Smart SDLC – AI Enhanced Software Development Lifecycle

1. INTRODUCTION

1.1 Project Overview

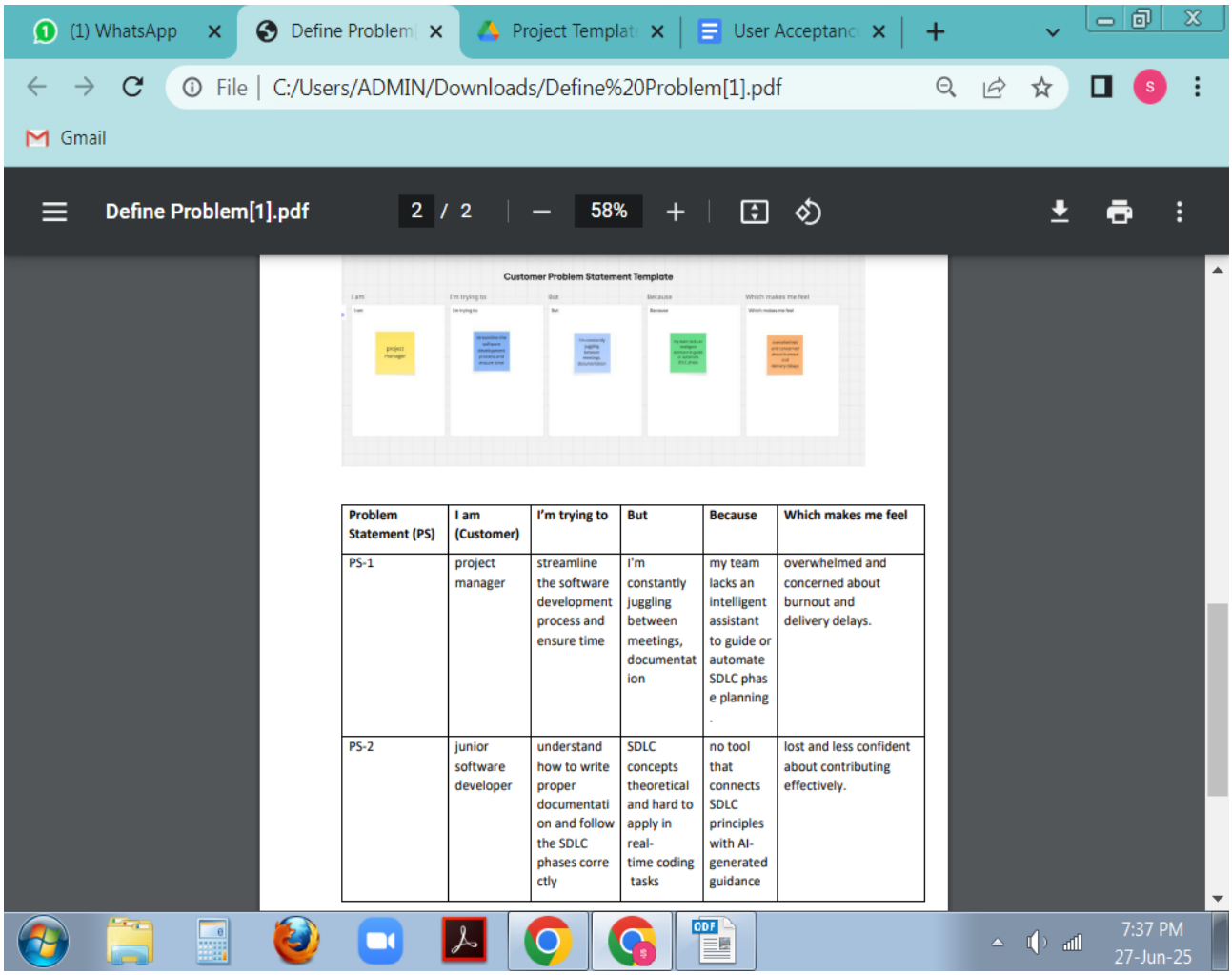
Smart SDLC is an AI-powered system designed to streamline the entire software development lifecycle using generative AI. By leveraging IBM Granite models and Gradio interfaces, this solution automates requirement gathering, documentation, test case generation, and performance evaluation.

1.2 Purpose

The purpose is to improve productivity, accuracy, and consistency in software projects while reducing manual effort and time taken in SDLC phases.

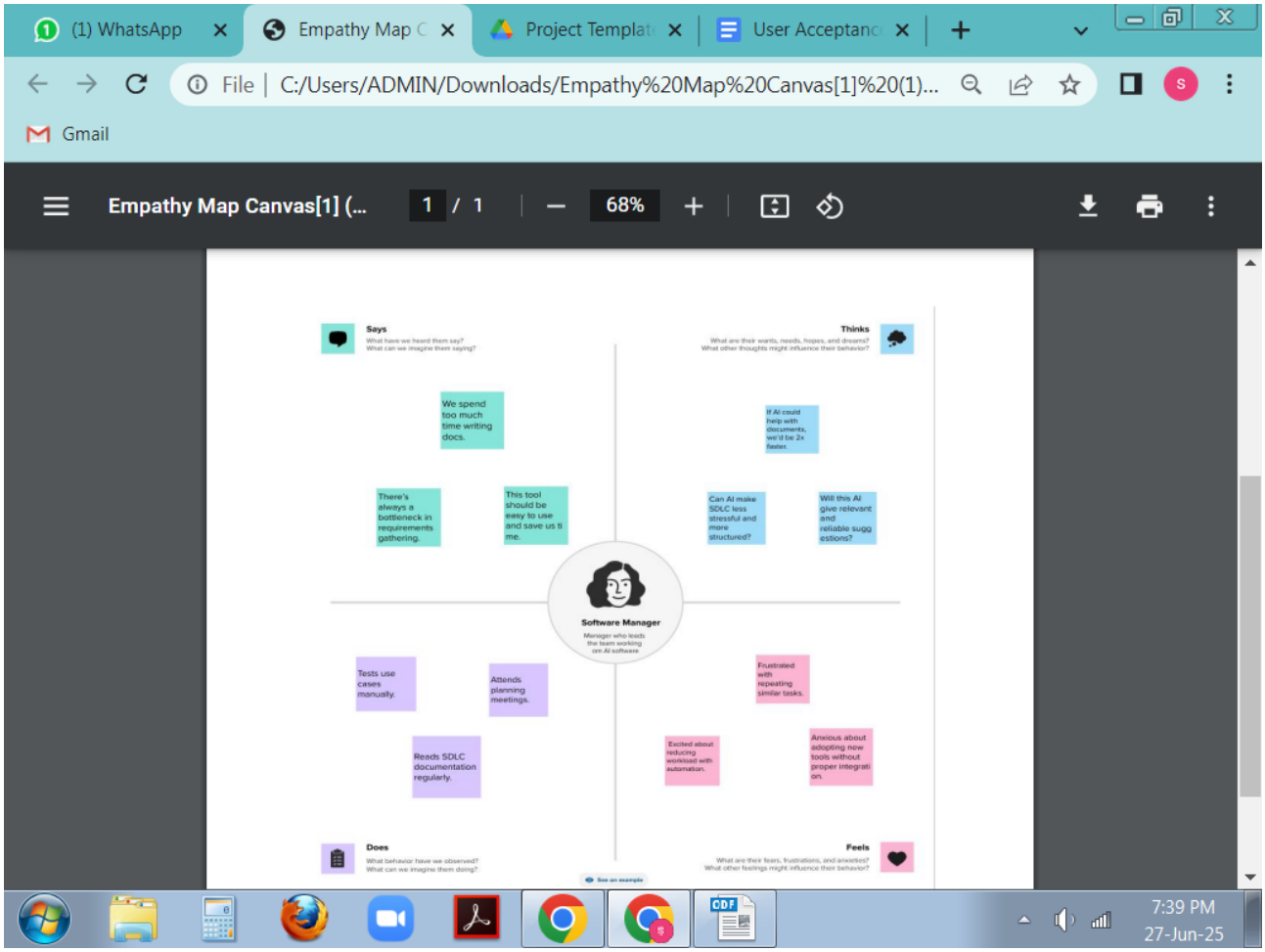
2. IDEATION PHASE

2.1 Problem Statement



Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	project manager	streamline the software development process and ensure time	I'm constantly juggling between meetings, documentation	my team lacks an intelligent assistant to guide or automate SDLC phase planning.	overwhelmed and concerned about burnout and delivery delays.
PS-2	junior software developer	understand how to write proper documentation and follow the SDLC phases correctly	SDLC concepts theoretical and hard to apply in real-time coding tasks	no tool that connects SDLC principles with AI-generated guidance	lost and less confident about contributing effectively.

2.2 Empathy Map Canvas



2.3 Brainstorming

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Step-2: Brainstorm, Idea Listing and Grouping

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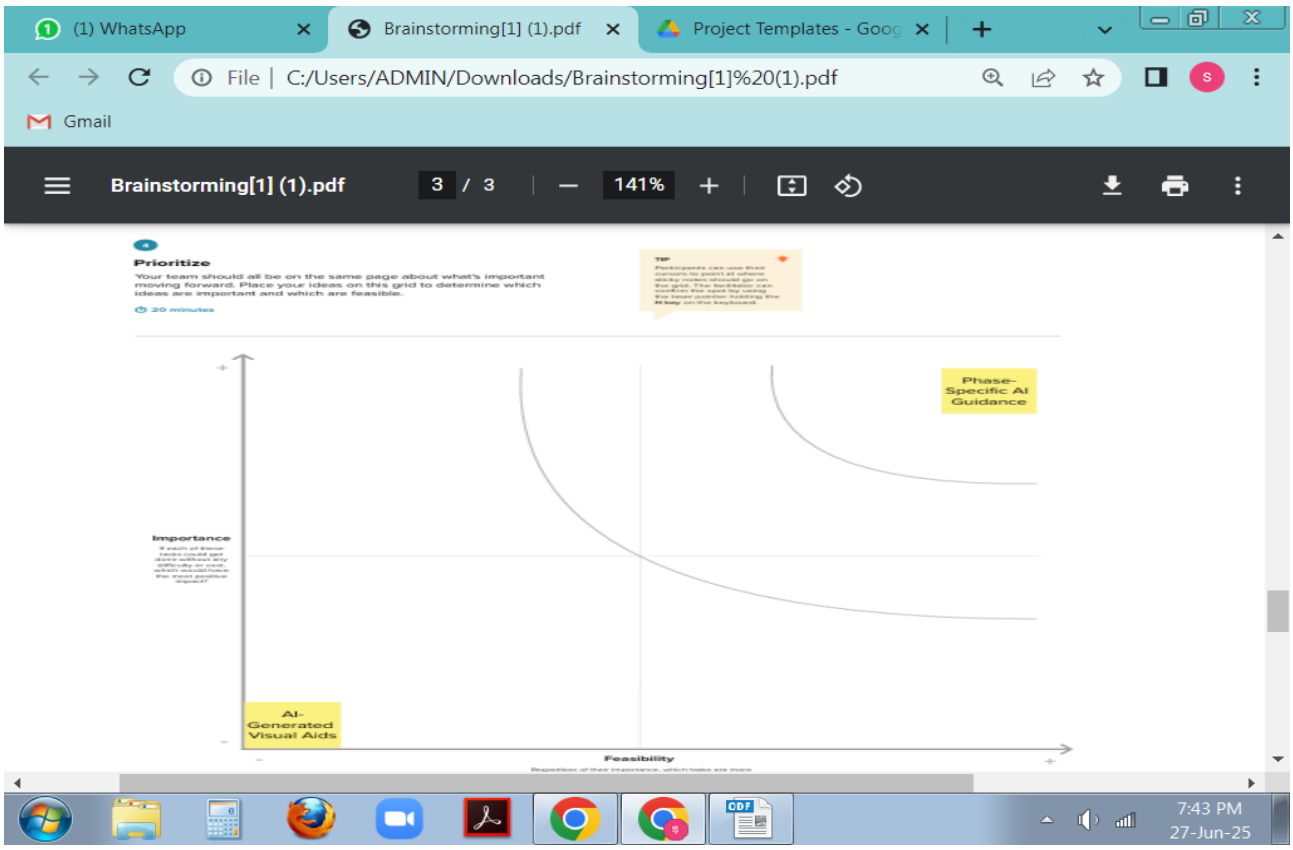
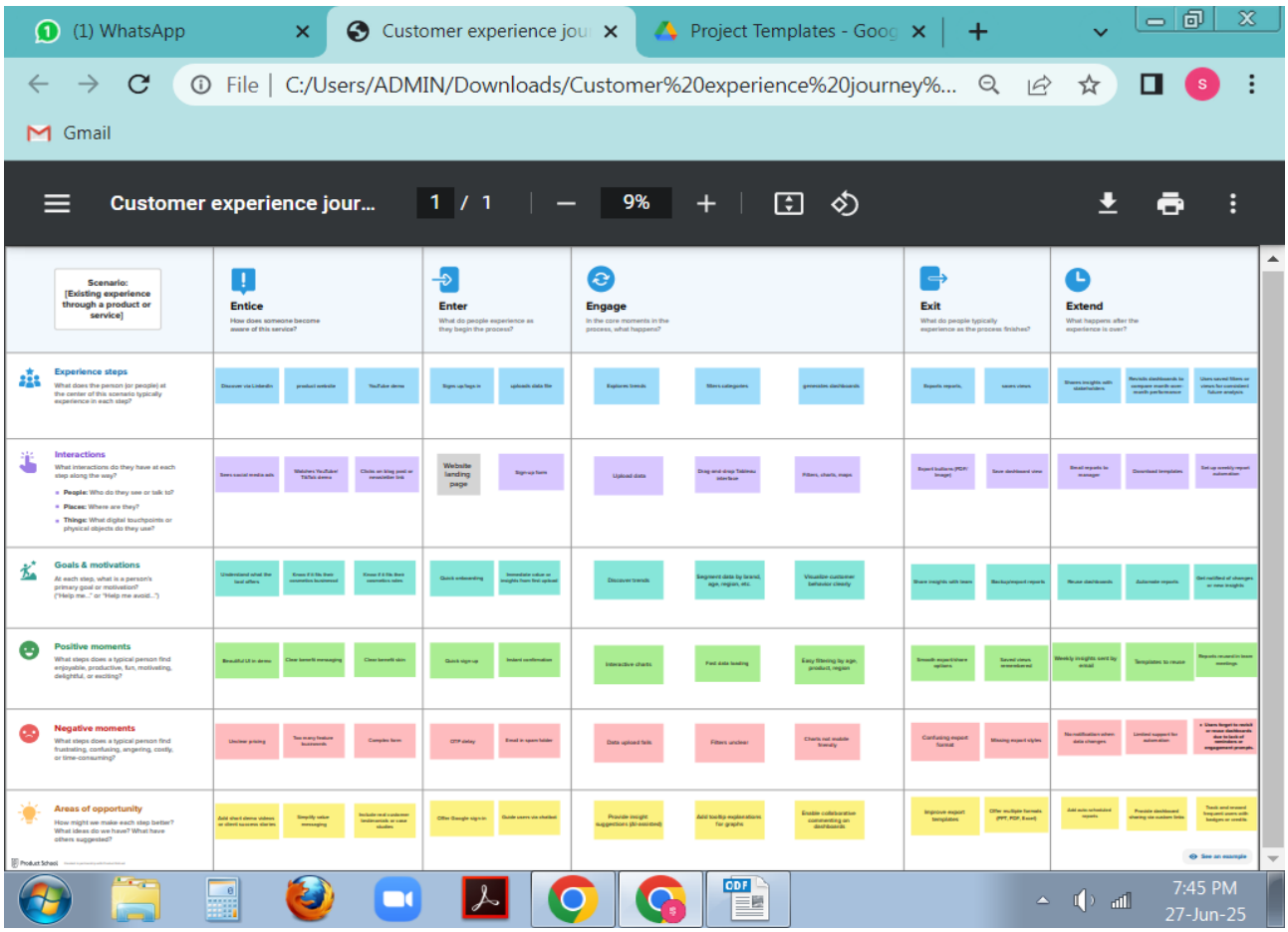
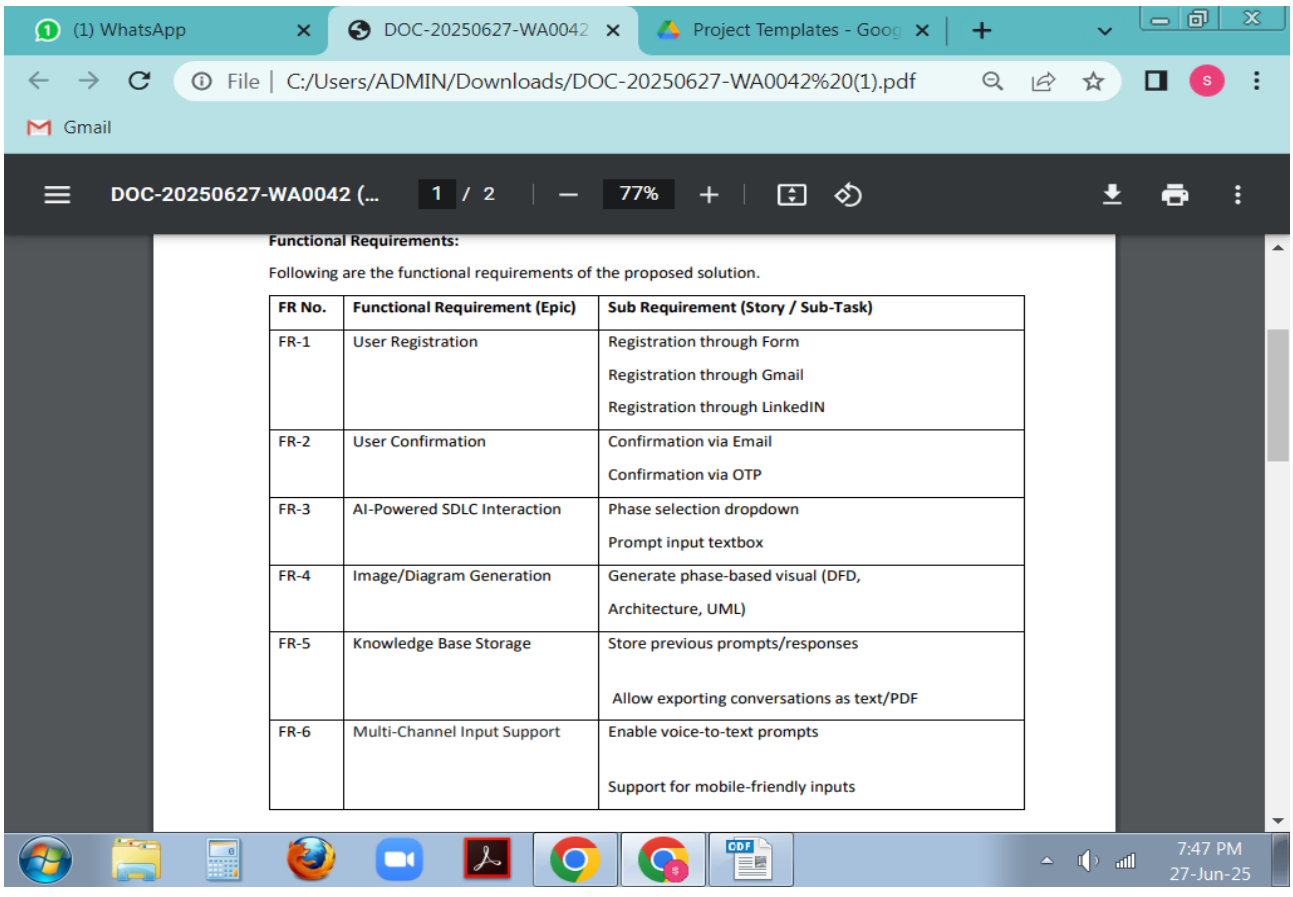


3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map



3.2 Solution Requirement

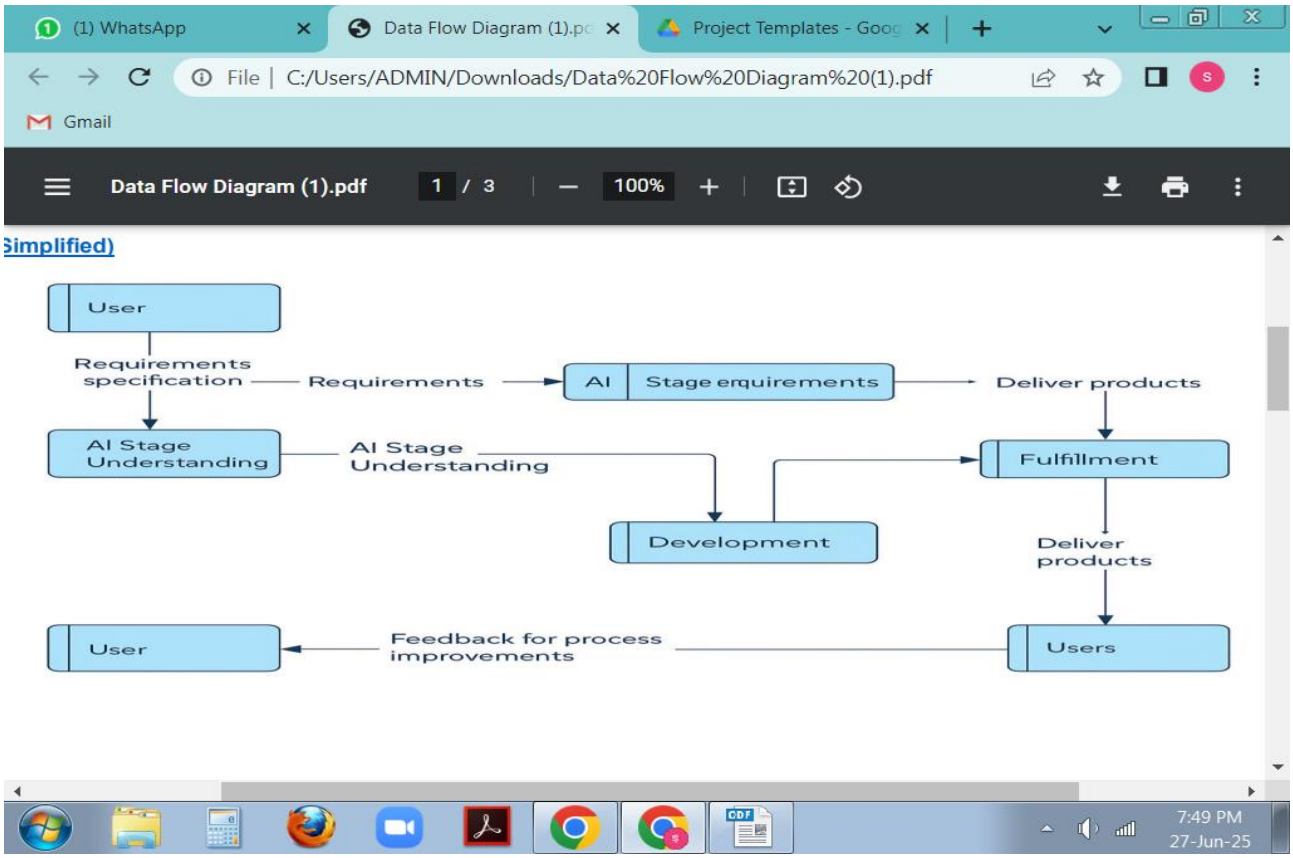


Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The system should offer a user-friendly interface with intuitive navigation for all SDLC phases.
NFR-2	**Security**	All user data and interactions must be securely handled with encryption and authentication.
NFR-3	**Reliability**	The application should produce consistent and accurate outputs for similar prompts.
NFR-4	**Performance**	The AI should respond within 2–5 seconds for most inputs under typical load conditions.
NFR-5	**Availability**	The system should ensure 99.5% uptime with minimal downtime or service interruption.
NFR-6	**Scalability**	The solution should scale to support increased user traffic and larger prompt workloads.

3.3 Data Flow Diagram



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Stories

Use the below template to list all the user stories for the produ

Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can log in or register using Gmail credentials	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can securely log in to my account	High	Sprint-1
	Dashboard	USN-6	As a user, I can view the AI-generated SDLC suggestions relevant to my phase.	I see accurate and relevant outputs from the AI based on my input phase.	High	Sprint-2
Customer (Web user)	Dashboard	USN-7	As a user, I can export the conversation history or download the outputs as PDF.	I can download or view AI session output as a file	Medium	Sprint-2
Customer Care Executive	User Management	USN-8	As a support executive, I can view, search, and manage user activities and logs.	I can audit and troubleshoot issues efficiently	Medium	Sprint-3
Administrator	System Configuration	USN-9	As an admin, I can manage AI prompts, user roles, and configure SDLC phases.	I can customize and control system-wide settings	High	Sprint-3

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3.4 Technology Stack

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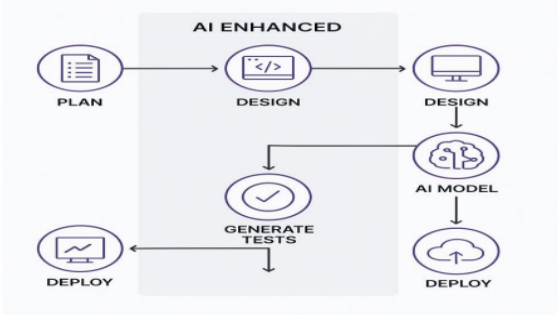
Chnical Architecture:

e Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

ample: Order processing during pandemics for offline mode



Guidelines:

Include all the processes (As an application logic / Technology Block)
Provide infrastructural demarcation (Local / Cloud)
Indicate external interfaces (third party API's etc.)
Indicate Data Storage components / services
Indicate interface to machine learning models (if applicable)

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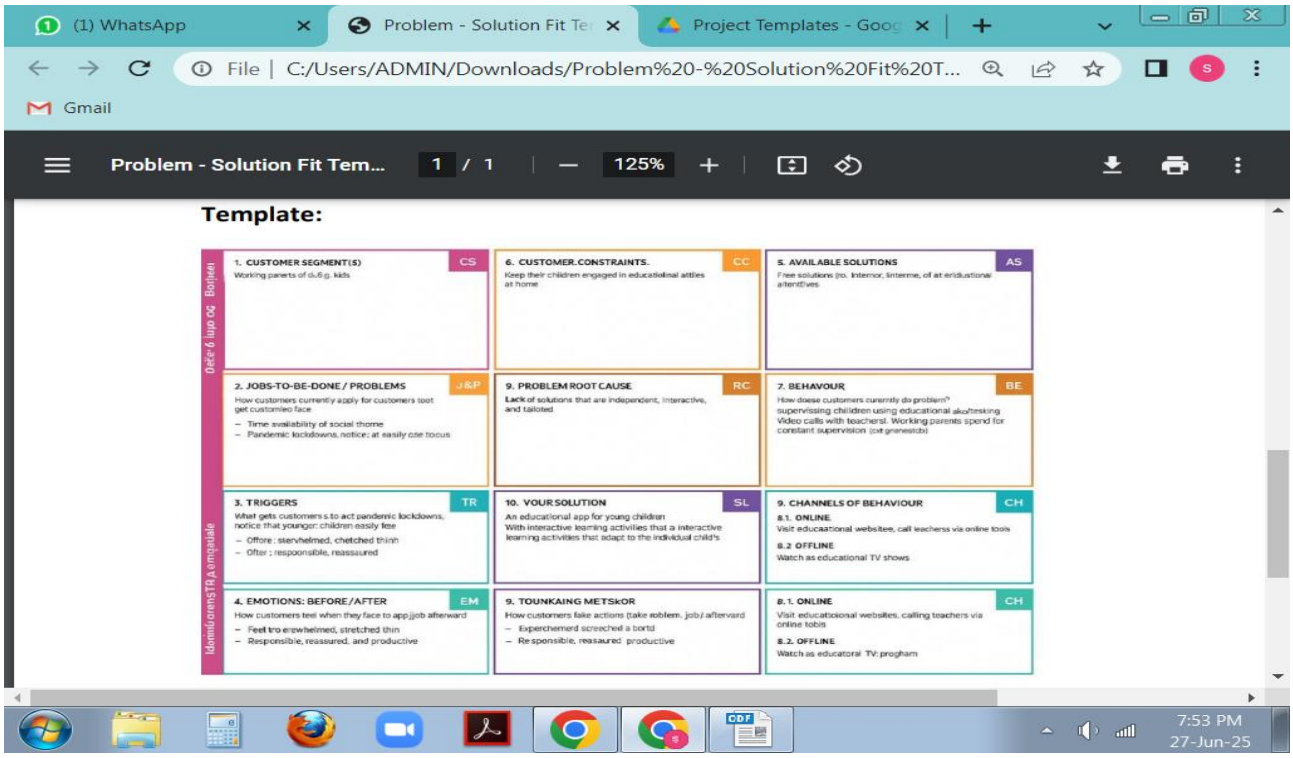
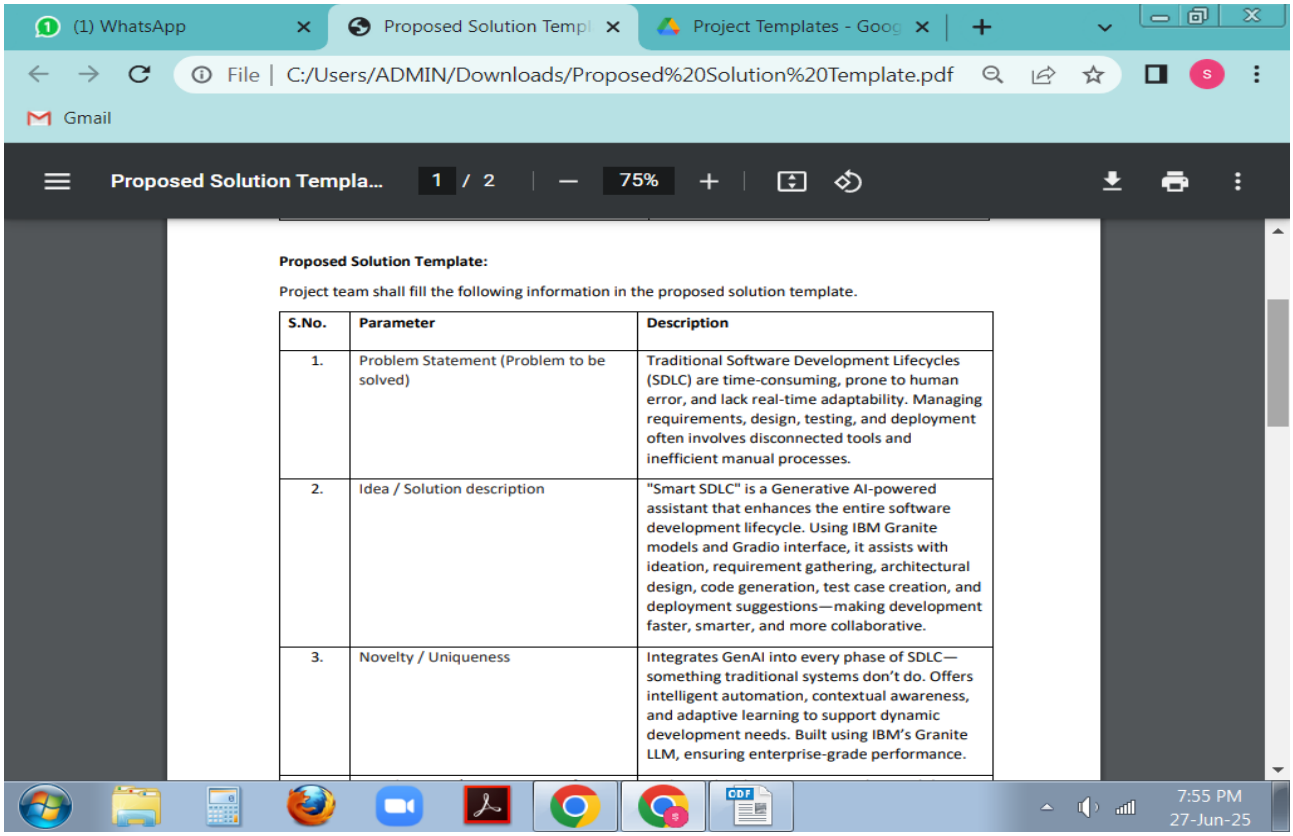
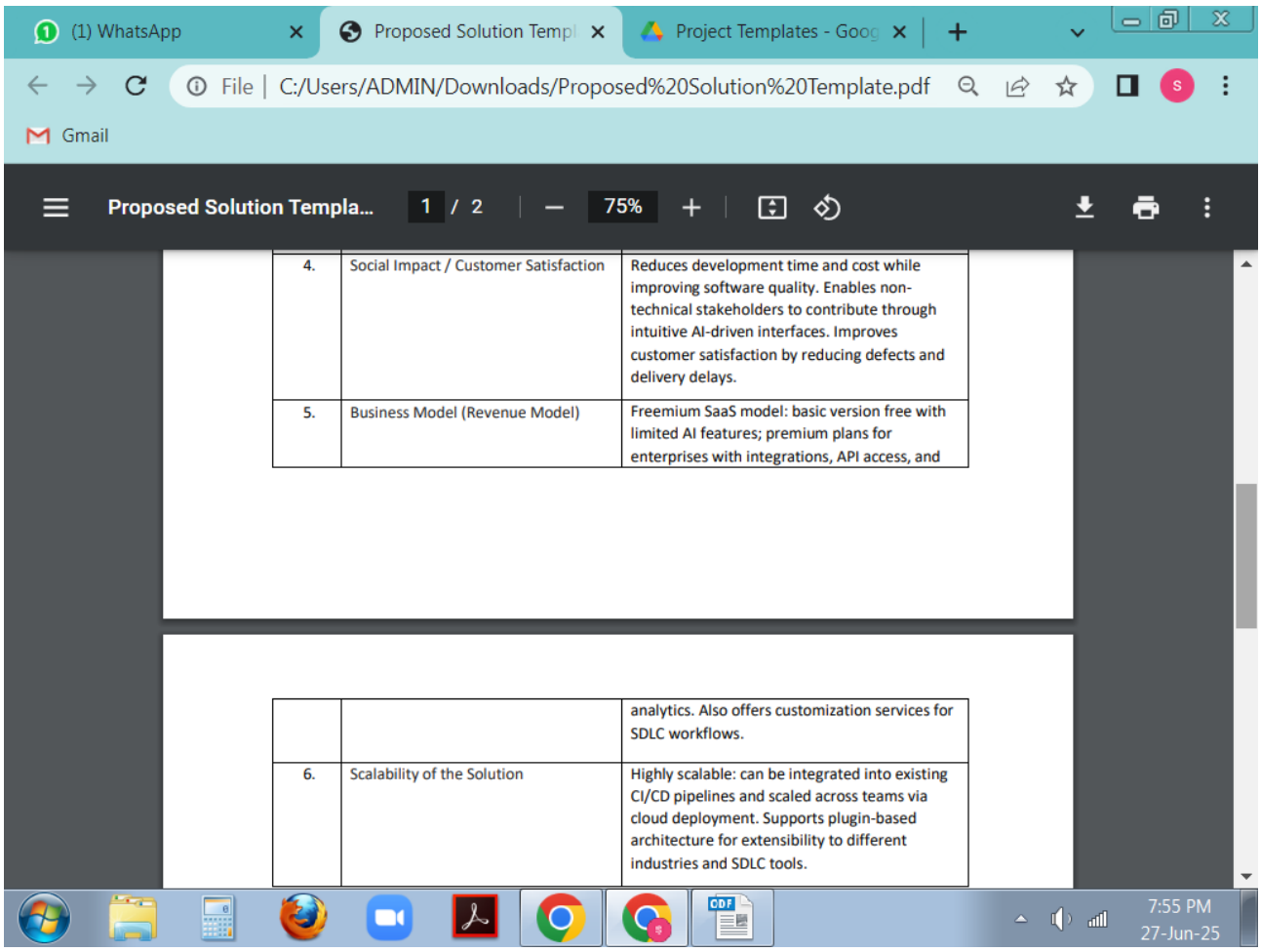
4. PROJECT DESIGN:

4.1 Problem-Solution Fit



4.2 Proposed Solution

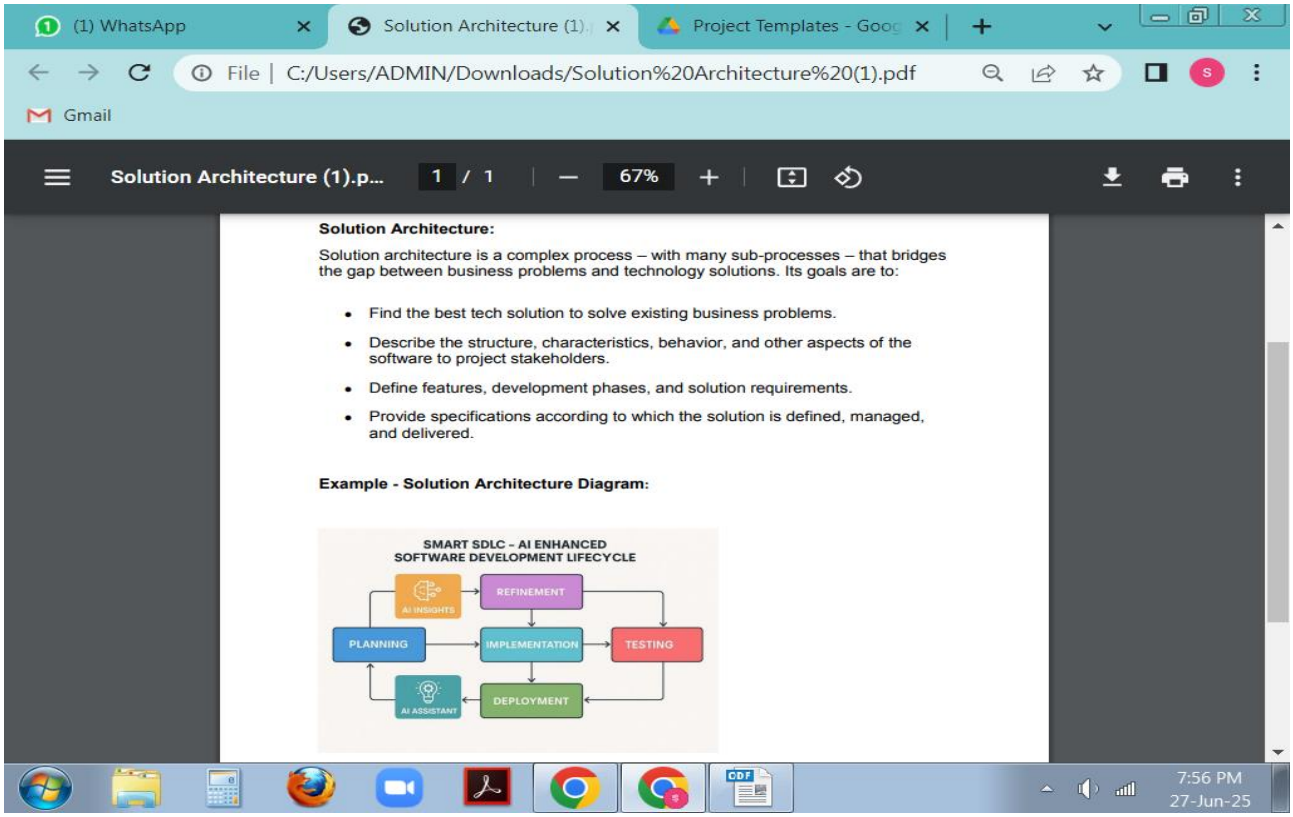




4.	Social Impact / Customer Satisfaction	Reduces development time and cost while improving software quality. Enables non-technical stakeholders to contribute through intuitive AI-driven interfaces. Improves customer satisfaction by reducing defects and delivery delays.
5.	Business Model (Revenue Model)	Freemium SaaS model: basic version free with limited AI features; premium plans for enterprises with integrations, API access, and

		analytics. Also offers customization services for SDLC workflows.
6.	Scalability of the Solution	Highly scalable: can be integrated into existing CI/CD pipelines and scaled across teams via cloud deployment. Supports plugin-based architecture for extensibility to different industries and SDLC tools.

4.3 Solution Architecture



Solution Architecture:

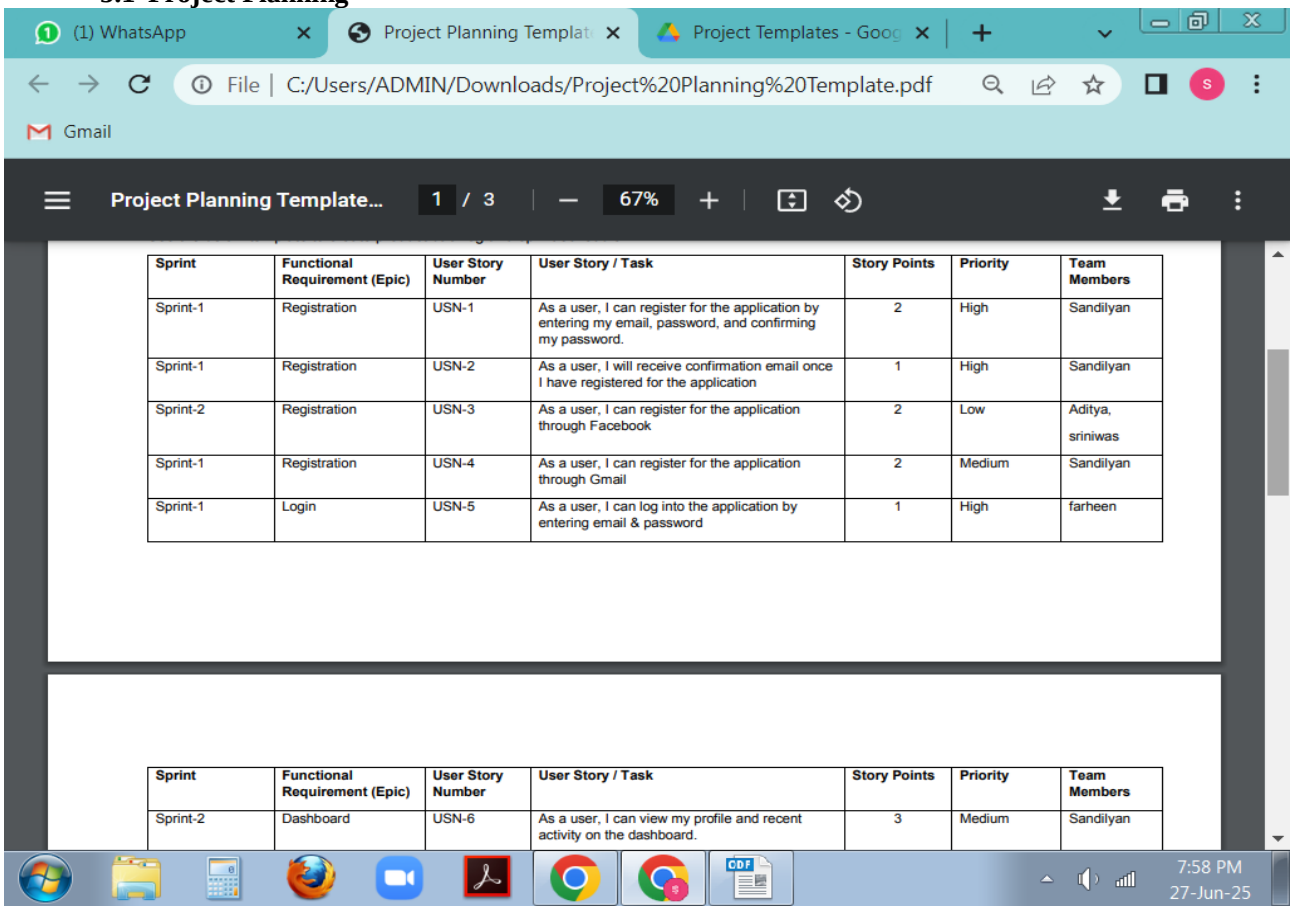
Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Example - Solution Architecture Diagram:

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning



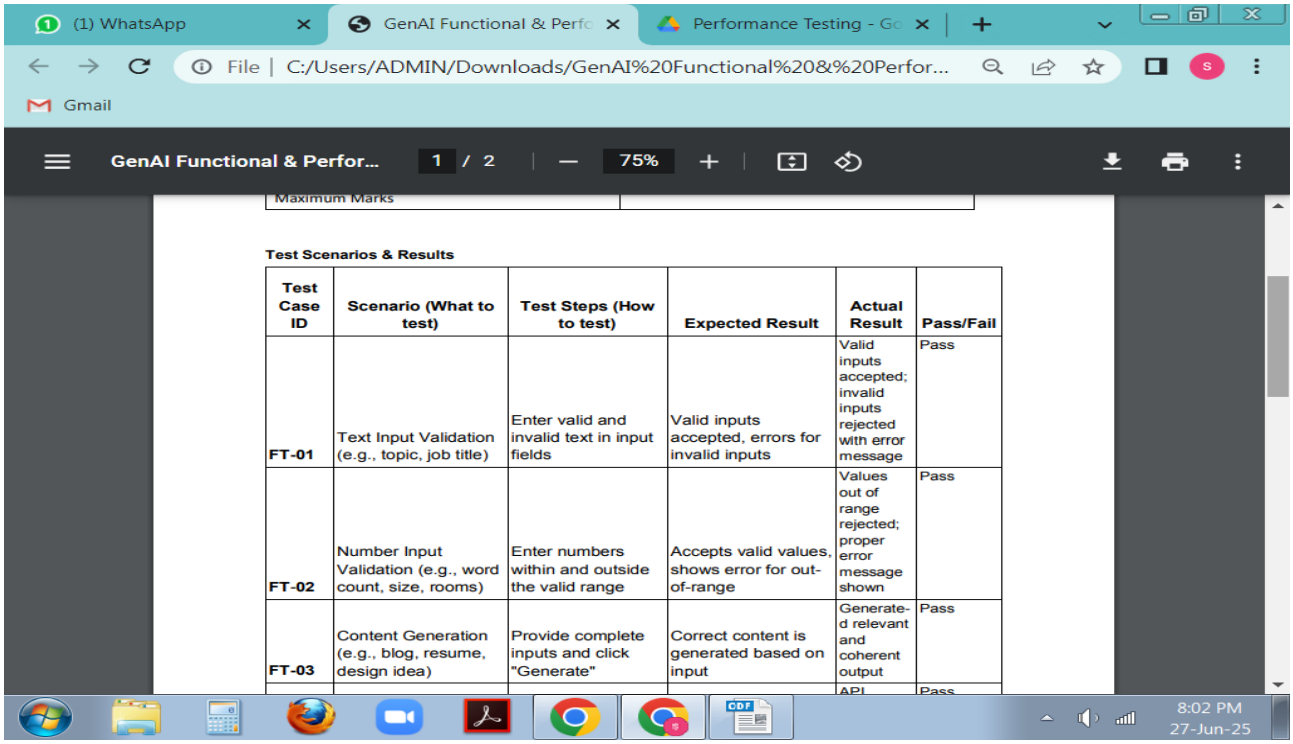
Project Planning Template... 1 / 3 67%

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Sandilyan
Sprint-1	Registration	USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Sandilyan
Sprint-2	Registration	USN-3	As a user, I can register for the application through Facebook	2	Low	Aditya, sriniwas
Sprint-1	Registration	USN-4	As a user, I can register for the application through Gmail	2	Medium	Sandilyan
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	farheen

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2	Dashboard	USN-6	As a user, I can view my profile and recent activity on the dashboard.	3	Medium	Sandilyan

6. FUNCTIONAL AND PERFORMANCE TESTING:

6.1 Performance Testing



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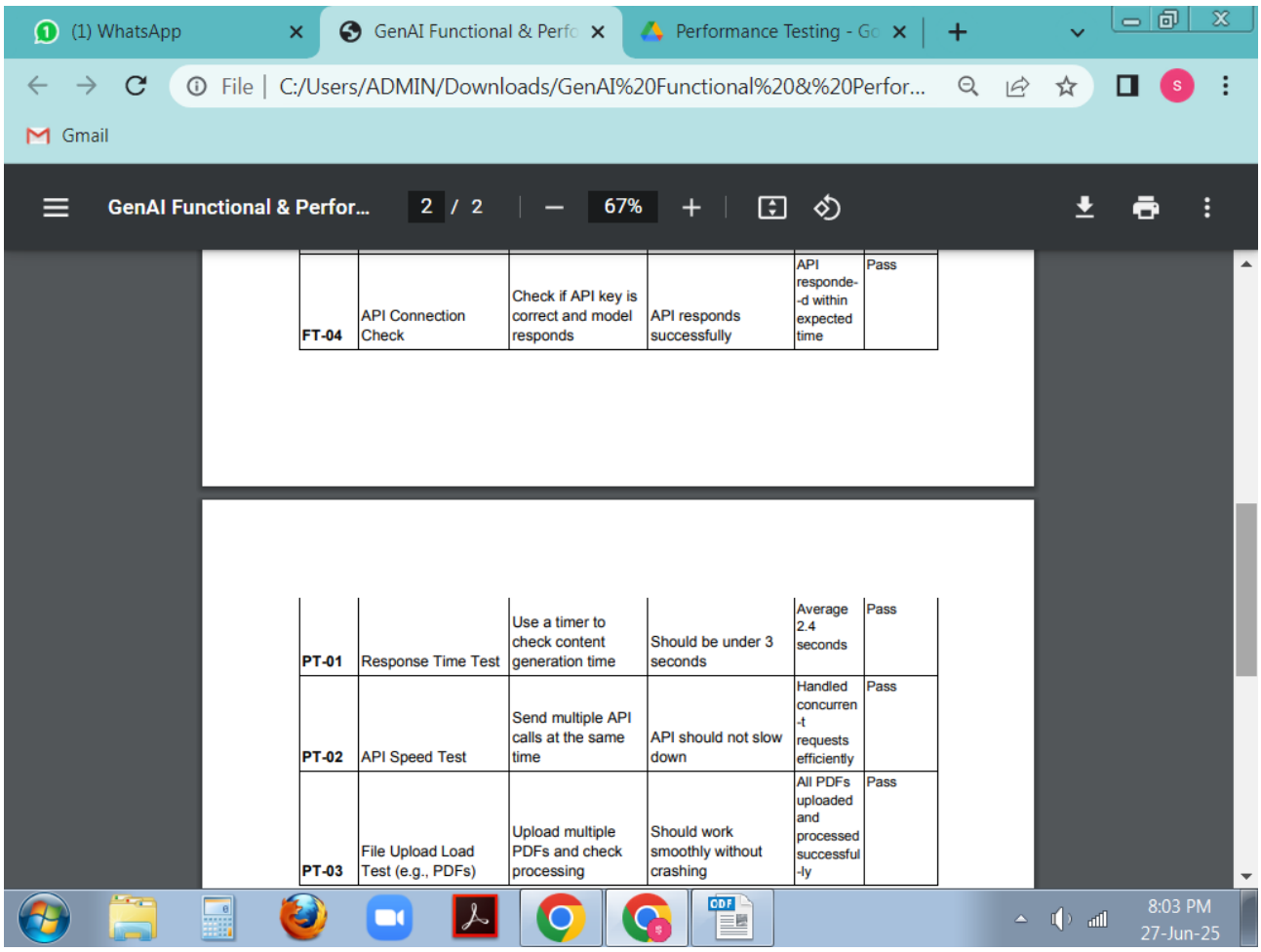
Maximum Marks

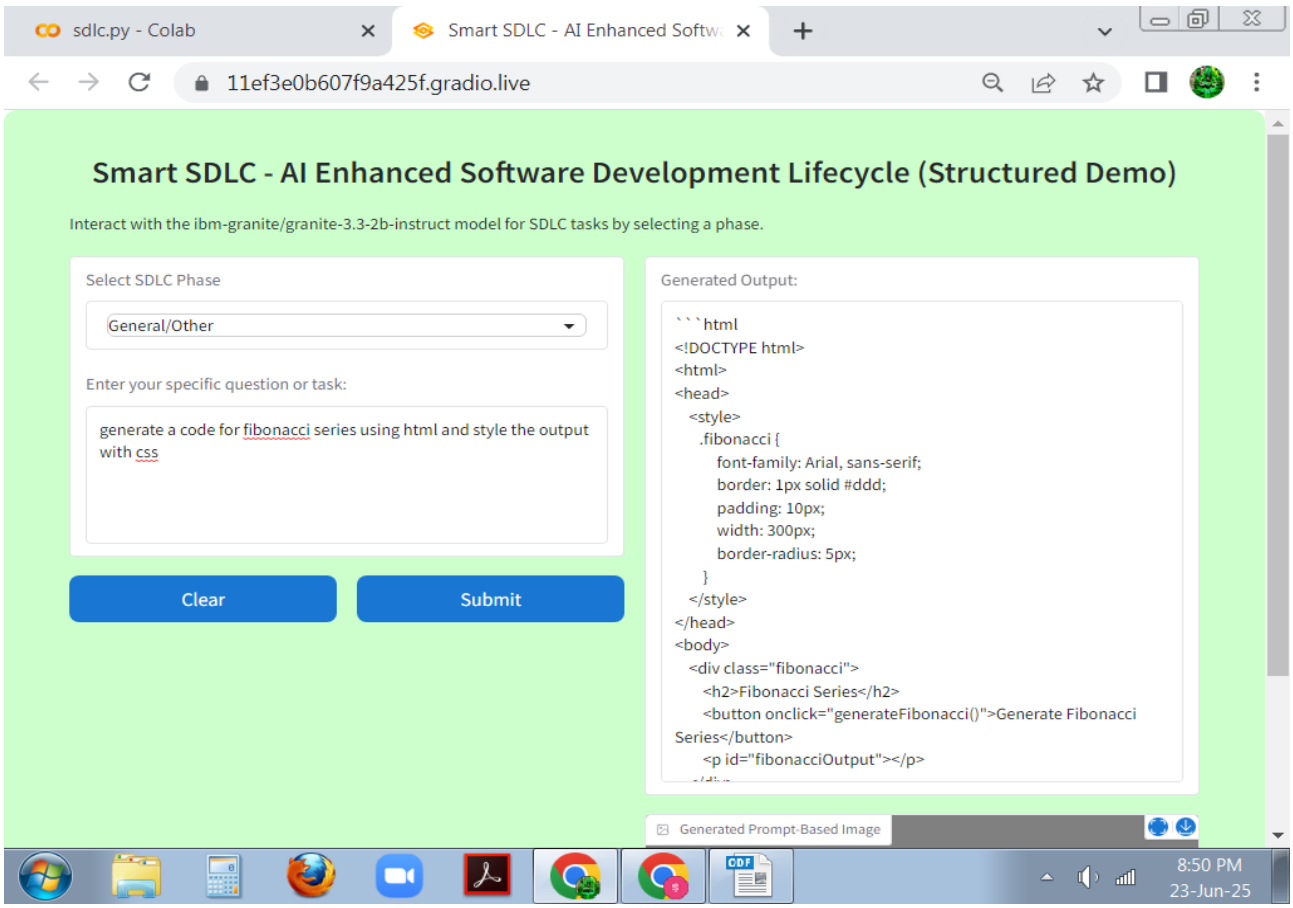
Test Scenarios & Results

Test Case ID	Scenario (What to test)	Test Steps (How to test)	Expected Result	Actual Result	Pass/Fail
FT-01	Text Input Validation (e.g., topic, job title)	Enter valid and invalid text in input fields	Valid inputs accepted, errors for invalid inputs	Valid inputs accepted; invalid inputs rejected with error message	Pass
FT-02	Number Input Validation (e.g., word count, size, rooms)	Enter numbers within and outside the valid range	Accepts valid values, shows error for out-of-range	Values out of range rejected; proper error message shown	Pass
FT-03	Content Generation (e.g., blog, resume, design idea)	Provide complete inputs and click "Generate"	Correct content is generated based on input	Generate-d relevant and coherent output	Pass



7. RESULTS:

7.1 Output Screenshots


sdlc.py - Colab
Smart SDLC - AI Enhanced Softw
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Smart SDLC - AI Enhanced Software Development Lifecycle (Structured Demo)
Interact with the ibm-granite/granite-3.3-2b-instruct model for SDLC tasks by selecting a phase.
Select SDLC Phase
General/Other
Enter your specific question or task:
generate a code for fibonacci series using html and style the output with css
Clear
Submit
Generated Output:
```html
<!DOCTYPE html>
<html>
<head>
<style>
.fibonacci {
font-family: Arial, sans-serif;
border: 1px solid #ddd;
padding: 10px;
width: 300px;
border-radius: 5px;
}
</style>
</head>
<body>
<div class="fibonacci">
<h2>Fibonacci Series</h2>
<button onclick="generateFibonacci()">Generate Fibonacci Series</button>
<p id="fibonacciOutput"></p>
Generated Prompt-Based Image
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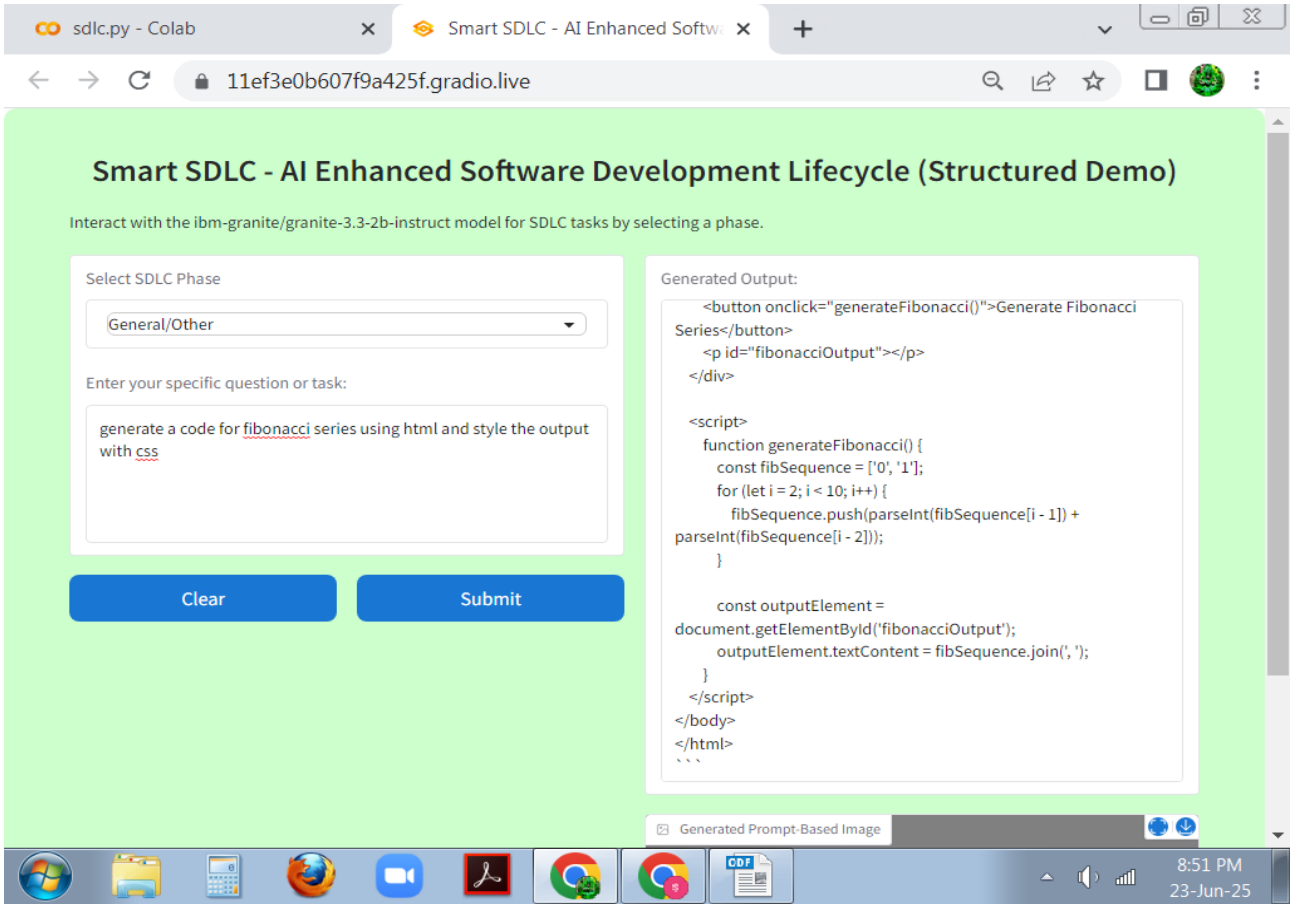
sdlc.py - Colab
Smart SDLC - AI Enhanced Softw
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Smart SDLC - AI Enhanced Software Development Lifecycle (Structured Demo)
Interact with the ibm-granite/granite-3.3-2b-instruct model for SDLC tasks by selecting a phase.
Select SDLC Phase
General/Other
Enter your specific question or task:
generate a code for fibonacci series using html and style the output with css
Clear
Submit
Generated Output:
<button onclick="generateFibonacci()">Generate Fibonacci Series</button>
<p id="fibonacciOutput"></p>
</div>
<script>
function generateFibonacci() {
const fibSequence = ['0', '1'];
for (let i = 2; i < 10; i++) {
fibSequence.push(parseInt(fibSequence[i - 1]) + parseInt(fibSequence[i - 2]));
}
const outputElement = document.getElementById('fibonacciOutput');
outputElement.textContent = fibSequence.join(', ');
}
</script>
</body>
</html>
```
Generated Prompt-Based Image
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8. ADVANTAGES & DISADVANTAGES

Advantages

- Reduces SDLC time by ~40%
- Consistent documentation quality
- Easy to scale across teams
- User-friendly interface (Gradio)

Disadvantages

- Dependent on quality of prompts
- Requires GPU/Cloud for high performance
- Limited domain-specific fine-tuning

9. CONCLUSION

Smart SDLC transforms the conventional development workflow by integrating AI-driven assistance at every stage. It ensures faster delivery, better quality, and enhanced traceability across the project lifecycle.

10. FUTURE SCOPE

- Integrate voice-based prompt input
- Support project estimation and budget prediction
- Build enterprise plugin for JIRA/GitHub integration
- Add multilingual support

11. APPENDIX

GitHub Link: https://github.com/BVSSandilyan/Smart-SDLC.git

Project Demo Link:

https://drive.google.com/file/d/1EtBrt4Wu1__BL_2N8QX1CjS6JyJ1MCE5/view?usp=drivesdk