
CAPSTONE PROJECT

AGENTIC AI FOR PERSONALIZED COURSE PATHWAYS.

Presented By:
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OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach (Technology Used)
- Process
- Result (Output Image)
- Conclusion
- Future Scope
- References

PROBLEM STATEMENT

Students often struggle to identify the right learning path that aligns with their interests and long-term goals due to the overwhelming number of online courses and a lack of personalized guidance. LearnMate aims to solve this by acting as an Agentic AI coach that interacts with students, understands their interests (like Frontend Development, Cybersecurity, UI/UX Design, etc.), assesses their current skill level, and dynamically builds a personalized course roadmap that adapts over time based on progress and preferences.

PROPOSED SOLUTION

- The proposed system aims to address the challenge of guiding students toward the right learning pathway aligned with their interests and career goals. LearnMate utilizes IBM Watsonx's Agentic AI capabilities to create a dynamic, personalized learning roadmap. The solution includes the following components:
- Agent Design & Configuration:
 - Create a dedicated AI agent using Watsonx Agent Lab (Beta) within IBM Cloud.
 - Configure the agent with tailored instructions to act as a course roadmap mentor.
 - Set interaction tokens to 500 for smooth, multi-turn conversations.
- Instruction-Based Interaction Logic :
 - Provide detailed instructions guiding the agent to:
 - Feature engineering to extract relevant features from the data that might impact bike demand.
 - Collect user inputs
 - Respond with structured, adaptive learning roadmaps
 - Recommend courses, certifications, and tools dynamically
- Dynamic Response Generation: When a user queries the agent:
 - Analyzes input context
 - Builds a multi-phase learning plan
 - Suggests tools, platforms , certifications
 - Follows up with clarification questions to refine guidance
- Deployment:
 - Hosted and executed within the IBM Watsonx.ai platform, eliminating the need for external compute infrastructure.
 - Takes advantage of IBM's Granite models and cloud scalability.
- Continuous Adaptation :
 - Future versions may include:
 - User profile memory or Cloudant integration to track progress
 - Integration with course APIs for live recommendations

SYSTEM APPROACH

- **System requirements :**
 - IBM Cloud account
 - Access to Watsonx.ai (Agent Lab – Beta)
 - Internet connection and web browser
- **Tools Used :**
 - Watsonx.ai
 - Agent Lab (Beta)
 - Granite Foundation Models (LLMs)
 - Prompt instructions
- **Methodology :**
 - Created a project and AI agent in Watsonx.ai
 - Gave custom instructions to act as a course mentor
 - Agent takes user interests & skills, and generates a learning path

PROCESS

IBM watsonx

?

🔔

Pagolu Sravya's Account ▾

Dallas ▾

PS

Create a project

Start with a new, blank project or select from where to import an existing project.

+ New

📁 Local file

📄 Sample

Name

LearnMate_agent

Description (optional)

LearnMate is an **Agentic** AI-powered coach that helps students find the right online learning path based on their interests and skill level. Using IBM Granite and IBM Cloud Lite, it creates **personalized** course roadmaps that adapt over time as users progress and update their preferences.

Tags (optional)

Add tags

Add tags to make projects easier to find. To add tags, separate them with commas and press Enter.

Storage

Cloud Object Storage-ze

Project includes integration with [Cloud Object Storage](#) for storing project assets.

Advanced settings ▾

Cancel

Create

PROCESS

Associate service

Choose an existing or add a new service to associate with your project.

1 x Default 2 x Locations

Find services [New service](#)

Name	Type	Plan	Location	Status	Group
<input checked="" type="checkbox"/> watsonx.ai Runtime-dx ⓘ	watsonx.ai Runtime	Lite	Dallas	Not associated	Default

Create a deployment space

Use a space to collect assets in one place to create, run, and manage deployments

New

Local file

Define details

Name

LearnMate

Description (Optional)

This is for LearnMate_Agent

Deployment stage ⓘ

Development

Tags (optional)

Find or create tags

Add tags to make assets easier to find

Storage

Cloud Object Storage-ze

RESULT

IBM watsonx

Upgrade ? Bell Pagolu Sravya's Account Dallas PS

Projects / LearnMate_agent / watsonx Agent Share feedback Autosaved 6:13 PM New agent + Deploy

Build

AI Model: llama-3-3-70b-instruct

Framework Architecture

LangGraph ReAct

Instructions Advanced configuration

You are a personalized course guidance agent named LearnMate. Your role is to act like a helpful career mentor who builds custom learning roadmaps for students based on their goals, skill levels, and preferences.

Knowledge

Tools

Add a tool Create custom tool

Added tools (4)

Google search

Retrieve information from the internet with the Google search engine.

DuckDuckGo search

Retrieve information from the internet with the DuckDuckGo search engine.

Model parameters

You can edit parameters only when the conversation has been cleared in chat mode. Clear chat

Frequency penalty -2 2 0

Presence penalty -2 2 0

Temperature 0 2 0

Top P (nucleus sampling) 0.01 1 1

Max tokens 500

Random seed

Agent preview

PS You: 06:13 PM

I'm interested in cybersecurity, I'm a beginner, and I have 2 years to become a professional. What should I do?

watsonx Agent 06:13 PM

To become a professional in cybersecurity within 2 years, I recommend starting with foundational knowledge and building your way up. Here's a suggested roadmap:

1. Begin with online courses and certifications:

- CompTIA Security+
- Certified Information Systems Security Professional (CISSP)
- Cybersecurity Fundamentals: Learn about threats, vulnerabilities, attacks, and security controls.

2. Gain practical experience:

- Build a Phishing Attack Simulator Project
- Participate in cybersecurity projects and challenges on platforms like TryHackMe, GitHub, or Coursera.

3. Stay updated with the latest trends and news:

- Follow cybersecurity blogs, podcasts, and YouTube channels, such as Cyber with Ben.
- Join online communities, like Reddit's r/cybersecurity, to network with professionals and learn from their experiences.

Type something...

RESULT

IBM watsonx
LearnMate_agent

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Projects / LearnMate_agent / watsonx Agent Share feedback Autosaved 7:50 PM New agent Deploy

Build

AI Model: llama-3-3-70b-instruct

Framework: LangGraph Architecture: ReAct

Instructions: You are a personalized course guidance agent named LearnMate. Your role is to act like a helpful career mentor who builds custom learning roadmaps for students based on their goals, skill levels, and preferences.

Knowledge

Tools: Add a tool Create custom tool

Added tools (4): Google search, DuckDuckGo search

Model parameters

You can edit parameters only when the conversation has been cleared in chat mode. Clear chat

Frequency penalty: -2 to 2 (0)

Presence penalty: -2 to 2 (0)

Temperature: 0 to 2 (0)

Top P (nucleus sampling): 0.01 to 1 (1)

Max tokens: 500

Random seed

Agent preview

PS You: 07:49 PM
I want to learn both Cybersecurity and Frontend Development. Please make a 2-year learning plan for me. I'm a beginner. Show me what to learn first, which courses to take, and how to balance both topics.

watsonx Agent 07:49 PM
Based on the search results, here is a suggested 2-year learning plan for Cybersecurity and Frontend Development:
Year 1:

- Month 1-3: Learn the basics of Frontend Development (HTML, CSS, JavaScript) through online courses such as FreeCodeCamp, Codecademy, or Udemy.
- Month 4-6: Learn the basics of Cybersecurity (network security, cryptography, threat analysis) through online courses such as Coursera, edX, or Udemy.
- Month 7-9: Build projects that combine Frontend Development and Cybersecurity, such as a secure web application or a phishing simulator.
- Month 10-12: Take advanced courses in Frontend Development (React, Angular, Vue) and Cybersecurity (penetration testing, incident response).

Year 2:

- Month 1-3: Learn advanced topics in Cybersecurity (cloud security, artificial intelligence, machine learning) through online courses or boot camps.
- Month 4-6: Learn advanced topics in Frontend Development (web performance optimization, accessibility, progressive web apps) through online courses or boot camps.

Type something...







RESULT

Deployment spaces /

LearnMate

Overview Assets **Deployments** Jobs Manage

  Search

Name		Type	Status	Asset	Asset type	Tags	Last modified
	watsonx Agent	Online	 Deployed	watsonx Agent	Ai service	wx-agent 	4 minutes ago Pagolu Sravya (You)
	watsonx Agent	Online	 Deployed	watsonx Agent	Ai service	wx-agent 	4 minutes ago Pagolu Sravya (You)

RESULT

IBM watsonx

Upgrade ? Bell

Pagolu Sravya's Account Dallas PS

Deployment spaces / LearnMate / watsonx Agent /

watsonx Agent Deployed Online

API reference Test **Preview**

New chat +

P

You 09:35 PM

i want to ace in digital forensics ,but im at beginner level,i want a roadmap for a year to be professional

watsonx Agent 09:35 PM

To create a personalized roadmap for becoming a professional in digital forensics within a year, we need to consider several factors such as your current skill level, available time, and learning goals. Since you're a beginner, we'll start with the basics and gradually move on to more advanced topics.

Here's a suggested roadmap for the next 12 months:

Month 1-3: Foundations

- Learn the basics of computer systems, networking, and operating systems (Windows, Linux, macOS)
- Familiarize yourself with digital forensics concepts, tools, and techniques
- Start with online courses or tutorials that introduce digital forensics, such as:
 - CompTIA Security+ or Cybersecurity Fundamentals
 - SANS Cyber Aces Online Course
 - Digital Forensics Course on Udemy or Coursera

Type something...

About this deployment

Name

watsonx Agent

Description

Change this description to reflect your particular agent

Deployment Details

Deployment ID: 8b48236d-db0a-46...

Serving name:
No serving name.

Software specification:
runtime-24.1-py3.11

Hardware specification:
Extra extra small: 1 CPU and 2 GB RAM

Copies:
1

Tags

wx-agent

Associated asset

watsonx Agent

bb964968-4406-418d-9ead-ce96cfac9b40

Last modified

3 hours ago

Created on

RESULT

Month 4-6: Digital Forensics Tools and Techniques

- Learn about popular digital forensics tools such as:
 - EnCase
 - FTK (Forensic Toolkit)
 - Volatility
 - Autopsy
- Practice using these tools on virtual machines or sandbox environments
- Study techniques for:
 - Disk imaging and analysis
 - File system analysis
 - Network traffic analysis
 - Malware analysis

Month 7-9: Advanced Topics

- Dive deeper into specialized areas of digital forensics, such as:
 - Mobile device forensics
 - Cloud forensics

- Cloud forensics
- Network forensics
- Reverse engineering
- Learn about industry-standard frameworks and methodologies, such as:
 - NIST Cybersecurity Framework
 - ISO 27037:2012 (Digital forensics)
- Participate in online communities, forums, or social media groups to stay updated on the latest developments and best practices

Month 10-12: Practical Experience and Certification

- Apply your knowledge by working on real-world cases or participating in capture-the-flag (CTF) challenges
- Prepare for professional certifications, such as:
 - Certified Digital Forensics Examiner (CDFE)
 - Certified Forensic Computer Examiner (CFCE)
 - GIAC Certified Forensic Analyst (GCFA)
- Join online platforms, such as HackerRank or Cybrary, to practice and demonstrate your skills

CONCLUSION

- **The LearnMate Agentic AI system effectively addresses the challenge students face in selecting suitable learning paths by providing personalized and adaptive course recommendations. Through interactive prompts and dynamic guidance, the AI coach understands user's interests, evaluates their skill levels, and designs a tailored roadmap that evolves with progress. While implementation using Watsonx Agent Lab was smooth, some limitations were observed in handling very specific or mixed-domain requests, which can be improved with richer datasets and advanced prompt engineering. Overall, LearnMate demonstrates how Agentic AI can transform online learning by offering clarity, personalization, and direction to students navigating vast educational choices.**

FUTURE SCOPE

- The LearnMate AI system can be further enhanced by integrating more user data such as past performance, learning preferences, and goals to improve personalization. Future updates may include support for multiple languages, regional content alignment, and real-time progress tracking. Incorporating advanced technologies like edge computing could help deliver faster and more localized responses. Additionally, integrating more powerful models or plugins may allow LearnMate to provide deeper domain-specific guidance and support across diverse fields such as cybersecurity, frontend development, and more. This expansion could help the system serve a wider audience across cities and educational platforms.

REFERENCES

- IBM watsonx.ai Documentation – <https://www.ibm.com/docs/en/watsonx>
- IBM Cloud – Building AI Agents with Agent Lab
- Google AI – *Responsible AI Practices* – <https://ai.google/responsibilities/responsible-ai-practices>

IBM CERTIFICATIONS

In recognition of the commitment to achieve
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Pagolu Sravya

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



Issued on: Jul 19, 2025

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IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Pagolu Sravya

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 24 Jul 2025 (GMT)

Learning hours: 20 mins



THANK YOU