

Easify: Scrum-based Project Management Web Application

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Abstract - In today's world, technology plays an important role and its role will increase with every passing year. Application to manage projects can be seen as a solution to today's world. As projects can be classified and can be solved in the real world, apps can solve each level whether it is developer, scrum master, product owner, and all types of posts in the real world. The number of applications will increase but the managing project in a systematic way is not possible. There are many applications which is a better way of managing the project. The main aim of the application is to fulfill users' needs and also fulfill the person who is at the post in the office.

This paper offers a solution to the previous project management tool. Our application Easify offers a web-based application to manage scrum or agile-based projects easily and effectively. This application offers users to create their projects and product backlogs, share the project work with other members and manage the project by prioritizing the work. When our application will come to the modern world, then this application will strive for efficiency, speed, and convenience to use for real-life people.

Keywords - Project Management, Computer Science, Scrum-based project, Web application using React, Management tool

I. INTRODUCTION

Easify is an application that has arisen in really difficult times for people who were with family and want to work from home. The idea behind this creation was simple and straightforward and it was for the people who

are using agile methods and who want to take all details of all the products and also manage the team. In these difficult times, people have to take care of their personal and professional life. For that, they have to manage time and for that reason may be coming to the office may not be possible for the product owner, scrum master, developers or any other person. Keeping this in mind, why waste time? To avoid time wastage, we as the team decided to go with the idea of going with this application keeping in mind of all posts and all functionalities will be present.

Thus Easify is an application that has many components or functionalities to manage scrum-based projects. Easify starts with the login page. After successful login or registration, the application redirects the user to Home Page. From here, users can navigate through different pages and see their projects and work. To effectively manage the projects, Easify has different functionalities and web pages like a product backlog page where the product owner can create a backlog and list out the product requirements, a sprint page where the scrum master can create sprint and sprint backlog so that the development team can work accordingly, resource sharing feature so that developers can share the images of their work, chatting feature to interact with each other within the application so that product owner, scrum master and developers can see the discussions at one place, etc. Easify will built-in React Js. We are using React Js as our front-end part of the application. Laravel is our backend system to store all the user data and project data.

There will be sections further discussed. The next section will be a literature overview of the current system and our proposed system. The next section will be product requirements where we explain all the features in detail. The

following section will be an explanation of the tools and technologies which we are using in this project. Then there will be a section for the results of our applications. The last sections will be the conclusion and the references.

II. LITERATURE REVIEW

In the current world, the ongoing system is the person of all posts like product owner, scrum master, developers, or any other users have to do meetings in order to discuss project requirements. They have to manage each other's time. The product owner has to explain all requirements of the product to his colleagues. The team have to do weekly and daily scrum meetings where the scrum master and development team had to meet and tell the progress and problems faced and also discussed how to solve them.

Seeing the current world situation there have been some applications that can solve this problem, for example, Jira, Azure DevOps and other tools.

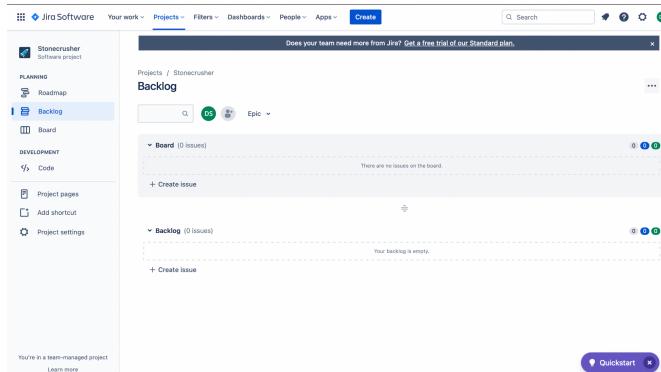


Fig. 1 Screenshot of Agile board in Jira

Jira Software is a website that offers users to manage two types of projects one is agile and another is kanban projects. The users can select anyone. After creating a project, Jira allows users to make backlogs or features. The users can add tasks with three different categories - user story, task, bug. The users can add these tasks to their sprint backlogs. Jira allows users to set the priorities of the tasks and also set the due date for the project. Jira has a feature to share projects with other Jira users. It also provides us with the functionalities of the

creation of a burndown chart to predict the efforts of the team. Using Jira, users can create a timeline for their projects, so that they can schedule the project and work accordingly[1].

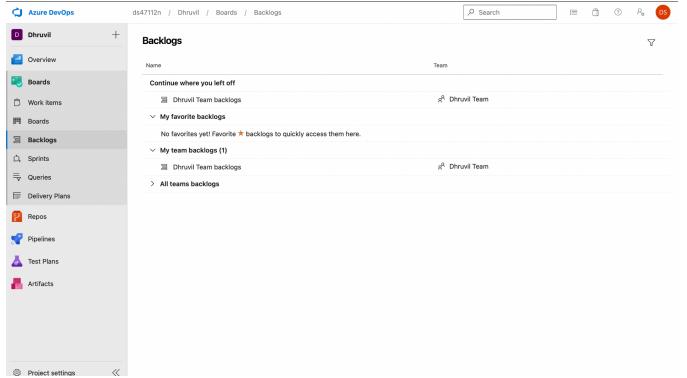


Fig. 2 Screenshot of Azure DevOps

Azure DevOps Server is a website as well as a PC application. It only offers to manage agile projects. The users can make their projects public or private. After creating a project, it gives us the dashboard which shows boards, backlogs, sprints, repos, pipelines and test plans.[2] The users can create backlogs and sprints on their board page. The board page has three different columns. Azure DevOps allows users to make test plans and progress reports. As it is a cloud-based service then it can be connected to GitHub repositories and users can also pipeline data.

III. PRODUCT REQUIREMENTS

Our goal is to develop a project management tool where users can manage their scrum-based projects easily and effectively. The application starts with a login page, users can login using their credentials. If they do not have an account, they can register themselves in order to use this application. After the successful login, user can see their home page. They can navigate to different pages like my-project page, shared project page, profile page, etc. The users can create new projects and product backlogs to list out the product functionalities. To manage the project, Easify has a few different pages like a product backlog page, sprint page, resource sharing page, chart page, chat page, project settings page, etc. Each of these pages and functionalities is described below.

- 1) *Register* - New users should be able to register with a new email id and create his/her account in order to use the different functionalities of Easify. Register Page will ask for name, email, password and confirm password. After all the checklists and validations are successful, the user will navigate to the Home Page.
- 2) *Login* - Easify application starts with the Login Page. Registered users should be able to login with their true credentials. After the successful login user will navigate to the Home Page and access his/ her data.
- 3) *Logout* - If any Easify user wants to end his/ her session, he/ she can do that using the Logout feature.
- 4) *Home Page* - The Home Page or Welcome Page is the main page of Easify. After the login, each user redirects to Home Page. The Home Page will show the welcome greetings and recently created or shared projects so that user can directly access their recent work.
- 5) *Profile Settings* - At some point, every user wants to change their profile settings like profile photo, password, etc. This feature enables Easify users to change or modify their profiles.
- 6) *My Project Page* - The user can access his/her projects, which he/ she created on My Project Page. My Project Page gives the functionality to create a new project. To create a new project, this page will ask for a unique name, his/ her role in the project and a project profile photo which the user can select from a personal device.
- 7) *Shared Project Page* - The user can access all the projects those are shared with him/ her on Shared Project Page. Clicking on any project, this page will redirect to the Product Backlog Page, which is the default screen of the project management screens.
- 8) *Project Settings* - Easify is a project management tool and it is possible that at any point, the user wants to change some settings of the project. Any project may have associated with one or more people. From Project Settings Page, user can share the project with other Easify users and also set their roles for that particular project. The user can change the project profile photo and any other settings using this feature.
- 9) *Project Backlog Page* - This is the main page in order to see the product requirements and manage the project. Here, users can add or modify tasks of the product backlog. The users can navigate to the sprint page, sharing page, chart page, project settings page, etc.
- 10) *Sprint Page* - This is the page where the progress of the project is being observed. The users can create sprints and sprint backlogs from this page. They can set the time duration for the sprint and add tasks to the sprint backlog from the product backlog. Scrum Master can set priorities for the tasks and the development team can change the status of the tasks based on their progress.
- 11) *Attachment Page* - Easify provides us a feature to share images of UI or bugs or any other related to the project with other project members. So all can see what others are developing or facing problems. The users can select images from their personal devices. The users can see the image in fullscreen mode. They can also rotate, flip, zoom in & out and download the image.
- 12) *Activity Map Page* - The User Activity Map is used by the team to develop the product based on user activities. Activity Map Page enables users to create the User Activity Map based on their input. The users can also download the activity map to share with others.
- 13) *Calendar* - In every project, the deadline of any tasks or bugs is very important. Based on the deadline or due, the development team can prioritize their work. The calendar Page shows the dates and related tasks list for that project. The users can add or modify any event on any date to notify the team.
- 14) *Chat Page* - The users can see different project groups in which they are involved on Chat Page. The users can send or receive messages and interact with each other. This page enables the Product Owner to give instant feedback or send any important message. Scrum Master and the development team can use this feature to discuss any issues or share their thoughts on any tasks.

IV. METHODOLOGY

A. HTML, CSS, JS

The HyperText Markup Language or HTML is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets and scripting languages such as JavaScript. Cascading Style Sheets is a style sheet language used for describing the presentation of a document written in a markup language such as HTML. JavaScript, often abbreviated JS, is a programming language that is one of the core technologies of the World Wide Web, alongside HTML and CSS. Over 97% of websites use JavaScript on the client-side for web page behavior, often incorporating third-party libraries.

HTML is used to create electronic documents (called pages) that are displayed on the World Wide Web. Each page contains a series of connections to other pages[3]. CSS is used to define styles for our web pages, including the design, layout and variations in display for different devices and screen sizes[4]. JavaScript library or web framework is used as client-side scripting. React Js is an example of the JavaScript library which is created by Facebook and Angular is a JavaScript-based web framework which is created by Google[5]. We have used these along with the React Js as frontend technologies for our web application.

B. Reacts JS

React is a free and open-source front-end JavaScript library for building user interfaces based on UI components. It is maintained by Meta and a community of individual developers and companies. The two main features that make React more than just a library are JSX and Virtual DOMs. React js is fast and simple and is easy to learn.

React is used for building user interfaces. It's used for handling the view layer for web and mobile apps. React also allows us to create reusable UI components. React allows developers to create large web applications that can change data, without reloading the page. The

main purpose of React is to be fast, scalable, and simple[7]. React Js is the main front-end technology for Easify. Using React, we are able to achieve our goals to develop responsive web pages which can route and navigate to one another.

C. PHP

PHP is a general-purpose scripting language geared toward web development. It is a server-side scripting language that is embedded in HTML[8]. It is used to manage dynamic content, databases, session tracking, etc. It is integrated with a number of popular databases, including MySQL, PostgreSQL, Oracle, Sybase, Informix, and Microsoft SQL Server.

D. Laravel

Laravel is a free, open-source PHP web framework, and intended for the development of web applications following the Model-View-Controller (MVC) architectural pattern. It's an entirely server-side framework that manages data with the help of Model-View-Controller design which breaks an application's back-end architecture into logical parts[10]. When it comes to sending routing requests, Laravel is more flexible and efficient. It also allows reverse routing.

Laravel provides an out-of-the-box configuration for the Authentication and Authorization system. It has an expressive beautiful syntax that makes it object-oriented. The Eloquent ORM is Laravel's built-in ORM implementation. Laravel has the best Object-relational Mapper as compared to the other frameworks out there. This Object-relational mapping allows you to interact with your database objects and database relationships using the expressive syntax[11]. We are using Laravel as our backend system for Easify to effectively handles the database and API calls with React Js.

E. AWS S3 Bucket

Amazon Simple Storage Service (Amazon S3) is a service offered by Amazon Web Services (AWS) that provides object storage through a web service interface. It is similar to file folders which are for image storing and sharing and this includes data and

descriptive metadata[12]. Customers create buckets in their regions geographically and then it selects tier and then selects privileges of the object. We can interact with the S3 bucket via the command line, console and also APIs.

AWS S3 bucket is used for the Attachment Feature. Easify users can upload images to the Easify Attachment Page so that whenever they have to fetch images on another system, they can do it easily.

F. AWS Elastic Beanstalk

AWS Elastic Beanstalk is an orchestration service offered by AWS for deploying applications that organize various AWS services, including EC2, S3, CloudWatch, autoscaling, and Elastic Load Balancers. It reduces complexity without restricting choice[13].

We have used Elastic Beanstalk to host our Laravel application (backend system). We can easily deploy and manage applications without thinking of the infrastructure that runs the applications[14]. We just have to upload the application and Elastic Beanstalk handles the details of capacity, load balancing and scaling and also health monitoring of the application.

G. AWS Elastic Beanstalk

RDS is a distributed relational database service offered by AWS. It is a web service running "in the cloud" designed to simplify the setup, operation, and scaling of a relational database for use in applications[15].

This web service is easy to set up, cost-efficient and we can also resize the capacity. One example of a Database is Amazon Aurora which is built in the cloud and also can be compatible with MySQL and PostgreSQL. Amazon Aurora is part of Amazon RDS. We have used RDS with MySQL database for our application[16]. It is connected to our Laravel application which is hosted on Elastic Beanstalk.

H. Scrum

Within project management, Scrum is a framework for developing, delivering, and sustaining products in a complex environment. Scrum helps teams work together[17]. Scrum

encourages teams to learn through experiences, self-organize while working on a problem, and reflect on their wins and losses to continuously improve[18]. Scrum helps in a significant rise in productivity and reduction in time to benefits as compared to the traditional waterfall processes[19]. Through Scrum we can release products to users and as it is iterative so we can incorporate changes very easily. We have used scrum to achieve our complex projects to complete. We have used scrum to facilitate our project.

V. RESULTS

The following figures are the results of our developed pages of Easify.

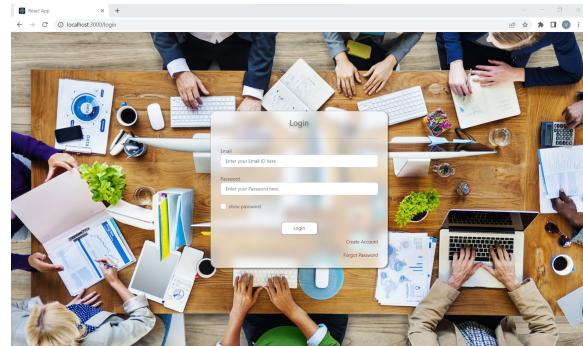


Fig. 3 Screenshot of Login Page

As we can see in the screenshot, on the Login Page, Easify will ask for the email and password of the users. After successful login, this page will redirect users to Home Page.

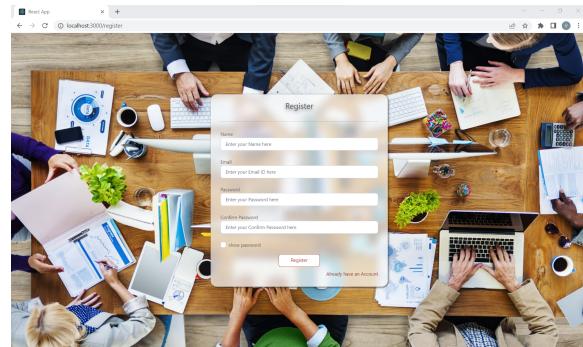


Fig. 4 Screenshot of Register Page

Register Page of Easify will ask for users' personal details like name, email, and new password in order to create an account.



Fig. 5 Screenshot of My Project Page and Logout

On My Project Page, the user can see the projects he/ she has created. This page enables users to create a new project. At the top-right, we can see the logout option. The users can end their session by clicking on logout.



Fig. 6 Screenshot of Shared Project Page

This is a screenshot of the Shared Project Page. The user can see the projects which are shared with him/ her.

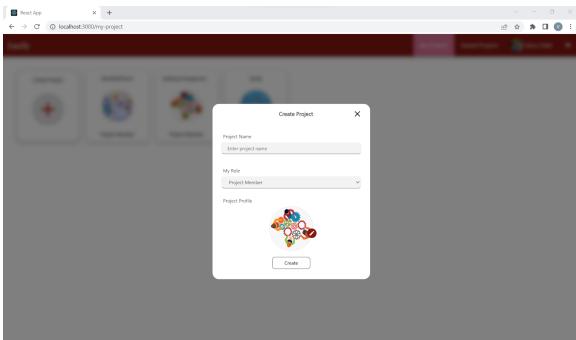


Fig. 7 Screenshot of Create Project Feature

The popup of creating a project will ask for the unique project name, role and the project photo.

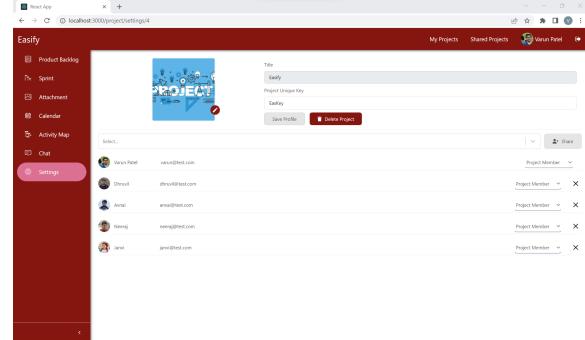


Fig. 8 Screenshot of Project Settings Feature

After the project is created successfully, the creator can share the project with others by email and also can set the roles.

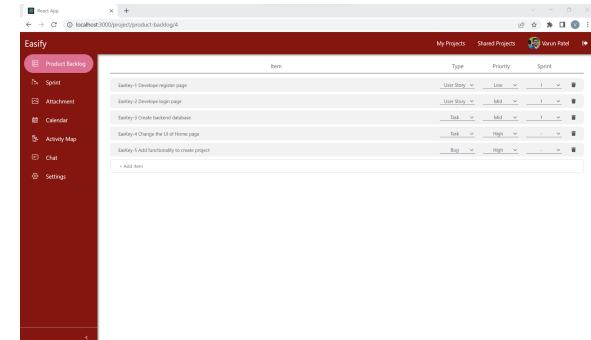


Fig. 9 Screenshot of Product Backlog Page

After the project is created successfully, the users can add or modify items to its Product Backlog.

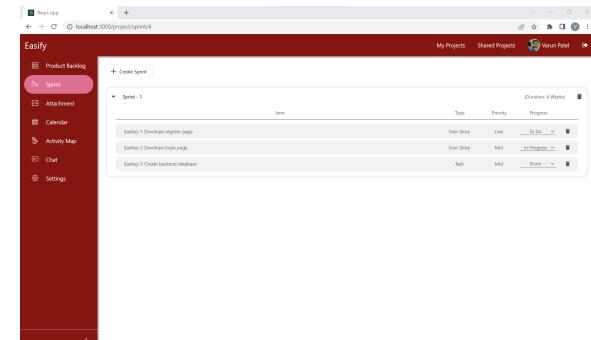


Fig. 10 Screenshot of Sprint Backlog Page

After the project is created successfully, the users can add or modify items to its Sprint Backlog from the Product Backlog.

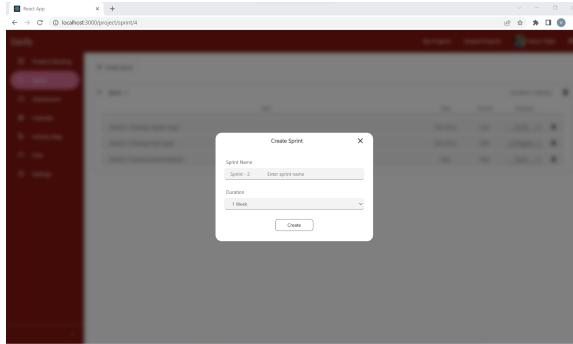


Fig. 11 Screenshot of Create Sprint
The popup of creating a sprint will ask for the sprint name and duration of the sprint.

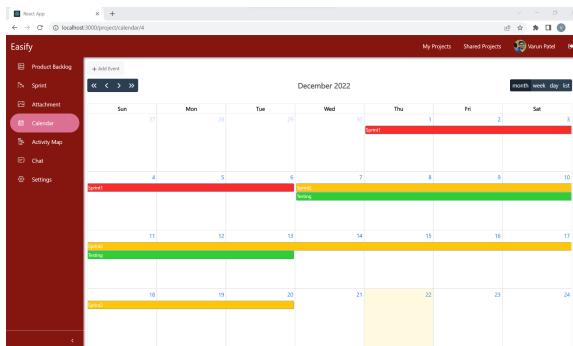


Fig. 12 Screenshot of Calendar Page
(Month View)

On Calendar Page, we can see that there are four options at top-right. Those are different views for the Calendar. Above screenshot is month view. The users can also navigate through months and years using top-left arrows.

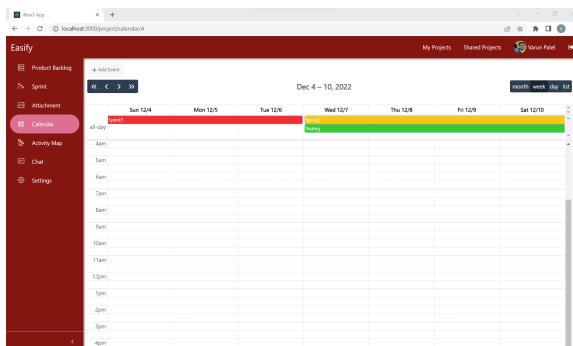


Fig. 13 Screenshot of Calendar Page
(Week View)

This is a screenshot of the week view of the calendar, where users can find/ plan their events for a particular week.

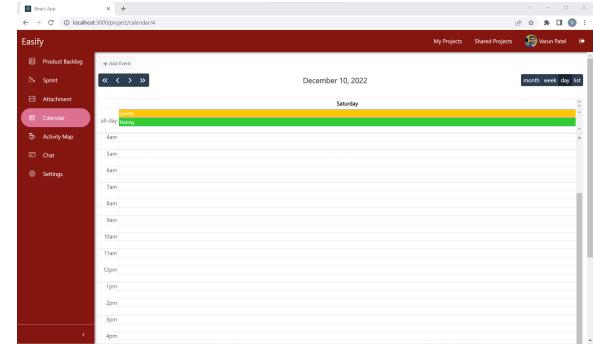


Fig. 14 Screenshot of Calendar Page
(Day View)

This is a screenshot of the day view of the calendar. The users can see these events for that day.

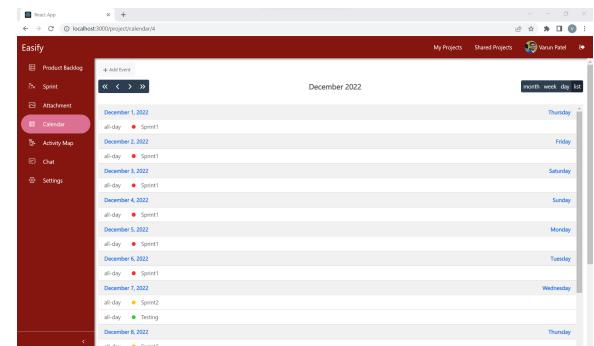


Fig. 15 Screenshot of Calendar Page
(List View)

This is a screenshot of the list view of the calendar. This is the list for a particular month.

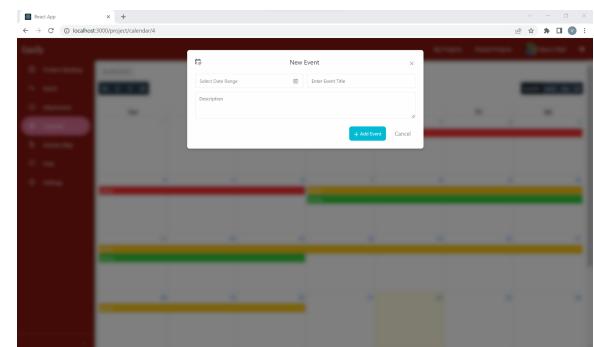


Fig. 16 Screenshot of Add Event

This popup will ask date range(start-end date), title and description in order to create an event.

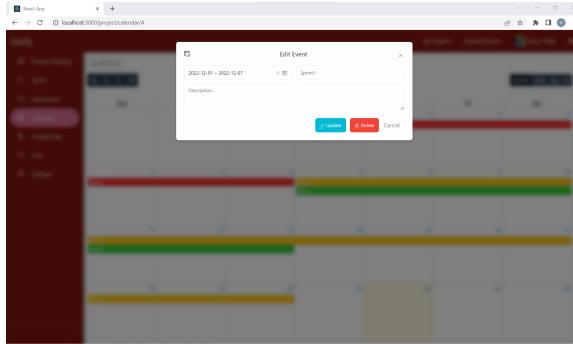


Fig. 17 Screenshot of Update/ Delete Event

This popup will show the event information. The users can either modify the info or can delete the event.

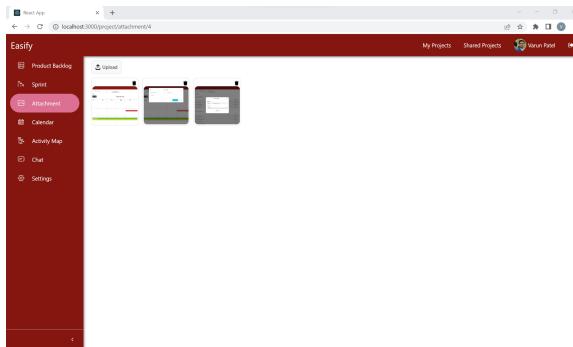


Fig. 18 Screenshot of Attachment Page

This is a screenshot of the Attachment Page. The users can see the uploaded images. They can also delete the images.

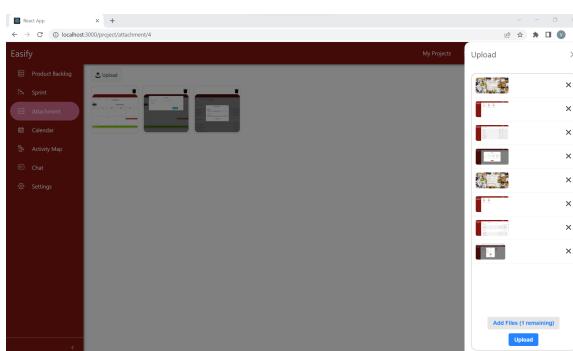


Fig. 19 Screenshot of Upload Dropzone

This is a screenshot of the dropzone side panel. The users can drop or browse the photos. The max limit is 9 Files. They can also cancel the image uploading.

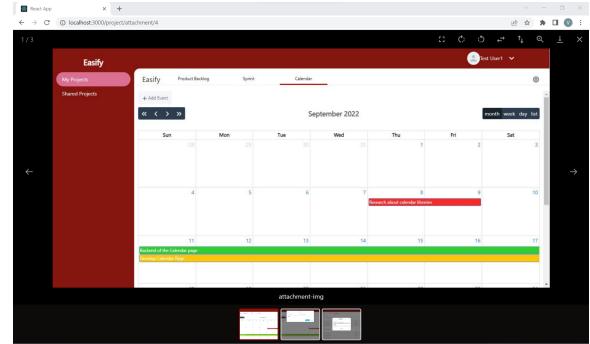


Fig. 20 Screenshot of Attachment Preview

The users can preview the uploaded images as we can see in the screenshot. They can see the images in fullscreen mode. From the top right toolbar options, the users can rotate, flip, zoom in & out and download the photo.

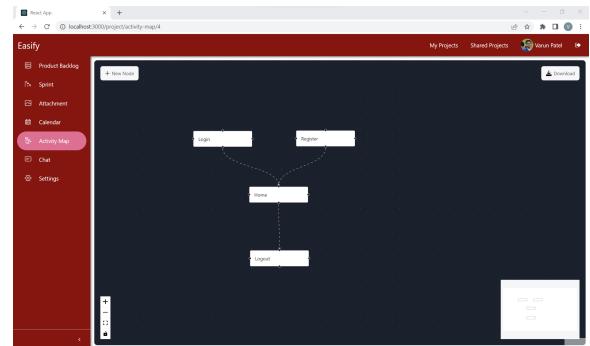


Fig. 21 Screenshot of Activity Map Page

This is a screenshot of the Activity Map Page. The users can create nodes by clicking on the top left button and connect the nodes by connecting the dots. The users can also download the activity map.

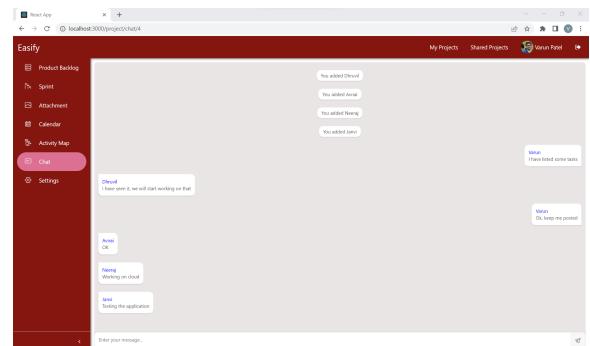


Fig. 22 Screenshot of Activity Map Page

This is a screenshot of the Project Chat Screen. The users can chat with shared members in this project group chat.

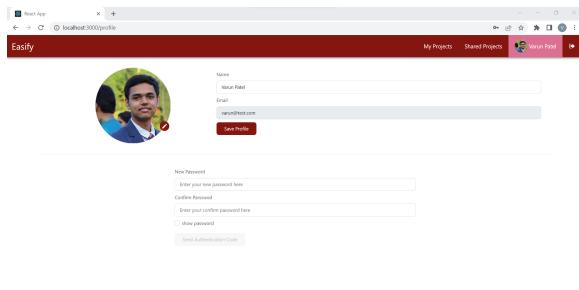


Fig. 23 Screenshot of Profile Page

This is a screenshot of the Profile Page. Users can edit their profile photo and name. They can also change the password.

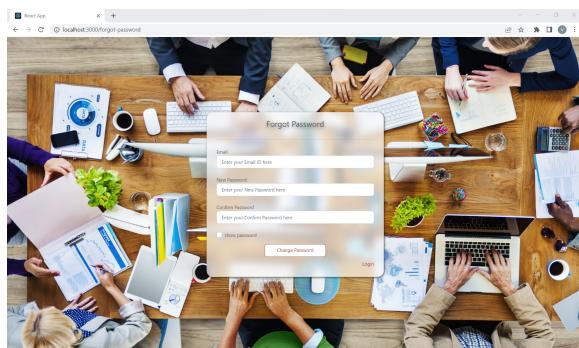


Fig. 24 Screenshot of Forgot Password Page

This is a screenshot of the Forgot Password Page. Users can change their password by email authentication.

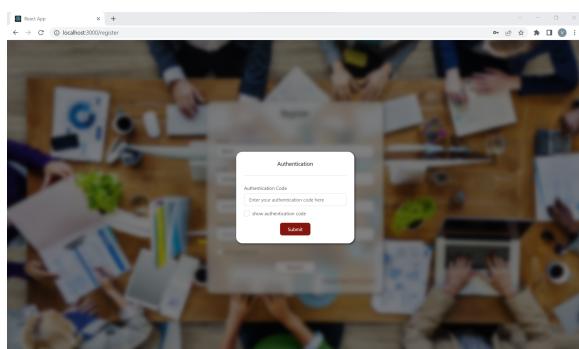


Fig. 25 Screenshot of Authentication Popup

This is a screenshot of the Authentication Popup. Users have to enter the

authentication code which they receive in their email.

VI. CONCLUSION

Easify is an application that aims to help users in project management. The users can manage scrum or agile-based projects very effectively using Easify. The product backlog feature enables users to list out product requirements which can be transferred to the sprint backlog during the sprint. The users can interact more using resource-sharing and chatting features. To finish the work on time, Easify provides features like settings the priorities of the tasks and tagging any events on the calendar.

In the future, we are planning to add new features that allow users to create user stories and create subtasks. Giving users more control over the project, assigning any particular task to someone, giving some users access to modify the project and its settings, etc.

HISTORY

- 1) Version-1: All the details up to Deliverable-4
- 2) Version-2: Added results of the Deliverable-5 (i.e the Calendar feature)
- 3) Version-3: Feature name changed from Image Sharing to Attachment. AWS S3 Bucket - A new technology added in the methodology section Results of Deliverable-6 are added (Attachment and Activity Map feature)
- 4) Version-4: Results of Deliverable-7 are added (Chat feature)
- 5) Version-5: AWS Elastic Beanstalk and AWS RDS added in the methodology section. All results are changed. We have changed our UI design. New screenshots are added for the Profile page, forgot password and email authentication (Profile feature and Authentication feature).

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