

Lab Practical 2

Aim: To create Level – 0, Level -1, Level 2 Data Flow Diagram (DFD) on Retrieval Augmented Generation for Holistic Cardiac Support.

Theory:

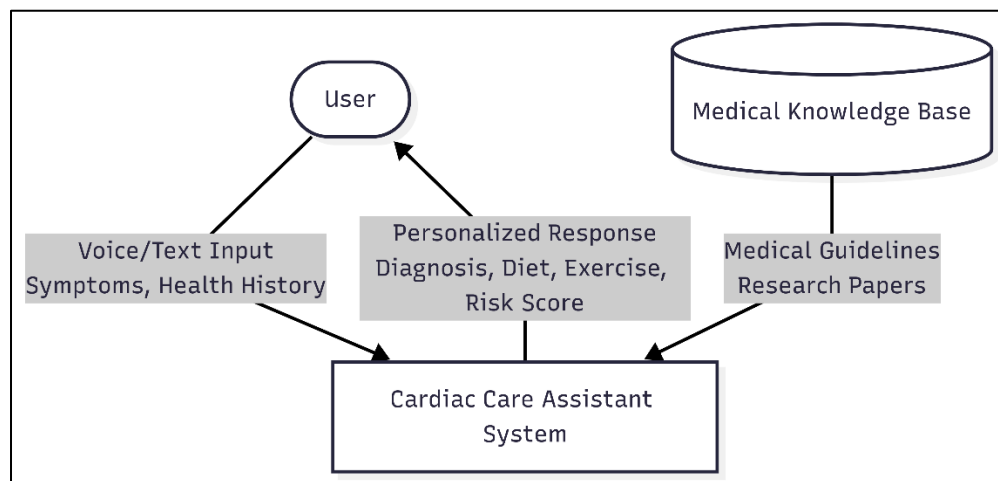
A Data Flow Diagram (DFD) is a graphical representation that shows how data flows through a system. It illustrates the movement of data between processes, data stores, external entities, and the system itself. DFDs use standard symbols: circles/bubbles for processes, open rectangles for external entities, parallel lines for data stores, and arrows for data flows.

Data Flow Diagram (DFD) use different symbols and notation to represent data flow within system. That simplify the complex system into understandable visual elements. This makes them easier to interpret by both technical and non-technical stakeholders.

Level - 0 Diagram

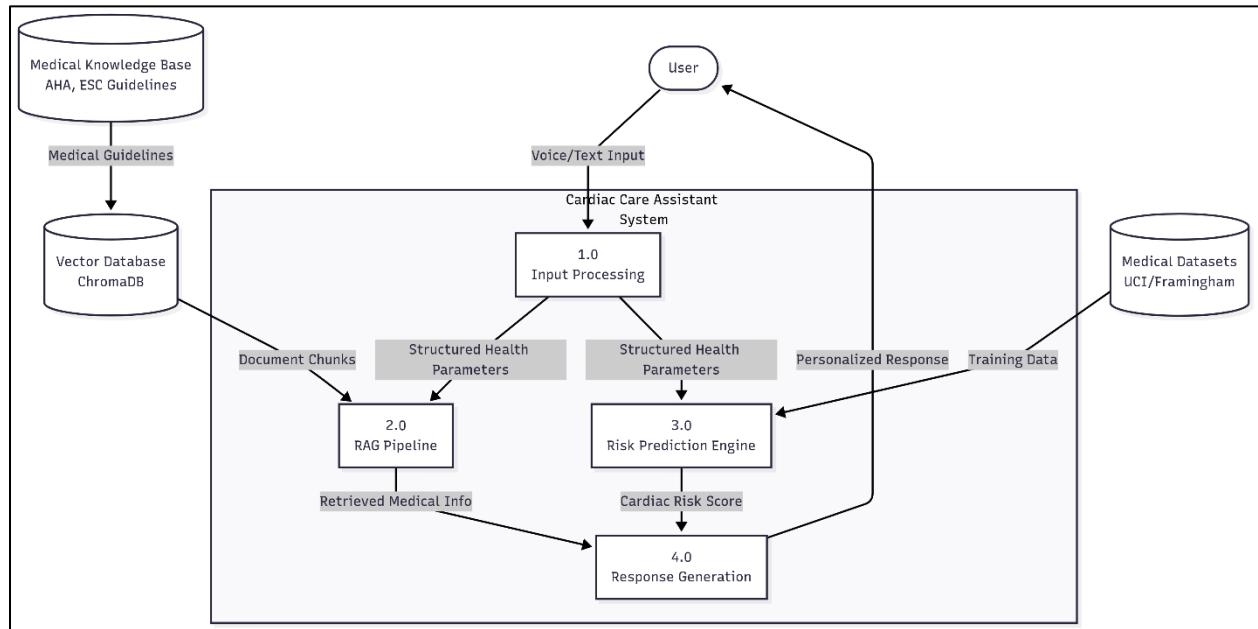
The highest-level view that shows the entire system as a single process bubble. It depicts the system's boundaries by showing all external entities that interact with the system and the major data flows between them and the system.

This level provides no details about internal system processes - it's purely a "black box" view that establishes scope and shows what data enters and leaves the system.



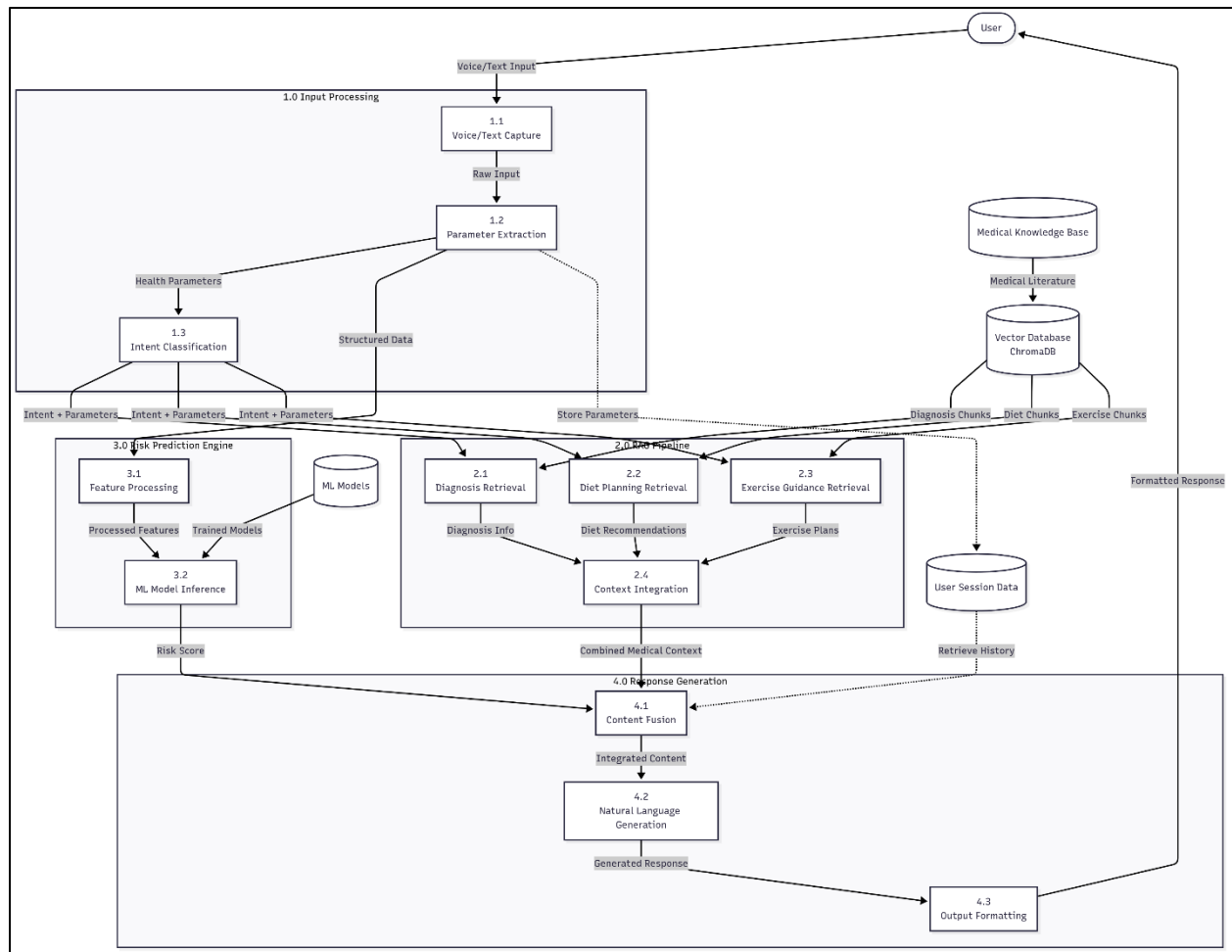
Level - 1 Diagram

This breaks down the single process from Level 0 into its major subsystems or functional areas. It shows the primary processes within the system, data stores used by these processes, and how data flows between processes and external entities. Each process bubble represents a significant function of the system, but still maintains a fairly high-level perspective without getting into detailed sub-processes.



Level - 2 Diagram

This further decomposes each Level 1 process into more detailed sub-processes. It shows the specific steps and operations that occur within each major function, along with any additional data stores that might be used at this more granular level. The data flows become more specific, showing exactly what information is passed between sub-processes. This level provides enough detail to understand the internal workings of each major system function.



Lab Practical 4

Aim: To create PERT (Program Evaluation and Review Technique Chart) on Retrieval Augmented Generation for Holistic Cardiac Support.

Theory:

A PERT chart (Program Evaluation and Review Technique) is a project management tool that uses a network diagram to visually represent the sequence of tasks required to complete a project. It shows the interdependencies between tasks and helps identify the critical path the longest sequence of dependent tasks that determines the minimum project duration.

Step 1: Identify Project Tasks

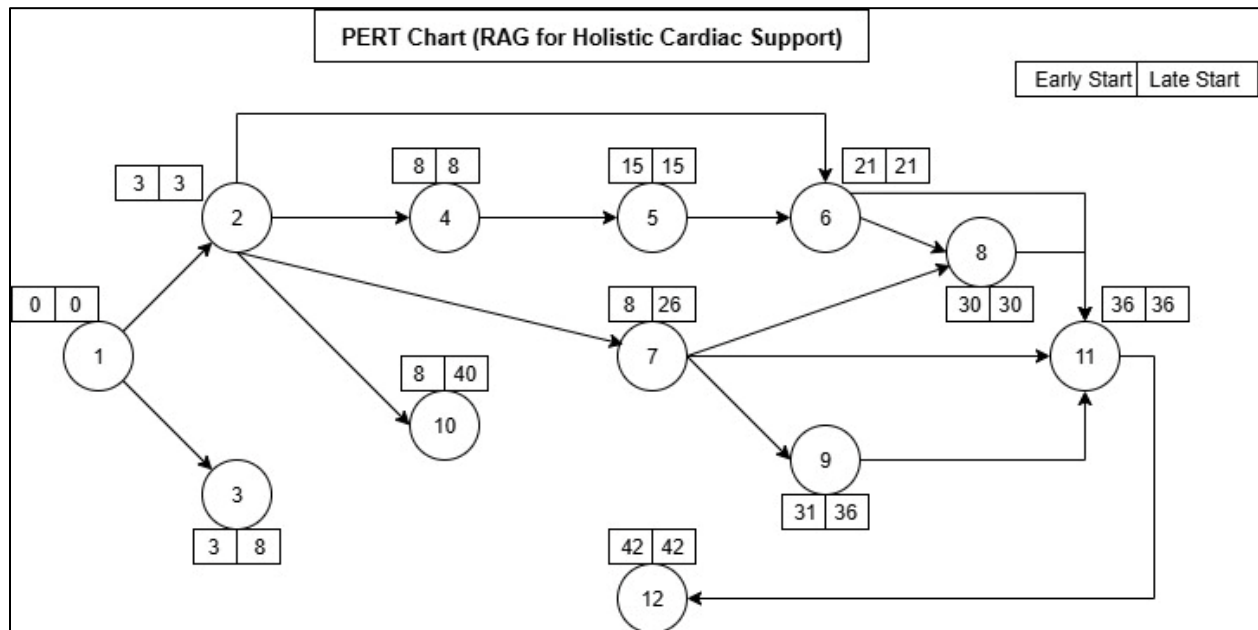
1. Project Scope and Objective
2. Requirement Analysis & Architecture Design
3. Literature Review
4. Data Collection & Medical Knowledge Base Development
5. Data Cleaning and Preprocessing
6. Vector Store Setup & RAG Pipeline Development
7. Conversational Flow Design
8. Memory Integration
9. User Interface Development
10. Define Evaluation Metrics
11. Testing & User Validation
12. Refinement, Documentation & Deployment

Step 2: Define Task Dependencies

Table 1. Task Dependencies

Task No.	Task Name	Dependencies
1	Project Scope & Objective	-
2	Requirement Analysis & Architecture Design	1
3	Literature Review	1
4	Data collection & Medical Knowledge base development	2
5	Data cleaning & pre-processing	4
6	Vector Store set up & RAG Pipeline Development	2,5
7	Conversational Flow Design	2
8	Memory Integration	6,7
9	User Interface Development	7
10	Define Evaluation Metrics	2
11	Testing & User Validation	6, 7, 8, 9
12	Refinement, Documentation & Deployment	11

Step 3: Connect Project Tasks



Step 4: Estimate Project Time Frame

Task No.	Task Name	Optimistic Days	Most likely days	Pessimistic days	Expected Days
1	Project Scope & Objective	2	3	4	3
2	Requirement Analysis & Architecture Design	3	5	7	5
3	Literature Review	3	4	6	4
4	Data collection & Medical Knowledge base development	5	7	10	7
5	Data cleaning & pre-processing	4	6	9	6
6	Vector Store set up & RAG Pipeline Development	6	9	12	9
7	Conversational Flow Design	3	5	7	5
8	Memory Integration	4	6	8	6
9	User Interface Development	5	7	10	7
10	Define Evaluation Metrics	2	3	5	3
11	Testing & User Validation	4	6	9	6
12	Refinement, Documentation & Deployment	3	5	8	5

Critical Path Analysis

- **Critical Path:** $1 \rightarrow 2 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 8 \rightarrow 11 \rightarrow 12$
- **Total Duration on Critical Path:** 47 days (sequential)
- **With Parallelization:** 60 days
- **Buffer Time Available:** 8 days

Key Phases:

1. **Planning and Research Phase** (Days 1-10): Tasks 1, 2, 3
2. **Data Pipeline Development** (Days 11-23): Tasks 4, 5
3. **Core System Development Phase** (Days 24-44): Tasks 6, 7, 8 (some parallel)
4. **Interface & Metrics** (Days 39-49): Tasks 9,10 (parallel)
5. **Testing & Deployment** (Days 50-66): Tasks 11,12

The calculations use the PERT formula: $(\text{Optimistic} + 4 \times \text{Most Likely} + \text{Pessimistic}) \div 6$

Lab Practical 5

Aim: To understand the construction and application of a Gantt Chart for effective project scheduling, monitoring, and management.

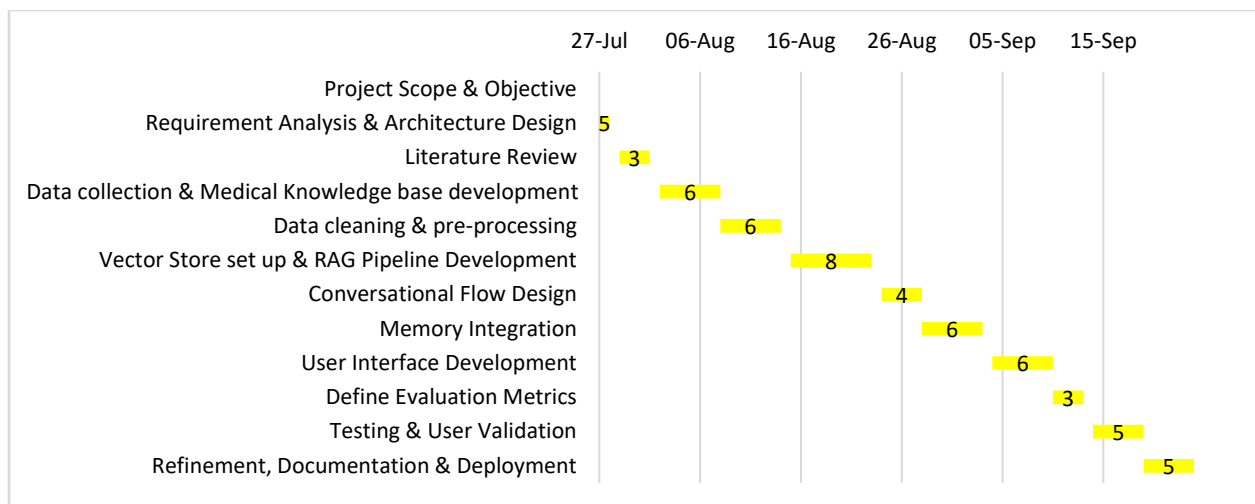
Theory:

A Gantt Chart is a type of bar chart used in project management to illustrate a project schedule. It visually represents:

- Tasks/Activities to be performed (on the vertical axis).
- Time schedule/duration of each task (on the horizontal axis).

Each task is shown as a horizontal bar, where the length of the bar indicates the start date, duration, and end date of the activity.

Task No.	Task Name	Duration (days)	Start Date	End Date
1	Project Scope & Objective	3	21 July	23 July
2	Requirement Analysis & Architecture Design	5	24 July	28 July
3	Literature Review	4	29 July	1 Aug
4	Data collection & Medical Knowledge base development	7	2 Aug	8 Aug
5	Data cleaning & pre-processing	6	9 Aug	14 Aug
6	Vector Store set up & RAG Pipeline Development	9	15 Aug	23 Aug
7	Conversational Flow Design	5	24 Aug	28 Aug
8	Memory Integration	6	29 Aug	3 Sep
9	User Interface Development	7	4 Sep	10 Sep
10	Define Evaluation Metrics	3	11 Sep	13 Aug
11	Testing & User Validation	6	14 Sep	19 Sep
12	Refinement, Documentation & Deployment	5	20 Sep	24 Sep

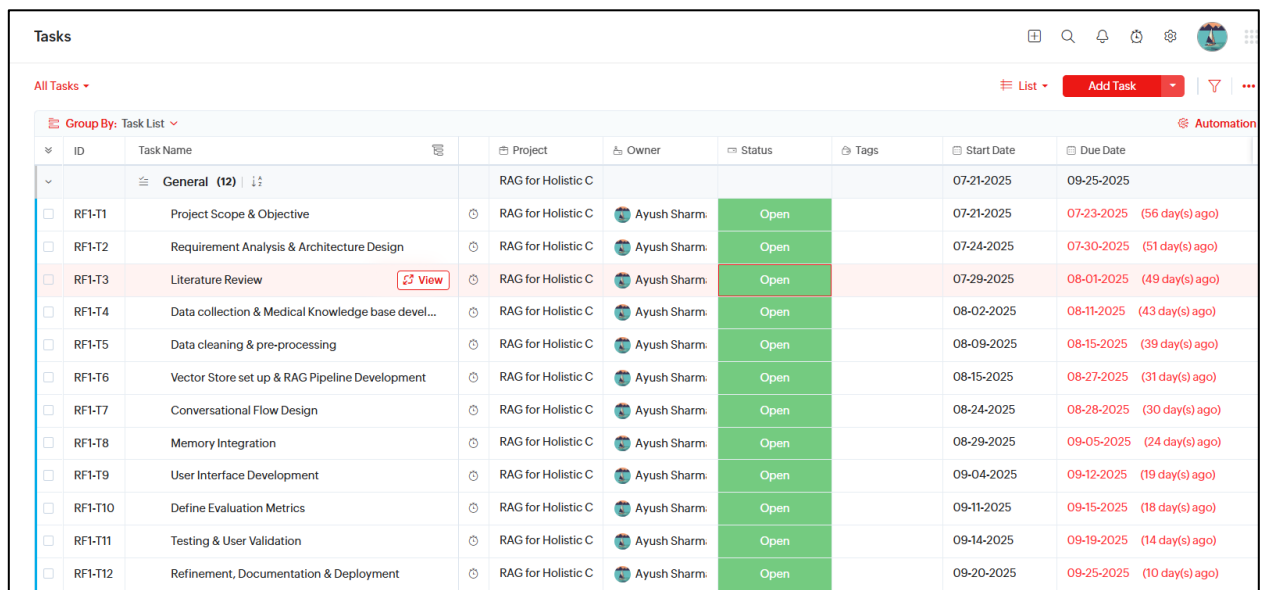


Lab Practical 3

Aim: Activity planning using any online software for project management i.e. Zoho Projects

Theory: Zoho Projects is a cloud-based project management software that provides a suite of tools, including project templates, task lists, and timesheets, tailored to meet the needs of small businesses and freelancers.

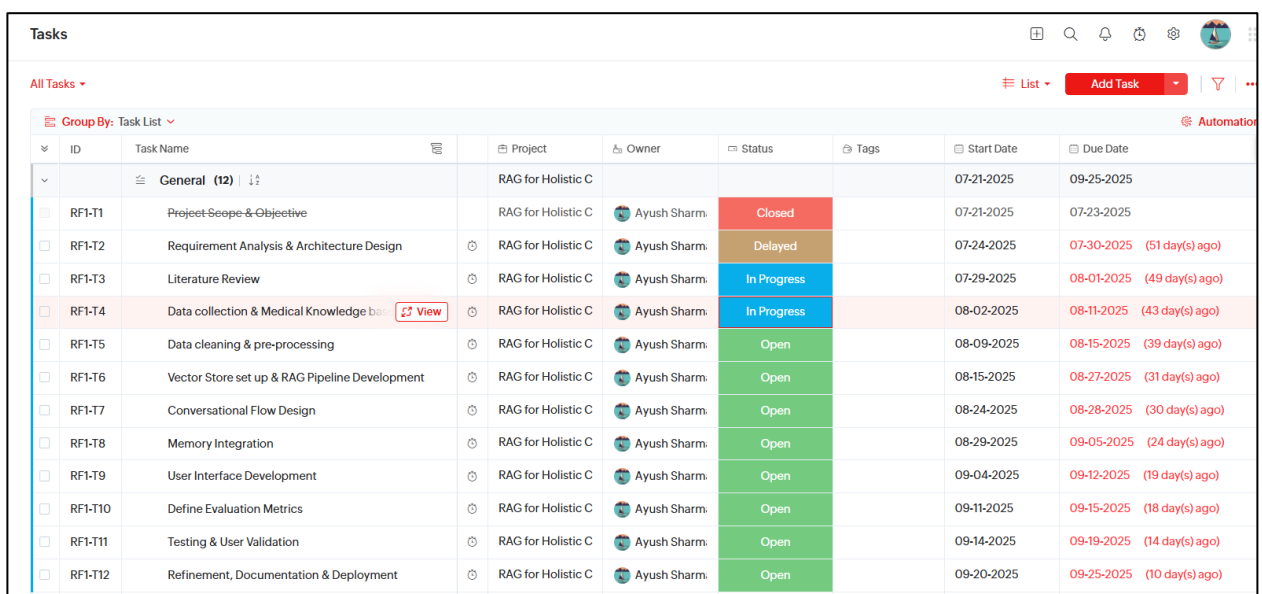
1. Initially we fill in details of respective tasks of project and then they are assigned **OPEN** tag by default.



The screenshot shows the 'Tasks' page in Zoho Projects. The tasks are listed in a table with columns: ID, Task Name, Project, Owner, Status, Tags, Start Date, and Due Date. The project is 'RAG for Holistic C' and the owner is 'Ayush Sharm'. All tasks are in 'Open' status.

ID	Task Name	Project	Owner	Status	Tags	Start Date	Due Date
RF1-T1	Project Scope & Objective	RAG for Holistic C	Ayush Sharm	Open		07-21-2025	07-23-2025 (56 day(s) ago)
RF1-T2	Requirement Analysis & Architecture Design	RAG for Holistic C	Ayush Sharm	Open		07-24-2025	07-30-2025 (51 day(s) ago)
RF1-T3	Literature Review	RAG for Holistic C	Ayush Sharm	Open		07-29-2025	08-01-2025 (49 day(s) ago)
RF1-T4	Data collection & Medical Knowledge base devel...	RAG for Holistic C	Ayush Sharm	Open		08-02-2025	08-11-2025 (43 day(s) ago)
RF1-T5	Data cleaning & pre-processing	RAG for Holistic C	Ayush Sharm	Open		08-09-2025	08-15-2025 (39 day(s) ago)
RF1-T6	Vector Store set up & RAG Pipeline Development	RAG for Holistic C	Ayush Sharm	Open		08-15-2025	08-27-2025 (31 day(s) ago)
RF1-T7	Conversational Flow Design	RAG for Holistic C	Ayush Sharm	Open		08-24-2025	08-28-2025 (30 day(s) ago)
RF1-T8	Memory Integration	RAG for Holistic C	Ayush Sharm	Open		08-29-2025	09-05-2025 (24 day(s) ago)
RF1-T9	User Interface Development	RAG for Holistic C	Ayush Sharm	Open		09-04-2025	09-12-2025 (19 day(s) ago)
RF1-T10	Define Evaluation Metrics	RAG for Holistic C	Ayush Sharm	Open		09-11-2025	09-15-2025 (18 day(s) ago)
RF1-T11	Testing & User Validation	RAG for Holistic C	Ayush Sharm	Open		09-14-2025	09-19-2025 (14 day(s) ago)
RF1-T12	Refinement, Documentation & Deployment	RAG for Holistic C	Ayush Sharm	Open		09-20-2025	09-25-2025 (10 day(s) ago)

2. Then as we progress with the project, we can change the status of task to either Closed or In Progress. There are other options also like Delayed, On Hold, to be Tested and In Review which can be used as per convenience.



The screenshot shows the 'Tasks' page in Zoho Projects. The tasks are listed in a table with columns: ID, Task Name, Project, Owner, Status, Tags, Start Date, and Due Date. The project is 'RAG for Holistic C' and the owner is 'Ayush Sharm'. The status of the tasks has been updated: RF1-T1 is 'Closed', RF1-T2 is 'Delayed', and RF1-T3, RF1-T4, RF1-T5, RF1-T6, RF1-T7, RF1-T8, RF1-T9, RF1-T10, RF1-T11, and RF1-T12 are 'Open'.

ID	Task Name	Project	Owner	Status	Tags	Start Date	Due Date
RF1-T1	Project Scope & Objective	RAG for Holistic C	Ayush Sharm	Closed		07-21-2025	07-23-2025
RF1-T2	Requirement Analysis & Architecture Design	RAG for Holistic C	Ayush Sharm	Delayed		07-24-2025	07-30-2025 (51 day(s) ago)
RF1-T3	Literature Review	RAG for Holistic C	Ayush Sharm	In Progress		07-29-2025	08-01-2025 (49 day(s) ago)
RF1-T4	Data collection & Medical Knowledge base devel...	RAG for Holistic C	Ayush Sharm	In Progress		08-02-2025	08-11-2025 (43 day(s) ago)
RF1-T5	Data cleaning & pre-processing	RAG for Holistic C	Ayush Sharm	Open		08-09-2025	08-15-2025 (39 day(s) ago)
RF1-T6	Vector Store set up & RAG Pipeline Development	RAG for Holistic C	Ayush Sharm	Open		08-15-2025	08-27-2025 (31 day(s) ago)
RF1-T7	Conversational Flow Design	RAG for Holistic C	Ayush Sharm	Open		08-24-2025	08-28-2025 (30 day(s) ago)
RF1-T8	Memory Integration	RAG for Holistic C	Ayush Sharm	Open		08-29-2025	09-05-2025 (24 day(s) ago)
RF1-T9	User Interface Development	RAG for Holistic C	Ayush Sharm	Open		09-04-2025	09-12-2025 (19 day(s) ago)
RF1-T10	Define Evaluation Metrics	RAG for Holistic C	Ayush Sharm	Open		09-11-2025	09-15-2025 (18 day(s) ago)
RF1-T11	Testing & User Validation	RAG for Holistic C	Ayush Sharm	Open		09-14-2025	09-19-2025 (14 day(s) ago)
RF1-T12	Refinement, Documentation & Deployment	RAG for Holistic C	Ayush Sharm	Open		09-20-2025	09-25-2025 (10 day(s) ago)

3. Priorities are also assigned to each task for better time management and control over more important things than less important ones.

General (12)		2025	09-25-2025			<div><div></div>8%</div>	
	RF1-T1	Project Scope & Objective	2025	07-23-2025	3 days	Medium	<div><div></div>100%</div> 0:00
	RF1-T2	Requirement Analysis & Architecture Design	-2025	07-30-2025 (51 day(s) ago)	5 days	Low	<div><div></div>0%</div> 0:00
	RF1-T3	Literature Review	-2025	08-01-2025 (49 day(s) ago)	4 days	None	<div><div></div>0%</div> 0:00
	RF1-T4	Data collection & Medical Knowledge base 🔗 View	-2025	08-11-2025 (43 day(s) ago)	7 days	None	<div><div></div>0%</div> 0:00
	RF1-T5	Data cleaning & pre-processing	-2025	08-15-2025 (39 day(s) ago)	6 days	High	<div><div></div>0%</div> 0:00
	RF1-T6	Vector Store set up & RAG Pipeline Development	-2025	08-27-2025 (31 day(s) ago)	9 days	None	<div><div></div>0%</div> 0:00
	RF1-T7	Conversational Flow Design	-2025	08-28-2025 (30 day(s) ago)	5 days	High	<div><div></div>0%</div> 0:00
	RF1-T8	Memory Integration	-2025	09-05-2025 (24 day(s) ago)	6 days	Medium	<div><div></div>0%</div> 0:00
	RF1-T9	User Interface Development	-2025	09-12-2025 (19 day(s) ago)	7 days	Medium	<div><div></div>0%</div> 0:00
	RF1-T10	Define Evaluation Metrics	2025	09-15-2025 (18 day(s) ago)	3 days	High	<div><div></div>0%</div> 0:00
	RF1-T11	Testing & User Validation	-2025	09-19-2025 (14 day(s) ago)	6 days	High	<div><div></div>0%</div> 0:00
	RF1-T12	Refinement, Documentation & Deployment	-2025	09-25-2025 (10 day(s) ago)	5 days	Medium	<div><div></div>0%</div> 0:00

4. We can also open up issues to better cater project needs and respectively assign status like Critical, Major or Minor depending upon severity, once resolved it can be closed or reopened.

Issues									
Group By None > All Issues									
ID	Issue Name	Project	Reporter	Created T...	Assignee	Tags	Last Clos...	Last Modi...	Due D...
RF1-T1	Inconsistent Knowledge Base	RAG for Holistic	Ayush Sharr	10-09-2025 02:...	Ayush Sharr		10-09-2025 02:...	08-13-2026 0...	

5. There is a phases section where sub groups of tasks can be made to execute collectively how work is being carried on in that phase.

Cleaning and final walk-through work items									
6 Open Bugs 1 Closed Bugs									
Bugs Invoices Release Notes Comments Fields Chart View Activity Stream									
#	Bug	Status	Reporter	Assignee	Severity	Created			
DC-168	As a user, I would like to receiv...	To be tested	Monica Hemswc	Chloé	Major	11/24/2020 06:33 PM	Cle		
DC-158	Streamline support tickets	On hold	Helen Collins	Charles Charles Stor	To be resolved lai	04/11/2019 04:13 PM	Cle		
DC-154	On click of 'Switch to normal m...	To be tested	Helen Collins	Monica Hemsworth	Medium	04/11/2019 04:13 PM	Cle		
DC-153	Zoom in and zoom out features.	Reopen	Helen Collins	Aravind Rajkumar	Medium	04/11/2019 04:13 PM	Cle		
DC-140	Water leakage in the third floor...	In progress	Helen Collins	Helen Collins	Major	06/26/2018 02:28 PM	Cle		
DC-112	Quality of load that was import...	In progress	Helen Collins	Charles Stones	High	02/24/2017 03:49 PM	Cle		
DC-18	Water-shortage	Closed	Victor Young	Victor Young	Minor	02/06/2017 06:28 PM	Cle		

Lab Practical 6

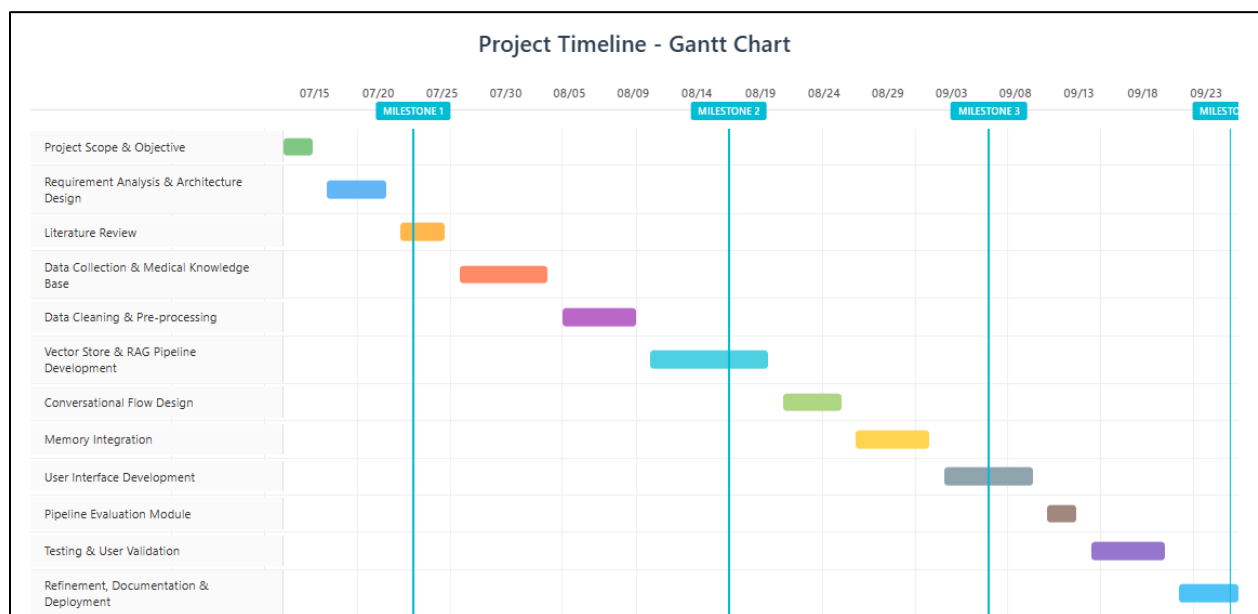
Aim: To prepare a milestone-driven Gantt chart for the project, show task sequencing and timelines, and use it to manage and report the project's progress.

Theory:

A milestone is a significant point or event in the project timeline that marks the completion of a major phase, deliverable, or task. Milestones are not activities themselves but rather indicators of progress. They help project managers monitor key achievements and ensure that the project is on track.

Milestones are integrated into Gantt charts as key markers that signify important achievements. While Gantt charts provide a detailed timeline of all activities, milestones act as summary indicators that help evaluate whether the project is moving according to plan.

Diagram:



Tasks:

- | | | | | | |
|-------------------------------|---|-------------------------------|---|-----------------------------------|--|
| 1. Project Scope & Objective | 2. Requirement Analysis & Architecture Design | 3. Literature Review | 4. Data Collection & Medical Knowledge Base | 5. Data Cleaning & Pre-processing | 6. Vector Store & RAG Pipeline Development |
| 7. Conversational Flow Design | 8. Memory Integration | 9. User Interface Development | 10. Pipeline Evaluation Module | 11. Testing & User Validation | 12. Refinement, Documentation & Deployment |

Division of Project Tasks into respective milestones:

Milestone No.	Milestone Title	Description / Outcome
M1	Project Initiation and Planning	Defined project scope, objectives, and motivation for developing a RAG-based holistic cardiac support system. Completed literature review and requirement analysis to identify existing research gaps.
M2	System Design and Knowledge Base Development	Designed system architecture, data flow diagrams (DFDs), and identified relevant medical datasets. Developed and structured the medical knowledge base for integration into the RAG framework.
M3	Model Development and Integration	Implemented data preprocessing, vector store setup, and RAG pipeline. Integrated conversational flow, memory modules, and evaluation metrics to ensure accurate and context-aware responses.
M4	Testing, Refinement, and Deployment	Conducted model evaluation and user testing. Refined system responses and performance. Finalized documentation and deployed the interactive cardiac decision support prototype.

Conclusion:

From the project milestone graph, it is evident that the development process followed a structured and systematic approach. Each milestone represented a key stage of progress, ensuring balanced time allocation for research, development, testing, and deployment. The visualization helped in tracking dependencies, identifying critical paths, and managing timelines efficiently. Overall, the graph provided valuable insights into project planning and progress monitoring.

Lab Practical 7

Aim: To construct a network diagram for a given project and determine the critical path using the Critical Path Method (CPM) for effective project scheduling and time management.

Theory:

A Network Diagram is a graphical representation of a project's activities and their logical relationships. It helps visualize the sequence of tasks, their dependencies, and the flow of work required to complete the project. Each activity is represented as a node (or arrow), and connections between them show the precedence relationships (which task must be completed before another can start).

Network diagrams are an essential tool in project management, particularly when using methods like Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT).

Task	Name	Duration	ES	EF	LS	LF
1	Project Scope & Objective	5	0	5	0	5
2	Requirement Analysis & Architecture Design	5	5	10	5	10
3	Literature Review	4	5	9	15	19
4	Data collection & Medical Knowledge base development	7	10	17	10	17
5	Data cleaning & pre-processing	6	17	23	17	23
6	Vector Store set up & RAG Pipeline Development	9	23	32	23	32
7	Conversational Flow Design	5	9	14	19	24
8	Memory Integration	6	14	20	24	30
9	User Interface Development	7	20	27	30	37
10	Define Evaluation Metrics	5	32	37	32	37
11	Testing & User Validation	6	37	43	37	43
12	Refinement, Documentation & Deployment	5	43	48	43	48

In the above table, ES stands for **Earliest Start** - The earliest time an activity can start without violating the sequence of activities.

EF stands for **Earliest Finish** - The earliest time an activity can be completed which is $ES + \text{duration}$.

LS stands for **Latest Start** - The latest time an activity can start without delaying the project which is $LF - \text{Duration}$.

LF stands for **Latest Finish** - The latest time an activity can finish without delaying the project completion.



Critical Path:

1 → 2 → 4 → 5 → 6 → 10 → 11 → 12

Conclusion:

From this experiment, we successfully constructed a network diagram for the given project and calculated the critical path using the CPM method. The analysis of ES, EF, LS, and LF values allowed us to identify the sequence of critical activities that determine the minimum project duration. By assessing the critical path, we were able to recognize high-risk activities that could delay the project if not properly managed. Any non-critical activities with float were identified, showing flexibility in scheduling.

If the critical path was reconstructed after risk assessment, it demonstrated how resource reallocation or task rescheduling can optimize the project timeline. Overall, this experiment highlighted the importance of network diagrams and CPM in effective project planning, monitoring, and control, ensuring timely completion of projects.

Lab Practical 8

Aim: Identify the risk, analyse / assess the critical path activities and reconstruct the Critical Path.

Theory:

Identify Risks in Critical Path Activities

- In this experiment, the critical path activities of the RAG-based Cardiac Care System project were analyzed to identify potential risks that could impact overall project completion.
- Key activities on the critical path—such as Data Collection and Knowledge Base Development, RAG Pipeline Implementation, User Interface Integration, and Testing & Deployment—were examined for possible delays due to factors like limited availability of authentic medical data, extended model training time, integration challenges, or unforeseen technical issues.
- Each identified risk was evaluated based on its impact and probability, with high-severity risks prioritized for mitigation. Preventive measures included maintaining data backups, using modular development for faster debugging, scheduling intermediate tests after each integration phase, and ensuring timely validation from medical datasets.
- This approach ensured that despite technical uncertainties, the RAG-based cardiac care system remained on track toward timely completion and reliable system performance.

Risk Description	Category	Probability	Impact	Mitigation Strategy
Incomplete or inconsistent medical data collection	Data	High	High	Use verified medical sources (AHA, ESC), cross-validate with multiple datasets, and maintain data versioning.
Poor data preprocessing leading to incorrect embeddings	Technical	Medium	High	Implement automated data validation scripts and perform manual checks for data quality.
Inadequate model performance or hallucination in medical responses	Model	Medium	High	Fine-tune LLM with domain-specific data; include safety filters and response verification layers.
Integration failure between RAG pipeline and user interface	Technical	Medium	Medium	Use modular development and testing after each integration stage.

Hardware or system resource limitations during training	Infrastructure	Low	Medium	Use cloud-based GPUs; optimize batch size and model parameters for efficient computation.
Delay in data collection and annotation	Schedule	High	Medium	Assign clear responsibilities, maintain progress logs, and automate data gathering where possible.
Ethical or privacy issues in handling sensitive medical data	Ethical	Low	High	Follow HIPAA/GDPR compliance, anonymize all user data, and secure storage with encryption.
Inaccurate evaluation metrics leading to false validation	Validation	Medium	High	Define metrics clearly (accuracy, precision, hallucination rate); use expert review for validation.
User interface usability issues reducing system adoption	User Experience	Medium	Medium	Conduct early user testing, collect feedback, and iterate design accordingly.
Team coordination and communication gaps	Management	Low	Medium	Schedule weekly sync meetings and use project management tools (Trello, Notion).

Analysis of Current Path

- **Task 3 (Literature Review)** is crucial *before* data collection and architecture finalization, it provides the foundation for your data sources, RAG structure, and evaluation plan.
- **Task 10 (Define Evaluation Metrics)** should ideally be finalized *before* or *during* model development (Task 6), not after, because the metrics guide how you validate your pipeline.
- **Conversational Flow Design (Task 7)** often overlaps or runs parallel with **UI Development (Task 9)**, and doesn't necessarily have to wait for memory integration.

Recommended Revised Critical Path

1 -> 2 -> 3 -> 4 -> 5 -> 6 -> 10 -> 11 -> 12

This revised path adds Literature Review (Task 3) and ensures Evaluation Metrics (Task 10) is set early enough to guide testing. So yes, a mild reconstruction is recommended, not a full overhaul, but an adjustment to ensure dependencies follow the logical research and development flow.

Lab Practical 9

Aim: Perform activities to track and monitor the project progress using a Software Project Management tool i.e. Trello

Theory:

1. Introduction to Trello

Trello is a popular project management and collaboration tool based on the Kanban methodology. It helps individuals and teams organize tasks visually using boards, lists, and cards. Developed by Atlassian, Trello provides an intuitive drag-and-drop interface that makes tracking work progress simple and effective. It is widely used for team coordination, task scheduling, workflow tracking, and project planning.

2. Structure and Key Components

- **Board:** Represents a complete project or workspace. Each board contains multiple lists that outline different stages of the project.
- **List:** Lists represent phases or categories of a workflow (for example: *To Do*, *In Progress*, *Completed*). They help visualize task flow and project status.
- **Card:** Each card represents an individual task or activity. Cards can include descriptions, attachments, deadlines, comments, checklists, and labels.
- **Members:** Team members can be added to specific boards or cards, allowing for task assignment and collaboration.
- **Labels and Checklists:** Labels are used for quick identification and classification, while checklists help in tracking sub-tasks within a card.

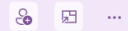
3. Features of Trello

- Drag-and-drop functionality for easy task movement between lists.
- Due dates and reminders for time-bound task management.
- Collaboration tools like comments, mentions, and attachments for team communication.
- Integrations with tools like Slack, Google Drive, Jira, and GitHub.
- Automation through Trello's built-in Butler feature, allowing custom rules, triggers, and actions to reduce repetitive work.

4. Advantages of Using Trello

- **Visual clarity:** The Kanban-style layout makes it easy to see project progress at a glance.
- **Ease of use:** Minimal learning curve and user-friendly interface.
- **Flexibility:** Can be adapted for different project types — software development, academic projects, event planning, or research tracking.
- **Collaboration:** Promotes transparency and communication among team members.
- **Cloud-based:** Accessible from any device with real-time updates.

To Do :



- ☐ User Interface Prototype – Develop a simple Streamlit dashboard to test conversational flow and risk score visualization. ☆
- ☐ Conversational Flow Design – Create structured intents and follow-up patterns for diagnosis, diet, and fitness modules. ☆
- ☐ Model Evaluation Framework – Define clear performance metrics such as precision, recall, hallucination rate, and response coherence. ☆
- ☐ RAG Pipeline Setup – Configure vector database (e.g., ChromaDB/Faiss), connect it to the LLM, and test retrieval accuracy. ☆
- ☐ Data Cleaning Pipeline – Build preprocessing scripts to remove duplicates, standardize terminologies, and tag medical entities. ☆
- ☐ Finalize Dataset Sources – Identify and validate medical datasets (AHA/ESC guidelines, clinical symptom databases, and dietary references) for ingestion into the knowledge base. ☆

Doing



- ☐ Creating UI Mockups – Developing Streamlit-based interface prototypes to visualize results and user responses interactively. ☆
- ☐ Integrating Memory Component – Working on storing previous user interactions to enable personalized follow-up recommendations. ☆
- ☐ Designing Conversational Prompts – Building structured query templates for diagnosis, diet, and exercise modules. ☆
- ☐ Testing RAG Query Retrieval Accuracy – Running test prompts to check how precisely the system retrieves and summarizes cardiology data. ☆
- ☐ Implementing Data Cleaning Scripts – Currently refining the preprocessing pipeline to ensure consistent and medically relevant data entries. ★

Doing



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Lab Practical 10

Aim: Perform the activities to receive the feedback from Stakeholders and prepare an Action Plan/Report.

Project: Retrieval Augmented Generation for Holistic Cardiac Support

1. Executive Summary

Following the feedback collection activities conducted from October 8–14, 2025, the project team gathered valuable insights from key stakeholders — faculty mentors, test users (Advik and Bhavya), and the development team. The overall response was highly positive, highlighting the project's potential to deliver an intelligent, user-centric cardiac support assistant.

Key feedback themes included improving the diagnostic accuracy of the RAG model, enhancing the personalization of dietary and exercise recommendations, and refining the user interface for clearer visualization of risk scores. Faculty mentors also emphasized the need for defined evaluation metrics and strict data validation standards to ensure medical reliability.

This report summarizes stakeholder feedback and presents a prioritized action plan to improve the system's performance, accuracy, and user satisfaction.

2. Summary of Feedback Received

2.1 Faculty Mentors

- **Positive Feedback:** Commended the use of Retrieval-Augmented Generation for personalized cardiac assessment.
- **Key Concern:** Suggested expanding the medical knowledge base and refining the retrieval logic to reduce hallucinations.
- **Recommendation:** Include measurable evaluation metrics (accuracy, precision, hallucination rate) to validate responses.

2.2 Test Users (Advik & Bhavya)

- **Positive Feedback:** Found the chatbot informative and user-friendly.
- **Key Concern:** Recommended smoother conversational flow and more customized advice for diet and fitness.
- **Suggestion:** Introduce visual health summaries and progress tracking features.

2.3 Project Team (Ayush & Janvi)

- **Observation:** Identified the need to optimize system latency and streamline the integration between the RAG pipeline and UI components.

3. Action Plan

ID	Feedback/Issue Summary	Category	Priority	Proposed Action	Owner	Target Date	Status
A-01	Improve diagnostic response precision	Technical	High	Refine retrieval logic and expand dataset with verified cardiology literature	Ayush	Oct 25, 2025	In Progress
A-02	Add personalized dietary and fitness suggestions	Functional	Medium	Integrate user-specific data (age, BMI, lifestyle) for tailored recommendations	Janvi	Oct 28, 2025	To Do
A-03	Define clear evaluation metrics	Validation	High	Establish metrics like accuracy, coherence, and hallucination rate; run validation tests	Both	Nov 2, 2025	In Progress
A-04	Enhance conversational flow	Usability	Medium	Implement memory-based context tracking for smoother dialogue transitions	Janvi	Nov 6, 2025	To Do
A-05	Improve user interface visualization	UI/UX	Medium	Add interactive elements to display risk scores and progress summaries	Ayush	Nov 10, 2025	To Do

4. Next Steps / Vision

- **Communication:** This report will be shared with all stakeholders for acknowledgment and additional feedback by October 20, 2025.
- **Implementation:** Approved actions will be integrated into the next project sprint and tracked using internal progress logs.
- **Follow-Up:** A progress review meeting will be scheduled on November 12, 2025, to evaluate improvements.
- **Vision:** The next phase aims to transform the system into a multimodal cardiac decision support assistant, integrating wearable sensor data, echocardiogram analysis, and continuous health monitoring for real-time personalized care.