

Die neue Software Ära hat begonnen



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Most Valuable Professional: AI

DANKE AN UNSERE SPONSOREN



PLATINUM



GOLD





F1 Pitstop 1950 vs 2009 vs 2013



MODEL

TOKENS

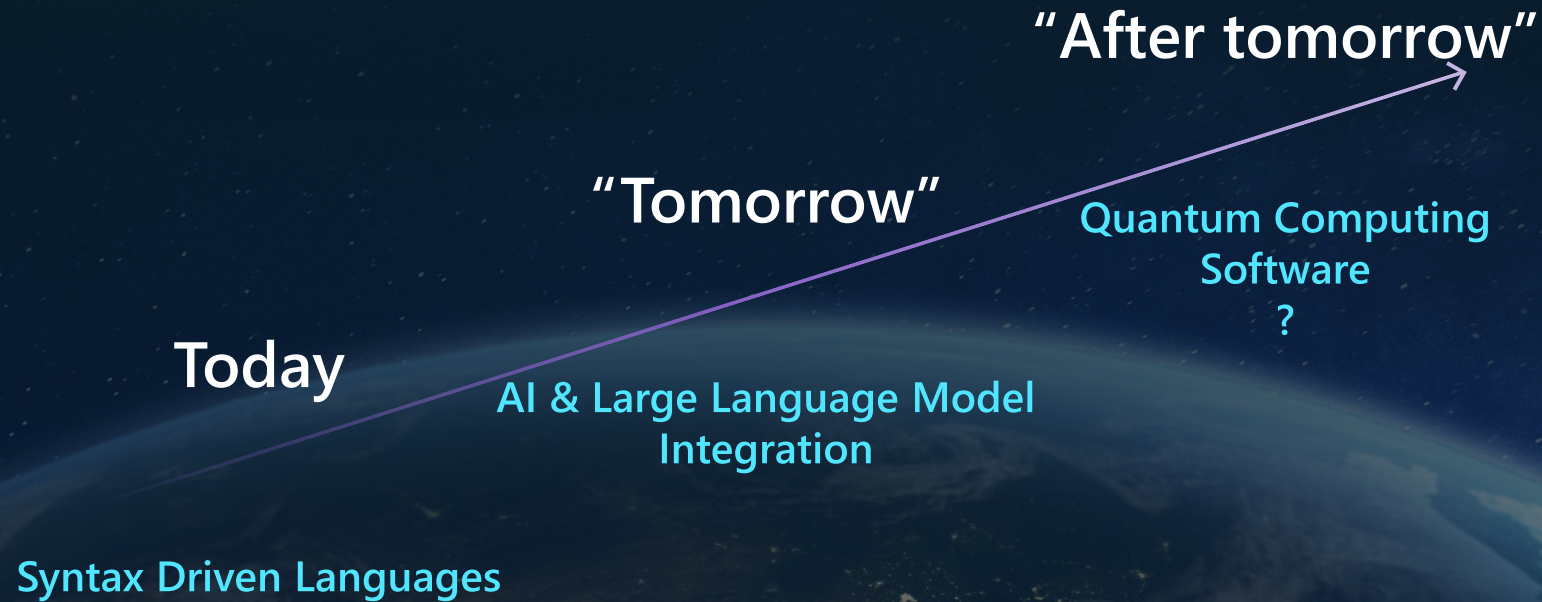
EMBEDDINGS

AGENT

RAG

Software V2

The new Generation of Software



DEMO

Symbiose: Mensch und Maschine Der Admin und die CommandLine-Console



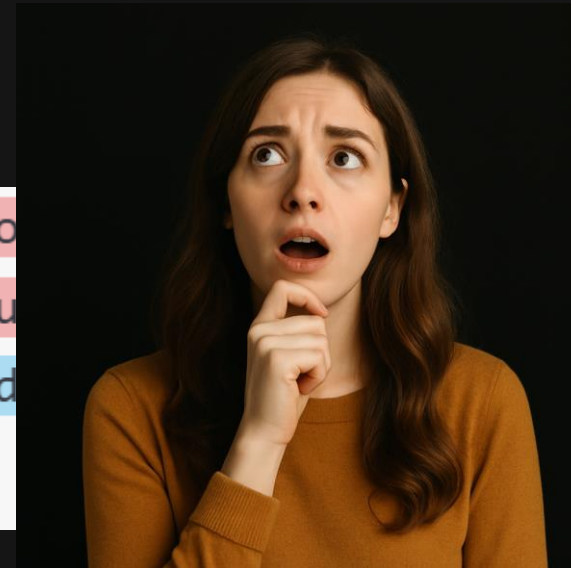
TOKENS



What are Tokens?

- 1 token \sim 4 chars in English
- 1 token \sim $\frac{3}{4}$ words
- 100 tokens \sim 75 words
- Byte Pair Encoding (Gage,1994): [Wikipedia](#)
- What are tokens and how to count them?
- Token Pricing: [Pricing \(openai.com\)](#)

OpenAI's large language models process text using tokens, which are continuous sequences of characters found in a set of text. The models learn to understand the statistical relationships between these tokens, and excel at producing the next token in a sequence of tokens.

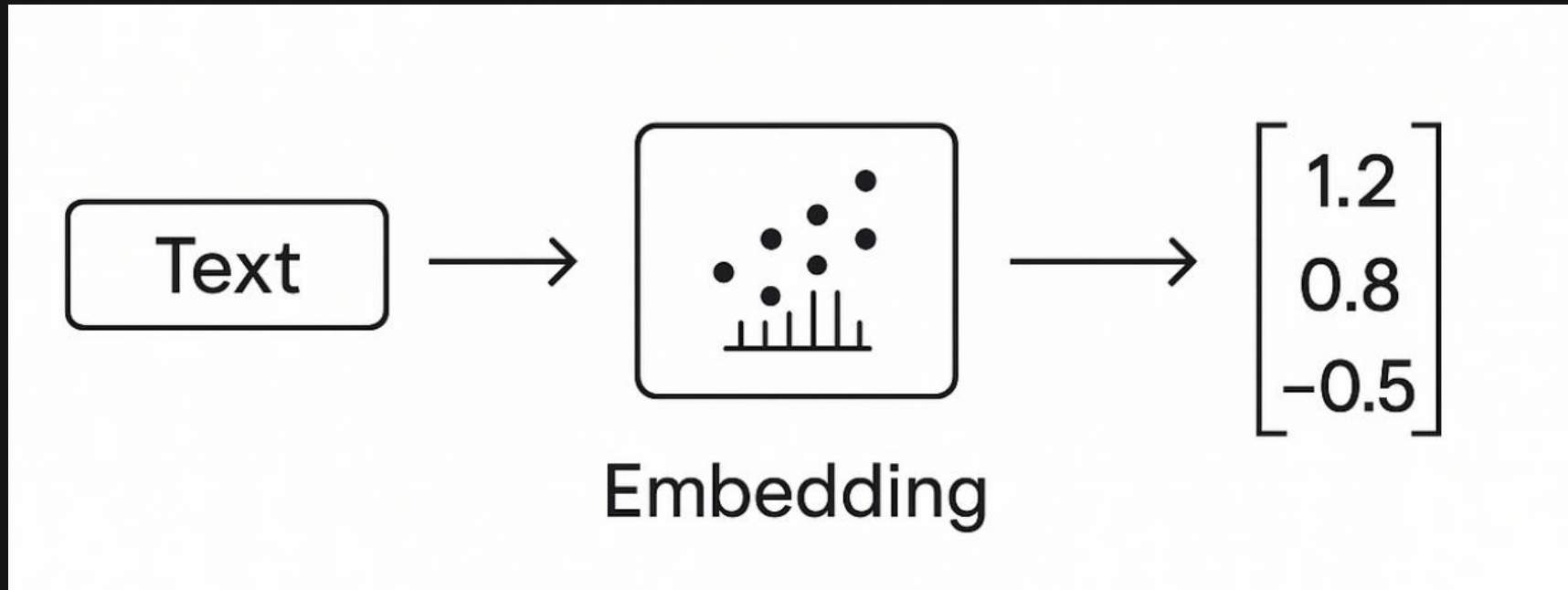


EMBEDDINGS

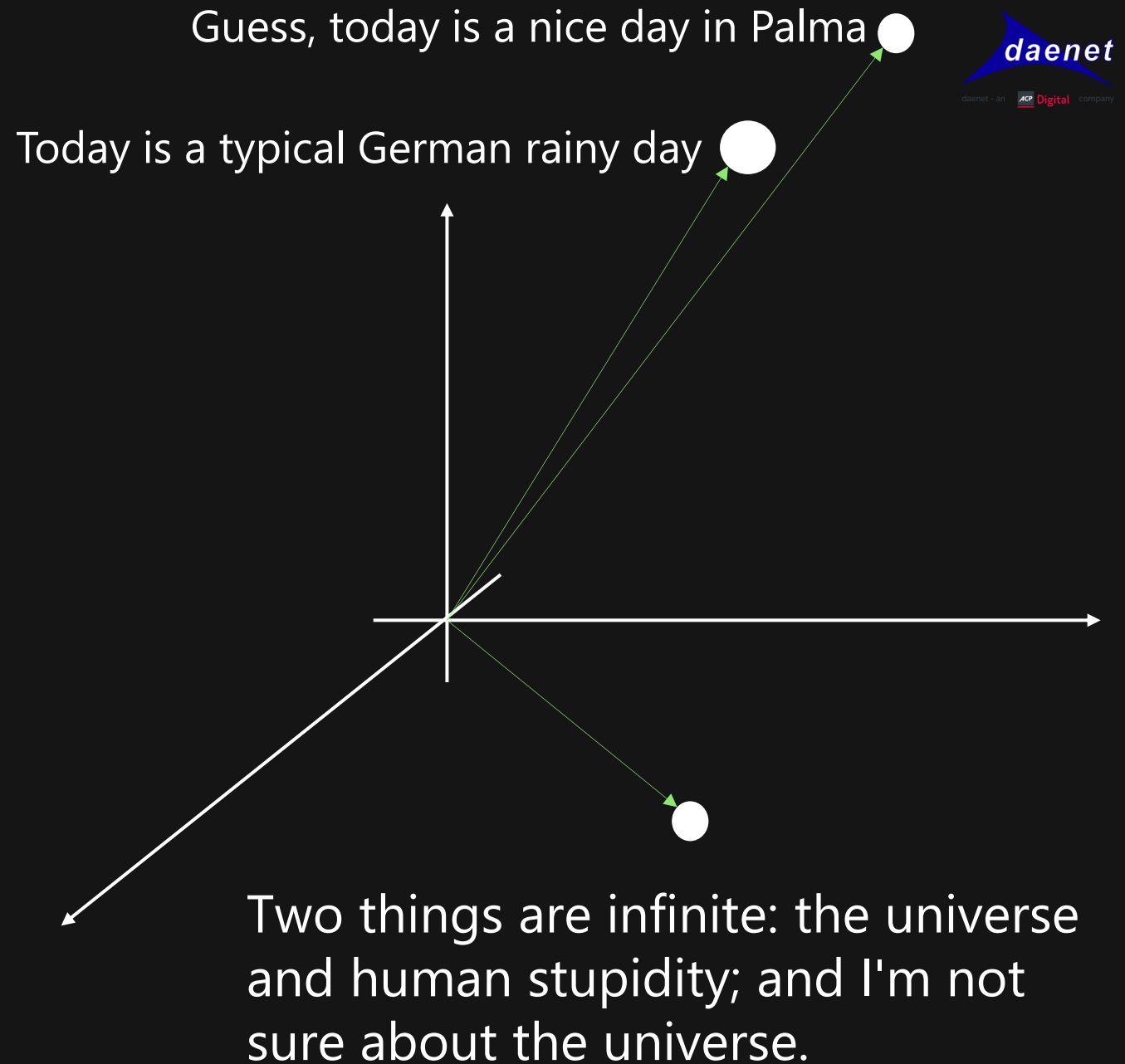


Embeddings

- Making a vector from text



Embedding Models



Similarity Between Multidimensional Vectors

- Dot Product
- The Norm
- Cosine Similarity

$$A \cdot B = a_1 \cdot b_1 + a_2 \cdot b_2 + \dots + a_n \cdot b_n$$

$$\|\mathbf{A}\| = \sqrt{a_1^2 + a_2^2 + \dots + a_n^2}$$

$$\mathbf{A} \cdot \mathbf{B} = \|\mathbf{A}\| \|\mathbf{B}\| \cos(\theta)$$

DEMO



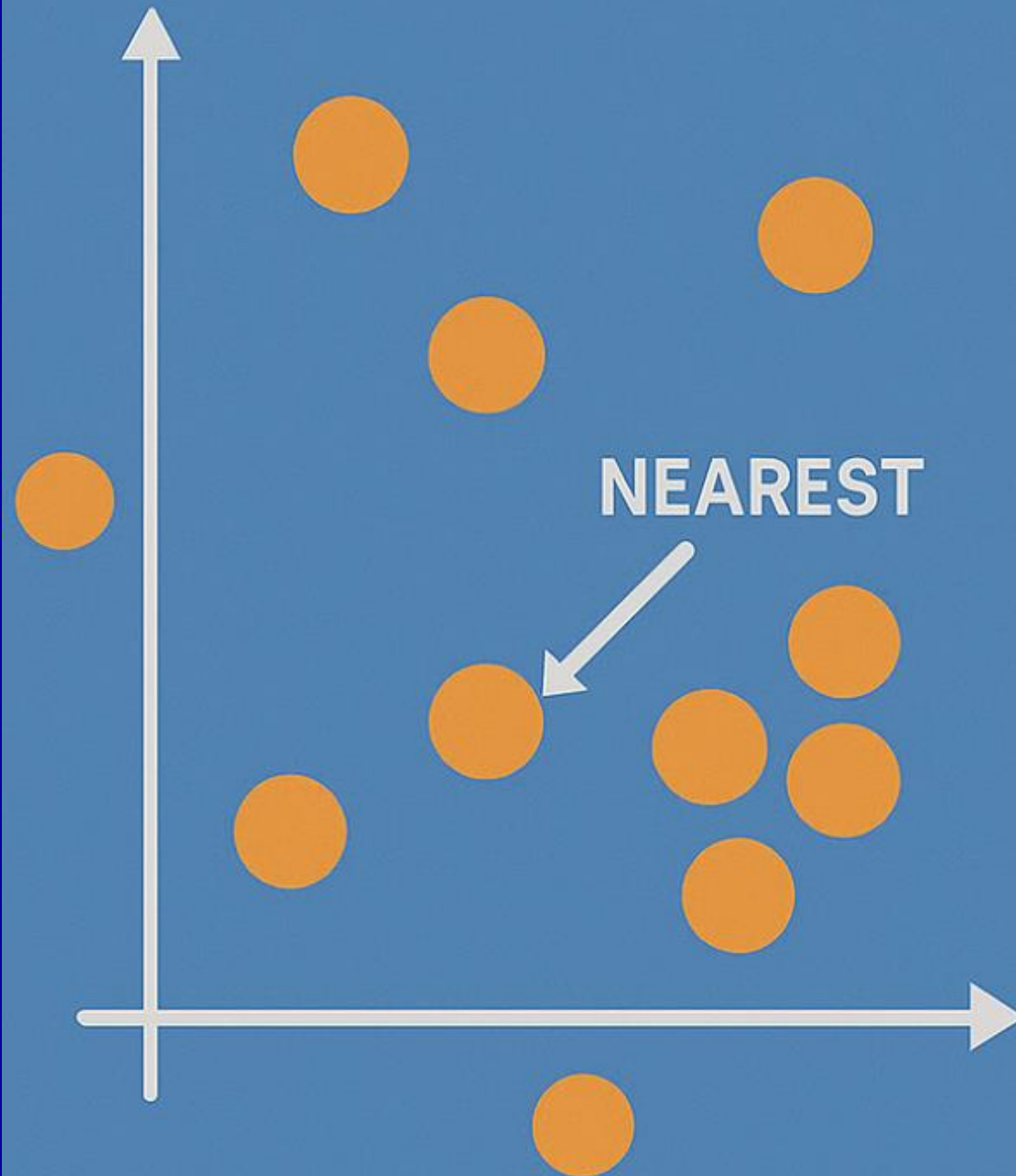
When to use Embeddings?

- Semantic Search
- Classification
- Clustering
- Recommendations
- . . .

VECTOR DATABASES



Embeddings in DATABASE



VECTORS

represent
data points

**NEAREST
SEARCH**

finds closest
vectors

Vector DBs

- SqlServer 2025 Native Vector Search
- Quadrant
- CosmosDB
- ...

SqlServer 2025 Native Vector Search

- SqlServer 2025 Native Vector Search
 - In Azure
 - On-Prem
- [SQL Server Native Vector Search for .NET Developers](#)

```
CREATE TABLE test.Vectors
(
    [Id] INT IDENTITY(1,1) NOT NULL,
    [Text] NVARCHAR(MAX) NULL,
    [VectorShort] VECTOR(3) NULL,
    [Vector] VECTOR(1536) NULL
);
```


DEMO

• SQL Server Native Vector Search

SQL Server Native Vector

```
DECLARE @v1 VECTOR(2) = '[1,1]';  
DECLARE @v2 VECTOR(2) = '[-1,-1]';  
  
SELECT  
    VECTOR_DISTANCE('euclidean', @v1, @v2) AS euclidean,  
    VECTOR_DISTANCE('cosine', @v1, @v2) AS cosine,  
    VECTOR_DISTANCE('dot', @v1, @v2) AS negative_dot_product;
```



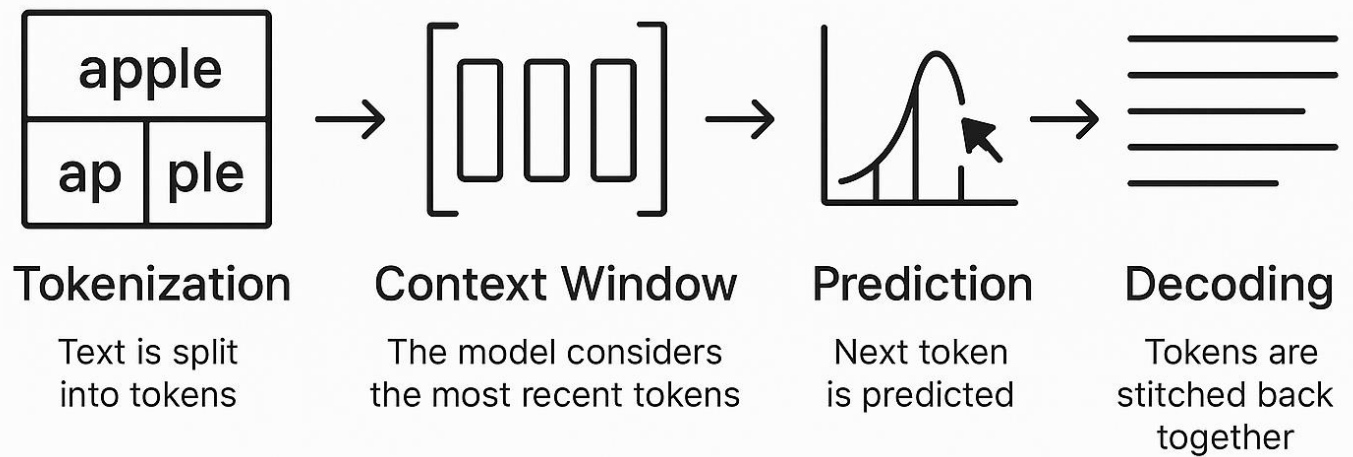
COMPLETION MODELS

How does all this work?



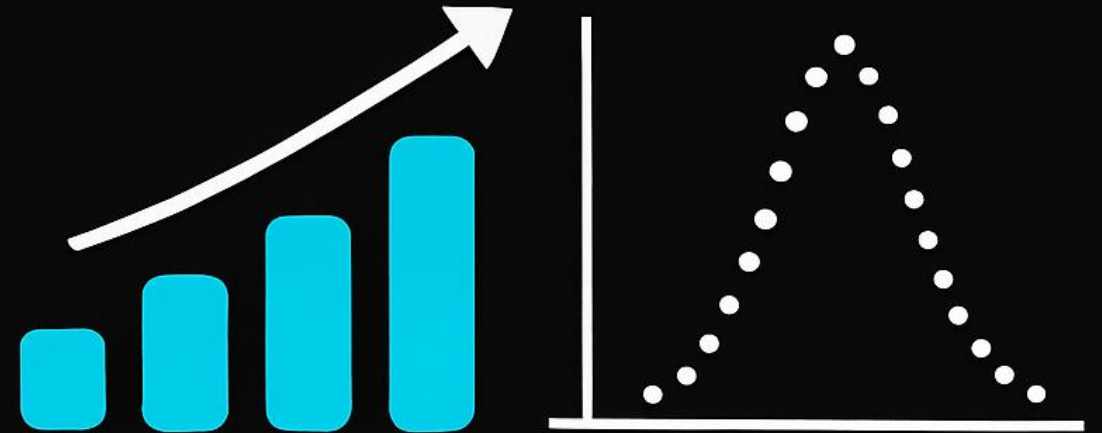
Completion Models

Text Completion Flow



DEMO

- Probabilities under the hub



RAG

Retrieval Augmented Generation

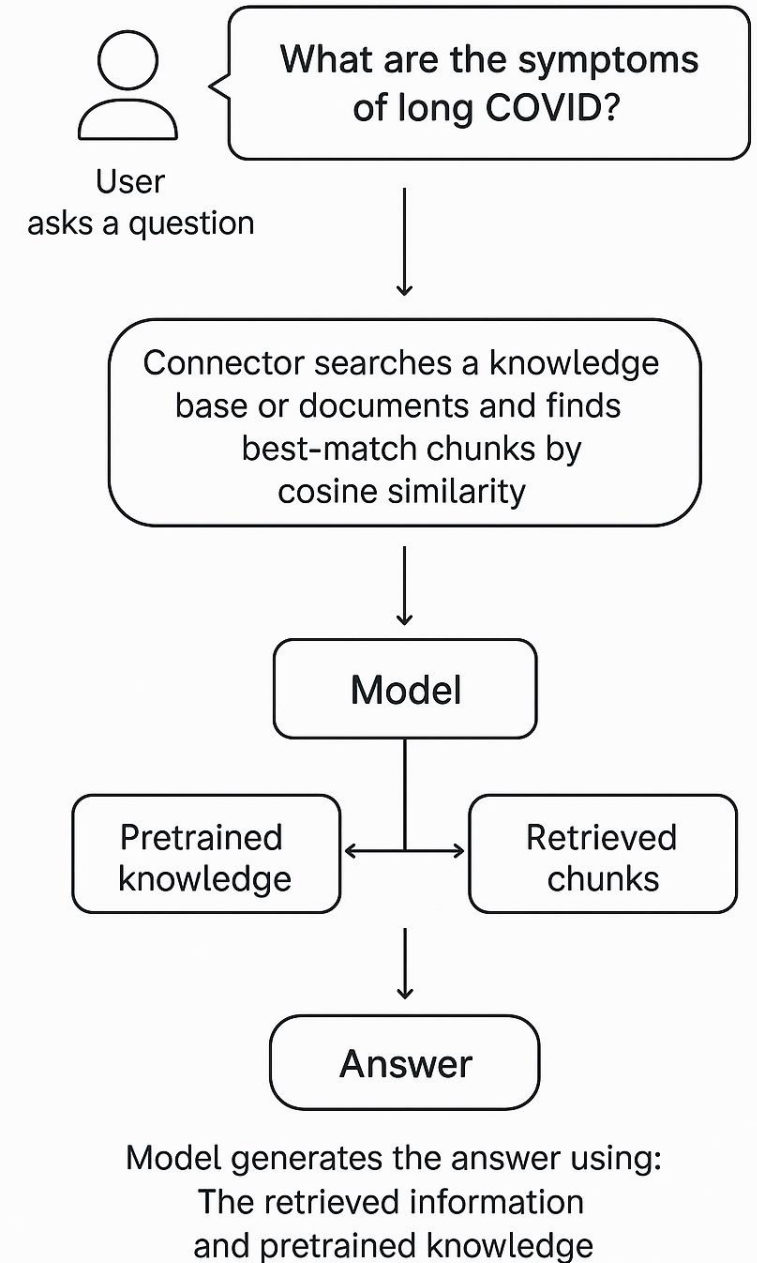


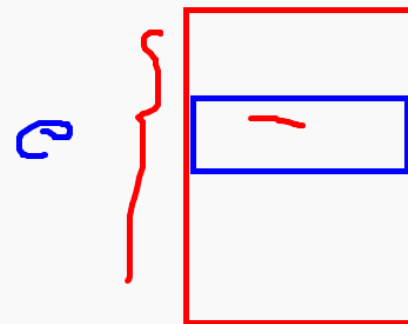
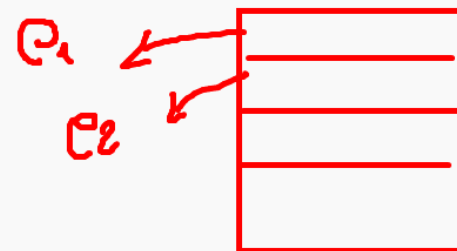
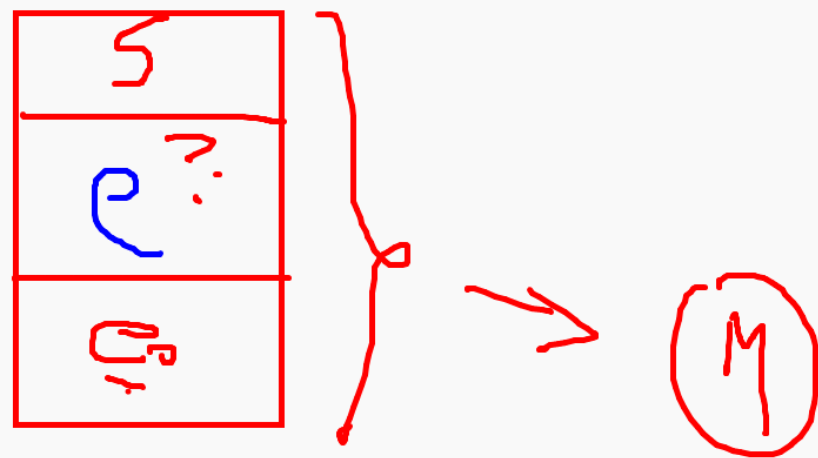
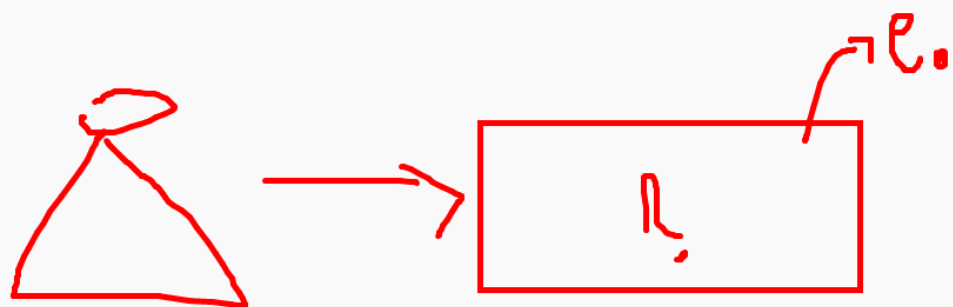
RAG

Retrieval-Augmented Generation

- Extending the model knowledge
- Combines information retrieval with text generation

<https://arxiv.org/abs/2005.11401>





DEMO (c#)

- Creating chunks
- Creating embeddings
- InMemory Vector DB
- Calculating Similarity



OpenAI SDK

Cộng đồng

Chức năng

Tên

Lỗi

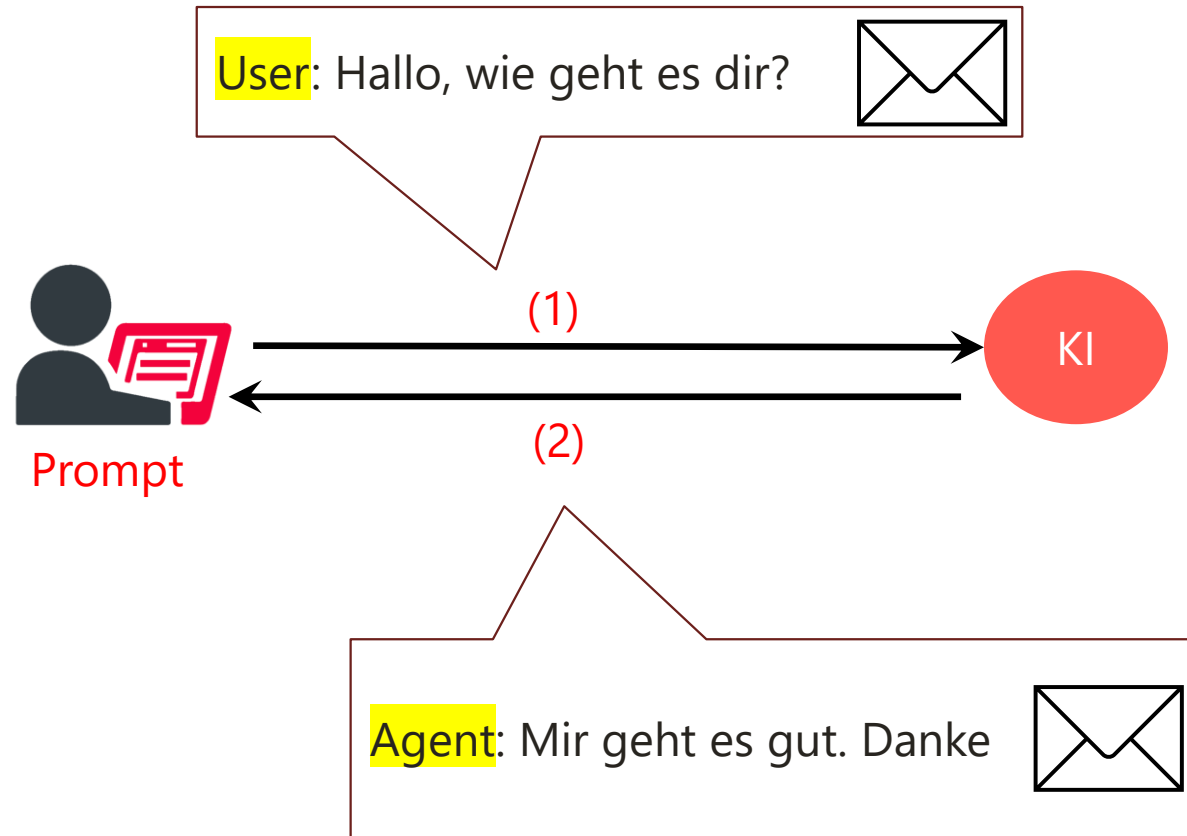
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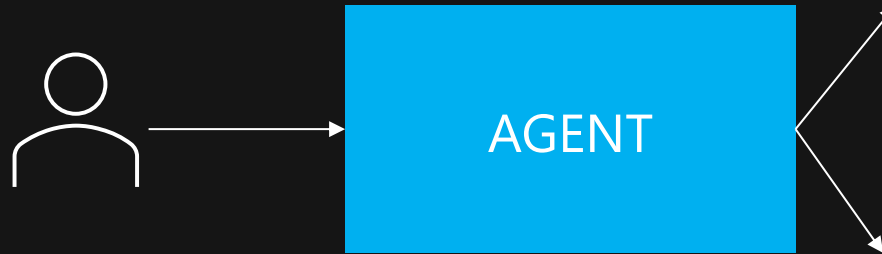
Édición

Rutina de inicio de la aplicación de GPT-3

Model generiert Text



Extending Models



Knowledge Tools => RAG



Bing Search



File Search



Azure AI Search

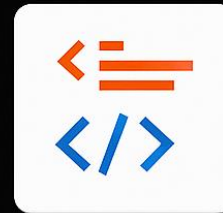


MS Fabric

Action Tools => Function Calling



Function Calling



Code Interpreter



OpenAPI Defined
Tools

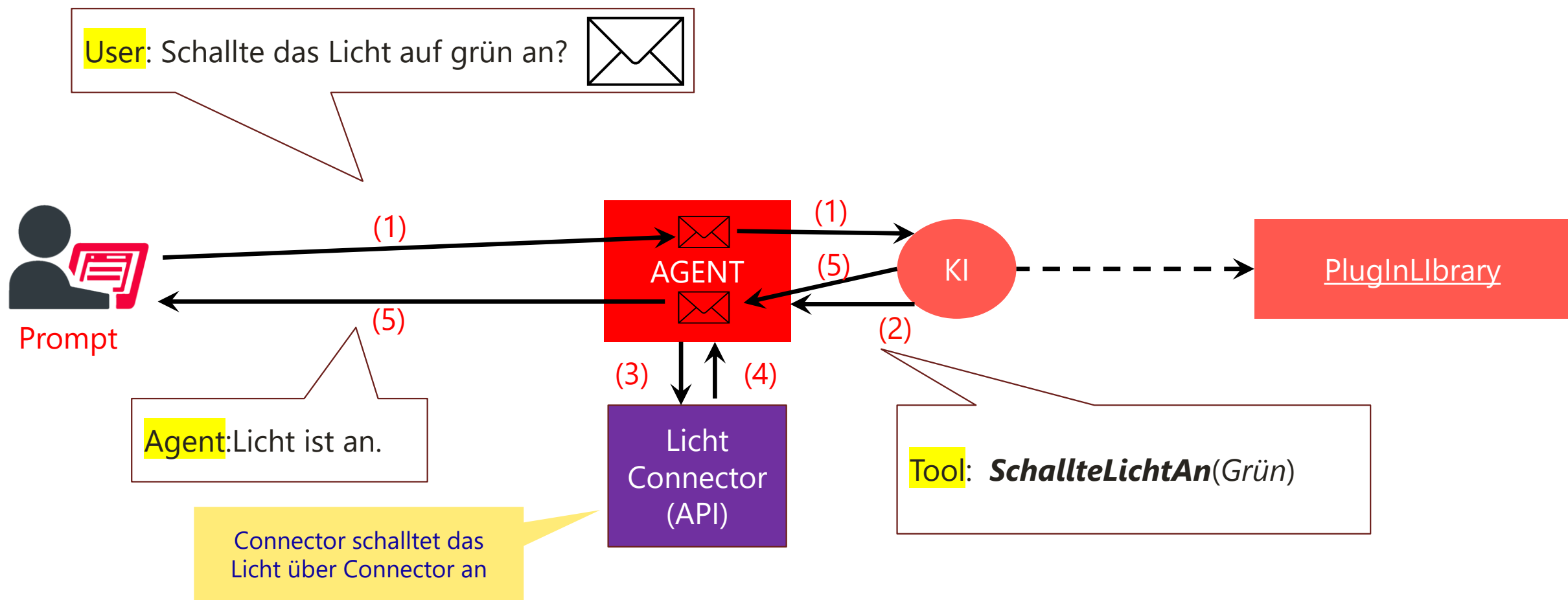


Azure Functions

Function Calling

Model wird zwei Mal angewendet:

- 1. Um Prompt auf Funktion zu mappen. (1)
 - 2. Um die User Message zu generieren. (4)
- An Model werden die Daten weitergegeben, die Connector zur Verfügung stellt. Z.B. Licht ist an.





Model Context Protocol

<https://mcpservers.org/>

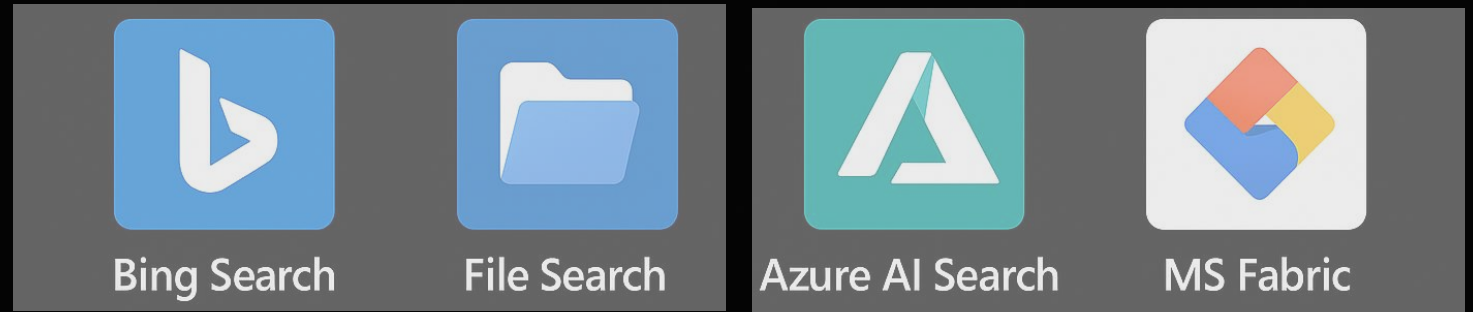
[Model Context Protocol](#)

[csharp-sdk/samples/AspNetCoreSseServer](#) at main · [modelcontextprotocol/csharp-sdk](#)

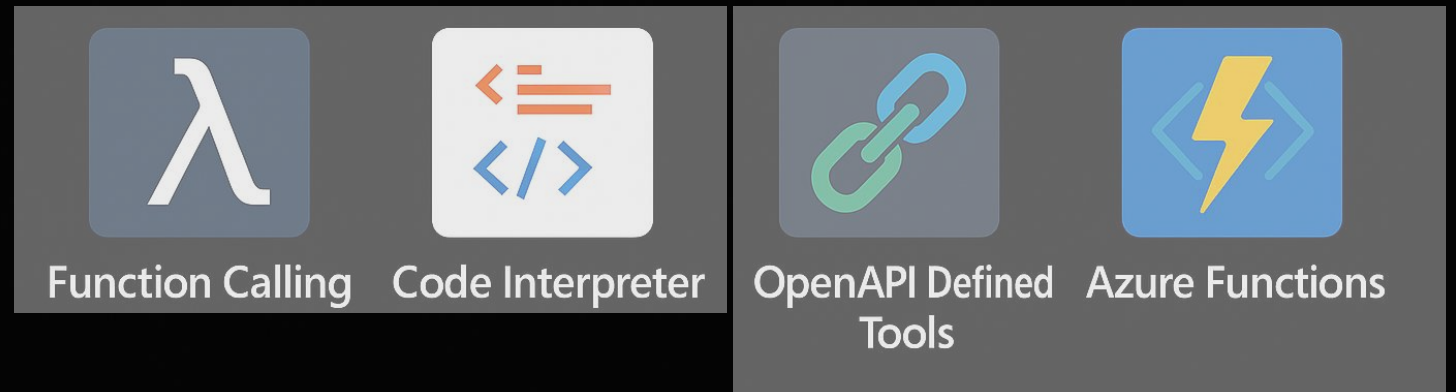
Tools are inside MCP Servers



Knowledge Tools => RAG





Action Tools => Function Calling



Semantic Kernel is an open-source SDK that lets you easily combine Generative AI Models syntactic programming languages like C#, Python an JAVA.

Currently supported languages: C#, Python

Currently supported AI Services: OpenAI, Azure OpenAI, and Hugging Face

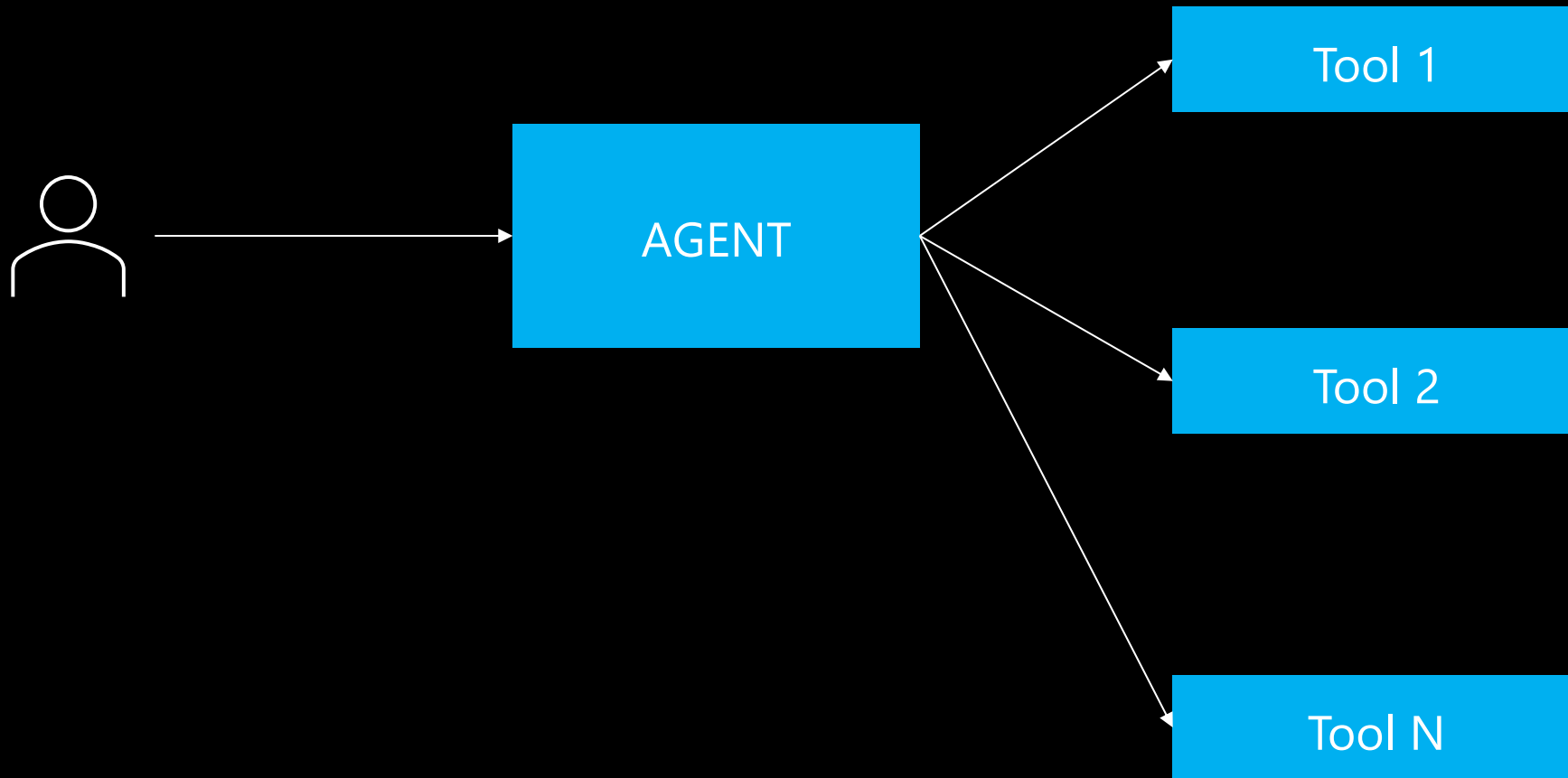
Introduction |   Langchain

DEMO

Die Beziehung zwischen
Menschen und der Lampe.



Process Orchestration



DEMO

Vibe Coding



