CAPSTONE PROJECT

AGENTIC AI FOR PERSONALIZED COURSE PATHWAYS

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edunet foundation

OUTLINE

- Agentic AI for Personalized Course Pathways
- AGENTIC AI FOR CAREER
- IBM GRANITE 3-3-8-8 INSTRUCT
- DEPLOYED ON IBM WATSONX
- A ROADMAP TO STARTING YOUR CAREER
- BEST FOR FRESHERS WHO DON’T HAVE AN IDEA WHAT TO FOLLOW
- CAN BE EXPANDED USING THE COLLECTED DATA
- AGENTIC AI BY IBM CLOUD

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

- LearnMate can be developed as an intelligent, multi-platform application that leverages a Large Language Model (LLM) and a knowledge graph to deliver a highly personalized and adaptive learning experience. The core of the solution is an agentic AI that acts as a student's personal mentor.
- How It Works
- **Chat to Define Goals:** Students chat with an AI agent (powered by an LLM like Google Gemini) to define their interests (e.g., Cybersecurity, UI/UX Design) and long-term goals.
- **Assess Skill Level:** The AI assesses the student's current skill level—beginner, intermediate, or advanced—through the conversation or by generating short, targeted quizzes.
- **Generate a Dynamic Roadmap:** Using a **Knowledge Graph** that understands how skills relate to each other (e.g., JavaScript is needed for React), the system instantly builds a visual, step-by-step roadmap. This path is filled with curated courses from top online platforms like Coursera and edX.
- **Adapt and Evolve:** The roadmap is a living plan. It adapts based on the student's progress, feedback, and any changes in their interests, acting as a "GPS for their learning journey."
- Core Technology Stack
- **Artificial Intelligence:** Google Gemini API for conversational understanding and content generation.
- **Backend:** Python (Flask/Django) or Node.js.
- **Data:** PostgreSQL for user data and a **Graph Database (Neo4j)** for the skills knowledge graph.
- **Frontend:** React (for web) or Flutter (for mobile) to create a simple, conversational interface.
- Phased Rollout
- **Phase 1 (MVP):** Launch with a single learning path (e.g., Frontend Development) using a curated course list to prove the concept.
- **Phase 2 (AI Integration):** Expand to multiple learning paths, integrate the full AI chatbot, and automate course discovery.
- **Phase 3 (Adaptive Learning):** Enable roadmaps to automatically adapt to user progress and feedback, making the experience fully dynamic.

SYSTEM APPROACH

- The system approach for LearnMate is modular, data-driven, and centered on an adaptive feedback loop. Its primary goal is to provide personalized learning guidance, acting as an AI coach rather than a course hosting platform.
- The system is decomposed into distinct subsystems: a conversational **Frontend**, a central **Backend** for orchestration, an **AI Core** for intelligent decision-making, and a **Data Management** layer. This data layer uses specialized databases, including a **Knowledge Graph** that maps skill dependencies, to form the system's logical foundation.
- A typical workflow involves the user interacting with the AI on the frontend. The backend routes this to the AI Core, which queries the knowledge graph and course data to generate a personalized roadmap.
- Crucially, the system operates on a **feedback loop**: it continuously monitors user progress and feedback, evaluating performance to dynamically adapt the learning path. This ensures the guidance remains relevant and effective over time. This microservices-based approach allows for scalable cloud deployment and iterative development, starting with an MVP and evolving with user feedback.

ALGORITHM & DEPLOYMENT

- **Algorithm**
- LearnMate’s core algorithm begins by using an LLM to understand a user's goals from conversation. It then queries a **Knowledge Graph** to perform a skill-gap analysis, identifying the exact skills needed to achieve the user's objective. For each required skill, a recommendation engine uses semantic search and a ranking score to select the best-fit online course from its database.
- Critically, the system operates on an **adaptive feedback loop**. It constantly monitors user progress and feedback, dynamically adjusting the roadmap by suggesting new modules if a user struggles or their goals change, ensuring the path is always optimized.
- **Deployment**
- The deployment strategy uses a modern, scalable cloud architecture. Each application component is containerized using **Docker** and orchestrated with **Kubernetes** for automated scaling and high availability. The system is hosted on a major cloud platform like GCP or AWS.
- A **CI/CD (Continuous Integration/Continuous Deployment)** pipeline automates the entire release cycle—from code commit to testing and deployment—allowing for rapid updates with zero downtime. The entire infrastructure is monitored to ensure system health and performance.

RESULT

- **For the student,** the result is the end of "analysis paralysis." They would receive a clear, adaptive roadmap from an AI coach that boosts their confidence and learning efficiency. This personalized guidance ensures they stay motivated and on the most direct path to their career goals, drastically improving skill acquisition and course completion rates.
- **For the LearnMate platform,** this translates to a highly engaging product with strong user retention. The system would become a valuable asset, generating rich data on learning trends and skill demands. Built on a scalable architecture, the platform would be positioned for global growth from its base in India, with clear monetization strategies like premium subscriptions, affiliate partnerships, and corporate B2B solutions.
- **For the broader ed-tech market,** LearnMate would set a new standard, shifting the industry from static course catalogs to dynamic, AI-driven mentorship. It would democratize access to personalized career guidance, making effective online learning and career mobility more accessible to learners worldwide.

CONCLUSION

- Our proposed solution, LearnMate, is not just another app; it is a visionary system designed to act as a personal AI learning coach. By leveraging a powerful combination of a Large Language Model for conversational intelligence, a Knowledge Graph for logical reasoning, and a scalable microservices architecture for robust deployment, we have a clear technical path forward.
- The intended result is multi-faceted:
- For students, it provides clarity, confidence, and an optimized path to success.
- For the platform, it creates a highly defensible and valuable business with strong user retention.
- For the market, it sets a new standard for true personalization in educational technology.
- Ultimately, LearnMate represents the future of digital mentorship. From here, we have the strategy and vision to build a platform that can empower millions of learners across India and the globe, turning ambition into achievement, one personalized step at a time.

FUTURE SCOPE

- The platform can evolve by directly integrating with hiring platforms like LinkedIn, transforming completed roadmaps into verified skills and tangible job opportunities.
- The AI coach will become more empathetic, adapting to individual learning styles and predicting when users need support.
- Expansion is key: we will broaden into non-tech fields like finance and arts, and crucially, add support for vernacular languages to serve all of India. Finally, the platform can leverage its data to provide valuable skills intelligence reports for corporations.

REFERENCES

- Educational data mining and learning analytics: An updated survey

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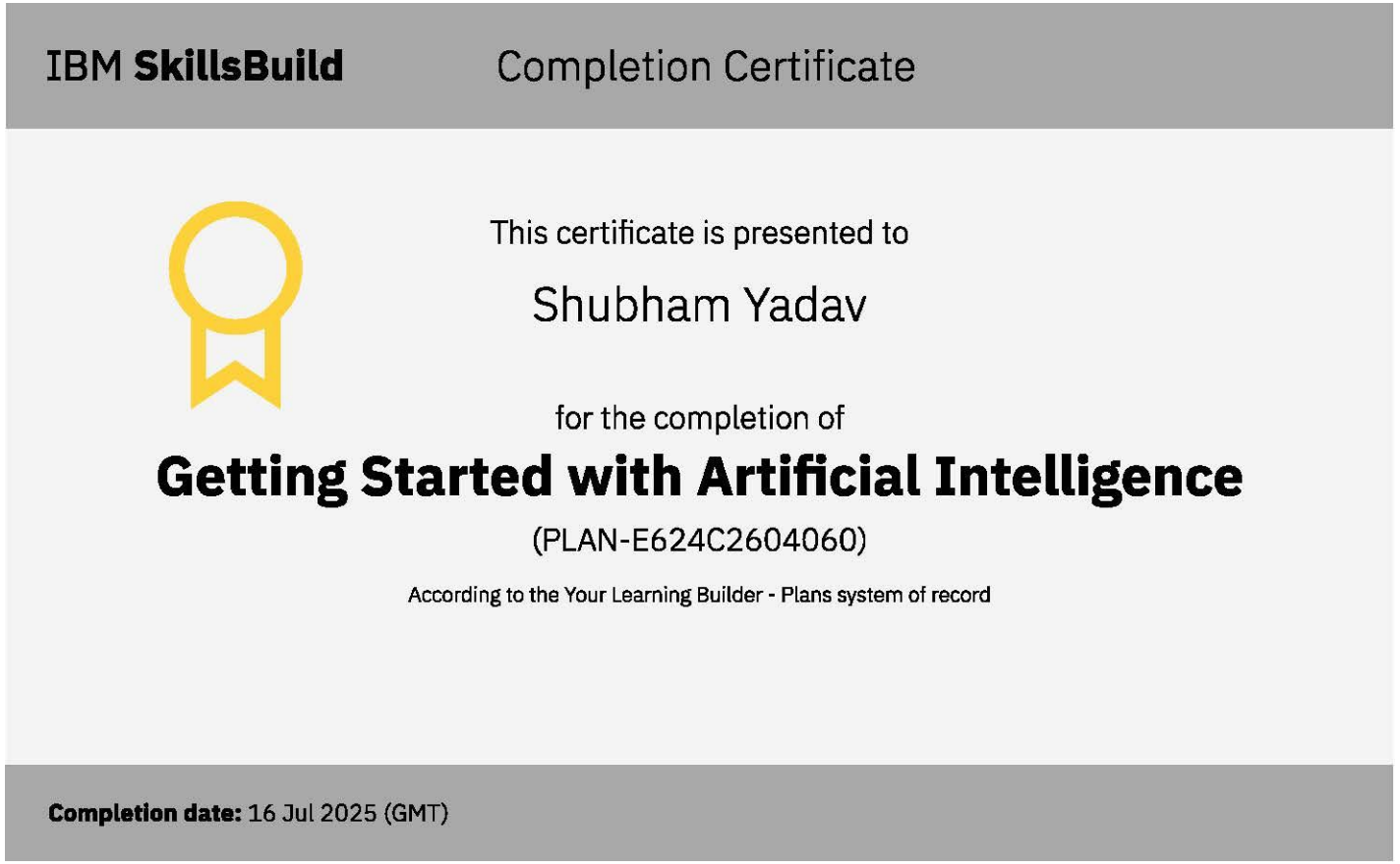

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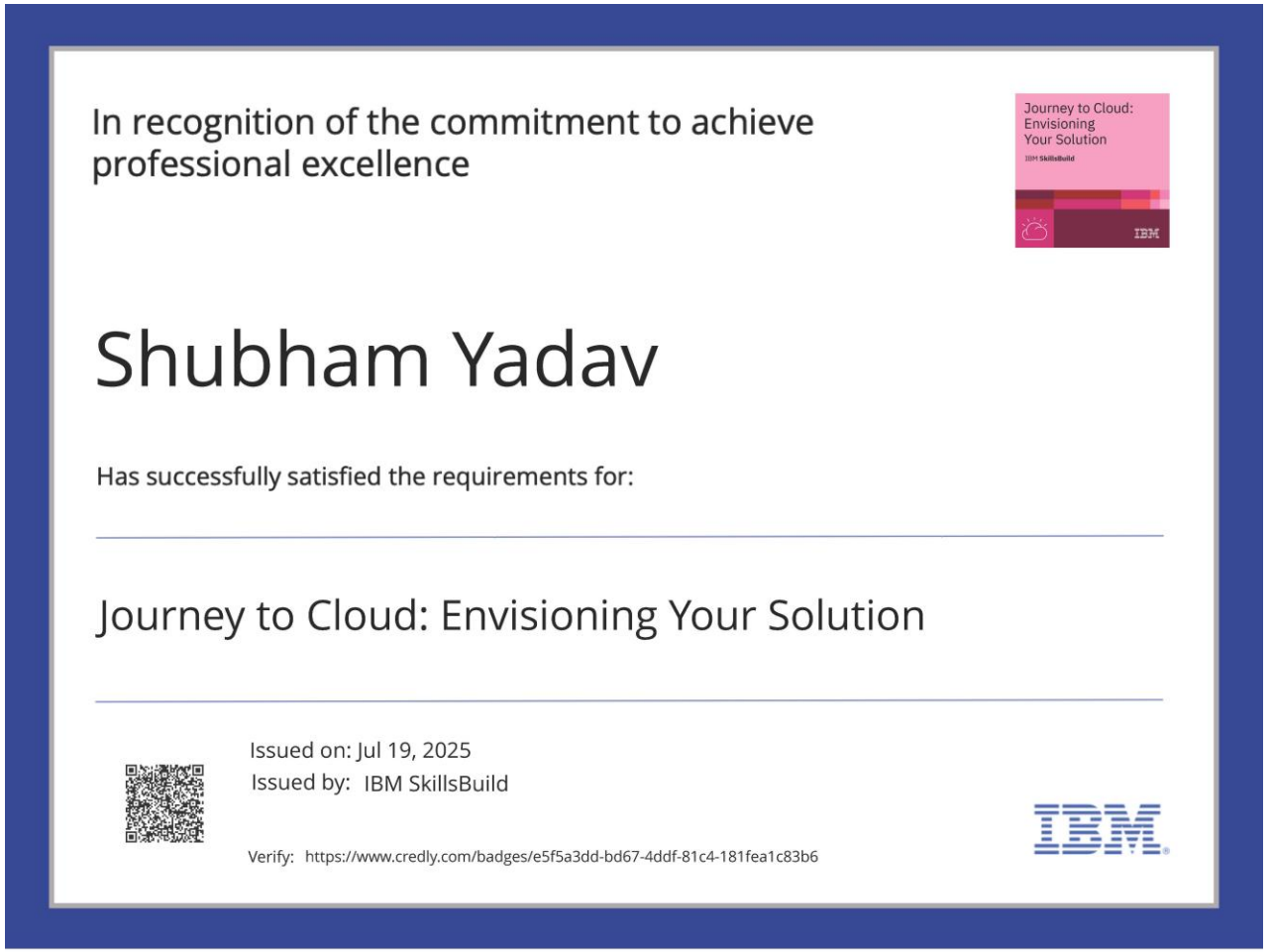

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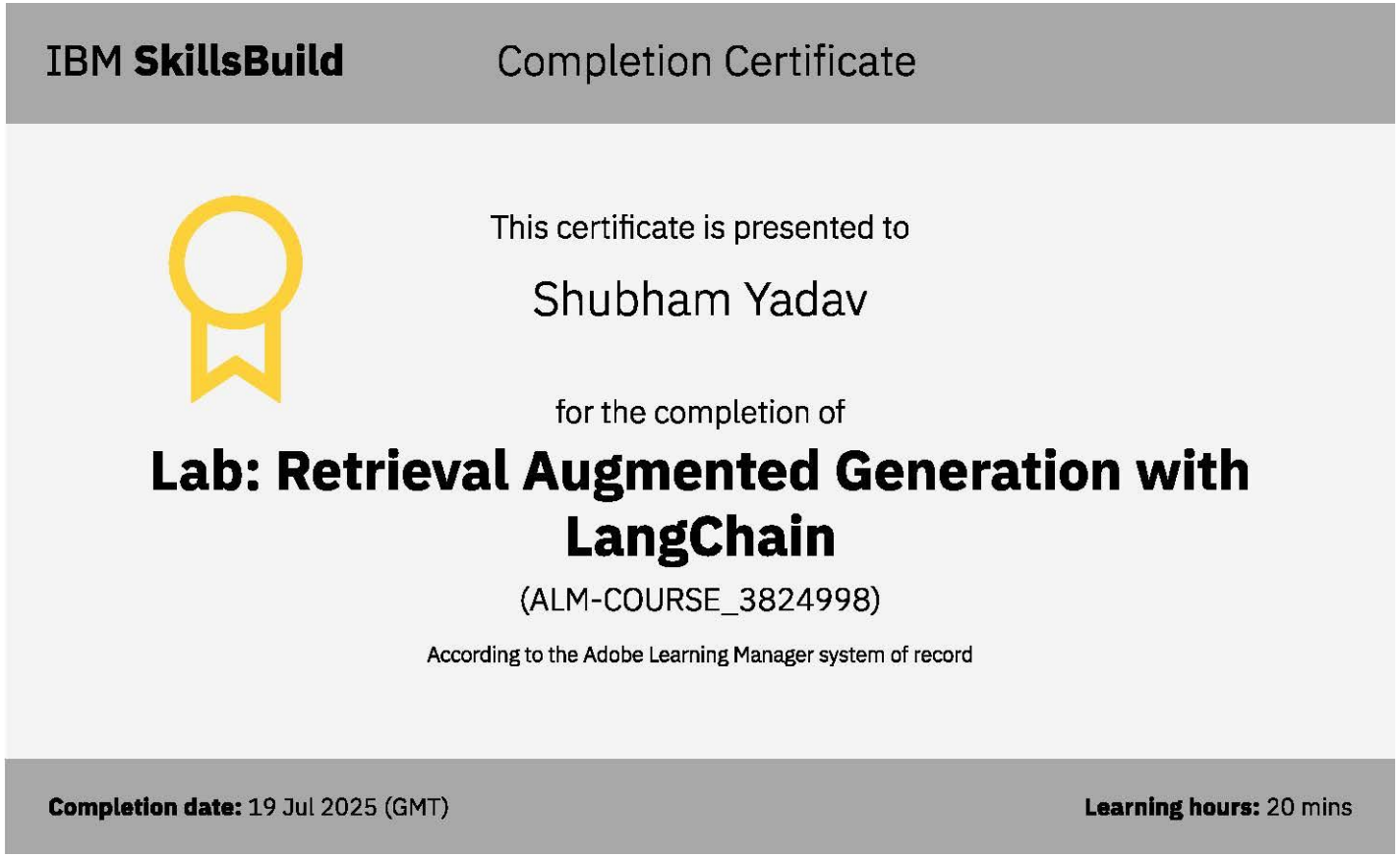

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Learning hours: 20 mins

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