# Technology Stack (Architecture & Stack)

Date: 26 June 2025

Team ID: LTVIP2025TMID31968

Project Name: Sustainable Smart City Assistant Using IBM Granite LLM

Maximum Marks: 2 Marks

## Table-1: Components & Technologies

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| --- | --- | --- | --- |
| **S.No** | **Component** | **Description** | **Technology** |
| 1 | User Interface | Web-based interface for policy, KPI, chat, feedback modules | Streamlit (Python) |
| 2 | Application Logic-1 | Handles summarization, forecasting, anomaly detection, eco tips, chat | Python (modular function-based) |
| 3 | Application Logic-2 | Manages AI prompt creation and Watsonx response parsing | IBM Watsonx Granite LLM |
| 4 | Database | Session-based temporary storage | Streamlit session\_state |
| 5 | Cloud Database | Future scope for feedback/data persistence | Planned: IBM Cloudant or Firebase |
| 6 | File Storage | Stores .env credentials, sample PDFs, and CSVs | Local filesystem |
| 7 | External API-1 | Access to foundation model for all generative tasks | IBM Watsonx Model API |
| 8 | External API-2 | Future integration with document search | Planned: Pinecone, GitHub API |
| 9 | Machine Learning Model | Generates summaries, predictions, tips, and chat | IBM Granite-3B / Granite-13B Instruct |
| 10 | Infrastructure | Runs locally with optional cloud deployment | Streamlit Cloud / IBM Cloud |

## Table-2: Application Characteristics

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| **S.No** | **Characteristics** | **Description / Technology** |
| 1 | Open-Source Frameworks | Built using Python, Streamlit, PyMuPDF, pandas |
| 2 | Security Implementations | API key handling with python-dotenv and secured .env file |
| 3 | Scalable Architecture | Modular, prompt-driven backend, extendable with additional ML/LLM modules |
| 4 | Availability | Supports local use, deployable on Streamlit Cloud or IBM Cloud |
| 5 | Performance | Fast response using optimized prompting and minimal frontend latency |