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 American 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 in order to see how each project is interacting with each other. This tool can include flexible work views, Dashboard, Reporting, 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 is one of the main reasons users cite for seeking an alternative tool.

III. PROJECT REQUIREMENTS

Our aim is 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 management*** – Team members should log in in order to view their respective assigned project tasks along with deadlines and update the task status. Manager should log in to the system to assign different tasks to the team members. He can also grant access levels to the team members. Clients should be able to view the tasks and their timelines along with progress of the project.
2) ***Hosting task content*** – Manager should be able to create/delete/update tasks and assign them to team members. Team members should be able to see the assigned tasks and update the status of tasks and clients should be able to see the tasks along with the status.
3) ***Posting announcements*** – Manager should be able to post announcements visible to all of their team members.
4) ***Chat function*** – Manager, team members and clients should be able to chat with each other regarding their work.
5) ***Update/Delete team members*** – Manager will have the access to add or delete the users to/from the project.
6) ***Update/View Repository*** – Manager and team members should be able to see the documents that are present and also be able to upload new documents.
7) ***Settings*** – Users will be able to update the profile and also can customize the page.

B. Technical Requirements

1) This web application for Project Management will 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 database SQLite3 which is an integrated executable 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 all the major web browsers.
2) This web application will be user friendly, with a simple user interface so that it is easy to work on.
3) Client /server validation will be implemented.
4) Dashboard view based upon the role of the user for Manager and User/Clients will be implemented.

IV. ARCHITECTURE

Our implementation of the Project management tools application architectures frontend ,backend and database. The technologies used on the frontend and database 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 which 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.

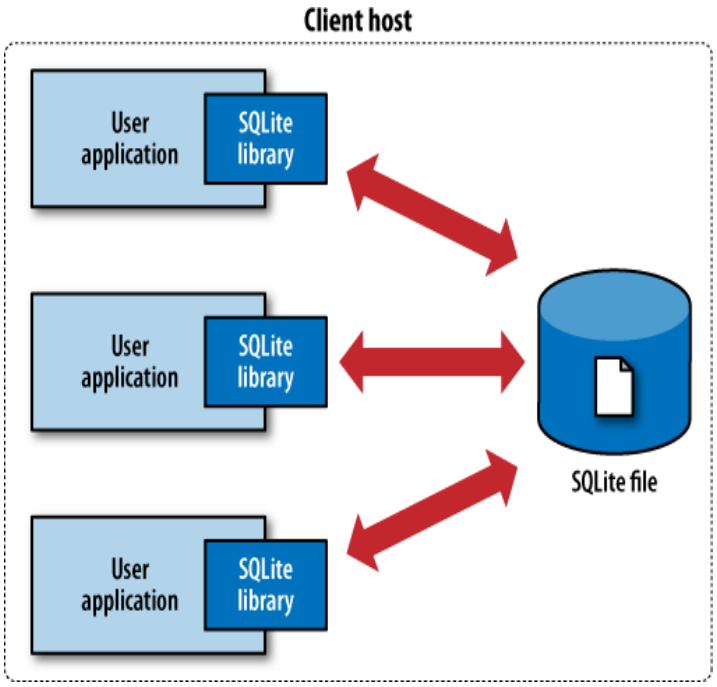

Fig .2.The SQLite server-less architecture.

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.

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 use SQLite as an application 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 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 cost.
SQLite can be easily extended in future releases just by adding new tables and/or columns. It also preserves backwards 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 reduces the 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].

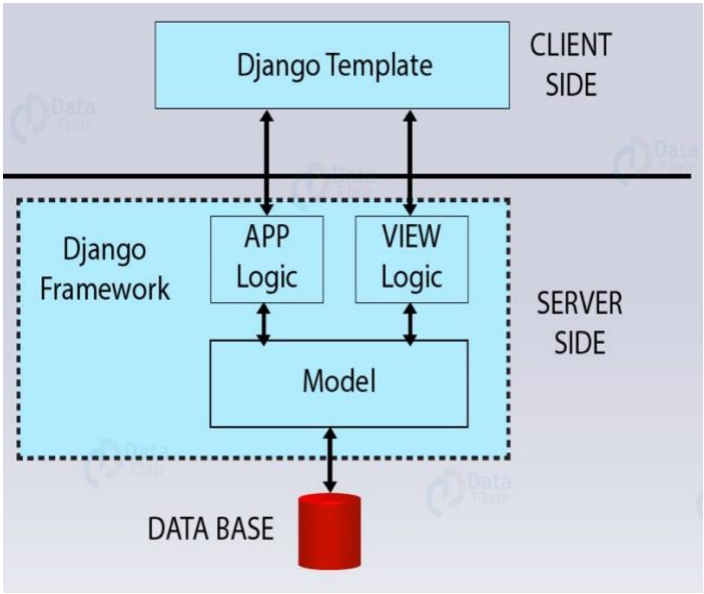

Fig. 3. Django Framework

[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.
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.

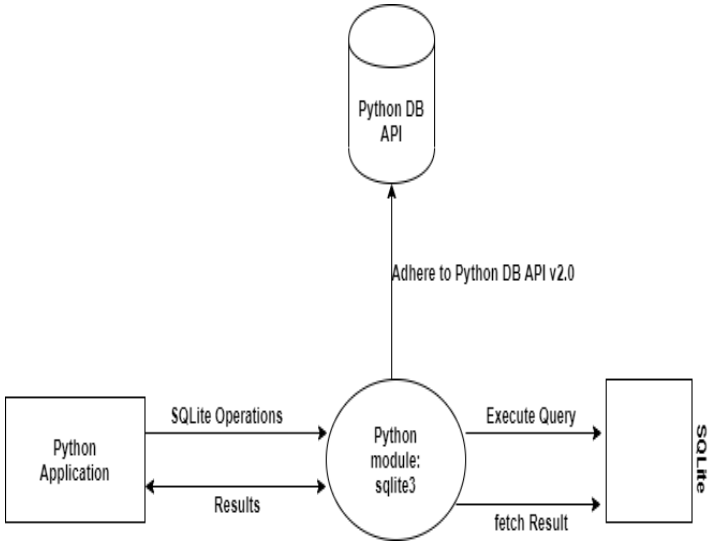

Fig. 4. SQLITE in Python

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.

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 its properties [10]. An ER diagram is a means of visualizing how the information a 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.

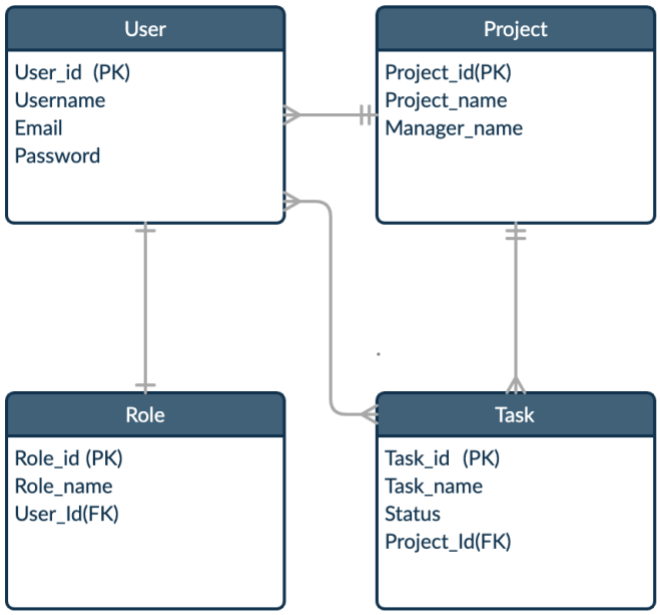

Fig.5. ER diagram

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 automate the workflow.

VII. PRODUCT RESULTS

So far we have done the user Authentication and Login and some HTML pages for the Dashboard. Manager will be able to create, update and delete all tasks for the team members. Calendar was done where all users and manager can access the events for the tasks created. Manager can be able to add timelines to the tasks created.

Resources can be shared and stored making collaboration between team members possible.

VIII. CONCLUSION

We have successfully created a Project Management Tool, with advanced features , where we can add Projects and Tasks and track the progress of all the team members.

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