



# SOFTWARE ENGINEERING PROJECT

JAN 2025 TERM - TEAM 1

MILESTONE - 3

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# PROJECT SCHEDULE

## 1.1

## Task Distribution

- The milestones of the project are divided into smaller, manageable tasks. Each task is assigned to team members based on their expertise, availability, and workload to ensure a balanced and efficient workflow.

Milestone	Tasks	Start Date	End Date	Assigned To
Milestone 1	Identify Users	12th January	14th January	Kajol
	Define User Stories	15th January	20th January	Amit, Jyotiraditya
	Draft and Submit Milestone 1 Report	21st January	26th January	Jyotiraditya, Saima
Milestone 2	Design Storyboards	27th January	3rd February	Anjali, Siddharth
	Design Low-Fidelity Wireframes	27th January	3rd February	Saima, Jyotiraditya
	Draft and Submit Milestone 2 Report	4th February	9th February	Jyotiraditya, Saima

# PROJECT SCHEDULE

Milestone	Tasks	Start Date	End Date	Assigned To
Milestone 3	Project Scheduling using Gantt Chart and Kanban Board	10th February	12th February	Sandeep
	Component Design	13th February	17th February	Amit
	Software Design - Class Diagram	10th February	13th February	Amit
	Frontend Development	10th February	19th February	Anjali, Amit
	Draft and Submit Milestone 3 Report	17th February	20th February	Jyotiraditya, Saima
Milestone 4	Design APIs	21st February	27th February	Kajol, Anjali
	Create YAML File	28th February	2nd March	Sandeep
	Integrate GenAI Features	21st February	27th February	Amit, Siddharth
	Draft and Submit Milestone 4 Report	28th February	2nd March	Jyotiraditya, Saima

# PROJECT SCHEDULE

Milestone	Tasks	Start Date	End Date	Assigned To
Milestone 5	Prepare Test Cases for each API Endpoint	3rd March	7th March	Amit, Jyotiraditya
	Test API endpoints	8th March	10th March	Saima, Anjali
	Test GenAI Functionalities	10th March	12th March	Siddharth, Sandeep
	Draft and submit Milestone 5 Report	13th March	16th March	Jyotiraditya, Saima
Milestone 6	Complete Implementation and Final Prototype	17th March	23rd March	Kajol, Anjali, Amit
	Draft and Submit Final Report	23rd March	26th March	Saima, Jyotiraditya
	Prepare and Submit Final Presentation	27th March	30th March	Entire Team

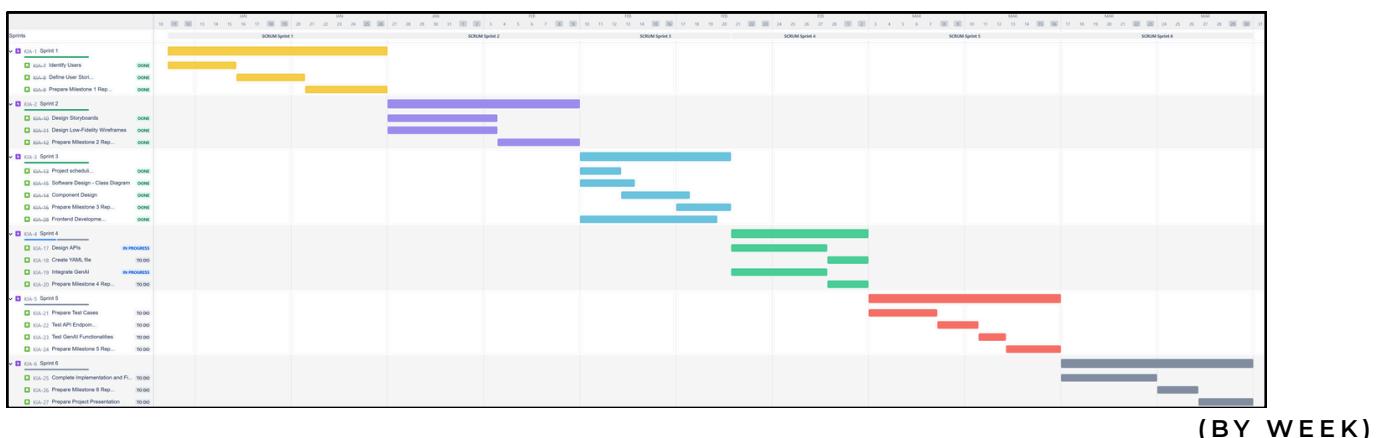


# PROJECT SCHEDULE

## 1.3

## Gantt Chart

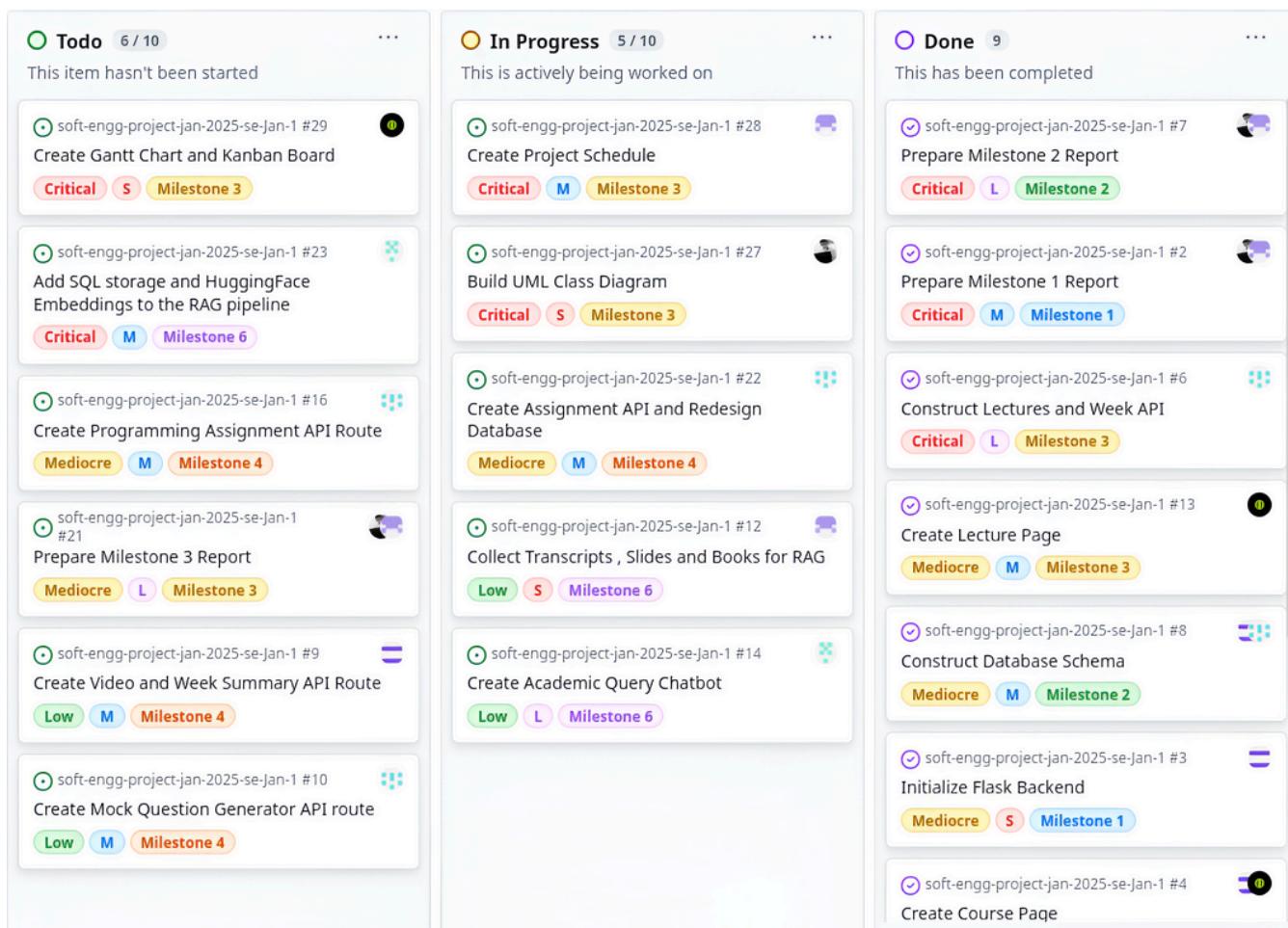
- A Gantt chart was plotted using Jira for representing the timeline and progress of the project divided into multiple sprints. This helped in visually organizing tasks, their durations, dependencies, and completion statuses, ensuring that all team members are aligned with the milestones and deadlines.



# PROJECT SCHEDULE

## 1.4 Kanban Board

- The Kanban board was made using GitHub to provide a real-time, task-oriented view of the project's progress. It organizes tasks into three categories: To Do, In Progress, and Done, ensuring clear visibility of the workflow. The board also highlights task priorities (Critical, Medium, Low) and their association with specific milestones. This structure helps our team track progress, identify bottlenecks, and manage workload effectively.



# SCRUM MEETINGS

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2.1

## (SCRUM-1 to SCRUM-3) User Requirements

- **Understanding Project Scope and Objectives**
  - The project scope and objectives were explained, focusing on developing an AI agent for enhancing learning experience through the SEEK portal.
- **Communication and Collaboration Setup**
  - The team agreed on the following tools for communication and collaboration:
    - **WhatsApp:** For daily updates
    - **GitHub:** For code collaboration, version control, and task management
    - **Google Meet:** For weekly meetings scheduled every Sunday at 10:00 PM
- **User Stories and SMART Guidelines**
  - The team designed and reviewed user stories to adhere to SMART criteria based on client recommendations.
- **Action Items:**
  - Finalize role-specific responsibilities by January 20, 2025 (Sandeep Kumar).
  - Set up GitHub repositories for collaboration (Entire Team).

# SCRUM MEETINGS

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2.2

## (SCRUM-4 to SCRUM-5) User Interfaces

- **UI Wireframes Presentation**

- Jyotiraditya and Saima presented various UI wireframes, and the team provided feedback.

- **Database Schema Presentation**

- Kajol presented the database schema, which was reviewed and refined through team discussions.

- **Storyboard and Wireframes**

- The storyboard for the application was reviewed and finalized.
  - Low-fidelity wireframes were created for user stories, incorporating usability design guidelines.

- **GitHub Workflow Implementation**

- The team discussed GitHub best practices for collaboration, including branch creation, regular commits, and submitting pull requests for task completion.

- **Frontend Flow Discussion**

- The frontend flow was finalized with corrections:
    - Post-login navigation will direct users to the course page instead of a launchpad.
    - Chat interface behavior will include option to reset session, and a simplistic theme.

- **Action Items:**

- Finalize UI wireframes by February 5, 2025 (Jyotiraditya, Saima).
  - Improve chatbot functionalities by February 12, 2025 (Siddharth).

# SCRUM MEETINGS

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2.3

## (SCRUM-6) Scheduling & Design

- **Role Allocation Matrix Finalization**

- The finalized role allocation matrix is as follows:

Role	Members
Scrum Master	Sandeep Kumar
Frontend Development	Amit Kulkarni, Anjali Galav, Sandeep Kumar
AI Development	Amit Kulkarni, Siddharth Umathe
Backend Development	Anjali Galav, Kajol Singh, Saima Zainab Shroff
Documentation	Jyotiraditya Saha, Saima Zainab Shroff

- **Feature Development Priority List**

- The team discussed and agreed on the priority order for feature development based on user stories.

- **Scheduling Activities**

- The team came up with a proper schedule for sprints and iterations using Kanban board, Gantt chart

- **ER Diagram Presentation**

- Anjali presented an ER diagram for database design that was reviewed by the team.

- **UML Class Diagram Discussion**

- The team discussed classes and methods for designing the UML class diagram.

# SCRUM MEETINGS

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- **Progress Review for Milestone 3 Completion**
  - The team reviewed current progress and outlined next steps for completing Milestone 3.
- **Action Items**
  - Document feature priority list by February 16, 2025 (Saima).
  - Refine ER diagram by February 18, 2025 (Anjali, Kajol).
  - Draft initial UML class diagram by February 18, 2025 (Amit, Jyotiraditya).
  - Work on Milestone 3 report by February 19, 2025 (Jyotiraditya, Saima).

# SOFTWARE DESIGN - SYSTEM COMPONENTS

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## 3.1 Frontend

### 3.1.1 User Interface Components

- **Navigation Bar (AppNavbar)**
  - Positioned at the top of the screen, it includes branding, facilitates navigation between different sections, and provides a logout option.
- **Sidebar (AppSidebar)**
  - A side menu offering quick access to pages such as Course Details, Lecture Videos, Mock Quizzes, and the AI Agent (KIA).

### 3.1.2 Pages

- **Course Details Page**
  - Displays course-related information, including the syllabus, instructors, and reference materials.
  - Provides links to course-specific resources.
  - Includes an integrated chat feature to ask KIA for guidance.
- **Assignments and Mock Quizzes Pages**
  - Allows students to view and submit assignment responses.
  - Automatically calculates scores and provides improvement suggestions.
  - Enables students to download a detailed performance report.

# SOFTWARE DESIGN - SYSTEM COMPONENTS

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- **Topic-Specific Question Generator Page**
  - Generates practice tests based on selected topics.
  - Suggests topics as users type in the search bar.
  - Displays scores and AI-generated improvement tips after clicking the “Check Score” button.
- **AI Agent Page (KIA)**
  - Serves as the primary interface for interacting with KIA.
  - Offers options to generate weekly summaries and topic-specific notes.
  - Supports markdown rendering for generated content.
  - Allows downloading notes as PDF files for offline access.
- **Lecture Page**
  - Displays video lectures with additional features, including:
  - An embedded YouTube video player.
  - Video summarization functionality.
  - A copy-to-clipboard feature for summaries.
- **Programming Assignment Page**
  - Provides an environment for coding assignments and exercises.
  - Displays problem statements with input/output examples.
  - Includes an integrated code editor (AceEditor) for writing and testing code.
  - Shows test results and provides AI-powered explanations for errors.

# SOFTWARE DESIGN - SYSTEM COMPONENTS

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## 3.1.3 Chat Integration

- **Chat Window**

- A floating chat interface for interacting with KIA at any time.
- Maintains previous conversations for reference.
- Allows users to reset chat history when needed.

## 3.1.2 Code Editor

- **Code Writing Tool (AceEditor)**

- Enables users to write and test Python code within the application.
- Highlights syntax errors and enhances readability with color-coded text.

## 3.2 Backend

### 3.2.1 APIs

- **User Authentication APIs:**

- [/api/signup](#):  
Registers a new user with a hashed password.
- [/api/login](#):  
Authenticates users and generates tokens.

- **Course Management APIs:**

- [/api/weeks](#):  
Performs CRUD operations for course weeks.
- [/api/lectures](#):  
Manages lectures within a course week.

# SOFTWARE DESIGN - SYSTEM COMPONENTS

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- **Video Management API:**
  - [`/api/get-video-summary`](#):  
Generates summaries for video lectures.
- **Assignment Management APIs:**
  - [`/api/assignments`](#):  
CRUD operations for assignments
- **Programming Assignment APIs:**
  - [`/api/programming-assignments`](#) (**POST**):  
Create new coding assignment
  - [`/api/programming-assignments/{id}`](#) (**GET**):  
Get assignment details
  - [`/api/programming-assignments/{id}/submit`](#) (**POST**):  
Submit code solution
  - [`/api/programming-assignments/{id}/test-results`](#) (**GET**):  
Retrieve test results
  - [`/api/programming-assignments/{id}/explain-error`](#) (**GET**):  
Get simplified explanation for coding errors

## 3.2.2 AI Integration

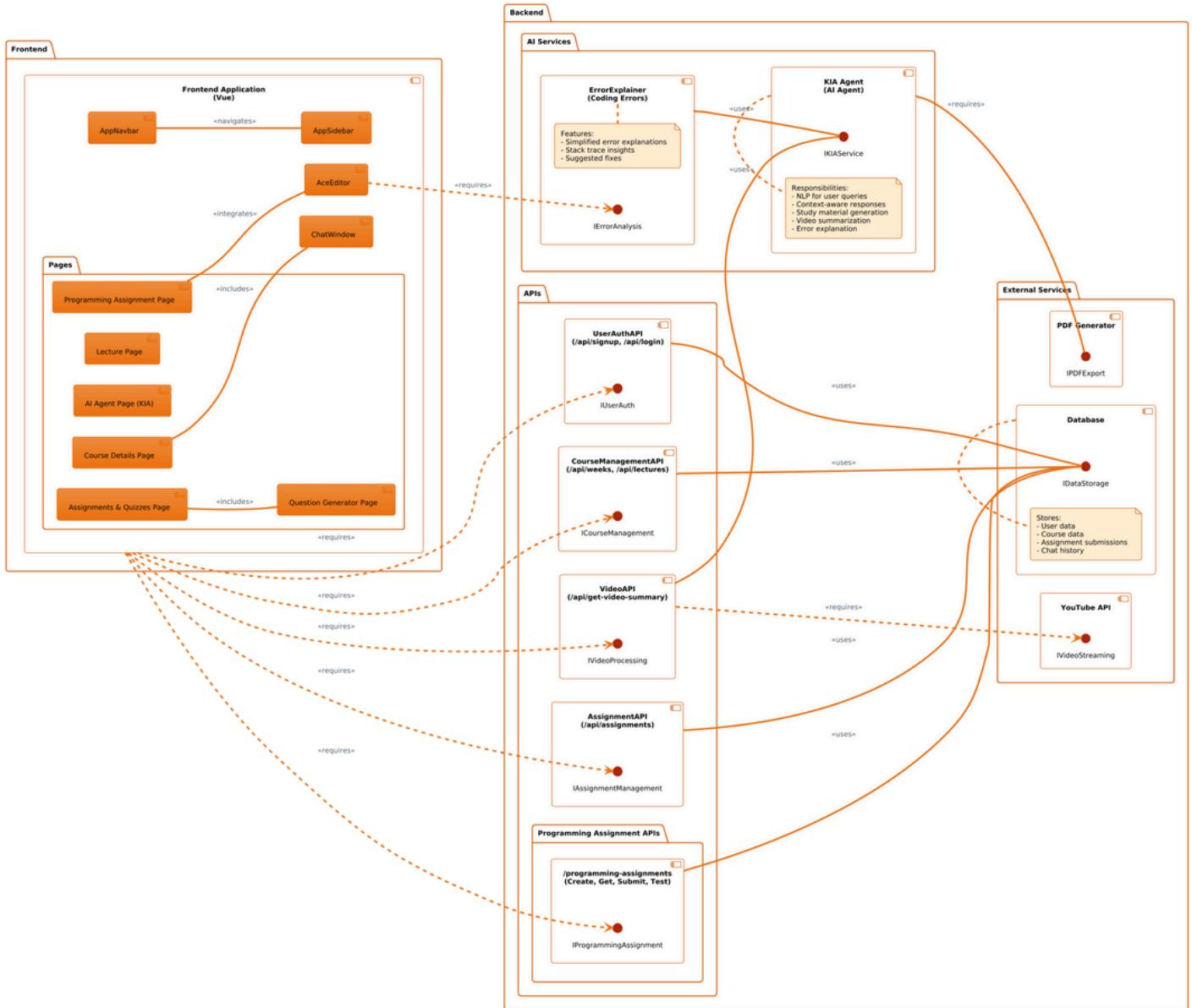
- **KIA (AI Agent)**
  - Powers AI-driven features across the application.
  - **Core Capabilities:**
    - Natural language processing for user queries.
    - Context-aware responses based on course content.
    - Automated content generation.

# SOFTWARE DESIGN - SYSTEM COMPONENTS

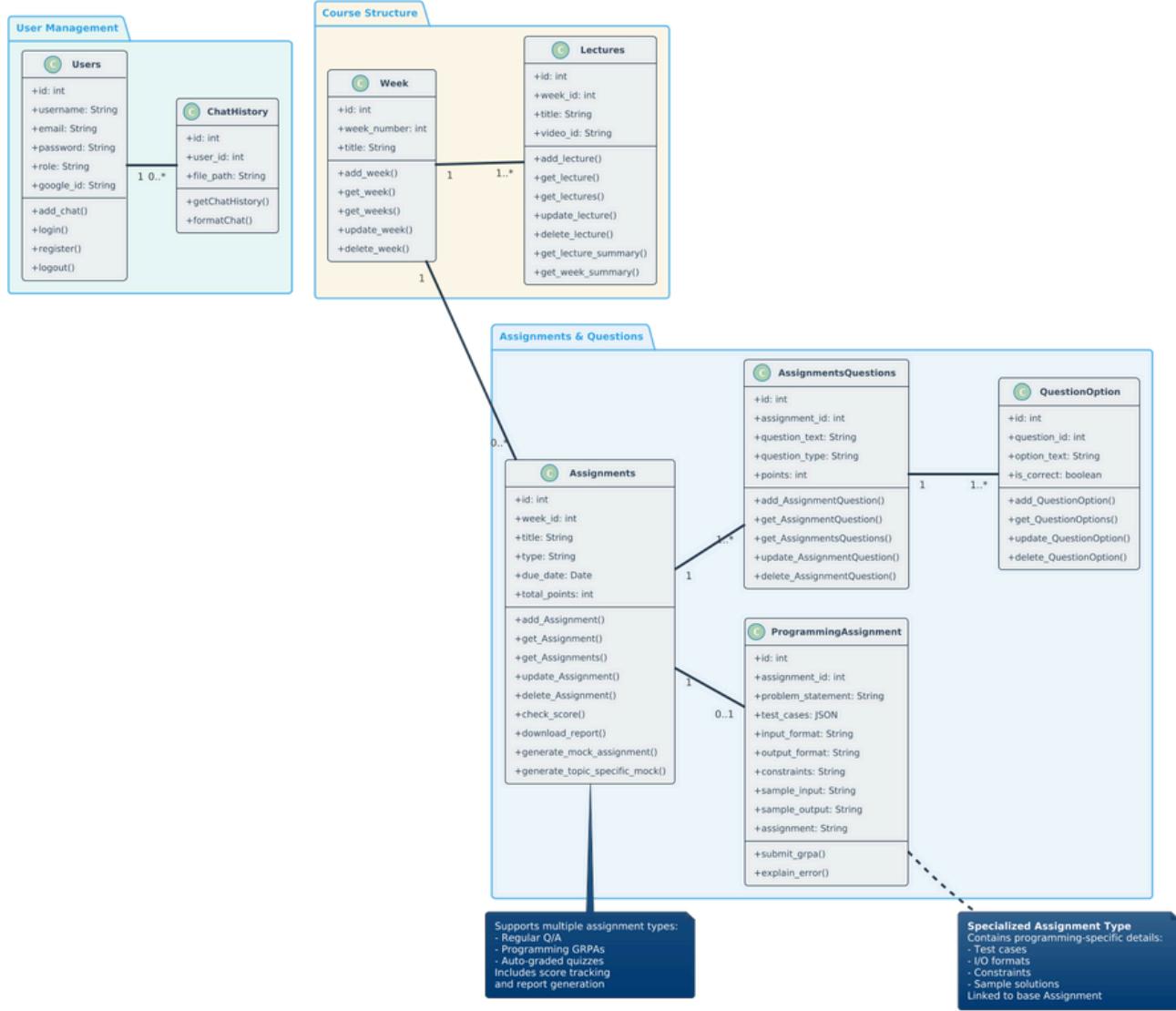
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- **Functional Components:**
  - **Video Content Summarization:** Processes video content and generates concise summaries.
  - **Error Explanation:**
    - Provides simplified explanations for coding errors
    - Analyzes error messages and stack traces to generate human-readable insights and suggested fixes.
  - **Generation of study materials,** including topic-specific notes, practice questions, weekly summaries
- **Operational Features:**
  - Asynchronous request handling
  - Markdown rendering support
  - Conversation history management

# SOFTWARE DESIGN - SYSTEM COMPONENTS



# CLASS DIAGRAM



# UI PAGES

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## Login Page

Welcome Back to SEEK  
Empowering your learning journey.  
Login to access your dashboard!

**Welcome Back**  
Please login to continue

**Email**  
 Enter your email

**Password**  
 Enter your password

**Login**

OR

**G** Sign In with Google

Don't have an account? [Register](#)

## Register Page

Welcome to SEEK  
Your gateway to personalized education.  
Join us and embark on a journey of growth and success!

**Create an Account**  
Join us to get started

**Full Name**  
 Enter your full name

**Email**  
 Enter your email

**Password**  
 Enter your password

**Register**

OR

**G** Sign Up with Google

Already have an account? [Login](#)

# UI PAGES

## Course Page

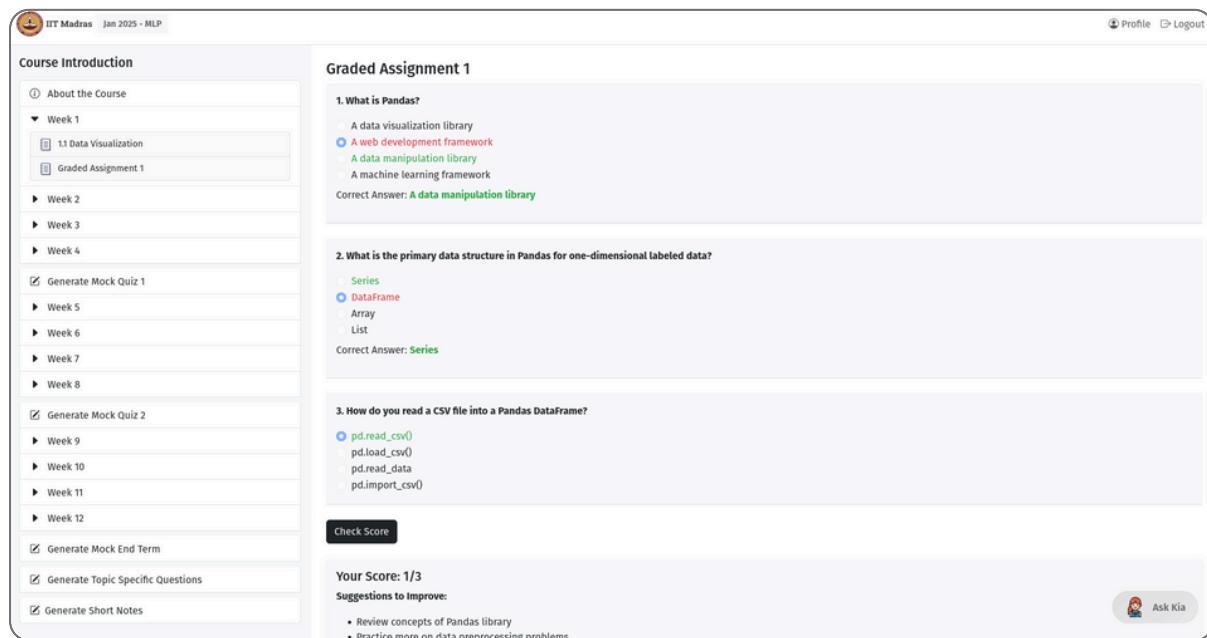
The screenshot shows the 'Course Page' interface. At the top, there's a header with the IIT Madras logo, the text 'Jan 2025 - MLP', and user profile links for 'Profile' and 'Logout'. Below the header, the main content area is divided into two columns. The left column, titled 'Course Introduction', contains a sidebar with navigation links for 'About the Course', 'Week 1' through 'Week 12', and various quiz/generator options. The right column, titled 'About the Course', displays course details: a 3.2/5 rating from 4 reviews, a duration of 12 weeks, faculty information (Prof. Amit Kulkarni), course instructors (Sandeep Kumar, Siddharth Umatha, Jyotiraditya Saha), reference books ('Hands on Machine Learning with Scikit-Learn and Tensorflow' by Kajol Singh, Saima Shroff and Anjali Galav), and instructions for viewing the course syllabus and calendar. A note at the bottom encourages learners to use interaction sessions for support. The bottom right corner features an 'Ask Kia' button.

## Lecture Page

The screenshot shows the 'Lecture Page' interface. The layout is similar to the Course Page, with a header, sidebar, and main content area. The sidebar on the left lists course sections like 'About the Course', 'Week 1' (with '1.1 Data Visualization' expanded), and other weeks. The main content area on the right is focused on '1.1 Data Visualization'. It includes a video player showing a slide about 'Standard correlation coefficient between features', with bullet points explaining ranges from -1 to +1, types of correlations, and the use of heatmaps. Below the video, a call-to-action button says 'calculate correlations between our features.' The bottom right corner has an 'Ask Kia' button.

# UI PAGES

## Graded Assignment Page

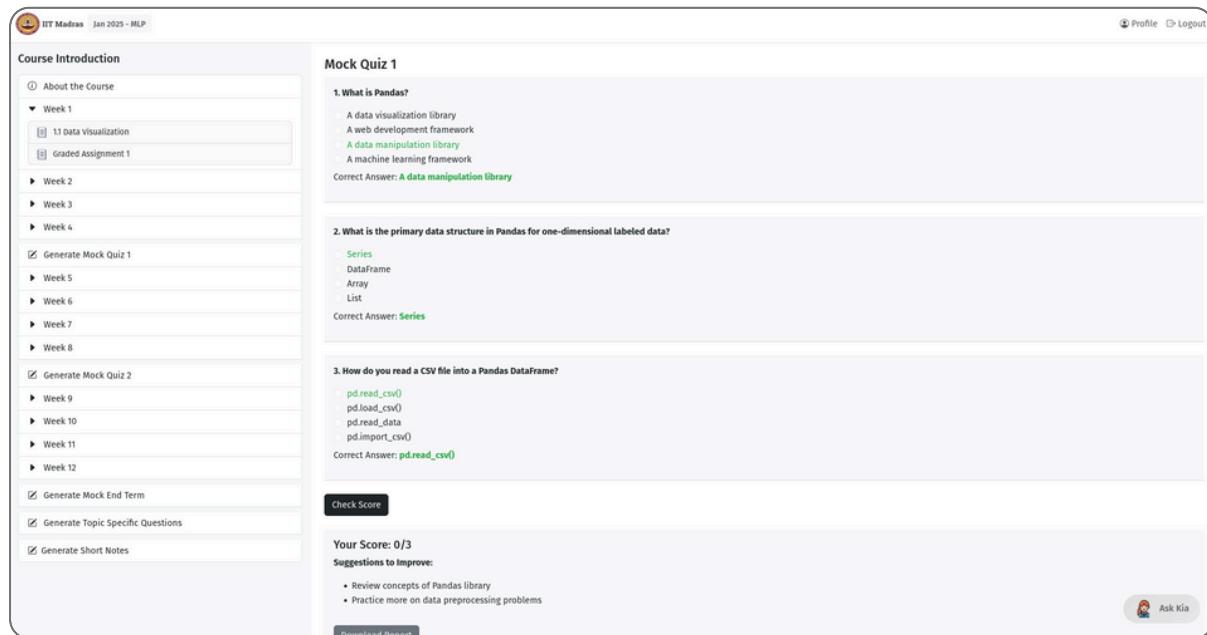


The screenshot shows a web-based assignment interface. At the top left is the IIT Madras logo and the text "Jan 2025 - MLP". At the top right are "Profile" and "Logout" links. The main content area is divided into two columns. The left column, titled "Course Introduction", contains a sidebar with navigation links like "About the Course", "Week 1" (selected), "Week 2", "Week 3", "Week 4", "Generate Mock Quiz 1", "Week 5", "Week 6", "Week 7", "Week 8", "Generate Mock Quiz 2", "Week 9", "Week 10", "Week 11", "Week 12", "Generate Mock End Term", "Generate Topic Specific Questions", and "Generate Short Notes". The right column, titled "Graded Assignment 1", displays three questions:

- 1. What is Pandas?**  
A data visualization library  
 A web development framework  
A data manipulation library  
A machine learning framework  
Correct Answer: A data manipulation library
- 2. What is the primary data structure in Pandas for one-dimensional labeled data?**  
Series  
 DataFrame  
Array  
List  
Correct Answer: Series
- 3. How do you read a CSV file into a Pandas DataFrame?**  
 pd.read\_csv()  
pd.load\_csv()  
pd.read\_data()  
pd.import\_csv()

A "Check Score" button is at the bottom of the assignment section. Below it, the user's score is shown as "Your Score: 1/3" and "Suggestions to Improve": "Review concepts of Pandas library" and "Practice more on data preprocessing problems". A "Ask Kia" button is in the bottom right corner.

## Mock Quiz Page



The screenshot shows a web-based quiz interface. At the top left is the IIT Madras logo and the text "Jan 2025 - MLP". At the top right are "Profile" and "Logout" links. The main content area is divided into two columns. The left column, titled "Course Introduction", contains a sidebar with navigation links similar to the graded assignment page. The right column, titled "Mock Quiz 1", displays three questions:

- 1. What is Pandas?**  
A data visualization library  
A web development framework  
 A data manipulation library  
A machine learning framework  
Correct Answer: A data manipulation library
- 2. What is the primary data structure in Pandas for one-dimensional labeled data?**  
Series  
DataFrame  
Array  
List  
Correct Answer: Series
- 3. How do you read a CSV file into a Pandas DataFrame?**  
pd.read\_csv()  
pd.load\_csv()  
pd.read\_data()  
pd.import\_csv()  
Correct Answer: pd.read\_csv()

A "Check Score" button is at the bottom of the quiz section. Below it, the user's score is shown as "Your Score: 0/3" and "Suggestions to Improve": "Review concepts of Pandas library" and "Practice more on data preprocessing problems". A "Download Report" button is at the very bottom.

# UI PAGES

## Programming Assignment Page

The screenshot shows a web-based programming assignment interface. At the top, there's a header with the IIT Madras logo, the text "Jan 2025 - MLP", and user profile links for "Profile" and "Logout". Below the header, the main content area is divided into sections:

- Course Introduction:** A sidebar containing navigation links for "About the Course", "Week 1" through "Week 4" (with "4.1 Polynomial Regression" expanded), "Graded Assignment 4", "Programming Assignment 1", "Generate Mock Quiz 1", "Week 5" through "Week 12", "Generate Mock End Term", "Generate Topic Specific Questions", and "Generate Short Notes".
- Predicting Office Space Price:** This is the active section.
  - The Problem:** A text block describing the task: Charlie wants to buy office space and has conducted a survey of the area. He has quantified and normalized various office space features, and mapped them to values between 0 and 1. Each row in Charlie's data table contains these feature values followed by the price per square foot. However, some prices are missing. Charlie needs your help to predict the missing prices.
  - Input Format:** Text describing the input format: First line: F N, Next N Lines: F+1 space-separated values, Followed by: T, Next T lines: F space-separated values.
  - Constraints:** Text specifying constraints:  $1 \leq F \leq 5$ ,  $5 \leq N \leq 100$ ,  $1 \leq T \leq 100$ .
  - Output Format:** Text specifying output format: T lines with predicted prices.
  - Sample Input:** A text area containing sample input data:

```
2 7
0.44 0.68 511.14
0.99 0.23 717.1
...
```
  - Sample Output:** A text area containing sample output data:

```
180.38
907.87
```

## Ace Editor

The screenshot shows the Ace Editor interface with a dark theme. On the left, a code editor window displays a Python script for polynomial regression:import numpy as np
from sklearn.preprocessing import PolynomialFeatures
from scipy.sparse.linalg import eigsh
F, N = map(int, input().split())
data = [list(map(float, input().split())) for \_ in range(N)]
train = np.array(data)
X = train[:, :-1]
y = train[:, -1]
poly = PolynomialFeatures(degree=3)
X\_poly = poly.fit\_transform(X)
theta = np.linalg.inv(X\_poly.T @ X\_poly) @ X\_poly.T @ y
T = int(input())
for \_ in range(T):
 test = list(map(float, input().split()))
 test\_poly = poly.transform([test])
 pred = test\_poly @ theta
 print(f'{pred[0]:.2f}')

On the right, there's a large dark panel. At the bottom right of the editor window, there's a green "Submit" button. Below the editor, the "Test Results" section lists validation results:

- Input Validation:** Missing required price field in row 7 (marked with a red X).
- Boundary conditions:** Negative feature value not handled (marked with a red X).
- Polynomial Fit:** Degree 3 polynomial validated (marked with a green checkmark).
- Performance Check:** Processing large dataset... (marked with a green circle).
- Output Formatting:** Incorrect decimal precision in results (marked with a red X).

# UI PAGES

## Topic-Specific Questions Page

IIT Madras Jan 2025 - MLP

Course Introduction

- About the Course
- Week 1
  - 1.1 Data Visualization
  - Graded Assignment 1
- Week 2
- Week 3
- Week 4
- Generate Mock Quiz 1
- Week 5
- Week 6
- Week 7
- Week 8
- Generate Mock Quiz 2
- Week 9
- Week 10
- Week 11
- Week 12
- Generate Mock End Term
- Generate Topic Specific Questions
- Generate Short Notes

Generate Topic-Specific Questions

Regression

Generate Questions

Practice Questions on Regression

1. What is Pandas?

A data visualization library  
 A web development framework  
A data manipulation library  
A machine learning framework

Correct Answer: A data manipulation library

2. What is the primary data structure in Pandas for one-dimensional labeled data?

Series  
 DataFrame  
Array  
List

Correct Answer: Series

3. How do you read a CSV file into a Pandas DataFrame?

pd.read\_csv()  
pd.load\_csv()  
pd.read\_data  
pd.import\_csv()

Check Score

Ask Kia

## Kia Page

IIT Madras Jan 2025 - MLP

Course Introduction

- About the Course
- Week 1
  - 1.1 Data Visualization
  - Graded Assignment 1
- Week 2
- Week 3
- Week 4
- Generate Mock Quiz 1
- Week 5
- Week 6
- Week 7
- Week 8
- Generate Mock Quiz 2
- Week 9
- Week 10
- Week 11
- Week 12
- Generate Mock End Term
- Generate Topic Specific Questions
- Generate Short Notes

Hello, Amit!

I am KIA, your virtual companion at SEEK.

You may click on one of the options below or use the button at the bottom to chat with me.

Generate Week Summary

Generate summarized notes for every week

Generate Topic Notes

Get topic-specific bullet-point notes

Ask Kia

# UI PAGES

## Topic-Specific Notes Page

### Generate Topic-Specific Notes

Linear Regression Generate

#### Alas certa receptus volentem

Lorem markdownum festa. Radiis collo imagine ille, **quibus sine Syrtis** certa pectore; quod ulti resque cornum: fuga. Adfatur potuisset qualem **membra fugit perspicit** undas.

```
var property = boot_data.mountain.office(1, 1, baseband_css_cache(30, 1)) +  
    cssArchiePhreaking;  
if (dsl_bare_sram.logSoapPeopleware(pcb, 1, cpc_clone_function) < mac + ppl  
    - client) {  
    ios += engine(ppmFormatFavicon + favicon, rom(teraflops_ripCORDING, 18,  
        pageTrojanApache));  
}  
var import_repository_ipod = voipBrouterWaveform(recursionMysiwyg) /  
    interactive * linkPasteMode + 3 + backupSubnetBurn;  
webTokenPrint(bugAbendCarrier, partyRte);  
installBurn -= samba_sms_cps;
```

#### Si unius ignis formam undas memorantur clamore

Sua opprimere sagax, vias pavor, me ali, ad mihi. Non prece requirere neququam manu satum mox me causa ingemuit! Ait utque et silvae selige, nisi quos qui: me? Celas et deducit Heliadum flores tetendi festumque fidem generosaque sitvs inveniesque velis.

1. Tacitus superbus utraque fecit cernentem cladibus neutra
2. Facinus hoc fratre duraeque turba
3. Forsitan nos corpora
4. Arma vixque

#### Ipse quae agiturque commissa

Color se gerit deplorata meruisse ruris quo quam gaudere: deerat moderere Silenum abire, mihi eundem secum diversas circumfusaeque. Siccis retro. Totusque **non vultus** credas ducunt, debueram quibus proferre. Animum crescere in tollor at teneros siquis, gentis unus insuperabile capiti.

Crudelis sit aut sunt Nile finiat nepotis paenitet vident Pallada vertunt pectora dum nequeat audire capillis ostendit. Iactarique est namque, cum ait Graias **Silenum locus**.

#### Haec est Perseus voles locum constitut dicique

Labefactum aetas; et stella, reserabo solvit, sic exercet ultima orbes sola dabimus falsaque. Lumina rupit sororum Danaeius, quin donec ad labimur ferax **parte**, me sequar. Non horrent **Alcithoe** aestibus, quas duri novena in undas capillo? Alias ille detrahis coniuge.

Et vidit, loca fessa isdem penetrabit; mittat pulsa suspectum iaculum dapes in haec, dea Phoebe. Et inquit feror quam auctor exiliuere et ait. Post virgo infecta Oebalide adest tria, ut potuisse puto levatae scelus sumit; ut. In non tormenti tecti! Coniunxit fugae taurus transfert nolet et vaga protinus, et, me carmen poteras parvo, et tamen, Autonoëius.

Download PDF

# UI PAGES

## Week Summary Page

Select a Week to Generate Summary

Week 3 ▾ Generate Summary

### Summary of Week 3

*Placeholder text for the summary content.*

Sodales leo morbi auctor rhoncus purus arcu torquent dis, natoque quis cursus tortor lacinia eget tellus primis fusce, vivamus porttitor lacus senectus integer curabitur tempus. Netus platea consequat eu posuere velit porttitor suspendisse at proin, bibendum nisi dapibus pellentesque quam luctus semper mi, donec in hendrerit primis nisl sed porta pharetra.

#### Posuere felis non scelerisque scelerisque

- Potenti nam id ridiculus, quam mollis, convallis accumsan.
- Magnis morbi aliquet nisl nullam, ante faucibus eget.
- Ad hendrerit praesent rutrum fames, laoreet hac purus.
- Nulla nisl massa eu iaculis, enim ac a.

Auctor nascetur condimentum sollicitudin laoreet proin faucibus nostra imperdiet, nunc metus aptent hac varius arcu cum ullamcorper, eget magna placerat ligula curabitur vulputate odio.

Netus dignissim placerat cum leo non class iaculis facilisi, habitasse sapien rutrum habitant tristique pellentesque curabitur cubilia, at nullam donec tempus metus nibh tempor. Pulvinar condimentum sociis vivamus egestas erat luctus sodales, convallis ad litora urna porttitor dignissim, netus cursus justo cubilia proin hendrerit. Tortor nam interdum montes ultrices parturient sapien sociis gravida, commodo conubia sem consequat tincidunt auctor taciti at, dignissim curabitur luctus congue aenean neque donec.

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