



# Incorporating AI into Teaching

Kerry Back, Rice University, FMA 2025



# JPMorgan: Chatbots to Agents

**CNBC, September 30, 2025:** "In 2023, JPMorgan gave employees access to OpenAI's models through LLM Suite; it was essentially a corporate ChatGPT tool used to draft emails and summarize documents.

About 250,000 JPMorgan employees have access to the platform today ... Half of them use it roughly every day.

JPMorgan is now early in the next phase of its AI blueprint: It has begun deploying agentic AI to handle complex multistep tasks for employees, according to an internal road map provided by the bank."

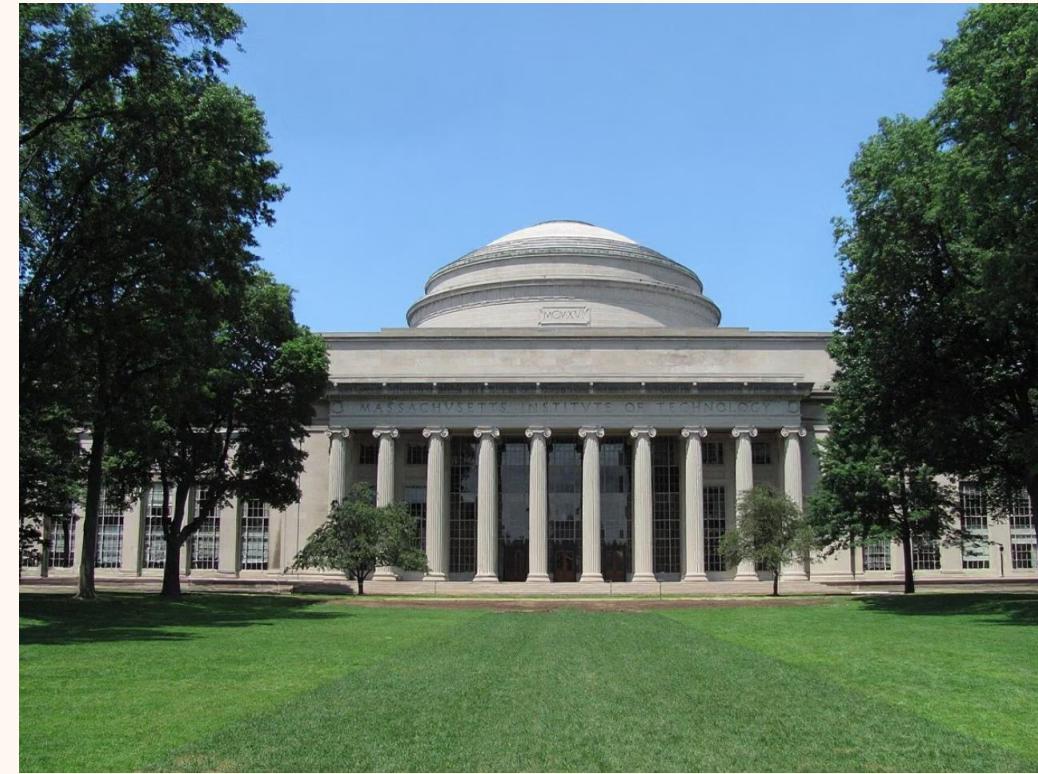
# FromMakers to Checkers

**Derek Waldron, JP Morgan Chief Analytics Officer:**

"What we're working towards is that every employee will have their own personalized AI assistant; every process is powered by AI agents, and every client experience has an AI concierge.

You'll still have people at the top who are managing and have relationships with clients, but many, many of the processes underneath are now being done by AI systems.

Workers would shift from being creators of reports or software updates, or 'makers' ... to 'checkers' or managers of AI agents doing that work."



# MIT/Media Labs Report

## Pilots to Production

**Only 5%** of AI pilots reach production according to MIT/Media Labs State of AI in Business 2025

## Used by Everyone

Workers from **over 90%** of companies surveyed reported regular use of personal AI tools for work tasks.

**Almost every single person** used an LLM in some form for their work

# Change was only at the margins for the past 40 years

C11 (L) TOTAL 25

	A	B	C	D
1	ITEM	NO.	UNIT	COST
2	SMUCK RAKE	43	12.95	556.85
3	BUZZ CUT	15	6.75	101.25
4	TOE TONER	250	49.95	12487.50
5	EYE SNUFF	2	4.95	9.90
6				
7	SUBTOTAL		13155.50	
8	9.75% TAX		1282.60	
9				
10	TOTAL		14438.16	

VisiCalc for Apple II (1979)

A:A1: 'EMP

	A	B	C	D	E	F	G
1	EMP	EMP NAME	DEPTNO	JOB	YEARS	SALARY	BONUS
2	1777	Azibad	4000	Sales	2	40000	10000
3	81964	Brown	6000	Sales	3	45000	10000
4	40370	Burns	6000	Mgr	4	75000	25000
5	50706	Caeser	7000	Mgr	3	65000	25000
6	49692	Curly	3000	Mgr	5	65000	20000
7	34791	Dabarratt	7000	Sales	2	45000	10000
8	84984	Daniels	1000	President	8	150000	100000
9	59937	Dempsey	3000	Sales	3	40000	10000
10	51515	Donovan	3000	Sales	2	30000	5000
11	48338	Fields	4000	Mgr	5	70000	25000
12	91574	Fiklore	1000	Admin	8	35000	---
13	64596	Fine	5000	Mgr	3	75000	25000
14	13729	Green	1000	Mgr	5	90000	25000
15	55957	Hermann	4000	Sales	4	50000	10000
16	31619	Hodgedon	5000	Sales	2	40000	10000
17	1773	Howard	2000	Mgr	3	80000	25000
18	2165	Hugh	1000	Admin	5	30000	---
19	23987	Johnson	1000	VP	1	100000	50000
20	7166	Laflare	2000	Sales	2	35000	5000

DATA.WK3

Lotus 1-2-3 for IBM PC (1983)

Microsoft Excel

	A	B	C	D
38	Telephone & Telex	\$3,372		
39	Office Supplies	\$900		
40	Office Postage	\$864		
41	Equipment	\$2,000		
42	Shipping	\$46,875		
43	Samples	\$480		
44	Legal & Accounting	\$2,700		
45	Travel & Entertainment	\$1,350		
46	Training	\$500		
47	Bank Charges	\$7,760		
48	Credit Card Fees	\$46,875		
49	Other	\$5,791		
50	Taxes & Licenses	\$229		
51	Interest	\$10,009		
52	Miscellaneous	\$1,323		
53	Total	\$143,623		
54				

CASHBUDG.XLS

BREAKEUN.XLS

Ready

Excel for Windows (1987)

For 40 years, the fundamental tool of business analysis remained essentially the same.



# Now We're All Learning Together

AI has created an unprecedented situation: faculty, students, and industry professionals are all navigating the technological shift simultaneously.

# Roadmap for Today's Discussion

01

## A Course on AI for Finance

Dedicated curriculum focused on AI applications in financial analysis

03

## Updating Existing Courses

Integrating AI tools and concepts into traditional finance curriculum

02

## Previous Disruptive Technologies

How education adapted to calculators and spreadsheets

04

## Deep Dive into Claude Code

Exploration of advanced AI coding agent for financial analysis

A stylized illustration of four business professionals—three men and one woman—working on laptops at a long desk. They are dressed in professional attire, including suits and ties. The office has large windows in the background and some green plants. The overall aesthetic is clean and modern.

# Course on AI for Finance

# Core Themes

## **Chatting:**

- Treat AI as a colleague: collaborate, evaluate, iterate
- Coding: LLMs are unreliable for arithmetic; coding is essential

## **Building:**

- Apps: to reuse tested code
- Custom chatbots: system prompts, RAG, or fine tuning
- Agents: chatbots with tools

# Teaching Methods



## Case Study

"Blazing New Trails: Responsible Generative AI and the Creative Adoption of a Large Language Model at Deloitte Canada" (HBS, 2024)



## Collaborating with AI

Vibe coding financial analysis and reports



## Interactive Learning

In-class demonstrations and group projects



## Hands-on Building

Create apps, custom chatbots, and agents through guided projects



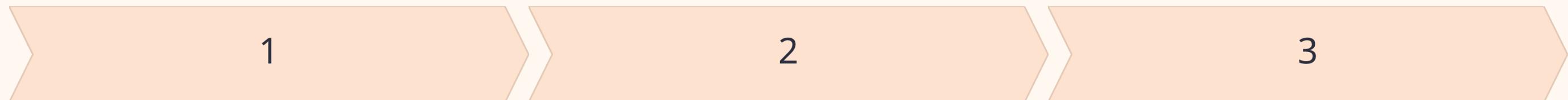
# Prompt Engineering

**Ethan Mollick, Wharton - "Good Enough Prompting":**

"Treat AI like an infinitely patient new coworker ... As it is a coworker, you want to work with it, not just give it orders, and you also want to learn what it is good or bad at ... Working with AI is a dialogue, not an order."

Students ask how to prompt, but **consistent practice and collaborative interaction** are what matter.

# Building Reusable Prompts



## Learn Capabilities

Discover what AI does well and where it struggles through hands-on experimentation

## Craft Precision

Develop more precise prompts based on understanding of AI strengths and limitations

## Save & Reuse

Build a library of effective prompts for common financial analysis tasks

- ❑ **Class Exercise:** Chat with a chatbot about financial analysis, evaluate the output, then develop a reusable prompt that achieves better results faster for similar future analyses.

# Using AI to Write Code

Y Combinator CEO Garry Tan and Managing Partner Jared Friedman, March 2025:

"For roughly a quarter of the startups in our Winter 2025 cohort, **95% of the codebase was written by AI.**"





**BRIDGEWATER**

# Claude + Python at Bridgewater

## **Aaron Linsky, CTO, AIA Labs at Bridgewater:**

"We've been developing capabilities powered by Claude since 2023 within AIA Labs."

**Claude** powered the first versions of our Investment Analyst Assistant, which streamlined our analysts' workflow by generating **Python code**, creating **data visualizations**, and iterating through **complex financial analysis tasks** with the precision of a junior analyst."

# Coding Tools

## Chatbots with Code Execution

ChatGPT, Gemini, Claude, **Julius.ai** - integrated environments for coding and testing

## Python Environments with AI

**Google Colab**, VS Code, Cursor, Windsurf - traditional development enhanced by AI assistance

## All-in-One Solutions

**Replit** - complete development and hosting platform with AI integration

## My Current Preference

Claude Desktop (cloud Python) and **Claude Code** (local Python)

# Claude Can Create Excel

**Simple Claude prompt:** "Create an Excel file illustrating two-stage DCF valuation."

Claude became able to generate fully functioning, nicely formatted Excel workbooks in September, 2025. Microsoft has introduced the same Anthropic technology into Excel itself.

[Claude Excel File Example](#)



# Solving a Case with Claude

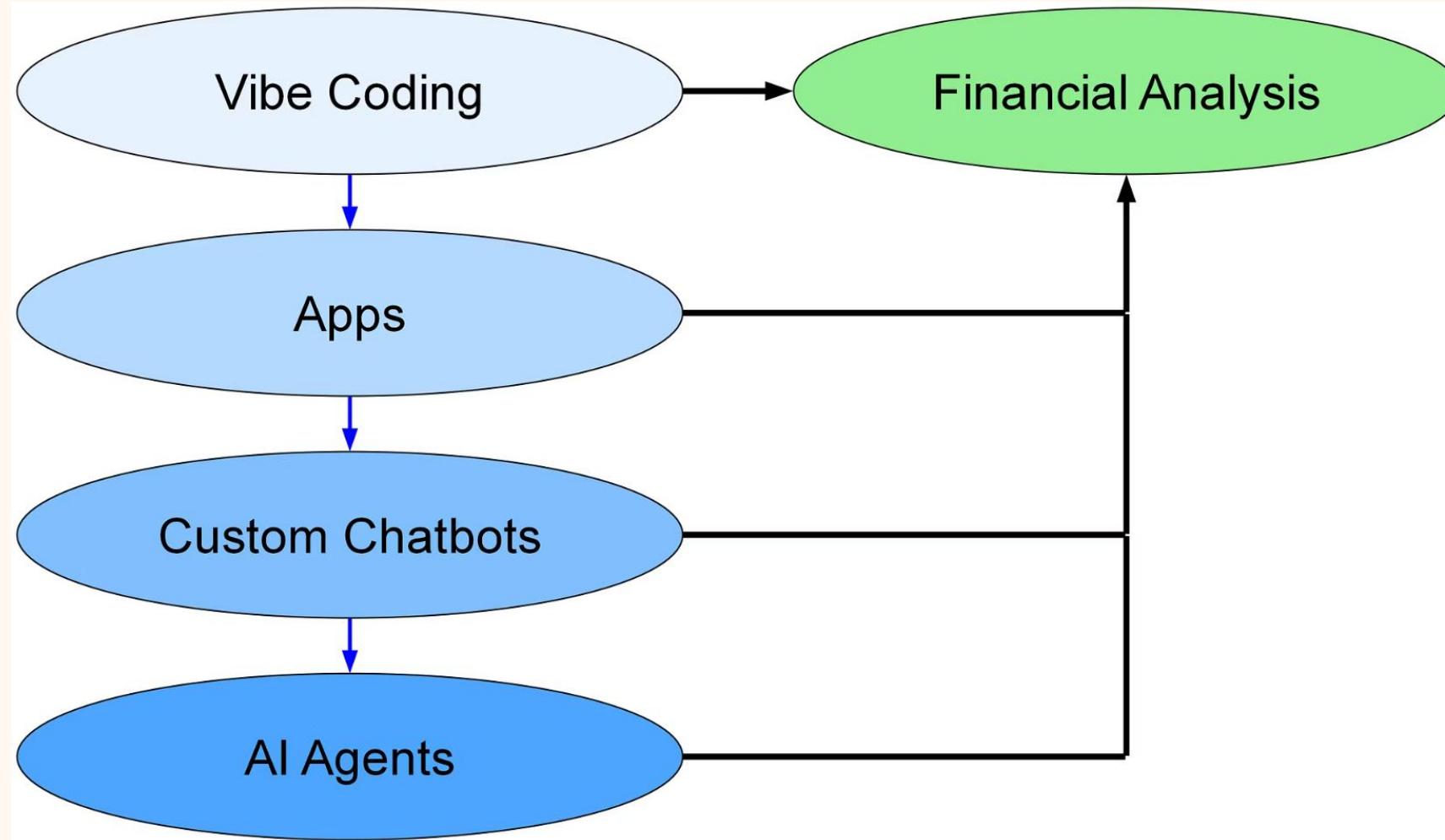
- ❑ **Valuing Wal-Mart 2010:** "Read the uploaded case. Ignore the valuation method described in the case. Do a two-stage DCF valuation. Project Sales, Assets (based on asset turnover projection), Depreciation (based on depreciation to assets), Cap Ex (based on asset and depreciation projections), Net Working Capital (based on net working capital to sales), EBITDA (based on EBITDA margin), Taxes, NOPAT, and Free Cash Flow. Create a PowerPoint deck and fully functioning and professionally formatted Excel workbook. Document your assumptions and your reasons for them. Put years in columns and items in rows throughout the Excel workbook and PowerPoint deck."

Currently requires Claude Max subscription.

Microsoft's Vibe Working

Powered by Claude

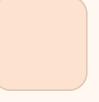
Agent Mode  
in Excel



## AI Plumbing

- Apps can use AI
- Chatbots are Apps
- Agents with apps with tools  
(tools=apps)

# Why Teach the Plumbing?

-  Students gain perspective on how things fit together in the AI space
-  Building apps/chatbots/agents to do finance can deepen understanding of finance
-  Students may end up at small or medium size firms and be the plumbers
-  May check a box for recruiters

# Chatbot Elements

1

## User Interface

The front-end interface where users interact with the system

2

## API Connection

Secure connection to Large Language Model (OpenAI, Anthropic, Google, etc.)

3

## System Prompt

Foundational instructions that define the chatbot's behavior, expertise, and response style

4

## Document Retrieval

Optional capability to access and reference specific documents or knowledge bases

5

## Tool Integration

Optional connections to external tools, databases, or APIs for enhanced functionality

# System Prompts: The Foundation

A system prompt is text sent to the LLM alongside each user prompt. It contains essential information and instructions that shape the AI's behavior and responses.

System prompts are fundamental to creating reliable, consistent AI behavior. They define the chatbot's personality, expertise level, response format, and operational constraints.

Explore [Anthropic's System Prompts](#)



# RAG: Retrieval Augmented Generation

01

## Document Storage

Store relevant documents in a searchable database or vector store

02

## Relevance Matching

Choose most relevant document chunks using vector similarity algorithms

03

## Context Integration

Send relevant chunks to LLM along with user prompt and system prompt

04

## Enhanced Response

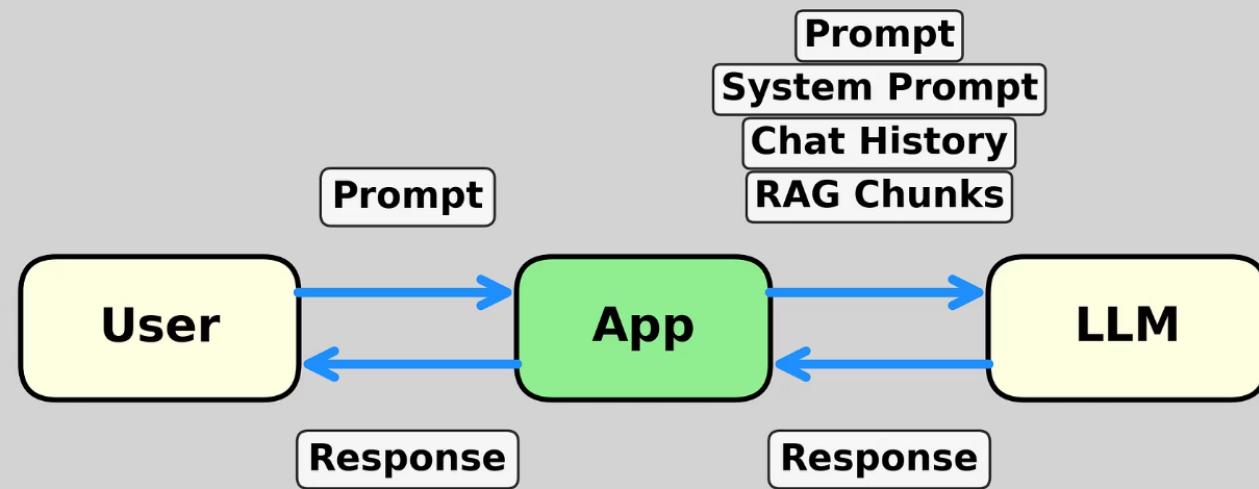
Generate responses grounded in specific, authoritative source material

RAG is a key element of many corporate AI implementations. This ensures AI responses are grounded in specific, authoritative sources rather than general training data.

# Example RAG Chatbot

Visit [chat.derivative-securities.org](https://chat.derivative-securities.org)



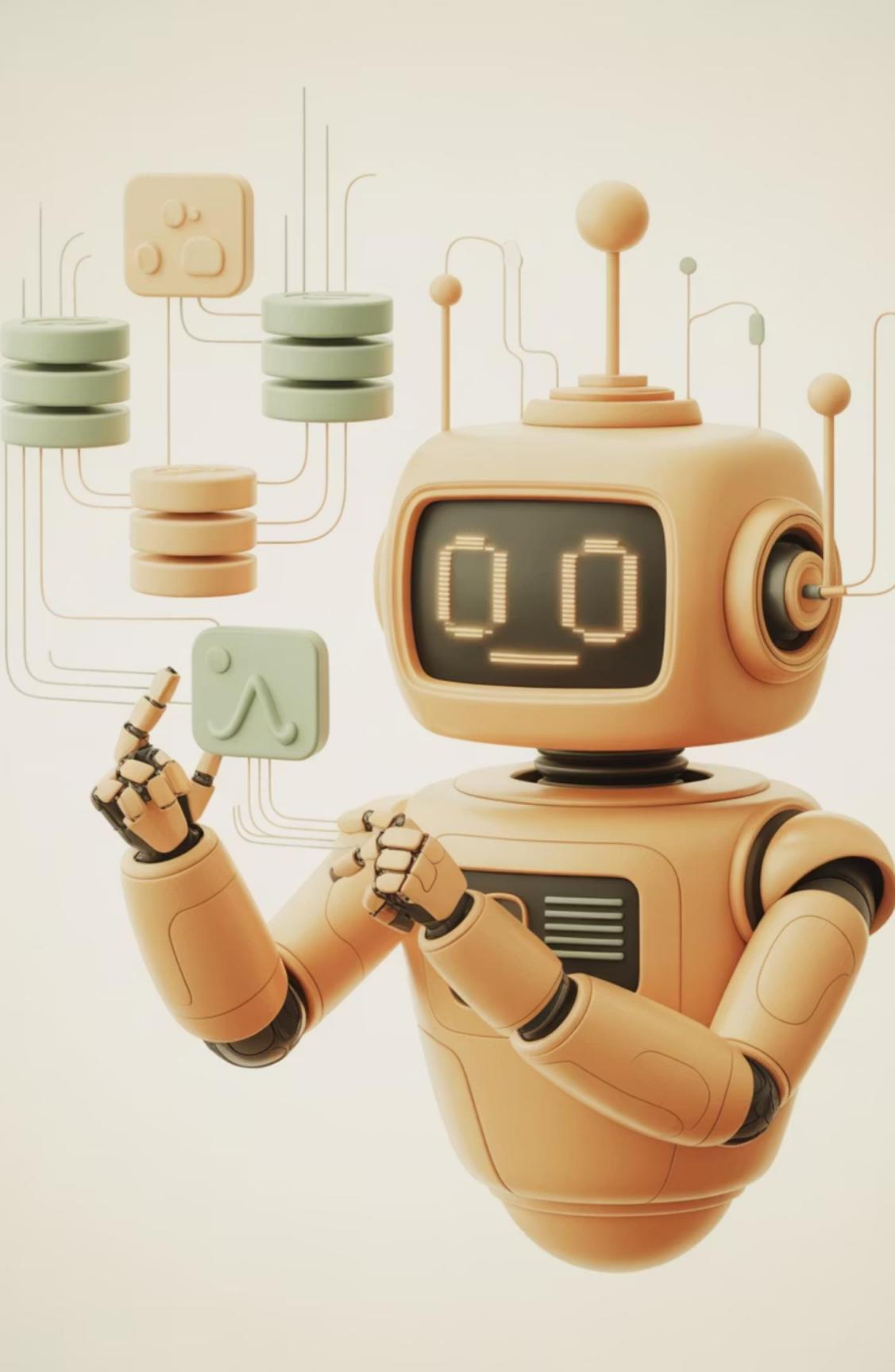


# Chatbot Architecture

# Claude Code Live Demo

Create a streamlit app that takes a user prompt and sends it to OpenAI GPT 4.1 using my OPENAI\_API\_KEY stored in C:\users\kerry\Dropbox\.ENV. In the system prompt, tell GPT to respond in Spanish. Run the app.

Use my NGROK\_TOKEN in C:\users\kerry\Dropbox\.ENV to tunnel the app.



# Agents = Enhanced Chatbots

## Definition

An AI agent is a chatbot equipped with tools to perform actions beyond conversation

## Current Examples

Claude and ChatGPT function as agents - they can execute code in Python environments

## Database Integration

Database tools are particularly valuable for chatbots in financial applications

# Claude for Financial Services:

"Through data providers, Claude has real-time access to comprehensive financial information:"



## Data Platforms

Box, Daloopa, Databricks



## Financial Data

FactSet, Morningstar, Palantir



## Market Intelligence

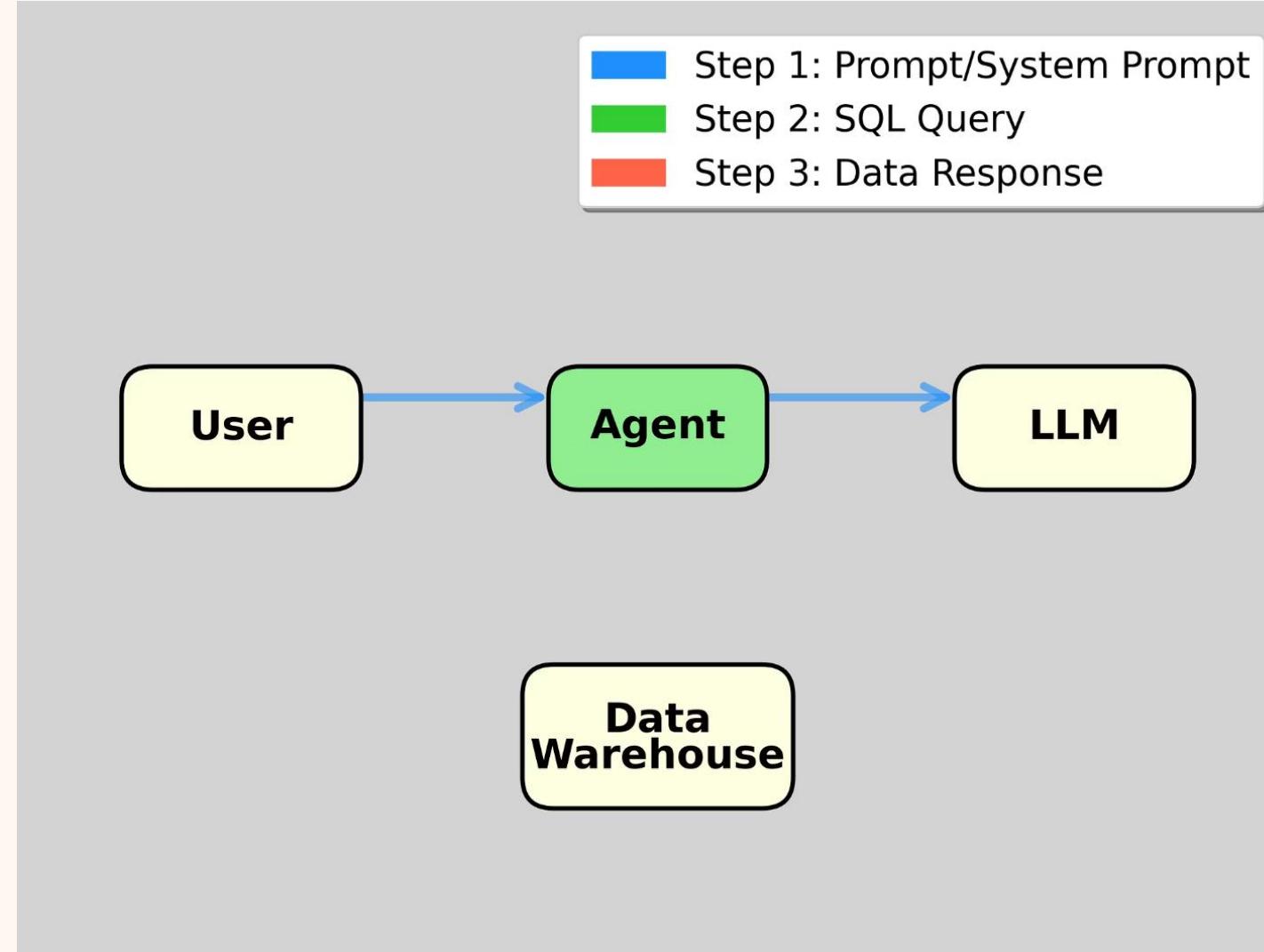
PitchBook, S&P Global,  
Snowflake

# Why MBAs Should Learn about Agents

**Fortune, September 14, 2025:**

"PromptQL, an enterprise AI platform created by San Francisco-based developer tooling company Hasura, is doling out **\$900-per-hour** wages to its engineers tasked with building and deploying AI agents to analyze internal company data using large language models (LLMs).

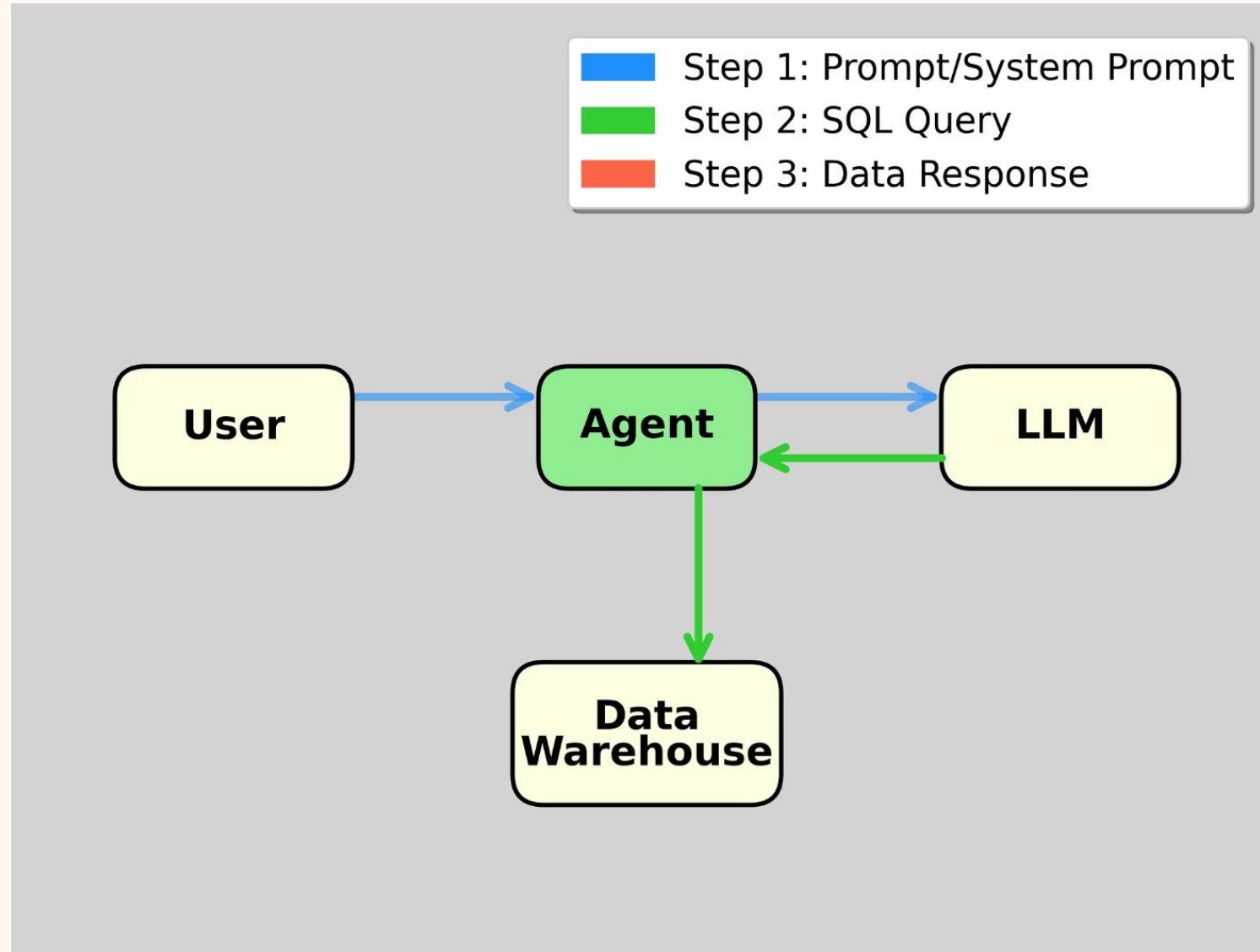
Tanmai Gopal, PromptQL's cofounder and CEO, said '**MBA types** ... are very strategic thinkers, and they're smart people, but they **don't have an intuition for what AI can do.**"



# Database Agent

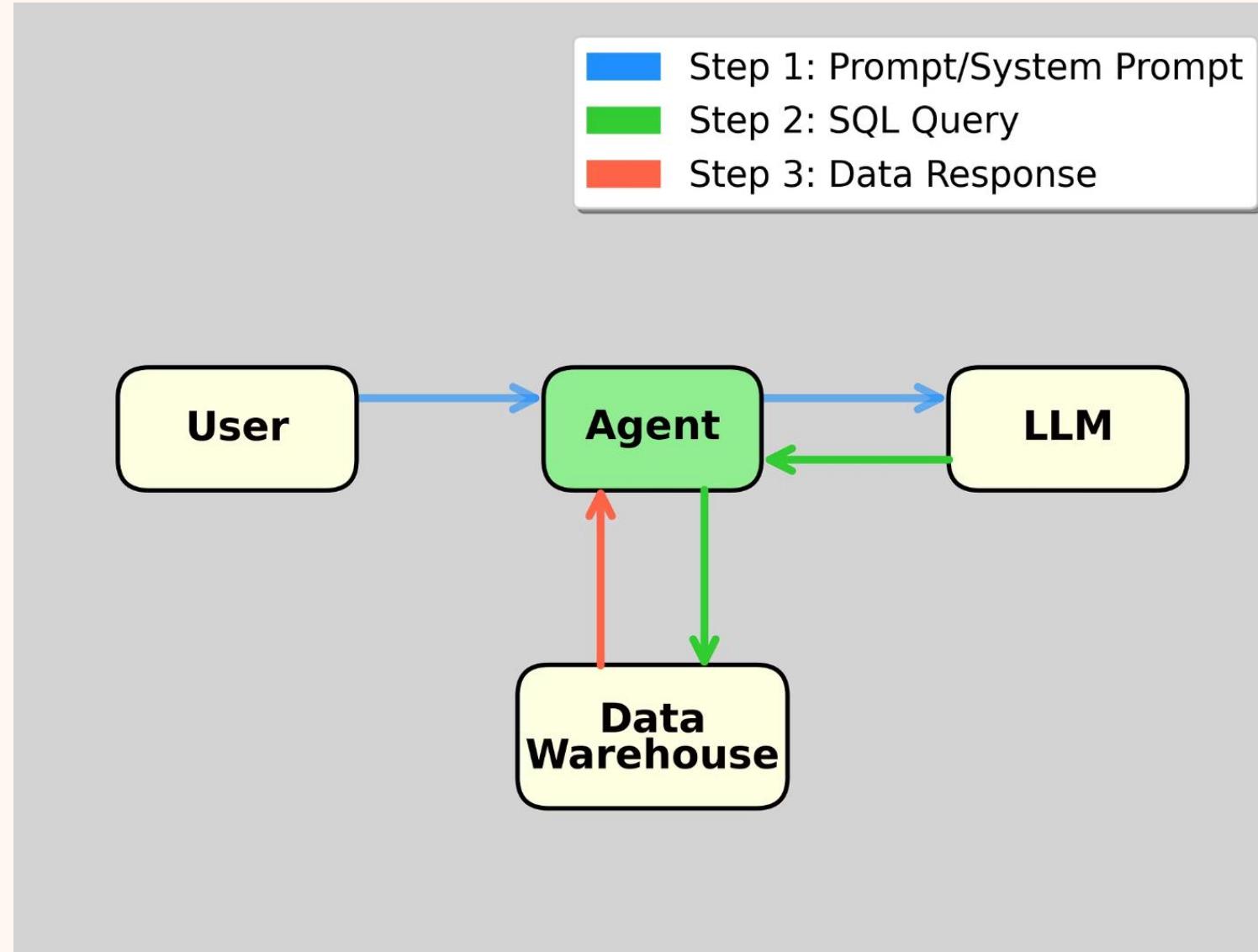
Agent: User prompt → LLM

May be multiple rounds to clarify prompt



# Database Agent

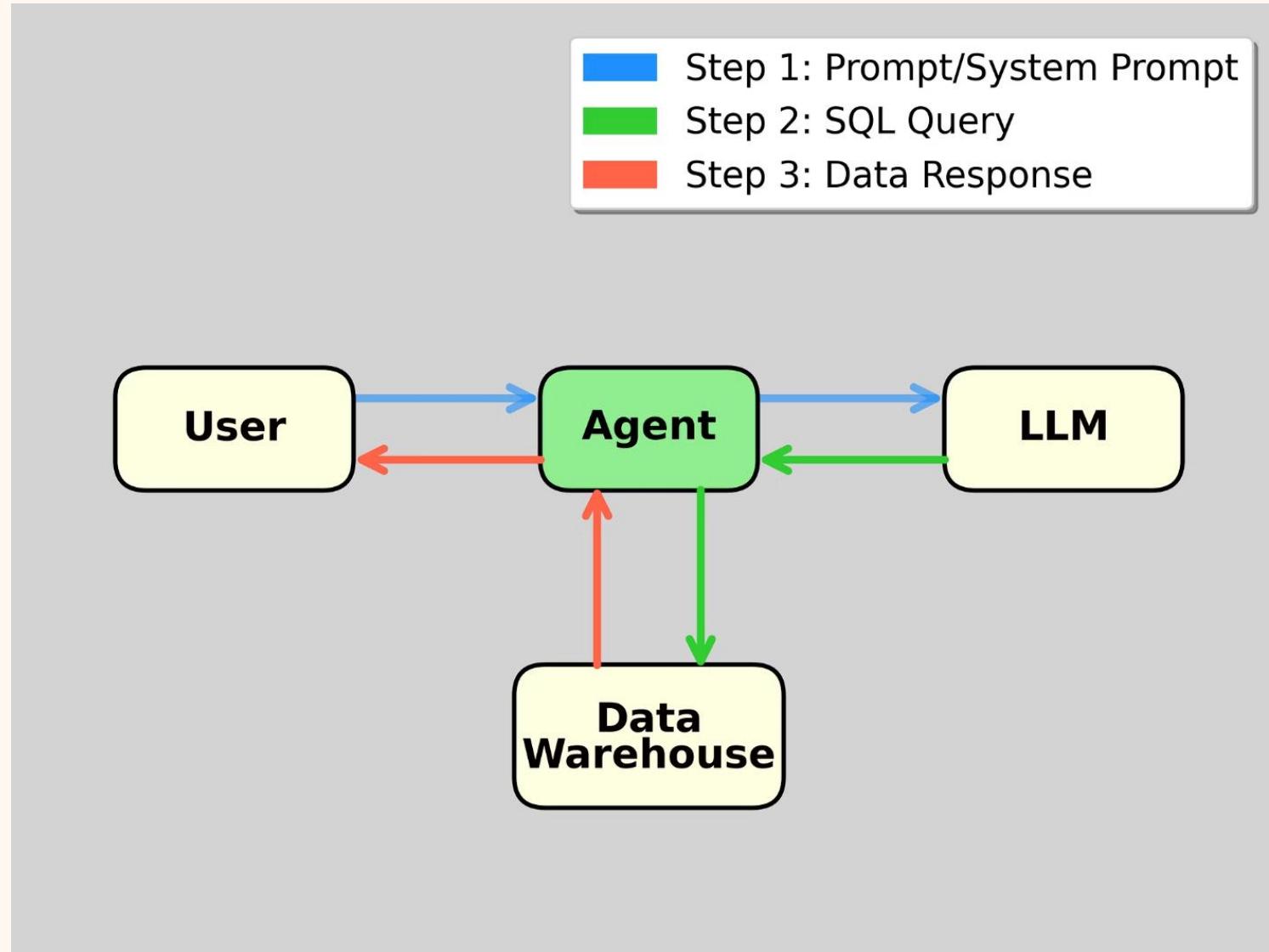
LLM: SQL → Agent → Data Warehouse



# Database Agent

Data Warehouse: Data or Error Message → Agent

Error message will be sent to LLM for new SQL



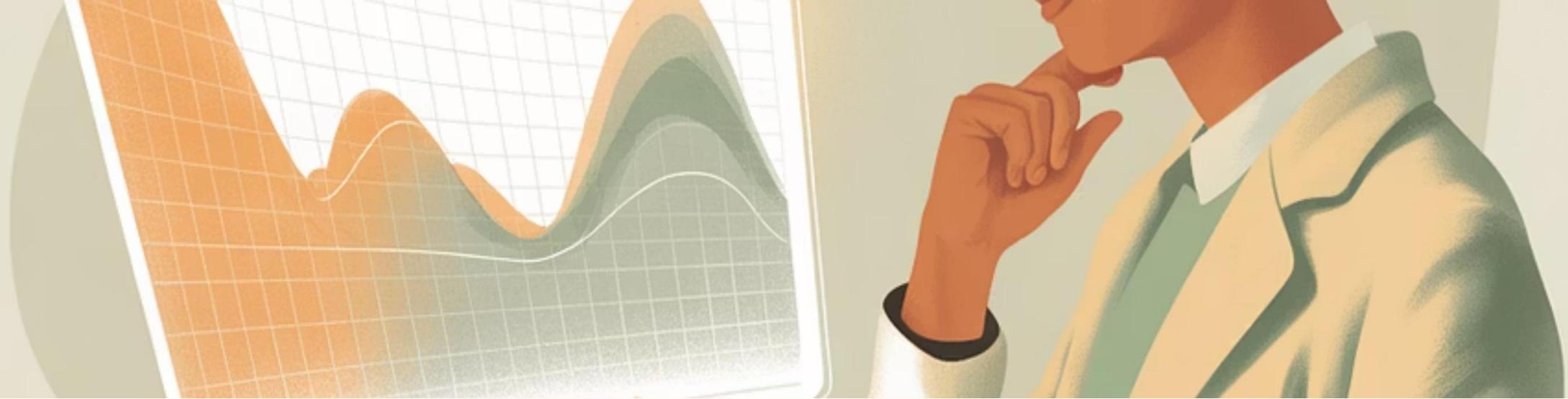
# Database Agent

Agent: Data → User

Could attach more tools.

For example, Python to analyze data.

Then Python output → User



## Example: Rice Business Data Portal

[Visit data-portal.rice-business.org](http://data-portal.rice-business.org)

This example demonstrates how students (and employees) can interact with complex databases using natural language.

# No-Code Solution: OpenAI Custom GPT

01

## Configure

Set name, description, and system prompt for specialized behavior

02

## Add Capabilities

Enable web browsing, DALL-E image generation, and Code Interpreter

03

## Upload Knowledge

Add documents for RAG functionality (PDFs, text files, etc.)

04

## Add Actions

Connect to external APIs for enhanced functionality (optional)

05

## Test & Publish

Deploy as private, link-only, or public to GPT Store

Requires ChatGPT Plus subscription



# Previous Disruptive Technologies

# Handheld Calculators

## The Concerns

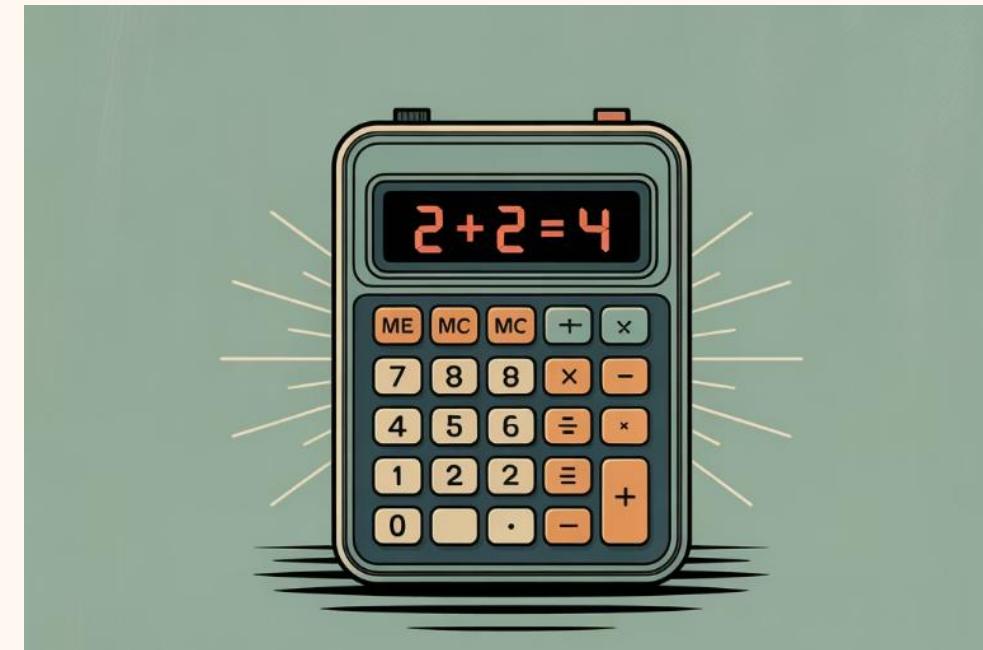
Educators worried students wouldn't learn fundamental arithmetic operations

## The Reality

Studies haven't found significant negative effects on basic math skills. However, primary schools still provide practice and assessments without calculators.

## The Hope

Some hoped schools could move beyond calculation to teach deeper mathematical concepts. That didn't happen either.





# Personal Computers & Spreadsheets

1

We added courses on how to use spreadsheets

2

We updated existing courses to use spreadsheets

3

We assess how well students can use spreadsheets (no pencil and paper valuation analyses)

Teaching how to do finance in spreadsheets is a main educational goal.

# Why Spreadsheets Succeeded



## Business Relevance

Spreadsheets are extensively used in real business environments



## Educational Value

Ideal for teaching the logic of valuation and capital budgeting concepts



## Tool Evolution

Spreadsheets didn't automatically replace what we taught before - they enhanced it

# AI: A Different Challenge

## ✓ Business Usage

AI is increasingly used across business functions

## ✓ Educational Tool

AI provides excellent tutoring and learning support

## X Automation Risk

AI can automatically perform many tasks we previously taught manually

AI is more like calculators than spreadsheets. We face similar concerns about skill atrophy. Like primary schools with arithmetic, we'll need practice and assessments without AI to ensure fundamental competencies.

# Updating Existing Courses



# The New Teaching Sequence



## Concepts First

Begin with fundamental concepts using slides or board presentations as usual

## Tool Implementation

Demonstrate implementation in traditional tools (usually Excel) as usual

## AI Enhancement

New step: Apply concepts using chatbots and AI agents

## Traditional Approach

Teach Excel implementation → students build Excel models

## Additional Piece

Teach AI implementation → students conduct AI chats or build AI apps



# The New Skills Landscape

## Brookings Institute, 2025:

"As AI models begin to handle underwriting, compliance, and asset allocation, the traditional architecture of financial work is undergoing a fundamental shift.

As job descriptions evolve, so does the definition of financial talent. **Excel is no longer a differentiator. Python is fast becoming the new Excel.**

But technical skills alone will not cut it. The **most in demand profiles today are those that speak both AI and finance."**

# Three Legs of Assessment

## Out-of-Class Assignments

"Turn in your chat, its output, and your evaluation of the output"

## Exams Without AI

In-class assessments ensuring students understand fundamental concepts independently

## Exams With AI

More ambitious assessments leveraging AI assistance - complex cases can become exams with AI support

# AI as Educational Partner

AI can be a highly effective tutor, and we should leverage this capability in our teaching.

## Replace Reading Assignments

Ask students to chat with chatbots instead of traditional reading assignments

## Pre-Class or In-Class

Assign pre-class or in class before slides and class discussion.

- ❑ **Assignment:** "Ask your chatbot to teach you about [topic]. Tell it to ask you questions to ensure you are understanding."

# If Chatbot Reliability is a Concern

01

## Use RAG

Build custom systems (could use Google's Notebook LM or Custom GPT) for specific source control

02

## Build with AI Reports

Can have AI create a comprehensive report, then edit if needed and use

03

## Reliability Reality

LLMs today are significantly more reliable than earlier versions - hallucinations have diminished



# Deep Dive into Claude Code

# Claude Code: Terminal-Based AI Agent

Claude Code is part of a new generation of terminal-based coding agents, along with OpenAI Codex and Gemini CLI. It integrates well with popular development environments like VS Code.

Built on standard Anthropic models, Claude Code appears to leverage exceptionally well-designed system prompts that optimize it for development tasks.



*Requires Claude Pro subscription*

# Claude Code's Capabilities



## File Operations

Create, edit, copy, move, and delete files



## Python Development

Write, edit, and execute **Python scripts** and **Jupyter notebooks**



## Document Creation

Generate and edit **LaTeX** documents. Generate **Word** docs and **PowerPoint** presentations



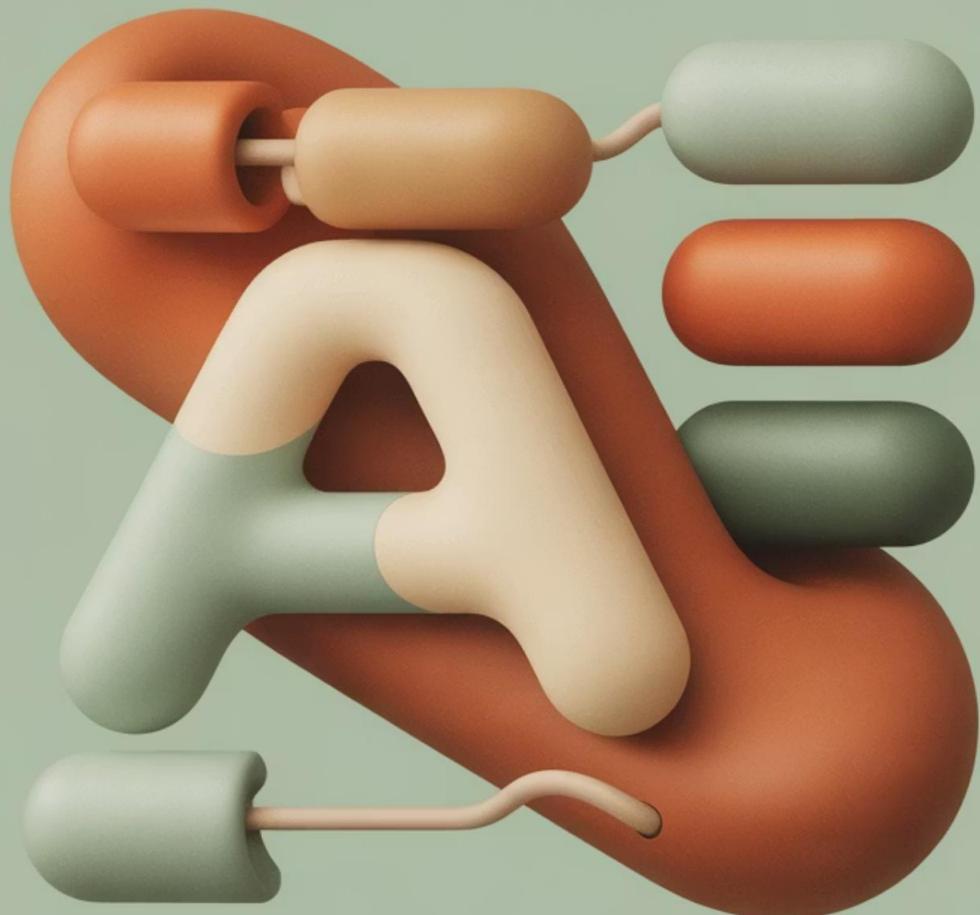
## Deployment

Create **GitHub** repositories and **deploy apps** on hosting platforms like Hugging Face Spaces, Streamlit Community Cloud, Koyeb, and Render

# Claude Code in VS Code Demo

Create a Jupyter notebook for mean-variance optimization. Prompt the user for the number of assets, their means, standard deviations, and correlations and risk-free rate. Only ask for the minimum number of correlations required to compute the correlation matrix. Assume short sales are allowed. Compute and display the tangency portfolio.





# Extending AI with MCP Servers

Anthropic's Model Context Protocol (MCP) enables adding custom tools to chatbots. I've added an MCP server to my Claude Code for the Rice database.

- ❑ **Demo Query:** "Get TSLA's ROE by quarter on a trailing 4-quarters basis for Q1 2020 through Q3 2025 **from the Rice stock database.** Also, get TSLA's adjusted closing price starting Jan 1 2020. Filter to keep only end-of-quarter prices. Plot the ROE and filtered price series in the same figure, with ROE on the left y-axis and price on the right y-axis."



## Some Additional Resources

Scan the QR code to access [genai4finance.kerryback.com](http://genai4finance.kerryback.com)