

Ideation Phase

Define the Problem Statements

Date	31 January 2025
Team ID	LTVIP2025TMID38456
Project Name	SmartSDLC-AI-Enhanced SoftwareDevelopment Lifecycle
Maximum Marks	2 Marks

Customer Problem Statement Template:

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

I am	Describe customer with 3-4 key characteristics - who are they?	Describe the customer and their attributes here
I'm trying to	List their outcome or "job" the care about - what are they trying to achieve?	List the thing they are trying to achieve here
but	Describe what problems or barriers stand in the way - what bothers them most?	Describe the problems or barriers that get in the way here
because	Enter the "root cause" of why the problem or barrier exists - what needs to be solved?	Describe the reason the problems or barriers exist
which makes me feel	Describe the emotions from the customer's point of view - how does it impact them emotionally?	Describe the emotions the result from experiencing the problems or barriers

Reference: <https://miro.com/templates/customer-problem-statement/>

Example:

I am	I'm trying to	But	Because	Which makes me feel
a traveler	book flights on my phone	it takes a long time	The website is not responsive and doesn't have a mobile version	Frustrated

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A software developer	write clean code and test	I spend too much	coding, debugging,	frustrated and inefficient

		cases faster	time on repetitive tasks	and testing take significant time	
PS-2	A project manager or team lead	deliver software projects on time	my team faces delays in early SDLC stages	requirement analysis and testing aren't automated	stressed and under pressure

Ideation Phase Empathize & Discover

Date	31 January 2025
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Project Name	SmartSDLC-AI-Enhanced SoftwareDevelopment Lifecycle
Maximum Marks	4 Marks

Empathy Map Canvas:

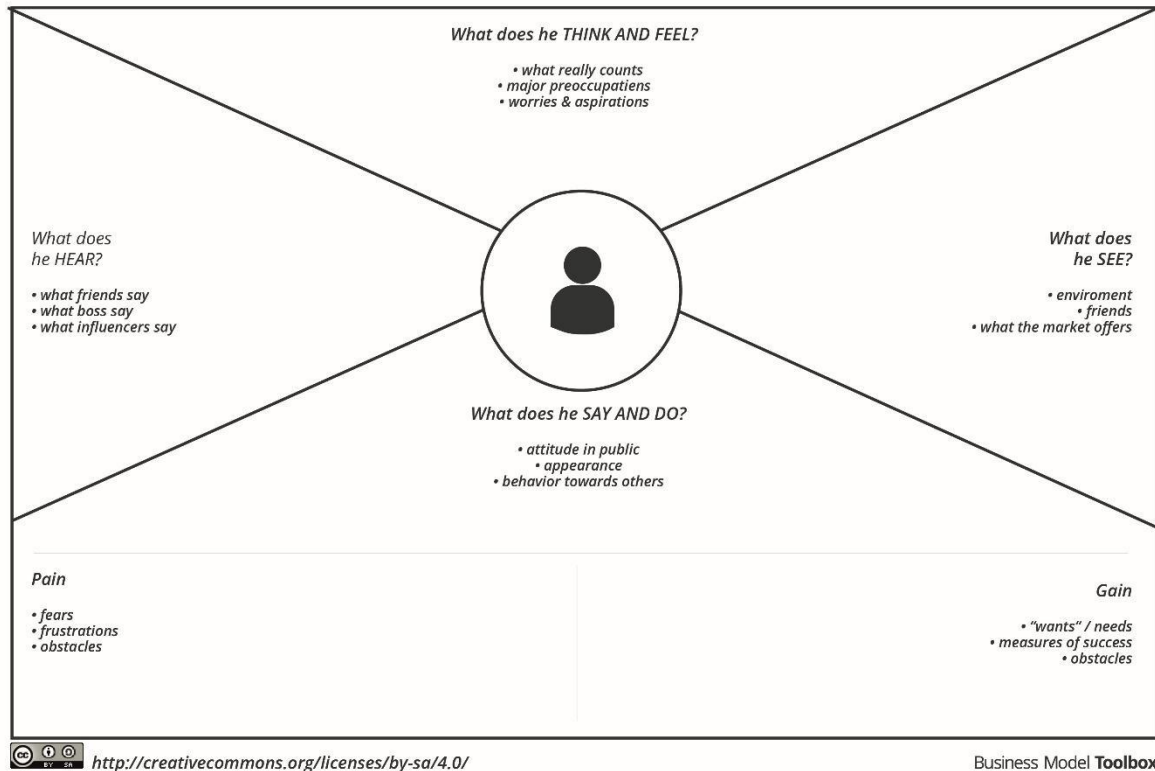
An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to help teams better understand their users.

Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

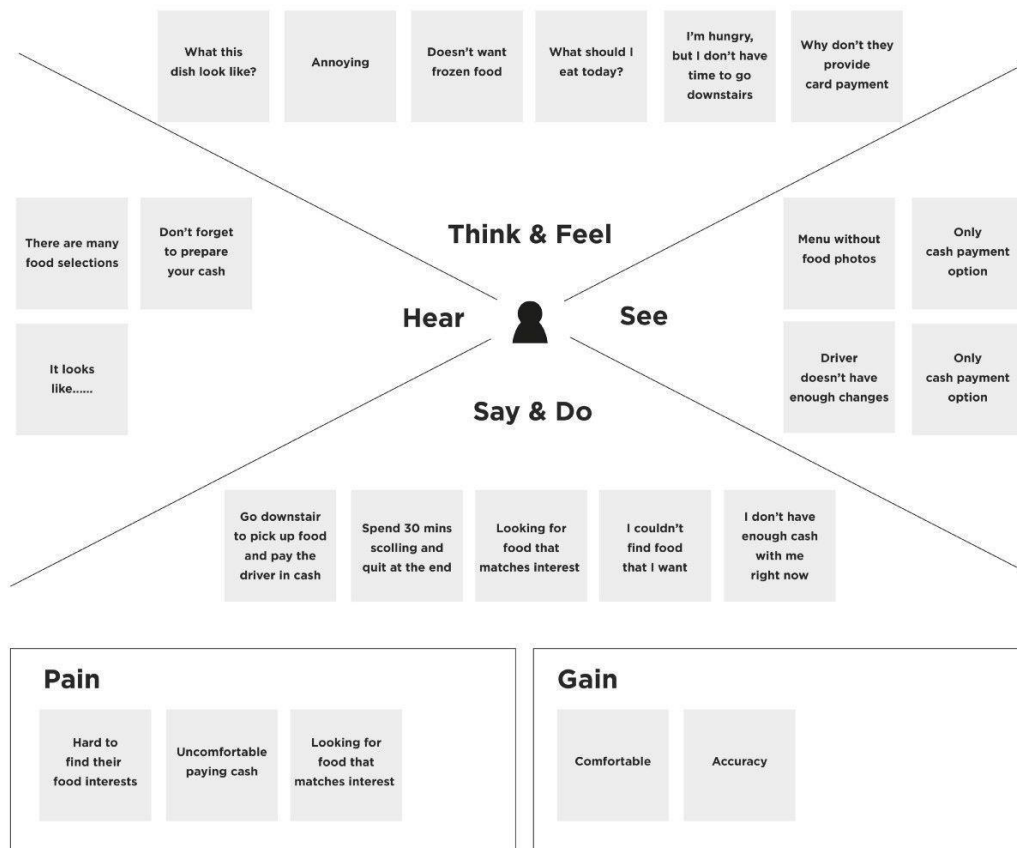
Example:

Empathy Map



Reference: <https://www.mural.co/templates/empathy-map-canvas>

Example: Food Ordering & Delivery Application



Ideation Phase

Brainstorm & Idea Prioritization Template

Date	31 January 2025
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Maximum Marks	4 Marks

Brainstorm & Idea Prioritization Template:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Reference: <https://www.mural.co/templates/brainstorm-and-idea-prioritization>

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- 🕒 10 minutes to prepare
- 🕒 1 hour to collaborate
- 👤 2-8 people recommended



Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕒 10 minutes



A Team gathering

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.



B Set the goal

Think about the problem you'll be focusing on solving in the brainstorming session.



C Learn how to use the facilitation tools

Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) →



1 Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕒 5 minutes

PROBLEM

How might we [your problem statement]?



Key rules of brainstorming

To run an smooth and productive session

- | | |
|-------------------|----------------------------|
| 🗣️ Stay in topic. | 💡 Encourage wild ideas. |
| 🕒 Defer judgment. | 👂 Listen to others. |
| 🗣️ Go for volume. | 👁️ If possible, be visual. |

Step-2: Brainstorm, Idea Listing and Grouping

2

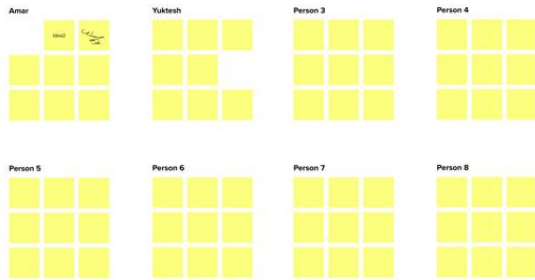
Brainstorm

Write down any ideas that come to mind that address your problem statement.

⌚ 10 minutes

TIP

You can select a sticky note and hit the pencil (switch to sketch) icon to start drawing!



3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

⌚ 20 minutes

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

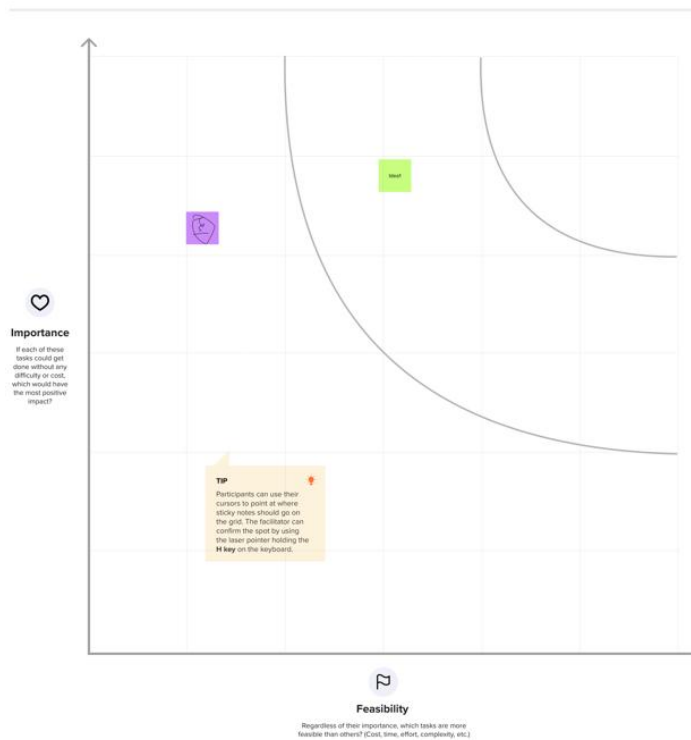
Step-3: Idea Prioritization

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

⌚ 20 minutes

**Project Design Phase-II**

Solution Requirements (Functional & Non-functional)

Date	31 January 2025
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Project Name	SmartSDLC-AI-Enhanced SoftwareDevelopment Lifecycle
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	- Registration through Form
		- Registration through Gmail
		- Registration through LinkedIn
FR-2	User Confirmation	- Confirmation via Email
		- Confirmation via OTP
FR-3	User Login	- Login with Email and Password
		- Login via Gmail
		- Login via Facebook
FR-4	Dashboard & SDLC Assistant	- View latest prompts and outputs
		- Generate code via prompt
		- Fix bugs in pasted code
		- Generate test cases for given code
		- Summarize uploaded source code
		- Chatbot interaction with Watsonx LLM

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
--------	----------------------------	-------------

NFR-1	Usability	The system must have a simple and intuitive user interface (UI) for easy use by both technical and non-technical users through Streamlit.
NFR-2	Security	All communication with Watsonx APIs and backend must be secured using HTTPS. Sensitive data like API keys must be stored in .env files and not hard-coded.
NFR-3	Reliability	The system must consistently respond to user inputs and Watsonx model calls without crashing. Error-handling for failed API responses is essential.
NFR-4	Performance	Backend responses to AI prompts should complete within an acceptable time (typically < 10 seconds). Performance optimizations must be considered for model latency.
NFR-5	Availability	The application should maintain 99% uptime in production environments, and ensure services auto-restart on failure (if deployed).
NFR-6	Scalability	The system architecture should support horizontal scaling of backend services and dynamic load distribution. It should accommodate increasing users, requests, and model interactions without performance degradation.

Project Design Phase-II Data Flow Diagram & User Stories

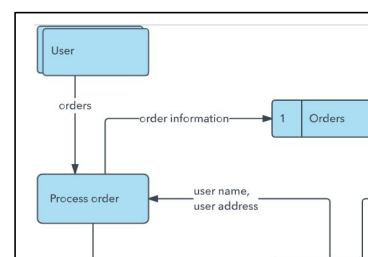
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Maximum Marks	4 Marks

Data Flow Diagrams:

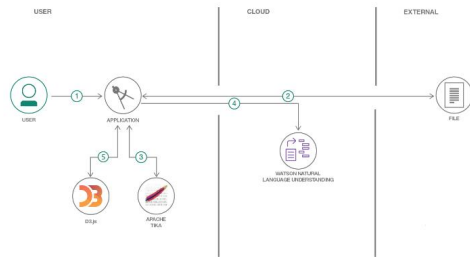
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

Example: [\(Simplified\)](#)

Example: DFD Level 0 (Industry)



Flow



1. User configures credentials for the Watson Natural Language Understanding service and starts the app.
2. User selects data file to process and load.
3. Apache Tika extracts text from the data file.
4. Extracted text is passed to Watson NLU for enrichment.
5. Enriched data is visualized in the UI using the D3.js library.

User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance Criteria	Priority	Release
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 a confirmation email once I have registered for the application.	I can receive a confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through	I can register & access the dashboard with Facebook	Low	Sprint-2

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance Criteria	Priority	Release
			Facebook.	Login		
		USN-4	As a user, I can register for the application through Gmail.	I can log in using my Gmail account	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password.	I can log in and reach the dashboard	High	Sprint-1
	Dashboard	TBD	As a user, I can view my recent activities and generate SDLC outputs.	Dashboard loads with AI-generated results	High	Sprint-2
Customer (Web User)	TBD	-	(You can define similar stories for web version)			
Customer Care Exec	TBD	-	(Define stories for managing user queries, etc.)			
Administrator	TBD	-	(Define admin-level controls, analytics, etc.)			

Project Design Phase-II
Technology Stack (Architecture & Stack)

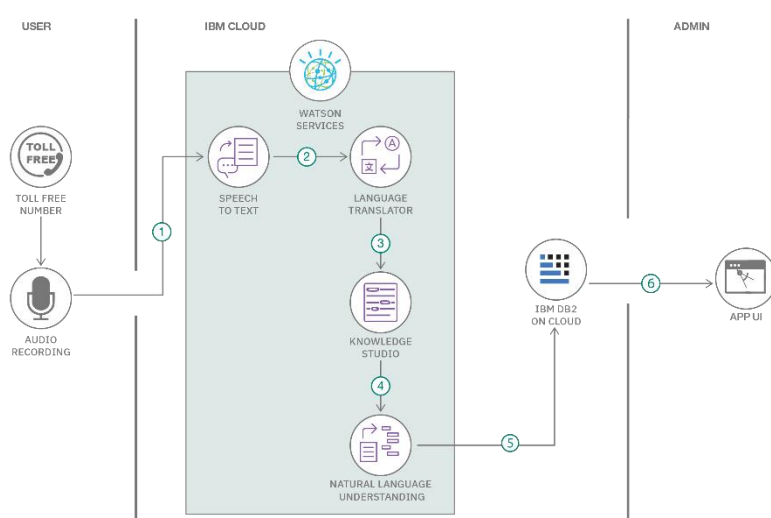
Date	31 January 3035
Team ID	LTVIP2025TMID38456
Project Name	SmartSDLC-AI-Enhanced SoftwareDevelopment Lifecycle
Maximum Marks	4 Marks

Technical Architecture:

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

Example: Order processing during pandemics for offline mode

Reference: <https://developer.ibm.com/patterns/ai-powered-backend-system-for-order-processing-during-pandemics/>



Guidelines:

Include all the processes (Technology Block)
 Provide infrastructural details
 Indicate external interfaces
 Indicate Data Storage components
 Indicate interface to management (if applicable)

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Logic for a process in the application	Java / Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4.	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem

8.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
9.	External API-2	Purpose of External API used in the application	Aadhar API, etc.
10.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
11.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration :	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Technology of Opensource framework
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Micro-services)	Technology used
4.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	Technology used
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	Technology used

References:

<https://c4model.com/>

<https://developer.ibm.com/patterns/online-order-processing-system-during-pandemic/>

<https://www.ibm.com/cloud/architecture>

<https://aws.amazon.com/architecture>

<https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d>

Project Design Phase

Problem – Solution Fit Template

Date	15 February 2025
Team ID	LTVIP2025TMID38456
Project Name	SmartSDLC-AI-Enhanced SoftwareDevelopment Lifecycle
Maximum Marks	2 Marks

Problem – Solution Fit Template:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why

Purpose:

- ☐ Solve complex problems in a way that fits the state of your customers.
- ☐ Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.
- ☐ Sharpen your communication and marketing strategy with the right triggers and messaging.
- ☐ Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.
- ☐ Understand the existing situation in order to improve it for your target group.

Template:

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) Who is your customer? I.e. working parents of 0-5 y.o. kids	6. CUSTOMER CONSTRAINTS What constraints prevent your customers from taking action or limit their choices of solutions? I.e. spending power, budget, no cash, network connection, available devices.	5. AVAILABLE SOLUTIONS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? I.e. pen and paper is an alternative to digital notetaking.	Explore AS, differentiate
Focus on J&P, tap into BE, understand RC	2. JOBS-TO-BE-DONE / PROBLEMS Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.	9. PROBLEM ROOT CAUSE What is the real reason that this problem exists? What is the back story behind the need to do this job? I.e. customers have to do it because of the change in regulations.	7. BEHAVIOUR What does your customer do to address the problem and get the job done? I.e. directly related: find the right solar panel installer, calculate usage and benefits; Indirectly associated: customers spend free time on volunteering work (I.e. Greenpeace)	Focus on J&P, tap into BE, understand RC
Identify strong TR & EM	3. TRIGGERS What triggers customers to act? I.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.	10. YOUR SOLUTION If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.	8. CHANNELS of BEHAVIOUR 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7	Extract online & offline CH of BE
	4. EMOTIONS: BEFORE / AFTER How do customers feel when they face a problem or a job and afterwards? I.e. lost, insecure > confident, in control - use it in your communication strategy & design.		8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.	

References:

1. <https://www.ideahackers.network/problem-solution-fit-canvas/>

2. <https://medium.com/@epicantus/problem-solution-fit-canvas-aa3dd59cb4fe>

Project Design Phase
Proposed Solution Template

Date	15 February 2025
Team ID	LTVIP2025TMID38456
Project Name	SmartSDLC-AI-Enhanced SoftwareDevelopment Lifecycle
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S.No.	Parameter	Description
1	Problem Statement (Problem to be solved)	Software developers and teams spend excessive time on repetitive SDLC tasks such as requirement classification, code generation, bug fixing, and testing. This delays delivery and reduces productivity.
2	Idea / Solution Description	Smart SDLC is an AI-powered assistant that automates key stages of the software development lifecycle using IBM Watsonx Granite LLMs. It offers functionalities like requirement classification, code generation, test case creation, bug fixing, and code summarization — all accessible through a user-friendly frontend.
3	Novelty / Uniqueness	Unlike traditional code generators or template-based tools, Smart SDLC uses enterprise-grade Watsonx LLMs to interpret, generate, and fix context-aware code and SDLC artifacts in natural language. Its modular backend+frontend approach ensures clean scalability.
4	Social Impact / Customer Satisfaction	Helps small teams, startups, and student developers improve speed, quality, and accessibility of software development. Reduces the learning curve for junior developers. Enables inclusive and rapid prototyping.
5	Business Model (Revenue Model)	Can be offered as a SaaS platform with tiered subscriptions (Free, Pro, Enterprise).

		Optional integration with version control tools, premium AI usage, and team analytics can serve as monetization avenues.
6	Scalability of the Solution	Backend-frontend architecture enables easy cloud deployment. Watsonx APIs ensure scalable AI usage. Can be extended to support multiple programming languages and industry workflows (e.g., DevOps, QA, architecture).

**Project Design Phase
Solution Architecture**

Date	15 February 2025
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Project Name	SmartSDLC-AI-Enhanced SoftwareDevelopment Lifecycle
Maximum Marks	4 Marks

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:

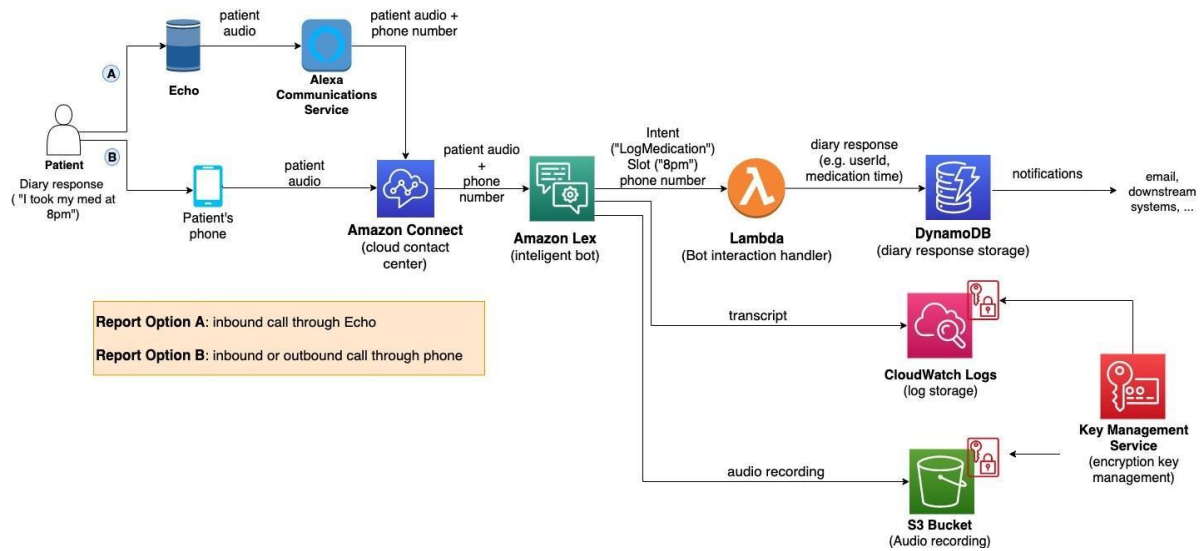


Figure 1: Architecture and data flow of the voice patient diary sample application

Reference: <https://aws.amazon.com/blogs/industries/voice-applications-in-clinical-research-powered-by-ai-on-aws-part-1-architecture-and-design-considerations/>

Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

Date	15 February 2025
Team ID	LTVIP2025TMID38456
Project Name	SmartSDLC-AI-Enhanced SoftwareDevelopment Lifecycle
Maximum Marks	5 Marks

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

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	[Assign here]
Sprint-1		USN-2	As a user, I will receive a confirmation email once I have registered for the	1	High	[Assign here]

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
			application.			
Sprint-1		USN-4	As a user, I can register for the application through Gmail.	2	Medium	[Assign here]
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password.	1	High	[Assign here]
Sprint-2	Registration	USN-3	As a user, I can register for the application through Facebook.	2	Low	[Assign here]
Sprint-X	Dashboard	TBD	As a user, I can view recent activities and generate SDLC outputs via AI tools.	TBD	High	[Assign here]

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	TBD	TBD
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	TBD	TBD
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	TBD	TBD

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

<https://www.visual-paradigm.com/scrum/scrum-burndown-chart/>

<https://www.atlassian.com/agile/tutorials/burndown-charts>

Reference:

<https://www.atlassian.com/agile/project-management>

<https://www.atlassian.com/agile/tutorials/how-to-do-scrum-with-jira-software>

<https://www.atlassian.com/agile/tutorials/epics>

<https://www.atlassian.com/agile/tutorials/sprints>

<https://www.atlassian.com/agile/project-management/estimation>

<https://www.atlassian.com/agile/tutorials/burndown-charts>

Functional & Performance Testing Template

Model Performance Test

Date	21 February 2025
Team ID	LTVIP2025TMID38456
Project Name	SmartSDLC-AI-Enhanced SoftwareDevelopment Lifecycle
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		
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		
FT-03	Content Generation (e.g., blog, resume, design idea)	Provide complete inputs and click "Generate"	Correct content is generated based on input		
FT-04	API Connection Check	Check if API key is correct and model responds	API responds successfully		
PT-01	Response Time Test	Use a timer to check content generation time	Should be under 3 seconds		
PT-02	API Speed Test	Send multiple API calls at the same time	API should not slow down		
PT-03	File Upload Load Test (e.g., PDFs)	Upload multiple PDFs and check processing	Should work smoothly without crashing		