



JakartaEE meets AI

Large Language Models (LLMs)

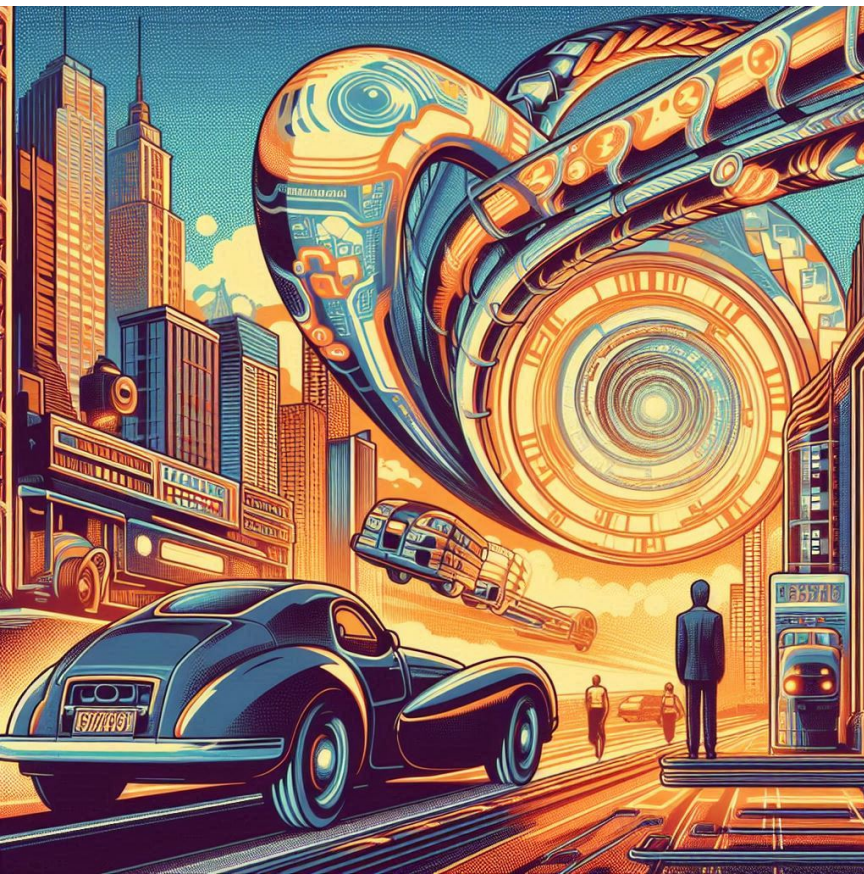


► Neural Networks

- Transformer based
- Recognize, Predict, and Generate text
- Trained on a VERY large corpus of text
- Deduce the statistical relationships between tokens
- Can be fine-tuned

A LLM predicts the next token based on its training data and statistical deduction

Java meets AI

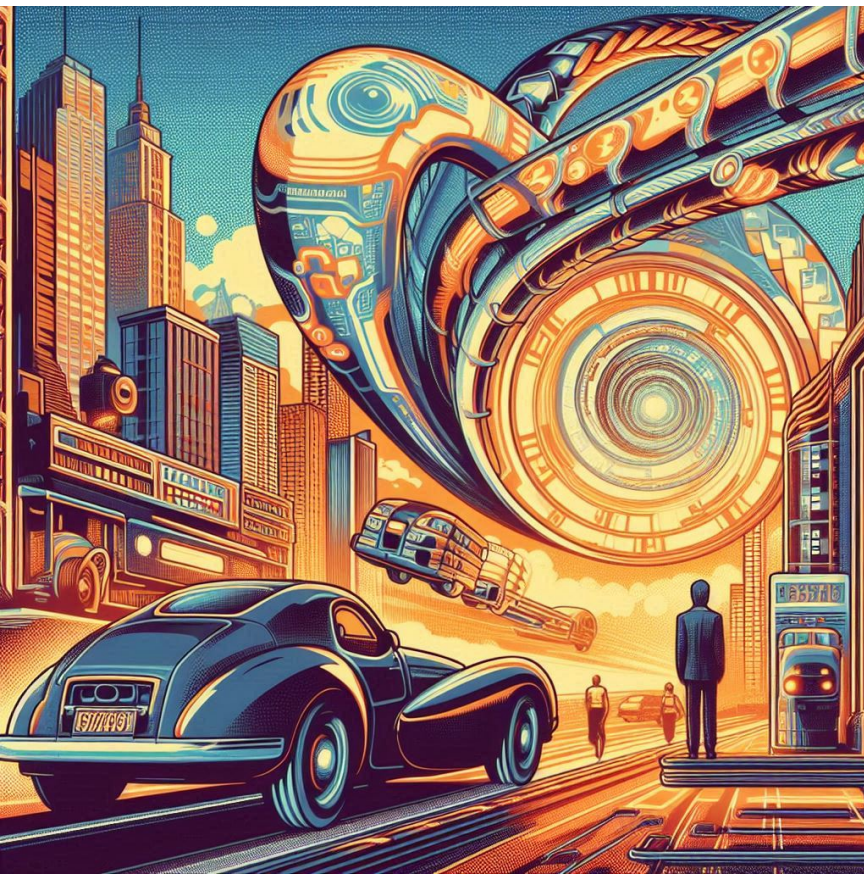


WildFly 



LangChain

JakartaEE meets AI



smallrye-llm



CDI
JAKARTA EE

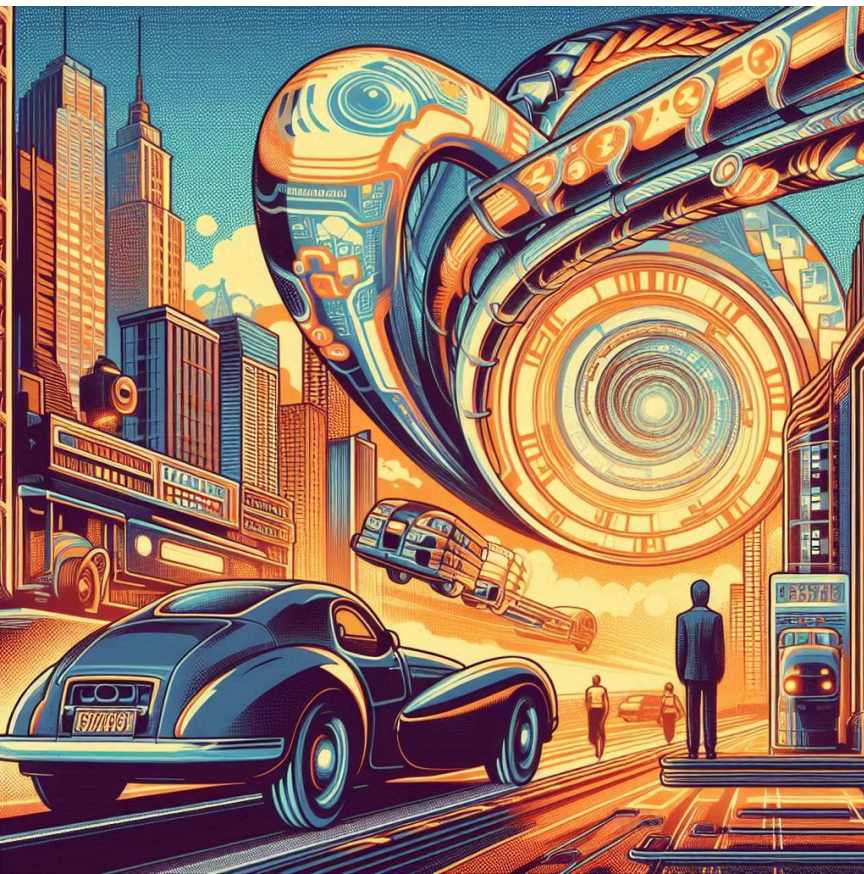


Microprofile config

Microprofile Fault Tolerance

Microprofile OpenTelemetry

WildFly meets AI



Support for streaming/chat models :

- `github-chat-model / github-streaming-chat-model`
- `groq-chat-model / groq-streaming-chat-mode`
- `mistral-ai-chat-model / mistral-ai-streaming-chat-mode`
- `ollama-chat-model / ollama-streaming-chat-mode`
- `openai-chat-model / openai-streaming-chat-mode`

Support for embedding models:

- `8 in-memory-embedding-models`
- `ollama-embedding-model`

Support for embedding stores:

- `in-memory-embedding-store`
- `neo4j-embedding-store`
- `weaviate-embedding-store`

Support for content retriever for RAG:

- `default-embedding-content-retriever`
- `neo4j-content-retriever`
- `web-search-engines`

Support for tool provider (MCP):

- `mcp-sse`
- `mcp-stdio`

Components of LangChain4j



Chains

Tools

AI Services

Basics

Image
Models

Language
Models

Prompt
Templates

Output
Parsers

Memory

RAG

Document
Loaders

Document
Splitters

Embedding
Models

Embedding
Stores

WildFly AI Feature Pack



- ▶ RAG components:

- embedding models
- embedding stores
- content retrievers



- ▶ Model Context Protocol Client:

- SSE
- Stdio



- ▶ Model Context Protocol server provides :

- Tools: to be called form a LLM
- Prompts: or prompts template to be shared across applications
- Resources: Data as text or binary



AI Service



```
@RegisterAIService(chatLanguageModelName = "ollama", tools =  
{org.wildfly.ai.websocket.Weather.class,org.wildfly.ai.websocket.Calculator.class}, scope =  
SessionScoped.class)  
public interface SimpleAIService {  
    @SystemMessage("""  
        You are an AI named Bob answering general question.  
        Your response must be polite, use the same language as the question, and be  
        relevant to the question.""")  
    String chat(@UserMessage String question);  
}
```

AI Service with MCP client



```
@RegisterAIService(chatMemoryName = "chat-ai-service-memory", contentRetrieverName = "embedding-store-retriever",
streamingChatLanguageModelName = "streaming-mistral", toolProviderName = "mcp")
public interface ChatAiService {
    @SystemMessage(""" You are a customer support agent of a car rental company named 'Miles of Smiles'. Before providing
information about a specific booking or canceling a booking, you MUST always check: booking number, customer first
name and last. You should not answer to any request not related to car booking or Miles of Smiles company general
information. When a customer wants to cancel a booking, you must check his name and the Miles of Smiles cancellation
policy first. Any cancelation request must comply with cancellation policy both for the delay and the duration. Today
is {{current_date}}. """)
    TokenStream streamingChat(String question);
}
```


MCP Server



```
@Prompt(name = "Prometheus-metrics-chart", description = "Prometheus metrics chart")
    PromptMessage prometheusMetricsChart() {
        return PromptMessage.withUserRole(new TextContent("using available tools, get Prometheus metrics from wildfly server. "
            + "You will repeat the invocation 3 times, being sure to wait 2 seconds between each invocation. "
            + "After all the 3 invocation has been completed you will organize the data in a table. "
            + "Then you will use this table to create a bar chart to visually compare the data. "
            + "Be sure to use at least 5 different data column and be sure to represent all data as bar in the chart"));
    }

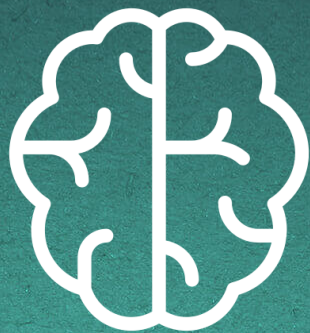
@Tool(description = "Get weather alerts for a US state.", name = "alerts")
public String getAlerts(@ToolArg(description = "Two-letter US state code (e.g. CA, NY)") String state) {
    return formatAlerts(weatherClient.getAlerts(state));
}

@Resource(uri = "file:///${jboss.server.log.dir}/server.log", mimeType = "text/plain", name = "server.log")
    TextResourceContents serverLog() throws IOException {
        Path path = new File(System.getProperty("jboss.server.log.dir"), "server.log").toPath();
        return TextResourceContents.create("file:///${jboss.server.log.dir}", Files.readString(path));
    }
```

Sample configuration



```
<subsystem xmlns="urn:jboss:domain:ai:1.0">
  <chat-language-models>
    <mistral-ai-chat-model name="streaming-mistral" api-key="${env.MISTRAL_API_KEY:YOUR_KEY_VALUE}"
base-url="https://api.mistral.ai/v1" log-requests="true" log-responses="true" model-name="mistral-small-latest"
streaming="true"/>
  </chat-language-models>
  <embedding-models>
    <in-memory-embedding-model name="all-minilm-l6-v2" module="dev.langchain4j.embeddings.all-minilm-l6-v2" embedding-
class="dev.langchain4j.model.embedding.onnx.allminilm6v2.AllMiniLmL6V2EmbeddingModel"/>
  </embedding-models>
  <embedding-stores>
    <in-memory-embedding-store name="in-memory" path="embeddings.json" relative-to="jboss.server.config.dir"/>
  </embedding-stores>
  <content-retrievers>
    <embedding-store-content-retriever name="embedding-store-retriever" embedding-model="all-minilm-l6-v2" embedding-
store="in-memory" max-results="2" min-score="0.7"/>
  </content-retrievers>
  <mcp>
    <mcp-tool-provider name="mcp" mcp-clients="mcp-sse"/>
    <mcp-client-sse name="mcp-sse" connect-timeout="6000000" log-requests="true" log-responses=true" sse-path="/sse" socket-
binding="mcp-sse"/>
  </mcp>
</subsystem>
```



Demo

What's next



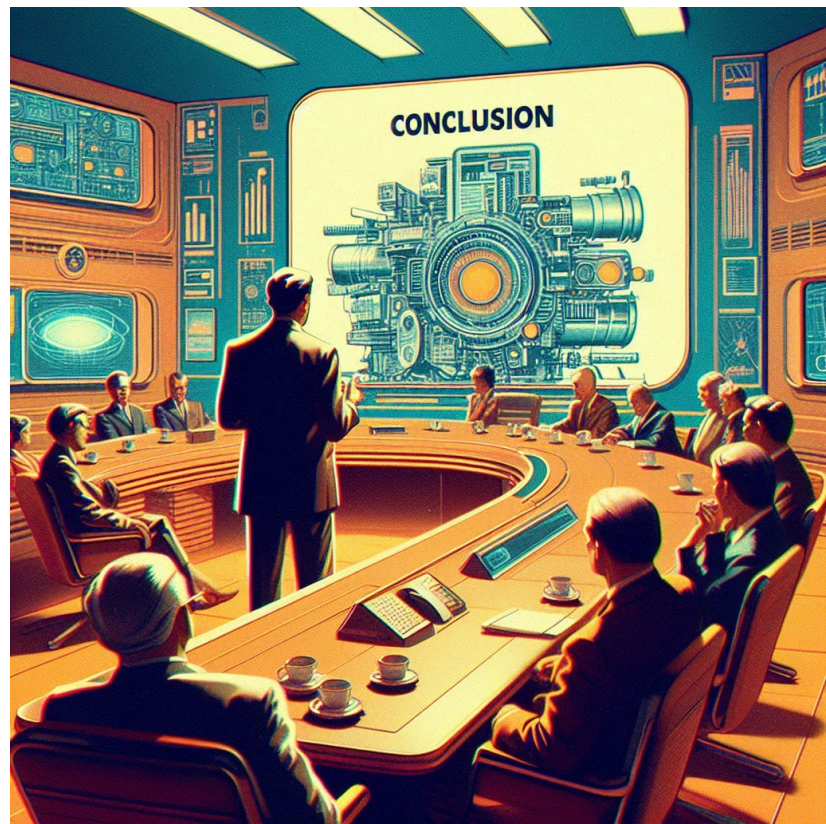
- ▶ WASM MCP Server
- ▶ More providers
- ▶ Fault Tolerance integration
- ▶ Graph RAG
- ▶ MCP specification changes



Conclusion



- ▶ Use WildFly Management to create required resources
- ▶ Layers to trim down the configuration to our needs
- ▶ CDI injection of those resources
- ▶ AI Service support
- ▶ MCP Server and MCP client support



Resources



- ▶ LangChain4J:
 - <https://docs.langchain4j.dev/>
- ▶ Model Context Protocol:
 - <https://spec.modelcontextprotocol.io/>
- ▶ smallrye-llm: a cross vendor LangChain4J -CDI integration library
 - <https://github.com/smallrye/smallrye-llm>
- ▶ WildFly AI Feature Pack:
 - <https://github.com/wildfly-extras/wildfly-ai-feature-pack>
- ▶ WildFly MCP: to interact with WildFly servers through MCP
 - <https://github.com/wildfly-extras/wildfly-mcp>
- ▶ Admin your WildFly with LLM and MCP
 - <https://www.youtube.com/watch?v=wg1hAdOoe2w>
- ▶ Making WildFly Glow with Intelligence:
 - <https://www.wildfly.org/news/2025/02/10/Glowing-with-AI/>
- ▶ Playing with Generative AI with WildFly:
 - <https://www.wildfly.org/news/2024/11/04/WildFly-playing-with-generative-ai/>





Questions