# Project Design Phase

# Solution Architecture

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| **Date** | 25 Aug 2025 |
| **Team ID** | NM2025TMID11404 |
| **Project Name** | SmartSDLC – AI-Enhanced Software Development Lifecycle |
| **Maximum Marks** | 4 Marks |

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## Solution Architecture Overview

The solution architecture for *SmartSDLC* bridges the gap between the manual complexities of the software development lifecycle and intelligent automation through AI models. The architecture outlines how different components interact to deliver a seamless experience for requirement analysis, code generation, testing, and deployment assistance.

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## Objectives of the Solution Architecture

- **Solve Business Problems:** Automate various stages of SDLC, reducing human errors and development time.
- **Clear System Representation:** Describe the behavior, data flow, and functional components of the system.
- **Phase-wise Development:** Define components that will be developed in each sprint for modular progress.
- **Well-Defined Specifications:** Guide developers on infrastructure setup, model integration, and API usage.

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## Architecture Components & Flow Description

1. **Frontend Interface (Gradio Web App)**
    - Allows users to interact with the system via uploading PDFs, entering user stories, and viewing AI-generated outputs.
2. **Backend Logic (Python + IBM Granite Model)**
    - IBM Granite LLM processes input for:
        - Requirement Classification
        - Code Generation
        - Bug Fixing
        - Test Case Generation
        - Code Summarization
        - AI SDLC Assistant (Chatbot)

3. **File Handling & Parsing**
    - PDF files are parsed using PyPDF2, and text data is extracted and preprocessed.
4. **ML Model Integration**
    - The IBM granite-3.3-2b-instruct model is used for all language understanding and code-related tasks.
5. **Deployment**
    - Hosted on **Google Colab** during development
    - Future scope includes deployment on **IBM Cloud**, integrated with CI/CD pipelines.
6. **Database (Optional/Future Scope)**
    - For storing user inputs, generated outputs, and audit trails using IBM DB2 / Cloudant.

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## Diagram Suggestion