DEVELOPMENT OF A TASK MANAGEMENT SYSTEM FOR SMALL AND MEDIUM SIZED SOFTWARE ENTERPRISES

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M.Engineering Thesis

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DHAKA, BANGLADESH

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DEVELOPMENT OF A TASK MANAGEMENT SYSTEM FOR SMALL AND MEDIUM SIZED ENTERPRISES

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DEVELOPMENT OF TASK MANAGEMENT SYSTEM FOR SMALL AND MEDIUM SIZED ENTERPRISES

DECLARATION

I hereby declare that the study reported in this project entitled above is my own original work and has not been submitted anywhere for any degree or other purposes. Further, I certify that the intellectual content of this project is the product of my own work and that all the assistance received in preparing this project and sources have been acknowledged and/or cited in the reference section.

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ABSTRACT

Development of a Task Management System for Small and Medium Sized Enterprises

Task Management System (TMS) is a web application for small and medium-sized enterprises which can be used to organize, assign and manage tasks among its employees. This project has various sub-modules such as commenting on tasks, upload and download files, task assignment, editing existing and creating new project, task, employee, user etc. Important benefits of the project are user-friendliness in design which helps the admin and the user to interact and accomplish various types of tasks online very easily.

It has a very helpful dashboard that displays projects and activities graphically on one screen. It is simple to find tasks and projects thanks to the search bar at the top. We have used the Kanban task management method to keep track of the progress of various projects. We have provisions to create milestones and assign subtasks, thereby tracking task accomplishment in an organized manner. Other features include granting permission for numerous clients simultaneously, making your unique notes, creating distinctive invoices, etc.

ACKNOWLEDGEMENTS

First and foremost, I want to give thanks and praise to God, the Almighty, for His blessings that helped me finish the job successfully.

I would like to express my deep and sincere gratitude to my supervisor, Professor Dr. Md. Shohrab Hossain, Department of Computer Science and Engineering, Bangladesh University of Engineering and Technology (BUET), for providing invaluable guidance throughout this project. He has inspired me with his vision, integrity, and drive. It was a real honor and privilege to work under his direction.

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I want to express my sincere gratitude to my family and friends for their unwavering support and patience as I worked on my project.

Last but not least, I want to express my gratitude to everyone who helped me, directly or indirectly, finish the work.

TABLE OF CONTENTS

DECLARATION ii
ABSTRACT iii
ACKNOWLEDGEMENTS iv
TABLE OF CONTENTS v
LIST OF FIGURES vii
CHAPTER 1 1
INTRODUCTION 1
1.1 Objectives and Possible outcomes of Project 1
1.2 Methodology 2
1.3 Organization of the Remaining Chapters 2
CHAPTER 2 3
LITERATURE SURVEY 3
2.1 Background 3
2.2 Project Management 4
2.3 Task Management 4
2.4 Why is Task Management important for any organization? 5
2.5 Functions of the Task Management System 5
CHAPTER 3 7
PROPOSED SYSTEM 7
3.1 HARDWARE SPECIFICATION FOR CLIENT 8
SOFTWARE SPECIFICATION FOR SERVER 8
PROJECT CATEGORY 9
3.2 TOOLS AND LANGUAGE USED 9
CHAPTER 4 9
REQUIREMENTS SPECIFICATION & FEASIBILITY STUDY 9
4.1 REQUIREMENTS SPECIFICATION 9
4.1.1 Performance Requirements 10

4.1.2 Functional Requirements 10
4.2 Logical Data Flow Diagram 10
4.3 Feasibility Study 12
CHAPTER 5 13
SYSTEM DESIGN 13
5.1 SYSTEM HIERARCHY 13
5.2 STRUCTURAL SYSTEM ANALYSIS 15
5.2.1 System Flow Chart 15
5.2.2 DATA FLOW DIAGRAM 16
5.2.3 ENTITY RELATIONSHIP DIAGRAM 17
5.3 Gantt chart 18
5.4 PERT CHART 19
CHAPTER 6 21
SYSTEM INTERFACE 21
6.1 SCREENSHOTS 21
CHAPTER 7 51
TESTING 51
7.1 TESTING 51
7.2 TEST PLAN 54
CHAPTER 8 56
PROJECT MAINTENANCE 56
2. Adaptive Maintenance 56
3. Perfective Maintenance or Enhancement 56
CHAPTER 9 56
CONCLUSION 57
9.1 CONCLUSION 57
9.2 Future Enhancement 58
References 59

LIST OF FIGURES

Figure 4.1	Logical Data Flow Diagram ……..	10
Figure 5.1	Hierarchy of TMS …….....	13
Figure 5.2	System Flow Chart ……	14
Figure 5.3	E-R Diagram …….	16
Figure 5.4	Gantt chart …….....	17
Figure 5.5	Pert Chart ……...	19
Figure 7.1	Load Test Report……	58

CHAPTER 1
INTRODUCTION

A Task Management System (TMS) is a software tool designed to help companies complete their projects more efficiently by organizing and prioritizing related tasks without missing any deadlines [1]. This tool can be used by an individual, a team, or an organization. By using a Task Management System, one organization can easily manage tasks, track time, and collaborate with their different teams [2]. The success of an organization largely depends on its Task Management System. A task manager plays a vital role to operate the system by managing and directing projects and employees [3].

The proposed system will help the employee and managers to communicate easily with each other. The system distributes assignments quickly to prevent all the time-consuming meetings that are sometimes pointless. Managers can periodically share all the details regarding the tasks with the employee. The management of tasks is easy from both ends. The task will observe and controlled by the Head of the Organization. The Head of the Organization maintains a database system and is responsible for the performance of the system. Head of the Organization has the authority to control the entire system.

1.1 Objectives and Possible outcomes of the Project

The objectives of the project are:

i. To perform a comparative study on Task Management System and design a prototype.

ii. To design and develop a Task Management System software.

iii. To validate the development of Task Management System software that achieves complete functionality.

The possible outcomes of this TM system are:

i. A report presenting a comparative study regarding functionalities and limitations of a TM system among various business organizations.

ii. Complete Task Management software that facilitates the assignment of work in a Small or Medium Enterprise.

1.2 **Methodology**

The methodology can be summed up in the following steps:

For the mentioned TMS, a system will be designed that starts with conducting a literature study to identify existing TM systems and its features. Investigate possible applications, categories of applications, and gaps among existing TMS. Gather design requirements and look into concepts for selecting a preferred concept and finally design a UI interface by using accumulated findings and development of Task Management System following software development life cycle steps consisting of planning, defining requirements, design and prototyping, software development, and testing.

1.3 **Organization of the Remaining Chapters**

The rest is organized in the following order:

In Chapter 2, the literature survey and functions of the task management system are discussed.

In Chapter 3, the hardware and software requirements of the proposed system are given.

In Chapter 4, requirements specification and feasibility study of the system are discussed.

In Chapter 5, the system's functionality and the system's work progress are presented.

In Chapter 6, how to manage the entire website is described with screenshots.

In Chapter 7, a testing technique of a website is discussed.

In Chapter 8, the maintenances of the project are presented.

In Chapter 9, the project is concluded and future directions for this project are provided.

CHAPTER 2

LITERATURE SURVEY

2.1 Background

After the software crisis at the start of the 1970s, professionals started to see the significance of software engineering as a way to offer a set of methods, tools, and procedures for the production of quality software while adhering to budgetary and time restrictions. However, the 2011 edition of the CHAOS report found that only 37% of all Information Technology (IT) projects succeeded in that they were delivered on time, within budget, and with all the required features and functions. According to IBM research on the causes of IT project failure, poor project management is directly responsible for 54% of IT project failures. Organizations like the Association for Computing Machinery (ACM) and IEEE Computer Society have consistently endorsed the value of teaching software project management to IT learners in their joint task force courses.

Compared with other degrees, such as Medicine or Aeronautics, IT learners start their professional life with a serious lack of real-life practical skills. As a result, new professionals need to develop their experience by working on real projects, where the

effects of an inadequate plan or a bad decision can lead to project failure or the loss of significant profit [4].

2.2 **Project Management**

The field of project management continues to evolve. Project management is becoming more of a science than an art due to ongoing process standardization, idea improvement, and software and application development. The creation of the Total Cost Management (TCM) system is a significant development in the industry. The term "TCM" refers to a "systematic approach to controlling cost throughout the life cycle of any company, program, facility, project, product, or service," according to AACE International (previously Association for the Advancement of Cost Engineering).In the scope of a project, TCM is a set of practices and processes an organization applies to govern the cost in the life cycle of a project. The TCM approach is based on the Plan Do Check Access (PDMA) [5].

The traditional definition of a project is "a brief activity undertaken to develop an original good or service" (Project Management Institute 2008). A project can also be viewed as a clearly defined set of tasks that must all be finished to achieve the project's objectives (Klastorin 2004). Many tasks are completed simultaneously in a typical project. The existence of links of precedence between the tasks is another important characteristic of projects. These relations often specify conditions that demand that one job be finished before beginning another [6].

2.3 **Task Management**

Task management, which should not be confused with project management, is the practice of following a task from beginning to end while completing it. Team task management is a component of project management that assists people, teams, and organizations in keeping track of all their work and ensuring nothing is missed. This is especially beneficial when there is a heavy workload or when communication is difficult [7]. Good Task management

software features include Prioritize, Collaboration, Status, Calendar, and Estimating [8]. Jyothi et al. [9] proposed a method in which the concept of Task Matrix and Eisenhower Matrix is used to organize the project-related tasks and segregate it on priority. There are a few Task management tools, such as Trello, Todo list, etc. [10].

2.4 **Why is Task Management important for any organization?**

The success of a project depends on task management since it enables the project managers to keep things moving smoothly. Planning, reporting, analyzing, assessing, and making task progress are all included. For each of these procedures, a top-notch task management system is necessary so that project managers can effectively manage project operations and gain access to real-time reports [11].

With huge complicated projects, it's becoming necessary for the project manager to coordinate diverse expertise, and project managers will have to adapt to do so efficiently new technologies and learn which specialized intricate tools will work best for each project [12].

2.5 **Functions of the Task Management System**

Time management is the key to ensuring the efficiency of work which can be done by prioritizing the tasks and projects that people work on individually and collectively. When doing the task of prioritization, one should have a clear grasp of the objective and the resources available. Developing an effective TMS will be beneficial for small and medium software enterprises by improving the productivity of their employees.

The **function of a Task Management System** is generally administrative and not common to all organizations.

- **Efficient Dashboard**: Get an overview of the total number of projects, tasks, bugs, and members. A visual representation of the task overview and project status can help you estimate the progress on each task. Lastly, you can check the top-due task

- **Project management:** Create new projects and assign teams to each project. Add multiple members to share the projects with clients. To govern client access, you can edit permissions and controls. Set a budget and create milestones for projects. Attach cost and summary to milestones and change the status through drop-down menu. Get a tab on recent activities of a project and also a graph about progress.

- **Task board**: Add a new task to an already existing project and prioritize them according to the need of urgency. Assign the task to team members and give them a deadline to complete it. Create a sub-task and add comments to the task to make it easier to complete. Attach necessary files in a required task.

- **Kanban task management**: With a simple layout, using a kanban board you could manage the progress of your projects. Clear statistics help you understand the number of completed, ongoing, finished, or on-hold tasks.

- **Multiple user access:** Invite users and give them access to various projects and workspaces. A user tab will give brief information on the projects and tasks of each user.

- **Create timesheets**: You can create a timesheet for various projects and tasks by assigning a date, time, and descriptions to it.

- **Upload files in the project**: Upload the necessary files to your project easily

- **Manage Invoices:** Create invoices for projects by assigning issues and due dates. You get to specify discounts and taxes at your convenience. Select the client whom you are generating an invoice. You can add and remove things from the invoice. Print the invoice.

- **Workspace settings:** You can add and edit a task, appropriate for your business. Your business logo, billing details, and tax details could be created here with ease. Assign currencies you wish to receive payment in.

CHAPTER 3

PROPOSED SYSTEM

The application is for a task management system which will be sophisticated and implemented for the Admin, Employee'-s, and Client'-s. The system will be used by three users. They are Admin, Employee, and Client. The admin is responsible for monitoring all tasks under a project. An organization can use this application to accomplish day-to-day tasks. The five modules make up the entire system. They are Login Module, Registration Module, Project Module, Client Module, and Utilities/ Workspace Setting Module. The task management system will enable us to make efficient accomplish company-related tasks. This application presents the design and implementation of a Task Management System. The application provides the design of a data program and the approach to allocating various tasks.

As "TMS" is web-based application, it needs MySQL for the database and Laravel framework (PHP) for Server-Side Coding.

a) MySQL: MySQL is a fast, easy-to-use RDBMS being used for small and big businesses. MySQL is released under an open-source license. By itself, MySQL is a pretty potent program. A standardized version of the well-known SQL data language is used by MySQL.MySQL works on many operating languages including PHP, PERL, C, C++, JAVA, etc.
b) PHP: PHP is a server-side language that is embedded in HTML. It is used to develop full e-commerce sites as well as manage dynamic content, databases, and session monitoring. Numerous well-known databases, including MySQL,

PostgreSQL, Oracle, Sybase, Informix, and Microsoft SQL Server, are connected with it.PHP is beneficial to small enterprises and private clients because it is available on almost all shared hosting providers and is the most extensively utilized runtime environment on servers today[13].

c) Laravel: Laravel is one of the few PHP frameworks that have seen an increase in popularity over the last five years, making it a popular choice for many website developers and businesses around the world. According to a survey done by SitePoint, the Laravel MVC framework is the most used framework in both personal projects and at work. Laravel is said to as a full-stack framework since it can handle everything from web serving to database management to HTML generation [14].

3.1 HARDWARE SPECIFICATION FOR CLIENT

Computer	:	PC-AT
Processor	:	INTEL DUAL Core and above
RAM	:	1GB and above
Input Device	:	Mouse or Keyboard
Output Device	:	VDU (minimum VGA, SVGA support)

SOFTWARE SPECIFICATION FOR SERVER

Operating System	:	Windows 7, 8, 10, Linux
Compatible Browsers	:	IE11, Firefox, Safari, Opera, Chrome
Web Server	:	Apache

PROJECT CATEGORY

The category of this project is **WEB APPLICATION.**

3.2 TOOLS AND LANGUAGE USED

Software Framework **:** Laravel

Software Version : PHP 7. x

Front End : JavaScript JS, HTML, CSS

Database Used : MySQL

Web Server : Apache

CHAPTER 4

REQUIREMENTS SPECIFICATION & FEASIBILITY STUDY

4.1 REQUIREMENTS SPECIFICATION

Requirements The basic criteria for the system to be developed are outlined in the specification. These can be broadly classified into two types.

1. Performance Requirements.
2. Functional Requirements.

Understanding the requirements specification is critical for the project's success otherwise the system does not get developed according to the user's wishes.

4.1.1 Performance Requirements

1. The system should be built in a way such that it is independent of the type of database used.
2. The response should be fast.
3. High throughput.
4. Security should be high such that no intruder can tamper with data.

4.1.2 Functional Requirements

Here Company Admin will do the following jobs:

- They can see, create, and delete updated projects.
- They can assign a task to the User on any project along with a client.
- They can create, delete update invoices, and edit, or remove any particular information.
- They can set general info like site setting, task setting, billing setting, payment setting, tax setting, and invoice setting.

4.2 Logical Data Flow Diagram

The following logical data flow diagram of the system shows the flow of data and process behind the system after examining it:

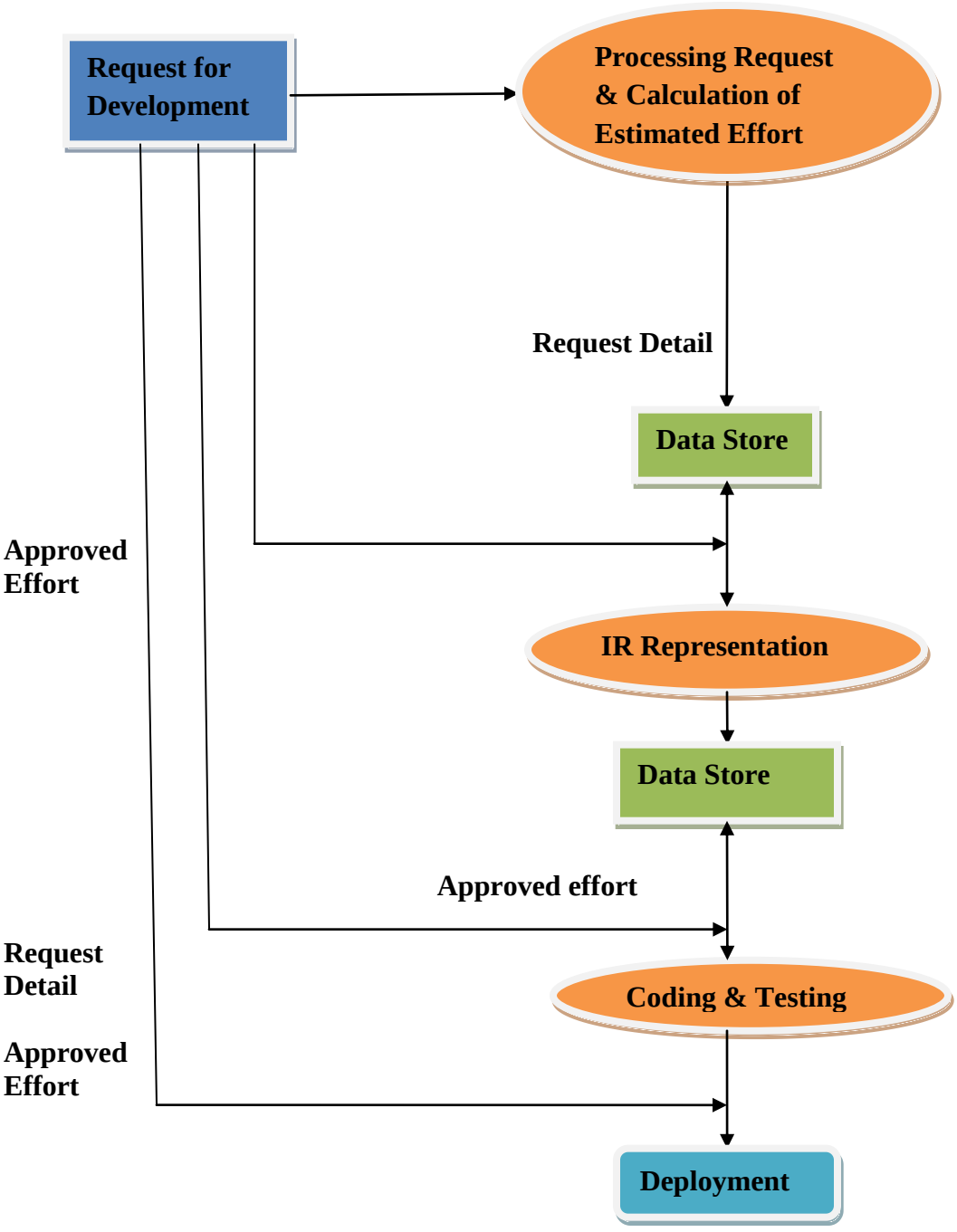


Fig 4.1: Logical Data Flow Diagram

The system interacts with the customer through some front-end **form**. To enter the system a **login form** will appear where an Email **ID** and **Password** will have to be entered to log

into the system and then this will check for the registration of the user. According to permission, the System is loaded.

4.3 Feasibility Study

The feasibility studies are undergone as follows:

Economic Feasibility:

More commonly known as **Cost/Benefit Analysis**. The technique is calculating the projected benefits and savings from a proposed system and comparing them to the costs. If the advantages outweigh the disadvantages, the system is designed and implemented. Considering the facts it is becoming evident that the system will be economically feasible both for the developer as well as for the client.

Technical Feasibility

The present computer system (hardware, software, etc.) and how well it can handle the proposed addition are the focus of technical feasibility. If the budget is a serious constraint, then the project is judged not feasible. In our case, this does not become an obstacle.

Operational feasibility:

The managers and operators want to be well-versed in the necessary skills. Here most of the members of the development team have technical expectations.

Time feasibility:

The management & operators here are concern about whether the project will complete in a timely or not. However, based on the information we have gathered about our project, we can confidently predict that it will be completed within the stipulated time range.

CHAPTER 5

SYSTEM DESIGN

5.1 SYSTEM HIERARCHY

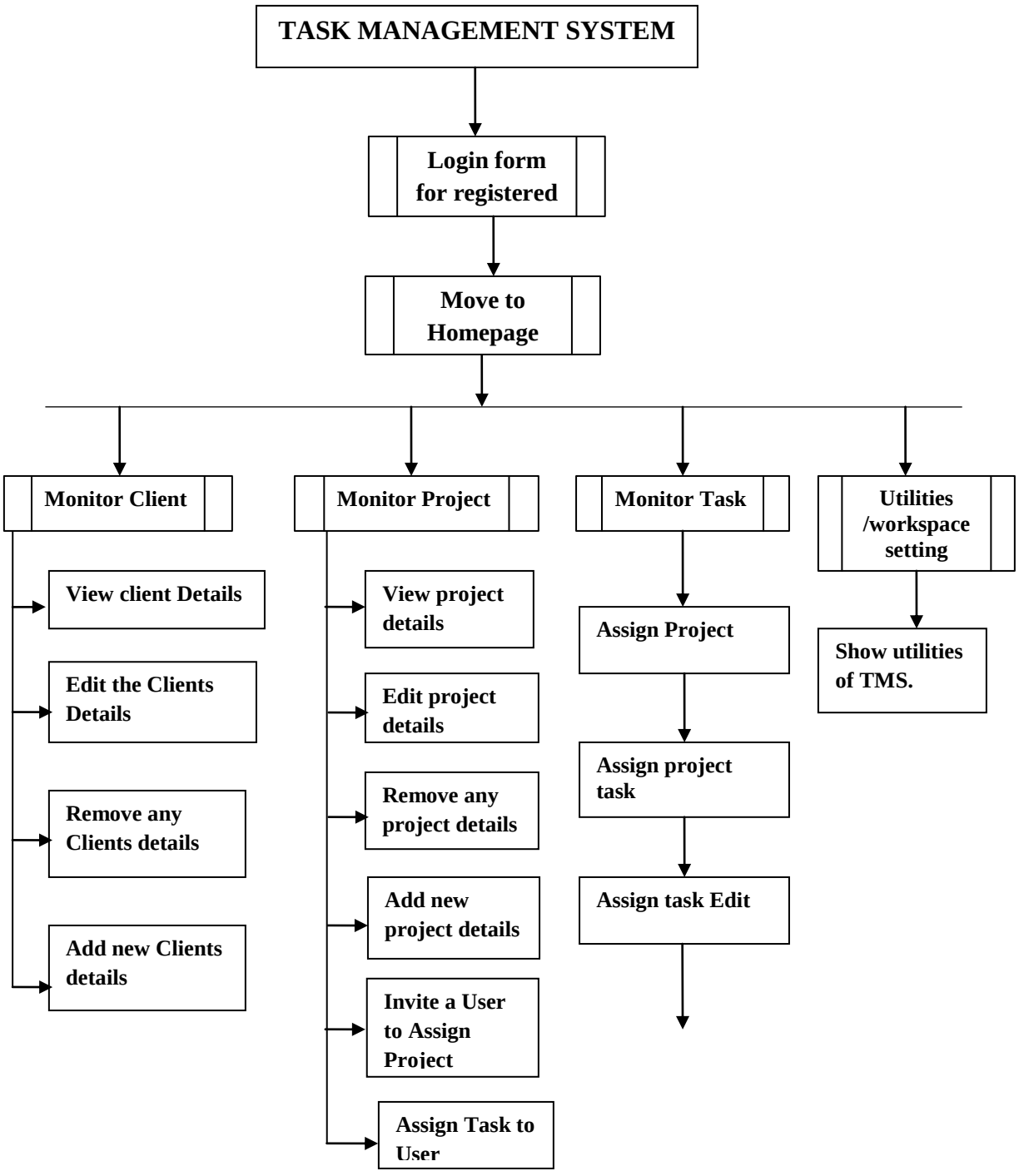


Figure 5.1: Hierarchy of TMS

5.2 STRUCTURAL SYSTEM ANALYSIS

5.2.1 System Flow Chart

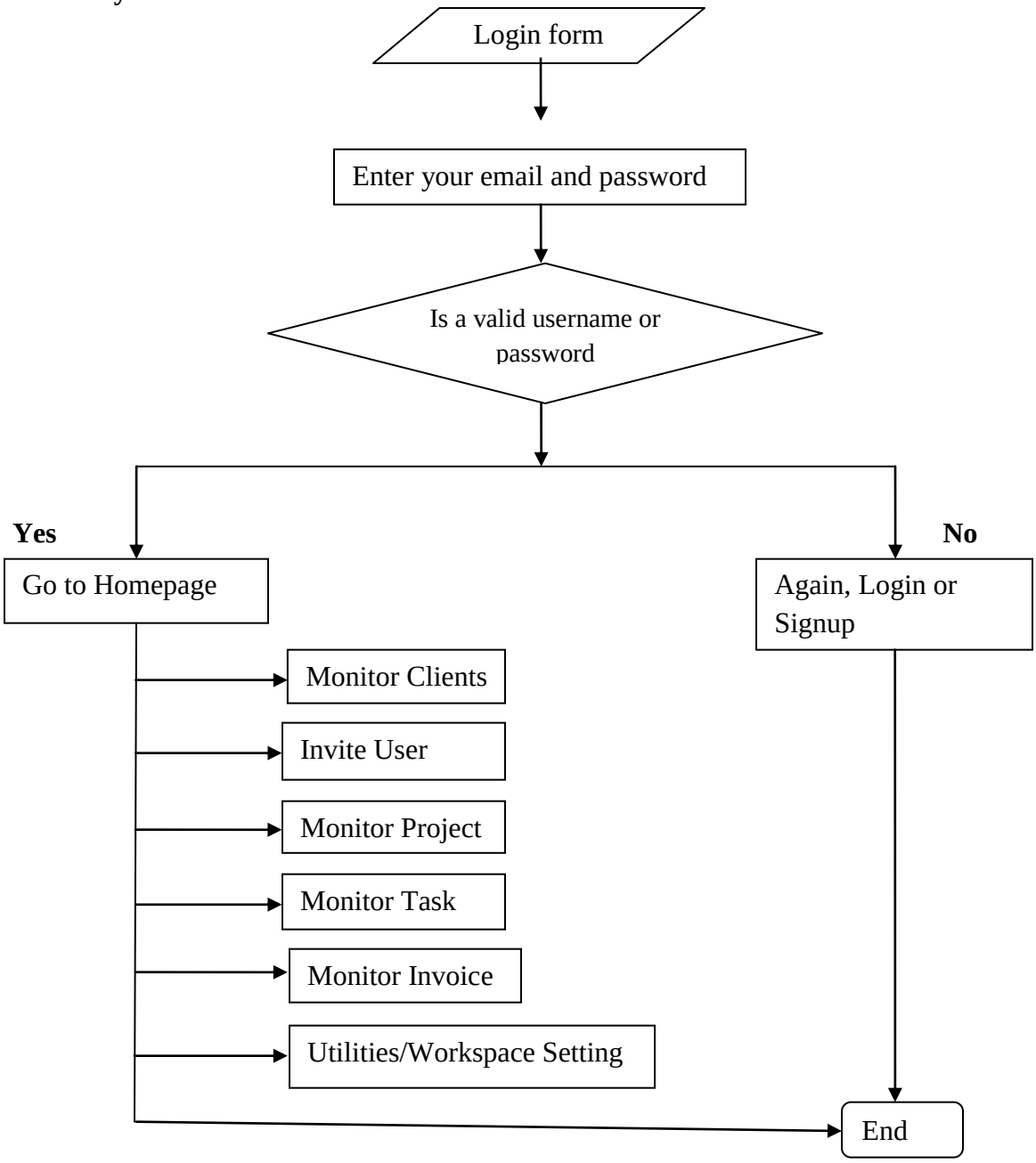


Figure 5.2: System Flow Chart

5.2.2 DATA FLOW DIAGRAM

DATA FLOW DIAGRAMS

Data Flow Diagrams are the central tool and the basis from which other components are developed. The logical translation of data from input to output through processes can be defined separately from the physical components of the system. A data flow graph or a bubble chart is another name for the DFD.

The most important aspect of data flow diagrams is balancing, which means that the data flow diagram at one level is appropriately reproduced in the data flow diagram at the following level when developing a project. Syntax and semantic mistakes are the two sorts of faults that can occur in data flow diagrams. Semantic errors are more complicated than syntax errors due to a set of rules that need to be followed to identify them [15].

5.2.3 ENTITY RELATIONSHIP DIAGRAM

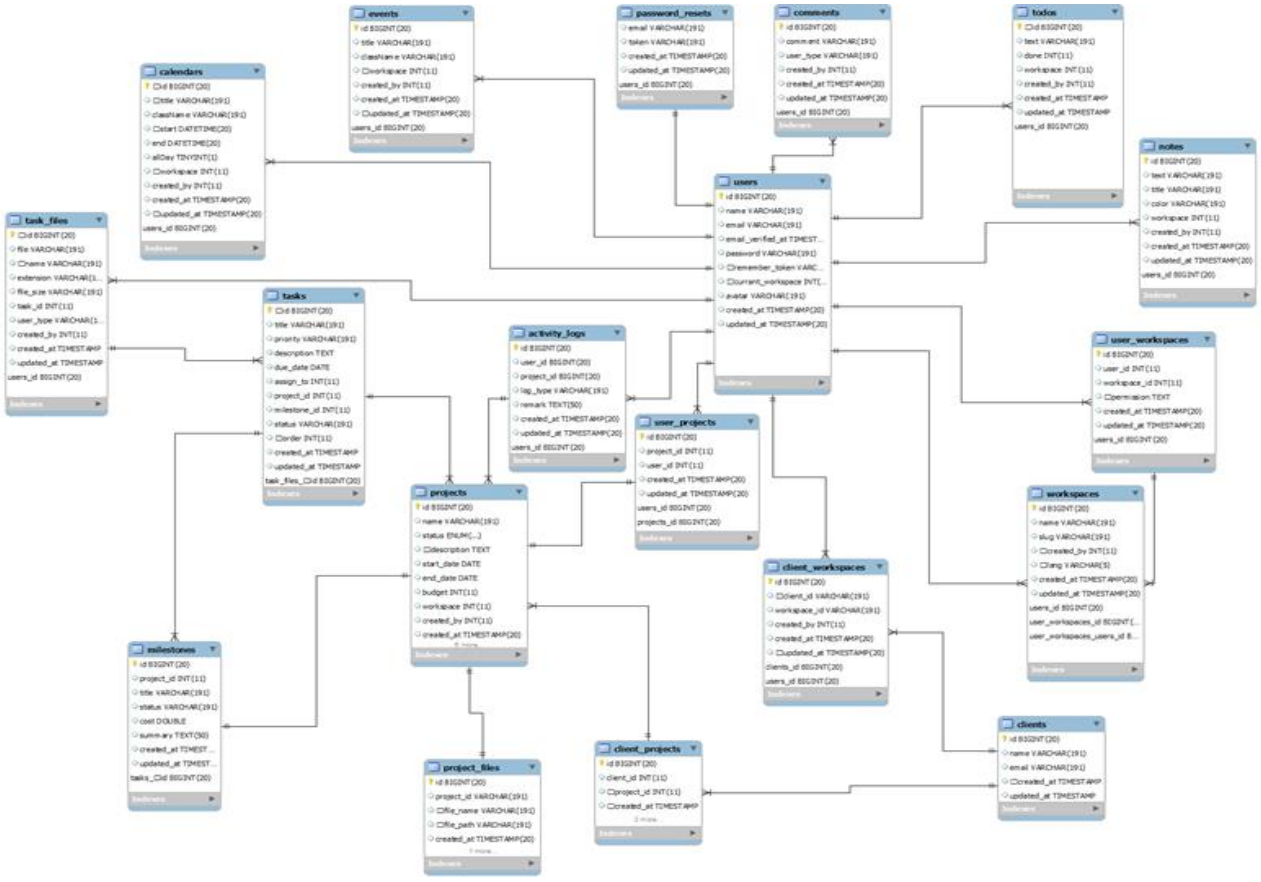


Figure 5.3: E-R Diagram

5.3 **Gantt chart**

A Gantt chart is a bar graph that shows how tasks are scheduled over time. A Gantt chart is used for planning projects of all sizes, and it is a useful way of showing what work is scheduled to be done on a specific day. It can also help you view the start and end dates of a project in one simple chart.

The systematic (step-by-step and planned) approach for passing the documented knowledge and experience obtained during development and/or commercialization to a competent, responsible, and the authorized party is presented by GC. To the satisfaction of both parties and any, or all, applicable regulatory agencies, technology transfer entails both the transfer of paperwork and the demonstrated competence of a receiving unit to properly perform the important parts of transferred technology [16].

Gantt charts can be used to show current schedule status using percent-complete shadings and a vertical “TODAY” line as shown here.

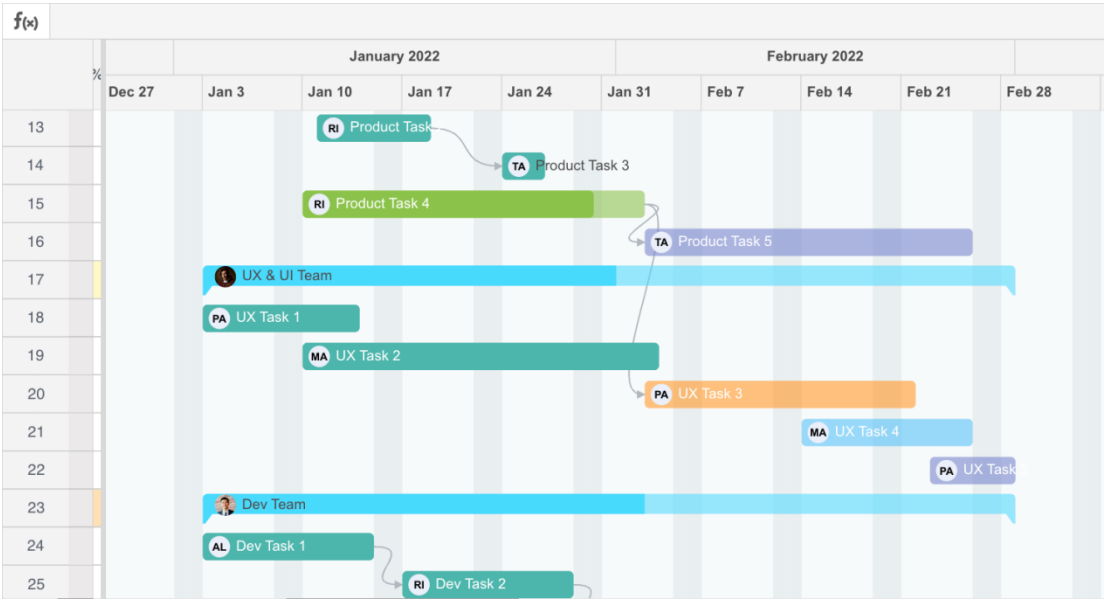


Fig 5.4: Gantt chart

5.4 **PERT CHART**

A PERT chart is a project management tool used to schedule, organize, and coordinate tasks within a project. PERT stands for Program Evaluation Review Technique, a management technique established by the United States Navy in the 1950s to oversee the Polaris submarine missile program. A similar methodology, the Critical Path Method (CPM) was developed for project management in the private sector at about the same time.

A PERT chart assists a project manager in analyzing a project's tasks and estimating the time needed to finish each activity. The project manager can estimate the least amount of time required to complete the project using this information. This data also assists the project manager in developing a project budget and determining the resources required to complete the project [17].

A PERT chart is a network diagram that depicts a project as a network of numbered nodes (circles or rectangles) representing events or milestones in the project, connected by labeled vectors (directional lines) representing project tasks. The task sequence is indicated by the direction of the arrows on the lines. The PERT chart, a common project management charting method, is sometimes favored over the Gantt chart because it clearly illustrates task dependencies. On the other hand, the PERT chart can be much more difficult to interpret, especially on complex projects. Frequently, project managers use both techniques.

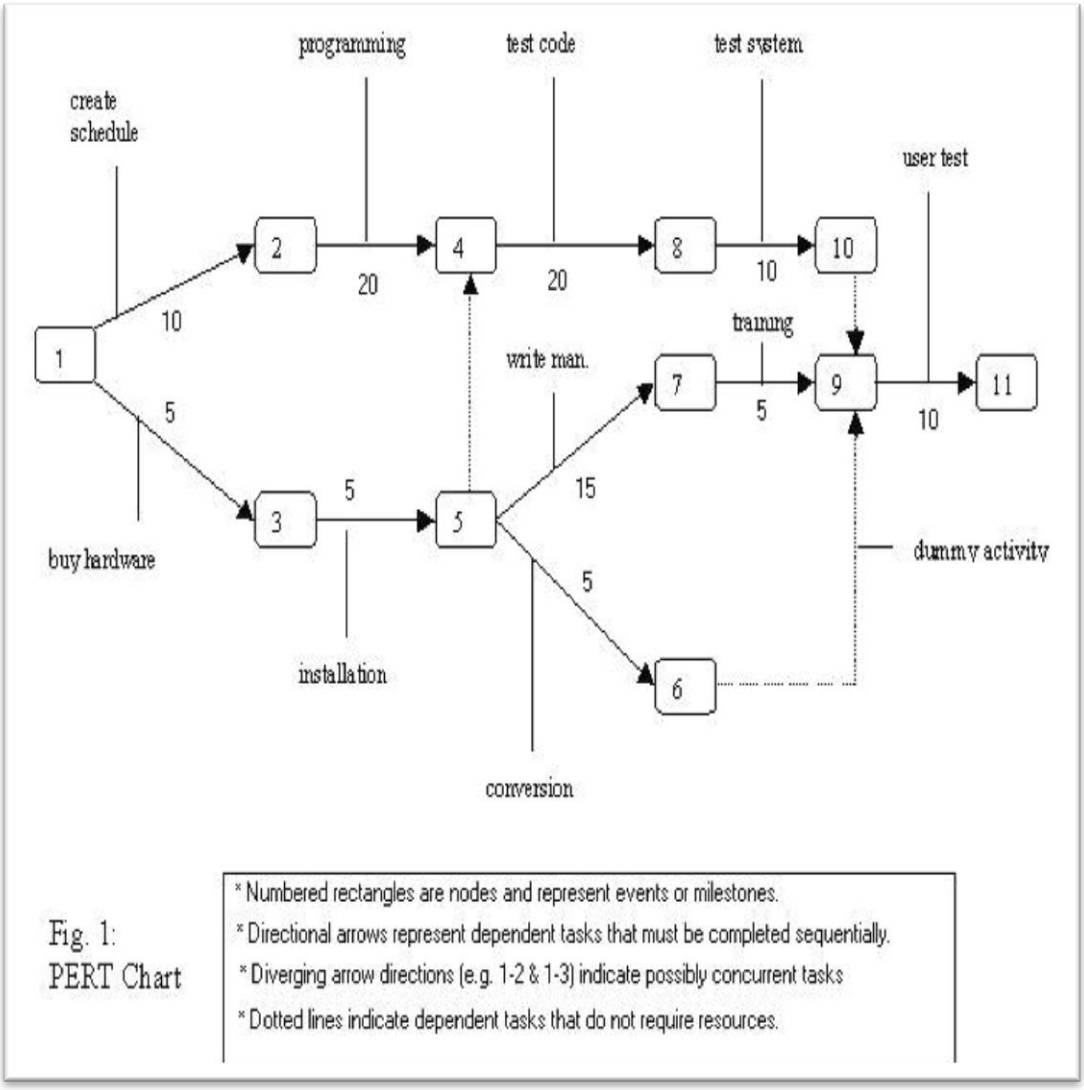


Fig. 1:
PERT Chart

Figure 5.5: Pert Chart

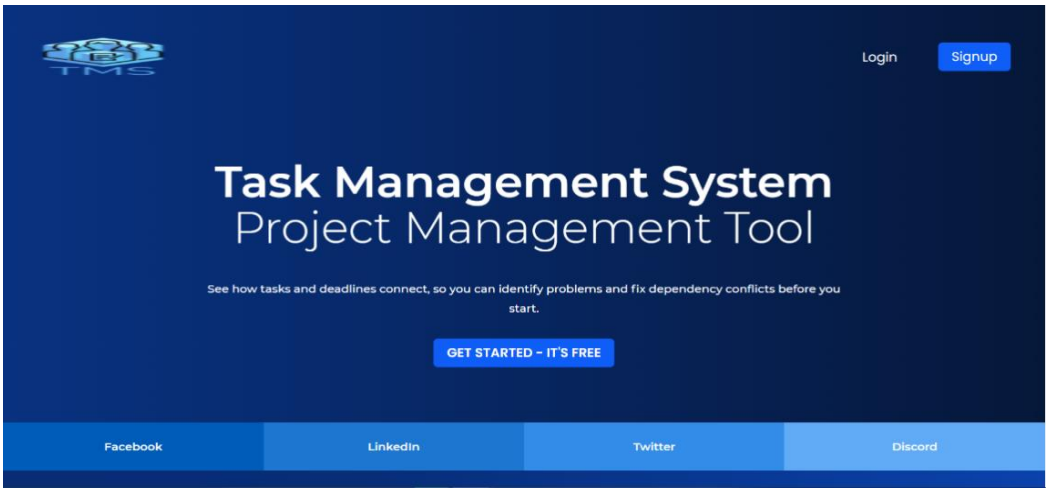
CHAPTER 6

SYSTEM INTERFACE

6.1 SCREENSHOTS

You can manage all aspects of all the projects under your organization using the TMS (Task Management System) module.

Landing page:

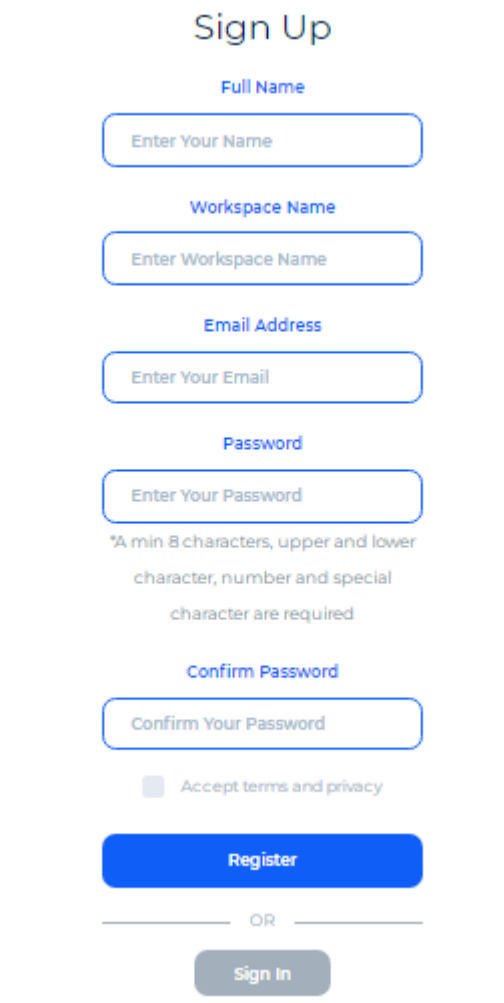


Landing page

Let’s go through how TMS works.

This is the TMS's primary landing page. If you haven't already done so, go to the top right corner of this page and click the Signup button. If you are a registered user, go to the top right corner of this page and click the Login button.

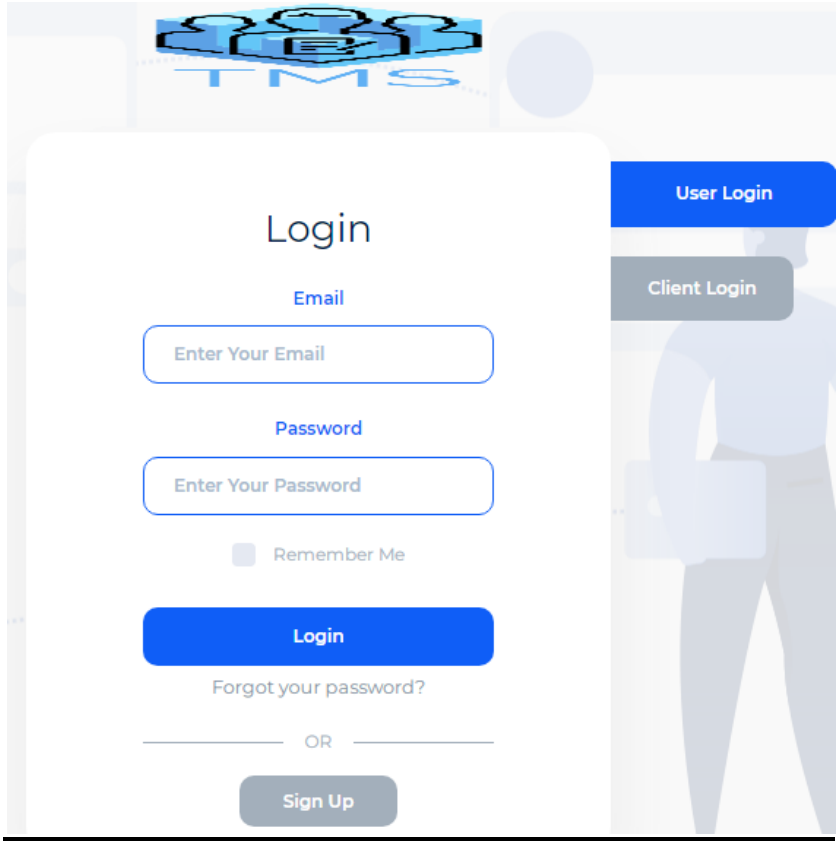
Registration Page:



Registration Page

Your name, email address, and password will be required. You'll also need to name your workspace. The main dashboard will open after you click Register.

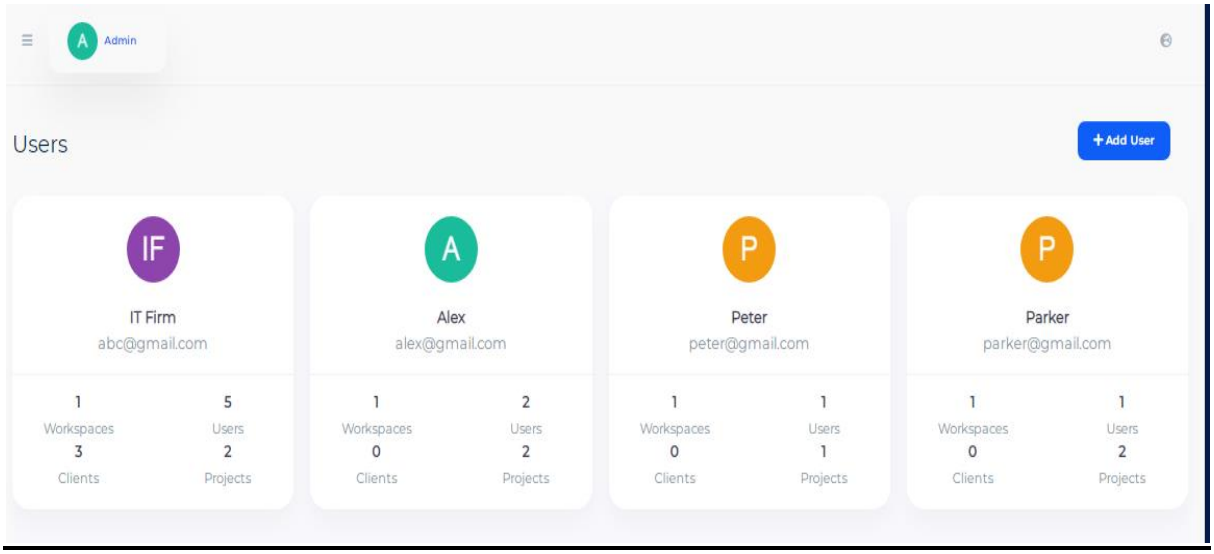
Login Page:



Login page

You can log in as a regular user or as a client from the login page. You'll see the screen below after logging in as an administrator.

Admin Dashboard Page:

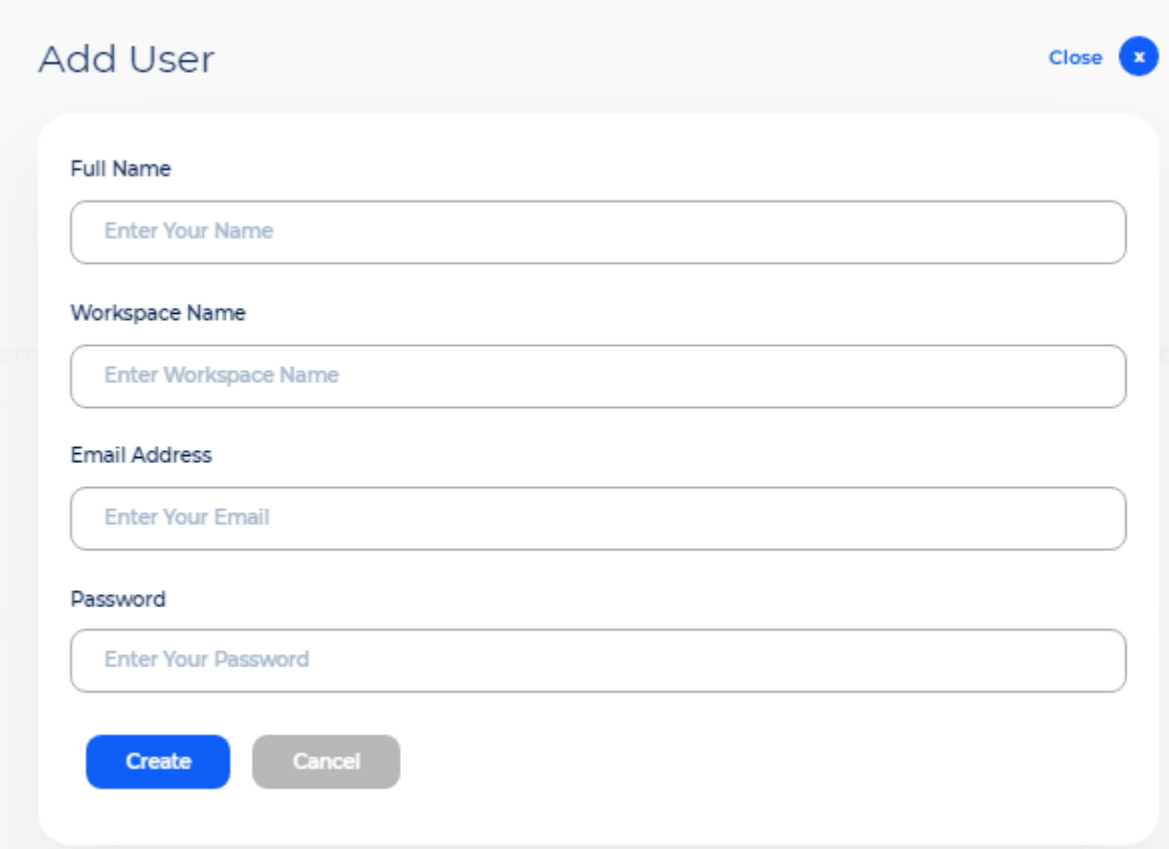


Admin Dashboard

The admin dashboard looks like this.

- Displays all of your organization's registered users.
- Displays the number of workspaces, users, clients, and projects associated with a single user.
- Click the Add User button to create a new user.
- Click the Admin button to view and change/edit the admin profile.

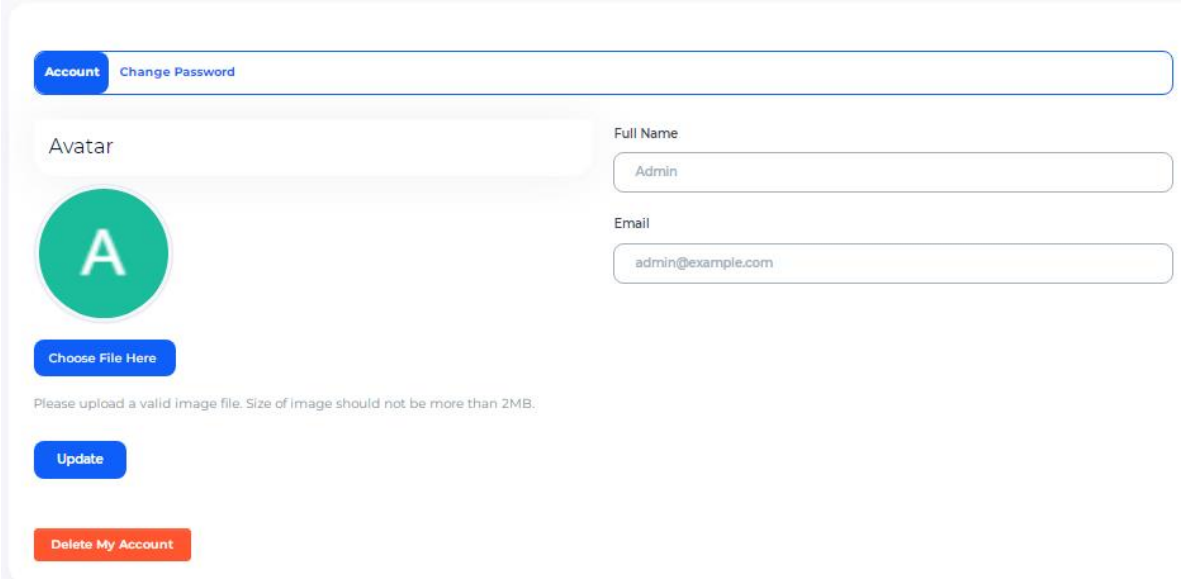
Add User Page:



Add User

When you're finished, click Create to save the new user's details.

Admin Profile Page:

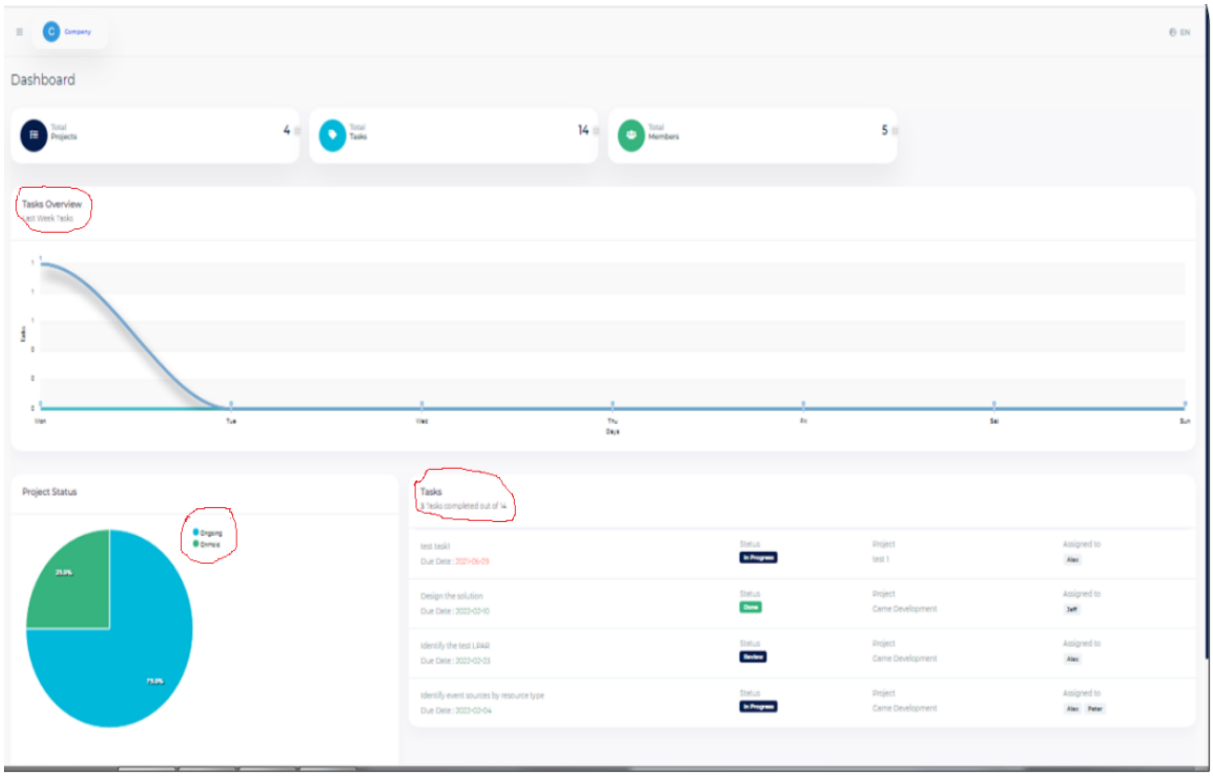


Admin Profile

Navigation: Admin > My Profile

- You can change the admin name, email address, and profile image from here.
- You can also update the administrator password from this page.

Registered User's Dashboard:

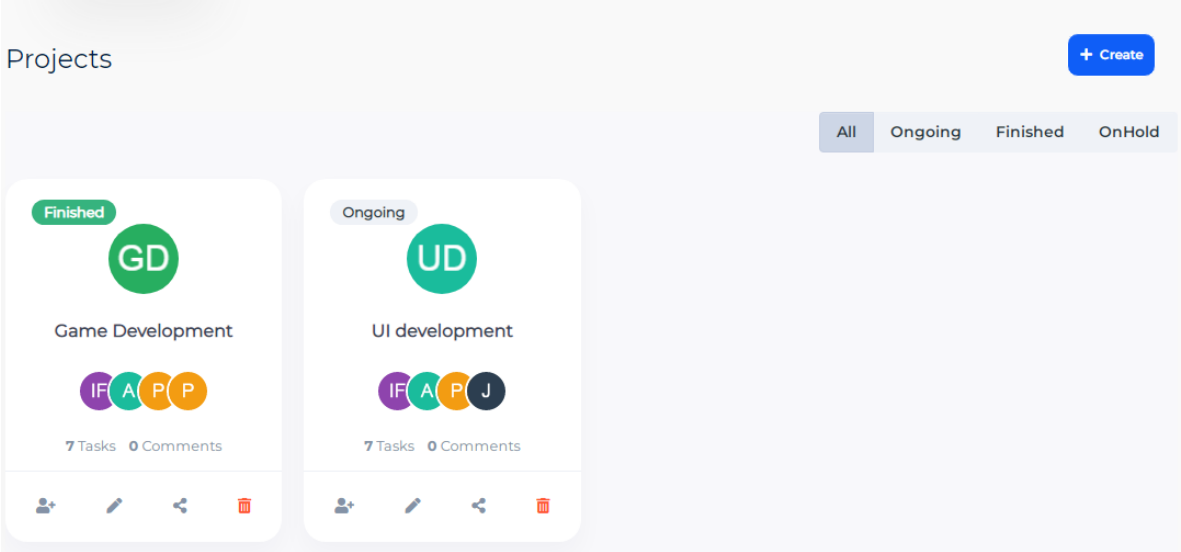


User's dashboard

This is the normal user dashboard.

- Shows the number of projects, tasks, and members under one user's supervision.
- Display last week's task overview in a graph.
- Display project status.
- Shows the number of completed tasks.

Project Overview Page:

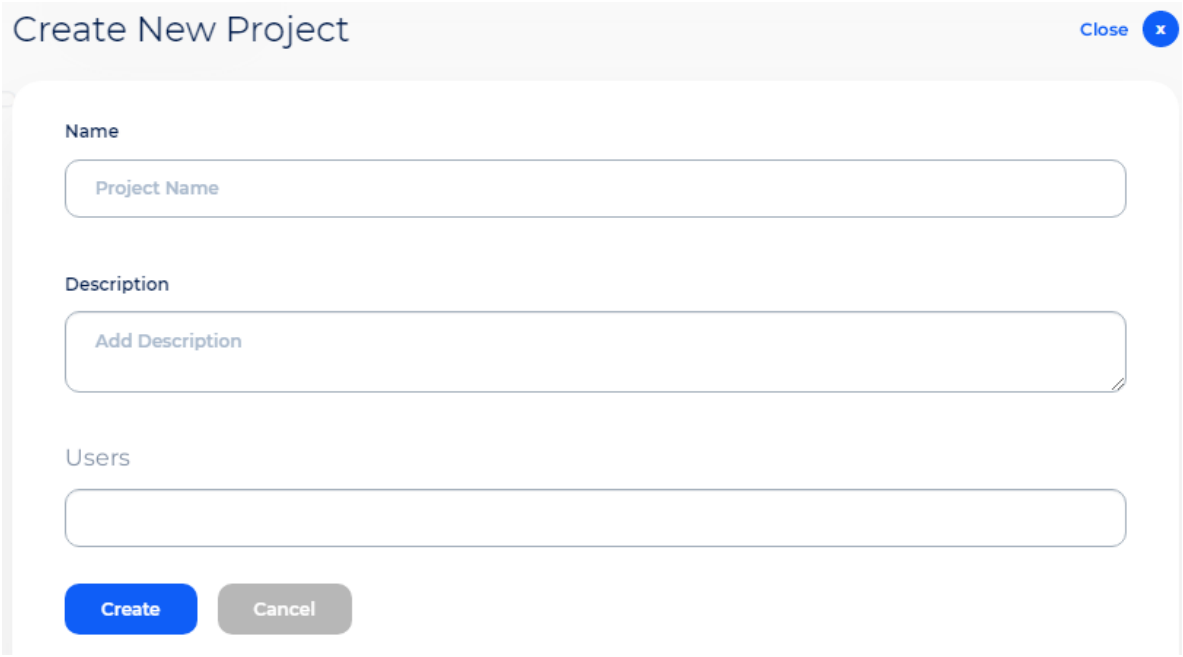


Project Overview

This is the project overview page of a particular user.

- Displays all projects under one user's supervision
- Projects are three types here: Ongoing, Finished, and On Hold.
- You can create new projects by clicking Create button.

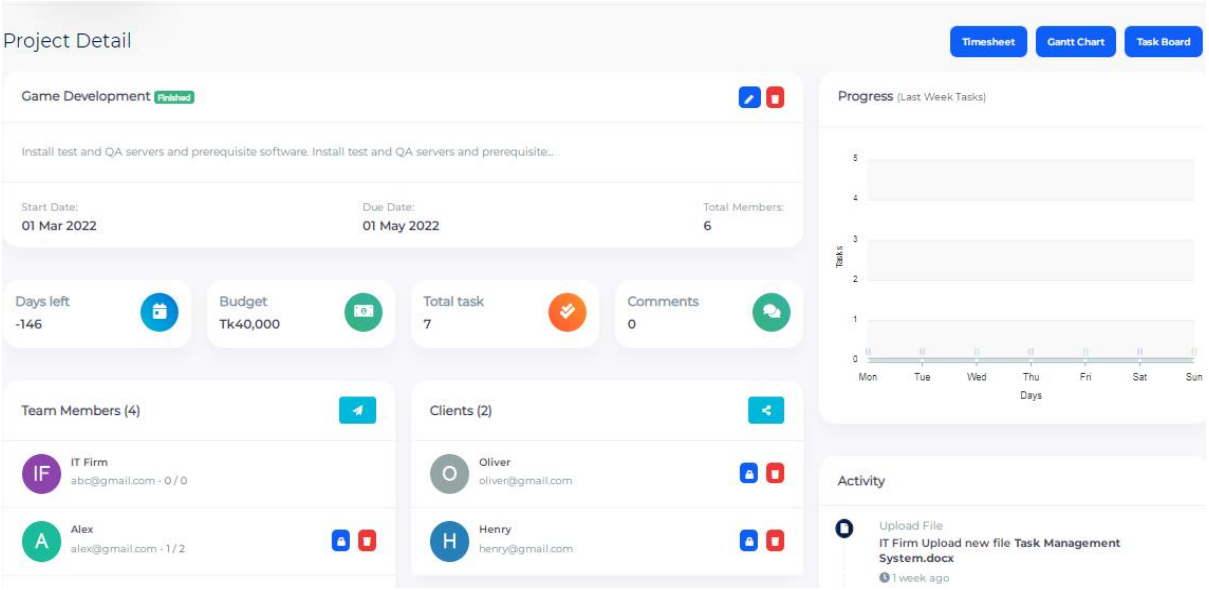
Create Project Page:



Create New Project

Enter all information relating to the new project and click Create when done.

Project Detail Page:

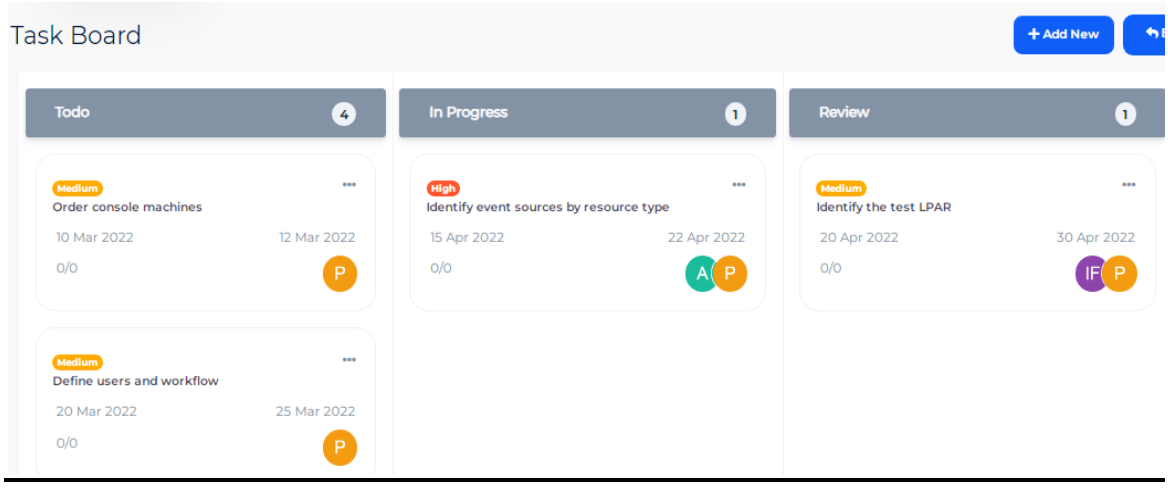


Project Detail

Navigation path: Projects > Project name Icon/ Project Title

- Shows project description, start date, due date, total members, budget, days left, etc.
- Invite new members and also remove members for this particular project.
- Share this project with new clients.
- Create, edit and delete milestones.
- Upload and download any type of file.
- Visual representation of task overview and task status.
- Shows activity in listed view.

Task Board Page:



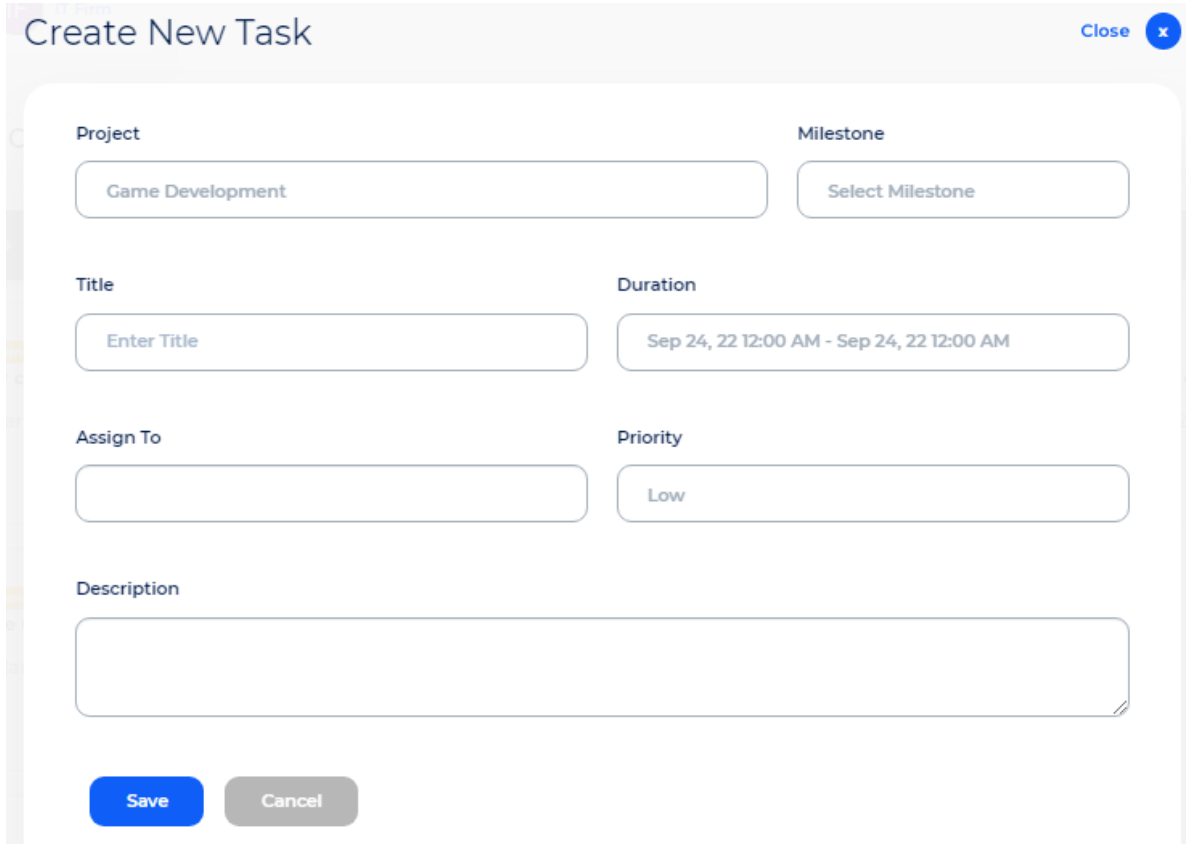
Task Board

Navigation path: Projects > Task Board button

This is a Kanban dashboard.

- Tasks are arranged in four lists: To do, In Progress, Review, and Done.
- Next to each task, you will see a link from which you can view the task, edit the task and delete the task.
- From here, you can add a new task or can also back to the project details page.

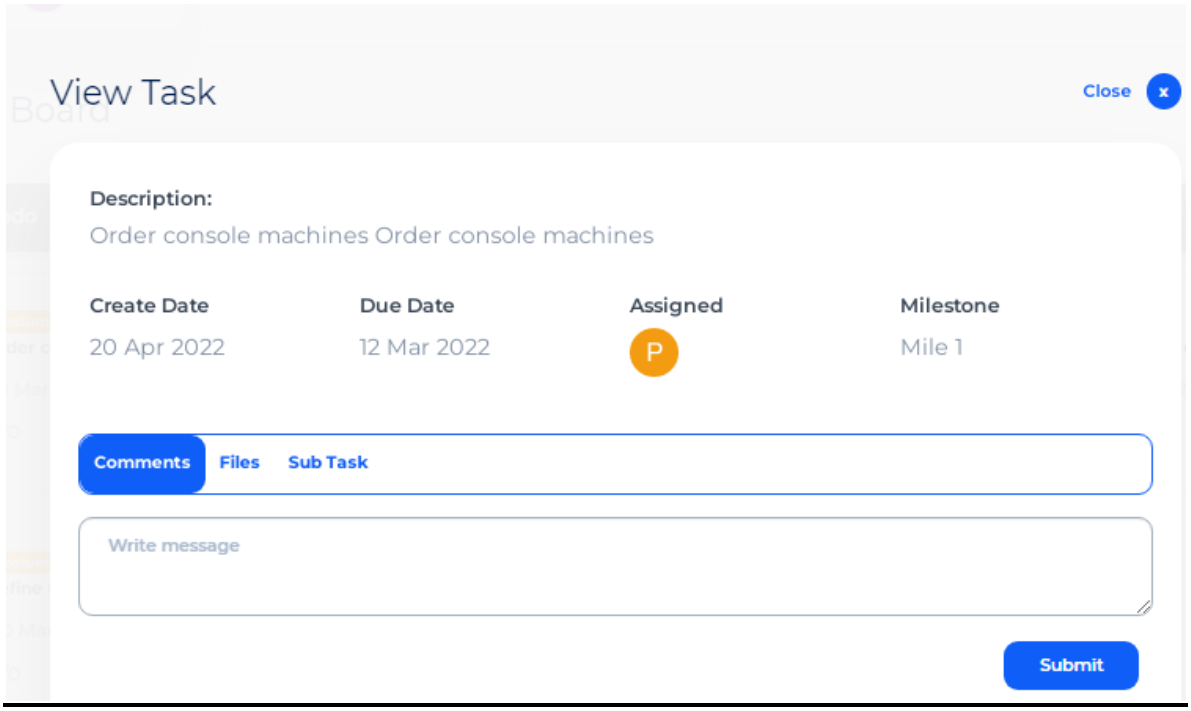
Create Task Page:



Create New Task

Enter all information relating to the new task and click Save when done.

View Task Page:

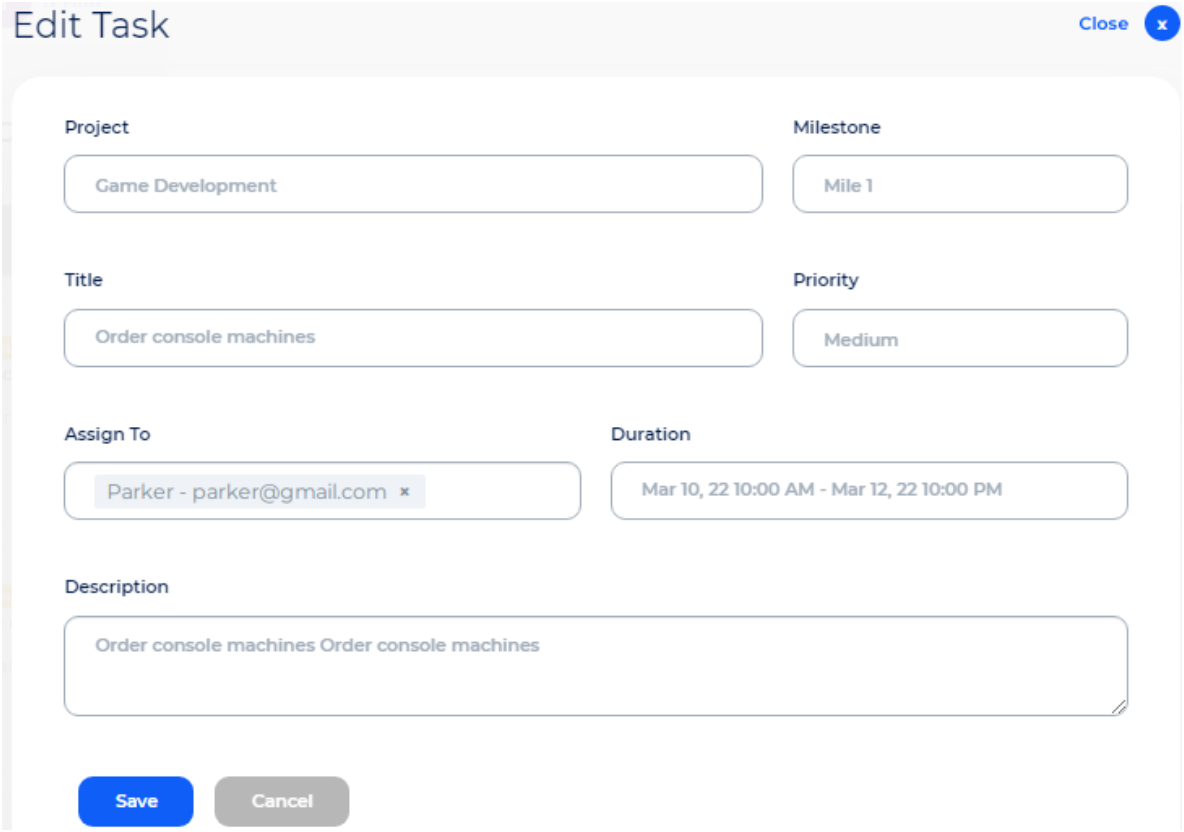


View Task

Navigation Path: Projects > Task Board > View

You will see details of the task with Description, Assigned member, etc. You can also add comments, upload files, and add sub-task from here.

Edit Task Page:

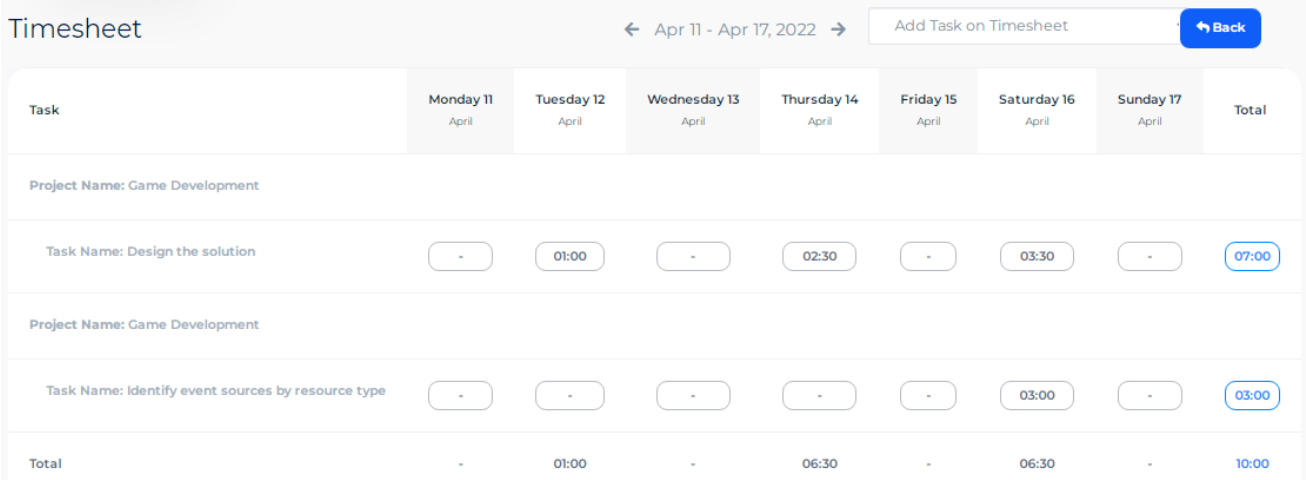


Edit Task

Navigation Path: Projects > Task Board > Edit

You can edit tasks from here if necessary. Change information and then save when done.

Timesheet Page:



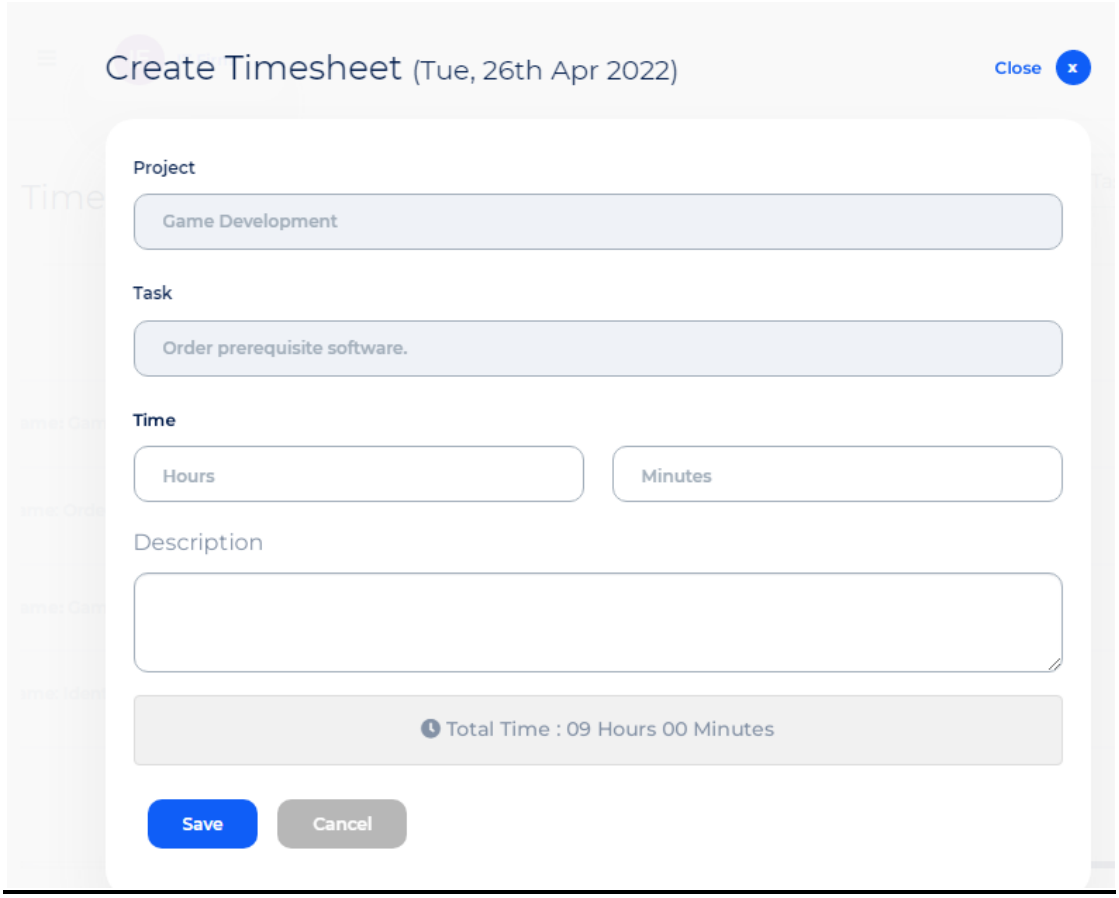
Timesheet Page

Navigation path: Projects > Timesheet button.

The tasks under a project can be specified as how many hours you have to work on a given day. The total amount of time spent on a project can be seen weekly.

You can create a timesheet by clicking on the marked circle.

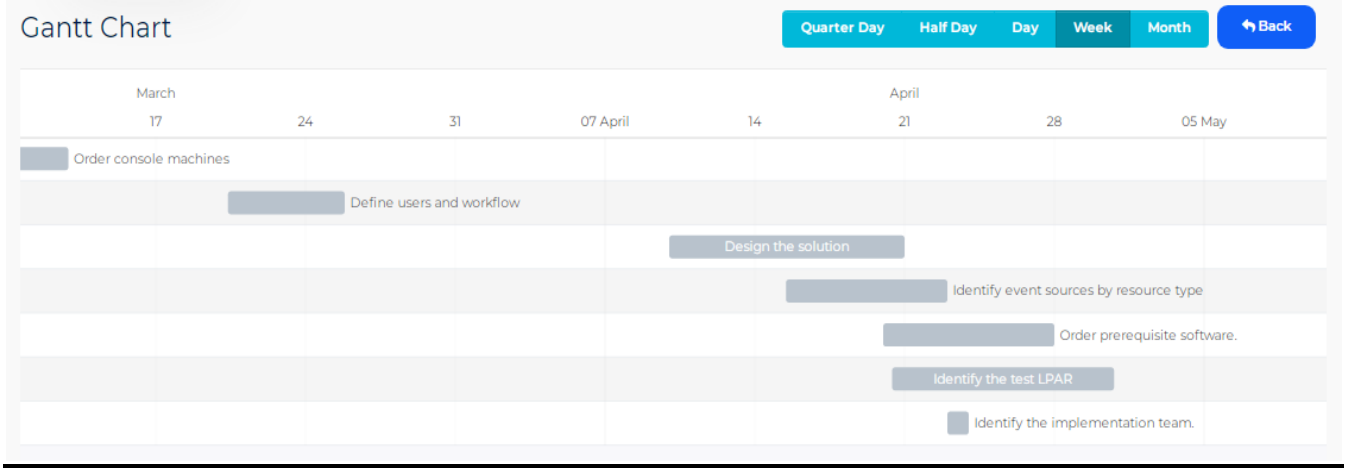
Create Timesheet Page:



Create Timesheet

Enter the required information and then click the save button.

Gantt chart Page:

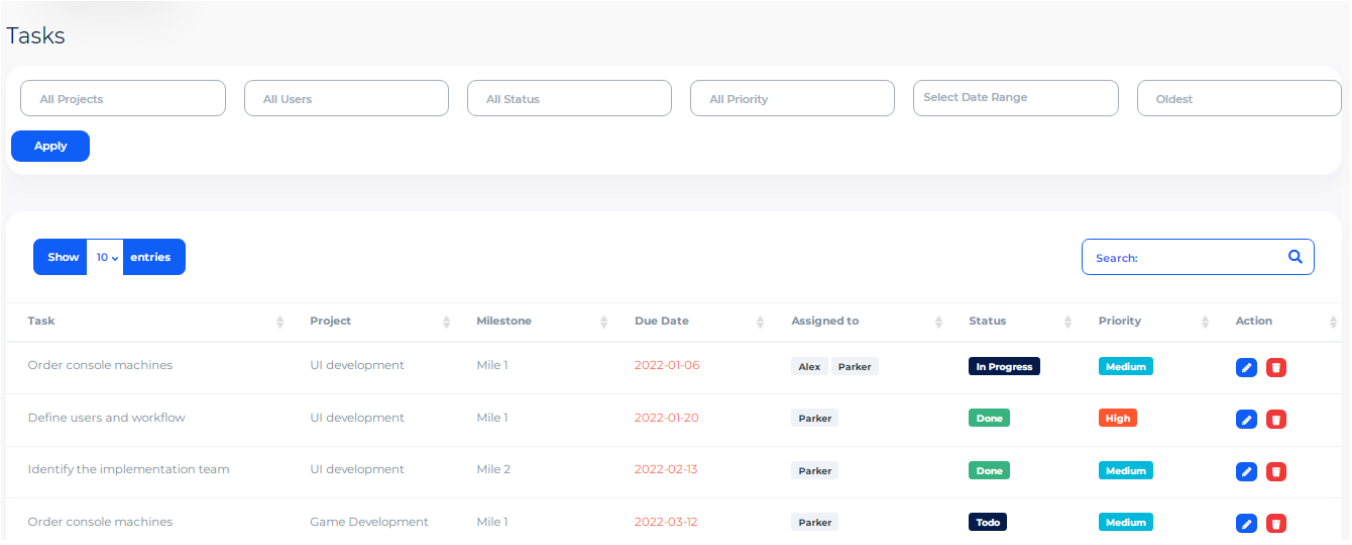


Gantt chart

Navigation path: Projects > Gantt chart button

This chart will show tasks time duration on a Quarter day basis, Half day basis, Day basis, Week basis, and monthly basis.

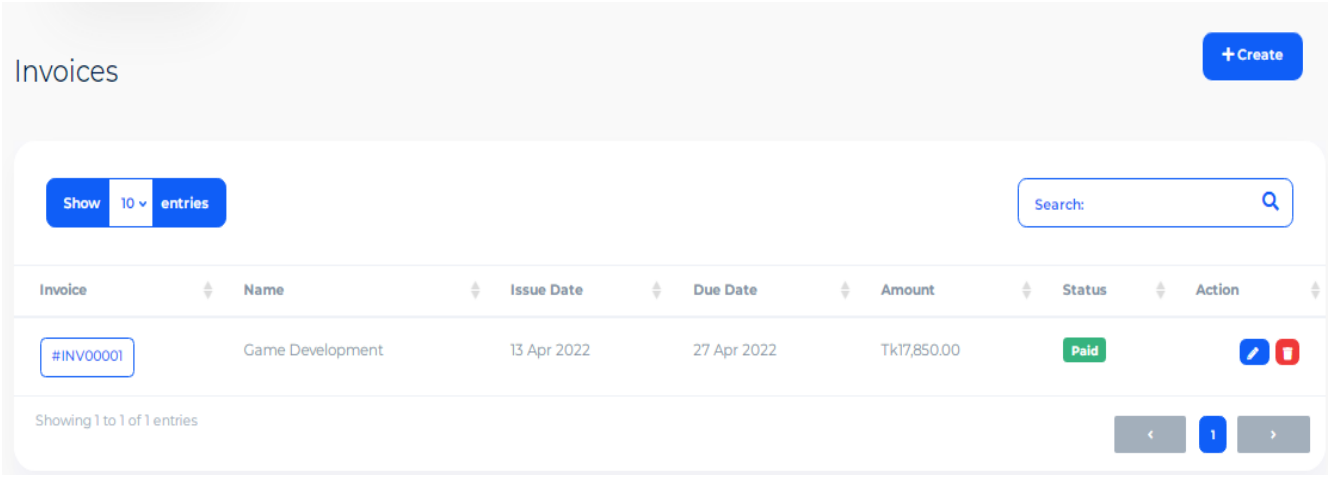
Tasks Index Page:



Tasks Index

The tasks index page will be opened by clicking on the Tasks side menu. From here you can also edit and delete tasks.

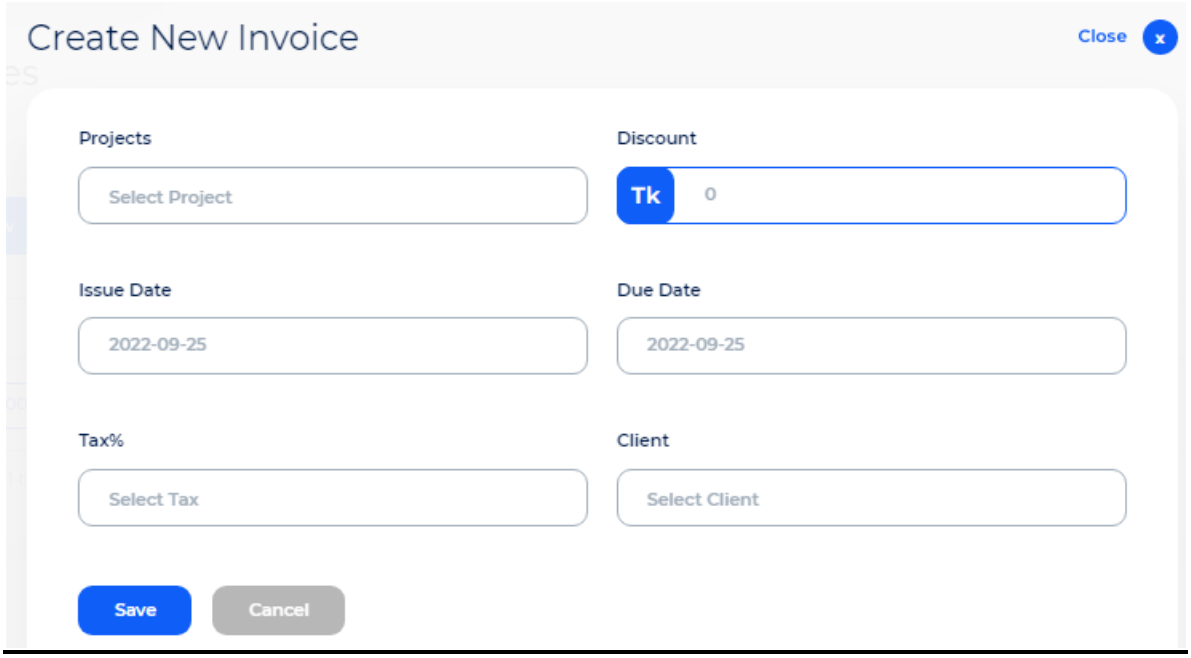
Invoice Index Page:



Invoice Index

The invoice index page will be opened by clicking on the Invoices side menu. We can see details of the invoice for a particular project. From this page, you can create, edit and delete the invoice.

Create Invoice Page:

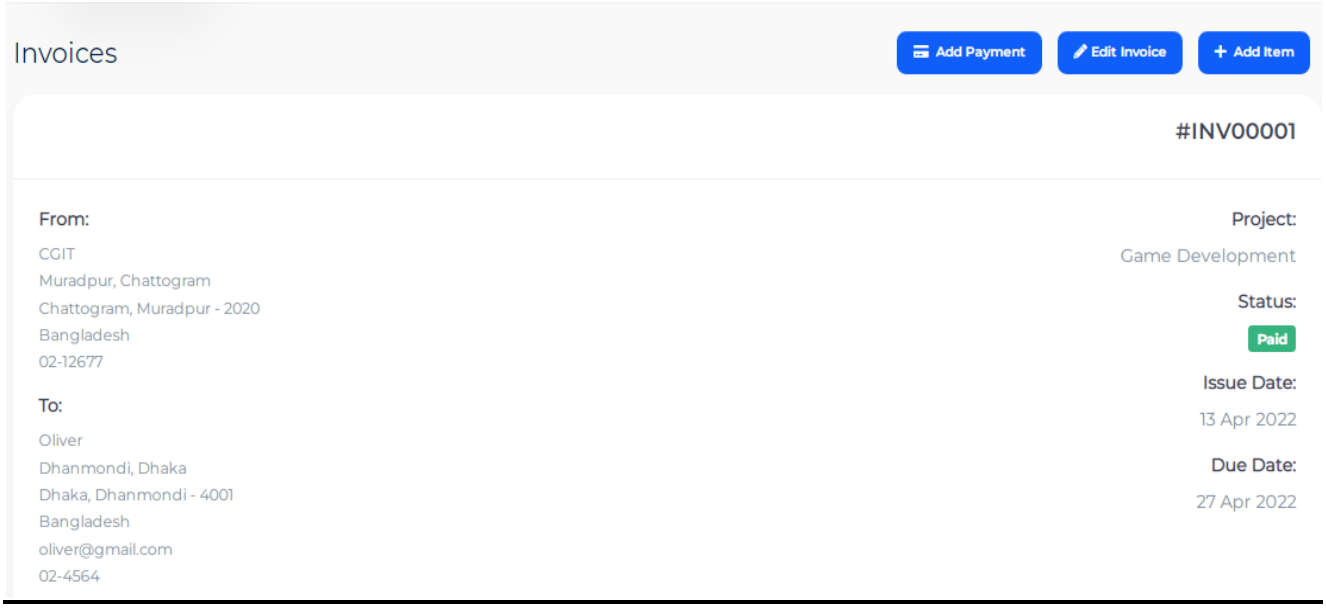


Create New Invoice

Navigation path: Invoices > Create button

Enter all information relating to the new invoice and click Save when done.

Invoice Detail Page:



The invoice detail page will be opened by clicking on the Invoice Number button.

- The invoice contains the billing address, client address, order summary, etc.
- You can print the invoice in pdf form from here.
- This page also shows all payments related to this invoice.

Print Invoice:

TMS

INVOICE

Number: #INV00001
Project: Game Development
Issue Date: 13 Apr 2022
Due Date: 27 Apr 2022

CGIT

Muradpur, Chattogram
Chattogram, Muradpur - 2020
Bangladesh
02-12677

Bill To:

Oliver
Dhanmondi, Dhaka
Dhaka, Dhanmondi - 4001
Bangladesh
oliver@gmail.com
02-4564

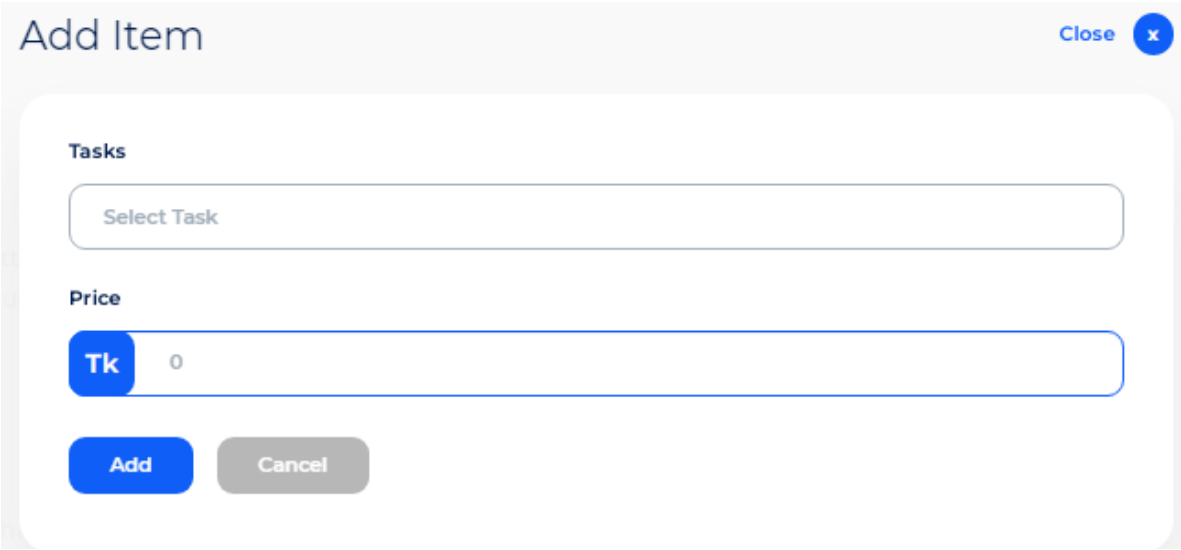
#	Item	Totals
1	Order console machines	Tk3,000.00
2	Define users and workflow	Tk4,000.00
3	Identify event sources by resource type	Tk6,000.00
4	Order prerequisite software.	Tk2,000.00
5	Identify the test LPAR	Tk4,000.00
6	Design the solution	Tk2,000.00

Subtotal:	Tk21,000.00
Discount:	- Tk4,000.00
Vat (5%):	Tk850.00
Total:	Tk17,850.00

Regards :
TMS Team

Invoice in pdf Form

Add Item Page:

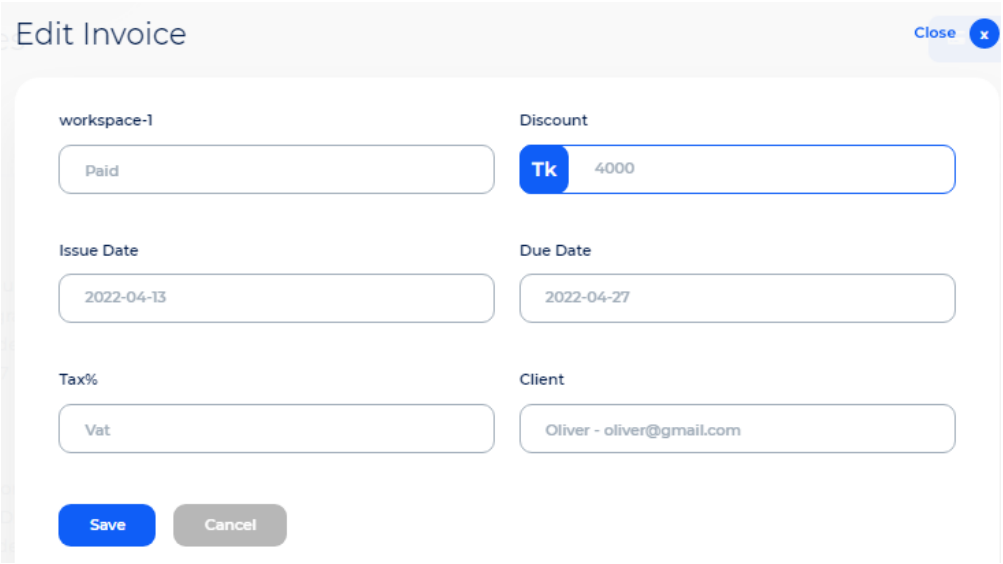


Add Item

Navigation path: Invoices > Invoice Number button > Add Item button

From here you can add tasks with prices for a specific project.

Edit Invoice Page:

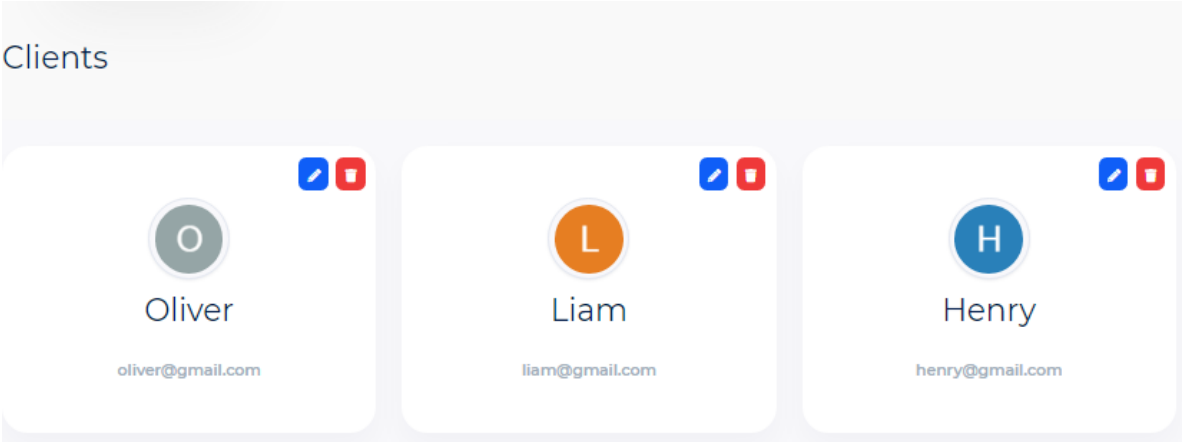


Edit Invoice

Navigation path: Invoices > Invoice Number button > Edit Invoice button

You can edit the invoice from here if required and click save when done.

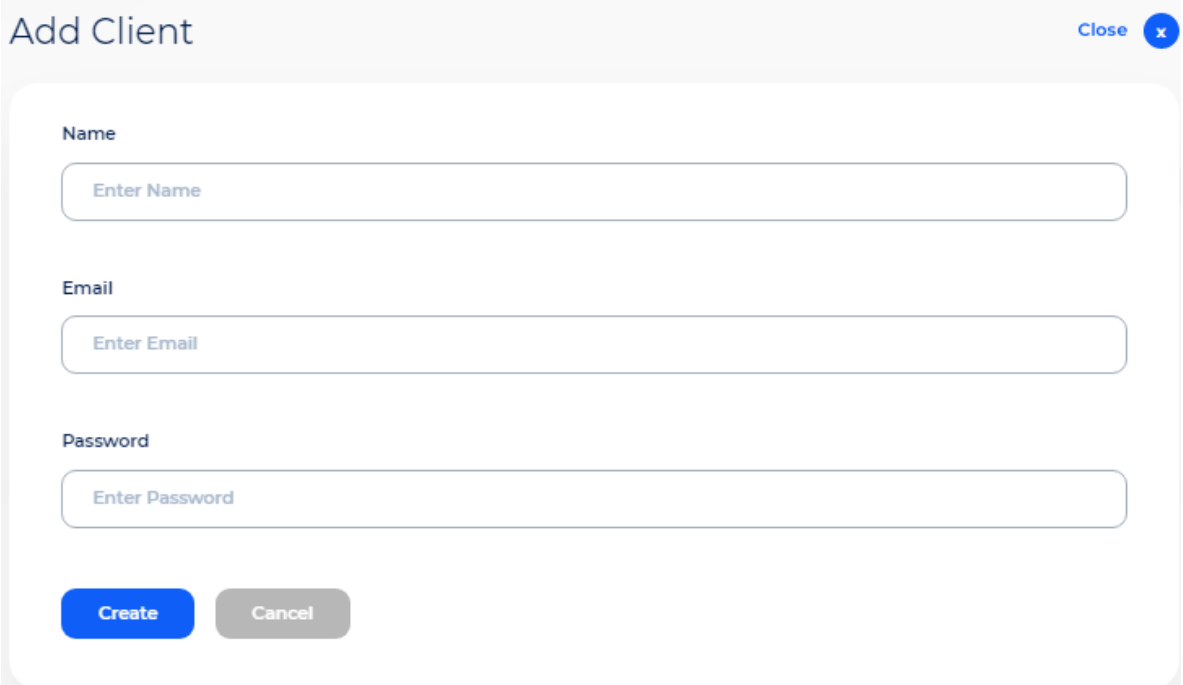
Client's Index Page:



Client's Index

The client's index page will be opened by clicking on the Clients side menu. From here you can add, edit or delete a client.

Add Client Page:



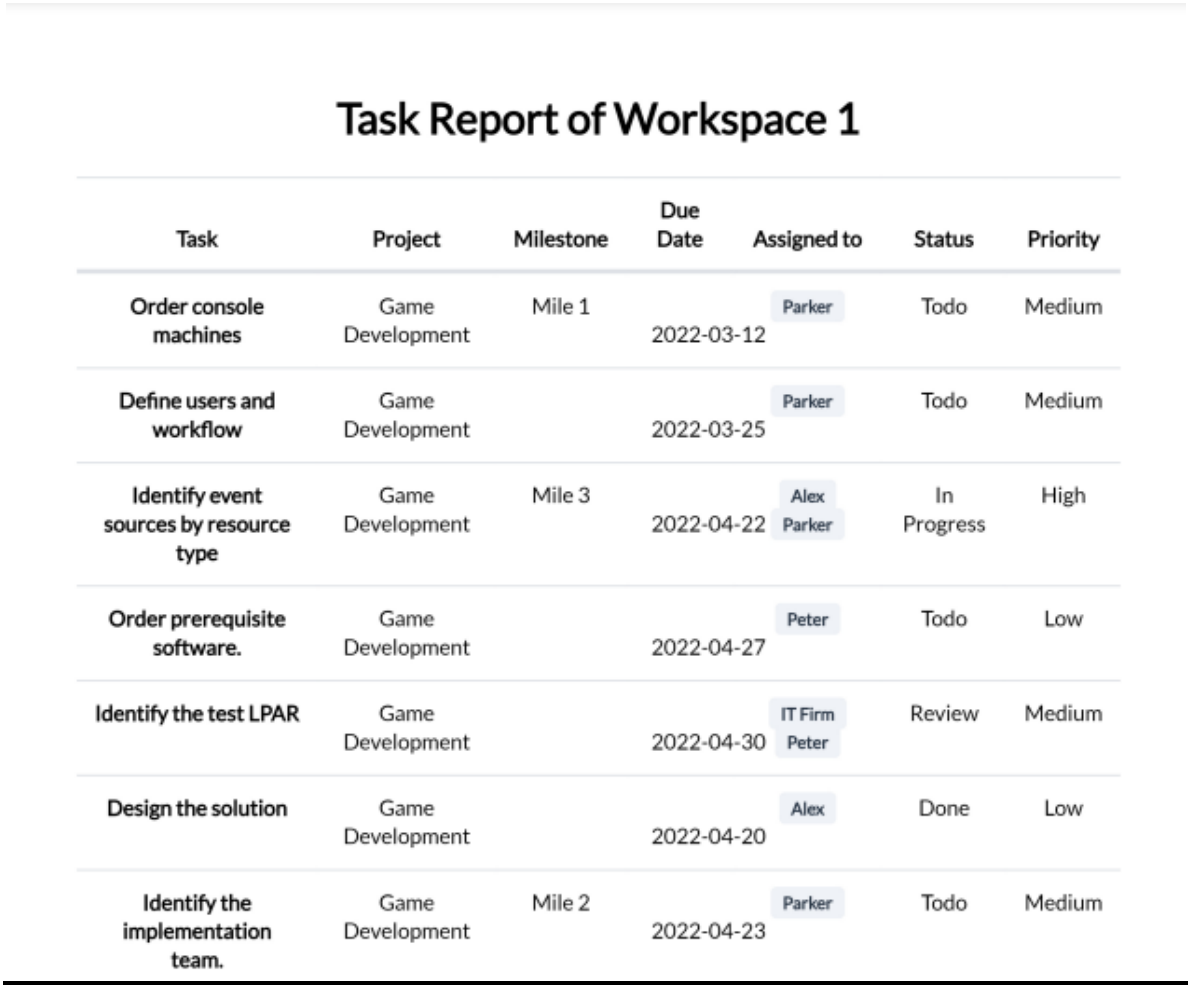
Add Client

Navigation path: Clients > Add Client

Enter all information related to a new client and click Create when done.

In the report section, there are three reports which are arranged in drop-down list.

Task Report:



Task Report of Workspace 1

Task	Project	Milestone	Due Date	Assigned to	Status	Priority
Order console machines	Game Development	Mile 1	2022-03-12	Parker	Todo	Medium
Define users and workflow	Game Development		2022-03-25	Parker	Todo	Medium
Identify event sources by resource type	Game Development	Mile 3	2022-04-22	Alex Parker	In Progress	High
Order prerequisite software.	Game Development		2022-04-27	Peter	Todo	Low
Identify the test LPAR	Game Development		2022-04-30	IT Firm Peter	Review	Medium
Design the solution	Game Development		2022-04-20	Alex	Done	Low
Identify the implementation team.	Game Development	Mile 2	2022-04-23	Parker	Todo	Medium

Navigation path: Reports > Task Report

You can filter tasks according to project name and date. The task report can be downloaded in pdf form.

Timesheet Report:

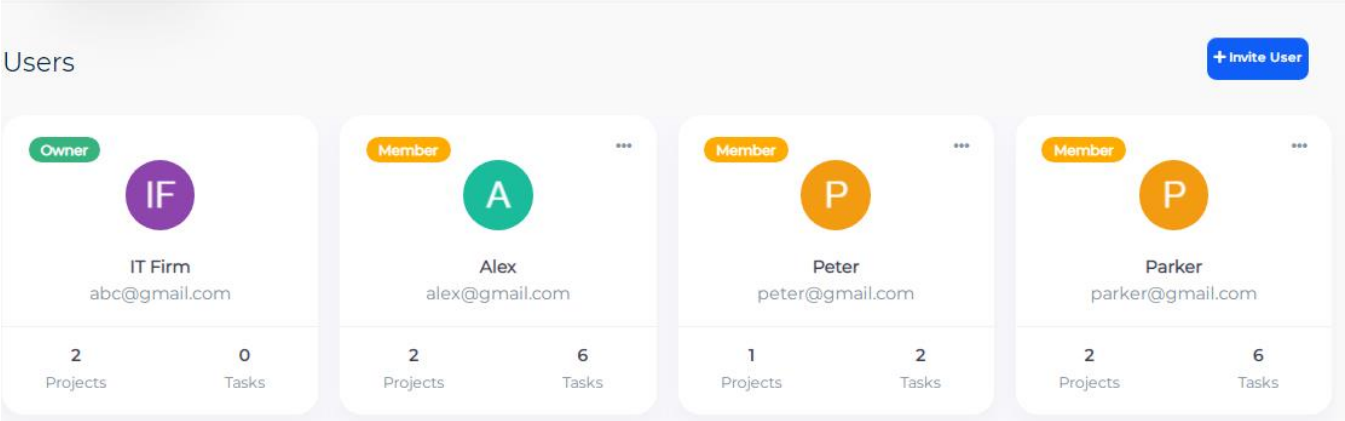
Weekly Timesheet of Workspace 1

Task	Monday 18 April	Tuesday 19 April	Wednesday 20 April	Thursday 21 April	Friday 22 April	Saturday 23 April	Sunday 24 April	Total
Project Name: Game Development								
Task Name: Design the solution								
IT Firm	-	-	00:30	-	-	-	-	00:30
Task Name: Identify event sources by resource type								
IT Firm	01:00	-	00:30	-	-	-	-	01:30
Task Name: Order prerequisite software.								
IT Firm	-	-	-	03:10	-	01:20	-	04:30

Navigation path: Reports > Timesheet Report

You can filter the timesheet according to the project name and user name. The timesheet report can be downloaded in pdf form.

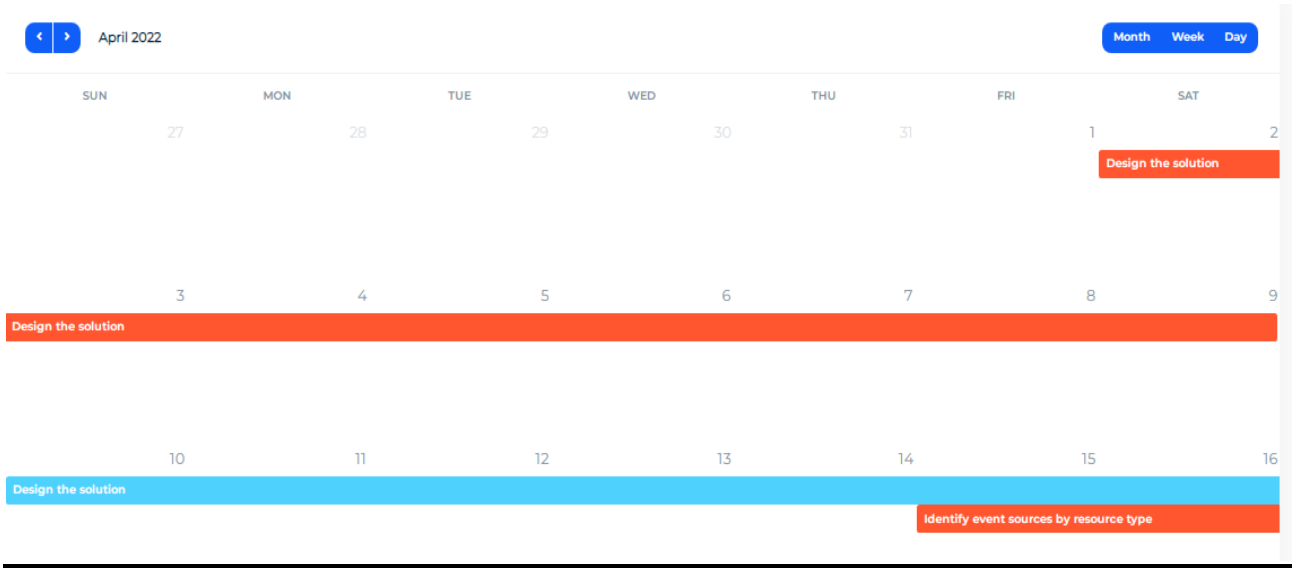
User's Index Page:



User's Index

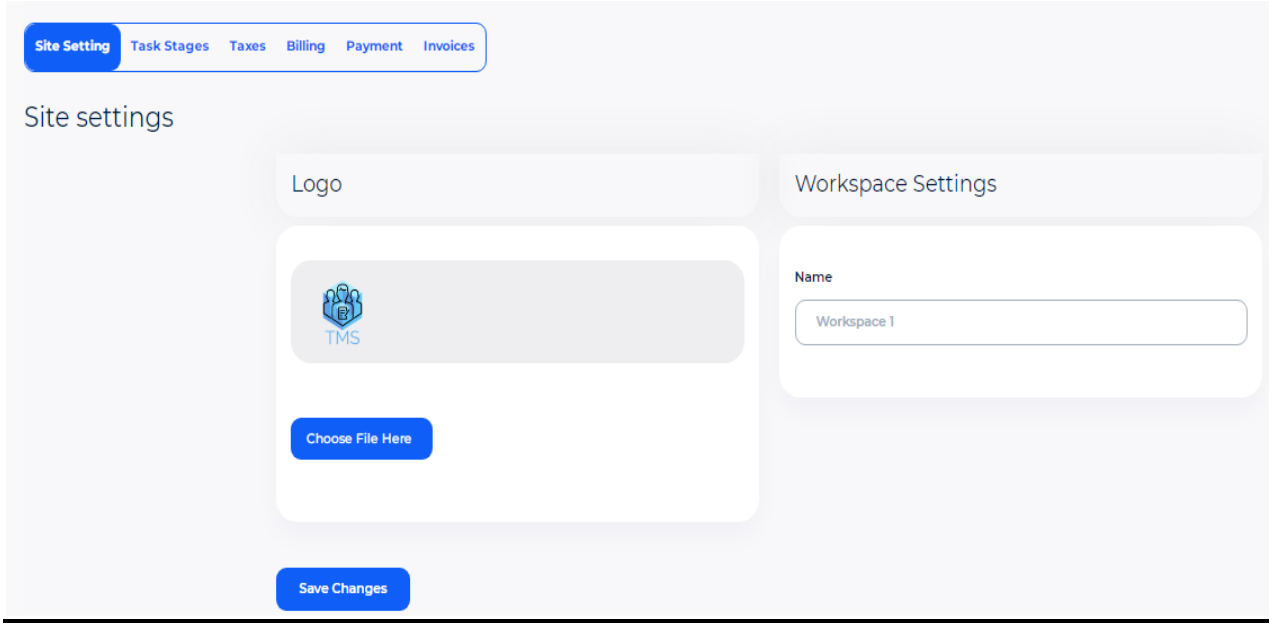
The user's index page will be opened by clicking on the Users side menu. From here a user (owner) can invite other users (members). The total number of assigned projects along with the tasks of a user will be shown on this page.

Calendar Page:



You can see all tasks at a glance from this Calendar menu.

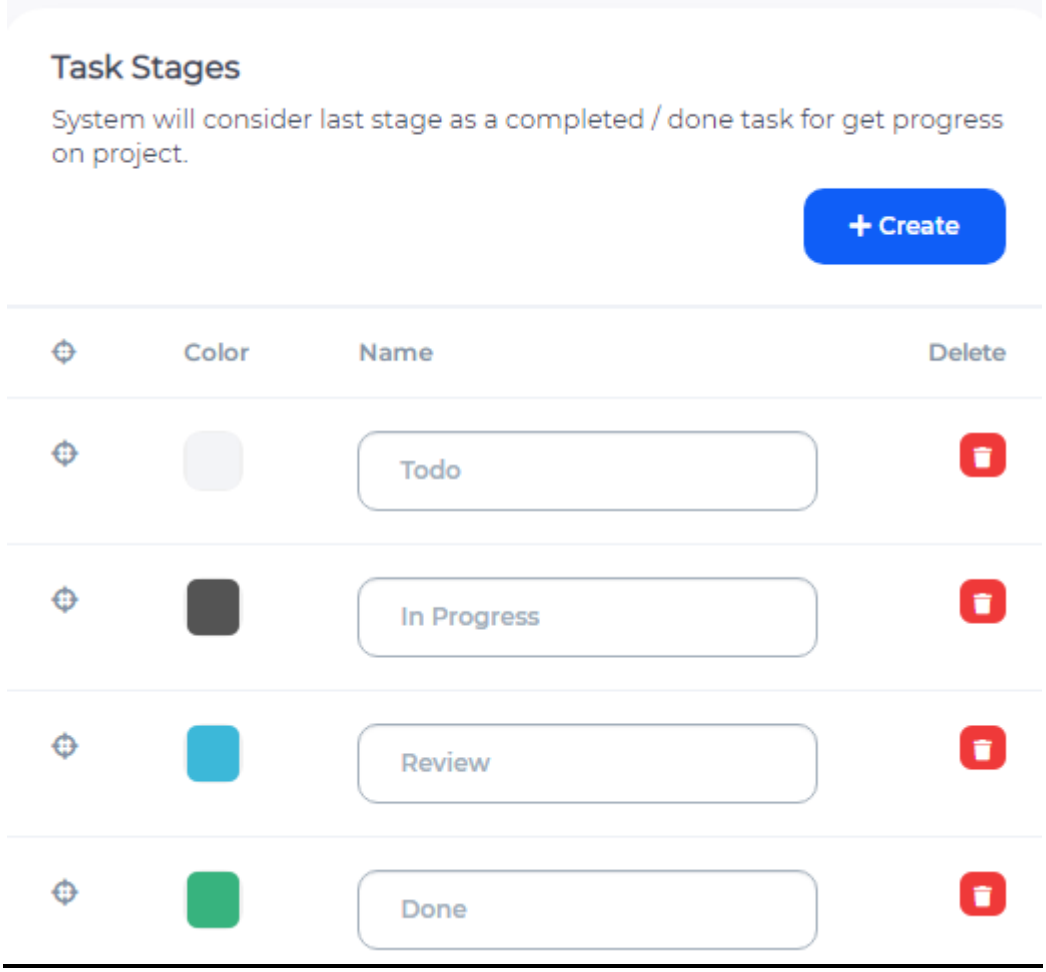
Workspace Setting Page:



Site Setting

Navigation path: Workspace Settings -> Site Setting

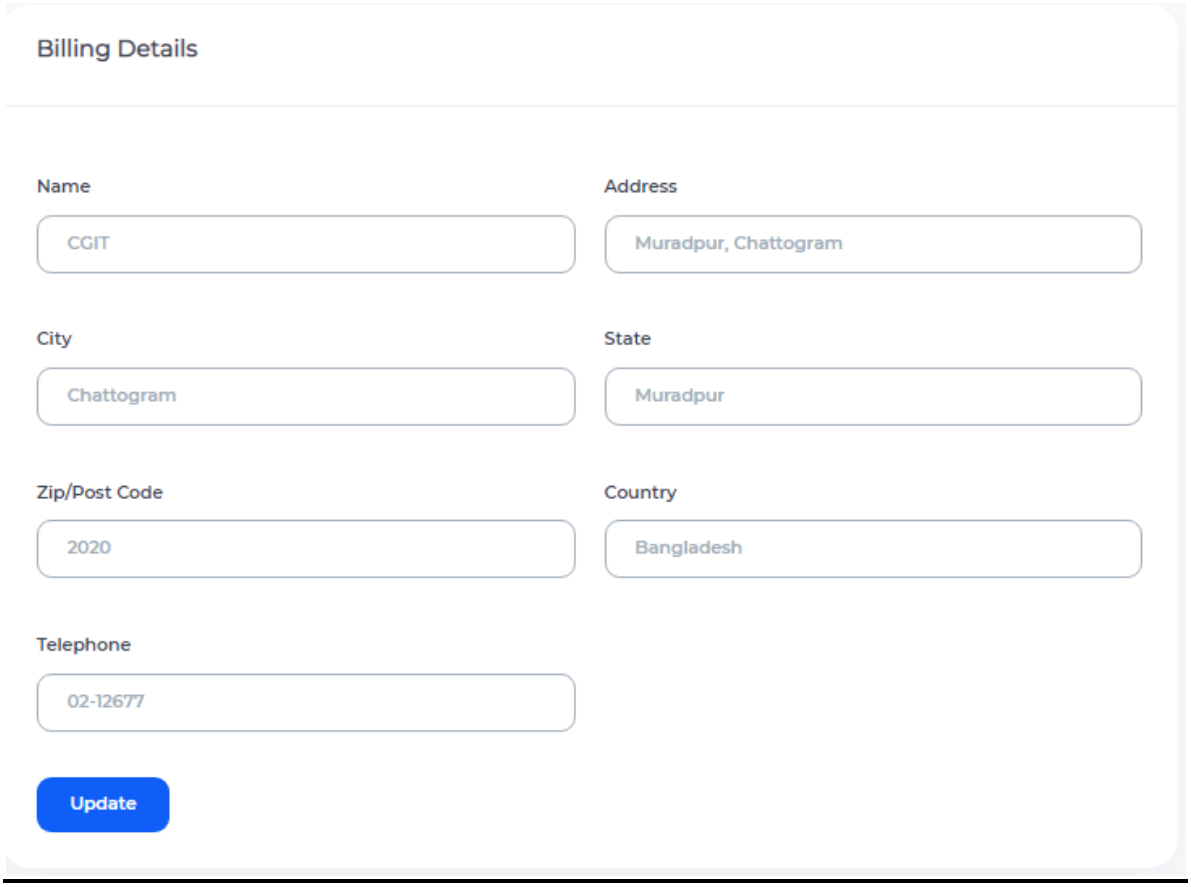
You can change the site logo and workspace name from here.



Task Stages

Navigation path: Workspace Settings -> Task Stages

You can create a task level, and create and edit it.

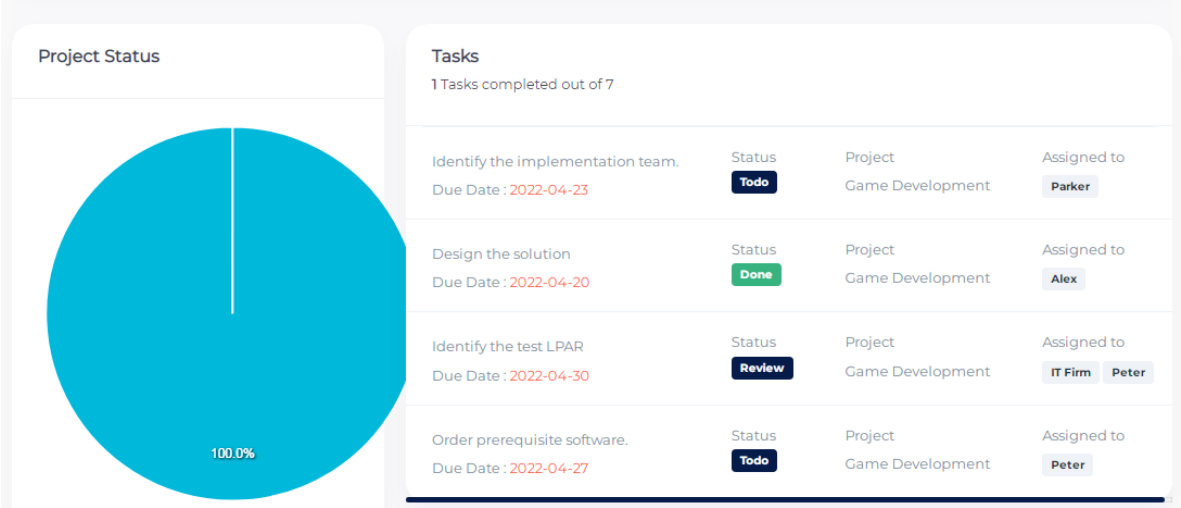


Billing Address

Navigation path: Workspace Settings -> Billing

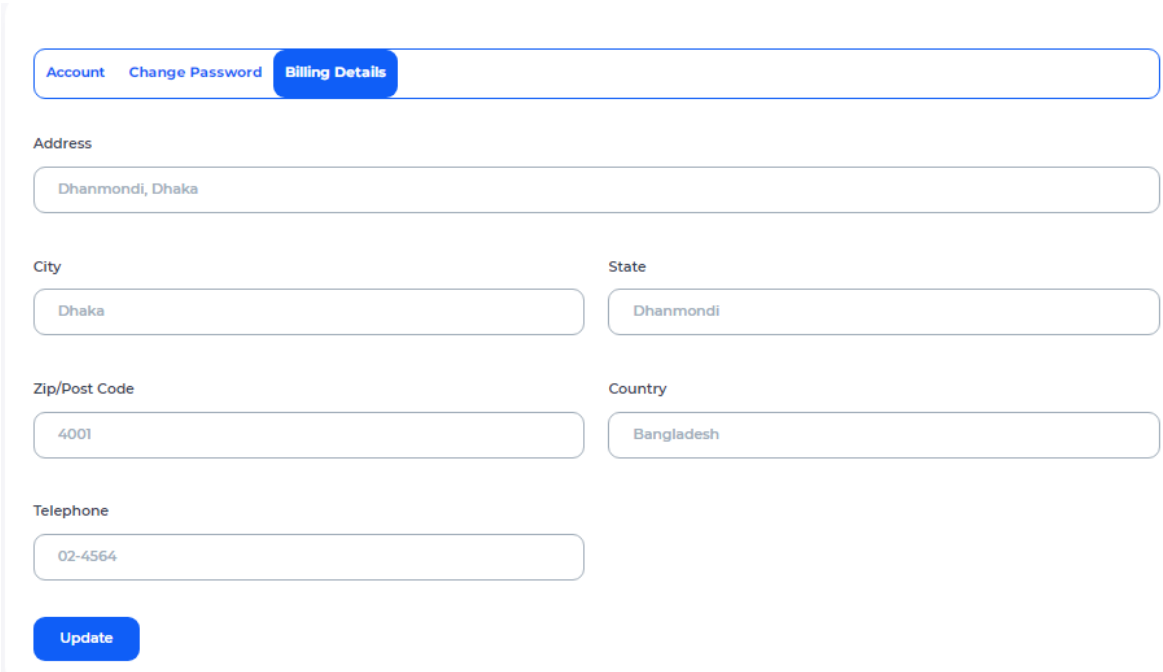
You can update billing details and save them.

Client's Dashboard:



This is the client's dashboard.

Client's Profile:



CHAPTER 7

TESTING

7.1 TESTING

Testing means the process of analyzing the software item to detect the differences between existing or required conditions and evaluate the features of the software items. Before the software is released, it must be thoroughly tested using numerous test cases and modes to ensure that it is bug-free and consumes the least amount of space and time possible. The test cases were chosen ahead of time, with expected outcomes specified and actual outcomes recorded for comparison. The selection of test cases is done vide the “White Box Testing” technique to check the internal programming logic and efficiency and vide the” Black Box Testing” technique to check software requirement fulfillment to find the maximum number of errors with minimum effort and time. Although test cases are design by considering the Cyclomatic complexity(CYC), conditional test, still the software code is not in its optional form, as all other possible alternative parts in the software are not considered. At the integration level, the software will be passing third-party tests which would further enhance the software’s optimality and efficiency.

TEST CHARACTERS:

1. A good test has a high probability of finding an error.
2. A good test is not redundant.
3. A good test should be “best of breed”.
4. A good test should be neither too simple nor too complex.

BLACK BOX TESTING:

A software testing technique that is essential for software testing. The testers performing black box testing do not know the internal design and have no access to the source code. Only the system architecture is known to the tester. This technique will be used to ensure that the system accepts all required inputs and produces the desired output [18].

The method of Black Box Testing is used by the software engineer to derive the required results of the test cases:

1. Black Box Testing alludes to the test that is conducted at the software interface.
2. A Black Box Test examines some fundamental aspects of a system with little regard for the internal logic structure of the software.
3. A limited number of important logical paths can be selected and exercised.
4. An important data structure can be probed for validity.

The following categories were subjected to black box testing to identify errors: -

- Incorrect or missing functions.
- Graphics error.
- Errors in data in binary format.
- Error in data in an integer format.
- File error.
- Pointer error.
- Memory access error.
- Variable error.
- Performance error.

WHITE BOX TESTING:

White box testing is a software evaluation technique that looks at the software's internal structure, design, coding, and inner workings. Developers utilize this testing method to ensure that inputs and outputs flow smoothly across the program, boosting usability and security. The notion is known as a "white box" since the code is visible to the tester during the examination [19**].**

Glass Box Testing is another name for White Box Testing. The software engineer can create the following test cases using White Box Testing methods:

1. Guarantee that all independent paths within a module have been exercised at least once.
2. Exercise all logical decisions on their true and false sides.
3. Execute all loops at their boundaries and within their operational bounds.
4. Exercise internal data structures to ensure validity.

The following issues were addressed during White Box Testing: -

- The number of input parameters is equal to the number of arguments.
- Parameters and arguments attribute to match.
- The number of arguments transmitted is called modules equal to attributes of parameters.
- The unit system of argument transmitted is called modules equal unit system of the parameter.
- Several attributes and order of arguments to build in functions correctly.
- Any references to parameters are not associated to build functions correctly.
- Input-only arguments altered.
- A global variable definition is consistent across the module.
- Files attribute correctly.

7.2 **TEST PLAN**

Testing is the process of examining a software item to determine the difference between the current and required permissions and to assess the software item's functionality. Different levels of testing begin once the test plan is complete and the test cases are fully defined.

- **UNIT TESTING:**

  Unit testing is performed to test the validity of the individual units. This is done in the coding phase with interactive testing.

- **INTEGRITY TESTING:**

  When the development of all the units or modules is completed and integrated the integrity test phase is started. In this phase, the interface between the modules is tested.

  Result: The test is successful.

- **SYSTEM TESTING:**

  The system testing phase incorporates performance stress testing to meet the product criteria concerning the desired benchmarks.

  Result: The entire system was put through its paces in terms of security, flexibility, error recovery, and efficiency. The test was successful.

- **VALIDATION TESTING:**

  To ensure that the requirements were met, tests were carried out. All functional needs were met through the development of plans and processes. The software was alpha-tested.

There are two goals in preparing test plans. Firstly, a properly detailed test plan demonstrates that the program specifications are understood completely. Second, the test plan is utilized during program testing to demonstrate the program's correctness.

Load Testing:

The performance of a software program is tested during load testing, a non-functional software testing procedure, under a predetermined expected load. It determines how the software program functions when several users are using it at once. Before a software application is deployed, load testing aims to reduce performance bottlenecks and ensure its stability and seamless operation.

I have load-tested my website on dotcom-monitor.com and the result is shown below:

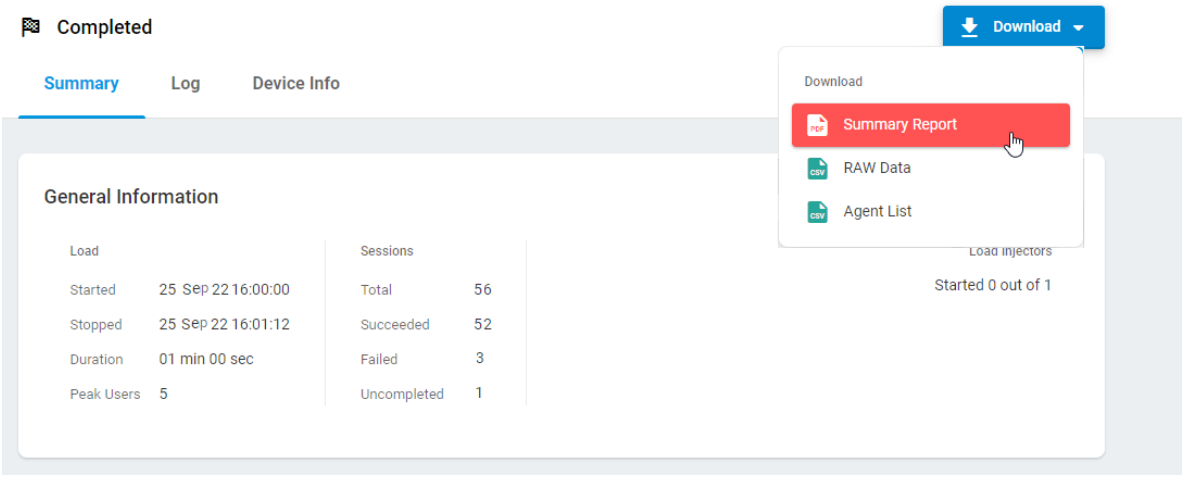


Fig 7.1: Load Test Report

The load test reports include the following section: Summary, Log, and Device Info. The Raw Data reports contain statistics on Start Time, Duration, Connection Time, First Packet time, and the other test parameters in the CSV file.

CHAPTER 8

PROJECT MAINTENANCE

8.1 Project Maintenance

Project maintenance is the post-implementation support to the client side from the developer's end. The development team is bound to give support and present at once at the time of need arises.

- Only 20% of the maintenance is spent on "fixing mistakes" and the reset 80% is for adapting existing systems to change in their external environments, making enhancements requested by the users, and reengineering an application for future use.
- When maintenance is considered to encompass all those activities, it is relatively easy to see why it absorbs too much effort.
- Maintenance is of –

    1. Corrective Maintenance
    2. Adaptive Maintenance
    3. Perfective Maintenance or Enhancement
    1. Preventive Maintenance or Reengineering.

We can suggest the maintenance metrics i.e. Software Maturity Index (SMI) that indicate the stability of a software product (based on changes that occur for each release of the product).

CHAPTER 9
CONCLUSION

9.1 CONCLUSION

While developing the system, a conscious attempt was made to construct and develop a software package that would generate a proper TASK MANAGEMENT SYSTEM using available tools, methodologies, and resources.

The system was designed to be as user-friendly as possible. As a result, it is reasonable to expect that the system will be acceptable to all users and will sufficiently meet their requirements.

The merits of this project are as follows:

- This project allows users to input data using straightforward and interactive forms. The client may enter the needed information with ease, which is quite beneficial.
- The user is primarily more concerned with the accuracy of the data he is submitting. Every step of every new creation, data entry, or modification is checked so that the user cannot submit erroneous data, which could cause issues in the future.
- Because data is kept methodically and in a single database, data storage and retrieval will be quicker and simpler to maintain.
- Faster information processing would considerably improve decision-making because it would take much less time to acquire data using a computer than a manual system.
- Through these characteristics, efficiency, accuracy, and transparency will all be improved.

9.2 **Future Enhancement**

- I want to include a chat feature in the future so that people may simply communicate with one another.
- I will add more features in response to user requests.
- No website has ever been deemed complete indefinitely because there are constantly new requirements that are increasing daily.

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