



Generative AI Project Using IBM Cloud Documentation

Project Title:

SmartSDLC – AI-Enhanced Software Development Lifecycle

Team Member:

BELLAMKONDA HARSHINI – Team Lead

- Backend Structure & Routing
- Frontend Development & Integration
- Prompt Design & Model Testing
- Module Coordination & Feature Improvement

Project Description:

SmartSDLC is an AI-augmented platform designed to enhance and automate various stages of the Software Development Lifecycle (SDLC). By integrating generative AI models through IBM Cloud, this solution intelligently assists in planning, development, testing, and documentation phases, thereby increasing developer productivity and reducing time-to-deployment.

Key Features:

- AI-driven requirement analysis
- Smart code generation and optimization

- Automated test case generation
- Natural language-based documentation
- Continuous integration recommendations

Tech Stack:

- Cloud Platform: IBM Cloud
- Frontend: HTML, CSS, JavaScript, React.js
- Backend: Node.js, Express.js
- AI Models: IBM Watson, Prompt-tuned LLM APIs
- Database: MongoDB

- Deployment: IBM Cloud Kubernetes & CI/CD Pipelines

Folder Structure:

SmartSDLC/

```
|— .env          ← stores your secret API keys (don't share this!)
|— README.md     ← project info and how it works
|
|— backend/      ← for FastAPI (backend server)
|   |— main.py   ← starts your FastAPI app
|   |— watsonx_ai.py ← connects to IBM Watsonx AI models
|
|— frontend/     ← for Streamlit (user interface)
```

```
| |── Home.py      ← main Streamlit app screen
| |── pages/      ← sub-pages like generate code, fix bugs, etc.
| |── Requirement.py
| |── CodeGen.py
| |── BugFix.py
| |── Tests.py
| |── Summary.py
|
|── assets/      ← any images, icons, logos etc.
|
|── requirements.txt ← list of packages you need to install
|── run.sh       ← optional: script to run your app
```

Architecture:

Streamlit UI (Frontend)

- Upload PDF
- Enter prompts
- View results

↓ Sends input to

FastAPI App (Backend)

- Receives input
- Calls the appropriate AI model
- Sends response back

↓ Sends request to

IBM Watsonx Granite AI (AI Layer)

- Understands text and code
- Generates code
- Fixes bugs
- Creates test cases
- Summarizes code

UI/UX Features

- Responsive cards for modules •

Toggle Theme (Dark/Light) •

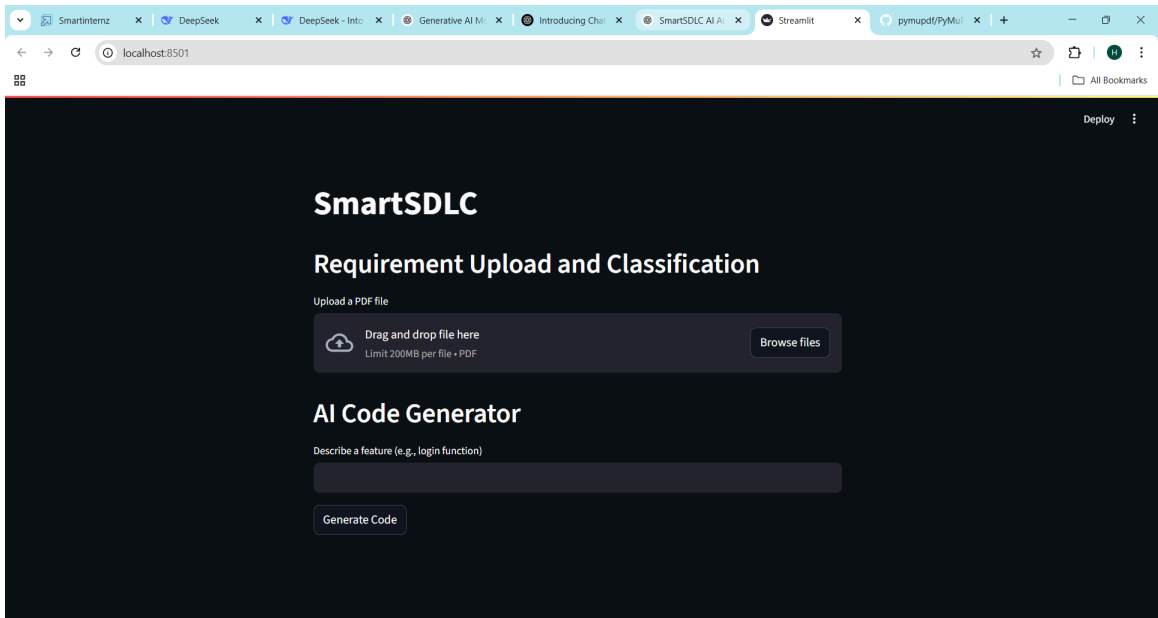
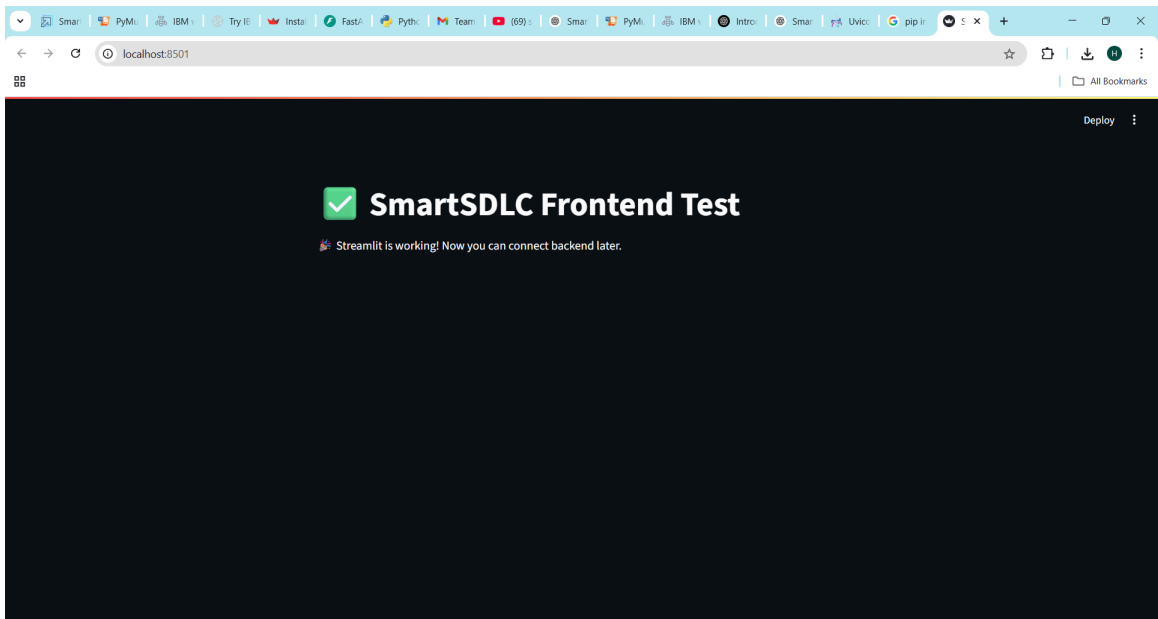
Animated popups for each module

- Chat history shown inline
- Suggestions listed for guidance
- Scrollable formatted responses

Testing

- API model response validation
- UI tested on desktop and mobile
- Error fallback and empty input handling

Frontend and backend outputs of webpages



:

Errors in the backend and frontend

```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\Harshini\OneDrive\Documents\Desktop\smartsdlc\backend> backend/main.py
backend/main.py : The term 'backend/main.py' is not recognized as the name of a cmdlet, function, script file, or
operable program. Check the spelling of the name, or if a path was included, verify that the path is correct and try
again.
At line:1 char:1
+ backend/main.py
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (backend/main.py:String) [], CommandNotFoundException
+ FullyQualifiedErrorId : CommandNotFoundException

PS C:\Users\Harshini\OneDrive\Documents\Desktop\smartsdlc\backend> backend/main.py
backend/main.py : The term 'backend/main.py' is not recognized as the name of a cmdlet, function, script file, or
operable program. Check the spelling of the name, or if a path was included, verify that the path is correct and try
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+ backend/main.py
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (backend/main.py:String) [], CommandNotFoundException
+ FullyQualifiedErrorId : CommandNotFoundException

PS C:\Users\Harshini\OneDrive\Documents\Desktop\smartsdlc\backend> |
```

```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\Harshini\OneDrive\Documents\Desktop\smartsdlc\backend> cd backend
cd : Cannot find path 'C:\Users\Harshini\OneDrive\Documents\Desktop\smartsdlc\backend\backend' because it does not
exist.
At line:1 char:1
+ cd backend
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\Harshi...backend\backend:String) [Set-Location], ItemNotFoundE
xception
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.SetLocationCommand

PS C:\Users\Harshini\OneDrive\Documents\Desktop\smartsdlc\backend> pip install -r requirements.txt
PS C:\Users\Harshini\OneDrive\Documents\Desktop\smartsdlc\backend> pip install -r requirements.txt
PS C:\Users\Harshini\OneDrive\Documents\Desktop\smartsdlc\backend> |
```

Roles and Responsibilities :

- Backend Structure & Routing:

Designed and implemented RESTful API structure, managed routing using Express.js, and ensured scalable integration with the frontend.

- Frontend Development & Integration:

Built responsive and interactive UI components, connected frontend elements with backend APIs, and tested user workflows across devices.

- Prompt Design & Model Testing:

Engineered effective prompts for IBM Watson and LLM-based services to enhance code generation, documentation, and testing features.

- Module Coordination & Feature Improvement:

Supervised module development, tracked feature enhancement through Agile sprints, and managed integration across the system lifecycle.

Conclusion:

SmartSDLC showcases the power of combining traditional development practices with next-gen AI models on a robust cloud infrastructure. This project demonstrates practical implementation of generative AI in solving real-world software development challenges.