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# CAPSTONE PROJECT

## LIBRARY AI AGENT

Presented By:

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# OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach
- Algorithm & Deployment
- Result
- Conclusion
- Future Scope
- References

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# PROBLEM STATEMENT

In academic environments, students often face difficulties in locating the most relevant learning resources from vast library collections. Manual search is time-consuming and inefficient.

The challenge is to build an **AI-powered Library Agent** that understands student needs, analyzes academic data like course syllabus and topics, and suggests the most suitable books.

The system should also handle real-time availability, prioritization of high-demand titles, and assist in reservations or waitlists..

# PROPOSED SOLUTION

The proposed system is a Library AI Agent that:

- Uses **Natural Language Processing (NLP)** to understand student queries.
- Analyzes **user profiles, course syllabi, and study topics**.
- Recommends books/resources from the library database.
- Tracks real-time book availability and manages reservations or waitlists.
- Personalizes recommendations to enhance academic efficiency and engagement.

# SYSTEM APPROACH

## System Requirements:

- IBM Cloud (mandatory)
- IBM Watson/NLP (Granite)
- IBM Cloud Object Storage for dataset handling

## Libraries/Tools:

- IBM Granite LLM
- Watson NLP Services

# ALGORITHM & DEPLOYMENT

## Algorithm:

- NLP-based semantic similarity and intent classification
- Query processing with IBM Granite
- Rule-based & AI-based recommendation ranking
- Book prioritization based on availability and demand

## Deployment:

- Hosted on IBM Cloud Lite
- NLP queries handled by IBM Granite or Watson

# RESULT

IBM watsonx

Upgrade ⓘ 🔔

Abinaya Arumugam's Acco... ▾

Dallas ▾

AA ⋮

Projects / Library\_AI\_Agent / watsonx Agent

Share feedback β Autosaved 8:32 PM 📁 ▾ New agent + Deploy 🔗 🔒 ⓘ

Build

AI Model: granite-3-3-8b-instruct ▾ ⚙️ <

Setup

Configuration

Framework Architecture

LangGraph ▾ ReAct ▾

Instructions [Advanced configuration](#)

You are a helpful AI Library Assistant. Use the uploaded library database to answer student queries about books, such as availability, category, recommended courses, or most in-demand books. Always respond in simple and clear sentences.

Knowledge

Vector index [Clear chat](#)

library\_dataset ▾

If you want to add a vector index to the agent, clear the agent preview chat.

Tools

Add a tool Create custom tool

Added tools (6)

Agent preview

AA You: 08:31 PM

Is the book "Artificial Intelligence: A Modern Approach" available in the library?

🤖 watsonx Agent 08:31 PM

The book "Artificial Intelligence: A Modern Approach" is not listed in the library's current catalog. It seems to be a popular textbook in the field of Artificial Intelligence, often assigned in university courses. If you're looking for resources on this topic, I can suggest some alternatives from our collection.

▶ How did I get this answer?

AA You: 08:32 PM

Can you recommend books for Data Structures?

🤖 watsonx Agent 08:32 PM

Sure, here are some highly recommended books on Data Structures:

1. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.
2. "Data Structures and Algorithms Made Easy" by Narasimha Karumanchi.
3. "The Algorithm Design Manual" by Steven S. Skiena.

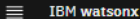
These books cover a wide range of data structures and algorithms, suitable for both beginners and more advanced learners.



▶ How did I get this answer?

🔄

Type something... 🔍 ➤

# RESULT



UpgradeAbinaya Arumugam's Acco...

Dallas


AA

Deployment spaces / Library\_agent\_deployment / watsonx Agent


watsonx Agent ✓ Deployed Online

API referenceTestPreview

New chat +

You 09:44 AM

Suggest me books for Operating Systems.

watsonx Agent 09:44 AM

Based on the information from the library database, here are some recommended books for learning about Operating Systems:

1. "Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne. This book is widely used as a text in undergraduate operating systems courses. It covers fundamental concepts and provides a comprehensive overview.
2. "Modern Operating Systems" by Andrew S. Tanenbaum. This book is known for its clear and concise explanations and is often used in university courses. It covers a wide range of topics, including process management, memory management, file systems, and security.
3. "Operating Systems: Three Easy Pieces" by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau. This book is available for free online and is praised for its clarity and depth. It covers the three core areas of operating systems: processes, memory, and file systems.
4. "Operating Systems: Design and Implementation" by Andrew S. Tanenbaum and Albert S. Woodhull. This book is unique because it also includes a detailed description of the Minix operating system, which is used in the accompanying course at Vrije Universiteit in Amsterdam.
5. "The Design of the UNIX Operating System" by Maurice J. Bach. This book is a classic in the field and provides an in-depth look at the UNIX operating system, which has greatly influenced many modern operating systems.

Remember to check the availability of these books in your library's catalog.



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# CONCLUSION

The **Library AI Agent** simplifies book discovery and saves students valuable time by offering personalized recommendations through AI and NLP. It enhances access to academic resources and improves student-library interaction. This solution demonstrates how combining **AI, NLP, and cloud technologies** can effectively address real-time educational challenges and boost learning efficiency.

# FUTURE SCOPE

- Multi-language NLP support
- Mobile application integration
- Voice-command-based search assistant
- Integration with e-learning platforms
- Expanded to university-wide or inter-library systems

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# REFERENCES

- IBM Watson NLP Docs
- IBM Granite AI Overview
- Research on Recommender Systems in Libraries
- Smart India Hackathon 2025 Problem Statement PDF

# IBM CERTIFICATIONS

In recognition of the commitment to achieve  
professional excellence



## Abinaya Arumugam

Has successfully satisfied the requirements for:

### Getting Started with Artificial Intelligence



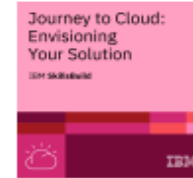
Issued on: Jul 18, 2025  
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# IBM CERTIFICATIONS

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to  
**Abinaya Arumugam**

for the completion of

**Lab: Retrieval Augmented Generation with  
LangChain**

(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 18 Jul 2025 (GMT)

**Learning hours:** 20 mins



# THANK YOU