Project Design Phase

Date	27 June 2025
Team ID	LTVIP2025TMID29288
Project Name	SmartSDLC – AI-Enhanced Software Development Lifecycle
Maximum Marks	4 Marks

Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

SmartSDLC – Solution Architecture

SmartSDLC is a cloud-integrated, AI-powered platform that leverages modular microservices to automate core phases of the Software Development Lifecycle (SDLC). It uses Watsonx large language models for intelligent processing and LangChain for interactive chatbot capabilities. The architecture follows a layered pattern for scalability, maintainability, and modularity.

Key Components:

1. Frontend: A React-based user interface that allows interaction with modules such as requirement upload, AI code generation, test generation, and the chatbot assistant.

2. Backend (FastAPI): Serves as the middleware to route user inputs, handle authentication, and invoke specific microservices.

3. AI Services:
- Watsonx (Granite-20B): Powers the NLP understanding for requirement classification, code generation, test case suggestion, summarization, and debugging.
- LangChain: Handles contextual prompt routing and real-time chatbot interaction.

4. Document Processor: Uses PyMuPDF for extracting text from uploaded PDF requirement documents.

5. Database (MongoDB/PostgreSQL): Stores classified requirements, code outputs, test cases, and user sessions.

6. API Gateway & Load Balancer: Ensures scalable API access and high availability.

7. Cloud Integration (Optional): Deployable on AWS/Azure with serverless functions and CI/CD pipelines.

Example - Solution Architecture Diagram:

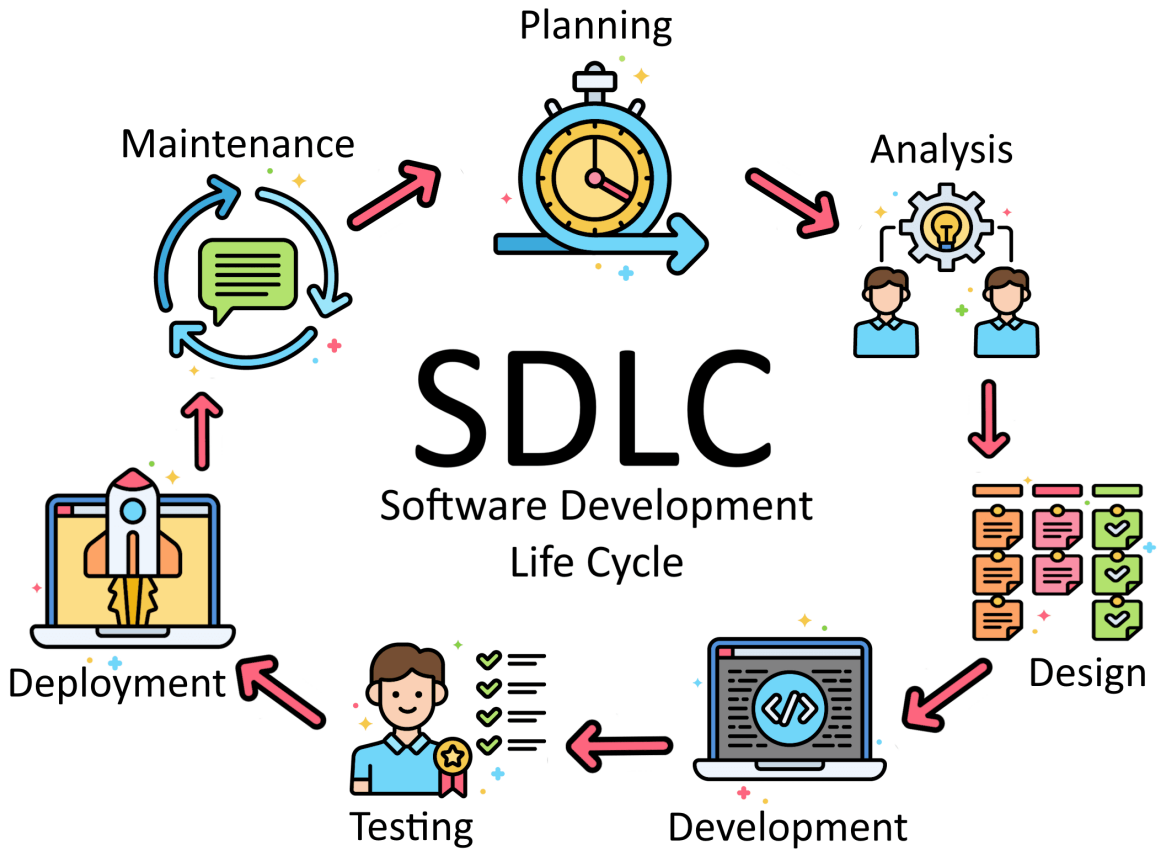

Figure 1: Architecture and data flow of Software Development Lifecycle