



American International University-Bangladesh (AIUB)

Department of Computer Science

Faculty of Science & Technology (FST)

LAW AND ORDER ASSISTANCE

(WITH THE HELP OF ARTIFICIAL INTELLIGENCE)

A Software Engineering Project Submitted

By

Group-1

Semester: Fall_23_24		Section: H	Group Number:01	
SN	Student Name	Student ID	Contribution (CO1+CO2)	Individual Marks
1	FAJUL, SOYED MD. SOLAMAN	21-44397-1	18%	
2	SEUM, SABBIR AHMED AL	22-47196-1	18%	
3	RAHMAN, MD. TAWFIQUR	21-45878-3	18%	
4	AHMED, MD. TANVIR	20-41866-1	18%	
5	HOSSAIN, TANVIR	21-45590-3	18%	
6	ARNAB, MD. AFNAN RAHMAN	20-43969-2	10%	

The project will be Evaluated for the following Course Outcomes

CO1: <i>Analyze</i> the impact of software engineering models over various context of software development to assess societal, health, safety, legal and cultural issues.	Total Marks	
Project Background Analysis and feasibility (needs, goal, benefits, etc.)	[5 Marks]	
Analysis the impact of societal, health, safety, legal and cultural issues	[5Marks]	
Review of existing Studies and Relevant Example	[5Marks]	
	Total Marks	

CO2: <i>Explain</i> appropriate software engineering model, project management roles and their skills in the context of professional engineering practice and solutions to complex engineering problems in a software development environment.		
Appropriate Process Model Selection and Argumentation with Evidence	[5Marks]	
Evidence of Argumentation regarding process model selection	[5Marks]	
Submission, Defense, Completeness, Spelling, grammar and Organization of the Project report	[5Marks]	

Description of Student's Contribution in the Project work

- Mid-Term contribution
- Final-term contribution

Student Name: FAJUL, SOYED MD. SOLAMAN

Student ID: 21-44397-1

Contribution in Percentage (18%):

Contribution in the Project:

- Contribution Description 1(Idea Generate, Solution to the problem Answer 3,4,5 questions, earned value analysis, Work breakdown structure, timeline chart 2, test cases)
- Contribution Description 2(Sequence Diagram Lab, process model, User interface, timeline chart 1, risk management)

SOYED

Signature of the Student

Student Name: SEUM, SABBIR AHMED AL

Student ID: 22-47196-1

Contribution in Percentage (18%):

Contribution in the Project:

- Contribution Description 1(Proposed Idea, Solution to the problem answer 1 and 2, user interface, earned value analysis, risk management, test cases)
- Contribution Description 2(Wrote and gather information of Functionality, Draw Use case Diagram and Class Diagram, Gather Idea, Gather Resources, timeline chart 1, work breakdown structure)

SEUM
Signature of the Student

Student Name: RAHMAN, MD. TAWFIQUR

Student ID: 21-45878-3

Contribution in Percentage (18%):

Contribution in the Project:

- Contribution Description 1 (Idea generation, Project proposal, Work breakdown structure, timeline chart 2, risk management)
- Contribution Description 2 (Functional requirements ideas, Class diagram(rejected), opinion share about process model, User interface, timeline chart 1, earned value analysis, test cases)

_____TAWFIQUR_____
Signature of the Student

Student Name: AHMED, MD. TANVIR

Student ID: 20-41866-1

Contribution in Percentage (18%):

Contribution in the Project:

- Contribution Description 1 (Proposed idea, project proposal-Background to the problem, User interface, earned value analysis, risk management, test cases)
- Contribution Description 2 (SDLC- Process model, relationship between roles, functional requirements, timeline chart 1, Work breakdown structure)

_____Tanvir_____
Signature of the Student

Student Name: HOSSAIN, TANVIR

Student ID: 21-45590-3

Contribution in Percentage (18%):

Contribution in the Project:

- Contribution Description 1 (Project Idea, Project Proposal, timeline chart 1-2, risk management, work breakdown structure, test cases)
- Contribution Description 2 (Functionality, Gather Idea/Select Process Model , Resource and idea, user interface, earned value analysis)

_____Tanvir_____
Signature of the Student

Student Name: ARNAB, MD. AFNAN RAHMAN

Student ID: 20-43969-2

Contribution in Percentage (10%):

Contribution in the Project:

- Contribution Description (Gather information of Functionality, Activity Diagram, Gather Idea)
- Contribution Description (User interface, Work breakdown structure, timeline chart 1)

ARNAB

Signature of the Student

- **PROJECT PROPOSAL**

- **Background to the problem**

Not knowing about laws and rules can create many problems, from accidentally breaking the law to not understanding our rights and duties. But don't worry! An AI assistant can be like your helpful friend, giving you easy-to-understand info about all the rules. It keeps learning and knows a lot about local and national laws. So, if you have any questions or need advice, just ask your AI buddy. It's like having a smart guide to help you follow the rules and know your rights. With this tech friend, you can be more aware and make better choices, making life a bit easier in our diverse and rule-filled world.

For example: a person wants to start a business in a foreign country. As a foreigner, he doesn't have much knowledge about what type of documents he will need. Not only in business, but also in education, permanent residence, buying property, passport, visa etc., people have to follow some criteria. They need to gather document. But in most cases, people had to face difficulties such as fraud people/ organization, facing hassle for having not enough documents, bribery, middle man etc. If people are being acknowledged, they can avoid most of the problem. Moreover, as a responsible citizen, people should be educated as well as be updated about laws and order about the country, they are from. Our system will acknowledge people as well as will help people to face all of these difficulties.

- **Solution to the problem**

The project was about law-and-order assistance with help of AI. Our software will provide the services by using knowledge of laws of different format such as (Home, Car, Traffic, Business, Weeding, Meetings, Rules of regulations of anything). With the help of our software, they can take decision of right or wrong. We can provide them the right kind of information by following the law-and-order constitution books of that (Country, State, Regions). So that they can have the right kind of information to solve the problems that they can deal with the situations. We are human being we can know that kind of information. So, if we have a assistant like this we can make less mistakes. If we look at the business perspective this was profitable. At beginning we run our software free for customers acquisition, then we will make profits by using ads or the we goes for subscriptions model. The basic functionality is to provide important information for a certain action of a user like while buying cars, houses or shops, while traveling or driving in a unknown or new area of a certain country, starting a business etc. By solving these problems, we can ensure a user's safety regarding legal and cultural issues. Everyone can use our application. By following our solution people won't have to cost extra money to a professional and also can save time. People faces many problems in their daily life. Law and order are the main issue. It will help them to learn and deal with their problems. There are many laws and order assistant in the market but they can provide only one problem or they are partnering with one set of company like legal action firmly. But we can provide our user anything that they thought about that it was wrong or right. If we can develop the software, our users can easily make their decision based on our information.

- **SOFTWARE DEVELOPMENT LIFE CYCLE**
- **Process Model**

We selected the Waterfall process model. Our requirements are well-defined upfront in the functional requirements document, making it feasible to follow a linear sequential flow from requirements to design, implementation, testing, and deployment. The project scope seems fixed and not expected to change significantly over development. The waterfall model works well for software projects with stable requirements. The waterfall model provides clear phases and visibility into the progress of each deliverable. This structured approach is a good fit based on the details provided in the functional requirements given to our project.

Other process models like agile or iterative may not be as suitable because there is no mention of changing requirements, need for stakeholder feedback or prototypes, or other indicators that suggest an adaptive approach is required. Our project size was broad and team members are same number and, we cannot take extra member in our team. The priority levels indicate importance rather than uncertainty or need for experimentation, backtracking, no need to change, no need to iteration, again indicating suitability for a predictive waterfall approach.

- **Project Role Identification and Responsibilities**

Based on the functional requirements outlined, here is how the **roles** fit into a waterfall process model for our project:

1. **Project Manager**: Responsible for overall project planning, monitoring, and coordination. They ensure that the project progresses through the defined phases in a timely and organized manner.
2. **Business Analyst**: Responsible for gathering and documenting detailed functional requirements, ensuring they meet the needs of both the users and the organization.
3. **Software architects and designers**: Translate requirements into detailed system and software design.
4. **Developers**: Code and implement the system based on the defined designs.
5. **QA testers**: Verify and validate the system against the requirements and designs.
6. **General Users**: Assist with user acceptance testing to ensure the system works as expected.
7. **Data Managers**: Handle deployment of the database and data migration.

Relationship Between Roles:

In the Waterfall Model, the Project Manager plays a central role in overseeing project planning, monitoring, and coordination. Collaborating closely with the Business Analyst, the Project Manager relies on detailed functional requirements to guide the project through its defined phases. The Business Analyst, in turn, communicates these requirements to Software Architects and Designers, who translate them into a comprehensive system and software design. Developers then implement the design, working closely with QA Testers during the testing phase. QA Testers validate the system against requirements, while General Users contribute to user acceptance testing. The Project Manager also collaborates with Data Managers to ensure the smooth deployment of the database. These relationships underscore the interdependence of roles, emphasizing the need for effective communication and collaboration to successfully navigate the sequential progression of the Waterfall Model and deliver a quality product.

- **Requirement Analysis**

1. General Users Functional Requirements:

1.1 Create an account:

- 1.1.1** Users must be able to create an account.
- 1.1.2** User must fill in the username, unique password, Current address, Mobile number, un-used email.
- 1.1.3** OTP will send to given email or Mobile number as selected before.
- 1.1.4** There will also be a two-step verification process. For ensuring account security.
- 1.1.5** After Filling profile form user need to pay to active his/her account.
- 1.1.6** Users can only proceed if they have paid.

1.2 Log In

- 1.2.1** Users can log in with a username and password.
- 1.2.2** Two-step verification is initiated if the account has been inactive for more than 1 month.

1.3 Locate User

- 1.3.1** Users should be able to find and connect with other users.

1.4 Forgot Password

- 1.4.1** Users can reset their password through a two-step verification process.

1.5 Searching

- 1.5.1** Users can search for problems to find solutions.

1.6 Categories

- 1.6.1** Users can browse problems by categories.

1.7 Filter

- 1.7.1** Users can filter search results based on various criteria.

1.8 Country

- 1.8.1** Users can specify their country for more localized results.

1.9 Active Account

- 1.9.1 Users can activate their account by making a payment.
 - 1.9.2 Inactive accounts will have limited functionality until activated.
 - 1.10 **Security**
 - 1.10.1 Users can manage their account security settings.
 - 1.11 **Previous Problems and Solutions**
 - 1.11.1 Users can view their past interactions with problems and solutions.
 - 1.12 **Rate the Solution**
 - 1.12.1 Users can rate and provide feedback on the solutions they have used.
 - 1.13 **Review and Report**
 - 1.13.1 Users can submit reviews and reports for inappropriate content or behavior.
 - 1.14 **Delete Account**
 - 1.14.1 Users can delete their accounts if they wish to discontinue using the platform.
- 1. **Data Manager Functional Requirements:**
 - 1.1 **Insert Data in the Database**
 - 1.1.1 Data Managers can upload data to the database connected to AI.
 - 1.2 **Verify User Accounts**
 - 1.2.1 Data Managers can verify user accounts based on payment status.
- 2. **Admin Functional Requirements:**
 - 2.1 **General Database Access**
 - 2.1.1 Admins have access to a general database to see the number of users.
 - 2.2 **Reviews and Reports Management**
 - 2.2.1 Admins can manage reviews and reports submitted by users.
- 3. **Functional Requirements Prioritization:**

High Priority:

- Sign Up
- Log In
- Forgot Password
- Searching
- Active Account

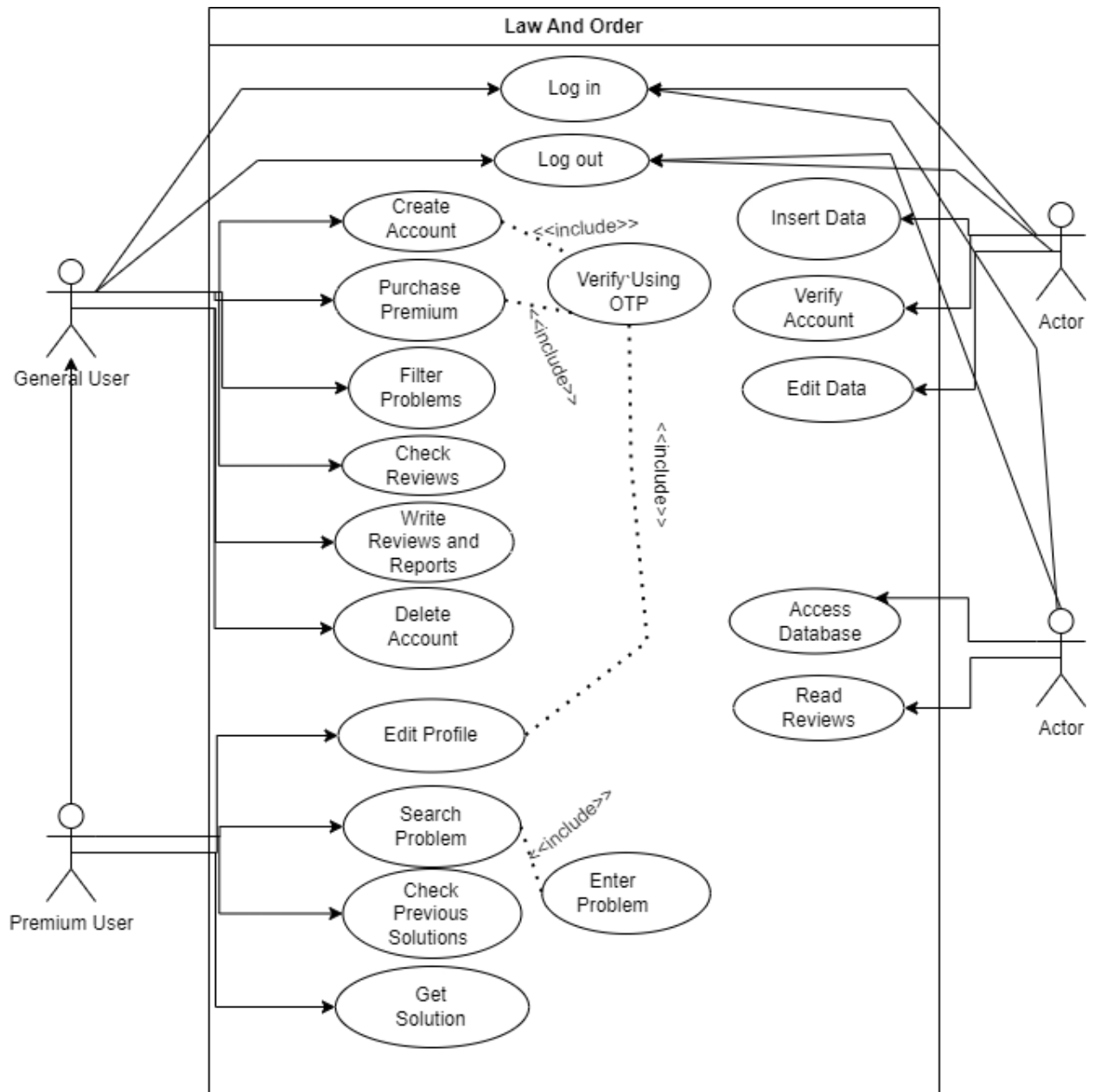
Medium Priority:

- Security
- Previous Problems and Solutions
- Review and Report
- Delete Account
- Insert Data in the Database (Data Manager)
- Verify User Accounts (Data Manager)

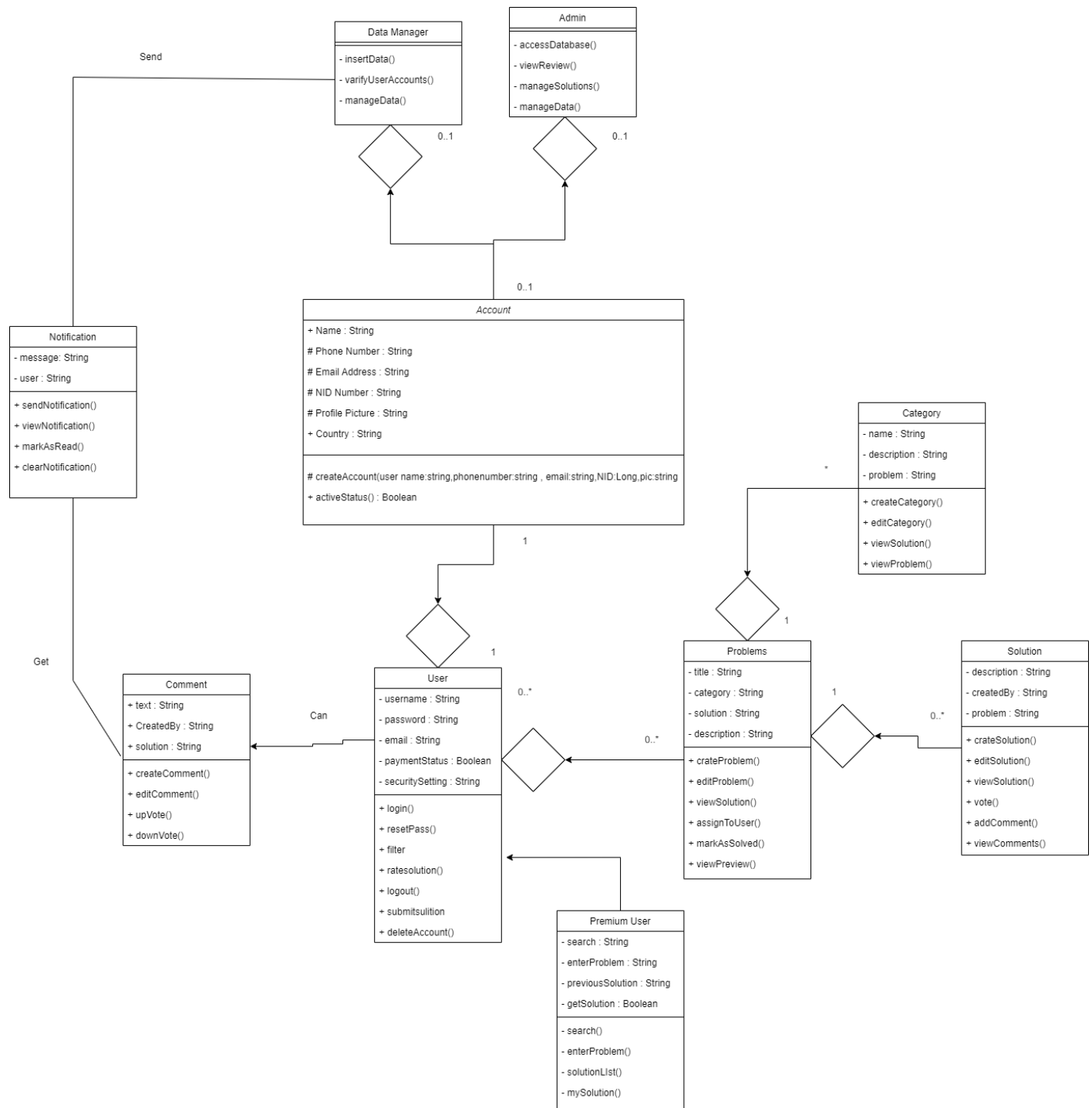
Low Priority:

- Locate User
- Categories
- Filter
- Country
- Rate the Solution
- General Database Access (Admin)
- Reviews and Reports Management (Admin)

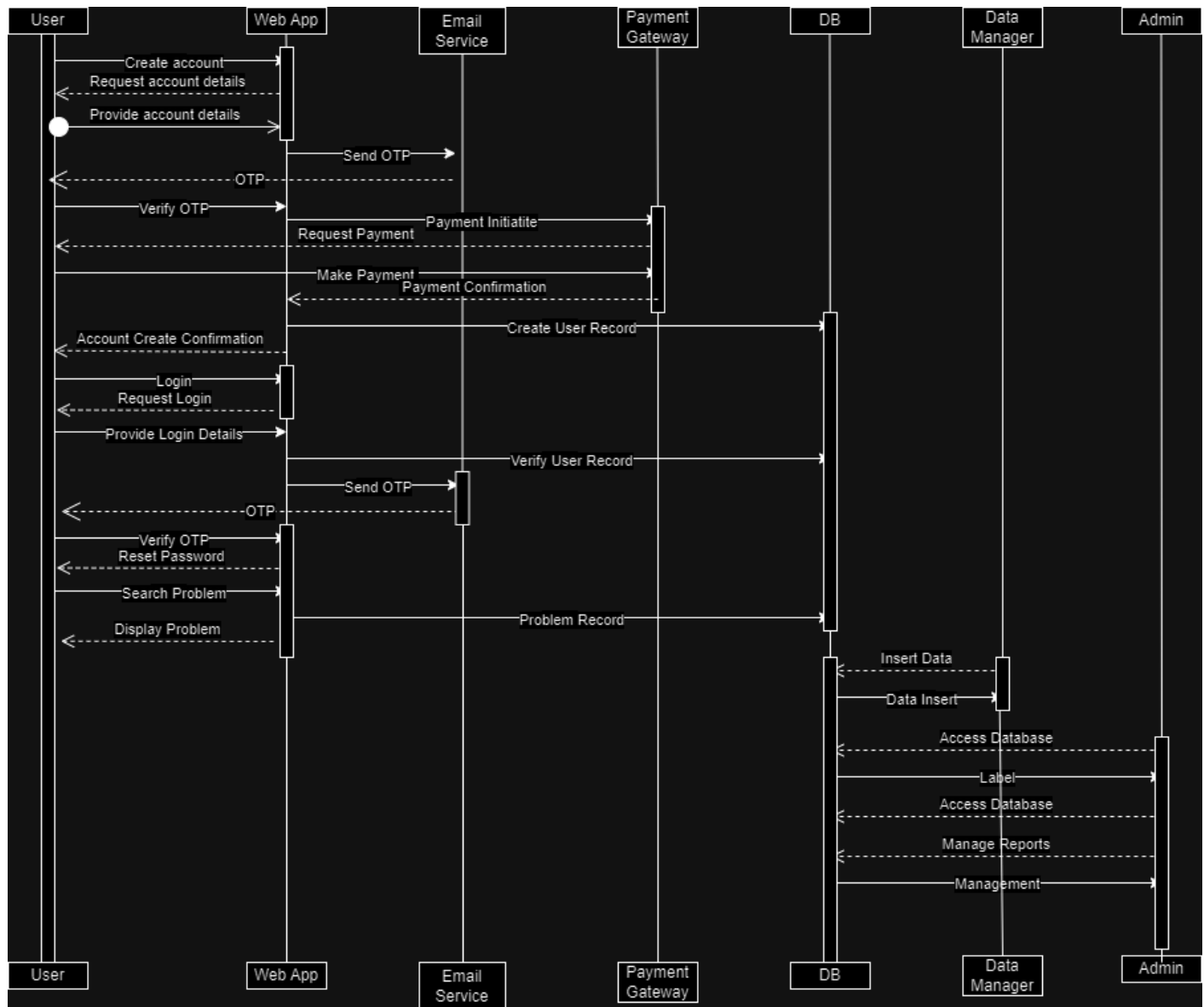
Use case diagram:



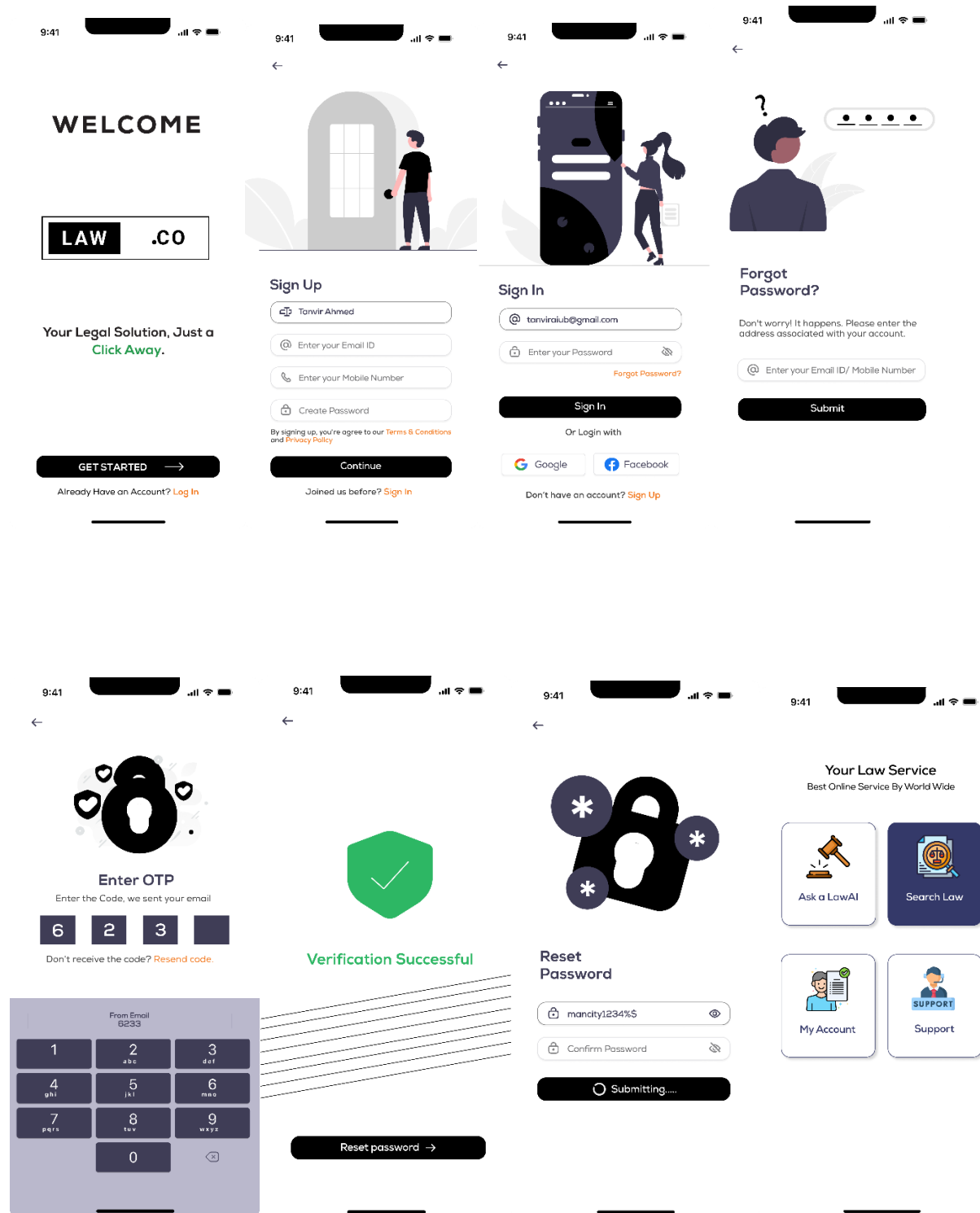
Class diagram:

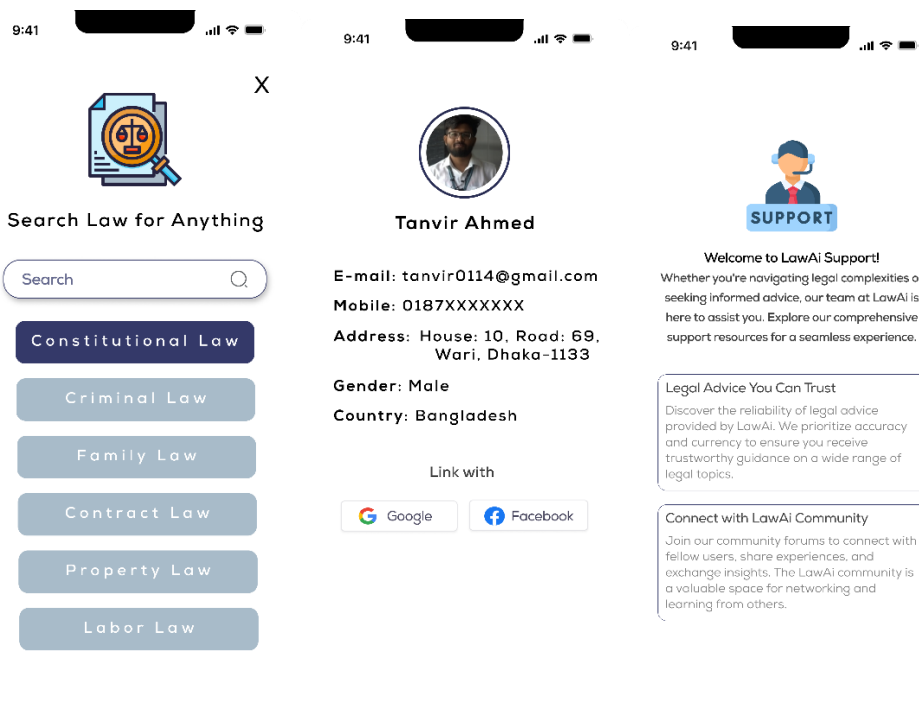
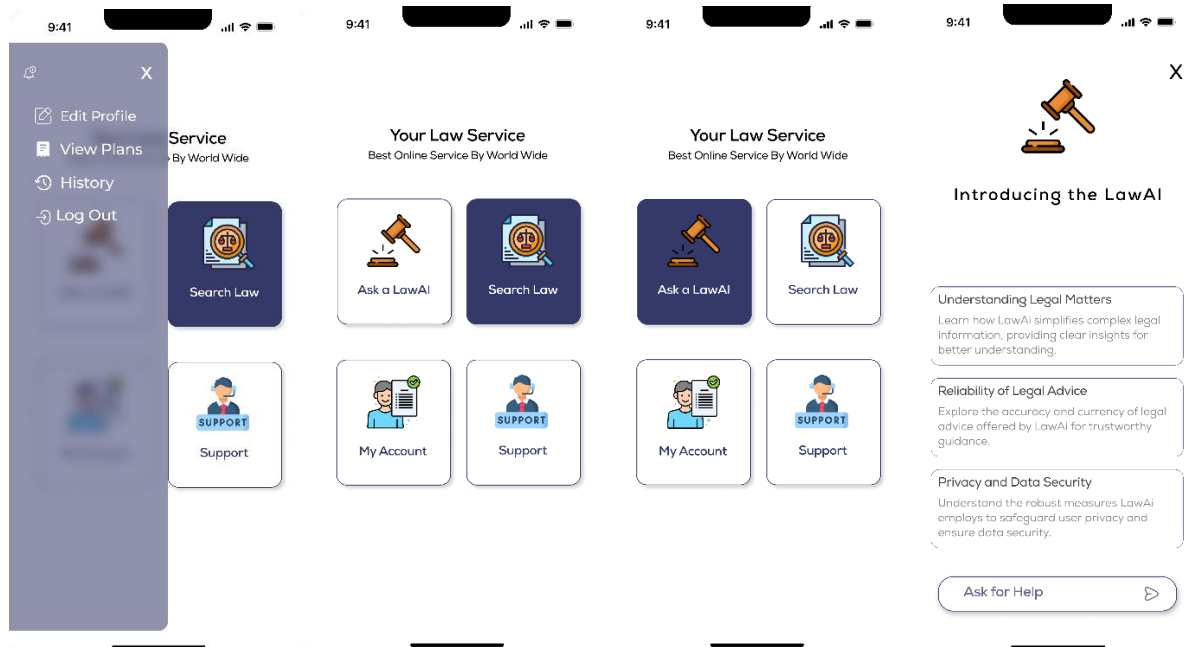


Sequence diagram:



User Interface:





Test Cases:

Tester name	SOYED,MD.SOLAMAN FAJUL	Tester scenario id	UN_01
Tester scenario name	Validate new user registration functionality	Test priority	High
Description	Test user ability to create new account	Man hours	20 hours
Module name	User Registration	Start date	10/11/2023
		End date	12/11/2023

Test Case ID	Description	Pre-condition	Test Steps	Test Data	Expected Result	Actual Result	Status	Notes
UN_01	Test user ability to create new account	New user account is created and activated in the system. User can login and access features based on account status and privileges.	<ol style="list-style-type: none">1. Navigate to sign up page2. Enter unique username3. Enter valid password4. Enter valid email address5. Enter phone number6. Enter address7. Click on sign up button8. Check for account created confirmation message9. Try to login with new credentials	Provided previously Expected	Account created, user can log in	As expected	Pass	

Tester name	SOYED,MD.SOLAMAN FAJUL	Tester scenario id	UN_02
Tester scenario name	Check login with valid and invalid credentials	Test priority	HIGH
Description	Validate login function	Man hours	15 hours
Module name	Login	Start date	11/11/2023
		End date	12/11/2023

Test Case ID	Description	Pre-condition	Test Steps	Test Data	Expected Result	Actual Result	Status	Notes
UN_02	Validate login function	Existing test user account	<ol style="list-style-type: none"> 1. Navigate to login page 2. Enter valid username 3. Enter valid password 4. Click login button 5. Verify directed to user dashboard page 6. Enter valid username 7. Enter invalid password 8. Click login button 9. Verify error message displayed 	Valid and invalid inputs	Appropriate system behavior	As expected	Pass	

Tester name	Md. Tanvir Ahmed	Tester scenario id	UN_03
Tester scenario name	Check login with valid and invalid credentials	Test priority	High
Description	Test search feature returns expected results Preconditions: User logged into account	Man hours	36 hours
Module name	Knowledge Base Search	Start date	10/11/2023
		End date	12/11/2023

Test Case ID	Description	Pre-condition	Test Steps	Test Data	Expected Result	Actual Result	Status	Notes
UN_03	Test search feature returns expected results Preconditions: User logged into account	User logged into account	<ol style="list-style-type: none"> 1. Login to user account 2. Navigate to search page 3. Enter search string "buying property" 4. Click search button 5. Verify search results page loads 6. Check results contain relevant problems on property purchase 	Sample search string	Relevant results displayed	As expected	Pass	

Tester name	Md. Tanvir Ahmed	Tester scenario id	UN_04
Tester scenario name	Check admin user account verification	Test priority	Medium
Description	Validate admin ability to verify users Preconditions: New user registration completed	Man hours	8 hours
Module name	User Management Test	Start date	11/11/2023
		End date	12/11/2023

Test Case ID	Description	Pre-condition	Test Steps	Test Data	Expected Result	Actual Result	Status	Notes
UN_04	Validate admin ability to verify users Preconditions: New user registration completed	New user registration completed	1. Login as administrator 2. Navigate to user management section 3. Find newly registered users section 4. Open sample user account for verification 5. Review provided user details for legitimacy 6. Click button to verify user account 7. Check user account activated in system	Sample new user account	Admin can verify user legitimacy and activate account	As expected	Pass	

Tester name	Md. Tanvir Ahmed	Tester scenario id	UN_05
Tester scenario name	Test password reset via email functionality	Test priority	Medium
Description	Check forgotten password reset feature	Man hours	72 hours
Module name	Login Test	Start date	5/11/2023
		End date	12/11/2023

Test Case ID	Description	Pre-condition	Test Steps	Test Data	Expected Result	Actual Result	Status	Notes
UN_05	Check forgotten password reset feature	Existing user account	<ol style="list-style-type: none"> 1. Click forgot password link 2. Enter username 3. Submit forgot password request 4. Check email received with reset instructions 5. Follow email link to reset page 6. Enter new password 7. Confirm new password 8. Click change password button 9. Verify able to login with new password 	Inputs for password reset	Password changed and login successful	As expected	Pass	

Tester name	SABBIR AHMED AL SEUM	Tester scenario id	UN_06
Test Title	Account Deletion Test Priority	Test priority	Low
Description	Validate account deletion functionality	Man hours	20 hours
Test module	User Settings Test	Start date	02/12/2023
		End date	11/12/2023

Test Case ID	Description	Pre-condition	Test Steps	Test Data	Expected Result	Actual Result	Status	Notes
UN_06	Verify users can delete their account	Active user account exists	<ol style="list-style-type: none"> 1. Login to test account. 2. Navigate to account settings. 3. Locate delete account option. 4. Confirm request to delete account. 5. Verify account is deleted. 6. Try re-accessing account on login page. 	Test user account Expected	Account deleted from system	As expected,	Pass	

Tester name	SABBIR AHMED AL SUM	Tester scenario id	UN_07
Test Title	Payments Test Priority	Test priority	High
Description	Confirm payment processing activates inactive accounts	Man hours	36 hours
Test module	Payments Test	Start date	09/12 / 2023
		End date	

Test Case ID	Description	Pre-condition	Test Steps	Test Data	Expected Result	Actual Result	Status	Notes
UN_07	Confirm payment processing activates inactive accounts	Inactive test account	<ol style="list-style-type: none"> 1. Login with inactive test account 2. Navigate to payments page 3. Select activate account payment option 4. Enter credit card details 5. Submit payment 6. Verify payment confirmation received 7. Check account switched to active status 	Simulated credit card details	Payment succeeds	As expected,	Pass	

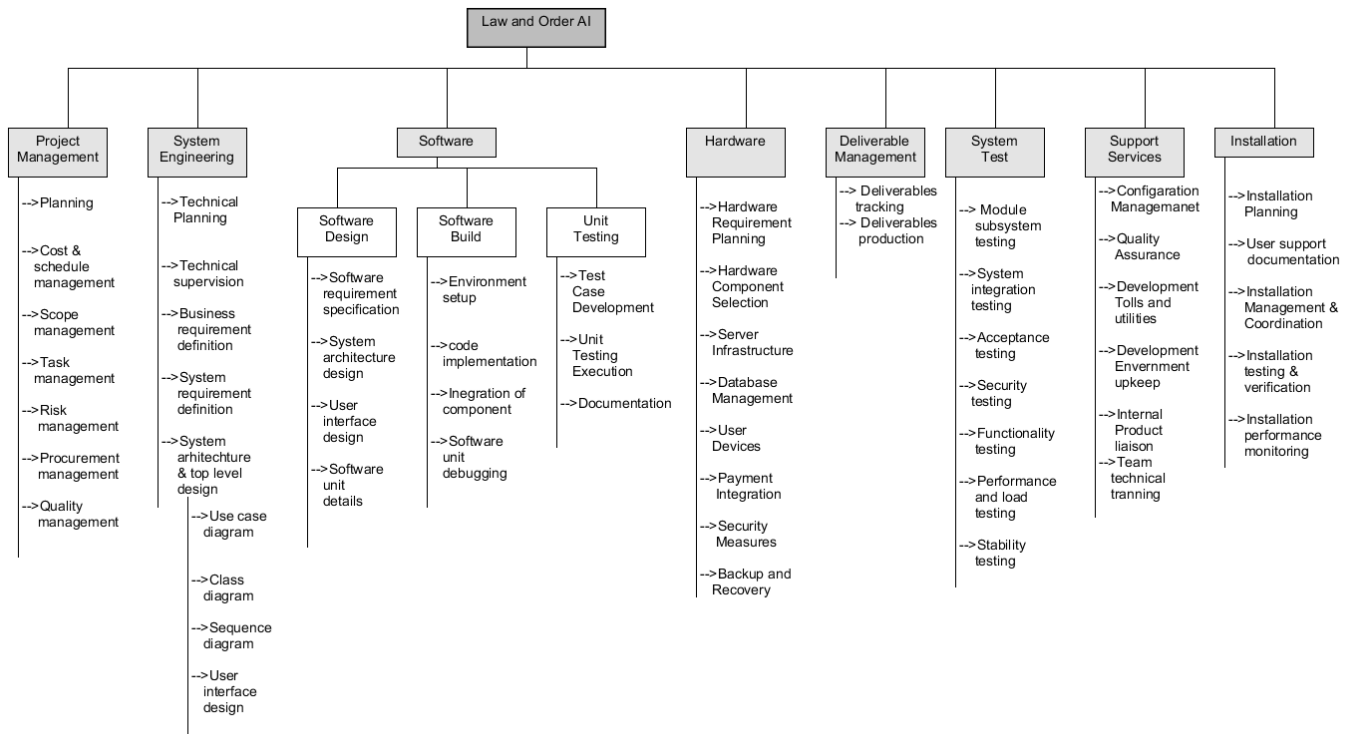
Tester name	Hossain.Tanvir	Tester scenario id	UN-8
Tester scenario name	Validate user review and report submission process	Test priority	Medium
Description	Test ability for users to flag issues to admin	Man hours	20 hours
Test Module	Moderation Test	Start date	10/12/23
		End date	12/12/23

Test Case ID	Description	Pre-condition	Test Steps	Test Data	Expected Result	Actual Result	Status	Notes
UN-08	Test ability for users to flag issues to admin	User logged into account	<ol style="list-style-type: none"> 1. Navigate to post to be reported while logged in 2. Locate report option 3. Select reason for reporting content 4. Enter details on why post is inappropriate 5. Submit report to admin team 6. Verify confirmation message displayed 	Sample content to report	Confirmation that report received	As expected	Pass	User friendly

Tester name	Hossain.Tanvir	Tester scenario id	UN-09
Tester scenario name	Check data manager CSV upload capabilities	Test priority	Medium
Description	Confirm data file uploads successfully to database Preconditions: Valid CSV file, data manager login	Man hours	30 hours
Test Module	Data Management	Start date	10/12/23
		End date	12/12/23

Test Case ID	Description	Pre-condition	Test Steps	Test Data	Expected Result	Actual Result	Status	Notes
UN-09	Confirm data file uploads successfully to database Preconditions: Valid CSV file, data manager login	Valid CSV file, data manager login	<ol style="list-style-type: none"> 1. Login as data manager 2. Navigate to data upload section 3. Select option to upload new data file 4. Choose CSV file containing data 5. Begin upload process for file 6. Monitor for upload complete confirmation 7. Verify data visible correctly in database 	CSV file with sample data	Data uploaded to database correctly	As expected	Pass	Data file upload All ok

Work Breakdown Structure:



Project estimation:

Project Type: Organic

P = 1.05

T = 0.38

Coefficient=2.4

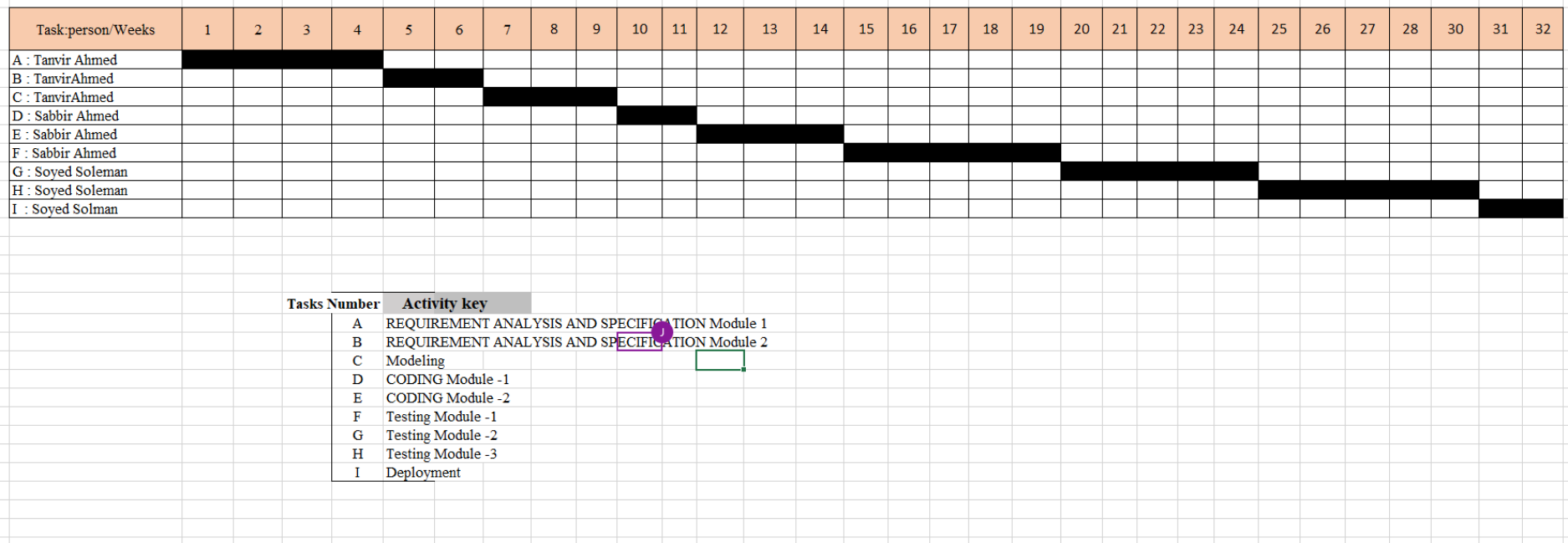
SLOC = 6000

PM = Coefficient * (SLOC/1000)^P = 2.4*(6000/1000)^{1.05} = 15.74

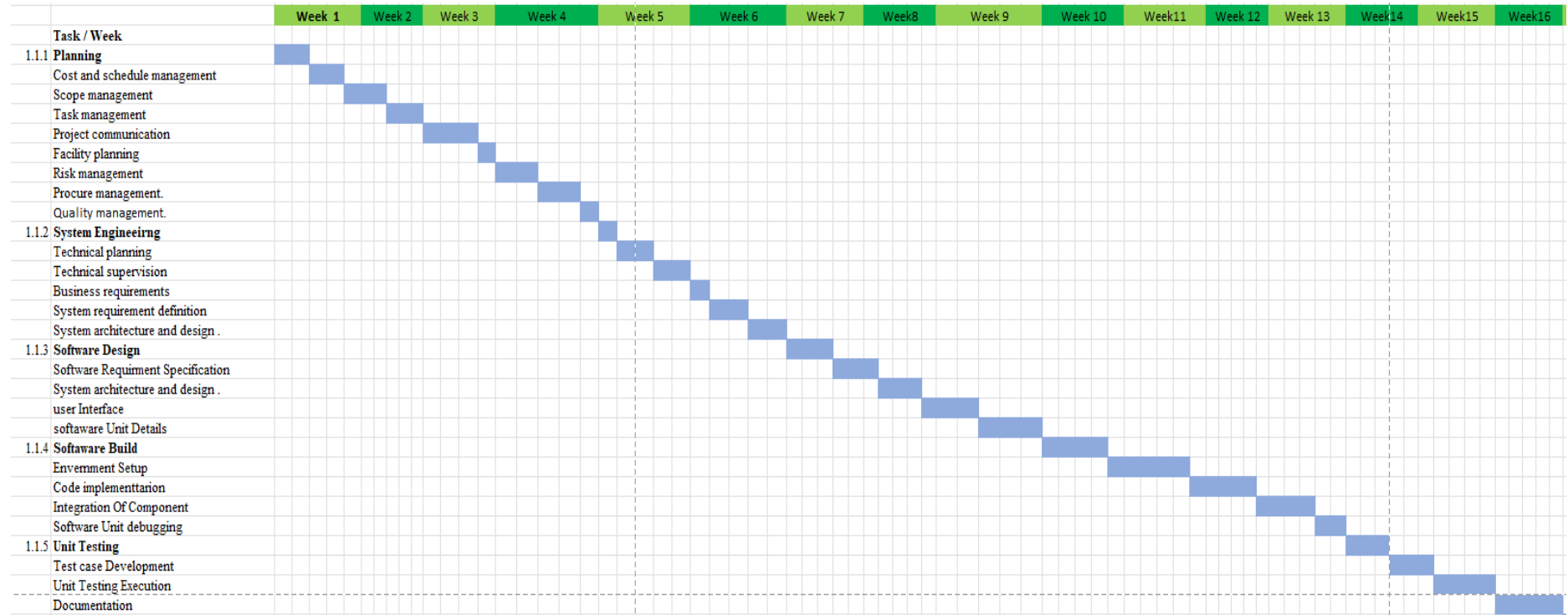
DM = 2.05 * (PM)^T = 2.5*(16)^{0.38} = 7.16

ST = PM/DM = 2.19 ≈ 3

Timeline Chart 1:



Timeline Chart 2:



[illegible]

Earned Value Analysis:

Effort estimated = $18.516 * 20$

= 371 person-day

Total task = 51

EVA conduct date: 1/12/2023

10 tasks have been completed but the project schedule indicates that 12 tasks should have been completed in that time.

Task	Planned Effort	Actual Effort
1	12.0	12.5
2	11.0	11.0
3	15.0	12
4	8.6	10.2
5	7.4	4.0
6	10.0	9.0
7	7.0	16.0
8	8.0	7
9	13	10
10	5	8
11	9	
12	10	

So here, BAC = 371
BCWP = 97

BCWS = 116
ACWP = 99.7

$SPI = BCWP / BCWS = 97 / 116 = 0.83620$

$SV = BCWP - BCWS = 97 - 116 = -19$ person-day

$CPI = BCWP / ACWP = 97 / 99.7 = 0.97291$

$CV = BCWP - ACWP = 97 - 99.7 = -2.7$ person-day

% Schedule for completion = $BCWS / BAC$
= $116 / 371$
= 31.26%

[% of work schedule to be done at this time]
% Complete = $BCWP / BAC$
= $97 / 371$
= 26.14%

[% of work completed at this time]

Risk Management:

Risks	Category	Probability	Impact
Size estimate may be significantly low	PS	70%	3
Larger number of users than planned	PS	10%	2
End-users resist system	BU	40%	1
Delivery deadline will be tightened	BU	80%	3
Funding will be lost	CU	90%	1
Customer will change requirements	PS	20%	1
Technology will not meet expectations	TE	30%	3
Lack of training on tools	DE	30%	4
Staff inexperienced	ST	20%	3
Staff turnover will be high	ST	50%	3
Personnel shortfalls	CU	20%	1
Unrealistic time and cost estimates	PS	70%	2
Developing the wrong software functions	DE	20%	1
Developing the wrong user interface	DE	20%	1
Gold plating	PS	50%	3
Late changes to requirements	CU	20%	1
Shortfalls in extremely supplied components	TE	20%	3
Shortfalls in extremely performed task	BU	60%	3
Real time performance problems	PR	70%	2
Development technically too difficult	DE	70%	3
Delayed customer feedback	CU	50%	3
Limited improvement opportunities	DE	80%	3
Dependency management issues	CU	80%	2
Complexity in large projects	PS	80%	2
Low quality product	PS	70%	4
Customer dissatisfaction	CU	70%	3
Key staff become unavailable	ST	20%	3
Technology limitations constrain intended functionality	TE	30%	3

1. Negligible
2. Marginal
3. Critical
4. Catastrophic