Interactive Graphene Documentation using LLMs and LangChain

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Focus of Today's Discussion

Introduction

Motivation behind the Proof of Concept (POC)

Proposed Workflow

Interplay between Components in an LLM Pipeline

Future Scope and Conclusion

Potential Enhancements

Demo of the Working Pipeline

AI-Builder

Motivation behind the POC- Enhancing Platform Utility

Source-code tutorials for Graphene Pipelines

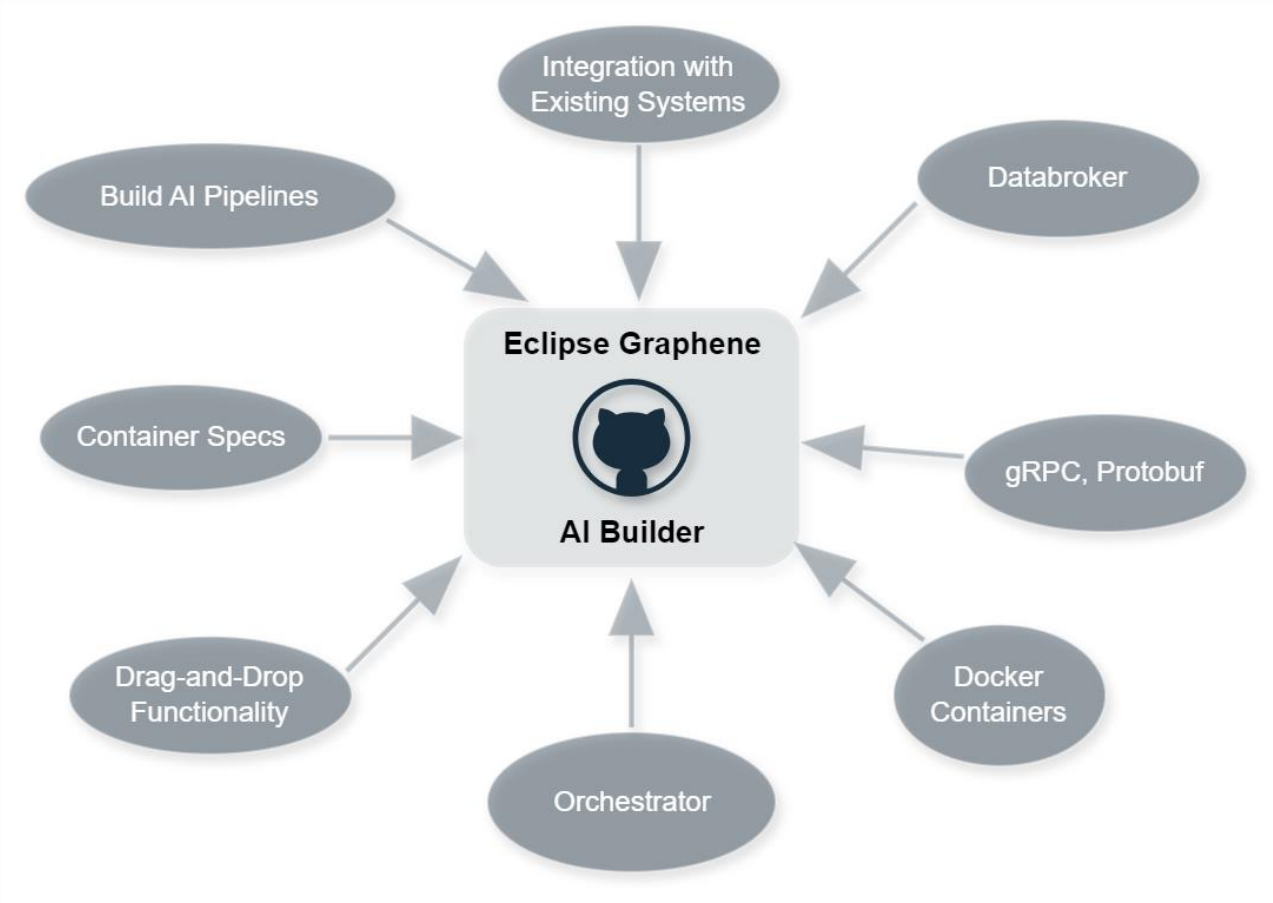
- Frequent documentation updates

Documentation Challenges

- Often, inadequacy, inaccessibility, or cumbersome processes
- Need to automate this process

Large Language Models (LLMs) as Documentation Augmenters

- Leveraging the use of LLMs enhances the Eclipse Graphene platform's [1][2] capability to handle and maintain documentation effectively



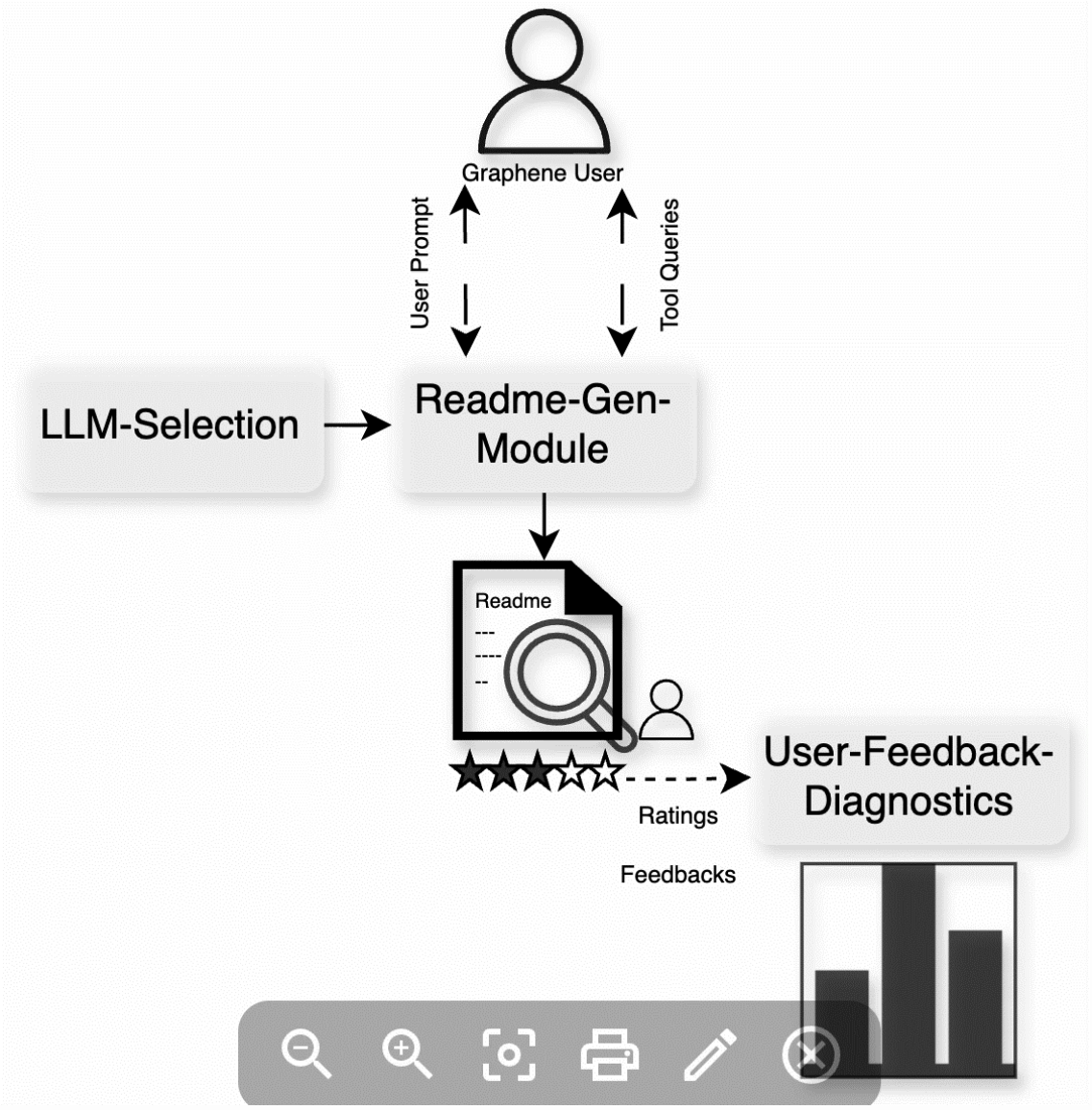
Proposed Workflow

User Input:

- Model Selection
- Intended Graphene Tutorial Repo
- Prompts
- Queries
- Ratings and Feedback

Pipeline Output:

- README.md
- Metrics - Metadata



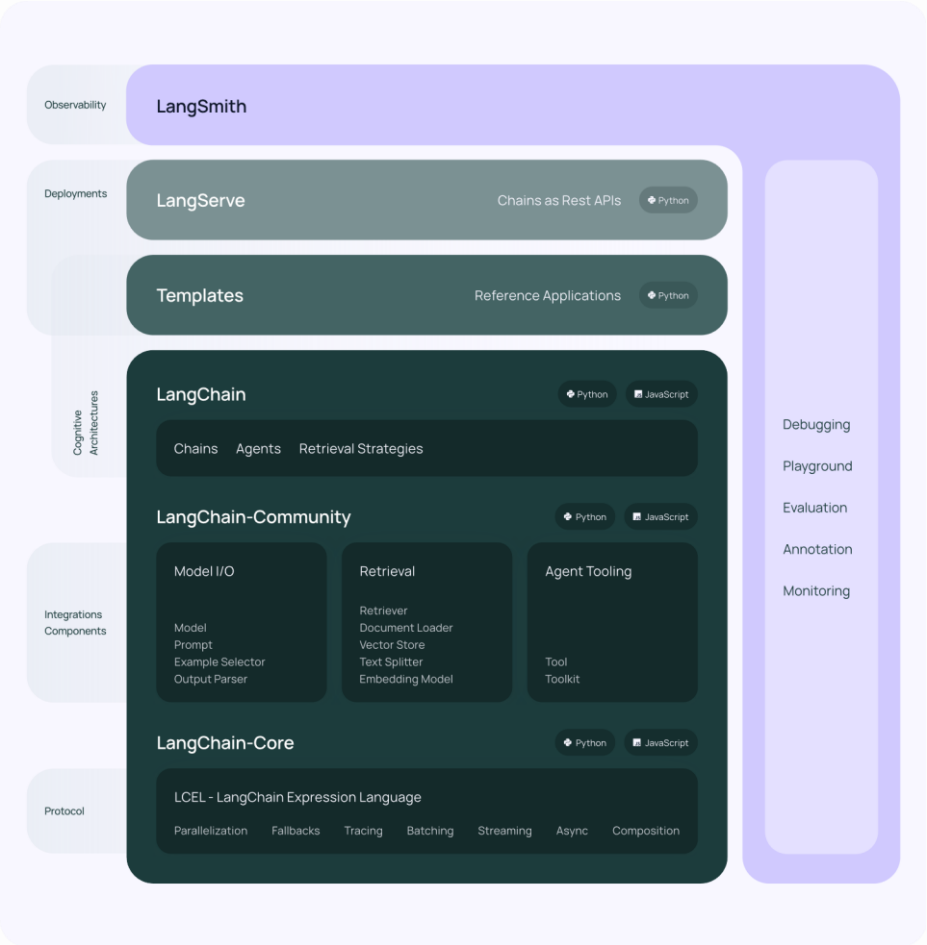
LLM-Selection

- Pipeline Tested with Four LLMs (Ongoing)

1. gpt-3.5-turbo-instruct
2. Mistral-7B-Instruct-v0.1_v2
3. llama-2-13b-chat_v3
4. OpenGPT-X-24EU-Bactrian-X-ENDEFRITES

LangChain Framework

- Designed to simplify the creation of applications using LLMs
- Addresses use-cases:
  - Chatbots, retrieval-augmented generation, document summarization, etc.
- Main Features used in POC
  - Models I/O
  - Chains
  - Agent Tooling
  - Lang Chain Expression Language (LCEL)



LangChain Stack [4]

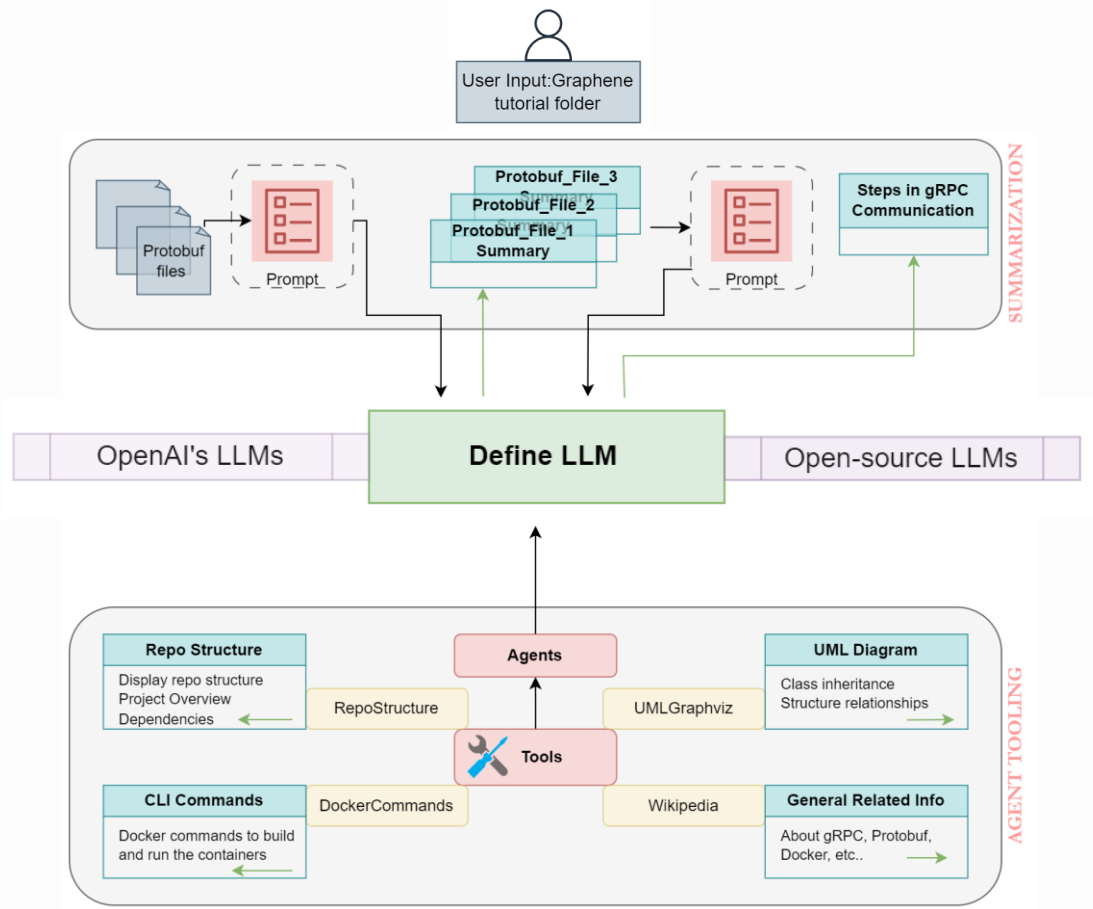
Readme-Gen-Module - Core Logic

MapReduce Chain

- Summarize each document on its own in a "map" step and then "reduce" the summaries into a final summary
- Iterative approach
- Parallel aggregation of results

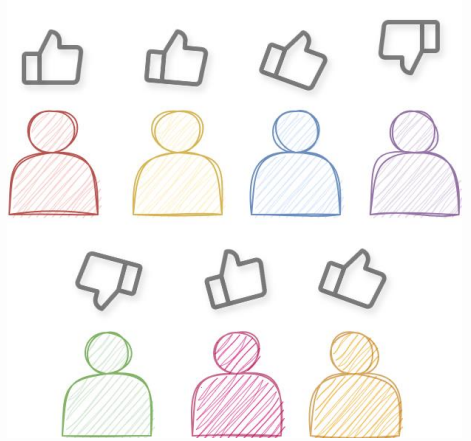
Agent Tooling

- Simple, basic functions as tools
- Reduce LLM Hallucinations
- Controlled text generation
- Aids in building structured prompts



User-Feedback – Human-in-loop

- Manages README file's user ratings and feedback
- Helps gauge the pipeline’s effectiveness



overall_avg_star_rating:

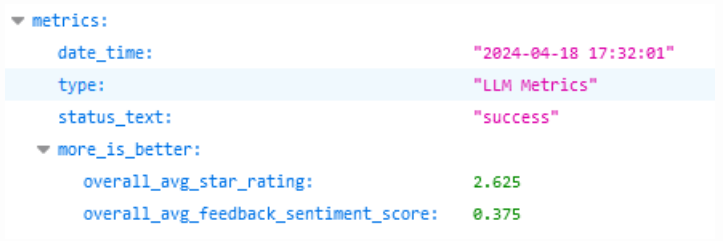
- Scale: 1 to 5 for user satisfaction.
- Mean rating received for READMEs in Graphene Tutorials.

overall_avg_feedback_sentiment_score:

Scale: -1 to 1 for sentiment polarity.

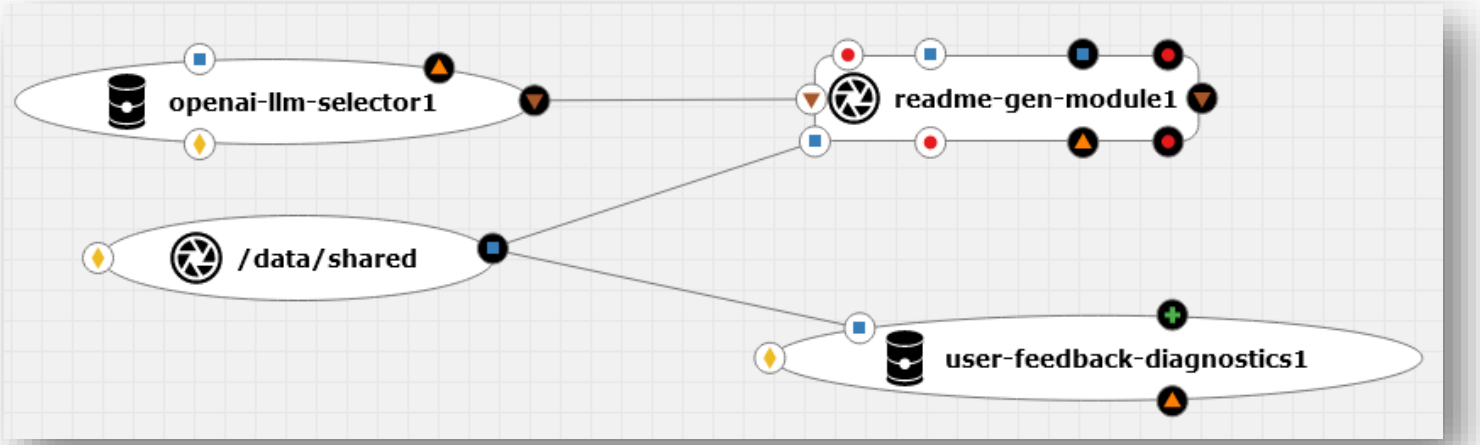
- Average sentiment polarity derived from README feedback

Feedback Text	Corresponding Sentiment Score
Good explanation	0.7
The generated docker commands were not accurate.	-0.2
Very good!	1.0
LLM can generate a better response!	0.5
Good generation	0.7

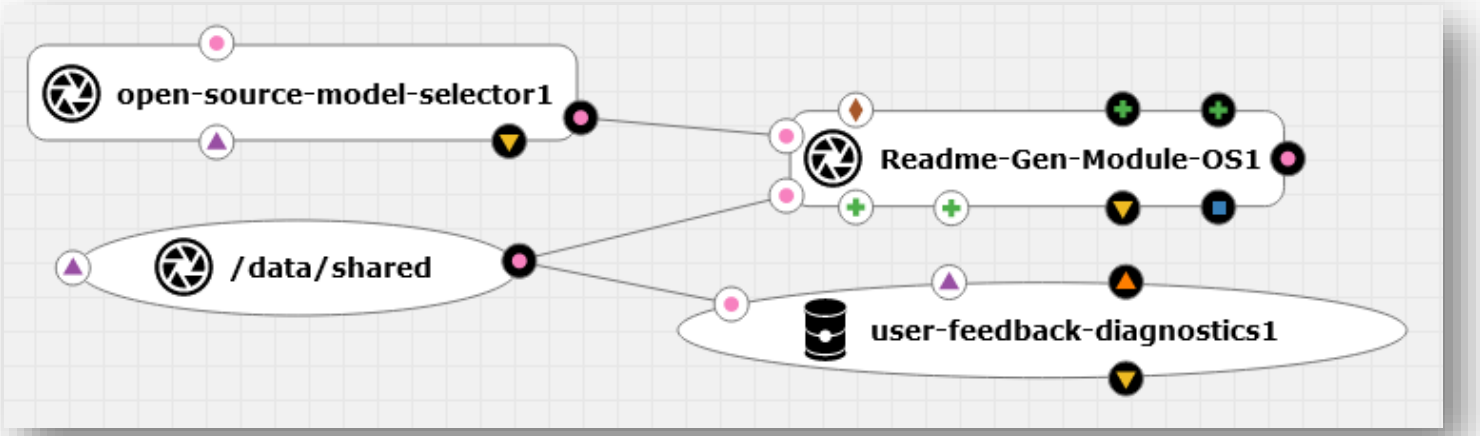


AI-Builder Pipeline

OpenAI LLMs



Open-source LLMs



Future Scope

1. **Q&A Chatbot** using the generated README
2. Automated tracking of **code updates** and README maintenance
3. Source c**ode optimization** recommendations
4. Improvise content generation for **Domain-Specific terminologies**
5. Identify issues and areas for enhancement in **large codebases**

References

1. https://gitlab.eclipse.org/eclipse/graphene/tutorials
2. https://www.ai4europe.eu/ai-builder
3. https://gitlab.eclipse.org/eclipse/graphene/tutorials/-/tree/main/graphene_llm_readme_gen?ref_type=heads
4. https://python.langchain.com/docs/get_started/introduction
5. https://python.langchain.com/docs/modules/chains/document/map_reduce
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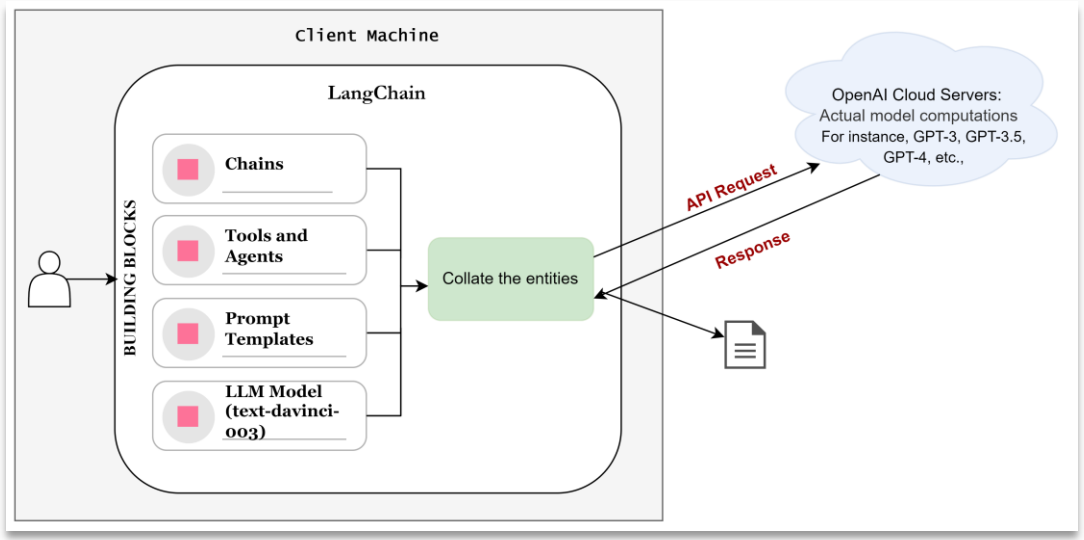
12. https://arxiv.org/abs/2310.12430
13. https://www.lakera.ai/blog/large-language-model-evaluation
14. https://textblob.readthedocs.io/en/dev/
15. https://openai.com/
16. https://huggingface.co/mistralai/Mistral-7B-v0.1

Thank you

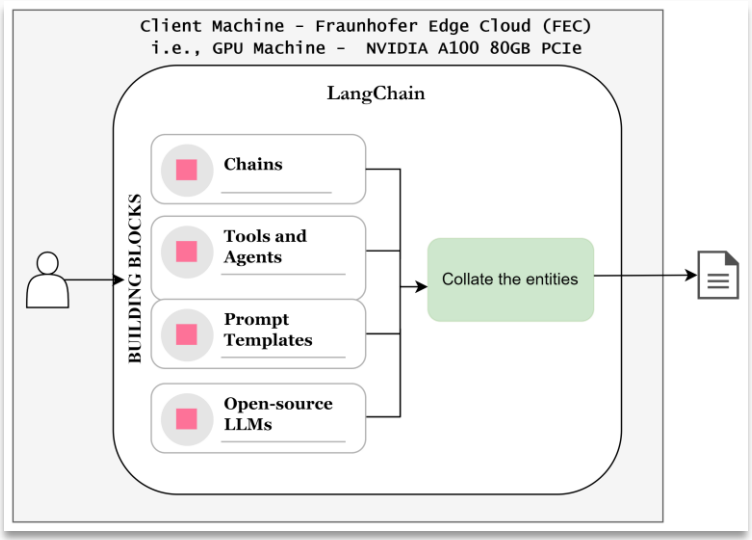
Inside the Pipeline: Key Components

- Open-Source and Closed-Source LLMs



OpenAI LLMs

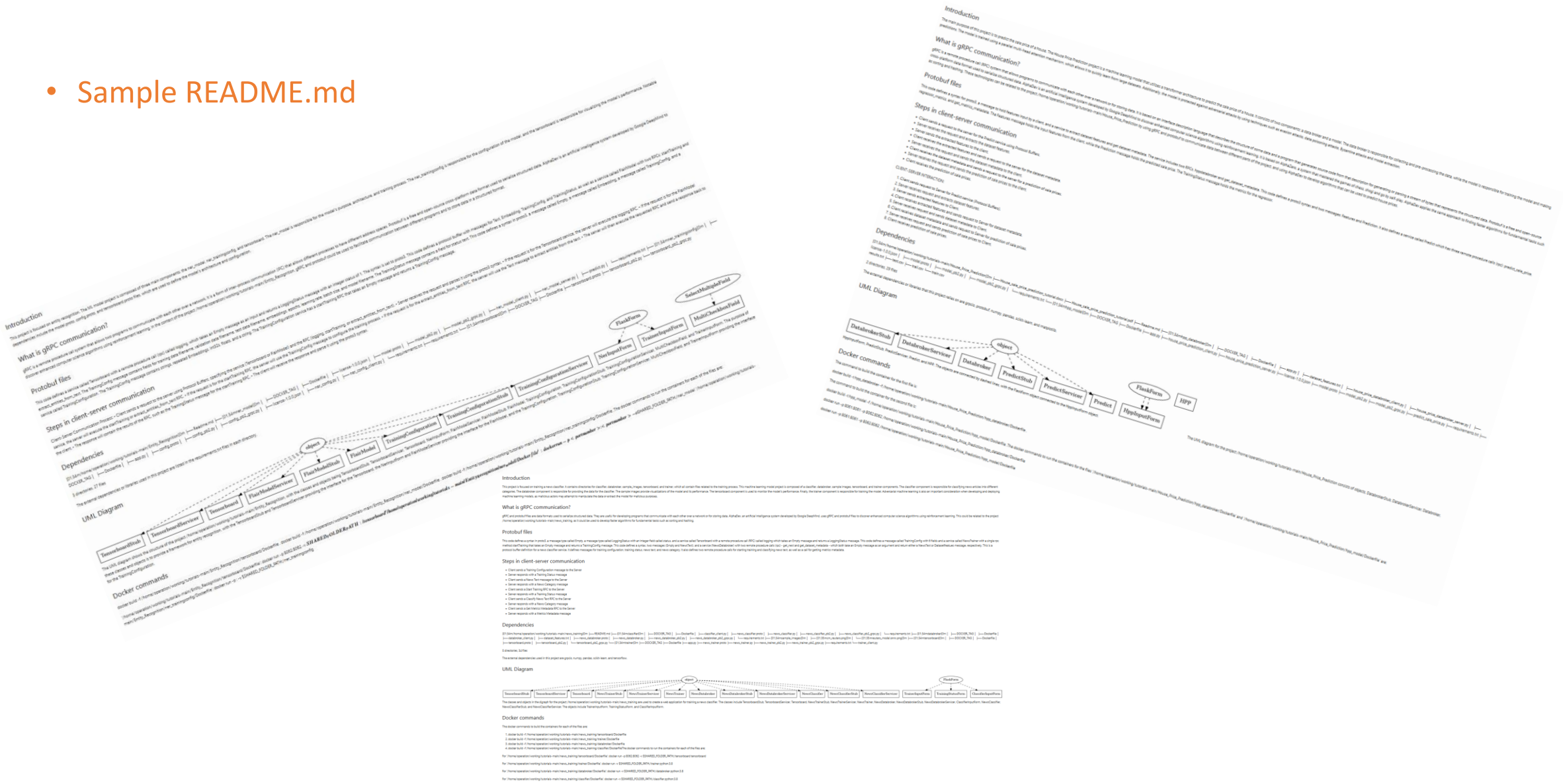
- Model : text-davinci-003
- GPT-3.5 architecture



Open-source LLMs

- Model : mistralai/Mistral-7B-Instruct-v0.1
- Instruct fine-tuned version of the Mistral-7B-v0.1 generative text model
- Set up in FEC VM with 1 A100 GPU

- Sample README.md



KINRW

7377657468612e6c616b73686d616e612e6d7572746879406961697 32e667261756e686f6665722e6465

Readme-Pipeline

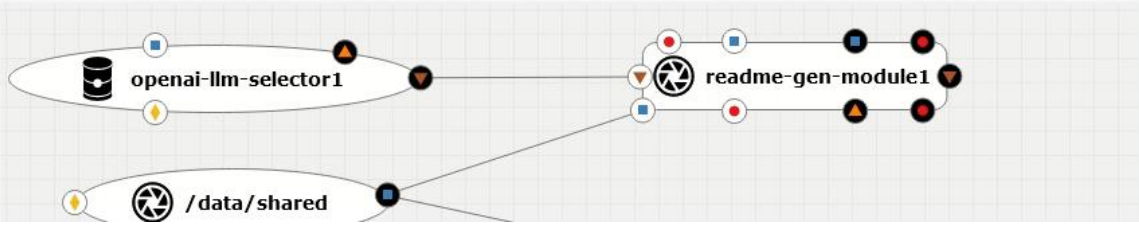
ReadmePipelineOS

Deployment: Readme-Pipeline

Status: Ready | Run | Reset | Delete | Logs | Capture Execution Metadata

Status Check	Nodename	Status Details	Logs	WebUI/Folder
✓	openai-llm-selector1	view	view	
✓	orchestrator	view	view	
✓	readme-gen-module1	view	view	
✓	user-feedback-diagnostics1	view	view	
✓	SharedFolder	view		

Solution description



The primary goal of the pipeline is to create a user-friendly interface connecting the Large Language Models (LLMs) and generate a comprehensive document (README.md) for various tutorials in the Graphene platform. Additionally, it strives to explore and integrate frameworks such as LangChain to access the seamless pipeline deployment. This sample pipeline offers insights into the interplay between different components within an LLM pipeline.

Three containers are utilized within the Graphene Design Studio framework to achieve this.

1. Openai_LLM_Selector