Advancing Payroll Automation: A Robust AI-Powered Chatbot Leveraging RAG, Cosmos DB, and Azure OpenAI

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Abstract

Payroll management is a critical yet complex domain, often burdened with manual processes, data navigation challenges, and delayed insights. This paper presents an advanced AI-powered chatbot designed to revolutionize payroll automation by leveraging Retrieval-Augmented Generation (RAG), Cosmos DB, and Azure OpenAI. Integrated with a user-friendly portal, the chatbot enables clients and partners to seamlessly interact using natural language, eliminating the need for complex navigation or manual data retrieval. To ensure real-time, accurate, and context-aware responses, the system incorporates RAG for dynamic data integration from external knowledge bases, enhancing the chatbot's relevance and reliability. A monthly data synchronization mechanism with a vector database ensures the chatbot is continuously updated with the latest payroll processing information. Advanced token optimization strategies, using ContentMaxToken and RAGMaxToken variables, further enhance performance by overcoming token limitations and minimizing resource consumption. Security is paramount, with Azure Key Vault used to securely store and retrieve sensitive secrets. Cosmos DB serves as a highly scalable database for managing chat history and vectors, supporting diverse use cases such as real-time personalization, high throughput IoT data, and mission-critical workloads. A caching mechanism further reduces token usage and latency, improving the chatbot's overall efficiency.

Developed using ASP.NET Core 8, Angular v18, and Azure OpenAI, this robust architecture demonstrates the transformative potential of AI in streamlining payroll operations. The system offers a secure, scalable, and intelligent solution that enhances client engagement, accelerates decision-making, and redefines payroll automation for modern enterprises.

Keywords

Payroll Automation, Retrieval-Augmented Generation (RAG), AI-Powered Chatbots, Cosmos DB, Azure OpenAI, Secure Data Integration, Real-Time Data Synchronization.