Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	31 January 3035
Team ID	LTVIP2025TMID29410
Project Name	Smart SDLC using Generative AI on IBM Cloud
Maximum Marks	4 Marks

Technical Architecture:

The project implements a **Smart Software Development Life Cycle (Smart SDLC)** enhanced by **Generative AI capabilities** hosted on **IBM Cloud**. The system leverages IBM Watson services to automate tasks like code generation, requirement analysis, test case creation, and documentation. The architecture also supports collaboration and deployment on cloud infrastructure using container orchestration.

- **Infrastructural demarcation:** Frontend and backend on IBM Cloud using Cloud Foundry/Kubernetes.
- **External interfaces:** GitHub, Jira, OpenAI APIs (if integrated with WatsonX), Slack, etc.
- **Data Storage:** IBM Cloudant (NoSQL), IBM DB2.
- **Machine Learning Models:** Custom-trained LLMs and WatsonX foundation models.
- **AI Integration:** WatsonX, IBM Watson NLP/NLU for classification and insight extraction.

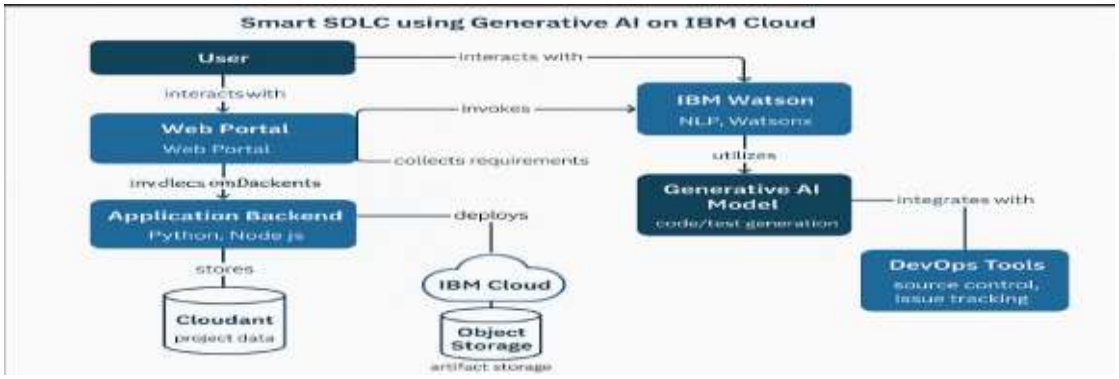

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1	User Interface	Web interface for SDLC interaction (task assignment, input prompts)	React.js, Tailwind CSS
2	Application Logic-1	Backend services for task management, API orchestration	Python (FastAPI/Flask)
3	Application Logic-2	Voice/text inputs converted using Speech to Text	IBM Watson Speech to Text
4	Application Logic-3	Generative assistance & NLP-based interaction	IBM Watson Assistant + IBM Watson NLU
5	Database	Store logs, users, tasks, and metadata	MongoDB (NoSQL)
6	Cloud Database	Scalable cloud-native DB for structured data	IBM Cloudant
7	File Storage	Save generated code, models, and results	IBM Cloud Object Storage
8	External API-1	Get weather info to plan deployments	IBM Weather API
9	External API-2	Identity verification for project owners	Aadhar API
10	Machine Learning Model	Generate, evaluate, or fix code using fine-tuned LLMs	OpenAI GPT via API or watsonx.ai Studio
11	Infrastructure	Deployment across cloud with auto-scaling and DevOps pipeline	IBM Cloud Foundry / Kubernetes on IBM Cloud

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1	Open-Source Frameworks	Frameworks and libraries in use	FastAPI, Flask, React.js, PyTorch, HuggingFace Transformers
2	Security Implementations	Securing APIs and user data	JWT, OAuth2, IAM Roles, HTTPS, OWASP Checks, SHA-256

S.No	Characteristics	Description	Technology
3	Scalable Architecture	Modular microservices architecture enabling horizontal scaling	3-tier + Microservices, Docker, Kubernetes
4	Availability	Designed for high uptime using IBM Load Balancers	IBM Load Balancer, Multi-zone Kubernetes clusters
5	Performance	Uses async APIs, Redis cache, CDN for static files	Redis, Async I/O in FastAPI, Akamai CDN