# 1.INTRODUCTION

1.1 Project Overview:

HealthAI is an intelligent healthcare assistant that leverages IBM's Granite 13B model to provide personalized medical support. It enables users to input symptoms and receive accurate disease predictions and treatment recommendations. The platform offers features like patient chat, health analytics, and AI-driven insights. Built using Python and Streamlit, it ensures a user-friendly interface. HealthAI empowers users to make informed health decisions using AI and cloud technology.

1.2 Purpose:

The purpose of HealthAI is to provide intelligent healthcare assistance using AI technologies.
It helps users predict diseases based on symptoms and offers personalized treatment plans.
The system enables users to chat with an AI assistant for health-related queries.
It visualizes patient health data to monitor trends like heart rate and blood pressure.
Overall, HealthAI aims to make healthcare information more accessible and user-friendly.
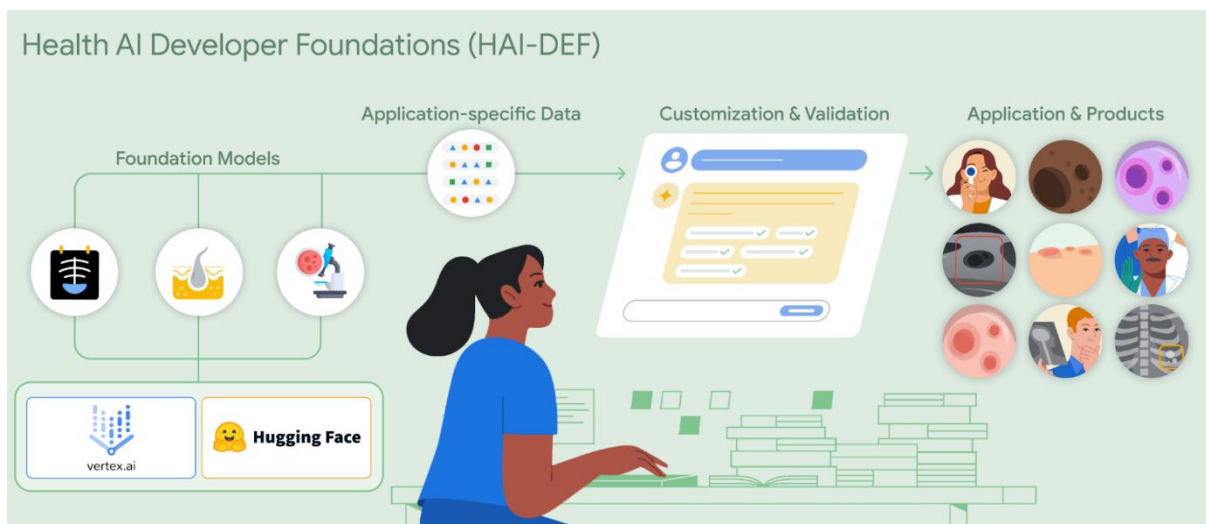
2. IDEATION PHASE

2.1 Problem Statement

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.

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

Example:

Customer Problem Statements – Health AI

| Parameter	Problem Statement PS-1	Problem Statement PS-2
I am (Customer)	A working professional living in a semi-urban area	A college student managing my studies and health
I'm trying to	Identify whether my health symptoms require immediate medical attention	Track my health metrics and prevent future illness through early warning signs
But	I don't have time to visit a doctor or access to affordable healthcare services nearby	I lack access to personalized tools or apps that help me understand health trends based on my data
Because	Medical centers are far away, and online health advice is often unreliable or generic	Most apps are either too complex, not AI-driven, or don't provide medical insight
Which makes me feel	Anxious, unsure, and vulnerable about my health decisions	Confused, overwhelmed, and less motivated to monitor my health regularly

2.2 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 helps 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:
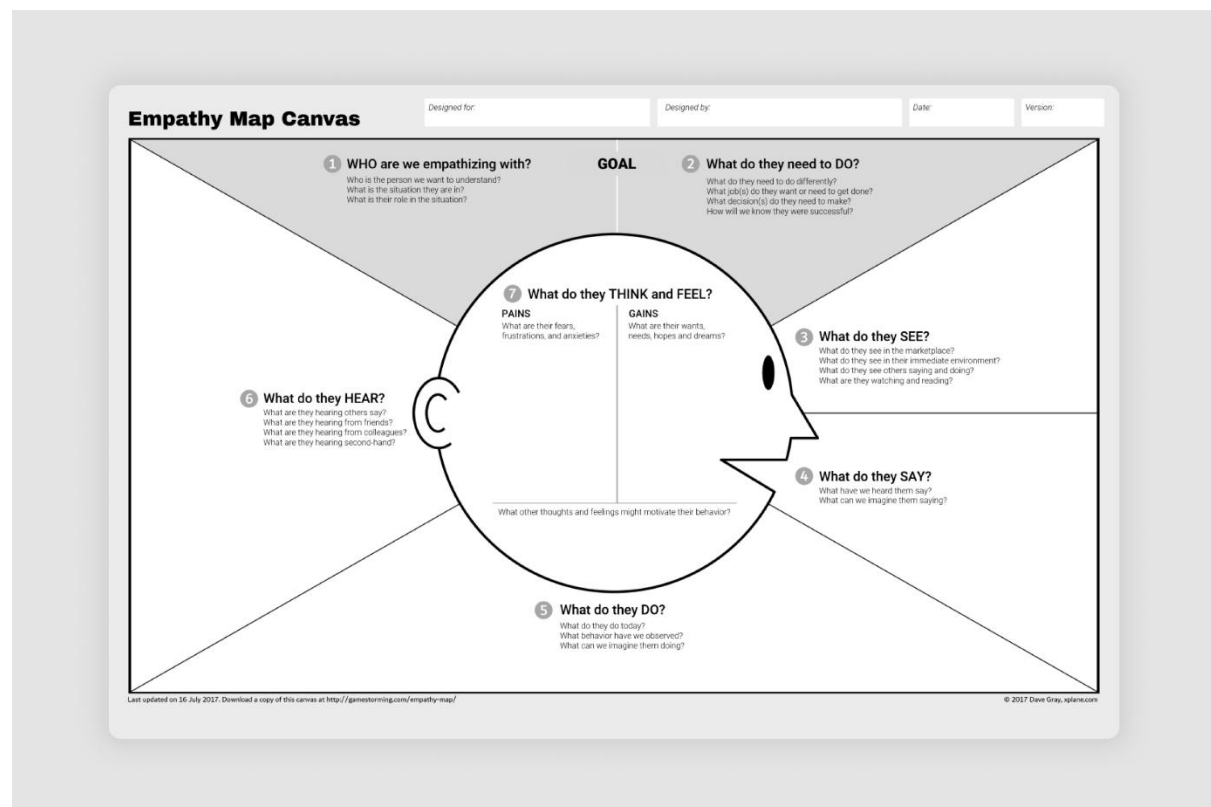
2.3 Brainstorming

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 →

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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 a 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!

Amar Yuktesh Person 3 Person 4
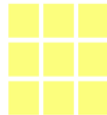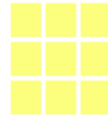
Person 5 Person 6 Person 7 Person 8
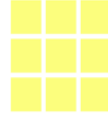
3 Group ideas

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 and break it up into smaller sub-groups.

🕐 20 minutes

Person 4

> **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

Importance
If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

TIP 💡
Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.

Feasibility
Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

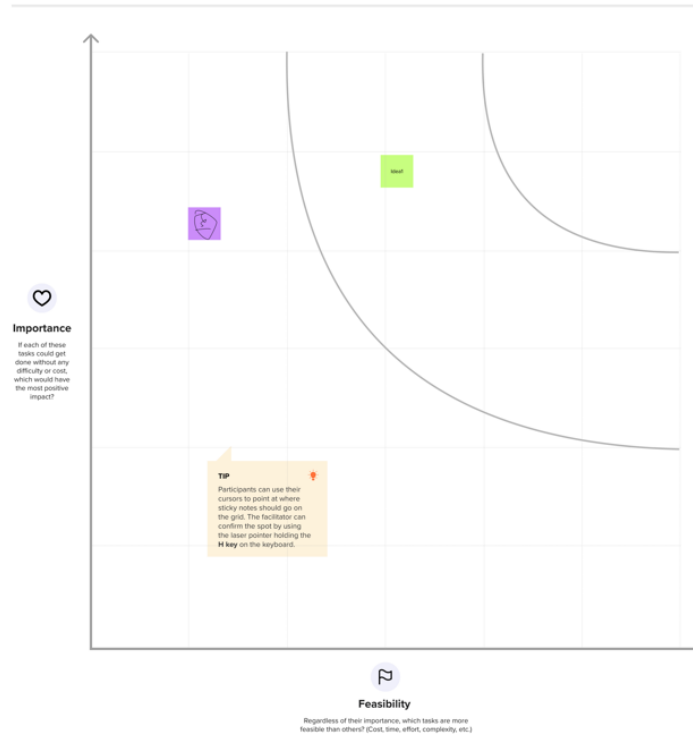| Weight (kg)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Harmonised	3·0–5·9			6·0–9·9				10·0–14·9					15·0–19·9					20·0–24·9					25·0–29·9					30·0–34·9					35·0–39·9					40·0–44·9			
Pocket Book for Hospital Care in Children	3·0–5·9			6·0–9·9				10·0–14·9					15·0–19·9					20·0–29·9										>30·0													
WHO antibiotic book	3·0–5·9			6·0–9·9				10·0–14·9					15·0–19·9					20·0–29·9										>30·0													
HIV	3·0–5·9			6·0–9·9				10·0–13·9				14·0–19·9						20·0–24·9				25·0–34·5										>35·0									
Drug-susceptible tuberculosis		4·0–7·9				8·0–11·9				12·0–15·9				16·0–24·9									>25·0																			
Levofloxacin*			5·0–9·9					10·0–15·9					16·0–23·9							24·0–33·9											>34·0										
3HP						10·0–15·9							16·0–23·9							24·0–30·9				31·0–33·9					>34·0												
RR/MDR tuberculosis	3·0–4·9	5·0–6·9		7·0–9·9				10·0–15·9					16·0–23·9							24·0–29·9					30·0–35·9						36·0–45·9									
Malaria																																										
A+L				5·0–14·9									15·0–24·9										25·0–34·9									>35·0									
AS+SP				5·0–24·9																	25·0–49·9																				
Primaquine			5·0–9·9					10·0–24·9													25·0–49·9																				
AS+MQ			5·0–8·9				9·0–17·9									18·0–29·9								>30·0																
AS+AQ			4·5–8·9				9·0–17·9									18·0–35·9												>36·0												
D+P			5·0–7·9		8·0–10·9			11·0–16·9					17·0–24·9								25·0–35·9								36·0–59·9												
Hepatitis C virus																																										
SOF–DCV												14·0–25·9												>26·0																		
SOF–VEL		<17·0											17·0–29·9											>30·0																		
G–P			<20·0												20·0–29·9									30·0–44·9																	
SOF–LED		<17·0													17·0–34·9										>35·0																

3.2 Solution Requirment

Functional Requirements:

These define **what the Health AI system should do**, i.e., features and behaviors that fulfill the user needs.

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	Health AI Chat	Symptom-based Chat with AI
		Natural language interaction with medical responses
FR-4	Health Monitoring Dashboard	View vitals (Heart Rate, BP, Glucose, etc.)
		Graph-based trend analysis
FR-5	Disease Prediction	Input symptoms to get probable conditions
		Use of AI model (IBM Granite/Hugging Face)
FR-6	Patient History Management	Track previous predictions, chats, reports
		Download or email history
FR-7	Appointment Booking	Request slot with doctor based on symptoms
		Confirmation & Reminder Notifications
FR-8	Admin Portal	Manage users, permissions, view analytics
		Configure AI thresholds and models

Non-functional Requirements:

These define **how the system should perform** rather than specific behaviors. These ensure **quality, security, and scalability** of the Health AI system.

NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	The interface must be easy to use for non-technical users (patients, doctors).
NFR-2	Security	Secure login, data encryption, and role-based access control.

NFR-3	Reliability	The system must provide consistent results and function correctly under load.
NFR-4	Performance	Fast AI responses, minimal delay in chat, graphs, and predictions.
NFR-5	Availability	24/7 system availability with minimum downtime (< 1%).
NFR-6	Scalability	Ability to handle increasing users and data without performance degradation.

## 3.3 Data Flow Diagram (DFD):

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.
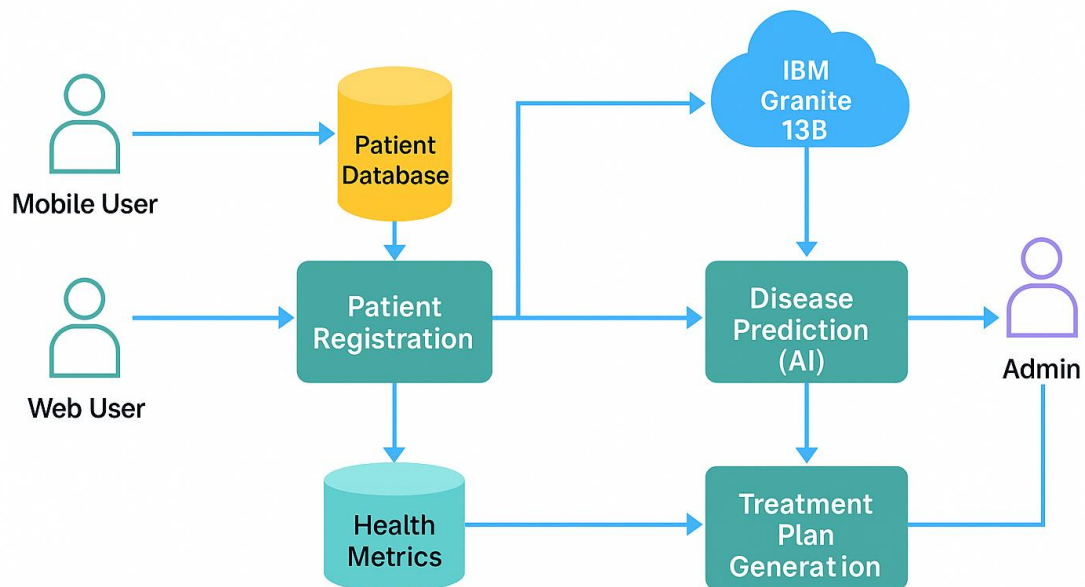
Health AI Data Flow Driagm

Example: (Simplified)

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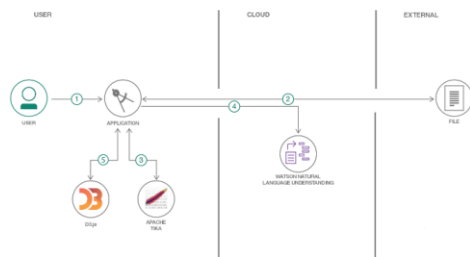
1. User configures credentials for the Watson Natural Language Understanding service and starts the app.
2. User selects data file to process and load.
3. Apache Tika extracts text from the data file.
4. Extracted text is passed to Watson NLU for enrichment.
5. Enriched data is visualized in the UI using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

User Stories – Health AI

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
	Registration	USN-2	As a user, I will receive a confirmation email once I have registered for the application.	I receive the confirmation email & can click to confirm	High	Sprint-1
	Registration	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

	Registration	USN-4	As a user, I can register for the application through Gmail.	I can register and log in using my Gmail credentials	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email and password.	I can securely log in and view my dashboard	High	Sprint-1
	Dashboard	USN-6	As a user, I can view my health records, AI disease predictions, and health graphs.	I see updated data and AI predictions after login	High	Sprint-2
	Health AI Chat	USN-7	As a user, I can chat with an AI to ask about my symptoms or health concerns.	AI responds with meaningful answers related to my health	High	Sprint-2
	Health Trends	USN-8	As a user, I can see graphs of my vital health parameters over time.	Graphs display trends for heart rate, BP, glucose, etc.	Medium	Sprint-3

| **Customer (Web User)** | Registration/Login/Dashboard | USN-9 | As a web user, I can register, login, and use all features similar to mobile. | Features work seamlessly on web version | High | Sprint-2 |

| | Appointment Booking | USN-10 | As a user, I can book appointments with a doctor through the web dashboard. | Appointment is scheduled and confirmed | Medium | Sprint-3 |

| **Customer Care Executive** | Patient Management | USN-11 | As an executive, I can view and manage patient queries from the AI chat system. | I can respond or escalate unresolved issues | High | Sprint-2 |

| | Report Generation | USN-12 | As an executive, I can download or email a summary of patient health data. | Reports are generated and sent correctly | Medium | Sprint-3 |

Administrator	User Management	USN-13	As an admin, I can manage user accounts (activate, deactivate, remove).	Admin can see all user actions and control access	High	Sprint-1
	Analytics	USN-14	As an admin, I can view overall analytics of AI performance and health trends.	I can monitor the system through graphs and reports	Medium	Sprint-3
	System Configuration	USN-15	As an admin, I can configure AI model versions, health thresholds, and set permissions.	Changes apply system-wide correctly	Medium	Sprint-3

3.4 Technology Stack:

Technical Architecture:

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

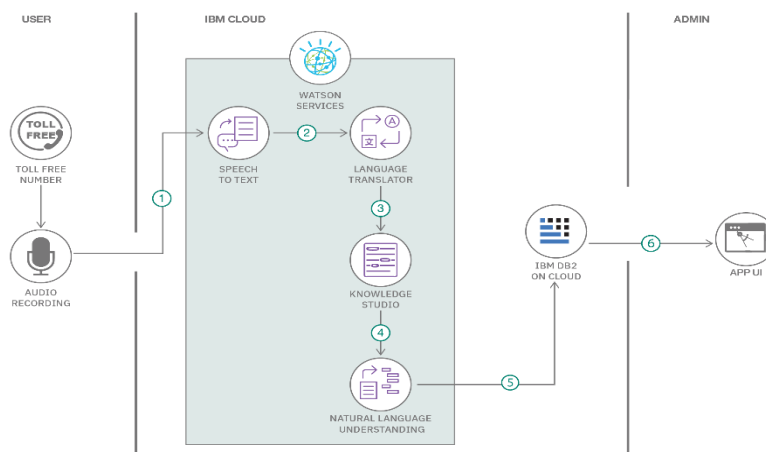**Example: Order processing during pandemics for offline mode**

Table-1: Components & Technologies

S.No	Component	Description	Technology
1	User Interface	Web and Mobile user interface with forms, chat, and health dashboards	Streamlit (Python), HTML/CSS, JS
2	Application Logic-1	Registration, login, and dashboard logic	Python (Flask)
3	Application Logic-2	Speech-to-text feature for patient voice inputs	IBM Watson Speech-to-Text
4	Application Logic-3	Conversational AI for symptom analysis	IBM Watson Assistant / Hugging Face Transformers
5	Database	Stores users, health logs, vitals, chats, and predictions	MySQL (on IBM Cloud)
6	Cloud Database	Cloud-based backup and data sync	IBM Cloudant

7	File Storage	Store user reports, chat logs, audio files	IBM Cloud Object Storage
8	External API-1	Health-related news, weather condition if relevant	IBM Weather API
9	External API-2	Aadhar verification API (for patient validation)	Aadhar eKYC API
10	Machine Learning Model	AI model to predict diseases based on symptoms	IBM Granite 13B / Hugging Face Transformers
11	Infrastructure	Deployment in the cloud for scalability and uptime	IBM Cloud Foundry / Kubernetes

Table-2: Application Characteristics

S.No	Characteristics	Description	Technology
1	Open-Source Frameworks	Frontend and backend based on open technologies	Streamlit, Flask, Hugging Face Transformers
2	Security Implementations	SHA-256 for password encryption, IAM roles, HTTPS, OAuth2 login	OpenSSL, JWT, IBM IAM, OAuth 2.0, HTTPS
3	Scalable Architecture	3-tier model with possible microservices expansion	Kubernetes, IBM Cloud Container Services
4	Availability	Load balancers and redundant instances for maximum uptime	IBM Cloud Load Balancer, Multi-zone deployments
5	Performance	Caching for repeated API calls, optimized queries, minimal AI response time	Redis Cache, CDN (Cloudflare), MySQL indexing

Reference Links

1. **IBM Developer – AI-Powered Backend for Order Processing During Pandemics**
   https://developer.ibm.com/patterns/ai-powered-backend-system-for-order-processing-during-pandemics/

2. **IBM Developer – Healthcare Chatbot Architecture**
   https://developer.ibm.com/patterns/healthcare-chatbot-architecture/

3. **IBM Cloud Architecture Center**
   https://www.ibm.com/cloud/architecture

4. **C4 Model – Visualizing Software Architecture**
   https://c4model.com/

5. **AWS Architecture Center**
   https://aws.amazon.com/architecture/

6. **Medium – How to Draw Useful Technical Architecture Diagrams**
   https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d

4. PROJECT DESIGN

4.1 Problem Solution Fit

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:

References:

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

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

4.2 Proposed Solution:

Proposed Solution Template: Health AI

S.No.	Parameter	Description
1	**Problem Statement**	Many individuals delay visiting a doctor due to minor symptoms, lack of awareness, or access issues. This results in late diagnoses and deteriorating health. There is a need for an AI-based system that can help users assess their symptoms, monitor vitals, and get personalized guidance from the comfort of their homes.
2	**Idea / Solution Description**	**Health AI** is an AI-powered web and mobile application that allows users to: – Enter symptoms and get disease predictions using AI/ML models – Chat with a healthcare assistant for real-time advice – Track vital parameters (heart rate, BP, glucose) and view graphical trends – Store and manage medical history – Access preventive care suggestions. The backend is powered by IBM Granite or Hugging Face models, while the frontend uses Streamlit.
3	**Novelty / Uniqueness**	– Combines symptom-based AI predictions, vitals monitoring, and AI chat in one system – Uses powerful open-source models (e.g., Hugging Face, IBM Granite) – Real-time vitals graphing and health trend prediction – Integration with external APIs (e.g., Aadhar for verification, IBM Watson for NLP) – Focus on affordable AI-driven early diagnosis.
4	**Social Impact / Customer Satisfaction**	– Increases access to primary health advice in remote and underserved areas – Reduces unnecessary hospital visits and crowding – Encourages health monitoring and preventive care – Provides 24x7 AI support for common health concerns – Enhances user satisfaction with quick, accurate, and personalized advice.
5	**Business Model (Revenue Model)**	– **Freemium Model**: Basic features free; premium version includes unlimited predictions, full chat history, downloadable reports – **Subscription Plans** for clinics or telemedicine partners

		– **API-as-a-Service** for other health apps and hospitals – **Advertisements** from health products or services (non-intrusive)
6	**Scalability of the Solution**	– Deployed on **IBM Cloud** or **Kubernetes**, scalable for thousands of users – **Modular architecture** supports adding new features (e.g., mental health AI) – Easy integration with IoT health devices and wearable sensors – Scalable backend APIs to support real-time chat, prediction, and data storage

4.3 Solution Architecture:

Solution Architecture: Health AI

Definition & Purpose:

Solution architecture in **Health AI** bridges the gap between healthcare needs and AI-driven technology. It defines the structure and components needed to develop an AI-based health assistant that can provide disease prediction, vitals monitoring, medical chat, and more.

The goals of the solution architecture in this project are to:

- Identify the **best technologies** to solve the problem of delayed and inaccessible healthcare support.

- Clearly describe the **software structure, components, and data flow** for all stakeholders.

- Break the system into phases like **Registration → Prediction → Monitoring → Reporting**.

- Provide **technical specifications** to guide development and ensure scalability, performance, and security.

- **Example - Solution Architecture Diagram:**

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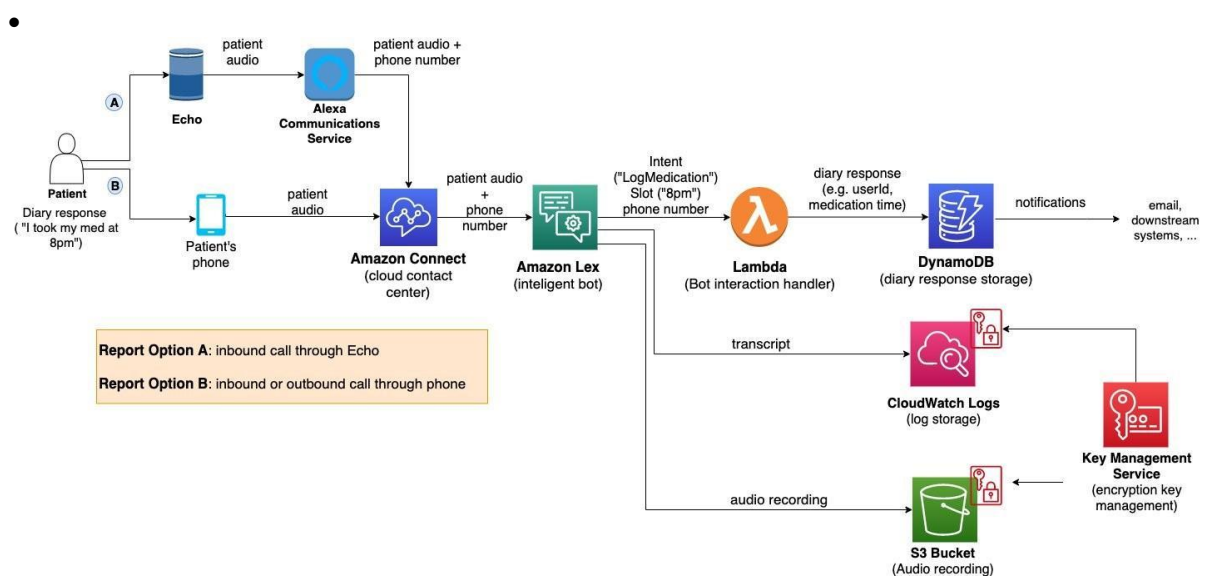
Figure 1: Architecture and data flow of the voice patient diary sample application

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

5.PROJECT PLANNING & SCHEDULING

5.1 Project Planning

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

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Patient Registration	USN-1	As a user, I can register patients by entering name, age, and gender.	2	High	[Member 1]
Sprint-1	Patient Registration	USN-2	As a user, I can store registration data into MySQL database securely.	1	High	[Member 2]
Sprint-1	Symptom Entry + Storage	USN-3	As a user, I can input symptoms and vital signs (BP, heart rate, glucose) via Streamlit interface.	3	High	[Member 3]
Sprint-1	Disease Prediction	USN-4	As a user, I receive predicted diseases based on symptoms using Hugging Face/IBM Granite.	4	High	[Member 4]
Sprint-2	Health Analytics Dashboard	USN-5	As a user, I can visualize health trends (vitals) using line charts and pie charts.	3	Medium	[Member 1]
Sprint-2	Treatment Plan Generation	USN-6	As a user, I receive personalized treatment plans using AI.	3	High	[Member 2]
Sprint-2	Patient Chat	USN-7	As a user, I can ask medical questions and receive AI-generated health responses.	4	Medium	[Member 3]
Sprint-2	Deployment	USN-8	As a user, I can access the app via Streamlit Cloud with proper .env API setup.	4	High	[Member 4]

Project Tracker, Velocity & Burndown Chart (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	10	5 Days	01 May 2025	05 May 2025	10	05 May 2025
Sprint-2	14	5 Days	06 May 2025	10 May 2025	14	10 May 2025

Velocity

Velocity = Total Story Points Completed / Number of Sprints
= (10 + 14) / 2 = 24 / 2 = 12

Team Velocity = 12 Story Points per Sprint

Velocity per day (for 5-day sprint):
12 / 5 = 2.4 Story Points/day

Burndown Chart:

A Burndown Chart shows how many story points remain each day during a sprint. It helps track project progress and whether you're ahead or behind.

Learn more:

- [Visual Paradigm – Scrum Burndown Chart](#)

- [Atlassian Guide on Burndown Charts](#)

References:

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

- https://www.atlassian.com/agile/tutorials/epics

- https://www.atlassian.com/agile/tutorials/sprints

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

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

6.FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

Functional Requirements:

These define **what the Health AI system should do**, i.e., features and behaviors that fulfill the user needs.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form
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FR-8	Admin Portal	Manage users, permissions, view analytics
		Configure AI thresholds and models

Non-functional Requirements:

These define **how the system should perform** rather than specific behaviors. These ensure **quality, security, and scalability** of the Health AI system.

NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	The interface must be easy to use for non-technical users (patients, doctors).
NFR-2	Security	Secure login, data encryption, and role-based access control.
NFR-3	Reliability	The system must provide consistent results and function correctly under load.

NFR-4	Performance	Fast AI responses, minimal delay in chat, graphs, and predictions.
NFR-5	Availability	24/7 system availability with minimum downtime (< 1%).
NFR-6	Scalability	Ability to handle increasing users and data without performance degradation.

7.RESULTS

7.1 OUTPUT SCREENSHOTS

```
Disease Predictor says:

A patient is experiencing the following symptoms: persistent headache, blurred vision, excessive thirst. What is the most likely disease, and
A patient is experiencing the following symptoms: persistent cough, fever, chest pain. What is the most likely disease, and what are the next
A patient is experiencing the following symptoms: pain and swelling in the joints, fatigue, fever. What is the most likely disease, and what a
A patient is experiencing the following symptoms: loss of appetite, weight loss, nausea. What is the most likely disease, and what are the nex
A patient is experiencing the following symptoms: diarrhea, abdominal pain, fever. What is the most likely disease, and what are the next step
A patient is experiencing the following symptoms: stiff neck, severe headache, fever. What is the most likely disease, and what are the next s
A patient is experiencing the following symptoms: difficulty breathing, chest tightness, cough. What is the most likely disease, and what are
A patient is experiencing the following symptoms: muscle weakness, fatigue, joint pain. What is the most likely disease, and what are the next
A patient is experiencing the following symptoms: decreased urine output, fatigue, confusion. What is the most likely disease, and what are th
A patient is experiencing the following symptoms
```

```
s    Terminal                                          ✦

Disease Predictor says:

A patient is experiencing the following symptoms: sneezing, runny nose, sore throat, mild fever. What is the most likely disease, and what are the ne
The most likely disease is the common cold, caused by a virus. The symptoms can last anywhere from a few days to a week or two. Treatment involves ma
```

8. ADVANTAGES & DISADVANTAGES

Advantages of HealthAI:

1. Provides quick and intelligent medical advice using AI.

2. Available anytime, anywhere through a web-based platform.

3. Uses IBM Granite for accurate disease prediction and treatment plans.

4. Helps users track health trends with visual dashboards.

5. Reduces unnecessary hospital visits for minor health issues.

Disadvantages of HealthAI:

1. Cannot fully replace doctors or emergency medical care.

2. Depends on internet connectivity and device access.

3. AI may give inaccurate predictions if input data is incomplete.

4. User health data must be securely managed to avoid privacy risks.

5. Setting up AI integration may be challenging for beginners.

9. **CONCLUSION**

The HealthAI project demonstrates how artificial intelligence can enhance healthcare accessibility and user engagement. By using IBM Granite via API and Google Colab, users receive AI-powered disease predictions, treatment suggestions, and answers to health-related queries. The integration of a simple interface with powerful backend models ensures both usability and accuracy. Health metrics are visualized for better self-monitoring and understanding of personal health trends. This project reduces the burden on healthcare systems by guiding users with minor issues. With secure API key handling and responsible design, HealthAI proves to be a helpful virtual healthcare assistant. It showcases the potential of combining AI, cloud tools, and real-time data analysis in modern medicine.

10.FUTURE SCOPE

1. **Integration with Wearable Devices:** HealthAI can connect with smartwatches or fitness trackers to collect real-time vitals like heart rate, BP, and glucose levels.

2. **Multilingual Support:** The chatbot can be enhanced to support multiple regional languages for wider accessibility.

3. **Electronic Health Record (EHR) Integration**: Future versions can integrate with hospitals to fetch and store patient medical histories securely.

4. **Voice-Enabled Assistance**: Adding voice input/output can help users with low literacy or accessibility needs.

5. **Telemedicine Support:** HealthAI can be extended to schedule doctor appointments or enable video consultations.

6. **Advanced Diagnosis with Imaging**: Incorporating AI for analyzing medical images (X-rays, scans) for deeper diagnostics.

7. **AI Model Enhancement:** Using more advanced and fine-tuned models to improve prediction accuracy and context-aware responses.

11. APPENDIX

```
!pip install requests

import os

os.environ["h_e_a_l_t_h"] = "YOUR_api_key"

import requests


def ask_health_ai(prompt, model_id="HuggingFaceH4/zephyr-7b-beta"):
  headers = {
    "Authorization": f"Bearer {os.environ['h_e_a_l_t_h']}",
```

```python
            "Content-Type": "application/json"
        }

        payload = {
            "inputs": prompt,
            "parameters": {
                "temperature": 0.7,
                "max_new_tokens": 300
            }
        }
url = f"https://api-inference.huggingface.co/models/{model_id}"
        response = requests.post(url, headers=headers, json=payload)

        if response.status_code == 200:
            return response.json()[0]["generated_text"]
        else:
            return f" Error {response.status_code}: {response.text}"


def predict_disease(symptoms):
    prompt = f"A patient is experiencing the following symptoms: {symptoms}. What is the most likely disease, and what are the next steps for treatment?"
    return ask_health_ai(prompt)
response = predict_disease("persistent headache, blurred vision, excessive thirst")
print(" Disease Predictor says:\n")
print(response)
response = predict_disease("sneezing, runny nose, sore throat, mild fever")
print(" Disease Predictor says:\n")
print(response)
```

GitHub link: Kalimandlasoniya/healthai-intelligent-healthcare-assistant-using-ibm-granite

Demo link:

https://drive.google.com/file/d/1yZqyqWl-legvD14sqMo0bD2Y_3Go8WzR/view?usp=drivesdk