

## Project Design Phase

### Solution Architecture

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Team ID	LTVIP2025TMID31167
Project Name	SmartSDLC – AI-Enhanced Software Development Lifecycle
Maximum Marks	4 Marks

### 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.

### 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.

### 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

