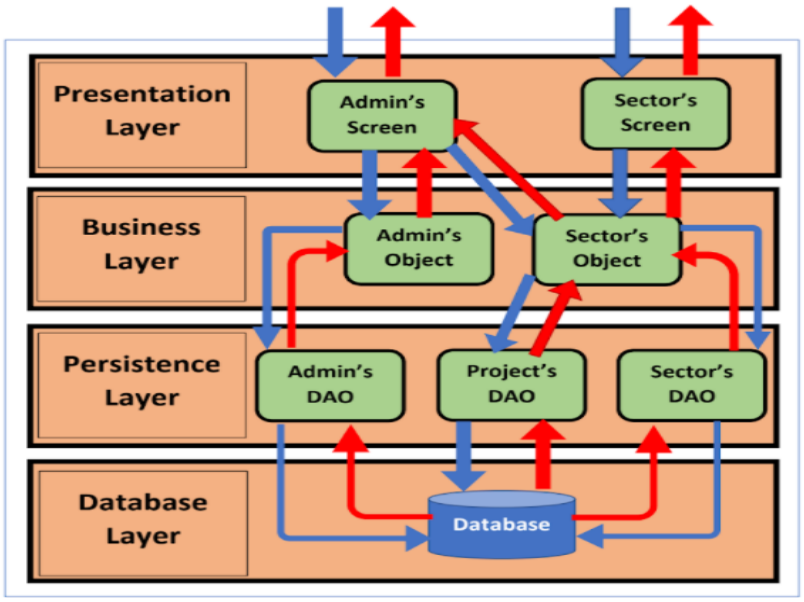
A.4 Class Diagram



In this class diagram, I made a frames that consists of information that includes in the systems such as title of the project, the due date of the project and the budget allocation for the project and also the frames is consists of the log in as a user such as sector name, password, confirm password and the code. Do not forget about the most important part: the admin consists of username and password. Like in this diagram only the admin can view the dashboard, monitor the project and can add comments that the admin wants to say about the project.

B. Non - Functional Requirements

B.1 Architectural Pattern/Design



This **Layered Architectural Pattern** organized the components with horizontal layers. We include four layers in this architectural wherein each layer has its role and connections to each other.

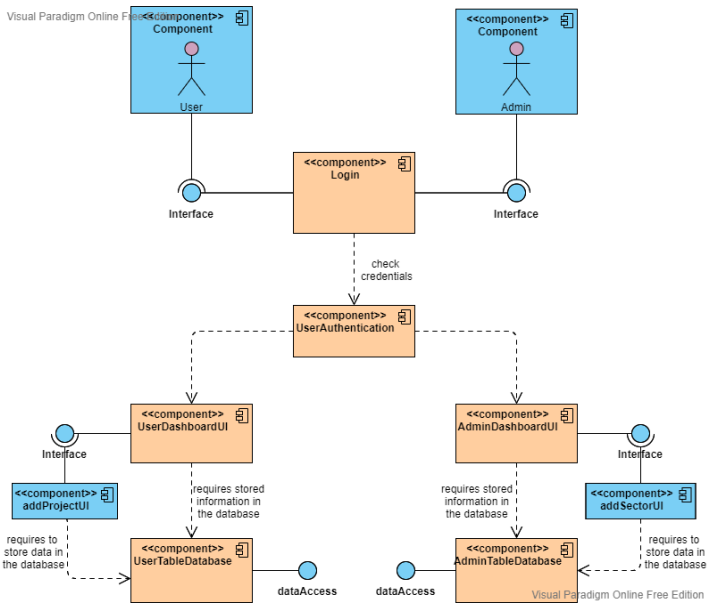
Presentation layer containing all viewing related components. It is the most visible layer of the software which defines how the system's prototype looks where the admin and sector user can interact with the system.

Business Layer contains business logic and rules to determine the behavior of the whole system, such as, sending notifications, updating the status of project and task, and to compute the progress of the project of a sector.

Third layer is the Persistence Layer, wherein the server contains the main programs, code definitions, and basic functions of the developed software. It is a layer that allows accessing the data in the database.

Lastly, the **Database Layer**, which contains the tables and data managed by the system. This is the area where the user can access the data. Manipulating it with adding some data, delete or update.

B.2 Component Diagram

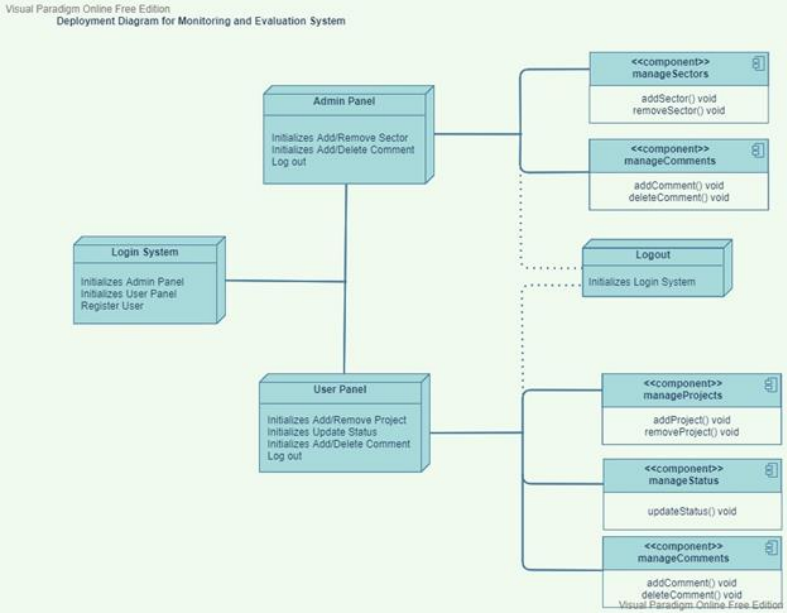


On the given component diagram, there are two actors, the user and the admin and they both need to log in. After entering their respective usernames and pass codes, there is a need for checking credentials. After successful checking of credentials, they can now access their respective dashboards. The information in the user's dashboard depends on the stored information in the user table database while the information in the admin dashboard depends on

the stored information in the admin table database.

In the user's dashboard there is a provided service which is the Add Project wherein this component requires user's input in filling out the form then after filling out the form this component needs to access the user table database to store the inputs of the user. While in the admin dashboard there is a provided service which is the Add Sector wherein this component requires admin input in filling out the form then after filling out the form this component needs to access the admin table database to store the inputs of the admin.

B.3 Deployment Diagram



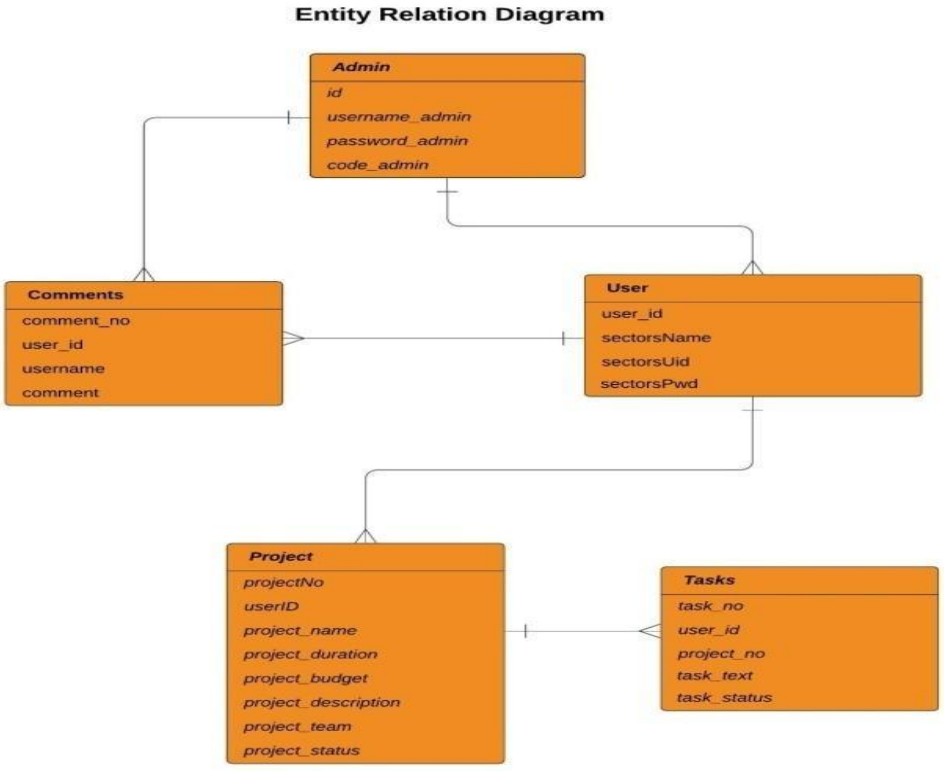
This diagram describes the physical deployment of information generated by the software program on hardware components.

The login system node executes the admin and user panel through the rest of the components. The admin panel shows what the MPDC Head is allowed to

do, and the node will initialize the addition and deletion of a sector and comment. The user panel shows what the Sector Official can do, the node will initialize the addition and deletion of a project and comment, also to update the status of the project.

C. System Models

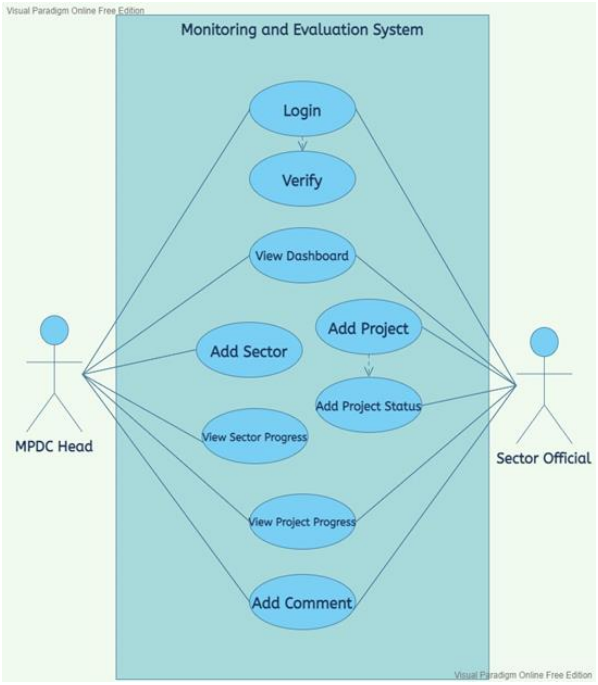
C.1 Entity-Relationship Model



An **entity relationship diagram (ERD)** shows the relationships of entity sets stored in a database. An entity in this context is an object, a component of data. An entity set is a collection of similar entities. These entities can have attributes that define its properties.

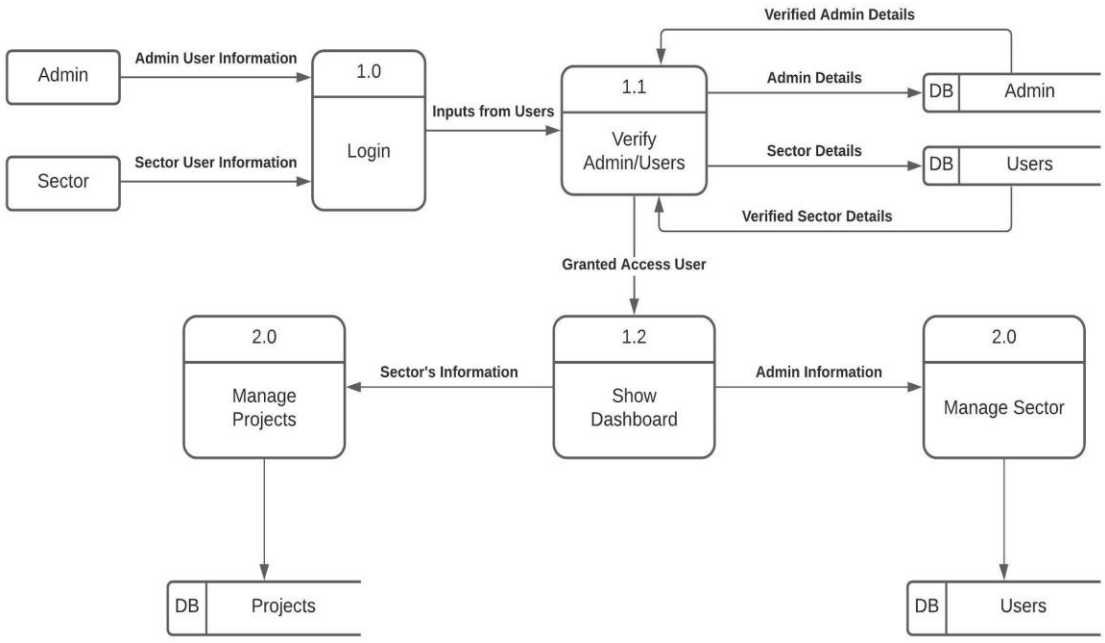
By defining the entities, their attributes, and showing the relationships between them, an ER diagram illustrates the logical structure of databases. ER diagrams are used to sketch out the design of a database.

C.2 Use Case Diagram



Use Case Diagram (UCD) shows the behavior of the system consisting of two actors, the (1) MPDC Head and the (2) Sector Official. It defines what actions can be executed by the user to use and interaction with the system. Such as, logging in, adding some projects and tasks, adding a sector or a user, and to add and delete comments. These actions are specified on the UCD.

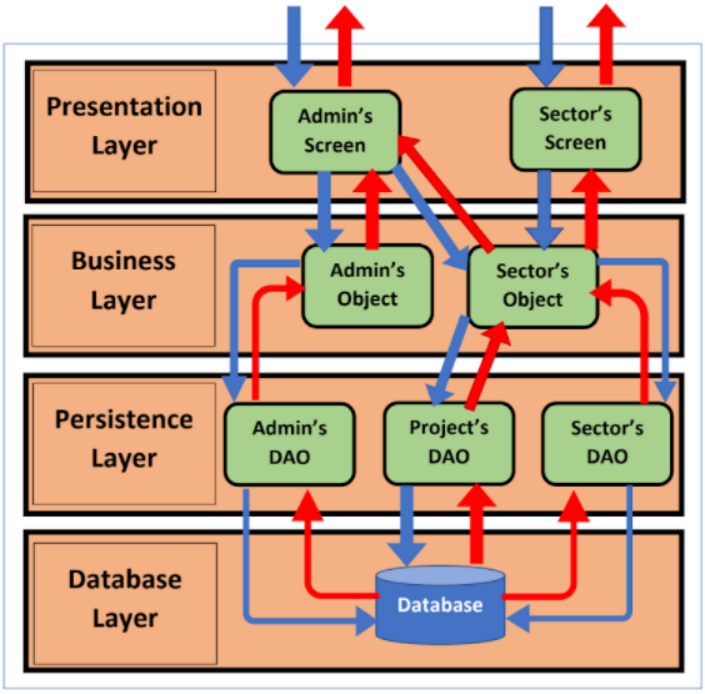
C.3 Data Flow Diagram



A **Data Flow Diagram (DFD)** is a way to visualize the information flows within a system. A neat and clear DFD can depict a good amount of the system requirements graphically. It can be manual, automated, or a combination of both.

It shows how information enters and leaves the system, what changes the information and where information is stored. The purpose of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communications tool between a systems analyst and any person who plays a part in the system that acts as the starting point for redesigning a system.

C.4 Architectural Pattern/Design



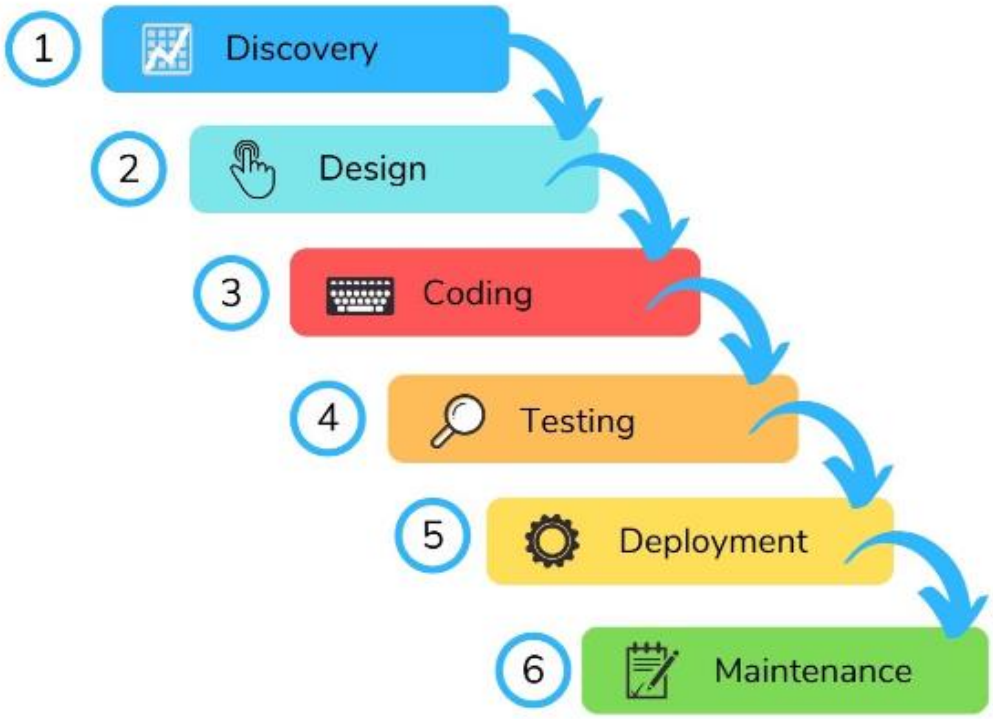
Layered architecture pattern also called as n-tiered pattern where the components are organized in horizontal layers. This is the traditional method for designing most software and is meant to be self-independent. This means that all the components are interconnected but do not depend on each other.

There are four layers in this architecture where each layer has a connection between modularity and components within them. From top to bottom, they are; (1) **presentation layer** that contains all categories related to the presentation layer; (2) **business layer** contains business logic; (3) **persistence layer** which is used for handling functions like object-relational mapping; and (4) **database layer,** where all the data is stored.

C.5 Software Development Life Cycle

SOFTWARE DEVELOPMENT METHODOLOGY

In developing the MPDC Monitoring and Evaluation System, the researchers employed the Waterfall Model developed by Dr. Winston W. Royce which consists of six (6) phases such as discovery, design, coding, testing, deployment and maintenance as shown in Fig. 1.



Waterfall Model

In the **discovery phase,** the development team collects a complete list of requirements for the whole project. It is a process wherein there is collaboration between the team and the client. The team will ask the client about what are

their concerns to their corresponding department. In accordance with that, they said concern will serve as the basis of what system that the team must develop.

The software architects are responsible for the process on how to build the system and how it works. In this **design phase**, the team will define the tools used to build the system and its behavior based on the collected requirements.

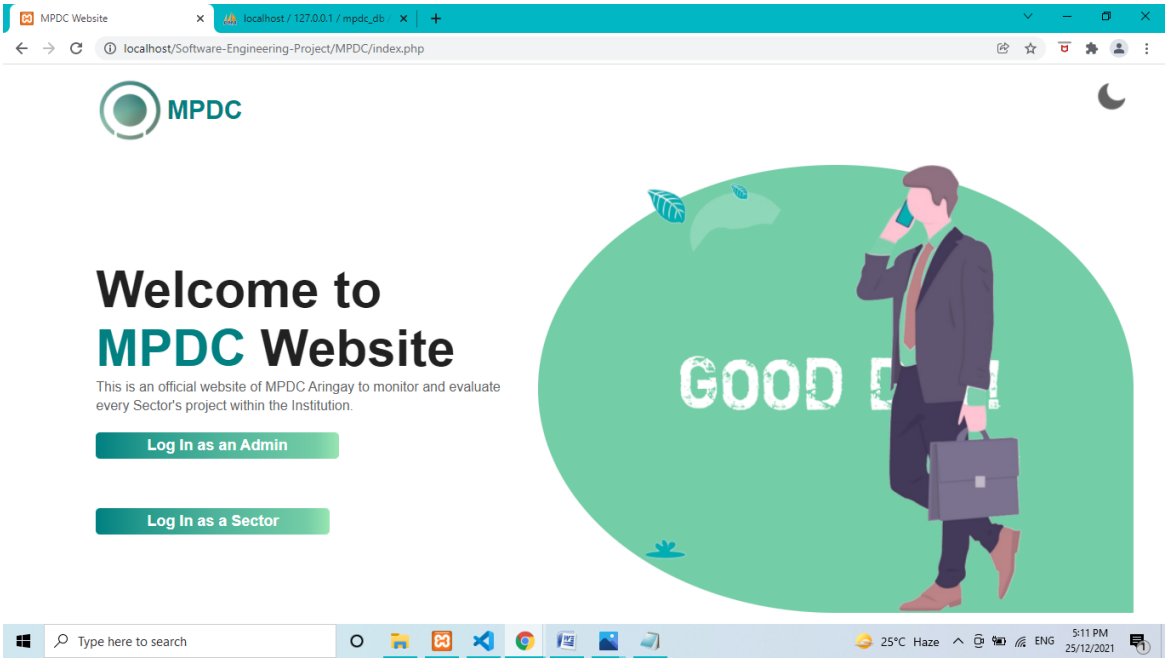
Coding phase is where the developers apply the consensus design of the project and where the functions of the system are implemented.

The process where the software engineering team checks the entire codebase for technical bugs is in the **testing phase**. In this phase, the developed system in the previous phase is validated as per the non-functional and functional requirements specified during the discovery and design phase.

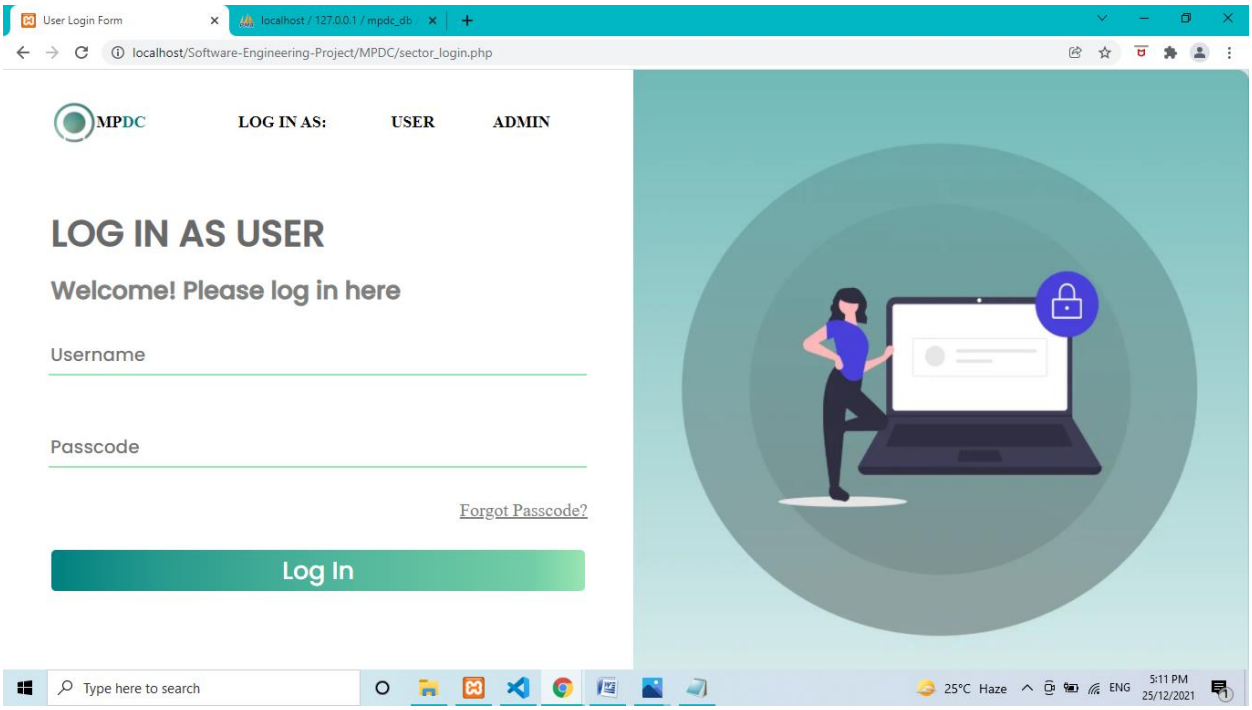
In the **deployment phase**, the software is deployed in the client environment when the functional and non-functional testing is done. The developers organize a demo for the stakeholders and the software becomes available to end-users.

The last phase is the **maintenance phase**, the development team provides support and maintenance for the software, making sure it runs smoothly. If the client and users come across errors during use, fixing them is the main purpose of this phase. Maintenance is done to deliver these changes in the client environment.

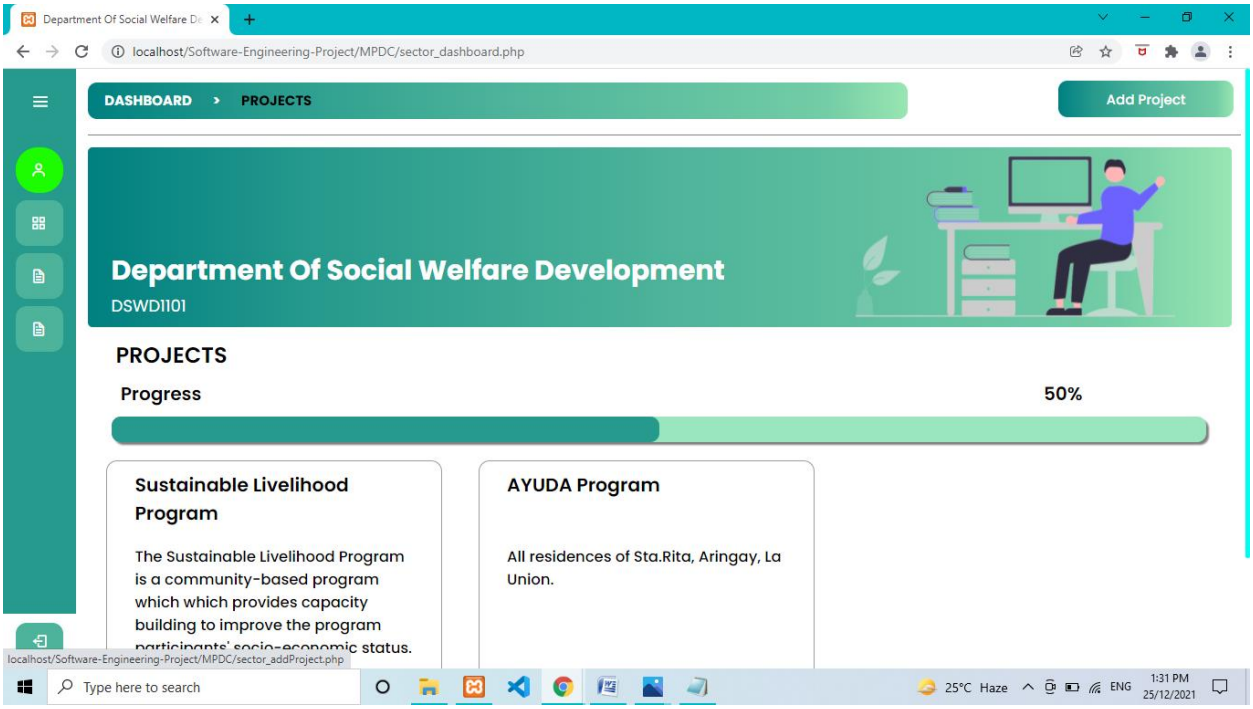
D. Screenshots

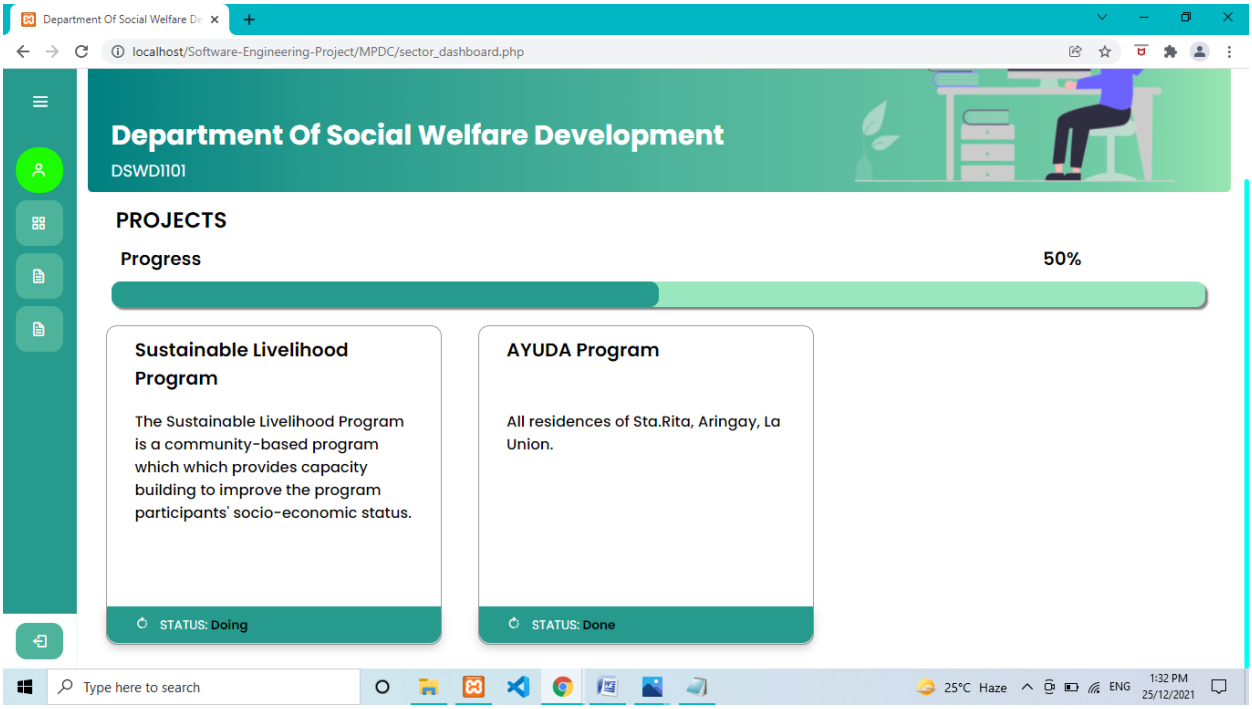


Main page of the MPDC Website

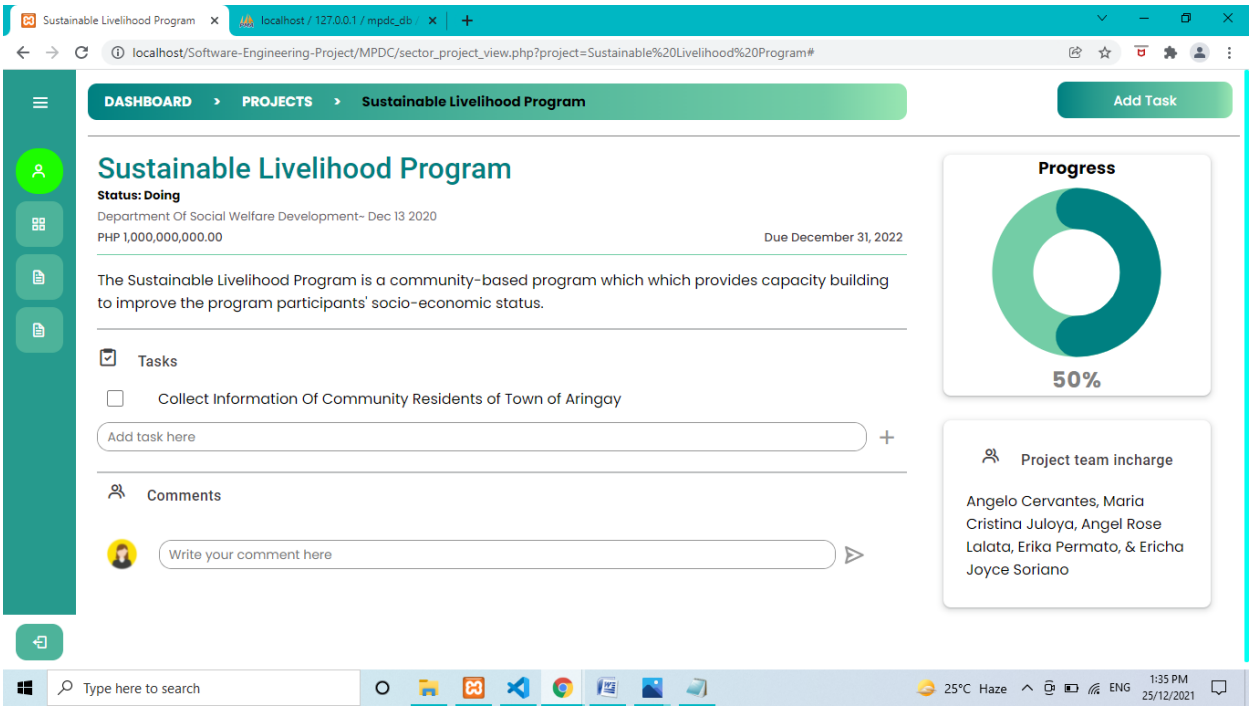


Login Page of Sector's User

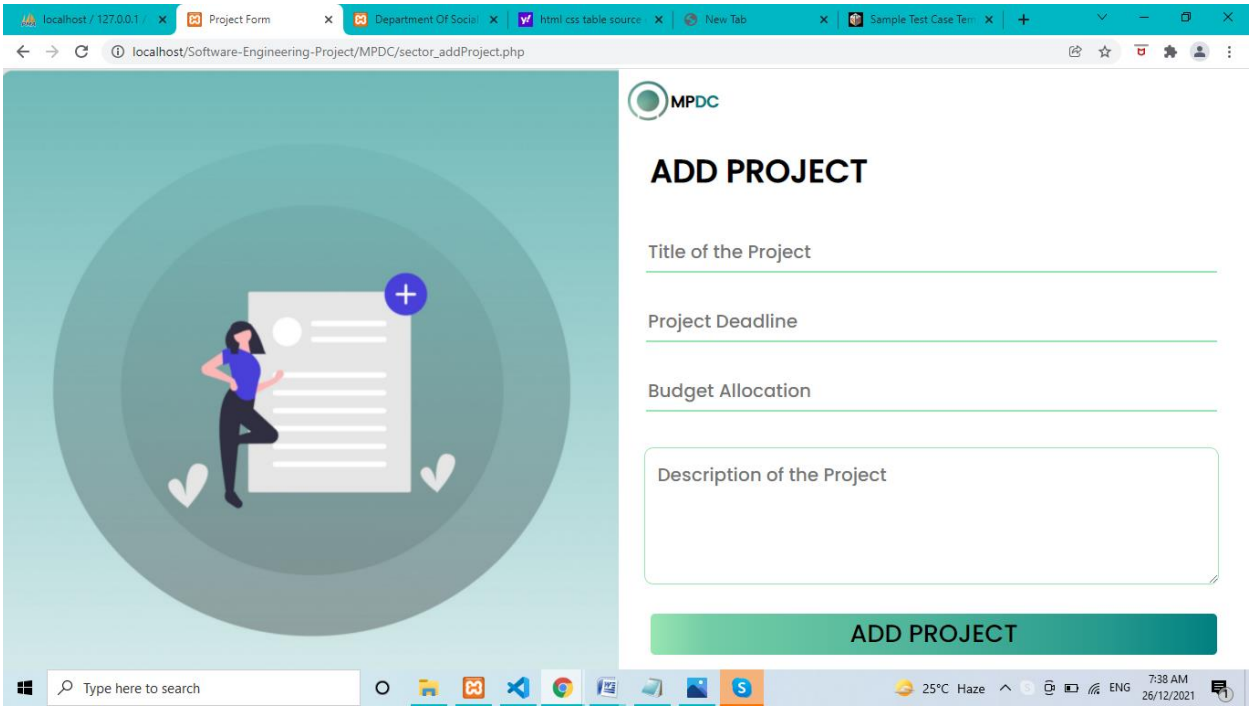




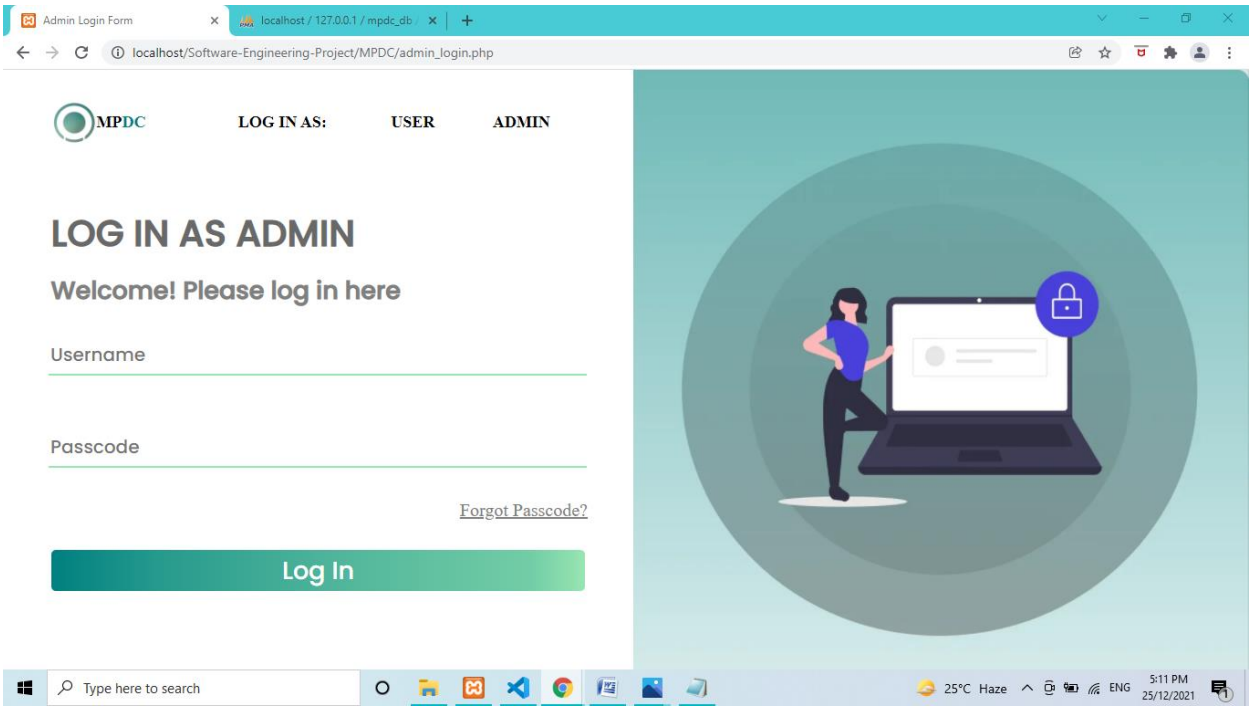
Dashboard of the Sector



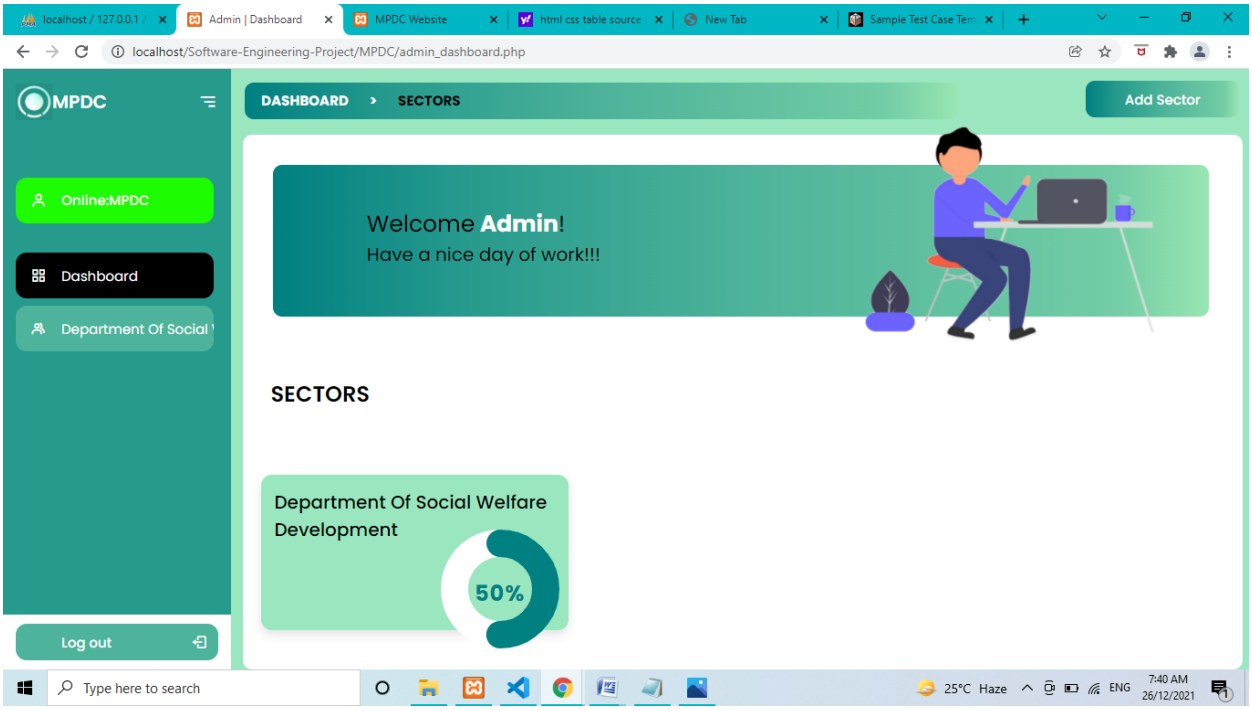
Sector's Page for viewing project information



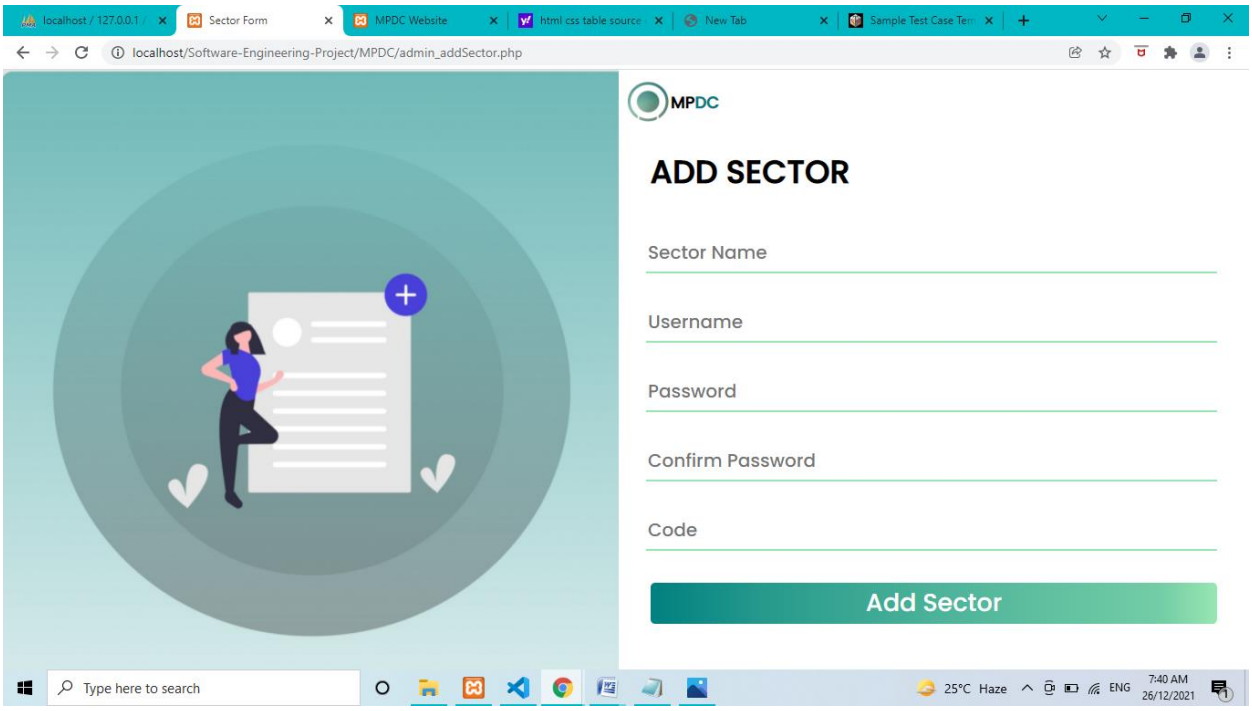
Sector's Page for adding Project



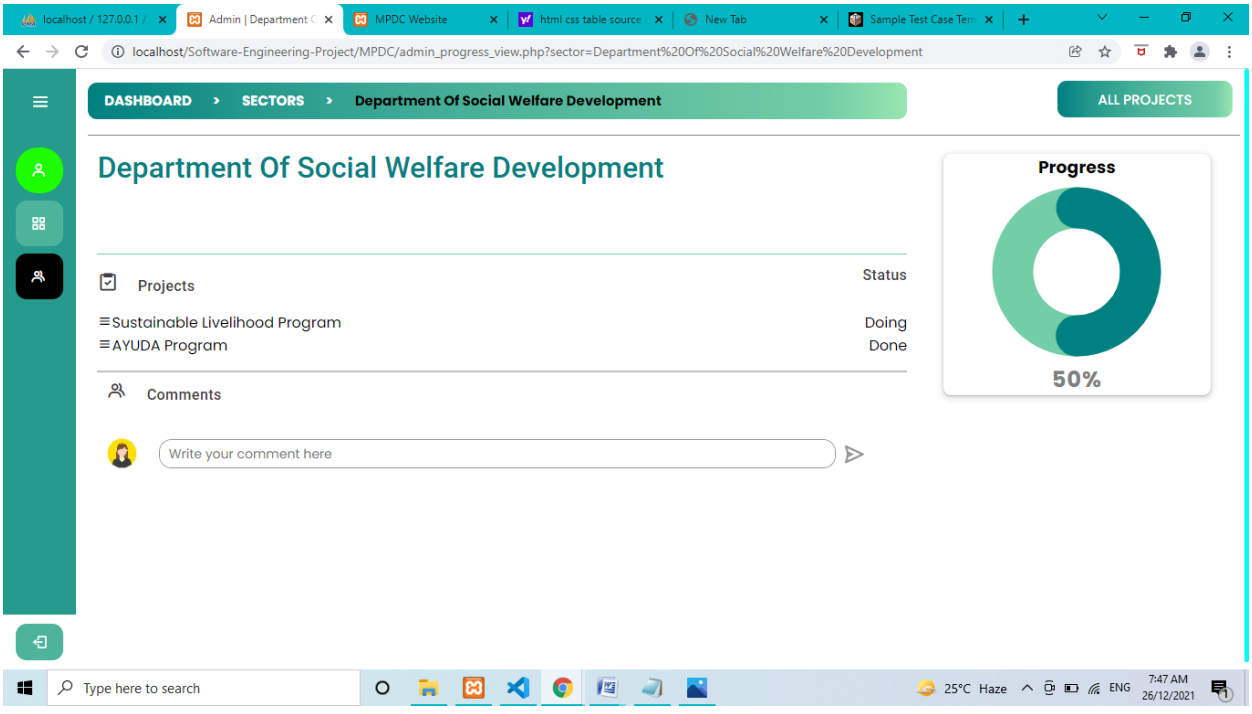
Login Page of Admin



Admin Dashboard



Admin page on Adding Sector.



Admin Page for viewing sector's projects and progress.

E. Test Cases

Test Scenario ID	TS_LOGIN-1	**Test Case ID**	TC_LOGIN-1A
Test Case Description	Verify the login functionality of the MPDC website	**Test Priority**	High
Prerequisite		**Post-Requisite**	

Test Execution Steps:

S.No	**Action**	**Inputs**	**Expected Output**	**Actual Output**	**Test Browser**	**Test Result**	**Test Comments**
1	Launch MPDC website	http://localhost/Software-Engineering-Project/MPDC/index.php	MPDC homepage	MPDC homepage	Google Chrome	Pass	Launched successfully
2	Click Login As an Admin button	http://localhost/Software-Engineering-Project/MPDC/admin_login.php	Admin Login Page	Admin Login Page	Google Chrome	Pass	Opened successfully
3	Enter invalid username of the admin and a invalid password	Invalid Username and password	Admin Login Page with an error message	Admin Login Page with an error message	Google Chrome	Pass	Login not Successful
4	Enter valid usernam	Valid Username and	Admin Dashboard	Admin Dashboard	Google Chrome	Pass	Login Successful

	e of the admin and a valid password	Password					
5	Click Login As a user button	http://localhost/Software-Engineering-Project/MPDC/sector_login.php	User Login Page	User Login Page	Google Chrome	Pass	Opened successfully
6	Enter invalid username of the user and a invalid password	Invalid Username and password	User Login Page with an error message	User Login Page with an error message	Google Chrome	Pass	Login not Successful
7	Enter valid username of the admin and a valid password	Enter valid username and password.	Sector Dashboard	Sector Dashboard	Google Chrome	Pass	Login Successful

Appendices

A. **Jobs and Responsibilities**

I am Angelo A. Cervantes, the project leader and manager of the team. I was assigned to lead the team. As project manager, I was in-charged to conduct an interview with our client together with the assistant programmer, Ms. Maria Cristina Juloya, as we gather information on what software or system must be develop with the accordance of the need of the client, MPDC of Municipality of Aringay, La Union.

I divided the works for the creation of the visual design of the website prototype with the use of HTML and CSS. I created the database of the system, sector dashboard, project view, side navigation bar, and assigned coding for all the behavior of the system. I was in charge of coding for the behavior of the system using PHP and JavaScript. I was also assigned to create the following:

1) Activity Diagram,

2) Data Flow Diagram, and the

3) Architectural Pattern.

- Angelo A. Cervantes

Chief Programmer was the role given to me during the development of this system. As a team member, I offered my contribution to its success, including the design for the system logo. I was also tasked to create the following system models:

1) Use Case Diagram,

2) Deployment Diagram, and the

3) Entity-Relationship Diagram.

During the development, I designed the dashboard assigned to me, particularly the projects and tasks dashboard.

- Angel Rose B. Lalata

I was in charge of designing the system we built. I looked into many UI design tools for our system's screen mock-up, such as Adobe XD, Balsamiq, Sketch, and Figma, to see what was better and easier to use. I also contributed in simulating the screen mock-up of our system, which we did using Visual Code. I was also entrusted with creating our system's component diagram.

- Erika C. Permato

I, Ericha Joyce Soriano, tester of the system and my contribution in this project is doing the Software development life cycle, class diagram and searching the things that can help on our project system.

- Ericha Joyce Soriano

I am Maria Cristina F. Juloya, the assigned assistant programmer in the team. My accomplishment to this endeavor are more on the documentation section specifically the following:

- I was assigned to help our project manager in gathering information that would benefit us to develop to desired system of the client. We interviewed the MPDC’s Head, Mam Camacho regarding of what system they really need to address their concerns in their working ground.

- I was also assigned to make the Introduction which includes the profile of the client, the functions of the system and the rationale as one of the part of the documentation of the said system.
- I was also assigned to make the powerpoint presentation for reporting purposes of the team.

Moreover, when it comes to coding section, I was also assigned to make the Login frame of the system with the supervision of our project manager.

-Maria Cristina F. Juloya

Lessons Learned

I've learned that software development is not easy but you may give an effort and courage to create one. Information is really important that needs to be recorded, when the client states functions and requirements of the software to be developed. As a project manager it is a must to update every member of the development team in terms of tasks that must be done. There are times that I was not responsible with my task as a project manager because of other priorities. It is challenging to lead a team without any experience or knowledge on how to be productive and how to manage time, how to distribute tasks equally and to discuss important matters.

~ Angelo Cervantes

The fulfillment of the aforementioned system ignites the flame of discovery of our potential.

Furthermore, the said system's practical tasks, such as resolving its deployment and prototype complexity made us to improve our logical reasoning and creativity.

On the other hand, the working phase of the aforementioned system emits our personality to work as a team because it requires a lot of patience, a spirit of unity, kindness, and understanding.

~ Maria Cristina Juloya

I've gained a better understanding of the process of building a system such as creating the diagrams assigned to me. I also learned the value of effective communication when discussing the requirement of the client and how to implement it in the system.

~ Angel Rose Lalata

As the team's Software Designer, I've learned a lot when it comes to UI designing. It is not easy because once something is changed in the concept of your software, its UI design will also be affected. Since we are not perfect, it is also inevitable to make mistakes but with that mistake it gives us new ideas on how we can improve the UI design of our software. It is not that easy to create a system especially now that we are facing a pandemic. It won't really work without proper communication. I also learned how to manage time since all of our subjects are major subjects and everything must be prioritized.

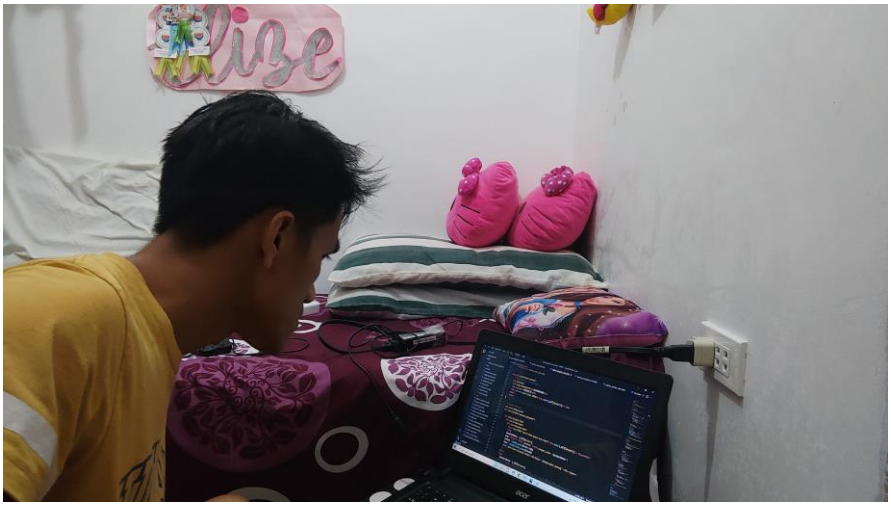
~ Erika Permato

In this entire project, I learned how the one system runs and what are the important roles of the part of the system to one another.

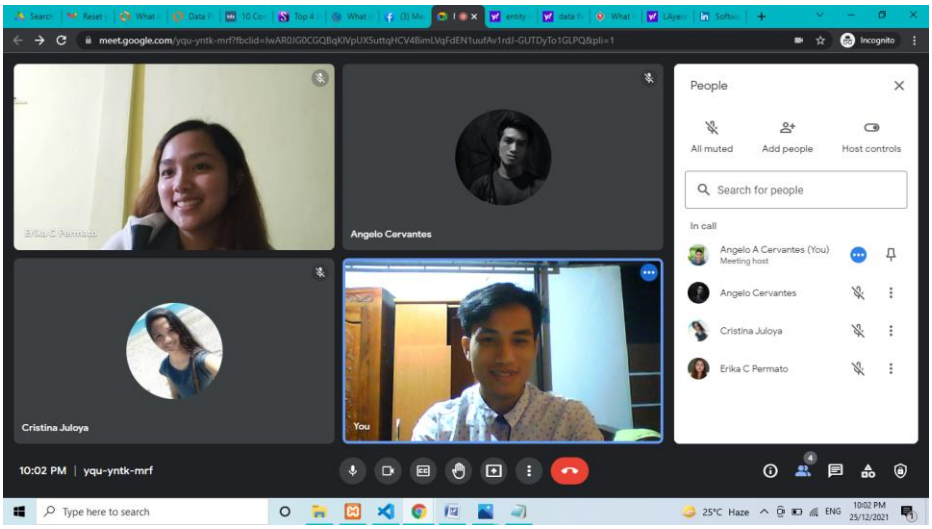
~ Ericha Joyce Soriano

B. Pictorials

Conducting interview with MPDC Head



Web Development using VS Code



Meeting with the development team

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