Live Guided Project

Automated Insights Generation

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- 8 years in Data & AI
- CS Tutor

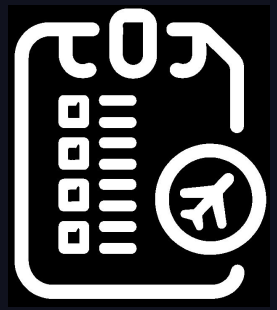
Objectives

- Build **natural language to insights** system without writing SQL
- Build **csv to SQL data pipeline** and uses **LangChain Toolkit** to connect to DB
- Develop chat based app that can converse with user and generate insights using frameworks like **Streamlit** and **LangChain**

What are AI Agents?

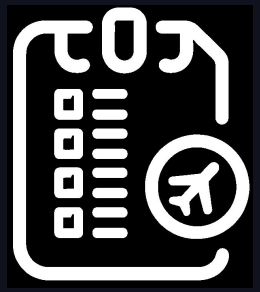
Prompt: Plan my next vacation

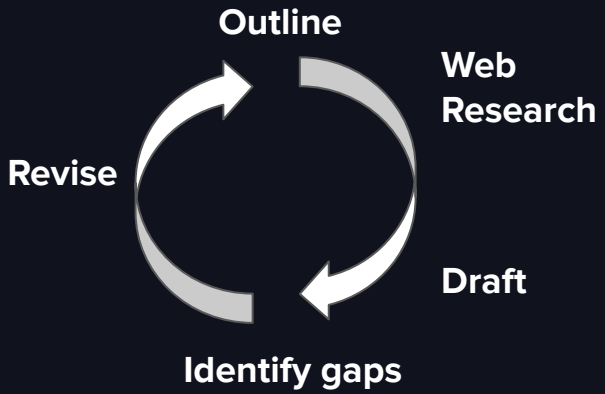
Non-Agentic



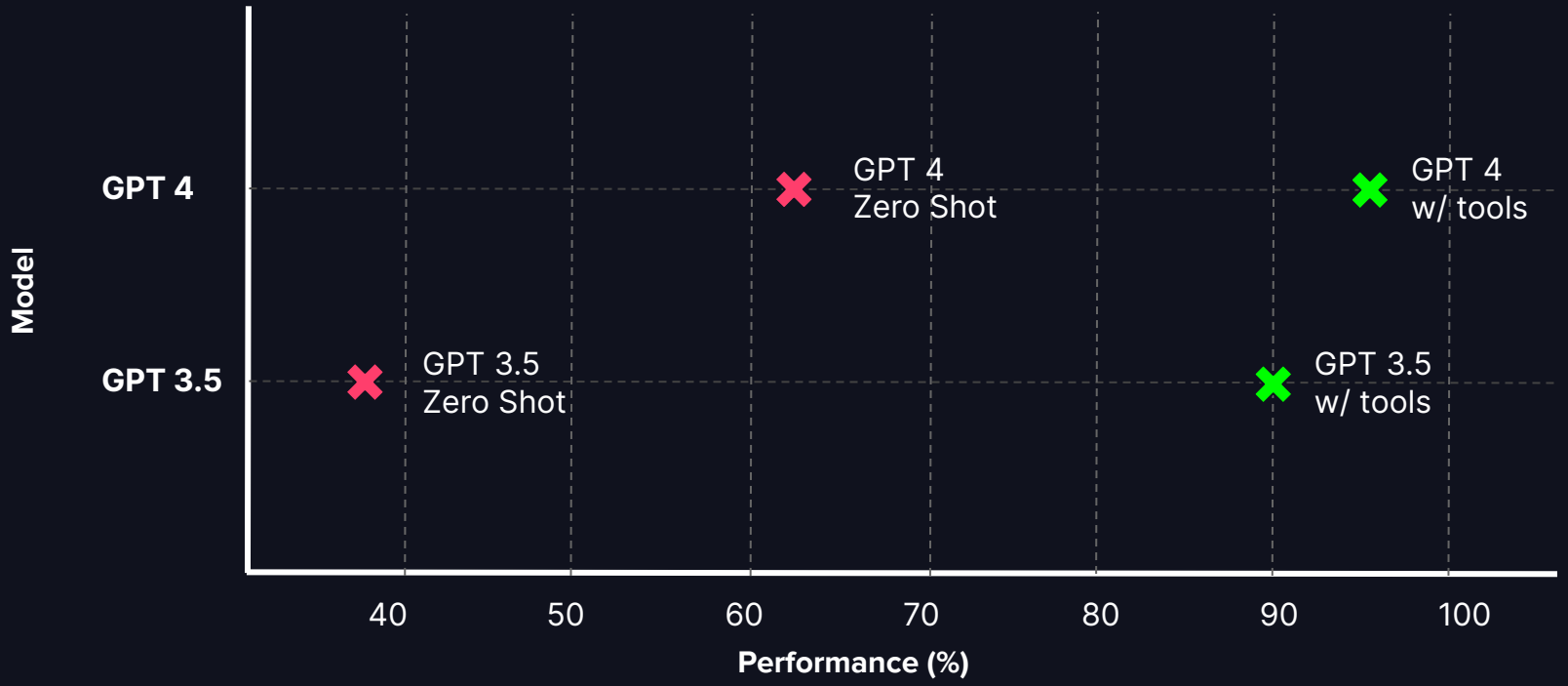
Writes the itinerary in one go

Agentic





Agents Significantly Improve Quality



Source: Coding benchmark by Andrew Ng, Joaquin Dominguez and John Santerre

Agents Simplify Access to Enterprise Data

- Easily Access Company Data Sources and Systems

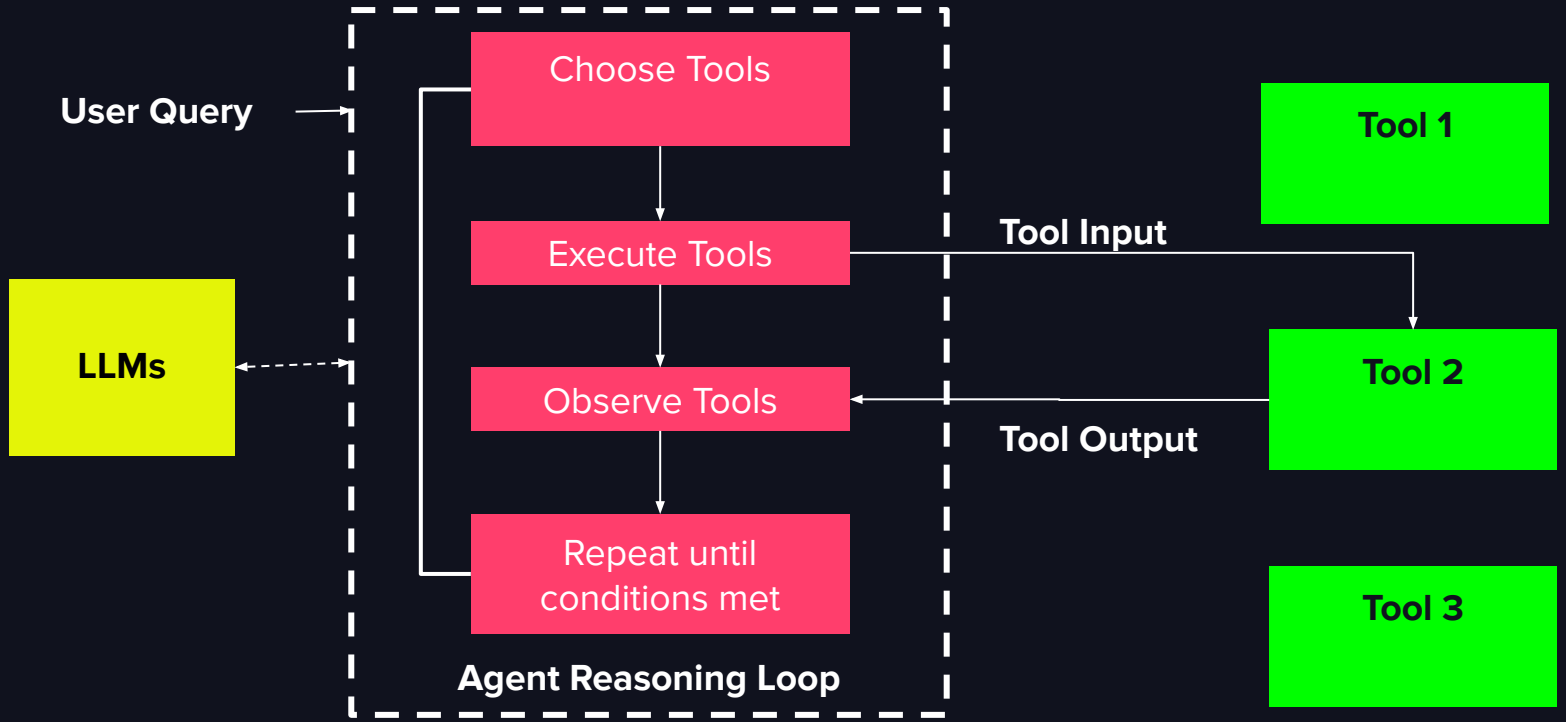
- Compared to Chains, Agents can
  - Automatically Recover from Errors
  - Execute Multi-Hop Prompts

Data Stores: Vector Search, SQL Warehouse

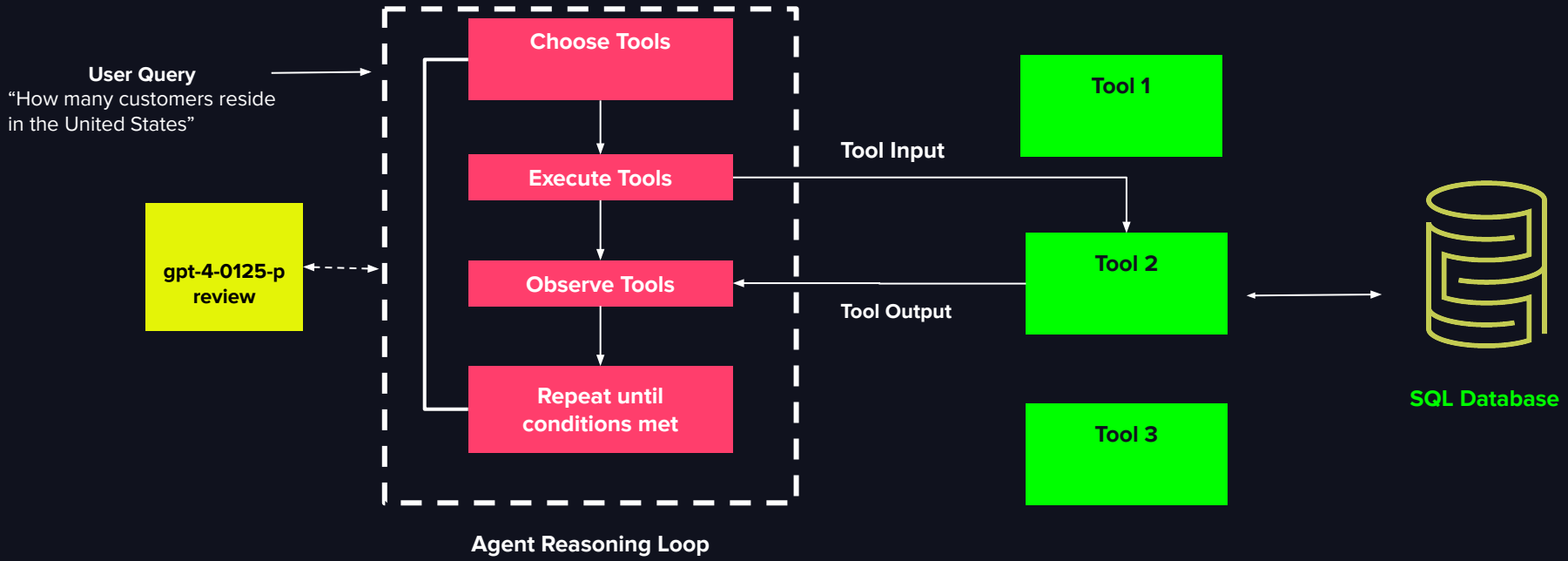
Company Systems: Search, Internal or External API services

Computations: Calculators, Code

Components of AI Agents



Project Overview: SQL Agent



What we'll use

- **Langchain** – To chain together the different components of our agent
- **Streamlit** – Chat Interface and dashboard visualization
- **SQL** – To store dataset and connect with LLM
- **Python** – Programming Language
- **LLM** – Our Large Language Model (GPT - 4 - 0125 - preview)

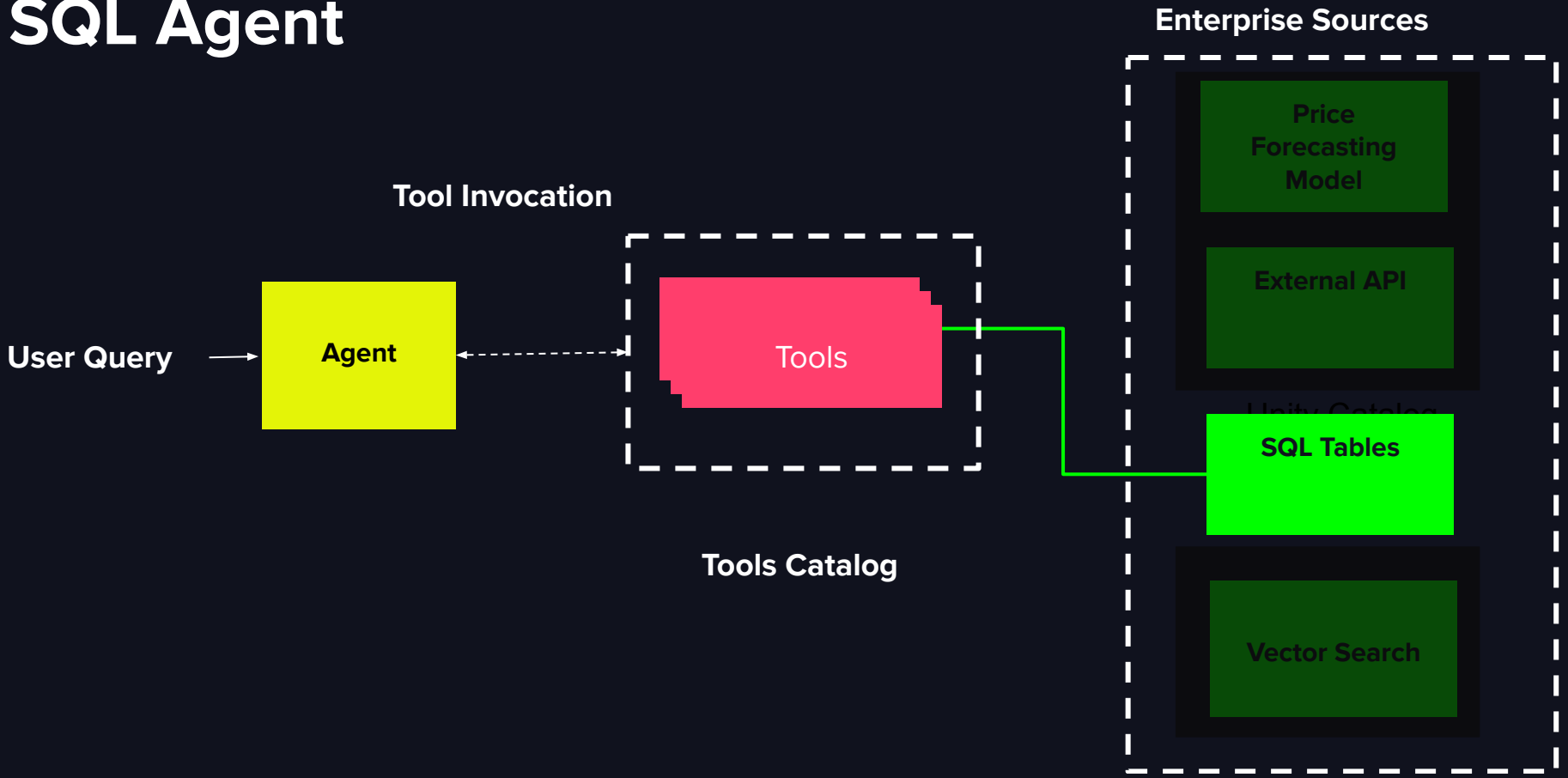
Requirements

- **Set up SQL Database –**

- **Install MySQL Workbench**

LET’S START BUILDING!

SQL Agent


Enterprise Sources
Price Forecasting Model
External API
SQL Tables
Vector Search
Tool Invocation
User Query
Agent
Tools
Tools Catalog

Best Practices

Tool Usage

- Provide clear tool prompts with descriptions,
- Return data details, arguments list, and example values.
- Make inputs optional when they can be inferred.

Error Handling

- Detect and prompt for agent errors.
- Use simple, deterministic functions for common tasks, and ensure proper error handling to keep agents on track.

Fine-Tuning

- Fine-tune models to improve tool usage quality and use return values to guide the agent’s subsequent actions.

Objectives

- How to install **MySQL Server (RDBMS)**
  - **Source:**
    - **MaCOS** https://flaviocopes.com/mysql-how-to-install/
    - **WINDOWS:** https://www.w3schools.com/mysql/mysql_install_windows.asp

- How to install **MySQL Workbench (GUI for MySQL Server)**
  - **Source:** https://dev.mysql.com/downloads/workbench/

Install Python in Windows (3.12.4 recommended)

1. Check if you already have Python Installed `python --version`

2. Download the Python Installer `curl -o python-3.12.4-amd64.exe https://www.python.org/ftp/python/3.12.4/python-3.12.4-amd64.exe`

3. Run the Installer `.\python-3.12.4-amd64.exe /quiet InstallAllUsers=1 PrependPath=1`

4. Verify Installation `python --version`