PROJECT MANAGEMENT TOOL

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***Abstract*— Project management tools are aids to assist an individual or team to effectively organize work and manage projects and tasks. The Global Pandemic which was faced recently contributed to the need to manage and collaborate with the team virtually.**

This paper proposes the various features of the project management tool for teams of various sizes and its need in planning, collaboration and evaluation. It also delves into the design and infrastructure of a working prototype of a management tool consisting of various features for collaboration, sharing and management of various tasks.

***Keywords* — management tools, collaboration tool, project management, project management software**

I. INTRODUCTION

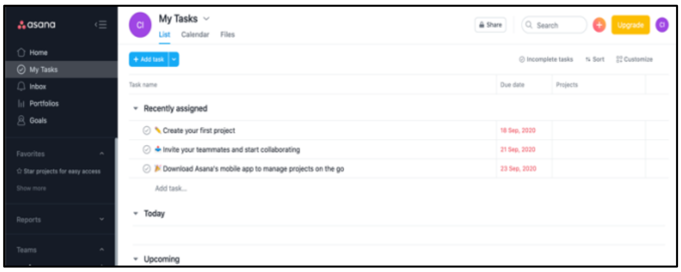
The Global Pandemic which affected the world during the start of 2020 and continued for months, changed the dynamics of working in offices. Estimates suggested around 64 percent of employed Americans worked from home during this crisis and preferred working from home, according to research conducted by SHRM's COVID-19 Business Index [1]. The need to collaborate virtually and to manage the teams over the internet led to the creation of this tool.

This application not only provides tools for virtual collaboration and communication of team members but also provides other features like planning and scheduling of tasks, sharing of documentation and evaluation of the work done by every team member. Project Management tools will need advanced features to track projects at a higher level to see how each project is interacting with each other. This tool can include flexible work views, Dashboard, Calendar and Task Reporting, Chat functions, Repositories, Timesheets which also creates a central workspace and knowledge base for communication and tracking.

II. LITERATURE REVIEW

The purpose of this literature review was to examine the research conducted within the field of project management to identify the most successful tool and methods for managing them. This will add to the body of project management knowledge and be useful for developing suggestions for areas of further research. The focus of this research study was on the effectiveness of project management, not the success of a product completed during a project.

Currently, few of the available options for project management tools are applications like Asana, Trello, Monday.com, etc., even though these web applications effectively serve their purpose it does fall short as the team expands beyond a few people. Also, pricing structure and the upfront cost of the tool are one of the main reasons users cite for seeking an alternative tool. Also, most of the small companies wants and affordable tool which is easy to understand and use. Fig 0.1 shows the dashboard asana which shows it might not be as easy to use.



Task name	Due date	Projects
Recently assigned		
Create your first project	18 Sep, 2020	
Invite your teammates and start collaborating	21 Sep, 2020	
Download Asana's mobile app to manage projects on the go	23 Sep, 2020	
Add task...		
Today		
Upcoming		

Fig 0.1 Asana Tool

III. PROJECT REQUIREMENTS

We aim to develop the Project Management Tool which helps in assisting an individual, team or organization to effectively organize work, projects and tasks. This tool will have advanced features to track projects at a higher level in order to see how each project is interacting with each other.

A. Functional Requirements

1) ***User and Session management and Hosting task content*** – User Management is a must requirement as there are 3 major personas involved in this project. All the 3 personas have different roles like manager, team member and Client and based on the role there will be slight variations in the dashboard. The manager should log in to the system to create new projects and to assign different tasks to the team members. Based on the need of the project timeline and the criticality of the tasks, he should assign a finish date to the task so that the team member can complete the assigned task in the given timeframe. He can also grant access levels to the team members. Team members should log in in order to view their respective assigned project tasks along with deadlines, prioritize and completed the assigned task and update the task status. Clients should be able to view the tasks and their timelines along with the progress of the project. All the team members should also have access to other modules on the dashboard like the chat function, the repository, calendar, etc.
Sessions should be managed correctly so that the state of the work assign is maintained along with other updates.

2) ***Chat function*** – Manager, team members and clients should be able to chat with each other regarding their work. To access the chat initially a request needs to be raised to admin from the settings >admin panel. Based on the username and the chat group requested from the user, the admin can add the user to the appropriate group. Once the admin process is done, all the users should have access to Chat Function and communicate with each other and the members of the group to which they have been added.

3) ***Add team members*** – The manager will have the access to new users to the project. He should be able to assign new tasks to the members.

4) ***Update/View Repository*** – Many times, in a project, resources and documents need to be shared. We should have a dedicated repository to store all such documents, media and all other types of resources. The manager and team members should be able to see the documents that are present in the repository and also be able to upload new documents.

5) ***Settings*** – Users should be able to view and update the profile and also can customize the page. There should also be a separate module in the settings to raise a ticket to the admin. This module can be used to contact the admin.

6) ***FAQ*** – A FAQ page is maintained to answer the frequently asked questions. This page can be customized to include the questions based on the type of projects or the needs of the company/project.

B. Technical Requirements

1) This web application for Project Managementwill have cross-browser support and be responsive.

2) For the development of this web application, we will use ReactJS for the frontend User Interface.

3) For the database SQLite3 which is an integratedexecutable with Python will be used.

4) For the backend we will use the Python-Django framework.

C. Usability Requirements

1) This web application will be functional in allthe major web browsers.

2) This web application will be user-friendly, having a simple user interface so

that it is easy to understand and convenient to work on.

3) Client /server validation will be implemented.

4) Dashboard view based upon the role of the userfor Manager and User/Clients will be implemented.

Below is the process flow diagram for the project.

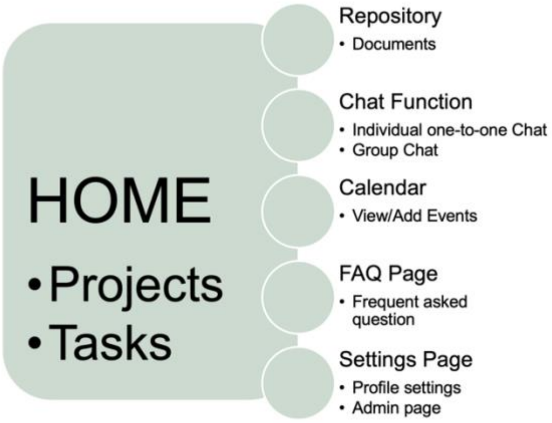


Fig .1. The Process diagram

IV. ARCHITECTURE

Our implementation of the Project management tools application architectures frontend, backend and database. The technologies used on the frontend anddatabase are as follows:

1) ***Frontend**:* HTML5, CSS3, and JavaScript are the languages interpreted by client machines. The web pages delivered to client browsers follow these standards. On the client-side, we use ReactJS which are JavaScript libraries. All modern browsers supporting HTML5 can view the Project Management Tool web application.

a) ReactJS React [2] (also known as React.js or ReactJS) is an open-source, front end, JavaScript library[3] for building user interfaces or UI components. React is a very simple and lightweight library that only deals with the view layer. It has a component-based structure that has its own state and can be used for complex UIs.

In addition to providing reusable React library code which helps in saving the development time and cutting down on the chance for coding errors, React comes with two key features which makes it more appealing for JavaScript developers:

JSX: JSX (short for JavaScript eXtension [4]) is a React extension that makes it easy for web developers to modify their DOM by using simple, HTML-style code. It provides a way to structure component rendering using familiar syntax. And—since React JS browser support extends to all modern web browsers—JSX is compatible with any browser platform you might be working with.

Virtual DOM: This is regarded as one of the greatest advantages of React in comparison with mature frameworks, including AngularJS.

The Virtual Document Object Model or Virtual DOM (like the name implies) is a copy of the site’s DOM, and React JS uses this copy to see what parts of the actual DOM need to change when an event happens (like a user clicking a button) and selectively updates that section of the DOM only. This selective rendering helps in providing a major performance boost, as it saves the effort of recalculating the CSS style, layout for the page and the rendering of the entire page.

Database: We are using SQLite3 for the database. SQLite is a relational database management system (RDBMS) contained in a C library

that provides a lightweight disk-based database that doesn’t require a separate server process and allows accessing the database using a nonstandard variant of the SQL query language [5]. SQLite is not a client–server database engine. Rather, it is embedded

into the end program. SQLite is designed to be integrated directly into an executable. This eliminates the need for an external library. The entire database engine is integrated into whatever application needs to access a database.

The only shared resource among applications is the single database file as it sits on disk. If you need to move or back up the database, you can simply copy the file.Fig.2. shows the SQLite infrastructure.

Some applications can use SQLite for internal data storage. It's also possible to prototype an application using SQLite and then port the code to a larger database such as PostgreSQL or Oracle.

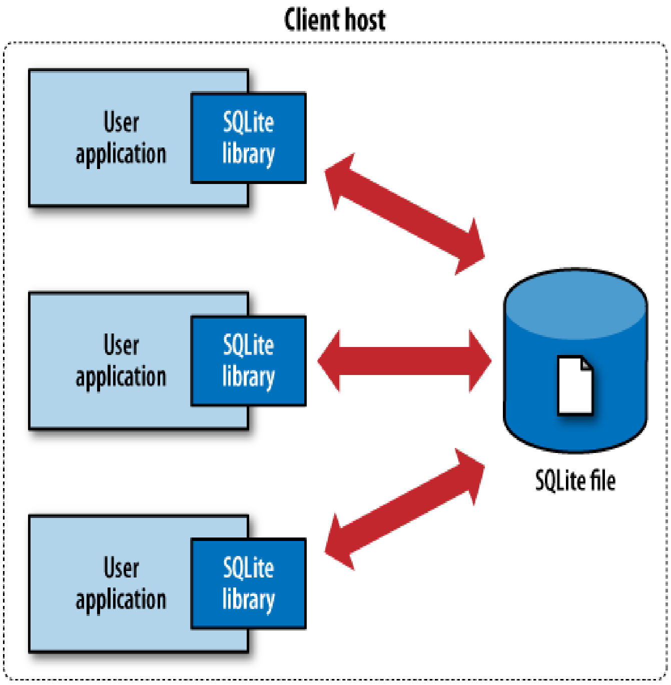


Fig .2. The SQLite server-less architecture.

SQLite is a popular choice as embedded database software for local/client storage in application software such as web browsers. It is arguably the most widely deployed database engine, as it is used today by several widespread browsers, operating systems, and embedded systems (such as mobile phones), among others[6]. SQLite has bindings to many programming languages.

There are a lot of advantages to using SQLite as anapplication file format:

SQLite is a very light weighted database, so it is easy to use it as an embedded software with devices like televisions, Mobile phones, cameras, home electronic devices, etc.
Reading and writing operations are very fast, as it only loads the data which is needed, rather than reading the entire file and holding it in memory. Also, if you edit small parts, it only overwrites the parts of the file which were changed.
Queries are smaller in SQLite than equivalent procedural codes, so the chances of bugs are minimal.
It can be used with all programming languages without any compatibility issue. SQLite database is accessible through a wide variety of third-party tools.
It reduces application costs.
SQLite can be easily extended in future releases just byadding new tables and/or columns. It also preserves backward compatibility.
SQLite can be integrated with Python using a Python module called sqlite3. Since we are using python as a backend it comes bundled with Python, which reducesthe need to

***Backend**:* For Backend, we are using Python-Django Framework. Django is a high-level Python Web framework that encourages rapid development and clean, pragmatic design.

It is a free and open-source web framework that follows the model-template-views (MTV) architectural pattern[7][8]. It is fast, secure and scalable.
One of the most important goals of Django's is to ease the creation of complex, database-driven websites. The framework emphasizes reusability and "pluggability" of components, less code, low coupling, rapid development, and the principle of don't repeat yourself which is a principle of software development aimed at reducing repetition of software patterns[11].

[9] Python is used throughout, even for settings files and data models. Django also provides an optional administrative interface for creating, reading, updating and deleting that is generated through introspection, dynamically and configured via admin models. Django follows a Model-View-Controller (MVC) architecture, which is divided into three different parts:
The Model, which is the logical data structure behind the entire application and is represented by a database (generally relational databases). The View, which is the user interface — what you see in your browser when you visit a website. These

are represented by HTML/CSS/JavaScript files.

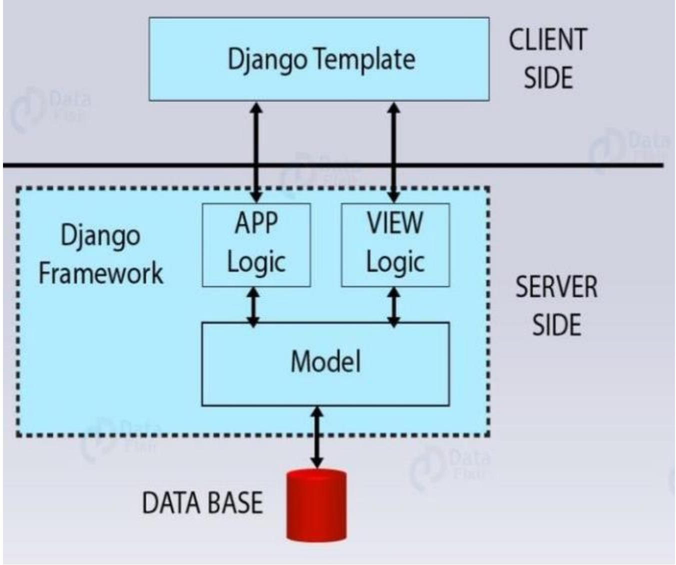


Fig. 3. Django Framework

The Controller, which is the connector that connects the view and model together, meaning that it is the one passing data from the model to the view. It consists of an object-relational mapper (ORM) that mediates between data models (defined as Python classes) and a relational database (Model), a system for processing HTTP requests with a web templating system (View), and a regular-expression-based URL dispatcher (Controller).

With MVC, the application will revolve around the model—either displaying it or manipulating it.

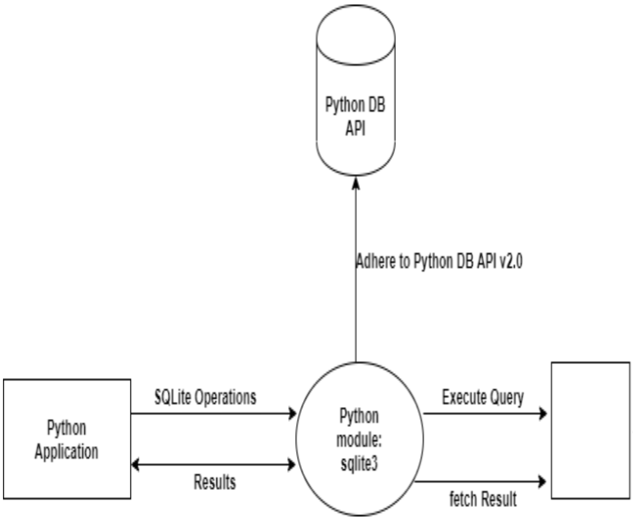


Fig. 4. SQLite in Python

Why React for Frontend?

During the planning phase of the project, there were two options for the frontend design -Angular and React. Both seemed liked good options. But on further research, we realized AngularJS comes with an extremely fixed and complex structure. React, on the other hand, offered a simple way of developing component trees with codes that are readable and logically structured. React framework also provided the freedom to choose the tools, libraries, and architecture for developing an app, which helped us to build a highly customized app using only the features and tech stack we required. These advantages and the popularity of React led us to choose React over Angular for the Frontend of our Project.

Why Python-Django framework?

When initially searching for a web application framework, we wanted to use an application that would be easy to use, simple and secure. Django framework provided with all such features and more. It provided us with documentation for real-life applications. It included databases and templates and cross-platform access The official project site [12] describes Django as “a high-level Python Web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of Web development, so you can focus on writing your app without needing to reinvent the wheel. It’s free and open source.” This was one of the main reasons to choose Django as it eliminated the need to install external databases and libraries and the complex process of setting and integrating them. It can also be easily used with React which was our choice for the front end.

V. ENTITY RELATIONSHIP DIAGRAM

An Entity-Relationship (ER) Diagram is a type of flowchart that shows the relationship between the entity sets stored in a database. An entity set is a collection of similar entities. These entities can have attributes that define their properties [10].

An ER diagram is a means of visualizing how the informationa system produces is related.

For a Project Management application, the four main tables or entities are the User which will store the user information mostly used for logging, the role which will categorize the user, the Project and the Task which are assigned to the User.

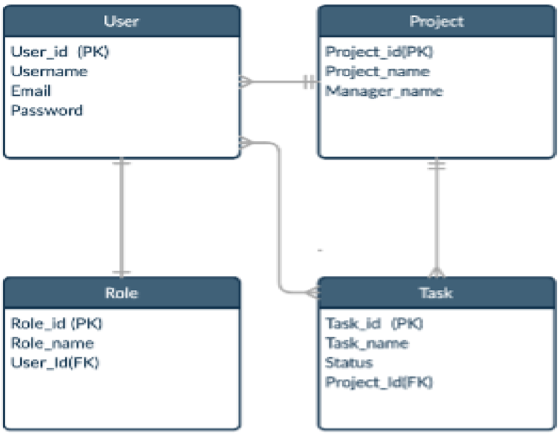


Fig. 5. E-R Diagram

VI. ADVANTAGES

It is beneficial for all companies that manage projects, regardless of organizational size or industry.

Any company that needs an effective method for estimating, planning, tracking can benefit from adopting this software.

Allows you to create, implement, and manage efficient and optimized processes for all areas of team and business.

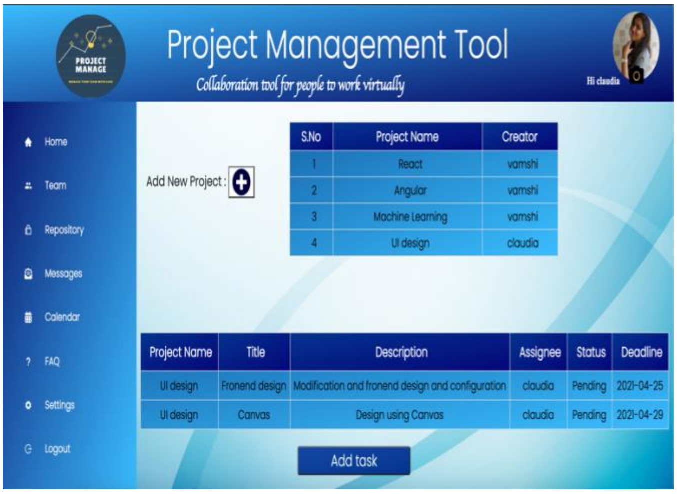
It creates a central workspace and knowledge base for communication and tracking.

It helps team members to coordinate tasks and automatethe workflow.

VII. PRODUCT RESULTS

We have done user Authentication and Login, Dashboard, chat messages, calendar, repository, Task and Project page for assigning of tasks and projects based on the personas, settings page, chat bot admin page to raise tickets etc.

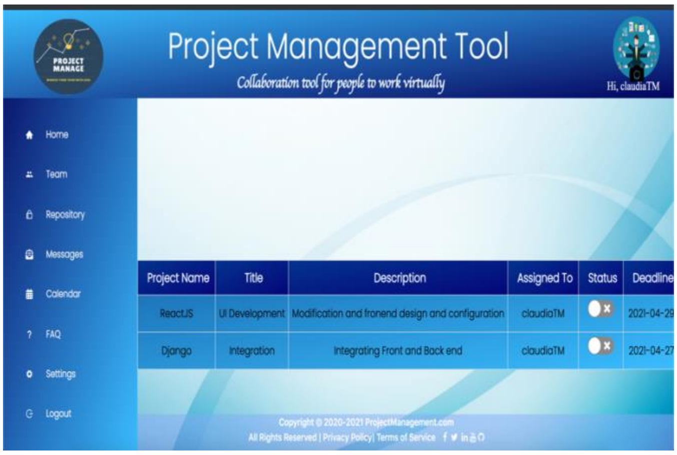
The manager will be able to create Project and assign tasks to the team members. Every task has a deadline which then reflects in the calendar of the person to whom the task is assigned. Fig 6 shows the dashboard page for Manager where we can see that Manager has provision for creating new projects and assigning tasks to the team members. Fig 7 on the other hand shows dashboard page for team member where only the tasks assign to them are visible.



S.No	Project Name	Creator
1	React	vamshi
2	Angular	vamshi
3	Machine Learning	vamshi
4	UI design	claudia

Project Name	Title	Description	Assignee	Status	Deadline
UI design	Fronend design	Modification and fronend design and configuration	claudia	Pending	2021-04-25
UI design	Canvas	Design using Canvas	claudia	Pending	2021-04-29

Fig. 6. Project Dashboard Page of Manager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Project Name	Title	Description	Assigned To	Status	Deadline
ReactJS	UI Development	Modification and fronend design and configuration	claudiaTM	○✕	2021-04-29
Django	Integration	Integrating Front and Back end	claudiaTM	○✕	2021-04-27

Fig. 7. Project Dashboard Page of Team Member

Fig 8 shows the calendar functionality. The Calendar shows all users and managers the upcoming events for the tasks created and the corresponding deadlines.

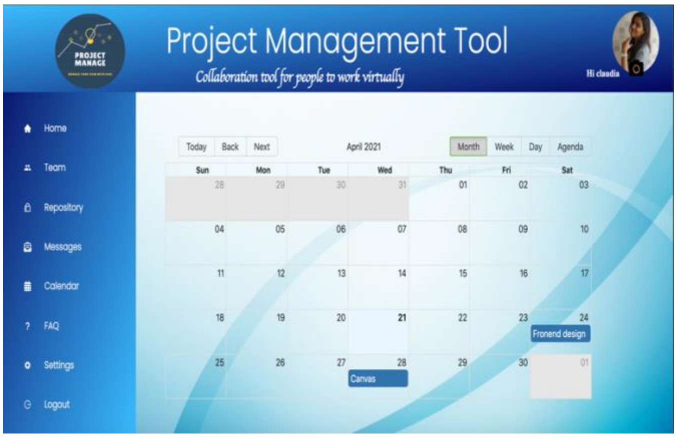
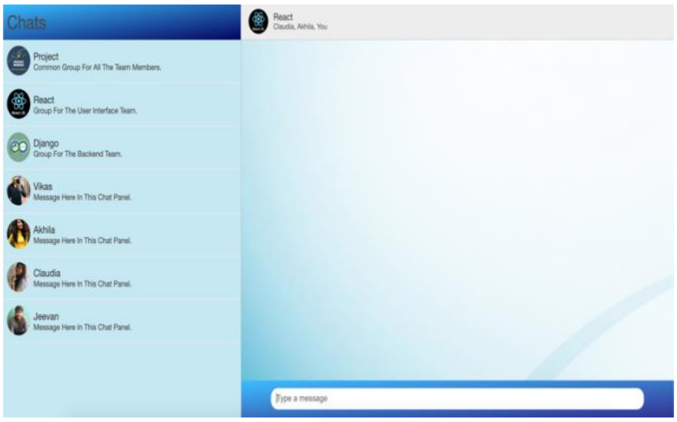


Fig. 8. Project Calendar Page

The Chat functions help the team members communicate with each other. Fig 9 shows the Chat Box functionality.



Project
Common Group For All The Team Members.

React
Group For The User Interface Team.

Django
Group For The Backend Team.

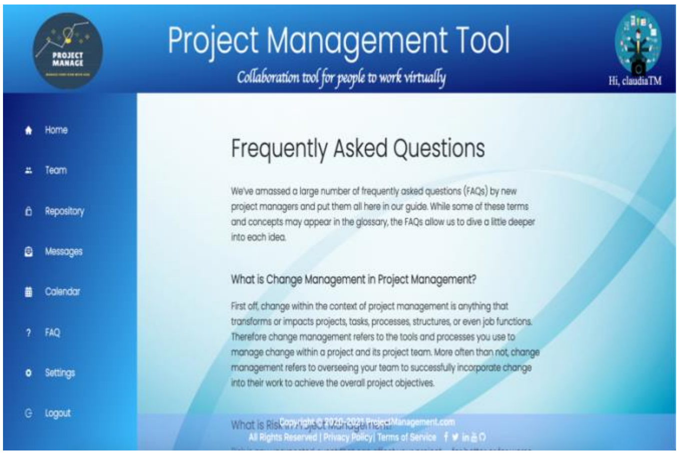
Vikas
Message Here In This Chat Panel.

Akhila
Message Here In This Chat Panel.

Claudia
Message Here In This Chat Panel.

Jeevan
Message Here In This Chat Panel.

Fig. 9. Project Chat Box Page



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Frequently Asked Questions

We've amassed a large number of frequently asked questions (FAQs) by new project managers and put them all here in our guide. While some of these terms and concepts may appear in the glossary, the FAQs allow us to dive a little deeper into each idea.

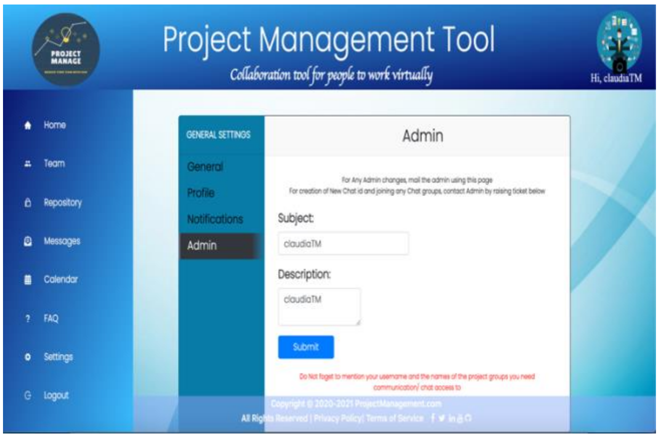
What is Change Management in Project Management?

First off, change within the context of project management is anything that transforms or impacts projects, tasks, processes, structures, or even job functions. Therefore change management refers to the tools and processes you use to manage change within a project and its project team. More often than not, change management refers to overseeing your team to successfully incorporate change into their work to achieve the overall project objectives.

What is Risk in Project Management?

Fig. 10. FAQ Page

The setting page helps to view and update the profile. As seen in Fig 11, we also have a module to raise tickets to the admin when in need.



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Profile
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Admin

For Any Admin changes, mail the admin using this page
For creation of New Chat id and joining any Chat groups, contact Admin by raising ticket below

Subject: claudiaTM

Description: claudiaTM

Do Not foget to mention your username and the names of the project groups you need communication/ chat access to

Fig. 11. Project Setting Page

The Repository can be used to share documents and upload and download of the files. Resources can be shared and stored making collaboration between team members possible.

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Fig. 12. Project Setting Page

VIII. CONCLUSION

We have successfully created a Project Management Tool, with advanced features, like chat, calendar, repository, etc. which helps in collaboration between team members possible and effective management of the Project.

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