
CAPSTONE PROJECT

SIMPLIFICATION AGENT

Presented By:

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OUTLINE

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PROBLEM STATEMENT

Many students, especially first-generation learners and those from non-English-medium backgrounds, struggle to understand complex academic materials. Textbooks, research articles, and lecture notes often use advanced language and technical terms, making it difficult for students to grasp the core concepts on their own. This leads to lower academic performance and increases the learning gap in under-resourced educational institutions.

TECHNOLOGY USED

IBM cloud lite services

Natural Language Processing (NLP)

Retrieval Augmented Generation (RAG)

IBM Granite model

IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab
- IBM Granite foundation model
- IBM Object Storage (for document handling, optional)

WOW FACTORS

This agent will significantly reduce learning difficulty, improve student comprehension, and help first-generation and rural learners confidently understand academic content. It makes dense textbook material more accessible and student-friendly by simplifying complex language into clear, digestible explanations.

Unique features:

- Simplifies dense textbook content into easy explanations.
- Especially helps students from under-resourced backgrounds.
- Supports glossary generation and visual analogies.
- Students can ask questions and get simplified answers instantly.
- Tailored for rural students and low-bandwidth environments.

END USERS

- School Students (especially from non-English-medium schools)
- First-generation Learners
- Rural and Semi-urban Educational Institutions
- Teachers creating easy study material
- NGOs working in education

RESULTS

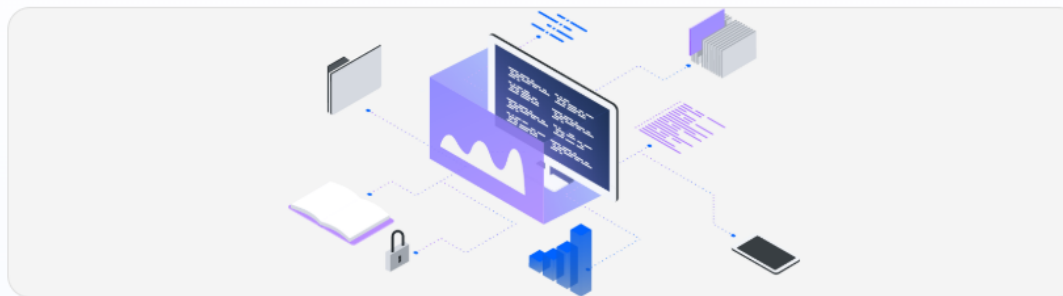
Agent preview



Simplification Agent 08:12 PM

Welcome to Simplification Agent

Hi there! I'm your study buddy. I simplify lessons and make learning clear, easy, and fun. Let's go



Type something...



RESULTS

The screenshot displays the IBM Watsonx Agent Lab interface. The top navigation bar includes the IBM Watsonx logo, a breadcrumb trail (Projects / Simplification Agent / Agent Lab), and user account information (Shreya Newaskar's Account, Dallas, and a profile icon). The main interface is divided into two primary sections: 'Build' on the left and 'Agent preview' on the right.

Build Section:

- Model:** Set to 'granite-3-3-8b-instruct'.
- LangGraph:** A dropdown menu for selecting the workflow.
- ReAct:** A dropdown menu for selecting the reasoning engine.
- Instructions:** A text area for defining the agent's instructions, with an 'Advanced configuration' link.
- Knowledge:** A section for adding vector indexes, currently showing '10th_Science_textbook' and a 'Clear chat' button.
- Tools:** A list of available tools with 'Add a tool' and 'Create custom tool' buttons. The 'Added tools (5)' list includes:
 - Google search: Retrieve information from the internet with the Google search engine.
 - DuckDuckGo search: Retrieve information from the internet with the DuckDuckGo search engine.
 - Wikipedia search: Retrieve information from Wikipedia articles.
 - Document search - 10th_Science_textbook: Search documents with vector indexes.
 - Webcrawler: Retrieve information from a website.

Agent preview Section:

This section shows the agent's responses to a user query. The user's message is: "Give me a roadmap to complete the chapter Life Processes step-by-step." The agent's response is a detailed, step-by-step roadmap for completing the chapter on "Life Processes" from a 10th-grade science textbook. The response is structured as follows:

- 1. Understand the Basics**
 - Begin by familiarizing yourself with the fundamental concept of life processes. These are the chemical reactions and physical changes that occur within living organisms to sustain life.
- 2. Explore the Key Concepts**
 - The chapter likely covers several key life processes, including nutrition, respiration, transportation, excretion, and reproduction. Make sure you understand each of these processes individually.
- 3. Nutrition**
 - Nutrition is the process by which living organisms take in food and use it for growth, repair, and energy. Look for sections in your textbook that explain different modes of nutrition (autotrophic, heterotrophic, saprophytic) and the process of digestion.
- 4. Respiration**
 - Respiration is the process of breaking down glucose (or other nutrients) to release energy. This can be further divided into cellular respiration (occurs inside the cell) and breathing (exchange of gases at the organism level).
- 5. Transportation**
 - This involves the movement of substances (like water, food, and gases) within the organism. In plants, this includes processes like transpiration and translocation. In animals, it involves the circulatory system.
- 6. Excretion**
 - Excretion is the process by which organisms get rid of waste products. This helps maintain the balance of materials inside their bodies.
- 7. Reproduction**
 - Reproduction is the process by which living organisms produce new individuals. This can be sexual (involving two parents) or asexual (involving one parent).

The interface also features a search bar at the bottom of the 'Agent preview' section with the placeholder text "Type something...".

RESULTS

The screenshot displays the IBM Watsonx Agent Lab interface. The top navigation bar includes the IBM Watsonx logo, a 'Share feedback' button, a '6' badge, an 'Unsaved' status indicator, a 'New agent +' button, and a 'Deploy' button. The main interface is divided into two panels: 'Build' on the left and 'Agent preview' on the right.

Build Panel:

- Configuration:** Framework is set to 'LangGraph' and Architecture is set to 'ReAct'.
- Instructions:** The instruction text reads: "You are a course content simplification agent. Use the uploaded 10th-grade science textbook as your knowledge base. When the user asks a question, first search the textbook using the Document Search tool. Always provide simplified, student-friendly explanations of the results." A link for 'Advanced configuration' is available.
- Knowledge:** A vector index named '10th_Science_textbook' is listed. A 'Clear chat' button is present.
- Tools:** There are buttons for 'Add a tool' and 'Create custom tool'.
- Added tools (1):** A tool named 'Document search - 10th_Science_textbook' is listed with the description 'Search documents with vector indexes.'

Agent preview Panel:

- User:** "You: 04:31 PM" - "List all formulas related to 'Electricity' in the textbook"
- Simplification Agent:** "04:31 PM" - "I have searched the 10th-grade science textbook for formulas related to 'Electricity'. Here are the formulas I found:"
 - 1. Ohm's Law: $V = IR$, where V is voltage, I is current, and R is resistance.
 - 2. Power Formula: $P = VI$, where P is power, V is voltage, and I is current.
 - 3. Resistance Formula: $R = \rho L/A$, where R is resistance, ρ is resistivity, L is length, and A is the cross-sectional area of the conductor.
 - 4. Energy Formula: $E = Pt$, where E is energy, P is power, and t is time.
 - 5. Electrical Charge Formula: $Q = It$, where Q is charge, I is current, and t is time.
- Agent Note:** "Please note that these formulas are simplified explanations from the textbook."
- Follow-up:** "► How did I get this answer?"

The bottom of the screen shows a Windows taskbar with the date and time as 16:31 on 03-08-2025, and the weather as 29°C Partly sunny.

RESULTS

The screenshot displays the IBM Watsonx Agent Lab interface in a web browser. The browser's address bar shows the URL: `dataplatfom.cloud.ibm.com/wx/agents?context=wx&project_id=fc5d6c09-ec77-4e99-94ba-3e4fa2c99217`. The page header includes the IBM Watsonx logo, an 'Upgrade' button, a user profile for 'Shreya Newaskar's Account', and location settings for 'Dallas'. The main navigation bar shows 'Projects / Simplification Agent / Agent Lab' and buttons for 'Share feedback', 'Unsaved', 'New agent', and 'Deploy'.

The interface is split into two main sections: 'Build' and 'Agent preview'.

Build Section:

- Model:** Set to 'granite-3-3-8b-instruct'.
- Setup:**
 - Name:** 'Simplification Agent'
 - Description:** 'Hi there! I'm your study buddy. I simplify lessons and make learning clear, easy, and fun. Let's go' (100/100 characters).
 - Icon:** A blue circular icon with a white brain-like shape.
 - Placeholder image:** A 3D illustration of a computer monitor displaying code, with a folder and a document icon nearby.
 - Quick start questions:** A section with the text 'Add up to 4 quick start questions that your users can select.'
 - Configuration:**
 - Framework:** 'LangGraph'
 - Architecture:** 'ReAct'

Agent preview Section:

- User:** 'You: 03:00 PM' asks 'What does "photosynthesis" mean in simple terms?'
- Simplification Agent:** '03:00 PM' responds with a detailed explanation of photosynthesis: 'Photosynthesis is the process by which plants make their own food. They use sunlight, water from the soil, and carbon dioxide from the air to create oxygen and energy in the form of sugar. This sugar is used by the plant for growth. You can think of it like a plant's way of eating and breathing all at once.'
- Glossary:**
 - Sunlight:** Energy from the sun.
 - Water:** A liquid that is essential for life.
 - Carbon Dioxide:** A gas that plants use for photosynthesis and that we exhale.
 - Oxygen:** A gas that plants release and that we need to breathe.
 - Sugar:** A type of carbohydrate that provides energy.
- How did I get this answer?:** A button to view the reasoning behind the answer.
- Input field:** A text box with the placeholder 'Type something...'

RESULTS

Deployed AI Agent

The screenshot displays the IBM Watsonx Simplification Agent interface in a web browser. The browser's address bar shows the URL: `dataplatfrom.cloud.ibm.com/ml-runtime/deployments/e7953511-5094-4170-bc16-81a13e358176/chat?space_id=83e0551c-d997-4311-8d0d-4eadcff20881&context=wx&flush=true`. The page title is "Simplification Agent" with a status of "Deployed" and "Online". The interface includes tabs for "API reference", "Test", and "Preview", with the "Preview" tab selected. A "New chat" button is located in the top right corner. The chat history shows a user query at 08:06 PM: "What are acids, bases, and salts? Give definitions and examples .". The agent's response, also at 08:06 PM, is titled "Acids, Bases, and Salts: Definitions and Examples". The response text states: "Acids, bases, and salts are fundamental concepts in chemistry, particularly within the study of chemical reactions. Let's break down each term with definitions and examples:". It then defines "Acids" with a definition and examples. The examples listed are: 1. Hydrochloric Acid (HCl), 2. Citric Acid (C₆H₈O₇), and 3. Acetic Acid (CH₃COOH). The interface also features a "Bases" section and a text input field at the bottom with the placeholder "Type something...". The bottom of the screen shows a Windows taskbar with the date and time as 2007-03-08-2025.

Deployment spaces / Simplification_Agent / Simplification Agent /

Simplification Agent Deployed Online

API reference Test **Preview**

New chat +

You 08:06 PM
What are acids, bases, and salts? Give definitions and examples .

Simplification Agent 08:06 PM

Acids, Bases, and Salts: Definitions and Examples

Acids, bases, and salts are fundamental concepts in chemistry, particularly within the study of chemical reactions. Let's break down each term with definitions and examples:

Acids

Definition: An acid is a substance that donates protons (H⁺ ions) when dissolved in water. This ability to donate protons gives acids their characteristic sour taste and the ability to react with metals, producing hydrogen gas.

Examples:

1. **Hydrochloric Acid (HCl):** Commonly found in stomach acid and used in laboratories for various reactions.
 - Reaction with a metal like zinc: $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$ (hydrogen gas is produced)
2. **Citric Acid (C₆H₈O₇):** Present in citrus fruits like lemons and oranges, giving them a sour taste. Used as a preservative and flavoring agent in foods.
3. **Acetic Acid (CH₃COOH):** The main component of vinegar, responsible for its sharp, sour flavor.

Bases

Type something...

CONCLUSION

- The agent can simplify textbook content, generate easy-to-understand summaries, and explain difficult concepts step-by-step.
- It helps students learn independently by converting complex academic language into clear, student-friendly explanations.
- By reducing reliance on teachers for every topic, it empowers first-generation and rural learners to bridge the comprehension gap.
- The system improves academic performance, boosts student confidence, and promotes equal access to education.

FUTURE SCOPE

- Multilingual support for regional languages
- Teacher dashboard for tracking student questions
- Gamified learning mode for better engagement
- Integration with educational portals and LMS platforms
- Use AI to track where students struggle most and recommend personalized learning plans.
- Include diagrams and AI-generated visuals for better understanding of complex topics.

IBM CERTIFICATIONS

In recognition of the commitment to achieve
professional excellence



Shreya Newaskar

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence

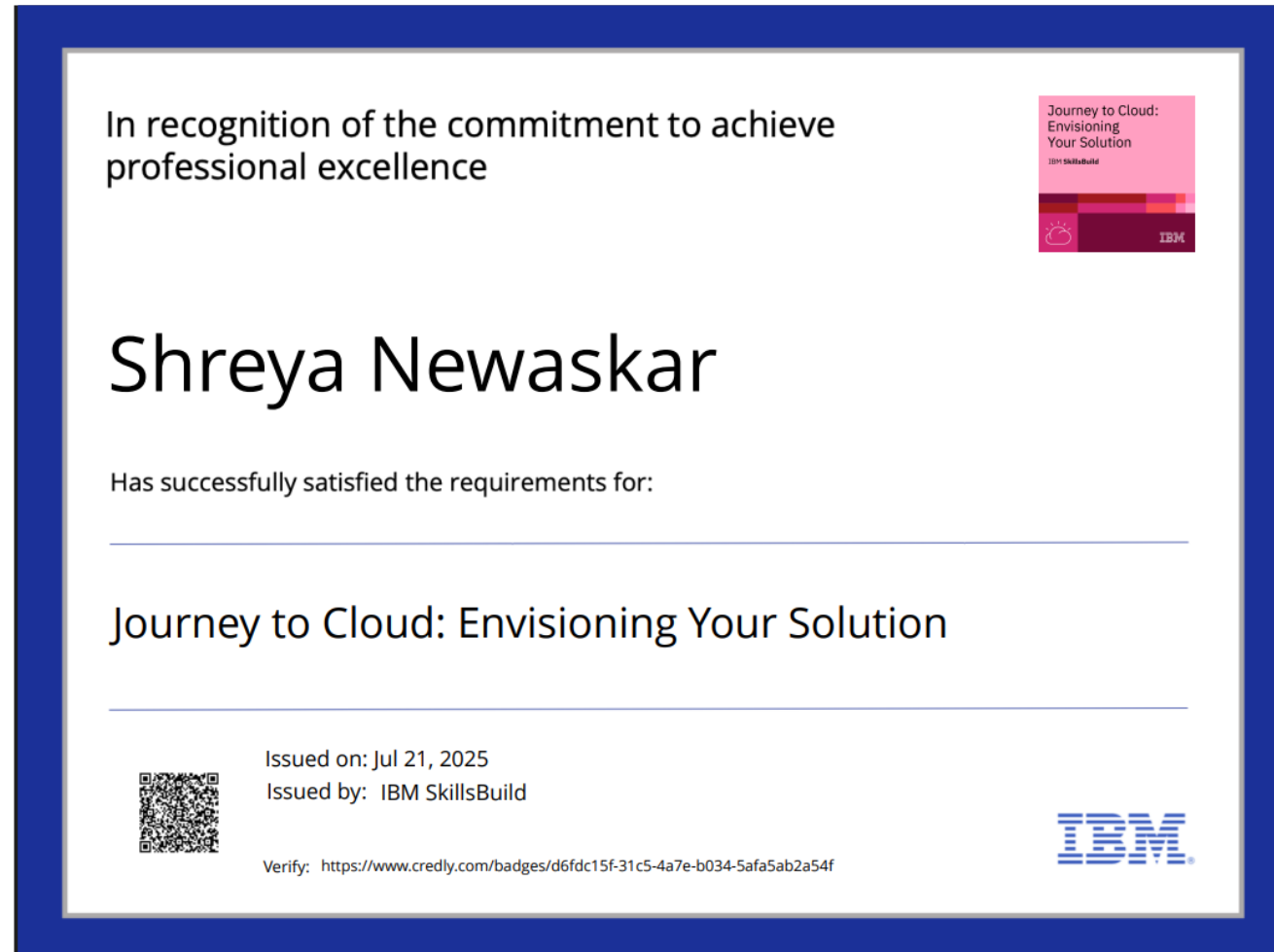


Issued on: Jul 16, 2025
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Completion Certificate



This certificate is presented to

Shreya Newaskar

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 21 Jul 2025 (GMT)

Learning hours: 20 mins

GITHUB LINK

- Git hub link : <https://github.com/shreyanewaskar/Simplification-Agent>



THANK YOU