The LangChain ecosystem

DEVELOPING LLM APPLICATIONS WITH LANGCHAIN

Jonathan Bennion
AI Engineer & LangChain Contributor

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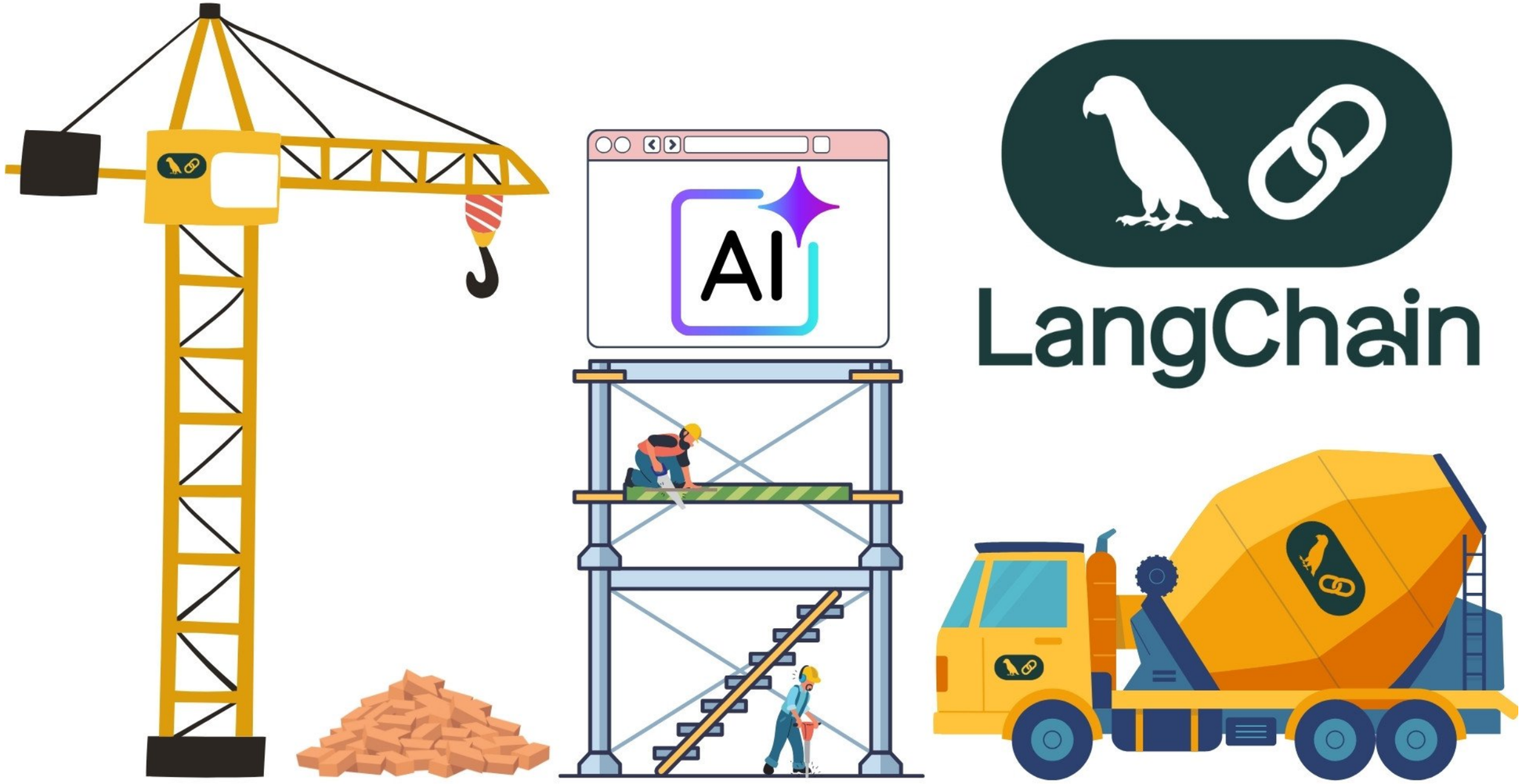
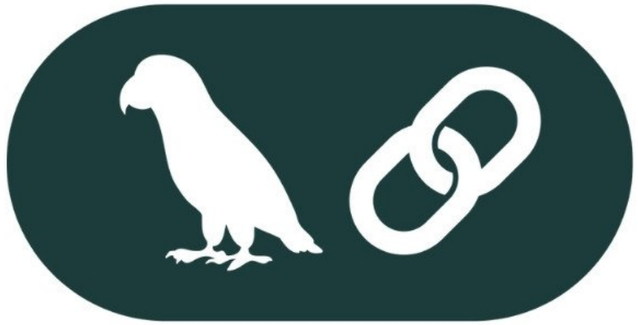
Meet your instructor...

- Jonathan Bennion, **AI Engineer**
- ML & AI at Facebook, Google, Amazon, Disney, EA
- Created *Logical Fallacy chain* in LangChain
- Contributor to **DeepEval**

Build LLM Apps with LangChain





LangChain

LangSmith

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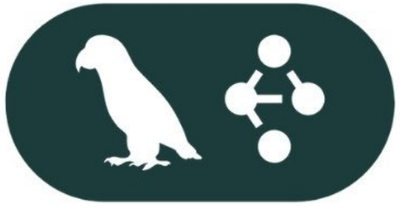
Deploying Apps



LangGraph

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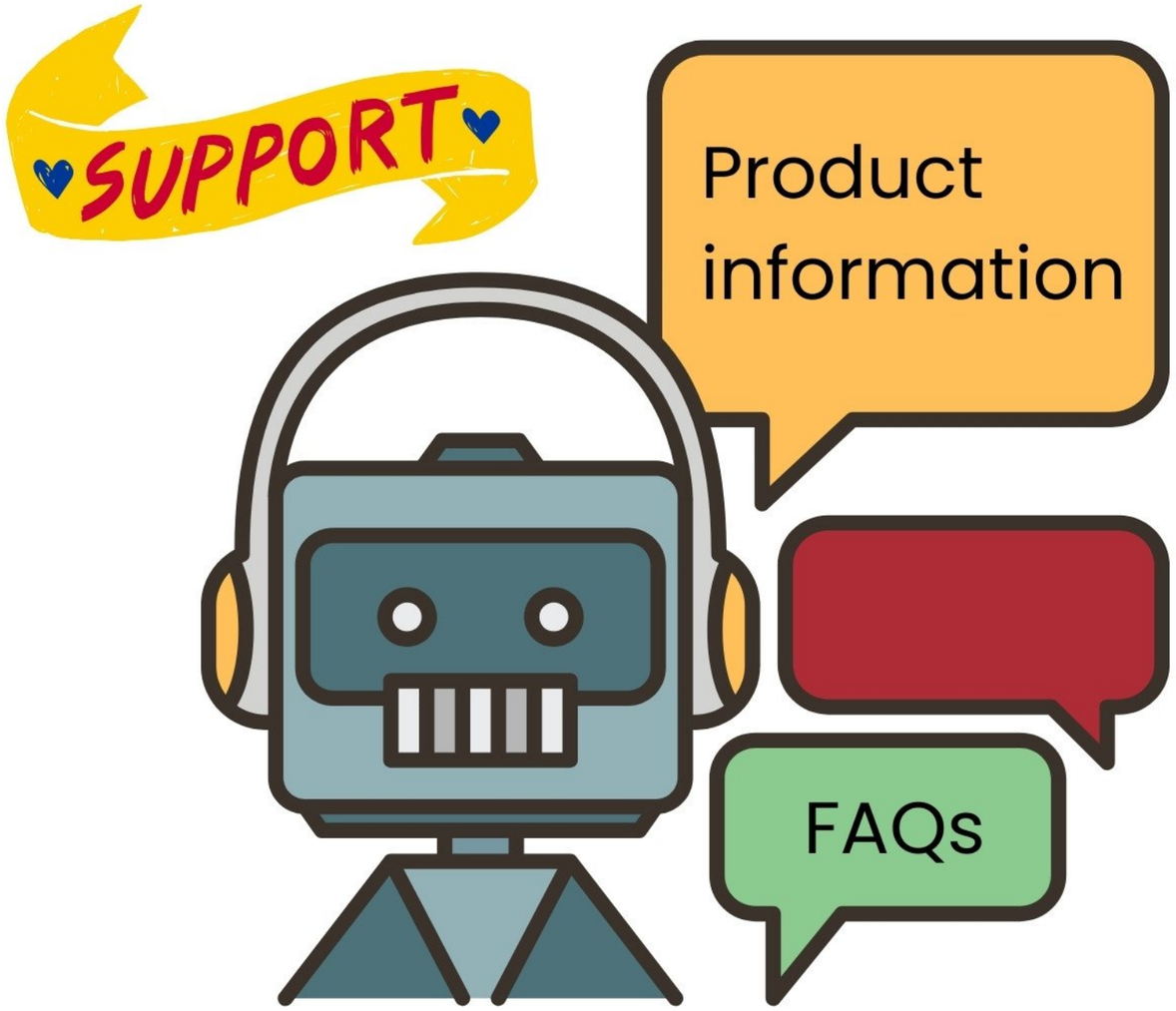
AI Agents

LangChain integrations

[1] https://python.langchain.com/docs/integrations/providers/

Building LLM apps the LangChain way...



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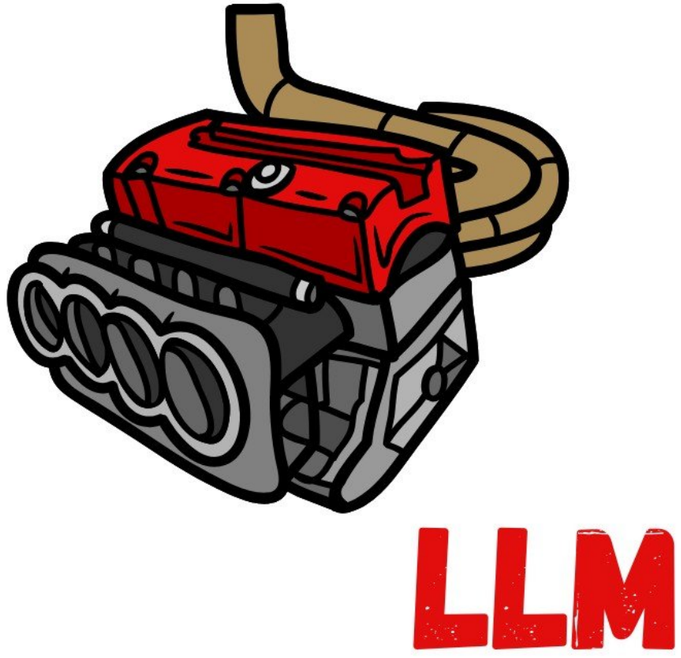

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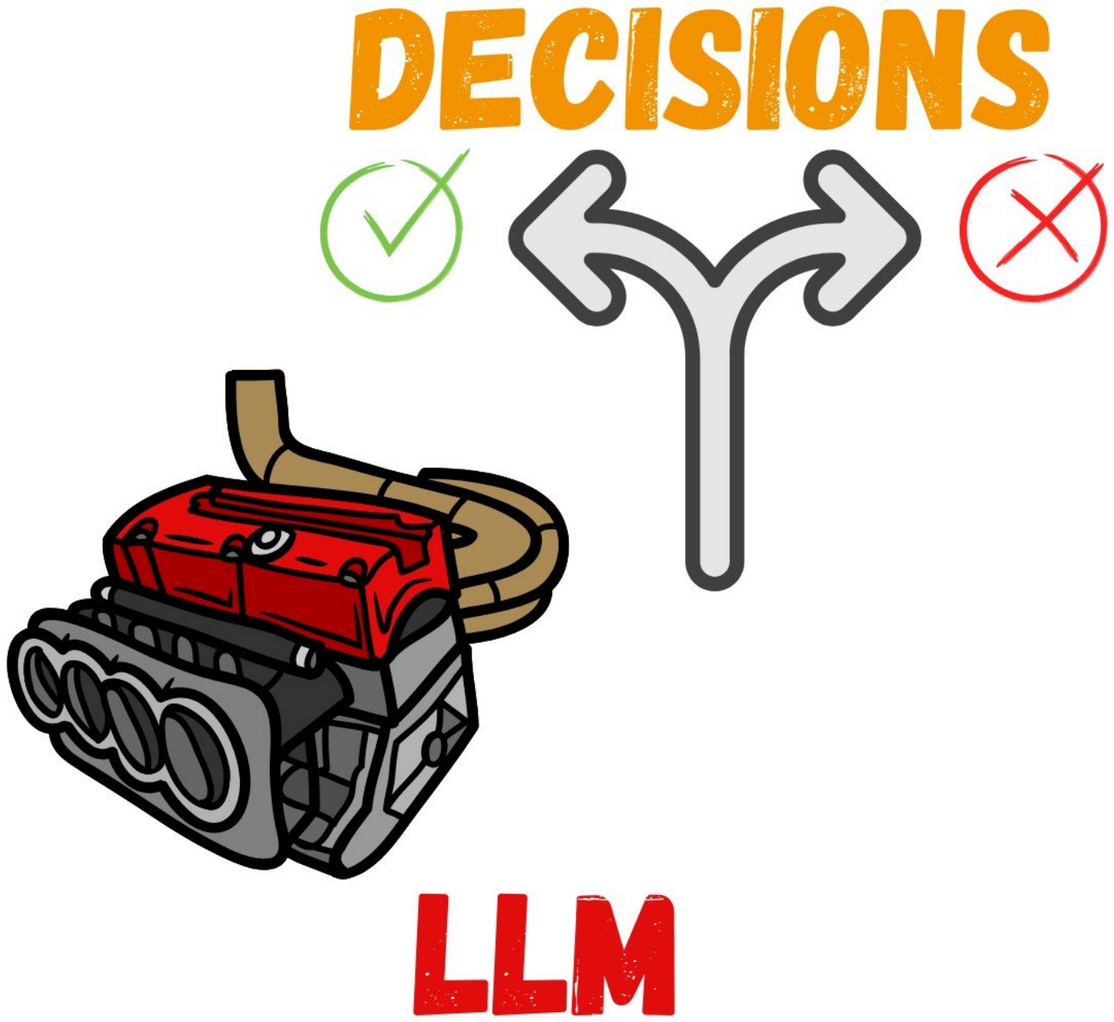

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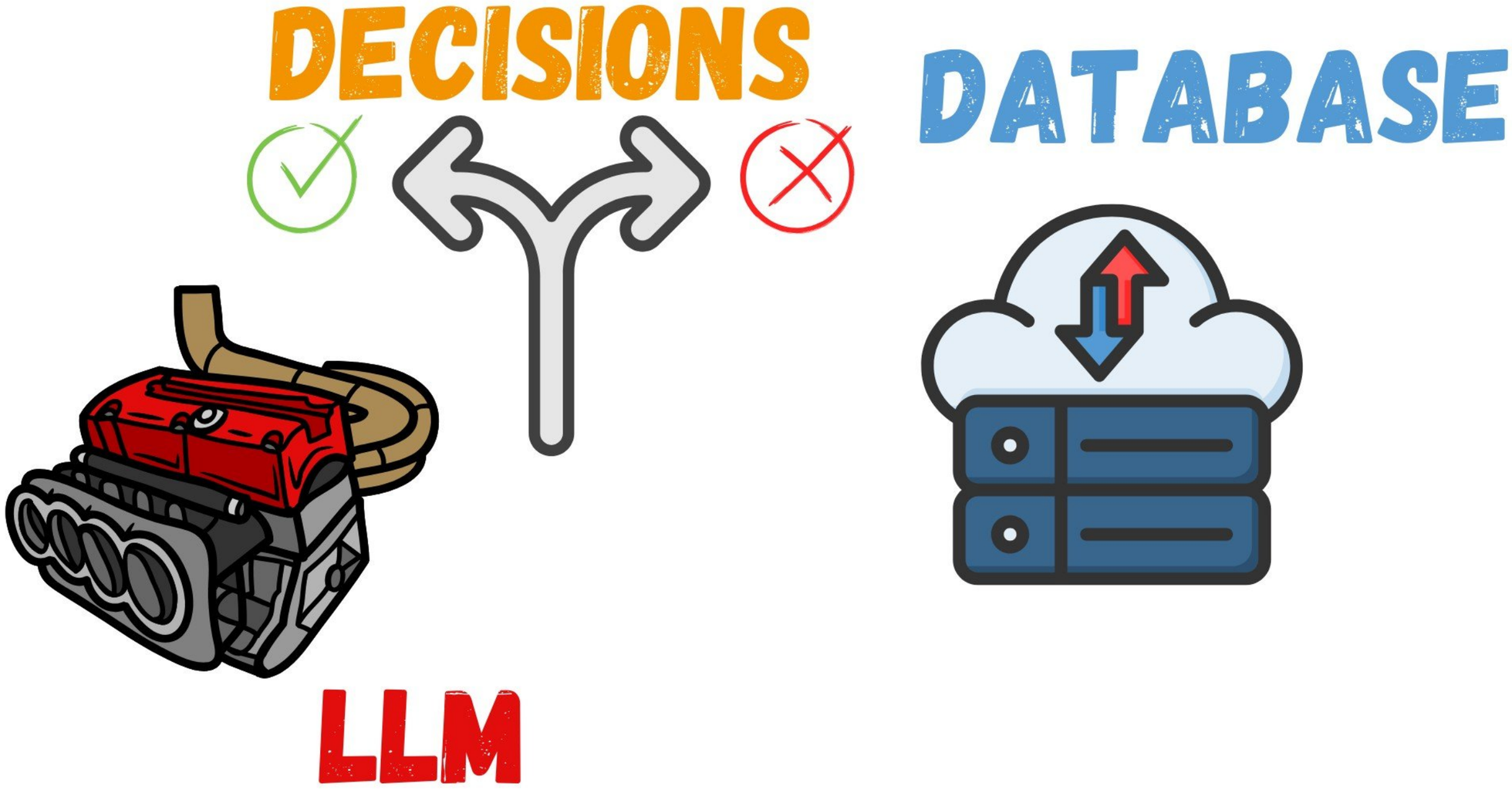
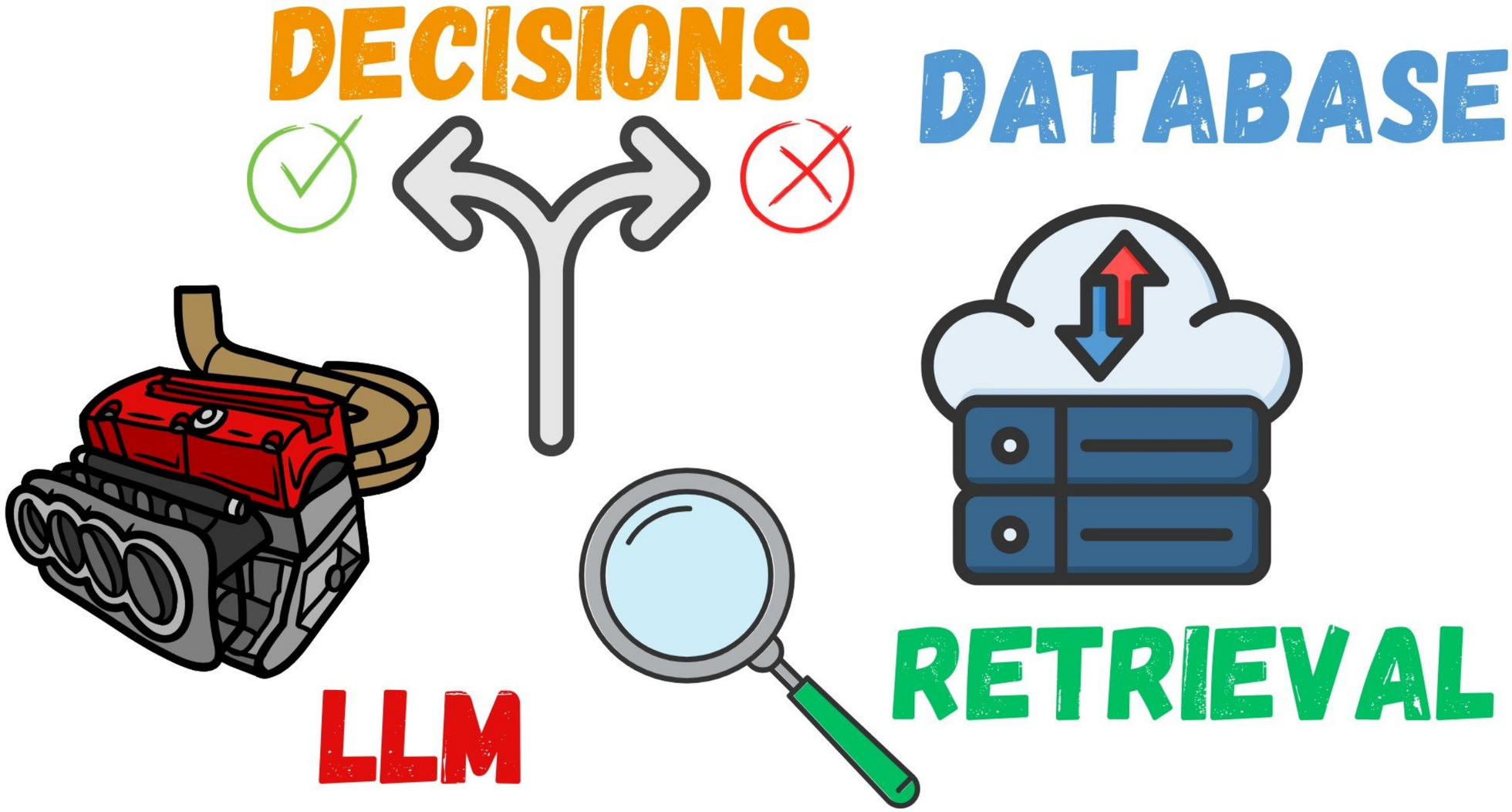


Building LLM apps the LangChain way...



Prompting OpenAI models

```python
from langchain_openai import ChatOpenAI

llm = ChatOpenAI(
    model="gpt-4o-mini",
    api_key='...'
)

llm.invoke("What is LangChain?")
```

```
LangChain is a framework designed for developing applications...
```

- Additional parameters: `max_completion_tokens` , `temperature` , etc.

[1] https://platform.openai.com/docs/quickstart

🤗 Prompting Hugging Face models

```
from langchain_huggingface import HuggingFacePipeline

llm = HuggingFacePipeline.from_model_id(
    model_id="meta-llama/Llama-3.2-3B-Instruct",
    task="text-generation",
    pipeline_kwargs={"max_new_tokens": 100}
)

llm.invoke("What is Hugging Face?")
```

```
Hugging Face is a popular open-source artificial intelligence (AI) library...
```

Let's practice!

DEVELOPING LLM APPLICATIONS WITH LANGCHAIN

Prompt templates

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Prompt templates

- **Recipes** for defining prompts for LLMs
- Can contain: instructions, examples, and additional context

Prompt templates

```
from langchain_core.prompts import PromptTemplate

template = "Expain this concept simply and concisely: {concept}"
prompt_template = PromptTemplate.from_template(
    template=template
)

prompt = prompt_template.invoke({"concept": "Prompting LLMs"})
print(prompt)
```

```
text='Expain this concept simply and concisely: Prompting LLMs'
```

```
llm = HuggingFacePipeline.from_model_id(
    model_id="meta-llama/Llama-3.3-70B-Instruct",
    task="text-generation"
)
llm_chain = prompt_template | llm

concept = "Prompting LLMs"
print(llm_chain.invoke({"concept": concept}))
```

```
Prompting LLMs (Large Language Models) refers to the process of giving a model a specific input or question to generate a response.
```

- LangChain Expression Language (**LCEL**): `|` (pipe) operator
- **Chain**: connect calls to different components

Chat models

- **Chat roles:** `system` , `human` , `ai`

```
from langchain_core.prompts import ChatPromptTemplate


template = ChatPromptTemplate.from_messages(
    [
        ("system", "You are a calculator that responds with math."),
        ("human", "Answer this math question: What is two plus two?"),
        ("ai", "2+2=4"),
        ("human", "Answer this math question: {math}")
    ]
)
```

Integrating ChatPromptTemplate

```
llm = ChatOpenAI(model="gpt-4o-mini", api_key='<OPENAI_API_TOKEN>')

llm_chain = template | llm
math='What is five times five?'

response = llm_chain.invoke({"math": math})
print(response.content)
```

```
5x5=25
```

Let's practice!

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Few-shot prompting

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Limitations of standard prompt templates

- `PromptTemplate` + `ChatPromptTemplate`
- Handling small numbers of examples
- Don't scale for many examples
- `FewShotPromptTemplate`

```
examples = [
    {
        "question": "..."
        "answer": "..."
    },
    ...
]
```

Building an example set

```
examples = [
    {
        "question": "Does Henry Campbell have any pets?",
        "answer": "Henry Campbell has a dog called Pluto."
    },
    ...
]
```

```
# Convert pandas DataFrame to list of dicts
examples = df.to_dict(orient="records")
```

Formatting the examples

```
from langchain_core.prompts import FewShotPromptTemplate, PromptTemplate


example_prompt = PromptTemplate.from_template("Question: {question}\n{answer}")
```

```
prompt = example_prompt.invoke({"question": "What is the capital of Italy?"
                                "answer": "Rome"})
print(prompt.text)
```

```
Question: What is the capital of Italy?
Rome
```

FewShotPromptTemplate

```
prompt_template = FewShotPromptTemplate(
    examples=examples,
    example_prompt=example_prompt,
    suffix="Question: {input}",
    input_variables=["input"]
)
```

- `examples` : the list of dicts
- `example_prompt` : formatted template
- `suffix` : suffix to add to the input
- `input_variables`

Invoking the few-shot prompt template

```
prompt = prompt_template.invoke({"input": "What is the name of Henry Campbell's dog?"})
print(prompt.text)
```

```
Question: Does Henry Campbell have any pets?
Henry Campbell has a dog called Pluto.
...

Question: What is the name of Henry Campbell's dog?
```

Integration with a chain

```
llm = ChatOpenAI(model="gpt-4o-mini", api_key="...")


llm_chain = prompt_template | llm
response = llm_chain.invoke({"input": "What is the name of Henry Campbell's dog?"})
print(response.content)
```

```
The name of Henry Campbell's dog is Pluto.
```

Let's practice!

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