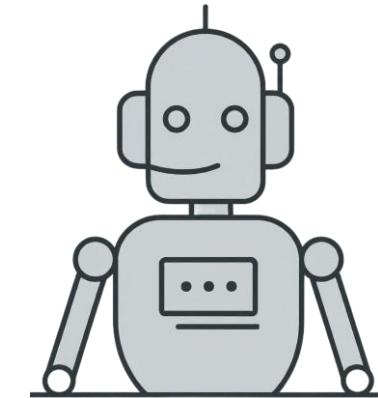


Foundations of Generative AI and NLP



Week 5: Introduction to AI Agents

Mike Lively



Mike Lively

Founder QuantumAI
Trainer, IT Evangelist, Developer
@mikelively-quantumai



About Me

Father of Nine
Working on a PhD in GenAI
Teaching AI for Johns Hopkins & GK
Avid Hacker & Prompt Engineer
40 years programming, Keynote
Flautist, USAF
YMCA Gym Rat



PhD “ABD”



SEPHORA



Pick Your Agent Archetype

Five “digital co-pilot” personalities (Memory • Tools • ReAct • Reflection • Done-ness)



ICE Breaker

Mira Memory

Context Keeper



Remembers what matters • prevents repeats

Option 1

Tess Tools

Tool Wrangler



Connects APIs •
searches •
executes safely

Option 2

Ravi ReAct

Planner-Doer



Reason → Act →
Observe → Repeat

Option 3

Rhea Reflection

Quality Critic



Reviews output •
fixes tone, gaps,
risks

Option 4

Gabe Goalkeeper

Done-ness Judge



Defines “done” •
checks completion
& handoff

Option 5

Learning Goals

At the end of the session, the learners will be able to:

- 1.Understand the progression from **Generative AI to AI Agents**
- 2.Explain the **core components** of AI Agents (Planning, Reasoning, Execution, Memory)
- 3.Navigate the n8n Editor UI** confidently and build basic workflows
- 4.Build a **Research Agent** that can search, summarize, and process information
- 5.Build a **Customer Analysis Agent** to analyze customer data.

Prerequisites

Ensure that you have watched **Week 5: Introduction to AI Agents**.
Ensure that you have set up “**n8n**” on your system (see Appendix).

<https://gemini.google.com/gems/view>

Agenda

Why AI Agents

- Quick AI journey (chatbots → copilots → agents)
- What makes agents different: goal-driven action + tools + memory

n8n Editor UI walkthrough

- Navigate the editor (canvas, nodes, connections, execution)
- Obtain OpenAI credentials from Olympus and configure them in n8n

Caselet 1: n8n Research Agent

- Workflow goals: search → summarize → structured output
- Live build/demo and a tour of each workflow component

Caselet 2: n8n Data Analysis Agent

- Add a dataset, create tables/outputs, and run analysis steps
- Live build/demo and a tour of each workflow component

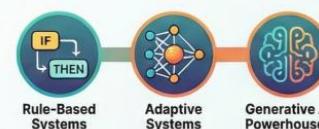
Key takeaways

Q&A

AI Agents: Your Guide to the Next Wave of Automation

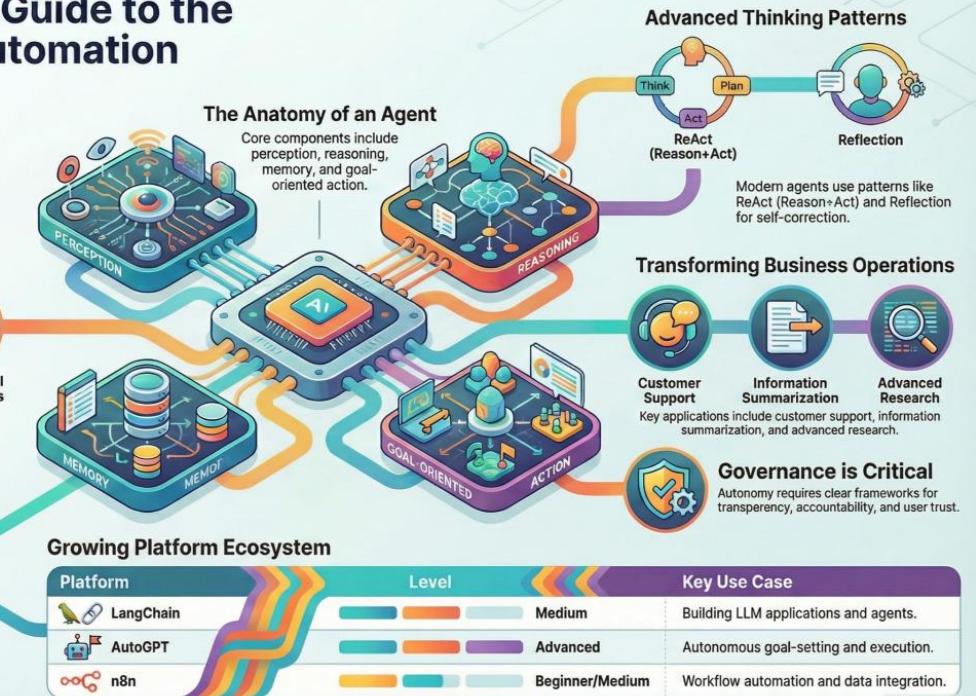
More Than Just Automation

AI agents autonomously perceive, reason, and act to achieve complex goals.



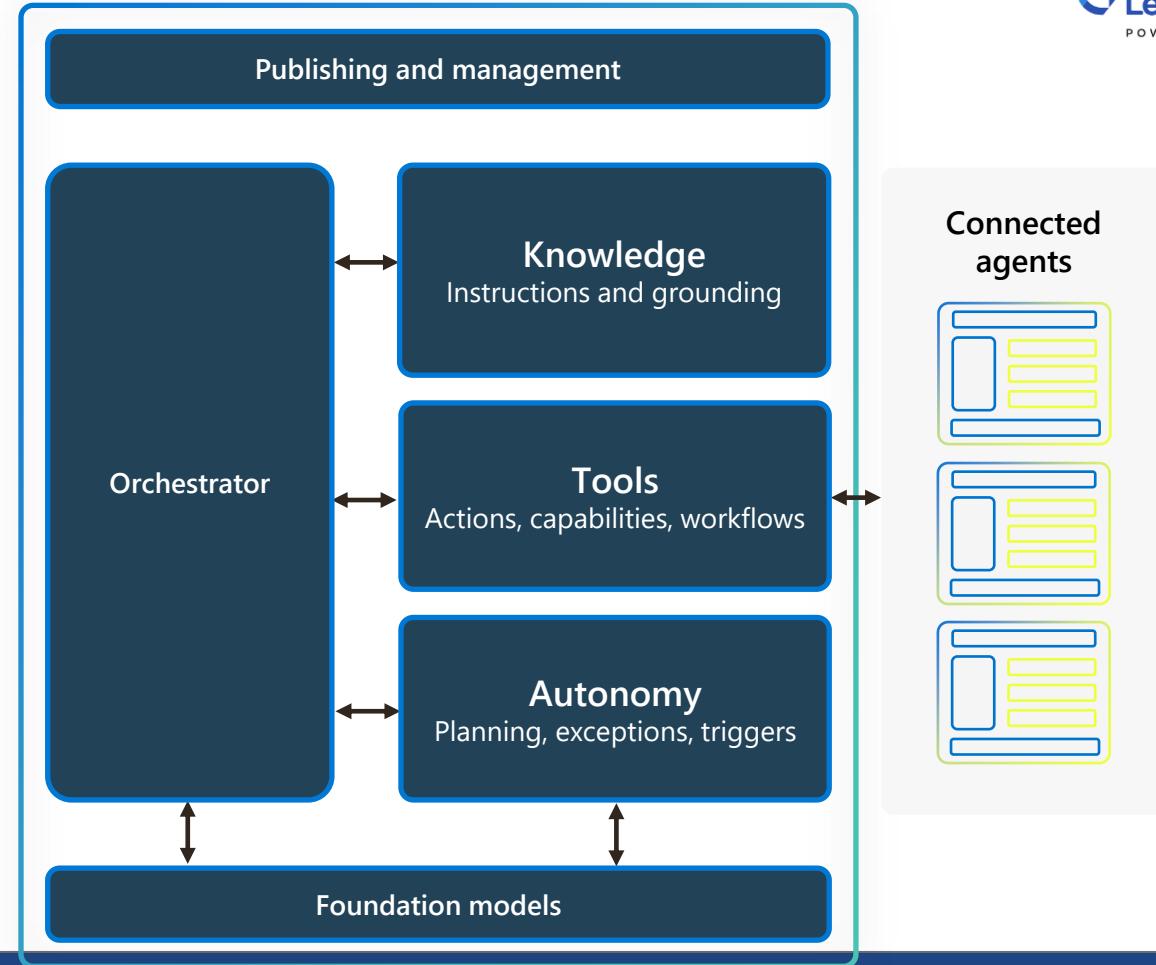
Evolving from Rules to Reason

Agents have progressed from simple rule-based systems to adaptive, generative AI powerhouses.

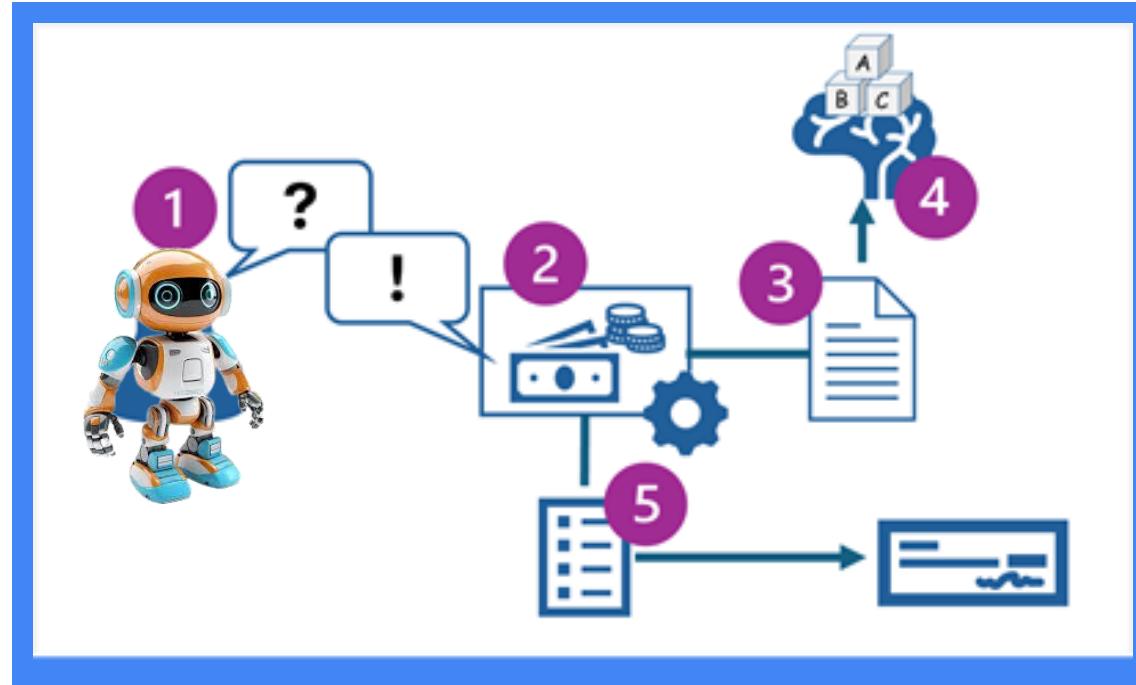


<https://www.linkedin.com/pulse/introduction-ai-agents-michael-lively-0czke/>

Agent vs Assistant Architecture



Example of what an agent does!



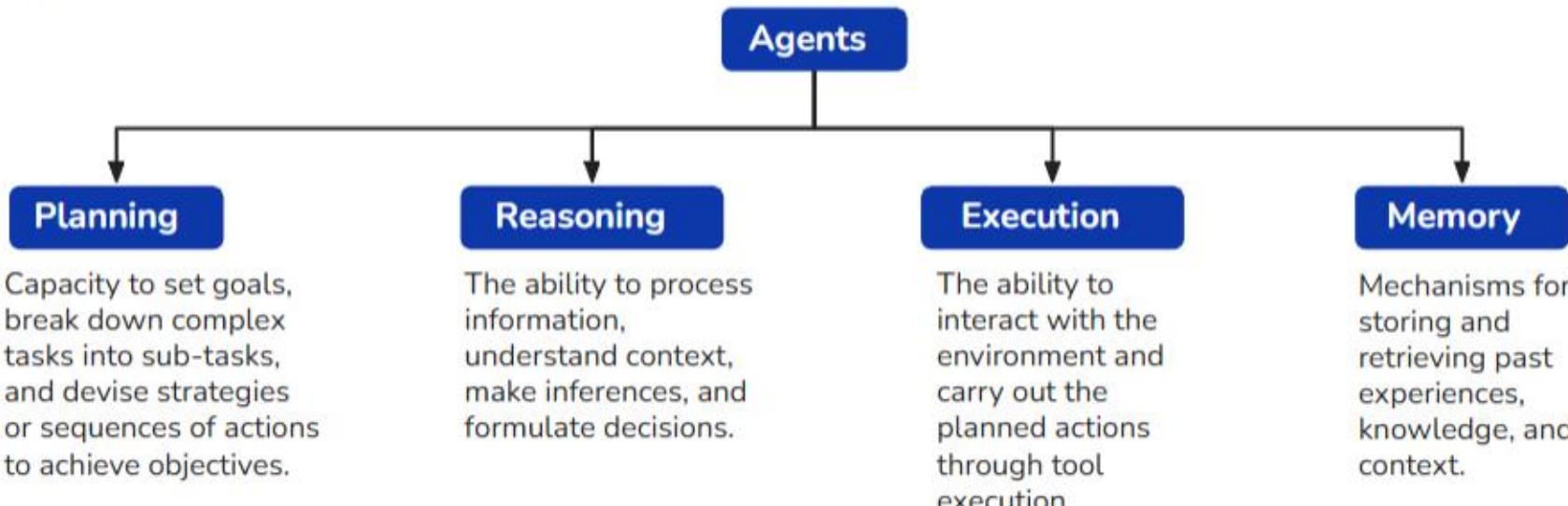
From generating ideas → to asking the right questions → to finding answers → to making AI work for you.



“Custom GPTs finds answers. Agents don’t just find, they plan, verify, and turn answers into actions”

AI Agents: Core Components

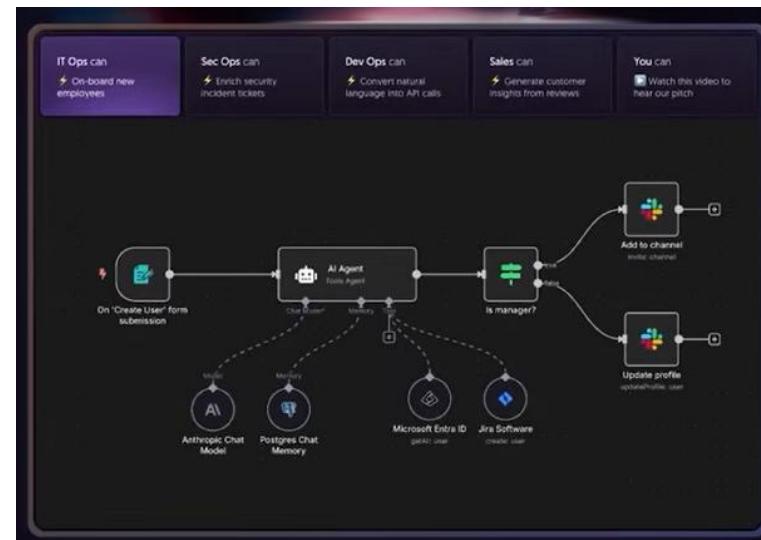
Agents are goal-oriented, autonomous systems composed of distinct functional components.



What is n8n?

What is n8n?

It's a node based, automation framework, that makes building automation and agents surprisingly easy!



From Automation to Agents

AUTOMATIONS ARE FIXED

They follow a set sequence



AGENTS ARE DYNAMIC

They can reason, make decisions, and choose which actions to take based on context



n8n: Visual Workflow Automation for Technical Teams

VISUAL BUILDING MEETS TECHNICAL CONTROL

A Visual, Node-Based Automation Platform:

Connect apps, APIs, and data into repeatable workflows using a drag-and-drop editor.

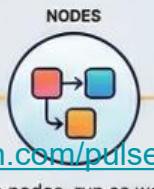
Balances Simplicity with Engineering Power



Offers a low-friction visual builder alongside self-hosting, encryption, and environment-based configuration.



Core Concepts: Workflows, Nodes, & Executions



<https://www.linkedin.com/pulse/n8n-introduction-michael-lively-6eyie/>

Build with nodes, run as workflows, and debug with detailed execution-level logs.

FLEXIBLE DEPLOYMENT & AI INTEGRATION

Choose Your Deployment: Cloud vs. Self-Host



CLOUD

Use n8n's managed cloud for speed...

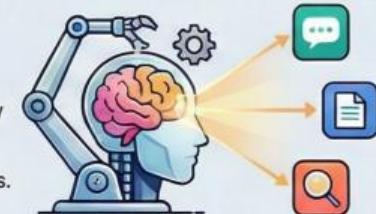


SELF-HOST

...or self-host via Docker for maximum control.

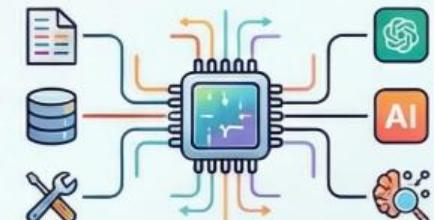
Build Powerful AI-Driven Agents

Integrate OpenAI directly or create "Tools Agents" that can autonomously select and call other APIs.

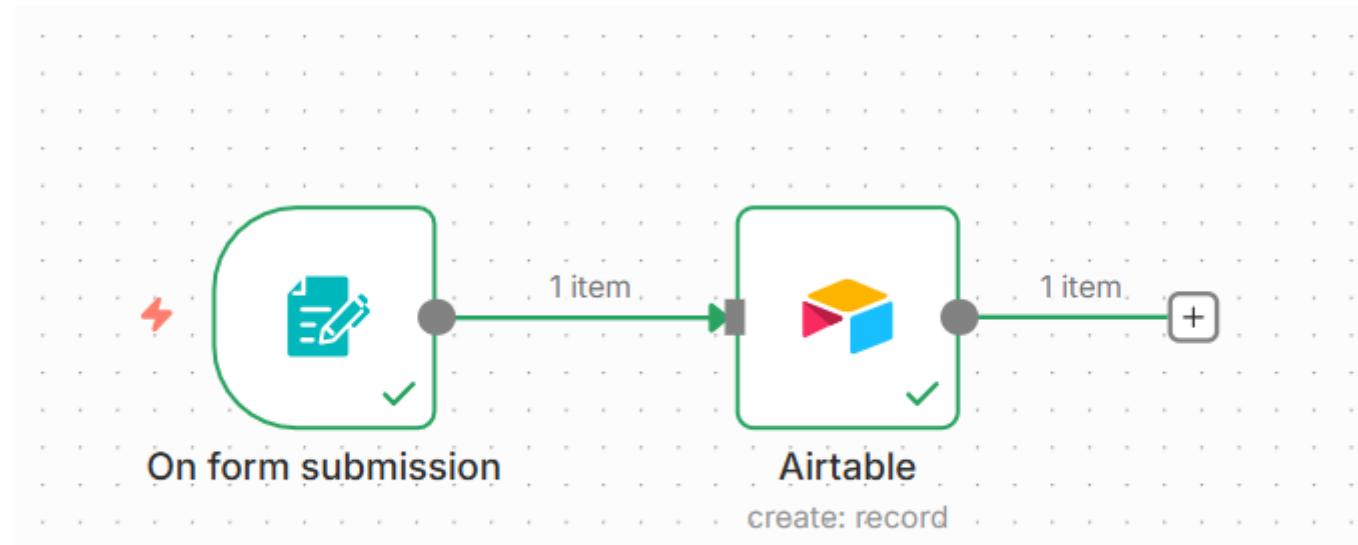


Ideal for API-Heavy Orchestration

Perfect for data enrichment, internal tooling, and AI workflows like classification or summarization.

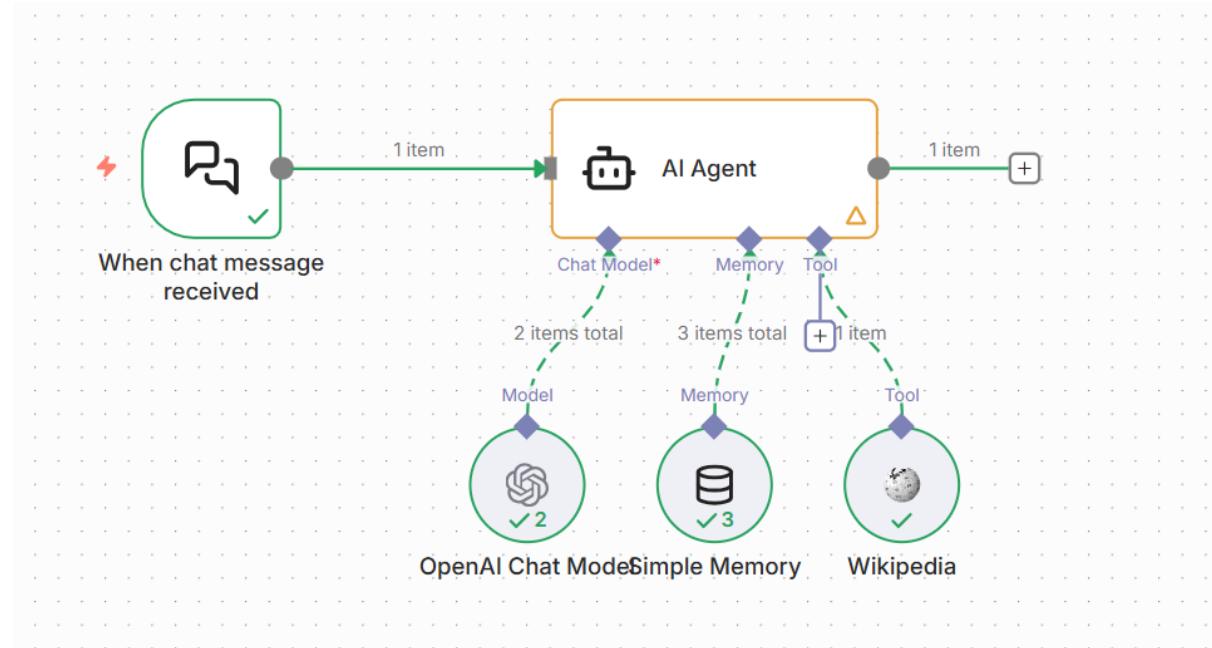


Using Airtable



Airtable is a cloud-based platform that blends the familiarity of a spreadsheet with the structure of a relational database, making it easy to organize and connect information. It lets teams build flexible, collaborative apps on top of shared data to power workflows ranging from project tracking to product roadmaps

Wikipedia Fun Facts



n8n Agentic Workflow Hands-on Demonstration

Week 5: Live Session

Navigating n8n Editor UI

Open n8n and discuss “**Navigating n8n Editor UI**” document in a **detailed, step-by-step manner**

Nodes: You can think of nodes as building blocks that serve different functions that, when put together, make up a functioning machine: an automated workflow.

Node - A node is an individual step in your workflow: one that either (a) loads, (b) processes, or (c) sends data. Based on their function, n8n classifies nodes into four types:

- **App or Action Nodes** add, remove, and edit data; request and send external data; and trigger events in other systems. Refer to the [Action nodes library \(Links to an external site.\)](#) for a full list of these nodes.

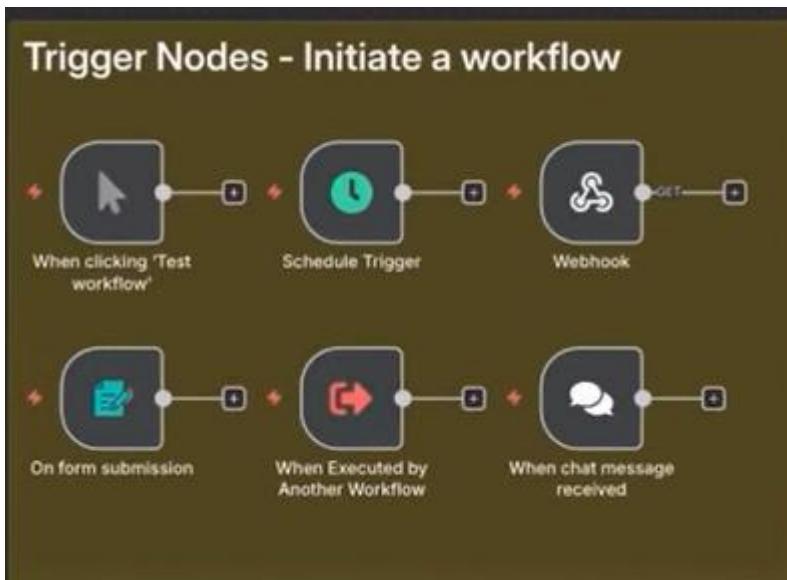
- **Trigger Nodes** start a workflow and supply the initial data. Refer to the [Trigger nodes library \(Links to an external site.\)](#) for a list of trigger nodes.

- **Core Nodes** can be trigger or app nodes. Whereas most nodes connect to a specific external service, core nodes provide functionality such as logic, scheduling, or generic API calls. Refer to the [Core Nodes library \(Links to an external site.\)](#) for a full list of core nodes.

- **Cluster Nodes** are node groups that work together to provide functionality in a workflow, primarily for AI workflows. Refer to [Cluster nodes \(Links to an external site.\)](#) for more information.

Learn more

Refer to [Node types \(Links to an external site.\)](#) for a more detailed explanation of all node types.

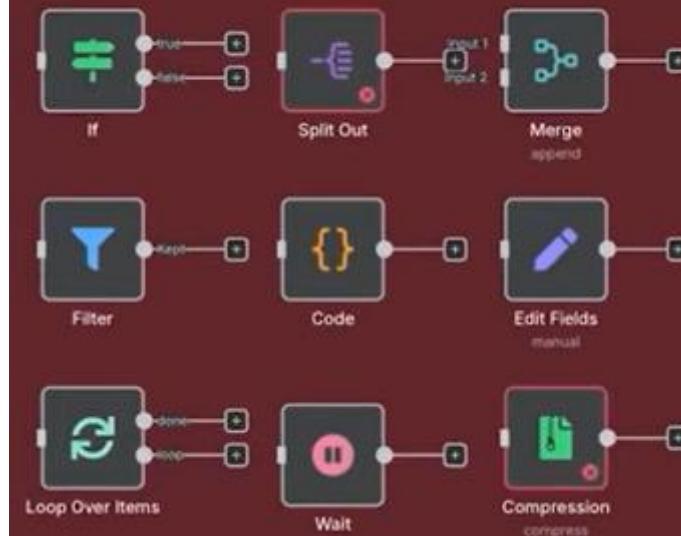


HTTP Request Node The Universal Adapter



HTTP Request
GET:

Logic Nodes - Control how data flows



AI Agent Node - Brain + Memory + Tools



n8n - Research Agent

Research Agent - Overview

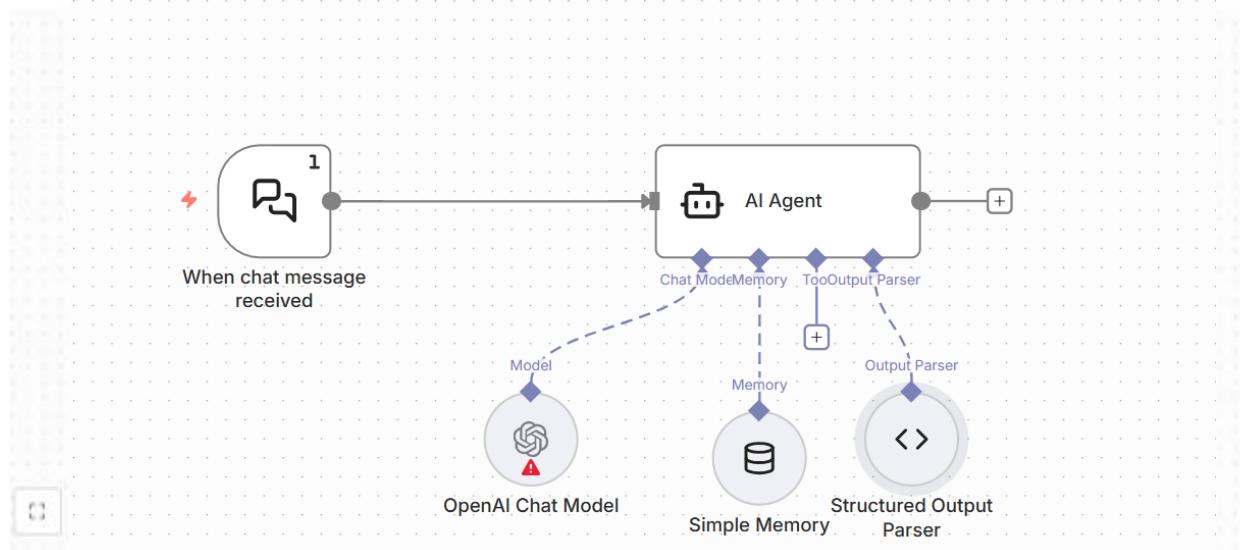
This n8n workflow provides a real-time, AI-generated summary of the latest updates in the financial and investment sector. When a user sends a chat message in natural language, the workflow searches for recent financial news, processes it through a memory component, summarizes it using an AI model, and outputs a structured JSON response. The JSON includes fields such as the results, title, etc.

Goal

The goal is to:

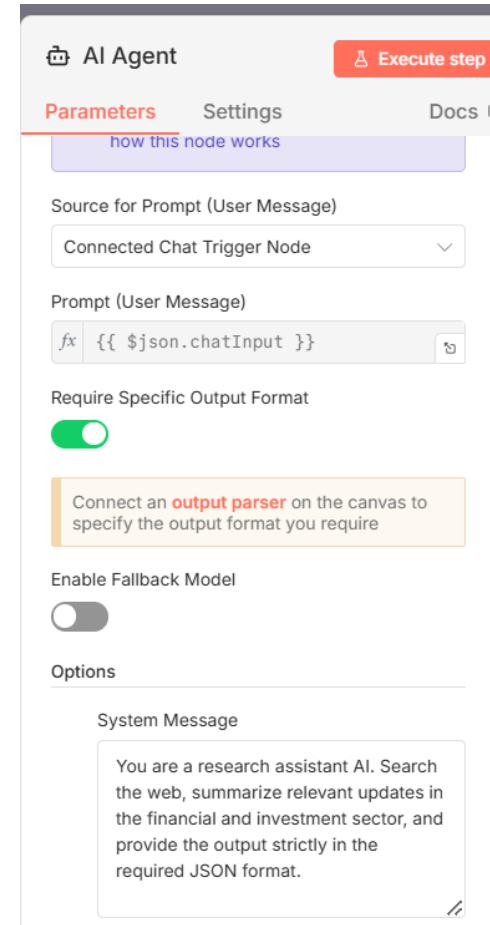
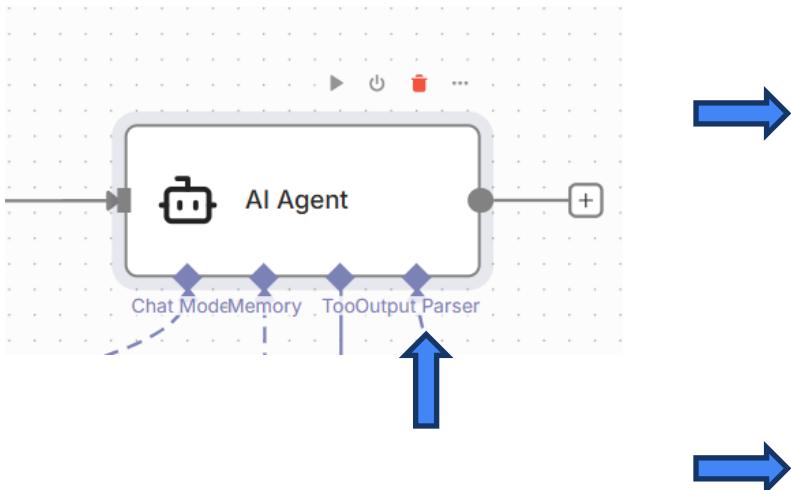
- Let the user send a question like "What is the expected Google Shares price in May 2025?"
- Search the web with web search Tools option in Open AI Chat model
- Summarize the news using OpenAI Chat model
- Show output in json format
- Send everything back to the user via the AI Agent

Workflow



Note: This workflow is available on Olympus as “**n8n Research Agent - Workflow File.**” Download and import it into n8n, then discuss each node in detail.

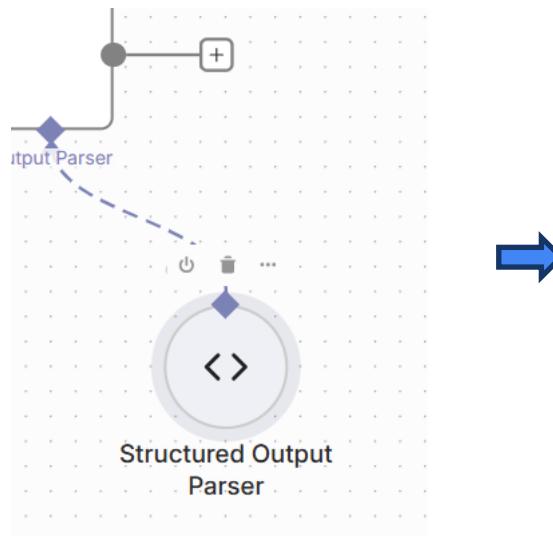
System Message & Structure Output



The screenshot shows the configuration panel for the "AI Agent" node. At the top, there are tabs for "Parameters" (which is selected), "Settings", and "Docs". Below the tabs, a purple header bar contains the text "how this node works".

- Source for Prompt (User Message):** Set to "Connected Chat Trigger Node".
- Prompt (User Message):** A code editor containing the expression `{{ \$json.chatInput }}`.
- Require Specific Output Format:** A toggle switch is turned on.
- System Message:** A text area containing the instruction: "You are a research assistant AI. Search the web, summarize relevant updates in the financial and investment sector, and provide the output strictly in the required JSON format."

Structure Parser



Edit JSON Example

```

1   v  {
2     "results": [
3       {
4         "title": "Article title",
5         "link": "https://example.com/article",
6         "snippet": "Short summary of the content...",
7         "source": "Example.com",
8         "published_date": "2025-12-10",
9         "relevance": 0.95,
10        "tags": ["AI", "OpenAI"]
11      }
12    ]
13  }

```

Structured Output Parser Success in 2ms	
INPUT	
action	parse
T	text
	{"output": {"results": [{"title": "Alphabet Inc. (GOOGL) Stock Forecast for 2025", "link": "https://www.marketbeat.com/stocks/NASDAQ/GOOGL/price-target/", "snippet": "Find the latest analyst forecasts for Alphabet Inc. (GOOGL) for the year 2025, including price predictions and target changes.", "source": "MarketBeat", "published_date": "2023-10-09", "relevance": 0.95, "tags": ["GOOGL", "market", "investment"]}, {"title": "Alphabet Stock Price Prediction for 2025", "link": "https://www.investing.com/equities/alphabet-inc-c-price-forecast", "snippet": "Expectations for Google's stock price in the year 2025 based on..."}]}
OUTPUT	
action	response
parse	<p>output</p> <p>results</p> <p>0</p> <p>title : Alphabet Inc. (GOOGL) Stock Forecast for 2025 link : https://www.marketbeat.com/stocks/NASDAQ/GOOGL/price-target/ snippet : Find the latest analyst forecasts for Alphabet Inc. (GOOGL) for the year 2025, including price predictions and target changes.</p>

Workflow Components

Node	Purpose
Chat Message Trigger	Starts the workflow when the user sends a chat message.
AI Agent	Central Brain: Sends prompts, calls tools, and builds responses. Provide it with a system message, and enable the “ Require Specific Output Format ” option.
Simple Memory	Stores and reuses the user query or intermediate data.
OpenAI Chat Model	Used by the AI Agent to search the web (using the Search Tool option) and summarize the content.
Output Parser	Used to provide output in a specific format.

n8n - Data Analysis Agent

The n8n workflow enables AI-assisted analysis of the *Customer Data* table. When a user sends a chat message in natural language, the workflow retrieves all relevant rows from the table, interprets the query using the AI Agent, performs the necessary data analysis, and outputs the result.

Goal

The goal is to:

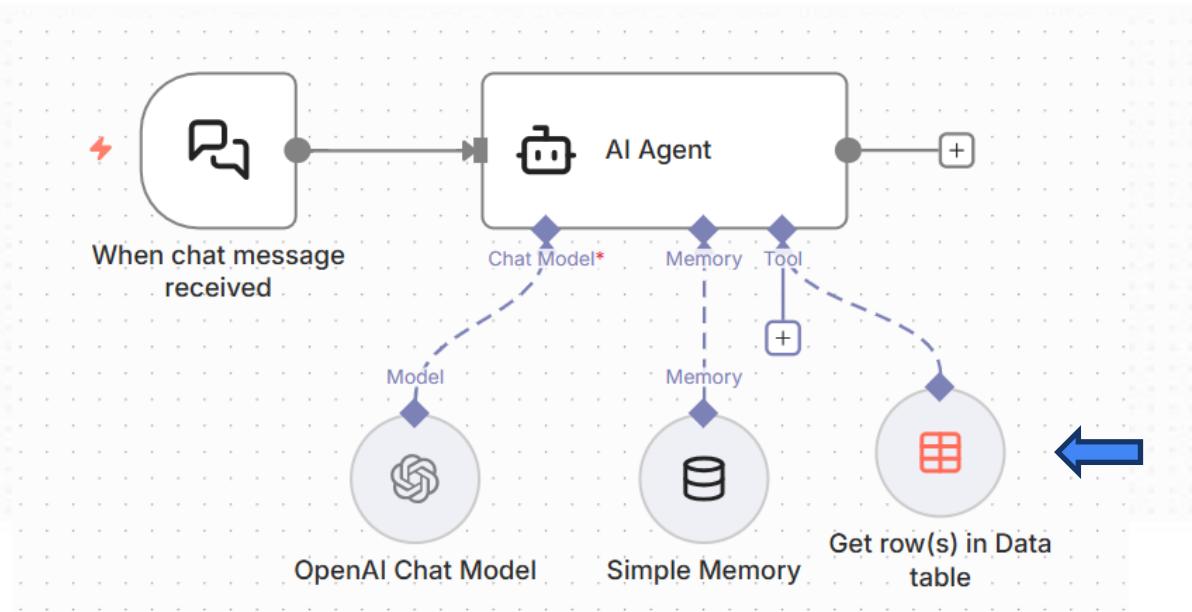
- Add “customer_analysis_dataset.csv” as Data Table in n8n
- Allow the user to ask customer data analysis questions like: “What percentage of female customers do we have?”
- Retrieve all relevant data from the Customer Data table.
- Perform analysis required to answer the query using the AI Agent.
- Return the structured response to the user via the AI Agent.

https://olympus.mygreatlearning.com/courses/140256/pages/add-customer-analysis-dataset-dot-csv-in-n8n?module_item_id=8138822

-   Case Study - Data Analysis Agent 
-   customer_analysis_dataset.csv 
-   Add customer_analysis_dataset.csv in n8n 

Use the "Add customer_analysis_dataset.csv in n8n" documentation to upload [customer_analysis_dataset.csv](#) into n8n, and demonstrate the hands-on steps.

Workflow



Note: This workflow is available on Olympus as “**n8n Data Analysis Agent - Workflow File**.” Download and import it into n8n, then discuss each node in detail.

Workflow Components

Node	Purpose
Chat Message Trigger	Starts the workflow when the user sends a chat message.
AI Agent	Central Brain: Sends prompts, calls tools, and builds responses. Provide it with a system message for analysis.
Simple Memory	Stores and reuses the user query or intermediate data.
OpenAI Chat Model	Used by the AI Agent to interpret the query and perform the necessary data analysis.
Tool (Get row(s) in Data Table)	Used to “get” all rows from the Customer Data table for the analysis required by the query.

7000 Templates

The screenshot shows the n8n.io website. At the top, there's a banner with the text "Go from prompt to possibility with AI Workflow Builder [Beta]" and a "Learn how" button. The main navigation bar includes links for Product, Use cases, Docs, Community, Enterprise, Pricing, and Sign in. A "Get Started" button is also present. On the left, a sidebar menu lists Product overview, Integrations, and Templates, with the Templates item highlighted by a blue arrow. The central part of the page features a large image of a hand interacting with a glowing tablet screen, with the text "Flexible AI workflow automation for technical teams". The n8n logo is in the top left corner.

- Overview of the **AI journey**: from generating ideas to autonomous agent actions
- Introduction to **AI Agents** – Planning, Reasoning, Execution & Memory
- **n8n Editor UI walkthrough** – step-by-step navigation and workflow creation
- Building a **Research Agent** in n8n – search & summarization workflow creation and discussion
- Building a **Customer Analysis Agent** – dataset setup, table creation & workflow creation and discussion

Appendix (n8n Setup) Windows and Mac

Appendix (n8n Setup)

Part 1: Obtain OpenAI API Key
and Open API Base (URL)

Part 2: Download NodeJS

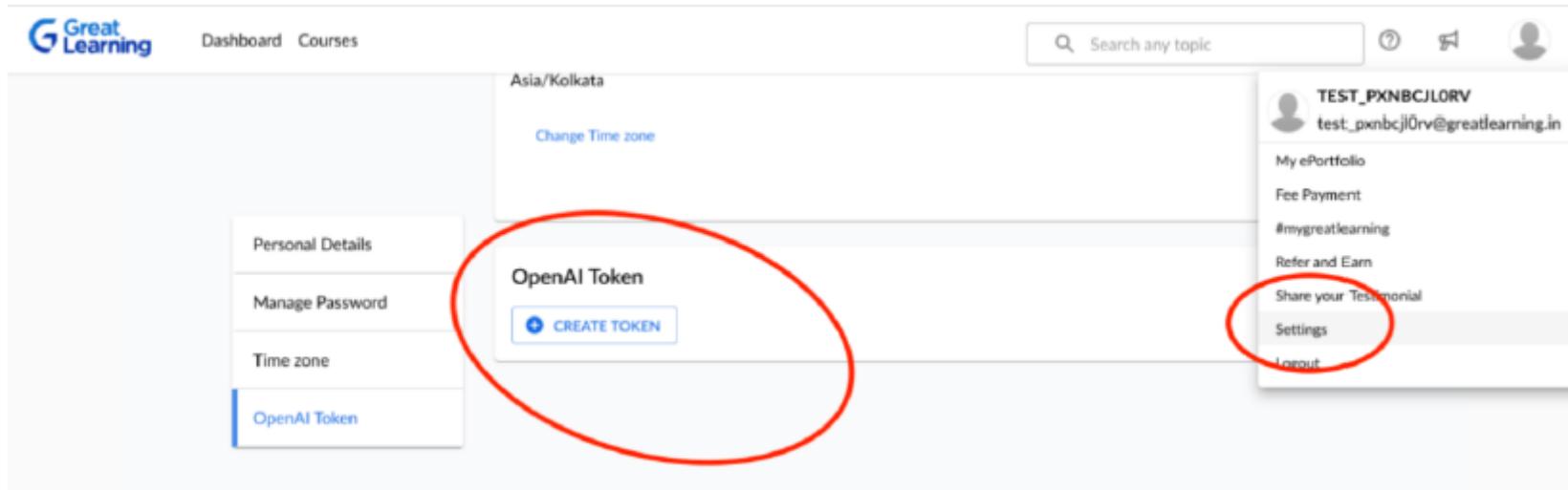
Part 3: Install n8n and add your
credentials

Basic Terminal Commands

1. ls — list files (CMD: dir)
2. dir — list files (CMD native)
3. cd — change folders (cd .. up one)
4. cls — clear screen
5. mkdir **filename** — create folder

Appendix (n8n Setup)

Part 1: Obtain OpenAI API Key and Open API Base (URL)

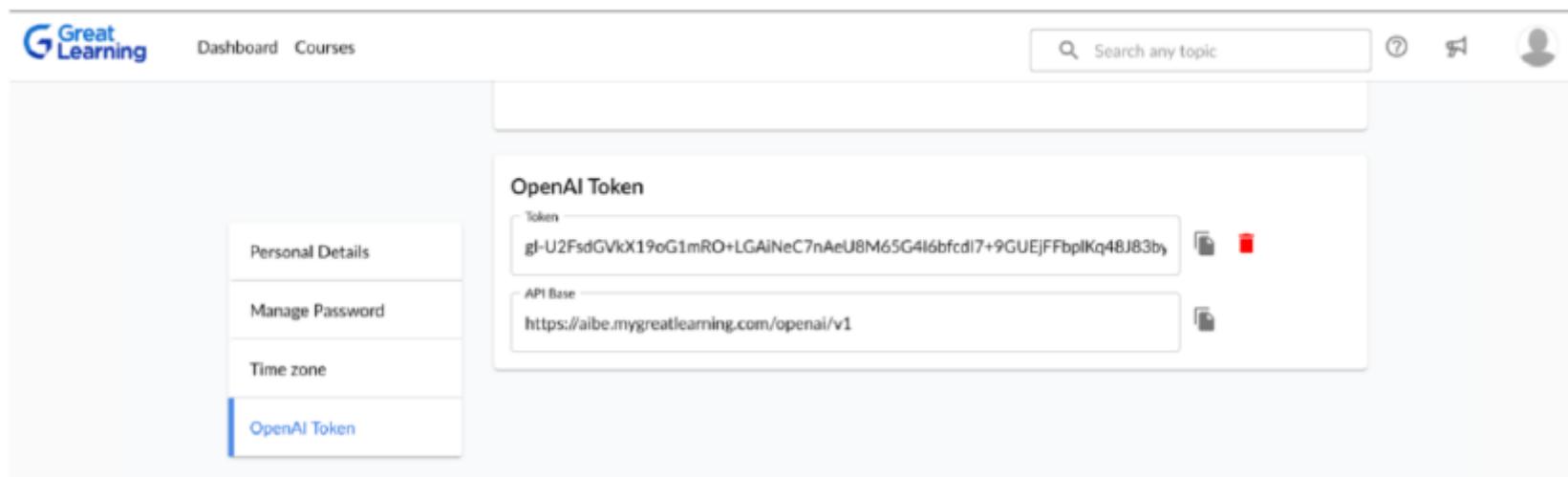


The screenshot shows a user profile page on the Great Learning platform. At the top, there's a navigation bar with 'Great Learning' logo, 'Dashboard', and 'Courses'. On the right, there's a search bar, a help icon, a notification icon, and a user profile icon. The main content area shows the user's time zone as 'Asia/Kolkata' with a 'Change Time zone' link. Below this, there's a sidebar with 'Personal Details', 'Manage Password', 'Time zone' (which is 'Asia/Kolkata'), and 'OpenAI Token' (which is currently selected). The main panel has a heading 'OpenAI Token' and a 'CREATE TOKEN' button. To the right, there's a sidebar with the user's name 'TEST_PXNBCJLORV' and email 'test_pxnbclorv@greatlearning.in', followed by links for 'My ePortfolio', 'Fee Payment', '#mygreatlearning', 'Refer and Earn', 'Share your Testimonial', 'Settings', and 'Logout'. A large red oval highlights the 'CREATE TOKEN' button.

Appendix (n8n Setup)

Part 1: Obtain OpenAI API Key and Open API Base (URL)

2. Clicking on **CREATE TOKEN** will assign you a Token and an API Base as follows:



The screenshot shows a user interface for managing API tokens. On the left, there's a sidebar with options: Personal Details, Manage Password, Time zone, and OpenAI Token, with OpenAI Token being the active tab. The main area displays two fields: 'Token' containing a long string of characters, and 'API Base' containing the URL <https://aibe.mygreatlearning.com/openai/v1>.

Appendix (n8n Setup)

Part 2: Download NodeJS

<https://nodejs.org/en/download>

Or get a prebuilt Node.js® for  Windows  running a  x64  architecture.

 [Windows Installer \(.msi\)](#)

 [Standalone Binary \(.zip\)](#)

Read the [changelog](#) ↗ or [blog post](#) for this version.

Learn more about [Node.js releases](#), including the release schedule and LTS status.

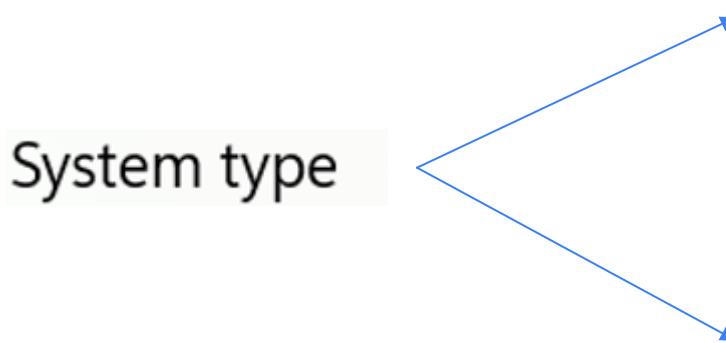
Learn how to [verify](#) ↗ signed SHASUMS.

Looking for Node.js source? Download a signed [Node.js source](#) ↗ tarball.

Check out our [nightly](#) ↗ binaries or all [previous releases](#) or the [unofficial](#) ↗ binaries for other platforms.

Appendix (n8n Setup Windows)

Part 2: Download NodeJS



<https://nodejs.org/en/download>

Windows running a x64

 Standalone Binary (.zip) for this version.

x64
x86
ARM64

macOS running a x64

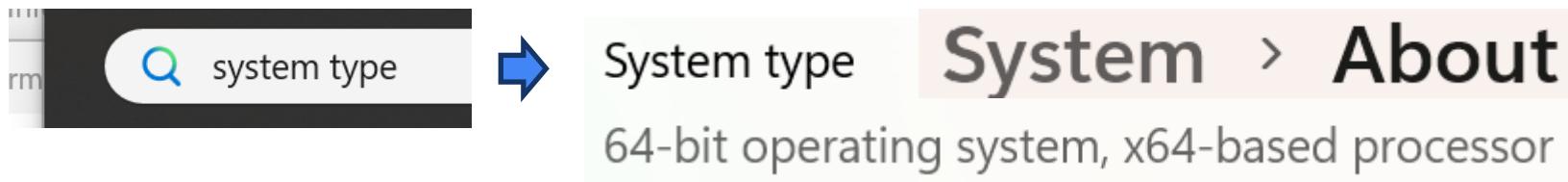
 Standalone Binary (.gz)

x64
ARM64

Appendix (n8n Setup Windows)

Part 2: Download NodeJS

<https://nodejs.org/en/download>



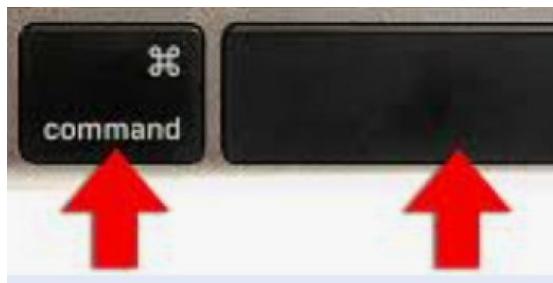
 node-v24.12.0-x64.msi
0 B/s - 30.7 MB of 30.7 MB

Appendix (n8n Setup Mac)

Part 2: Download NodeJS

<https://nodejs.org/en/download>

terminal



`uname -m`

If it says **x86_64** → your Mac uses an **Intel processor**.

- If it says **arm64** → your Mac uses an **Apple Silicon (M1, M2) processor**.

 **Check System Architecture**

Appendix (n8n Setup)

Part 2: Download NodeJS

<https://nodejs.org/en/download>

Or get a prebuilt Node.js® for  Windows  running a  x64  architecture.

 [Windows Installer \(.msi\)](#)

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Appendix (n8n Setup)

Part 2: Download NodeJS

<https://nodejs.org/en/download>

Some npm modules need to be compiled from C/C++ when installing. If you want to be able to install such modules, some tools (Python and Visual Studio Build Tools) need to be installed.

- Automatically install the necessary tools. Note that this will also install Chocolatey. The script will pop-up in a new window after the installation completes.

Alternatively, follow the instructions at <https://github.com/nodejs/node-gyp#on-windows> to install the dependencies yourself.

Appendix (n8n Setup)

Part 2: Download NodeJS

<https://nodejs.org/en/download>

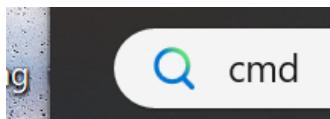
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- Automatically install the necessary tools. Note that this will also install Chocolatey. The script will pop-up in a new window after the installation completes.

Alternatively, follow the instructions at <https://github.com/nodejs/node-gyp#on-windows> to install the dependencies yourself.

Appendix (n8n Setup - windows)

Part 3: Install n8n and add your credentials



```
C:\Users\eagle\n8n-local>doskey /history  
node -v  
npm -v  
mkdir n8n-local  
cd n8n-local  
npm install n8n -g  
n8n start
```

```
doskey /history
```



After n8n start, type o to bring it up in the browser!

Part 3: Install n8n and add your credentials

4 Install n8n

Enter the following command in the Terminal and confirm with your Mac password:

```
sudo npm install -g n8n
```

Wait until the installation is complete.

Start n8n

Start n8n with the following command:

```
n8n start
```

Type o to open.

If security issue, open in chrome browser

Part 3: Install n8n and add your credentials

Install homebrew

```
brew install node
```

```
sudo npm install -g n8n
```

Wait until the installation is complete.

Start n8n

Start n8n with the following command:

```
n8n start
```

If security issue, open in chrome browser

<https://brew.sh/>

Appendix (n8n Setup)

Part 3: Install n8n and add your credentials

After n8n start type the letter o to bring up the website



n8n

Set up owner account

Email *

First Name *

Last Name *

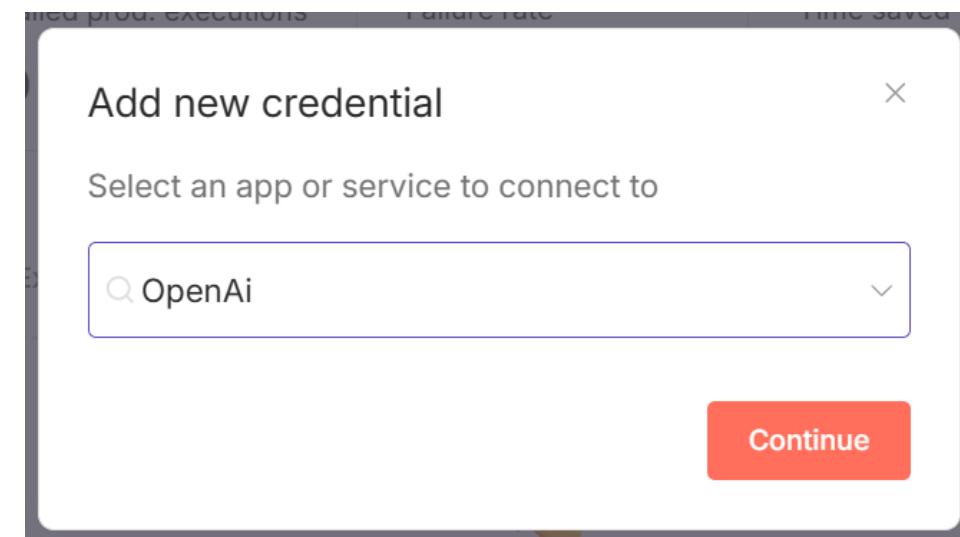
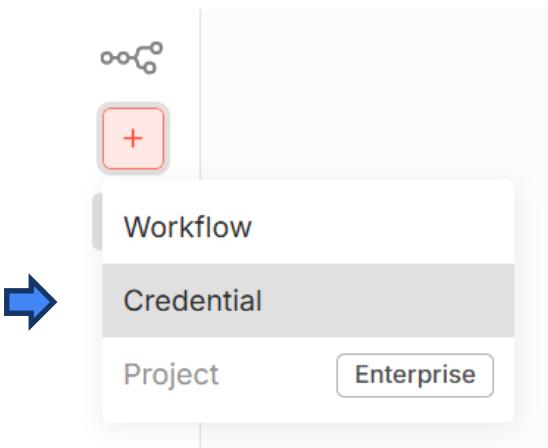
Password *

8+ characters, at least 1 number and 1 capital letter

I want to receive security and product updates

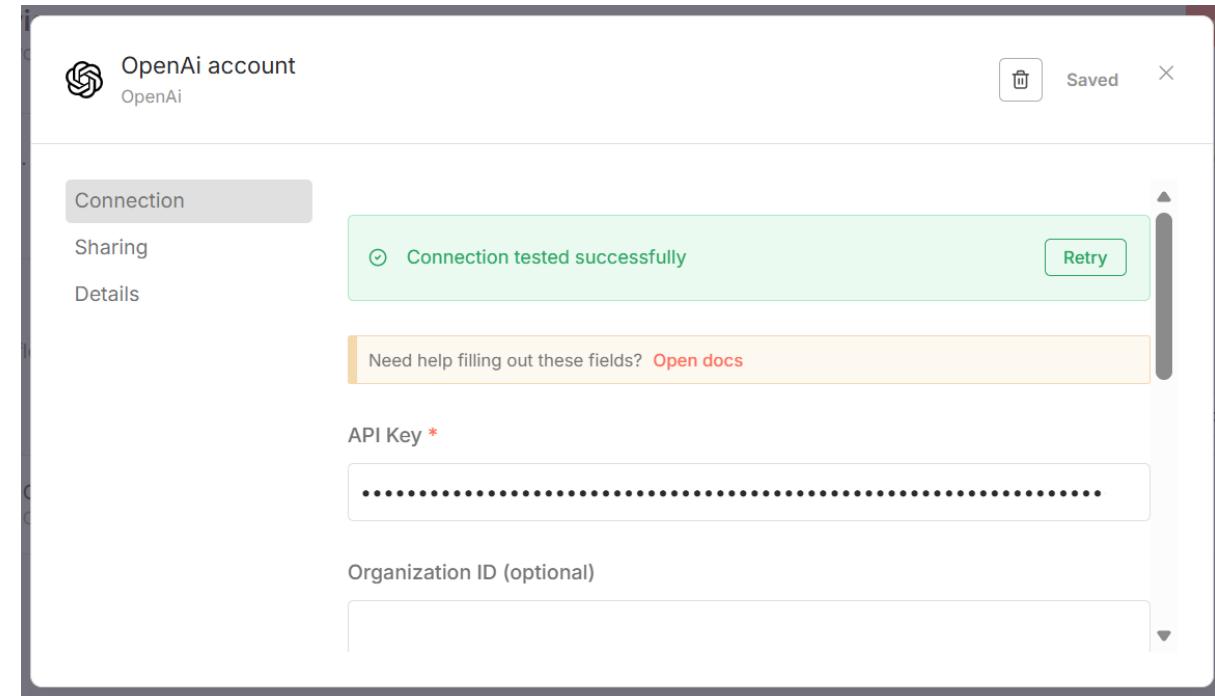
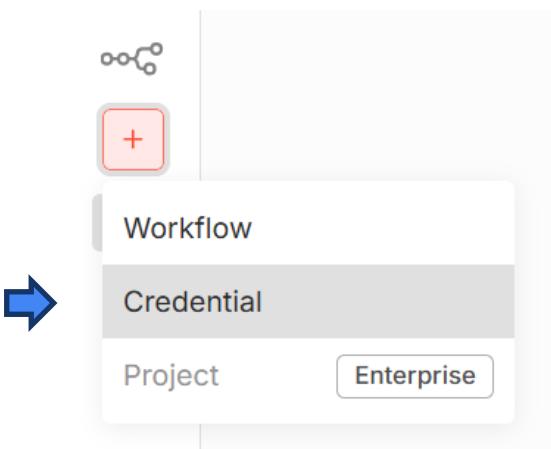
Appendix (n8n Setup)

Part 3: Install n8n and add your credentials



Appendix (n8n Setup)

Part 3: Install n8n and add your credentials



Appendix (n8n Setup)

OPTIONAL: Store Workflows Locally (Persistent Use)

By default, data is stored in memory and resets when you close the terminal. To persist workflows, follow these steps:

- ◆ Step 1: Create a .n8n folder

```
mkdir .n8n
```

- ◆ Step 2: Set data folder path when starting n8n

```
npx n8n --tunnel --data-folder=.n8n
```

Welcome Michael!

Create your first workflow



Start from scratch



What triggers this workflow?

A trigger is a step that starts your workflow

Search nodes...

Trigger manually

Runs the flow on clicking a button in n8n. Good for getting started quickly

On app event

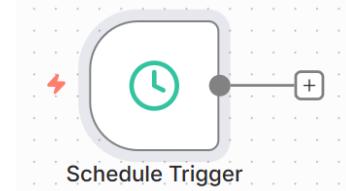
Runs the flow when something happens in an app like Telegram, Notion or Airtable

On a schedule

Runs the flow every day, hour, or custom interval

On webhook call

Runs the flow on receiving an HTTP request



Schedule Trigger

Parameters Settings

Execute step

This workflow will run on the schedule you define here once you **activate** it.

For testing, you can also trigger it manually: by going back to the canvas and clicking 'execute workflow'

Trigger Rules

Trigger Interval

Days

Days Between Triggers

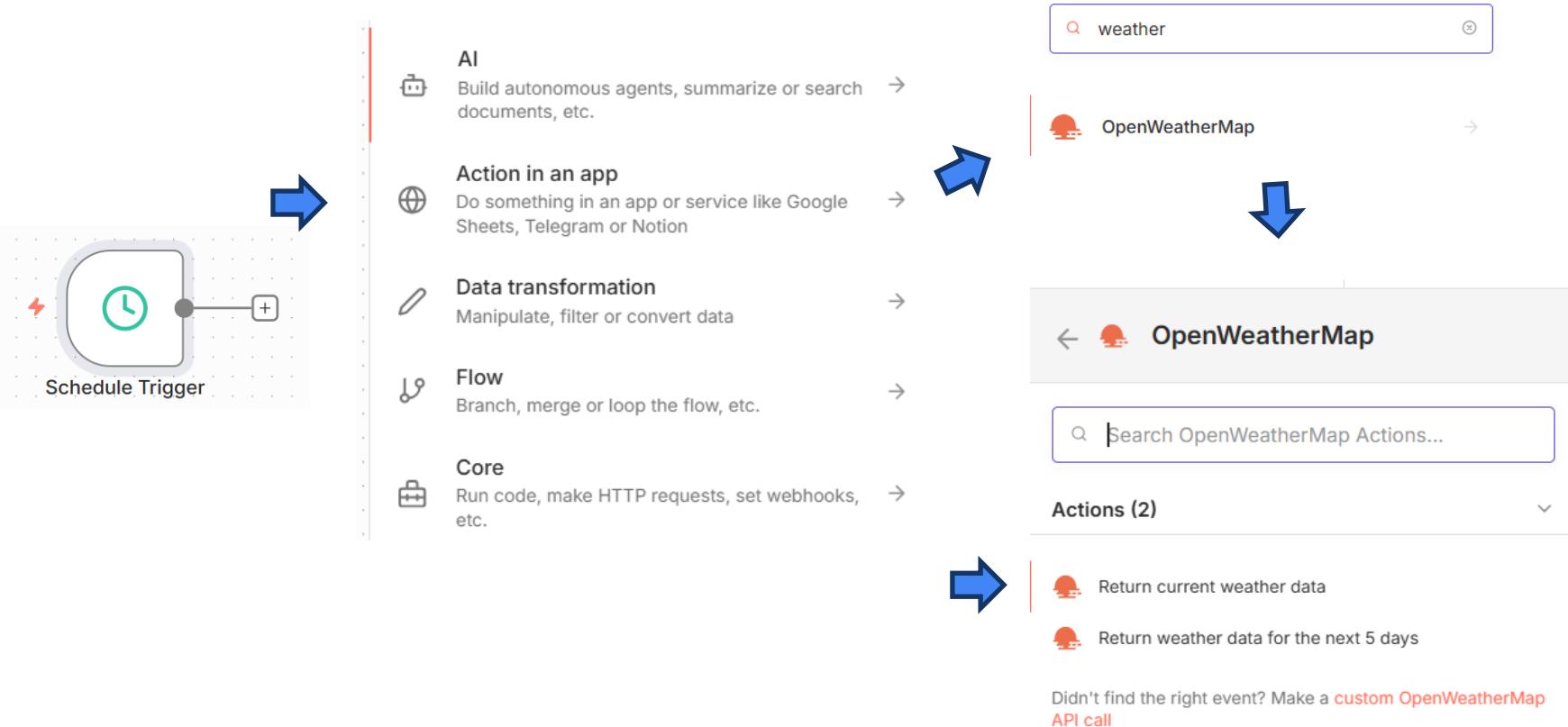
1

Must be in range 1-31

Trigger at Hour

: Fixed Expression

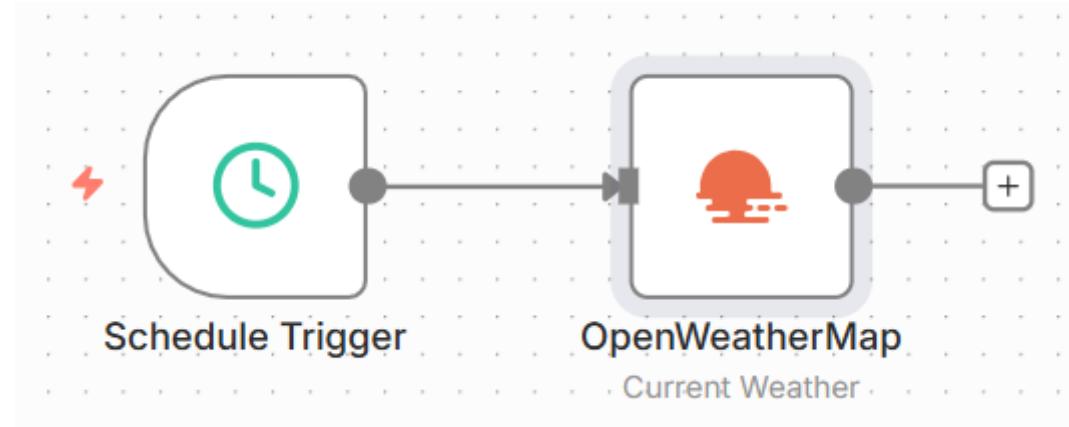
6am



Parameters	Settings	Execute step
Credential to connect with	Select Credential	
Operation	Current Weather	
Format	Metric	
Location Selection	City Name	
City	berlin,de	
Language	en	

Parameters	Settings	Execute step
Credential to connect with	OpenWeatherMap account	
Operation	Current Weather	
Format	Imperial	
Location Selection	Zip Code	
Zip Code	41042	
Language	en	

<https://openweathermap.org/api>



OpenWeatherMap

INPUT

Schedule Trigger 

1 item

- T timestamp 2025-12-13T06:00:04.898-05:00
- T Readable date December 13th 2025, 6:00:04 am
- T Readable time 6:00:04 am
- T Day of week Saturday
- T Year 2025
- T Month December
- T Day of month 13
- T Hour 06
- T Minute 00
- T Second 04
- T Timezone America/New_York (UTC-05:00)

> Variables and context

Parameters **Settings**  **Execute step**

Credential to connect with
OpenWeatherMap account

Operation
Current Weather

Format
Imperial

Location Selection
Zip Code

Zip Code
41042

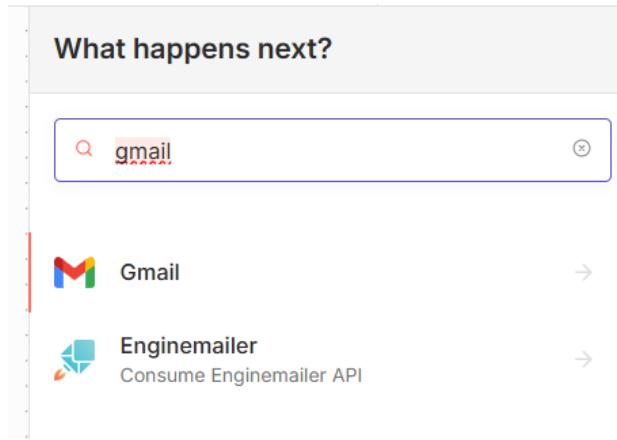
Language
en

OUTPUT   

1 item

coord	weather
lon : -84.642 lat : 38.9941	0 id : 804 main : Clouds description : overcast clouds icon : 04n

What happens next?



The screenshot shows a search bar with the query "gmail". Below the search bar, there are two items listed:

- Gmail →
- Enginemailer →
Consume Enginemailer API



Actions (26) ?

MESSAGE ACTIONS

-  Add label to message
-  Delete a message
-  Get a message
-  Get many messages
-  Mark a message as read
-  Mark a message as unread
-  Remove label from message
-  Reply to a message
-  Send a message
-  Send message and wait for response