

PROManagement

Submitted in partial fulfillment of the requirements
for the degree of

B.E. Information Technology

By

Varshit Jain 181261

Dhairya Desai 181256

Ansh Aya 171013

Supervisor

Mr Vaibhav Kala

Assistant Professor



**Department of Information Technology
St. Francis Institute of Technology
(Engineering College)**

**University of Mumbai
2020-2021**

CERTIFICATE

This is to certify that the project entitled **"PROManagement"** is a bonafide work of **Varshit Jain (181261), Dhairya Desai (181256), & Ansh Aya (171013)** submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of Bachelor of Engineering in Information Technology.

Mr Vaibhav Kala
(Project Guide)

Dr. Joanne Gomes
(Head Of Department)

Dr. Sincy George
(Principal)

Project Report for B.E.

This project report entitled "*PROManagement*" by *Varshit Jain (181261)*, *Dhairya Desai (181256)*, & *Ansh Aya (171013)* is approved for the degree of *Bachelors of Engineering in Information Technology*.

1. _____

2. _____

Date: 11/5/2021

Place: Mumbai

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

(Signature)

Varshit Jain (181261)

(Signature)

Dhairya Desai(181256)

(Signature)

Ansh Aya (171013)

Date: 11/5/2021

ABSTRACT

This report highlights the important features of our project 'PROManagement'. 'PROManagement' is a project management application that can be used to improve the quality of management in an organization. It explains the various features and requirements of the project. The report shows the various problems in the current project management techniques and how it can be improved to provide a better quality to the users. The Literature Review consists of ten IEEE Papers where each paper discusses some aspects of project management and how it can be improved for the organization. They discuss various methodologies that can be used to reduce the cost incurred to the organization during a course of project development cycle. It also recommends various algorithms that can be used to overcome the challenges faced by an organization. This report consists of a well defined proposed methodology where the methodology proposed to complete the project is explained in detail and how the outcomes can be achieved. The scope of the project defines the actual outcomes that need to be expected from the application. The features of the application show the positives of the application. The functional requirements and non-functional requirements of the proposed system are clearly defined with the roles of different actors that will participate in the actions occurring. The non functional requirements specify the requirements of the system that do not affect the system functionality directly but indirectly. The proposed application has certain hardware and software requirements it needs to be fulfilled to be able to run smoothly. These hardware and software requirements are specified for the user to meet. The requirements mentioned are minimum requirements and thus the system needs to fulfill at least these requirements to be able to run smoothly. The software requirements are useful to complete the list of dependencies required by the system to run, it includes the class files and framework the application is built on. Use case diagram details the various uses of the various actors defined for the application to be worked with. Class diagram complies the use cases and the actors into classes and their attributes along with the functions for each user. Activity diagram defined the flow of the system from the start to finish and the various tasks a user could do. Data flow diagram detailed the flow of data among the application from the user to action to database. Timeline Chart shows the timeline predicted for the project development.

Contents

1	Introduction	1
1.1	Introduction	1
1.2	Problem Formulation	1
1.3	Motivation	1
1.4	Problem Solution	2
1.5	Scope of the Project	2
2	Literature Review	3
2.1	Existing Work	3
2.1.1	Literature review related to exiting system/methodology	3
2.2	Gap identified	6
3	System Analysis	7
3.1	Functional Requirements	7
3.1.1	Performance Requirements	7
3.1.2	Accuracy Requirements	7
3.2	Non Functional Requirements	7
3.2.1	Safety Requirements	7
3.2.2	Security Requirements	7
3.2.3	Software Quality Attributes	7
3.3	Specific Requirements	8
3.3.1	Hardware Requirements	8
3.3.2	Software Requirements	8
4	Analysis Modeling	9
4.1	Data Modeling : ER Diagram	9
4.2	Activity Diagrams	10
4.3	Functional Modeling	11
4.3.1	DFD: Level 0	11
4.3.2	DFD: Level 1	11
4.3.3	DFD: Level 2	12
4.4	Timeline Chart	12
5	Design	13
5.1	Architectural Design	13
5.2	User Interface Design	14

6	Implementation	22
6.1	Algorithms / Methods Used	22
6.1.1	Random Forrest	22
6.2	Working of the Algorithm	23
7	Testing	26
8	Results	30
9	Conclusion	33
9.1	Conclusion	33

List of Figures

4.1	ER Diagram of the Application.	9
4.2	Activity Diagram for User.	10
4.3	DFD Level 0	11
4.4	DFD Level 1	11
4.5	DFD Level 2	12
4.6	Time Chart Tasks.	12
5.1	Architecture Diagram of the Application.	13
5.2	Homepage.	14
5.3	Login/Register Page.	14
5.4	Admin Login.	15
5.5	Admin Privileges.	15
5.6	Employee Details.	15
5.7	Create a new Company.	16
5.8	Create a new Project.	16
5.9	Create a new Task.	16
5.10	Companies Details.	17
5.11	User Details.	17
5.12	Project Details.	17
5.13	Project Details.	18
5.14	Tasks Details.	18
5.15	User Dropdown Menu.	18
5.16	User Profile.	19
5.17	User Tasks.	19
5.18	User Issues.	19
5.19	Self Evaluation Form.	20
5.20	Issues.	20
5.21	Gantt View.	20
5.22	Employee Appraisal.	21
5.23	Employee Dashboard.	21
5.24	Churn Analysis.	21
7.1	Test Case for Login.	26
7.2	Test Case for Registration.	27
7.3	Test Case for Creation Module.	27
7.4	Test Case for Appraisal Form.	28
7.5	Test Case for Self Evaluation Form.	28

7.6	Test Case for Issue Creation Form.	29
8.1	Employee Appraisal.	30
8.2	Self Evaluation Form.	31
8.3	A List of At Risk Employees.	31
8.4	Calculating Metrics.	32
8.5	Result	32

List of Tables

2.1	Comparison of methodology	3
-----	-------------------------------------	---

Chapter 1

Introduction

1.1 Introduction

Currently, there are many project management applications available, but they either have limited set of activities and the ones that have all of them are behind a paywall. Our aim is to create an application that will help in project management activities and reduce the human capital required by the organization. PROManagement is a project management web application that facilitates in activities related to project management like task management, report generation and employee management.

1.2 Problem Formulation

The management of projects and employees working on them for small to medium size company or a freelancer working alone on different projects. Effective utilization of available resources to keep costs down for the entire project and maximize the profits. Easy and efficient delegation to monitor each and every milestone. Tracking every milestone of the project is one of the most major problems which could not be done by the previous projects done. The employees and the project manager will update about the tasks completion on the dashboard , so that it would be easy for any person to check the status of the project and task via the dashboard. To check overall progress of employee and project. Report generation for mid level and high level management helps checking every user's progress report is a problem which has to be overcome in a way that Reports are easy for the Admin and Project to check the status of the project and to take actions on what to be done and what not and they can easily view the status via the dashboard.

1.3 Motivation

The motivation of this project is to create an application that will help in project management activities and reduce the human capital required by the organization, as well as be a helpful tool to freelancer working alone on multiple projects. With this project, small to medium size companies would benefit greatly. The project created should be scale-able for future additions. It can be used to improve the management quality of the organization and can work effectively as a stand-alone program or as a key component of an ERP system, although as a part of a system it will lead to better results such as less time for administrative work by managers, easier and quicker access to needed information and reduced costs. The benefits of using a

planning tool can be easily observed and measured. Having a well-thought, solid and working plan will undoubtedly lead to more well-completed projects and increasing the business profits.

1.4 Problem Solution

The aim of the project is to develop a system for project management that can effectively and efficiently manage employees across projects and companies for small to medium size companies and freelancers working on multiple projects.

1.5 Scope of the Project

The project will be an employee and project management system that will automate the tasks of employee assignment and appraisal based upon the task completed by the employees and how successfully the project managers manage the project. The employee tracking will be across different projects past and future along with a profile highlighting the skills the employee possesses and also it shows the area of interest of the employees. It will also improve coordination among different departments of the organization. The manager can view the progress of their assigned projects via the dashboard. They can overlook one or more than one project. Project managers assign tasks to the employees. A dashboard will show a detailed report of the current progress of the various ongoing projects with the feature showing how much work has been done by the employees and the progress of the current project. These reports can be generated to be shown to higher executives for better business management. Deadlines for each Project is set by the Admin and project status and work is checked by the Project Managers and the Deadlines are given to the Employees by the Project Manager and Admin gives the Deadline for the project to the Project Managers. These deadlines can be easily checked by any of the users on the Dashboard of Project Management System.

Chapter 2

Literature Review

2.1 Existing Work

2.1.1 Literature review related to exiting system/methodology

Table 2.1: Comparison of methodology

Sr.	Paper Name	Review	Analysis/Limitations
[1]	A project management system for time planning and resources allocation	The solution is three tier architecture that can be developed into a company's ERP system. The proposal has a clear defined functional and nonfunctional requirements specified by the author. The problems collected by the author are clearly labeled based on the importance of them and have a specific numeric value attached to them.	The problems are collected using interviews with actual employees and thus present a realistic problem definition for the organization looking to find the solution.
[2]	Algorithms for workforce assignment problem	The authors study and present a solution to the workforce assignment problem. They propose algorithms which can reduce the cost of human resources required to work on a project. There are three proposed solution the problem	The solution presented to the problem is focused on the salary benefits to the company and not about the time savings presented. They propose a 16.5 percent reduction in the total salary.

[3]	Employee Performance Assessment with Profile Matching Method	Employee Profile method presented in the paper is an extremely detailed and segregated approach. The author defines the various stages of the implementation of the solution with all the requirements of each stage.	The result of the profile matching method in ranking form, therefore this method makes it easier to determine the best employees according to the profile desired by the company.
[4]	A Semi automated Human Resource Management System	The authors present a solution to the human resource allocation. This paper expands on skill based approach by introducing adaptive skill sets for employees and a history-based initial evaluation strategy. For this purpose, the mathematical model is adjusted in order to modify skill vectors after a task allocation. In turn this enables estimations of the time to task completion based on employee history	The results presented by the author are a result of a simulation they performed and not a result of actual/practical usage of the proposed solution.
[5]	Project management tools-software tools	The authors present the essential feature that a good and useful project management software requires and compares the existing Project Management softwares in the market.	1) Insufficient information about the details of the features discussed in the paper. 2) No formal comparison of different softwares in the market
[6]	Fatigue Consideration optimization Model for Employee Allocation in Flow Shop Scheduling Problems	The authors recognize the fatigue problem among the workforce of the company and present a solution for it. The authors propose a mathematical model called the FEAL model to the fatigue problem among the workforce and how it can be used to improve the overall efficiency of development and reduce the development time.	The results are a result of a simulation and not an actual experiment

[7]	The model of universal project states classifier in project management system	The purpose of the article is to identify approaches to improving the mechanisms for assessing the status of projects as managed objects in organizational systems under the environmental influence and imperfection of performers and management tools.	Model is verified using a simulation.
[8]	Employee Performance Target Management System to Support Work Performance Assessment	Indonesia's DP3 is a work assessment system used to determine workers appraisal, these workers are civil servants. The existing system is oriented to the assessment of personality and behaviour of employees and not on the actual performance and the work completed by the employees.	The authors propose a prototyping model to weed out non essential features and have a working prototype early in the development stages. Limitation - Appraisal is defined but other features required for an employee management system are not present
[9]	Competence-based knowledge management in project oriented organisations in bi-adaptive context	1) The authors discover many problems that may occur with the knowledge management of an organization. 2) They also identified the problem in finding what information should be considered knowledge and what should be excluded.	1. Insufficient research in terms of practical implementation. 2. Implementation is complex and difficult.
[10]	Priorities management in the portfolio of projects in complex and dynamically variable environments	The author recognizes the main reason for the problematic situations in the management of development programs is the integration problems of the projects and the management of the transitions from one project to another or from one phase to another.	The author proposes a new approach to the management of development programs in the context of the triad is proposed: strategy, projects and people.

2.2 Gap identified

Effective utilisation of Resource Management and to map the impact of building Employee Work Profile(skillset) and effectively use it in the system for Employee growth. Easy and efficient delegation to monitor each and every milestone. To check overall progress of employee and project. Report generation for mid level and high level management.

Chapter 3

System Analysis

3.1 Functional Requirements

3.1.1 Performance Requirements

Performance of the system should be in real-time and all the actions taken place should be atomic. The attrition module must use update to date information on the employees. The tasks and issues should be in sync across the board. The report generation module must use the latest information in the report.

3.1.2 Accuracy Requirements

The attrition prediction module must have accurate information on the users to be able to successfully identify the employees at risk of attrition.

3.2 Non Functional Requirements

3.2.1 Safety Requirements

No safety requirements have been identified.

3.2.2 Security Requirements

Data stored in the database must only be accessible to users with sufficient permissions. Sensitive information should be stored with extra protection.

3.2.3 Software Quality Attributes

- Accessibility : The application should be accessible even to new user with easy installation.
- Usability : The application should be user-friendly.
- Maintainance : The application interface should be simple and concise so as it can be easily edited in future.
- Acceptance : It should meet user's requirements.

- Responsive : The function response time should be smooth.
- Modifiable : The function should be modifiable .
- Sustainable : The function should be able to be maintained at a certain rate or level.
- User Friendly Graphical Interface.

3.3 Specific Requirements

3.3.1 Hardware Requirements

- CPU : 64 Bit Intel or AMD Processor .
- GPU : Minimum 2GB Graphics Memory with DX10.
- RAM : 8GB or above.
- Memory : Minimum 10 GB for installation and additional project files.
- Operating System : Windows 7 or above / macOS Yosemite or above.

3.3.2 Software Requirements

- Django v3.0.4 – Python
- Adobe XD for UI/UX design

Chapter 4

Analysis Modeling

4.1 Data Modeling : ER Diagram

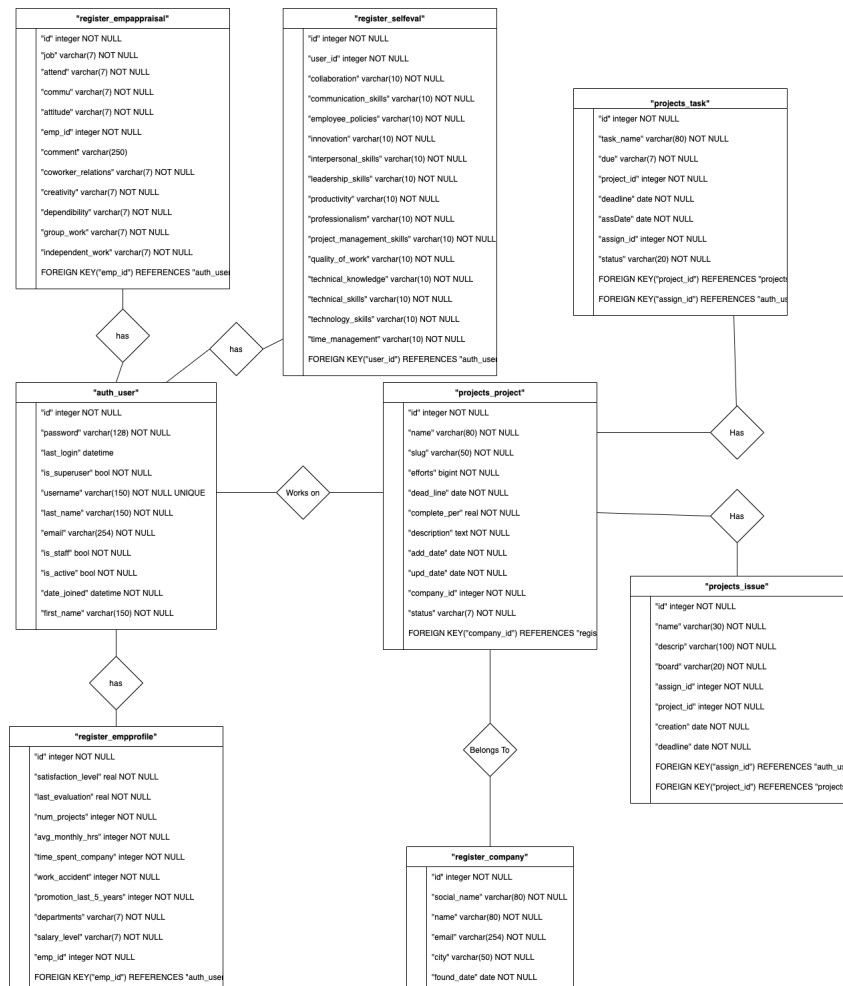


Figure 4.1: ER Diagram of the Application.

ER model is a logical representation of an enterprise data. ER model is a diagrammatic representation of logical structure of database. By seeing ER diagram, we can easily understand relationship among entities and relationship.

4.2 Activity Diagrams

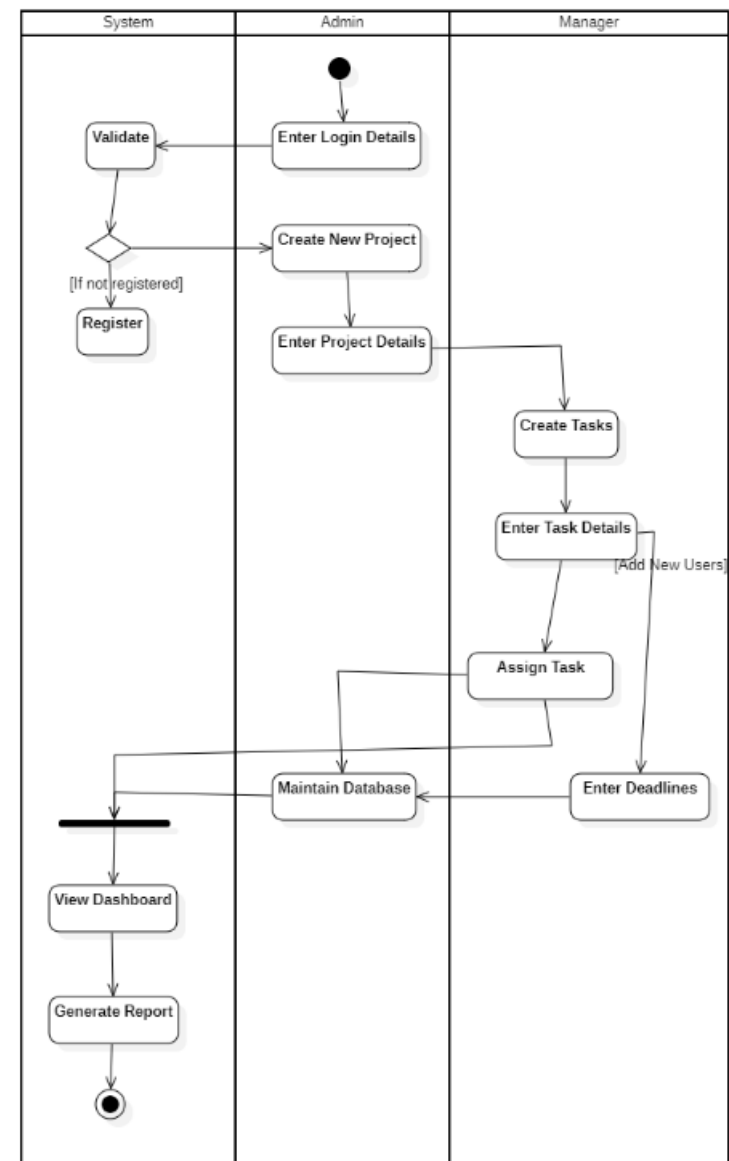


Figure 4.2: Activity Diagram for User.

The Activity Diagram gives us a gist of the stages in the application Process. The stages are the creation of the project, development of project and completion of project. The diagram shows the different activities of employees, managers and administrators from project creation to completion.

4.3 Functional Modeling

4.3.1 DFD: Level 0



Figure 4.3: DFD Level 0

DFD Level 0 describes all the user modules in the the system. Above is the data flow diagram of promanagement system that is useful in project management activities.

4.3.2 DFD: Level 1

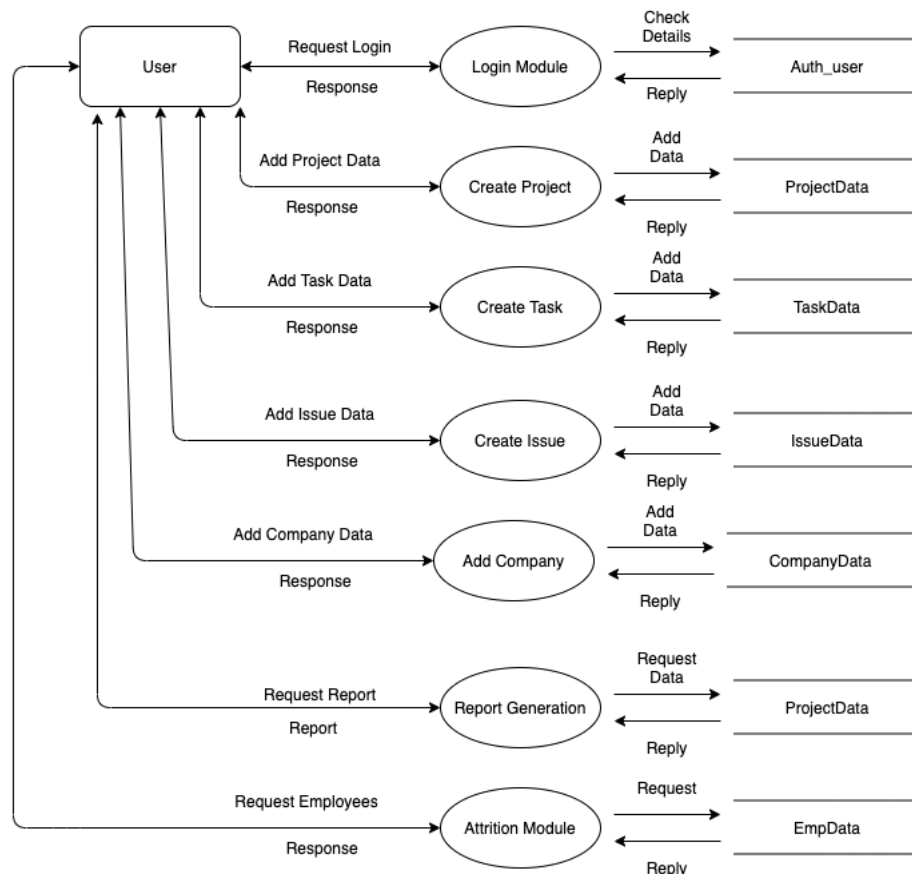


Figure 4.4: DFD Level 1

The admin side DFD describes the various modules in the promanagement system. These modules are Login Module, Creation Modules and Report Generation Module. Each module has its own database to manage the processes.

4.3.3 DFD: Level 2

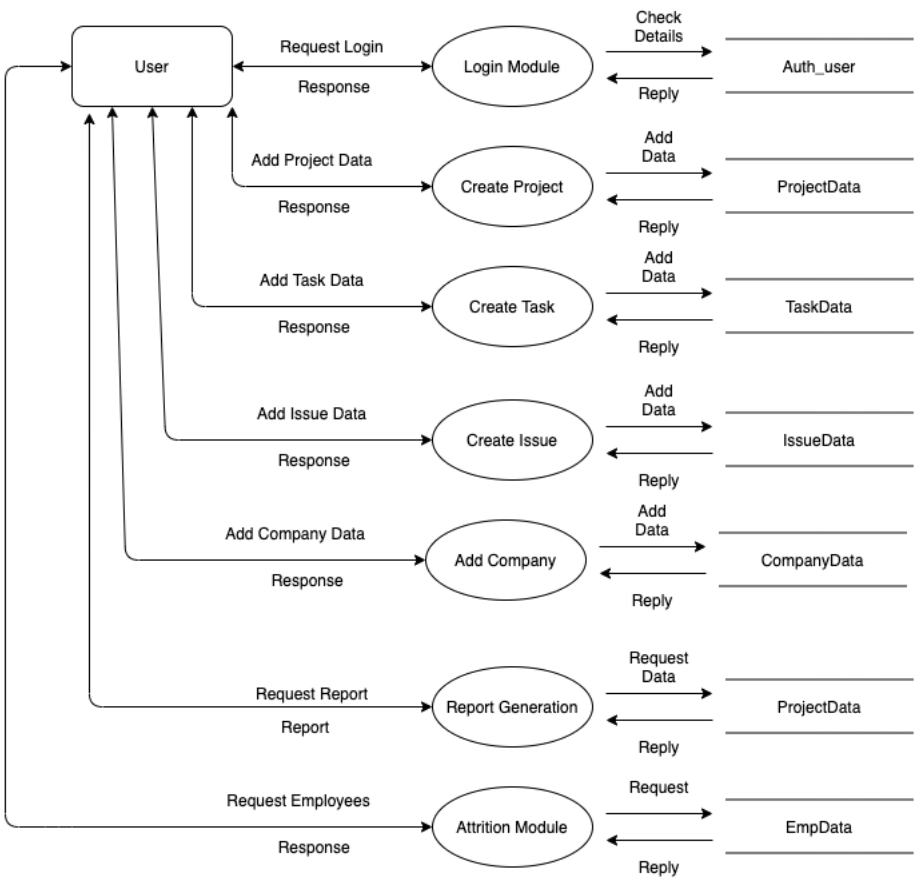


Figure 4.5: DFD Level 2

The modules in DFD Level 2 are divided in the functionalities they have like report genera- tion, creation of project, task and issues. The Attrition module outputs a list of at risk employees of attrition.

4.4 Timeline Chart

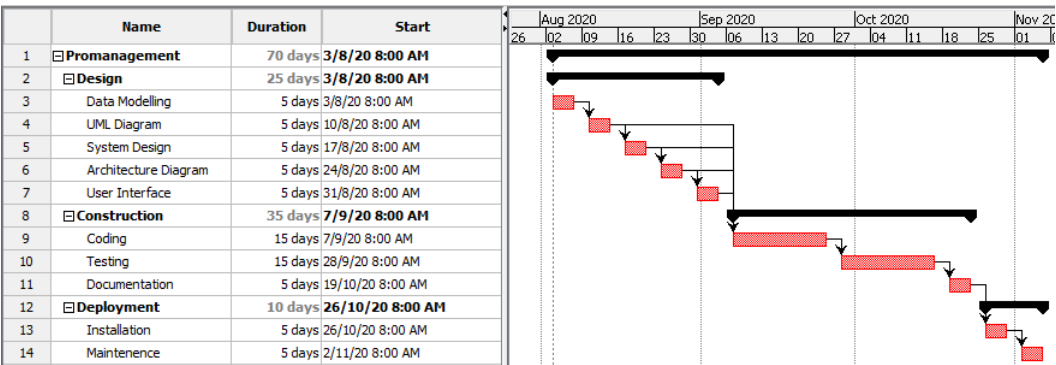


Figure 4.6: Time Chart Tasks.

Chapter 5

Design

5.1 Architectural Design

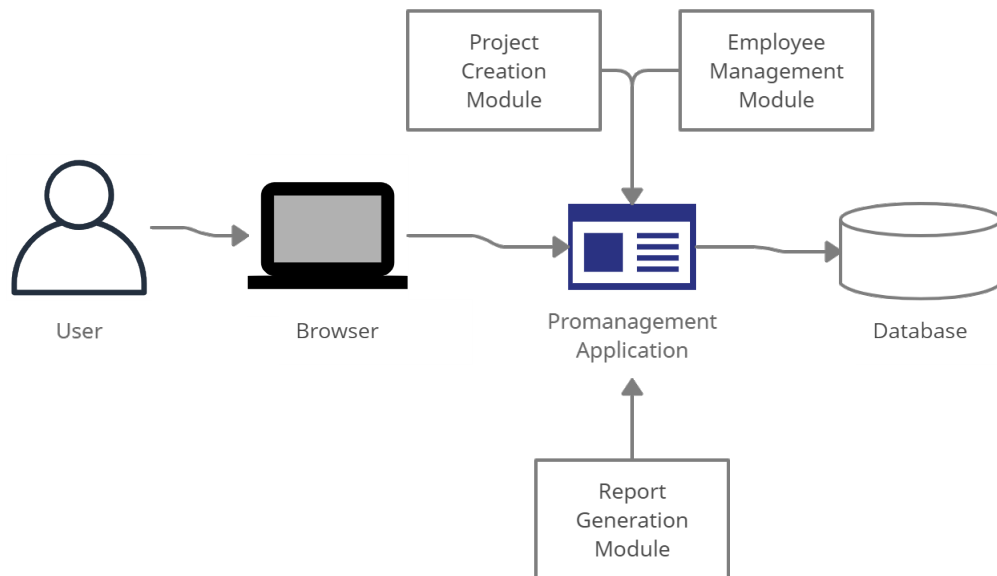


Figure 5.1: Architecture Diagram of the Application.

There are four main components of the application, a user, a Web browser to access the application, the application itself and the database storing the required data to run the application. Promanagement application is built using Django Framework and the underlying database is sqlite3. The Promanagement application has three modules, a project creation module, a employee management module and a report generation module. The User can be of two types: an employee and an administrator.

5.2 User Interface Design

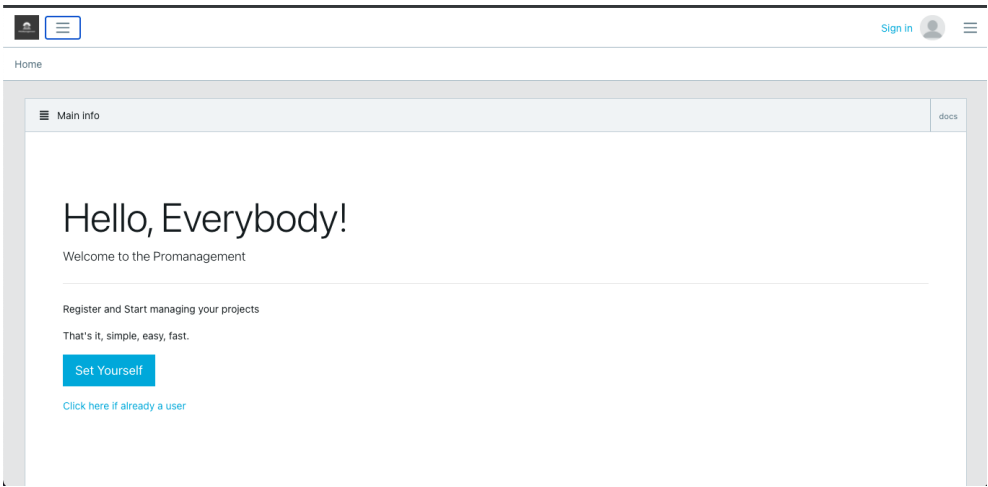


Figure 5.2: Homepage.

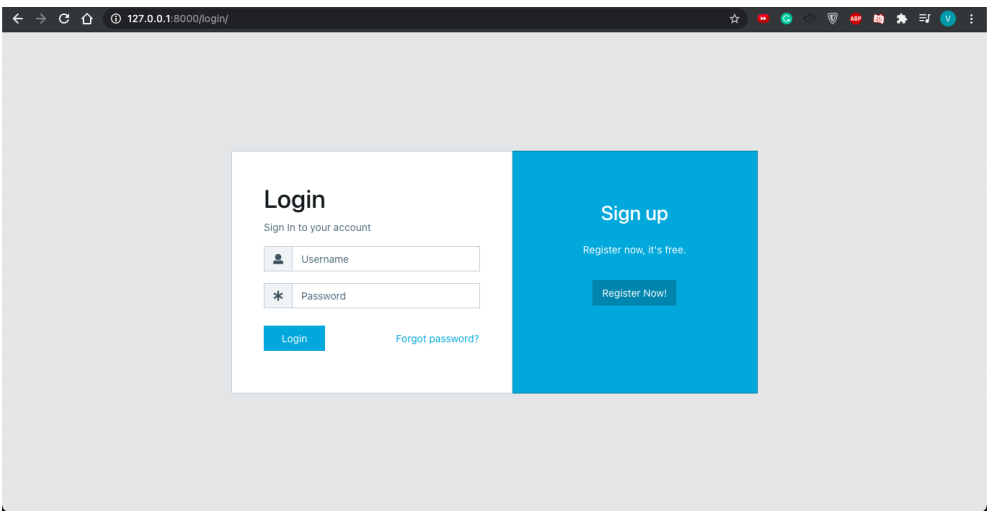


Figure 5.3: Login/Register Page.

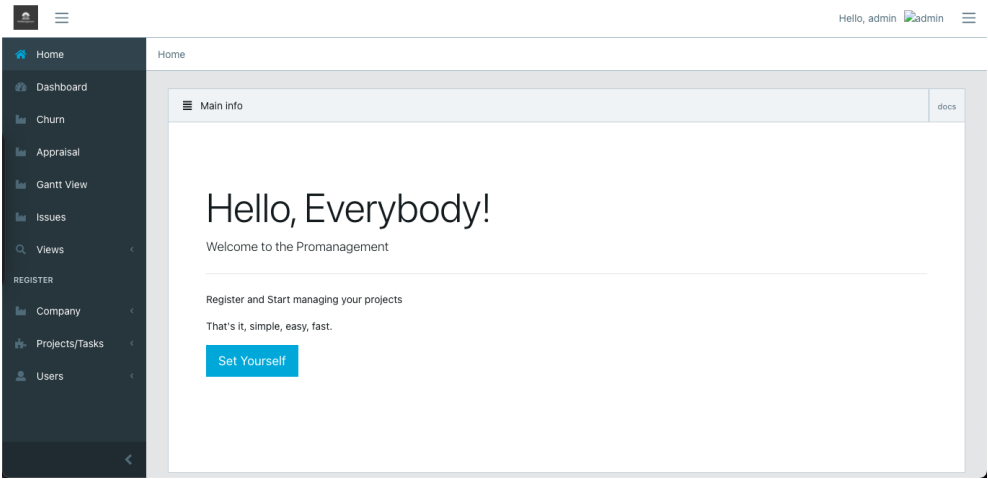


Figure 5.4: Admin Login.

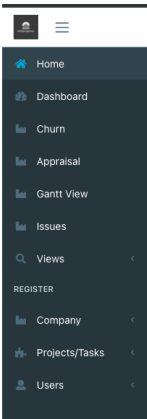


Figure 5.5: Admin Privileges.

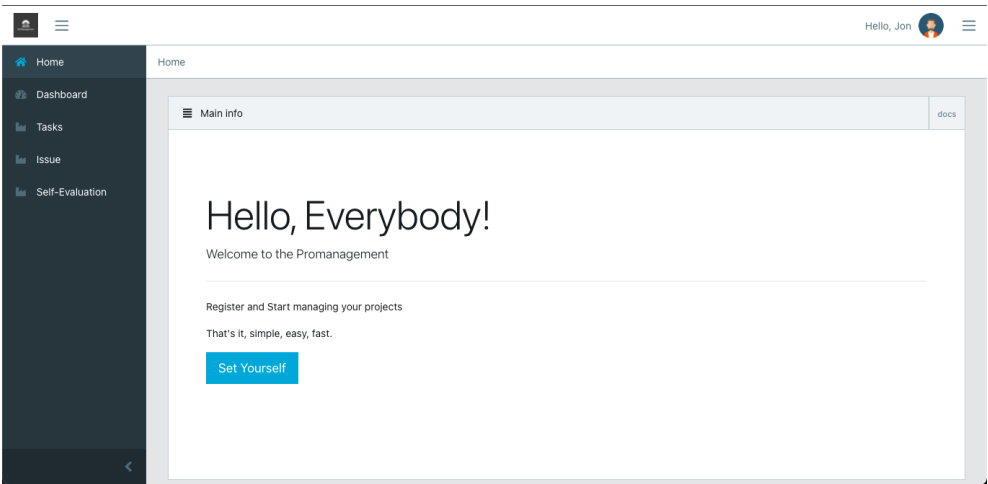


Figure 5.6: Employee Details.

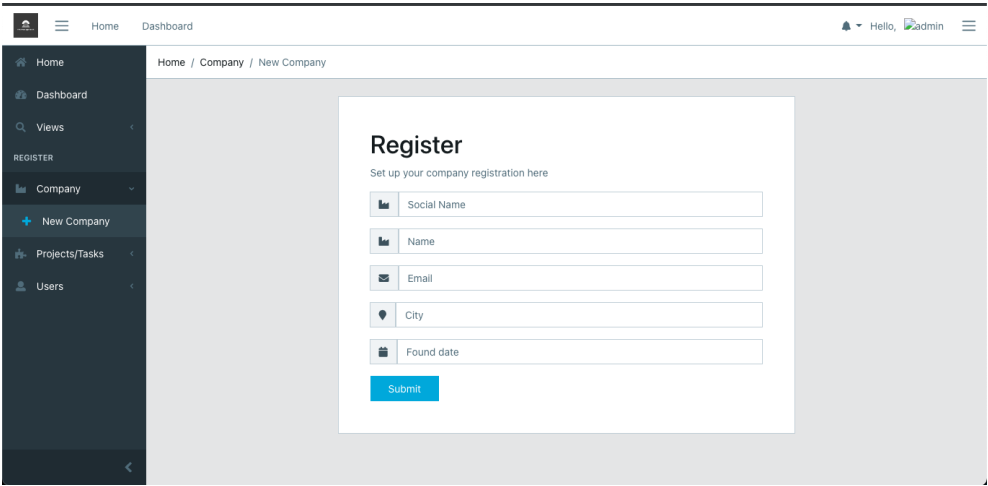


Figure 5.7: Create a new Company.

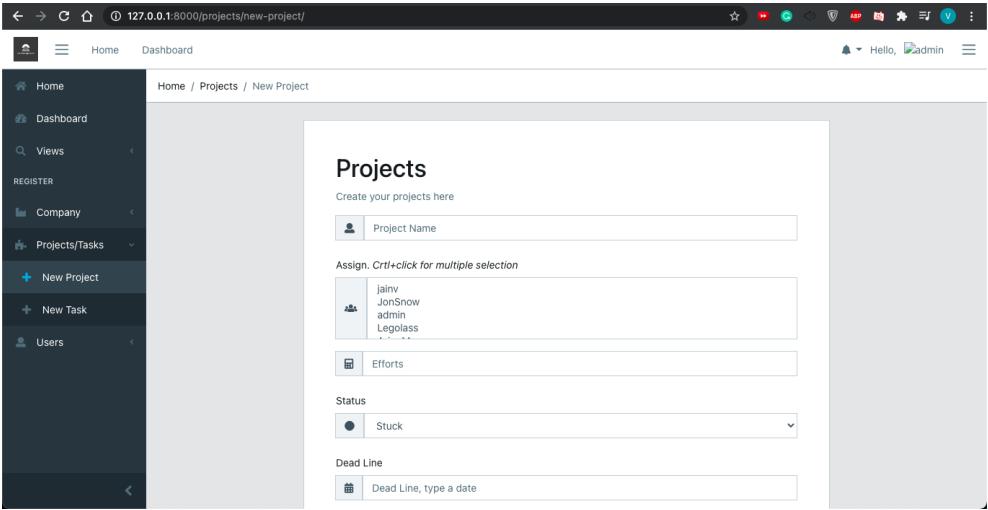


Figure 5.8: Create a new Project.

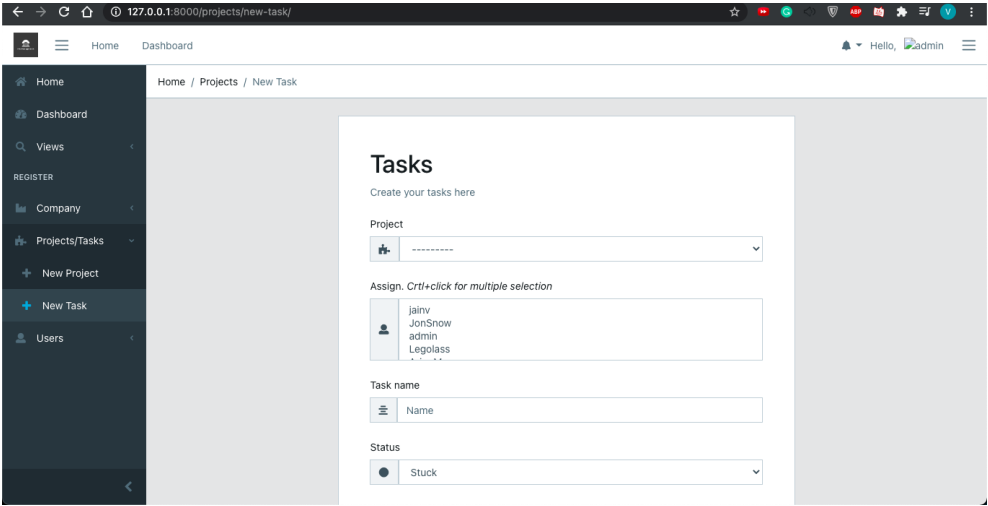


Figure 5.9: Create a new Task.

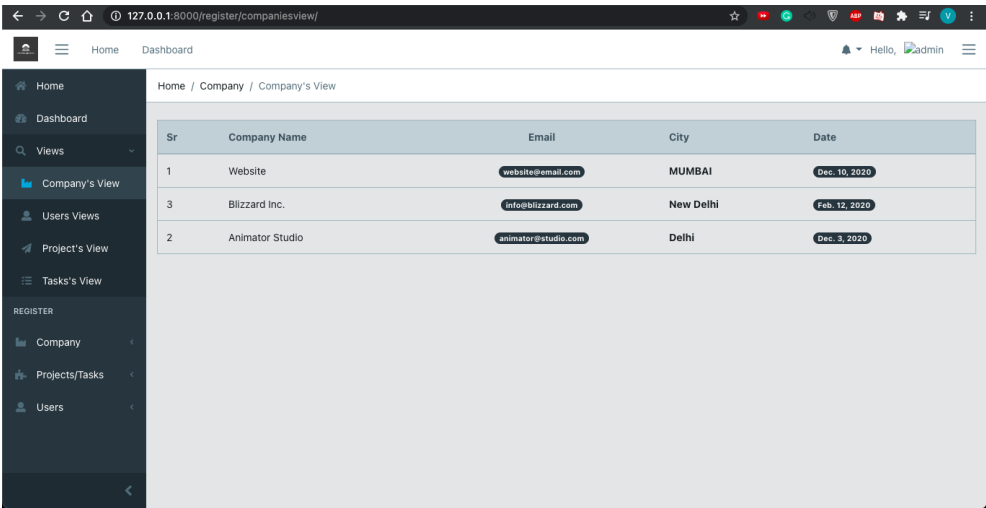


Figure 5.10: Companies Details.

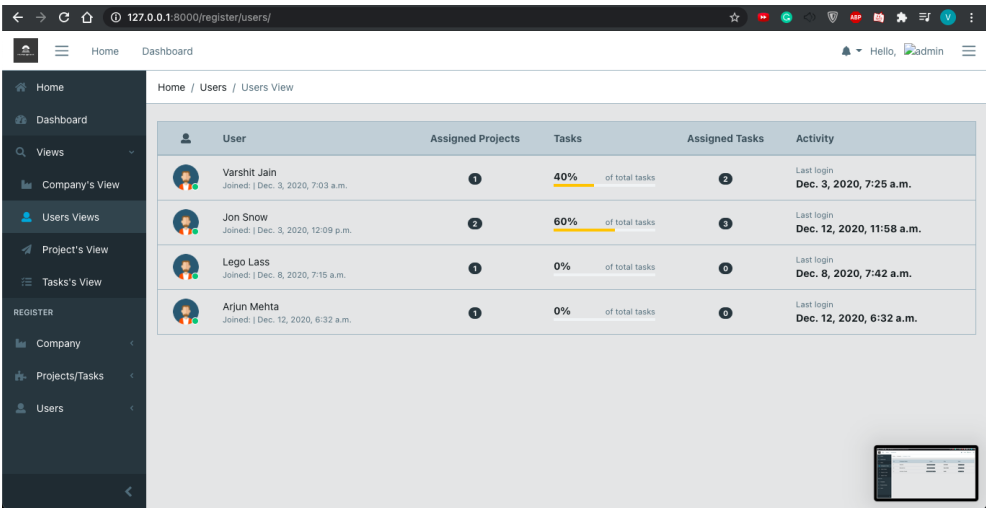


Figure 5.11: User Details.

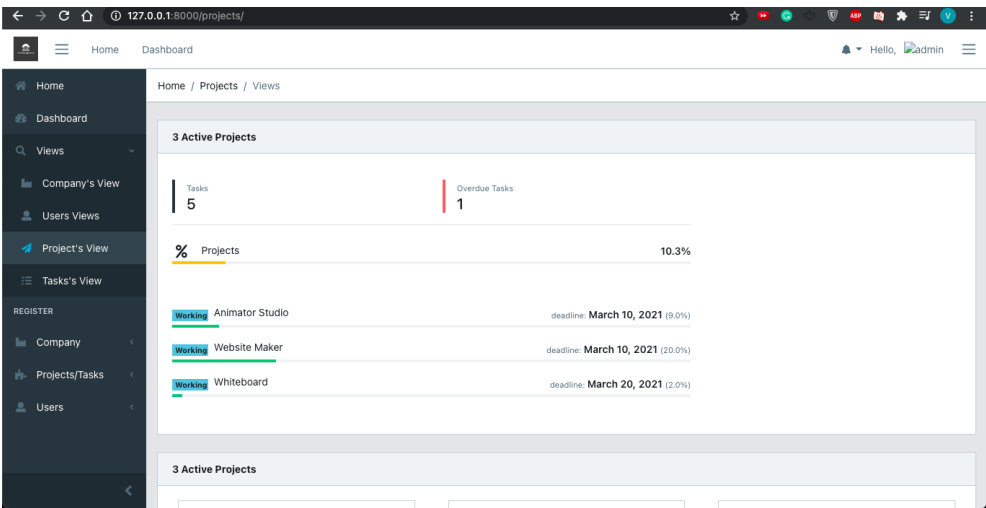


Figure 5.12: Project Details.

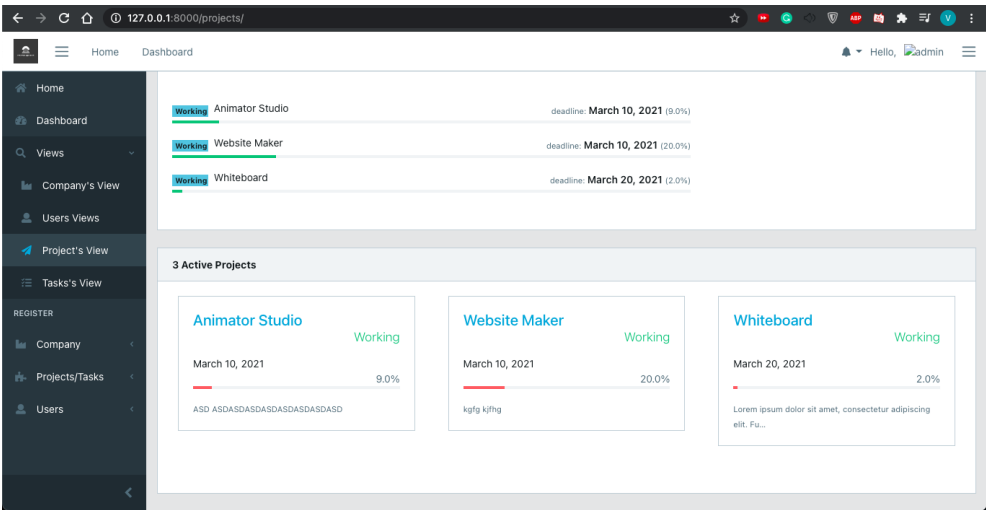


Figure 5.13: Project Details.

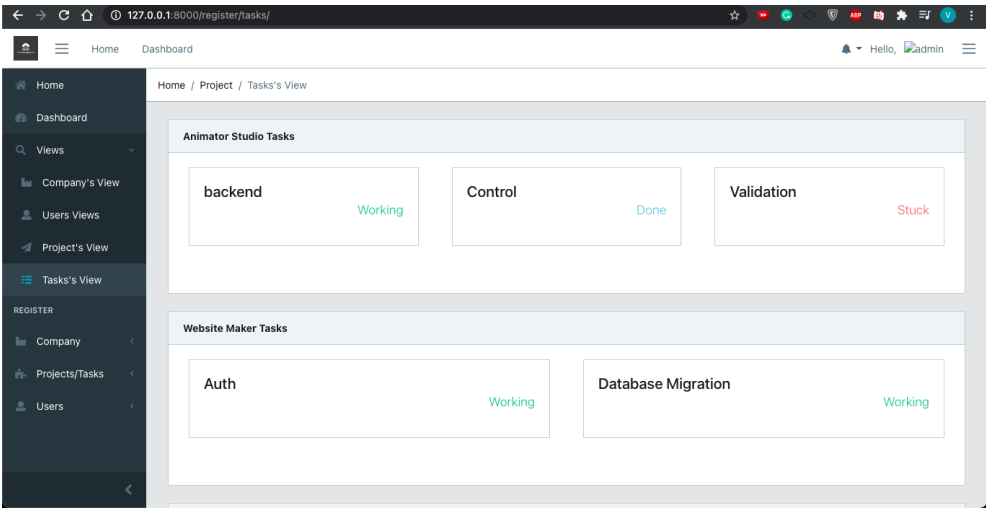


Figure 5.14: Tasks Details.

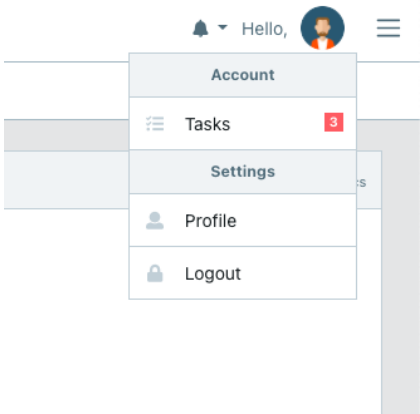


Figure 5.15: User Dropdown Menu.

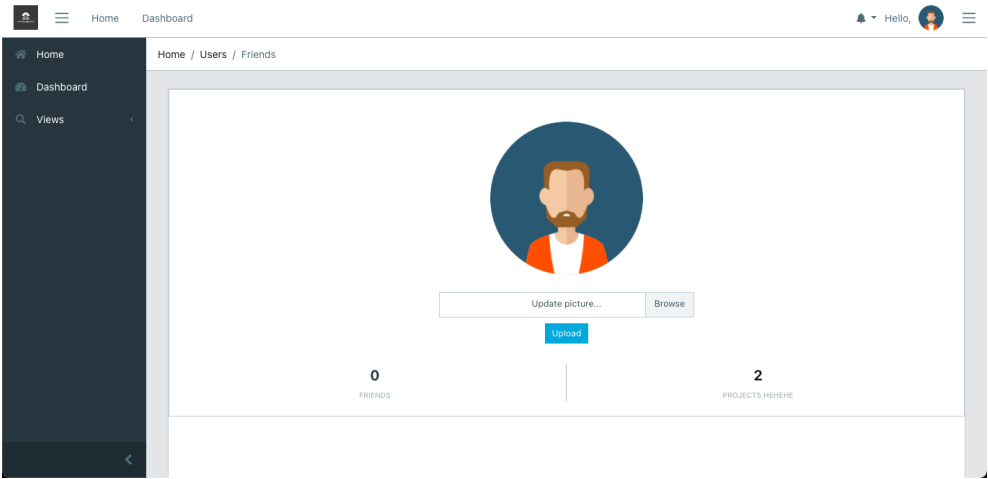


Figure 5.16: User Profile.

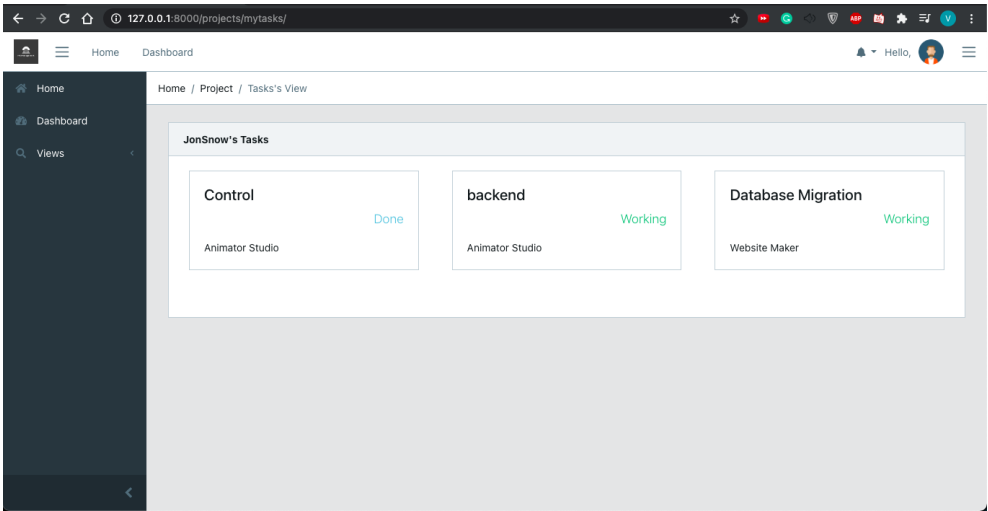


Figure 5.17: User Tasks.

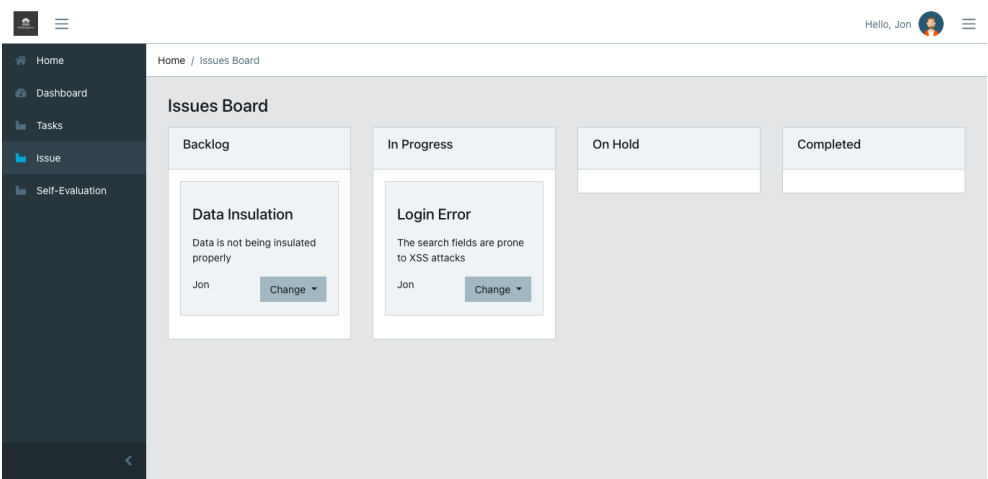


Figure 5.18: User Issues.

The screenshot shows a web application interface with a dark sidebar on the left containing navigation links: Home, Dashboard, Tasks, Issue, and Self-Evaluation (which is highlighted). The main content area is titled 'Self Evaluation' and includes a sub-header 'Fill the form to conduct a self Evaluation'. Below this, there is a form with several dropdown menus, each with 'NA' selected. The dropdowns are for: a user selection (indicated by a person icon), Manager Satisfaction, Technical Knowledge, Quality of Work, Productivity, and Project management Skills. The top right of the page shows a user profile 'Hello, Jon' and a hamburger menu icon.

Figure 5.19: Self Evaluation Form.

The screenshot displays the 'Issues' management page. The sidebar on the left lists various navigation options: Home, Dashboard, Churn, Appraisal, Gantt View, Issues (highlighted), Views, REGISTER, Company, Projects/Tasks, and Users. The main content area is titled 'Add New Issue' and contains a form with fields for Issue Name, Project Name, Assigned, Status, and Deadline. Below the form is a section titled 'Click to Add' with a green 'Add' button. The lower part of the page shows four columns representing different stages of issue resolution: Backlog, In Progress, On Hold, and Completed. Each column contains one or more issue cards with titles like 'Results Not Availabe', 'Login Error', 'Sudden Crashing', and 'CSS Overlapping', along with details and a 'Change' button.

Figure 5.20: Issues.

The screenshot shows the 'Gantt View' of a project. The sidebar on the left includes navigation links: Home, Dashboard, Churn, Appraisal, Gantt View (highlighted), Issues, Views, REGISTER, Company, Projects/Tasks, and Users. The main content area is titled 'Home / Gantt View' and displays a Gantt chart. The chart has a table of task details on the left and a corresponding timeline on the right. The tasks are listed in the table below:

Task name	Start time	Duration
Auth	2021-04-05	5
Validation	2021-04-02	5
backend	2021-04-06	5
Auth	2021-04-09	5
Database Migratic	2021-04-06	5
ETS	2021-04-10	5
Meeting	2021-05-04	5
Task #1	2021-05-08	5

The Gantt chart visualizes these tasks as horizontal bars across a timeline from April 4th to April 14th. The bars are color-coded: blue for 'Auth', orange for 'Validation', green for 'backend', red for 'Auth', purple for 'Database Migration', yellow for 'ETS', and light blue for 'Meeting' and 'Task #1'.

Figure 5.21: Gantt View.

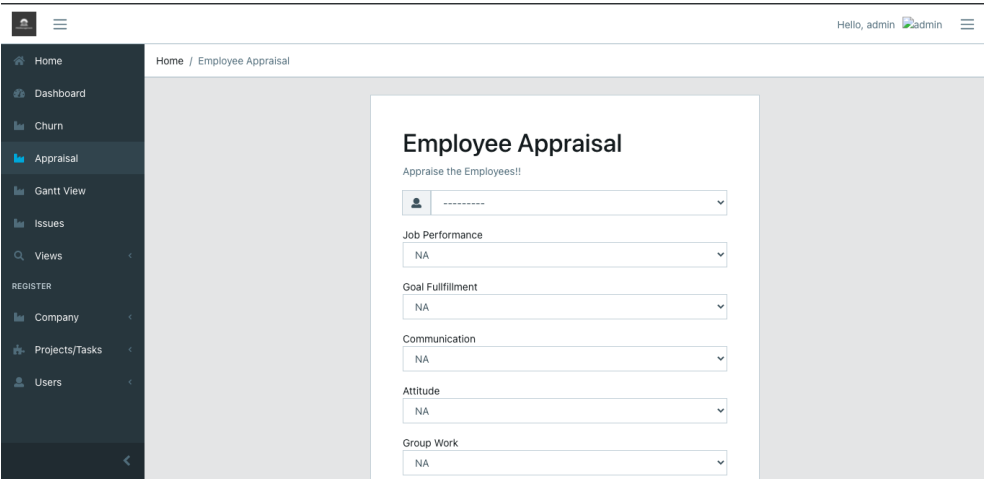


Figure 5.22: Employee Appraisal.

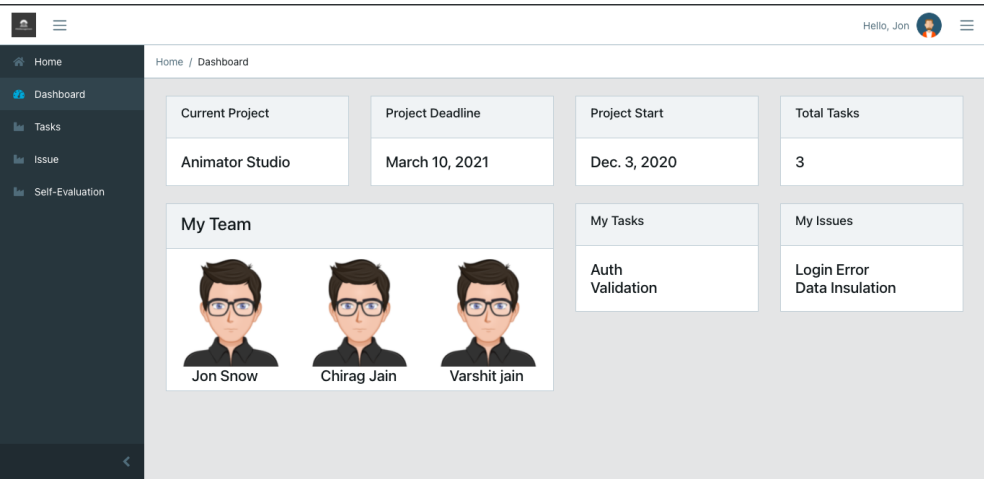


Figure 5.23: Employee Dashboard.

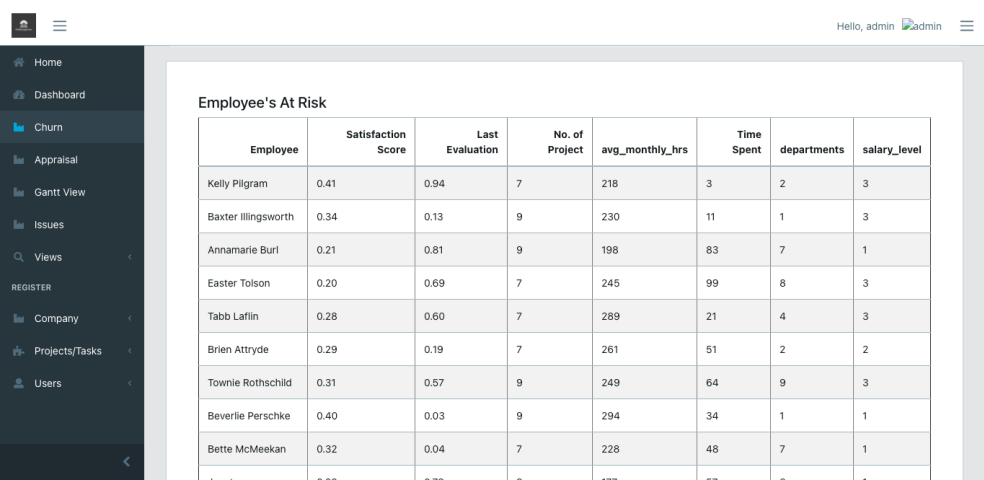


Figure 5.24: Churn Analysis.

Chapter 6

Implementation

6.1 Algorithms / Methods Used

6.1.1 Random Forrest

Random forest, like its name implies, consists of a large number of individual decision trees that operate as an ensemble. Each individual tree in the random forest spits out a class prediction and the class with the most votes becomes our model's prediction. The low correlation between models is the key. Just like how investments with low correlations (like stocks and bonds) come together to form a portfolio that is greater than the sum of its parts, uncorrelated models can produce ensemble predictions that are more accurate than any of the individual predictions. The reason for this wonderful effect is that the trees protect each other from their individual errors (as long as they don't constantly all err in the same direction). While some trees may be wrong, many other trees will be right, so as a group the trees are able to move in the correct direction. So the prerequisites for random forest to perform well are: There needs to be some actual signal in our features so that models built using those features do better than random guessing. The predictions (and therefore the errors) made by the individual trees need to have low correlations with each other.

6.2 Working of the Algorithm

```
model.py x
1
2 import pandas # for dataframes
3 import matplotlib.pyplot as plt # for plotting graphs
4 import seaborn as sns # for plotting graphs
5 import sklearn
6 import joblib
7 from sklearn import preprocessing
8 from sklearn.model_selection import train_test_split # Import train_test_split function
9 from sklearn.ensemble import RandomForestClassifier #Import Gradient Boosting Classifier m
10
11
12 data=pandas.read_csv('HR_comma_sep.csv')
13 print('The scikit-learn version is {}'.format(sklearn.__version__))
14
15 #Creating labelEncoder
16 le = preprocessing.LabelEncoder()
17
18 # Converting string labels into numbers.
19 data['salary']=le.fit_transform(data['salary'])
20 data['Departments ']=le.fit_transform(data['Departments '])
21 data.to_csv('r'asd.csv', index = False, header=True)
22
23 X=data[['satisfaction_level', 'last_evaluation', 'number_project',
24         'average_monthly_hours', 'time_spend_company', 'Work_accident',
25         'promotion_last_5years', 'Departments ', 'salary']]
26 y=data['left']
27
28 # Split dataset into training set and test set
29 X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)
30
31
32 #Create Gradient Boosting Classifier
33 gb = RandomForestClassifier()
34
35 #Train the model using the training sets
36 gb.fit(X_train, y_train)
37
38 #Predict the response for test dataset
39 y_pred = gb.predict(X_test)
40
41 joblib.dump(gb, "RandomForrest.sav")
42
```

```

378 def churn(request):
379
380     df = pd.DataFrame(list(EmpProfile.objects.all().values()), columns=['satisfaction_level', 'last_evaluation', 'num_projects', 'av
381     print(df)
382
383     e = EmpProfile.objects.all()
384     ids = []
385     for i in e:
386         ids.append(i.emp.first_name + " " + i.emp.last_name)
387
388     df1 = pd.read_csv('mock.csv')
389     gb = joblib.load('RandomForrest.sav')
390
391     test = df[['satisfaction_level', 'last_evaluation', 'num_projects', 'avg_monthly_hrs', 'time_spent_company', 'work_accident', 'pr
392     res = gb.predict(test)
393     test.insert(9, "Result", res)
394     test.insert(0, "Employee", ids)
395
396     test = test[['Employee', 'satisfaction_level', 'last_evaluation', 'num_projects', 'avg_monthly_hrs', 'time_spent_company', 'depar
397     ms = test["Result"] == 1
398     pas = test[ms]
399
400     atRiskList = pas['Employee']
401     #print(atRiskList)
402
403     pas = pas[['Employee', 'satisfaction_level', 'last_evaluation', 'num_projects', 'avg_monthly_hrs', 'time_spent_company', 'depar
404     pas = pas.rename(columns={
405         'satisfaction_level': 'Satisfaction Score',
406         'last_evaluation': 'Last Evaluation',
407         'num_projects': 'No. of Project',
408         'average_monthly_hours': 'Average Monthly Hours',
409         'time_spent_company': 'Time Spent',
410     })
411     html = pas.to_html(classes='table table-striped', index=False)
412
413     data1 = pd.DataFrame(pas)
414
415     #Department Bar Graph
416     data = [['IT', (data1['departments']=='1').sum()],
417            ['Rand', (data1['departments']=='1').sum()],
418            ['Accounting', (data1['departments']=='2').sum()],
419            ['HR', (data1['departments']=='3').sum()],
420            ['Management', (data1['departments']=='4').sum()],
421            ['Marketing', (data1['departments']=='5').sum()],
422            ['Product Management', (data1['departments']=='6').sum()],
423            ['Sales', (data1['departments']=='7').sum()],
424            ['Support', (data1['departments']=='8').sum()],
425            ['Technical', (data1['departments']=='9').sum()]]
426     df = pd.DataFrame(data, columns=['Departments', 'Count'])
427     #print(df)
428     fig = px.bar(df, x='Departments', y='Count')
429     depart_grap = plot(fig, output_type='div')
430
431     data = [['Low', (data1['salary_level']=='1').sum()],
432            ['Medium', (data1['salary_level']=='2').sum()],
433            ['High', (data1['salary_level']=='3').sum()]]
434
435     df = pd.DataFrame(data, columns=['Salary', 'Count'])
436     fig = px.bar(df, x='Salary', y='Count')
437     sal_grap = plot(fig, output_type='div')
438
439     #Gender Diagram
440     genderDF = UserProfile.objects.all()
441     mC = UserProfile.objects.all().filter(gender='M').count()
442     fC = UserProfile.objects.all().filter(gender='F').count()
443     val = [mC, fC]
444     #print(genderDF)
445     fig = go.Figure(data=[go.Pie(labels=['Male', 'Female'], values=val, textinfo='label+percent', title='Gender Overview')])
446     fig.update_traces(textfont_size=18)
447     pie = plot(fig, output_type='div')
448
449
450     context = {
451         'data': html,
452         'departG': depart_grap,
453         'salG': sal_grap,
454         'genderG': pie,
455     }
456
457     return render(request, 'core/churn.html', context)

```

```

1  {% extends 'core/base.html' %}
2  {% load static %}
3  {% block breadcrumb %}
4      <li class="breadcrumb-item">Home</li>
5      <li class="breadcrumb-item active">Churn Analysis</li>
6  {% endblock breadcrumb %}
7  {% block content %}
8
9
10 <style media="screen">
11     .input-group-text, .btn-primary{
12         width:100%;
13         align: "left"
14     }
15     input::placeholder{
16         text-align: left;
17     }
18     input::value{
19         text-align: left;
20     }
21 </style>
22
23 <div class="container-fluid">
24     <div class="row justify-content-center">
25         {% autoescape off %}
26
27         <div class="col-sm-6"> {{ genderG }} </div>
28         <div class="col-sm-6"> {{ salG }} </div>
29         <div class="col-sm-12" style="padding:20px"> {{ departG }} </div>
30
31         <div class="container animated fadeIn">
32             <div class="row justify-content-center">
33                 <div class="col-sm-12">
34                     <div class="card-group">
35                         <div class="card p-4 mb-5">
36                             <div class="card-body">
37                                 <h4> Employee's At Risk</h4> {{ data }}
38                             </div>
39                         </div>
40                     </div>
41                 </div>
42             </div>
43         </div>
44     </div>

```

```

1  from django.urls import path
2  from . import views
3  from django.conf import settings
4  from django.conf.urls.static import static
5
6  app_name = 'core'
7
8  urlpatterns = [
9      path('', views.index, name='index'),
10     path('dashboard/', views.dashboard, name='dashboard'),
11     path('dashboard/<id>/', views.genreport, name='genreport'),
12     path('login/', views.login_view, name='login'),
13     path('logout/', views.logout_view, name='logout'),
14     path('churn/', views.churn, name='churn'),
15     path('appraisal/', views.appraisal, name='appraisal'),
16     path('selfeval/', views.selfeval, name='selfeval'),
17     path('gantt/', views.ganttview, name='ganttview'),
18     path('empdash/', views.empdash, name='empdash'),
19     path('kanban/', views.kanban, name='kanban'),
20     path('kanban/<id>/<boardno>', views.boardupdate, name='boardupdate'),
21     path('kanban/<project>/<user>', views.filterboard, name='filterboard'),
22     path('ganttinsert/', views.ganttinsert, name='ganttinsert')
23 ]
24
25
26 if settings.DEBUG:
27     urlpatterns += static(settings.MEDIA_URL, document_root=settings.MEDIA_ROOT)
28

```

Chapter 7

Testing

Test Case ID	PR_001	Test Case Description	Test the Login Functionality			
Created By	Varshit	Reviewed By	Mr Vaibhav Kala	Version	2.1	
<u>QA Tester's Log</u>		Review comments from Mr Vaibhav Kala incorporate in version 2.1				
Tester's Name	Varshit	Date Tested	February 2, 2021	Test Case (Pass/Fail/Not Executed)	Pass	
S #	Prerequisites:		S #	Test Data		
1	Access to Chrome Browser		1	Userid = JonSnow		
2			2	Pass = 1234@qwer		
3			3			
4			4			
<u>Test Scenario</u>	Verify on entering valid userid and password, the customer can login					
Step #	Step Details	Expected Results	Actual Results		Pass / Fail / Not executed / Suspended	
1	Navigate to login page	Site should open	As Expected		Pass	
2	Enter Userid & Password	Credential can be entered	As Expected		Pass	
3	Click Submit	Cutomer is logged in	As Expected		Pass	

Figure 7.1: Test Case for Login.

Test Case ID	PR_002	Test Case Description	Test the Registration Functionality		
Created By	Varshit	Reviewed By	Mr Vaibhav Kala	Version	2.1
QA Tester's Log	Review comments from Mr Vaibhav Kala incorporate in version 2.1				
Tester's Name	Varshit	Date Tested	February 2, 2021	Test Case (Pass/Fail/Not Executed)	Pass
S #	Prerequisites:		S #	Test Data	
1	Access to Chrome Browser		1	Userid = JonSnow	
2			2	Pass = 1234@qwer	
3			3		
4			4		
Test Scenario	Verify on entering valid userid and password, the customer can login				
Step #	Step Details	Expected Results	Actual Results		Pass / Fail / Not executed / Suspended
1	Navigate to Registration page	Site should open	As Expected		Pass
2	Enter details into form	Credential can be entered	As Expected		Pass
3	Click Submit	User is logged in	As Expected		Pass

Figure 7.2: Test Case for Registration.

Test Case ID	PR_003	Test Case Description	Test the Create Functionality		
Created By	Varshit	Reviewed By	Mr Vaibhav Kala	Version	2.1
QA Tester's Log	Review comments from Mr Vaibhav Kala incorprate in version 2.1				
Tester's Name	Varshit	Date Tested	February 2, 2021	Test Case (Pass/Fail/Not Executed)	Pass
S #	Prerequisites:		S #	Test Data	
1	Access to Chrome Browser		1	Project/Task name = 'ERP System'	
2			2	Project/Task Summary = 'A short summary'	
3			3	Assign ="JonSnow"	
4			4		
Test Scenario	Verify on entering valid form deatails, project/task is created				
Step #	Step Details	Expected Results	Actual Results		Pass / Fail / Not executed / Suspended
1	Navigate to create(project/task) page	Site should open	As Expected		Pass
2	Enter Form Details	Credential can be entered	As Expected		Pass
3	Click Submit	Cutomer is logged in	As Expected		Pass

Figure 7.3: Test Case for Creation Module.

Test Case ID	PR_004	Test Case Description	Appraisal Form Functionality		
Created By	Varshit	Reviewed By	Mr Vaibhav Kala	Version	2.1
QA Tester's Log		Review comments from Mr Vaibhav Kala incorporate in version 2.1			
Tester's Name	Varshit	Date Tested	February 2, 2021	Test Case (Pass/Fail/Not Executed)	Pass
S #	Prerequisites:	S #	Test Data		
1	Access to Chrome Browser	1	job performance = Outstanding		
2		2	Goal Fulfillment = Outstanding		
3		3	Communication = Outstanding		
4		4	Attitude = Outstanding		
Test Scenario		Verify on entering valid userid and password, the customer can login			
Step #	Step Details	Expected Results	Actual Results	Pass / Fail / Not executed / Suspended	
1	Navigate to Appraisal Form page	Site should open	As Expected	Pass	
2	Enter details into form	Data can be entered	As Expected	Pass	
3	Calculate the score	Add to database	As Expected	Pass	
4	Submit	Success Message	As Expected	Pass	

Figure 7.4: Test Case for Appraisal Form.

Test Case ID	PR_005	Test Case Description	Self Evaluation Form Functionality		
Created By	Varshit	Reviewed By	Mr Vaibhav Kala	Version	2.1
QA Tester's Log		Review comments from Mr Vaibhav Kala incorporate in version 2.1			
Tester's Name	Varshit	Date Tested	April 3, 2021	Test Case (Pass/Fail/Not Executed)	Pass
S #	Prerequisites:		S #	Test Data	
1	Access to Chrome Browser		1	Manager Satisfaction = Outstanding	
2			2	Technical Knowledge = Outstanding	
3			3	Quality of Work = Outstanding	
4			4	Productivity = Outstanding	
Test Scenario		Adding form details to database			
Step #	Step Details	Expected Results	Actual Results	Pass / Fail / Not executed / Suspended	
1	Navigate to Self Evaluation Form page	Site should open	As Expected	Pass	
2	Enter details into form	Data can be entered	As Expected	Pass	
3	Calculate the score	Add to database	As Expected	Pass	
4	Submit	Success Message	As Expected	Pass	

Figure 7.5: Test Case for Self Evaluation Form.

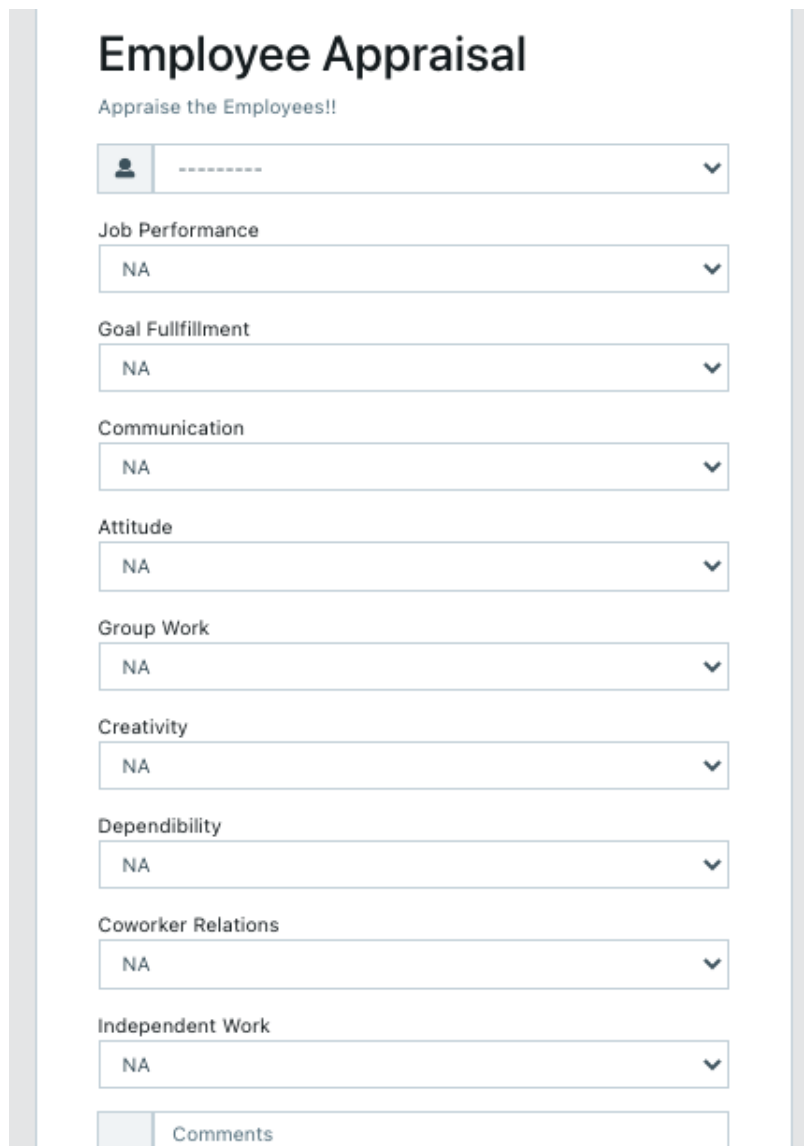
Test Case ID	PR_006	Test Case Description	Issue Creation Functionality		
Created By	Varshit	Reviewed By	Mr Vaibhav Kala	Version	2.1
QA Tester's Log	Review comments from Mr Vaibhav Kala incorporate in version 2.1				
Tester's Name	Varshit	Date Tested	April 3, 2021	Test Case (Pass/Fail/Not Executed)	Pass
S #	Prerequisites:		S #	Test Data	
1	Access to Chrome Browser		1	Name = Display Error	
2			2	Project = Animator Studio	
3			3	Description = Display Error in Home Page	
4			4	Assign = JonSnow	
			5	Deadline = 4/3/2021	
Test Scenario	Adding form details to database				
Step #	Step Details	Expected Results	Actual Results	Pass / Fail / Not executed / Suspended	
1	Navigate to Issue Creation Form page	Site should open	As Expected	Pass	
2	Enter details into form	Data can be entered	As Expected	Pass	
4	Submit	Success Message	As Expected	Pass	

Figure 7.6: Test Case for Issue Creation Form.

Chapter 8

Results

The admin will fill the Appraisal form and the based on the the entries a score will be calculated and assigned to the Employee ans stored in the database. This score will be called the last evaluation score.



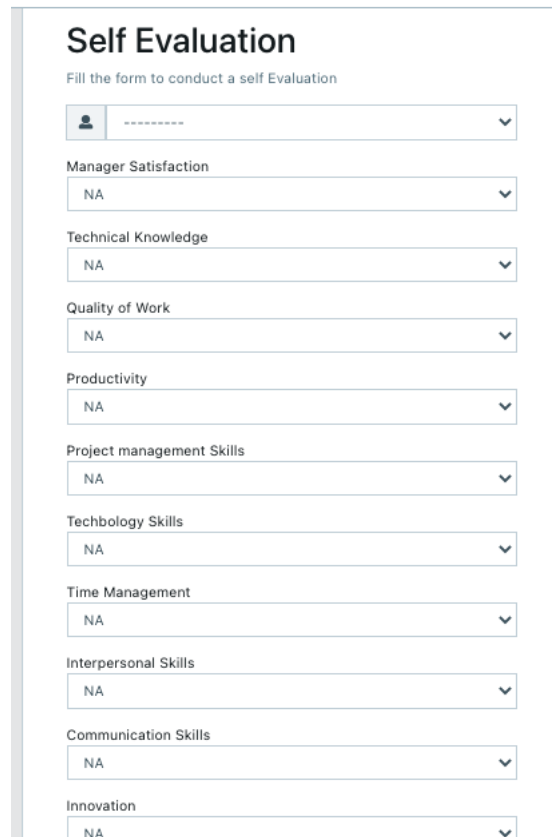
The form is titled "Employee Appraisal" with a subtitle "Appraise the Employees!!". It features a dropdown menu for selecting an employee, followed by ten categories for appraisal: Job Performance, Goal Fulfillment, Communication, Attitude, Group Work, Creativity, Dependability, Coworker Relations, and Independent Work. Each category has a dropdown menu currently set to "NA". At the bottom, there is a "Comments" section with a text input field.

Category	Value
Job Performance	NA
Goal Fulfillment	NA
Communication	NA
Attitude	NA
Group Work	NA
Creativity	NA
Dependability	NA
Coworker Relations	NA
Independent Work	NA

Comments

Figure 8.1: Employee Appraisal.

The employee will fill the Self Evaluation form and the based on the the entries a score will be calculated and assigned to the Employee and stored in the database. this will be stored in the databases as self satisfaction score.



Self Evaluation
Fill the form to conduct a self Evaluation

Employee ID: [NA] ▼

Manager Satisfaction: [NA] ▼

Technical Knowledge: [NA] ▼

Quality of Work: [NA] ▼

Productivity: [NA] ▼

Project management Skills: [NA] ▼

Techbology Skills: [NA] ▼

Time Management: [NA] ▼

Interpersonal Skills: [NA] ▼

Communication Skills: [NA] ▼

Innovation: [NA] ▼

Figure 8.2: Self Evaluation Form.

When an employee is added to the system the date of joining, department and salary level are entered. The date of joining is used to determine the amount of time the employee has been with the company. These three attributes are also stored to predict the employee attrition. When an employee is assigned to a project the number of projects is increased everytime.

Employee's At Risk

Employee	Satisfaction Score	Last Evaluation	No. of Project	Average Monthly Hours	Time Spent	Departments	Salary Level
Kelly Pilgram	0.41	0.94	7	218	3	Accounting	High
Baxter Illingsworth	0.34	0.13	9	230	11	R&D	High
Annamarie Burl	0.21	0.81	9	198	83	Sales	Low
Easter Tolson	0.20	0.69	7	245	99	Support	High
Tabb Laffin	0.28	0.60	7	289	21	Management	High
Brien Attryde	0.29	0.19	7	261	51	Accounting	Medium
Townie Rothschild	0.31	0.57	9	249	64	Technical	High
Beverlie Perschke	0.40	0.03	9	294	34	R&D	Low
Bette McMeekan	0.32	0.04	7	228	48	Sales	Low
Janeta	0.28	0.79	9	177	57	HR	Low

Figure 8.3: A List of At Risk Employees.

Feature importance refers to techniques that assign a score to input features based on how useful they are at predicting a target variable. Here the target variable being if an employee will leave the company or not, based on the multiple features. We can see that the most important feature in whether an employee will leave the company or not is the satisfaction score of the employee.

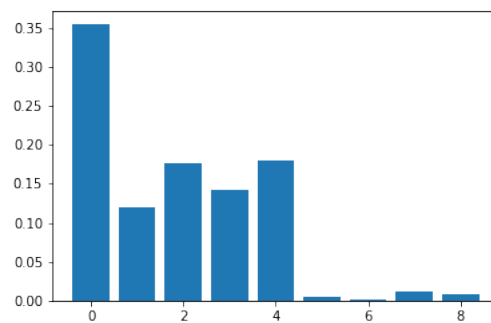


Figure 8.4: Calculating Metrics.

We got a classification rate of 98%, which is considered as good accuracy. Precision is about being precise, i.e., how precise your model is. In other words, you can say, when a model makes a prediction, how often it is correct. In our prediction case, when our model predicted an employee is going to leave, that employee actually left 99% of the time. Recall: If there is an employee who left present in the test set and our model can identify it 95% of the time

```
Accuracy: 0.9875555555555555
Precision: 0.9922480620155039
Recall: 0.9552238805970149
```

Figure 8.5: Result

Chapter 9

Conclusion

9.1 Conclusion

‘PROManagement’ is a web application that can help organization in their project management activities. It can be used to improve the management quality of the organization and can work effectively as a stand-alone program or as a key component of an ERP system. Although as a part of a system it will lead to better results such as less time for administrative work by managers, easier and quicker access to needed information and reduced costs. The benefits if using a planning tool can be easily observed and measured. Having a well-thought, solid and working plan will undoubtedly lead to more well-completed projects and increasing of the business profits.

Literature Cited

- [1] T. Mladenova, "A project management system for time planning and resources allocation", *2019 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO)*, Opatija, Croatia, pp. 1299-1303, 2019
- [2] R. G. Evgeny, A. L. Aleksandr and V. Z. Aleksandr, "Algorithms for workforce assignment problem", *2017 Tenth International Conference Management of Large-Scale System Development (MLSD)*, Moscow, 2017, pp. 1-3
- [3] Safrizal, L. Tanti, R. Puspasari and B. Triandi, "Employee Performance Assessment with Profile Matching Method", *2018 6th International Conference on Cyber and IT Service Management (CITSM)*, Parapat, Indonesia, 2018, pp. 1-6.
- [4] M. Ilie, S. Ilie and I. Muraretu, "A Semiautomated Human Resource Management System", *2019 IEEE International Symposium on INnovations in Intelligent SysTems and Applications (INISTA)*, Sofia, Bulgaria,, 2019, pp. 1-6.
- [5] C. Desmond, Project management tools-software tools", *IEEE Engineering Management Review*, vol. 45, no. 4, pp. 24-25, Fourth Quarter 2017
- [6] S. Kerdsiri, S. Aramkul and P. Champrasert, "Fatigue Consideration optimization Model for Employee Allocation in Flow Shop Scheduling Problems," *019 IEEE 6th International Conference on Industrial Engineering and Applications (ICIEA)*, Tokyo, Japan, 2019, pp. 898-902.
- [7] A. S. Korznyakov, A. U. Gaida, T. G. Grigorian and K. V. Koshkin, "The model of universal project states classifier in project management system" *2017 9th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS)*, Bucharest, 2017, pp. 1066-1072.
- [8] A. Rasyid, M. A. Akbar, N. Dengen, M. Tonggiroh, S. N. Alam and E. Budiman, "Employee Performance Target Management System to Support Work Performance Assessment," *2018 2nd East Indonesia Conference on Computer and Information Technology (EIconCIT)*, Makassar, Indonesia, 2018, pp. 280-284
- [9] O. Voitenko, I. Achkasov and A. Timinsky, "Competence-based knowledge management in project oriented organisations in bi-adaptive context," *2019 IEEE 14th International Conference on Computer Sciences and Information Technologies (CSIT)*, Lviv, Ukraine, 2019, pp. 111-115
- [10] I. Babayev, "Priorities management in the portfolio of projects in complex and dynamically variable environments", *2017 12th International Scientific and Technical Conference on Computer Sciences and Information Technologies (CSIT)*, Lviv, 2017, pp. 187-191.

Acknowledgements

We would like to thank the Director Rev. Bro. Jose Thuruthiyil and Principal Dr. Sincy George for giving us the opportunity to work on the project and for their guidance. We would like to express our deep gratitude towards Dr Joanne Gomes Head of The Department (INFT) and our project guide for her encouragement, constant guidance, support along with Mr. Vaibhav Kala for sharing her experience and knowledge and pushing us in the right direction to ensure timely completion of all our project work.