

Leveraging Integrated Multimodal Databases with Vector Datatypes for Advancing Healthcare Solutions

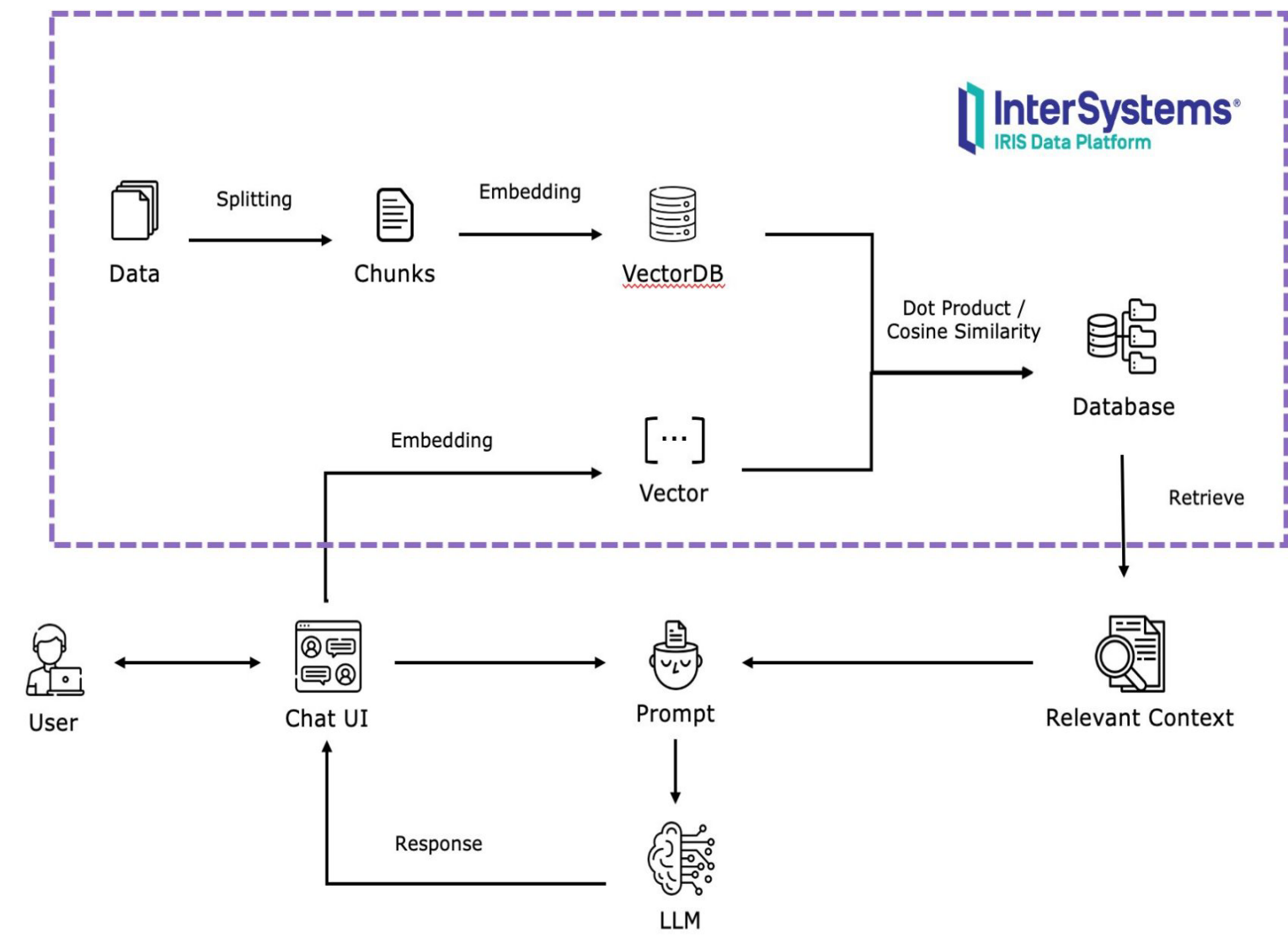
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Abstract

Integrating multimodal databases with vector datatypes in healthcare marks a significant advancement in database technology, providing a sophisticated framework for managing and analyzing diverse medical data. We introduce a fully integrated database utilizing vector datatypes to efficiently store, retrieve, and process complex datasets, thereby enhancing data interoperability and facilitating seamless cross-referencing. Implementing this within Retrieval-Augmented Generation (RAG) patterns substantially improves the user experience for clinicians. The solution design resolves security, accuracy, auditability, and data privacy concerns that challenge real-world healthcare deployments.

RAG applications

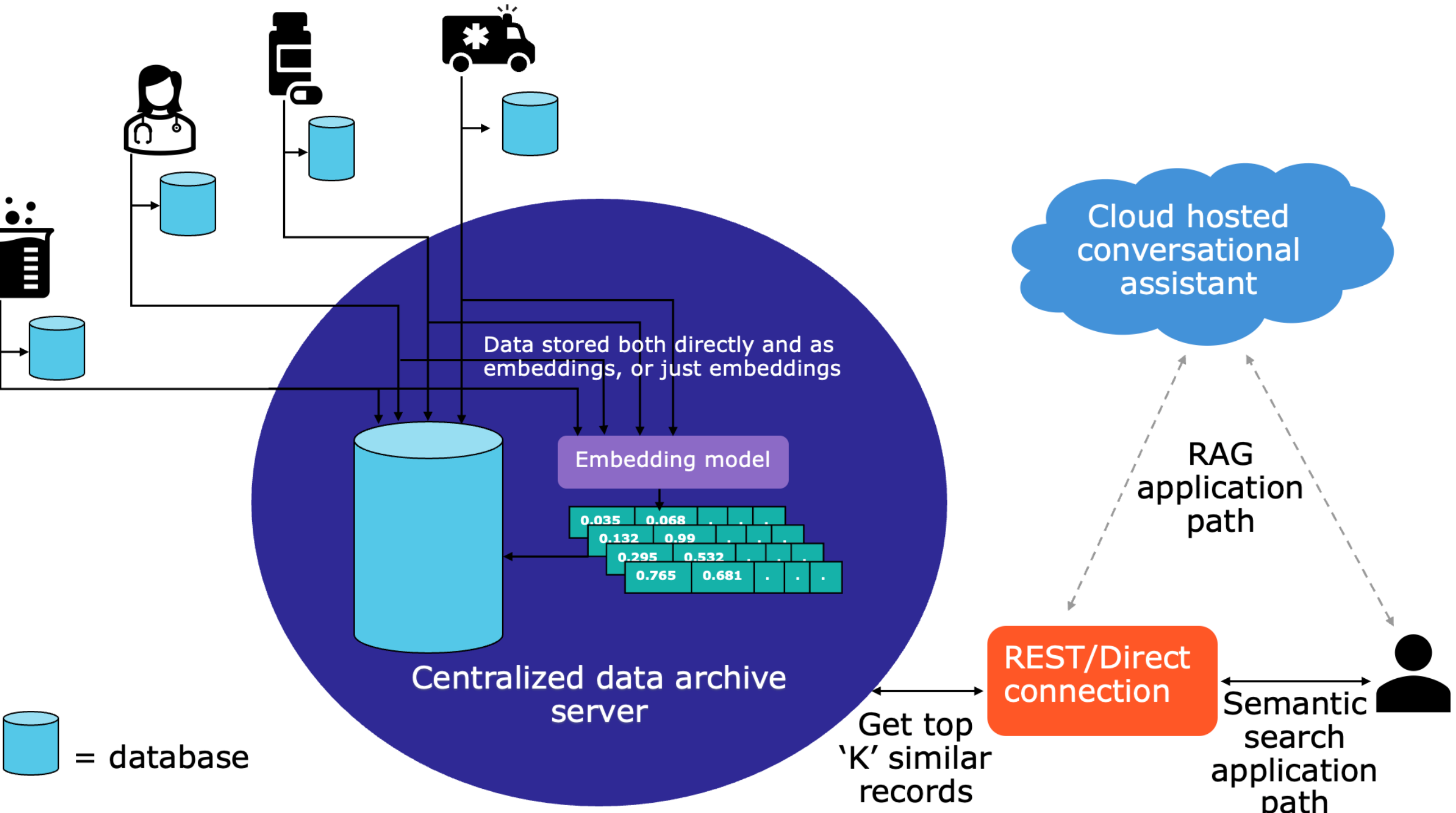
Vector Databases are increasingly used in retrieval augmented generation (RAG). A typical RAG workflow looks as follows:



Solution Design

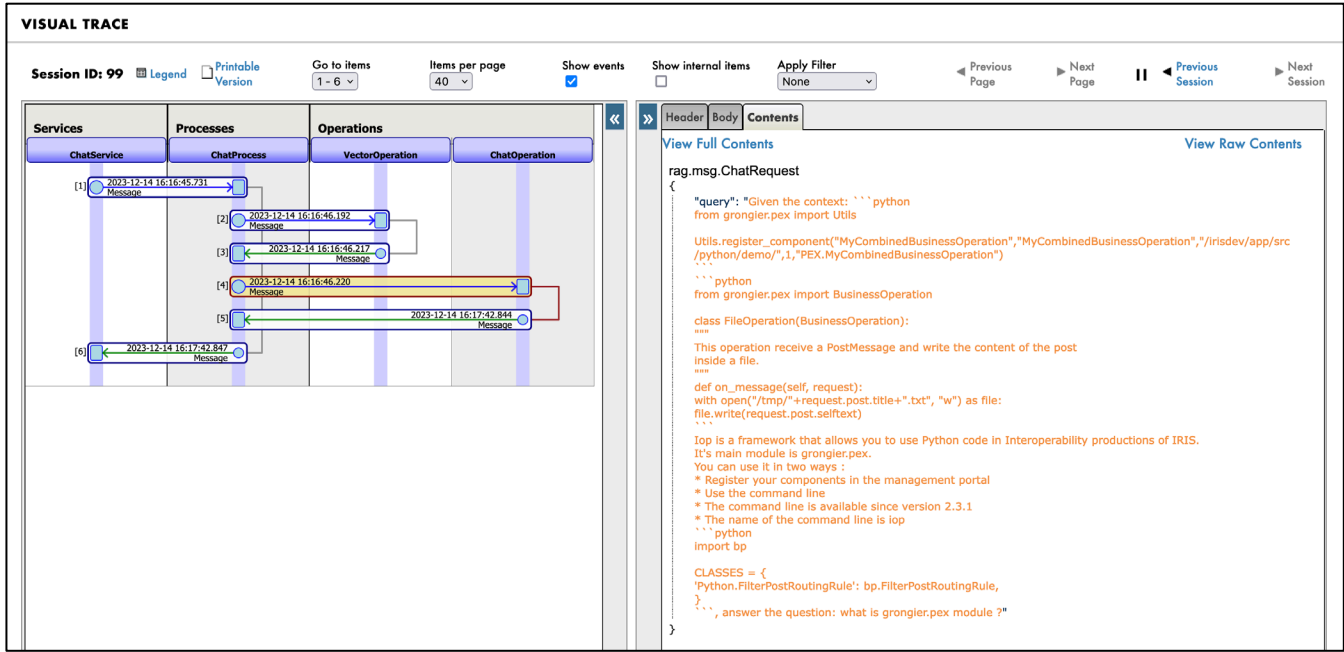
Our solution leverages some key features of the InterSystems IRIS data platform:

- **Interoperability:** for developing complex data pipelines (“Productions”) orchestrating complex inter-system data flows
- **Integrated Vector and multimodal database :** for storing embeddings and ensuring connectivity to the underlying data
- **Enterprise Message Bank:** for secure transformations without disrupting existing workflows
- **Strong persistence model** tightly coupled with data flow, allowing for complete message tracing
- **Embedded Python** within the database server supporting data science and genAI processing at high performance



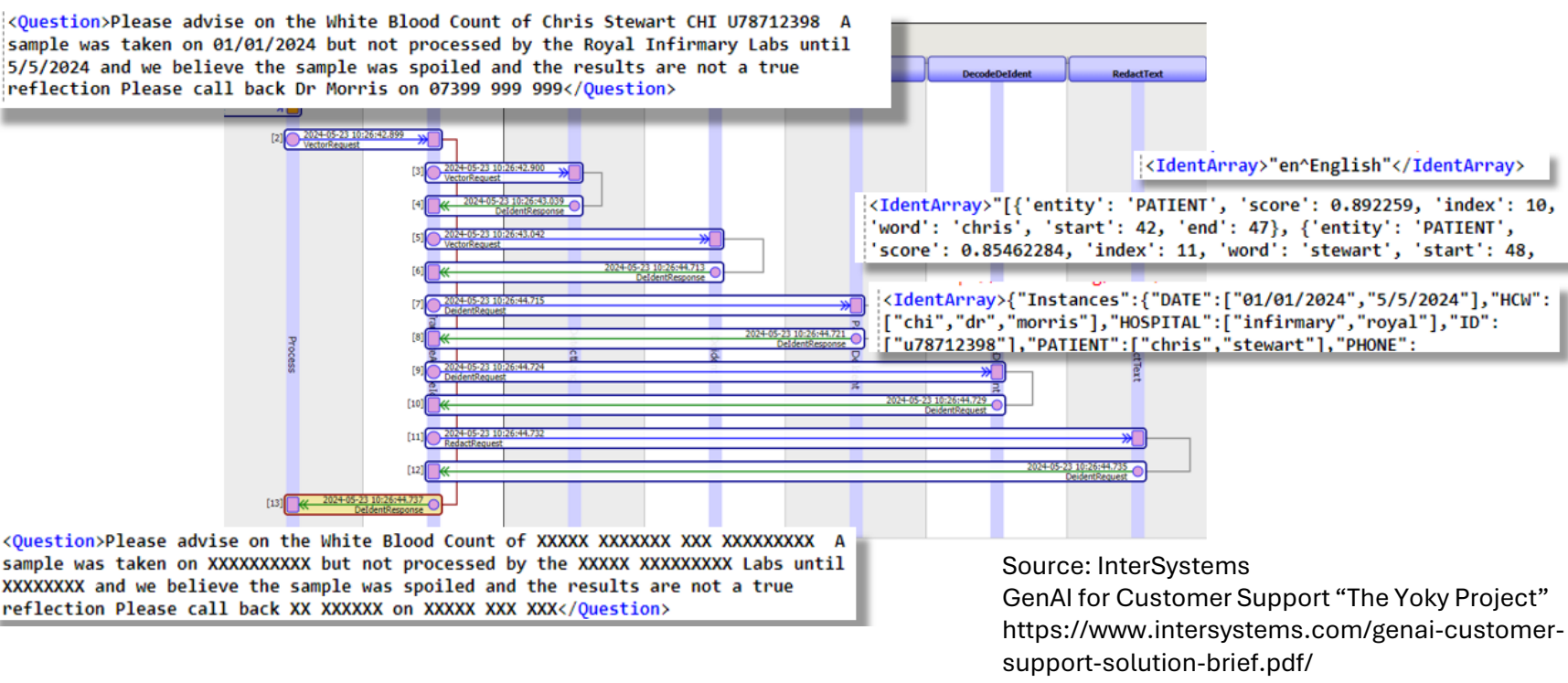
Handling Healthcare Challenges

Visual Trace mechanism allows users to **audit**, analyze, and troubleshoot the orchestration of LLMs, vector search, business workflows, etc.



Data Privacy requirements can be met through data anonymization within the system, prior to using any cloud-based genAI subsystem

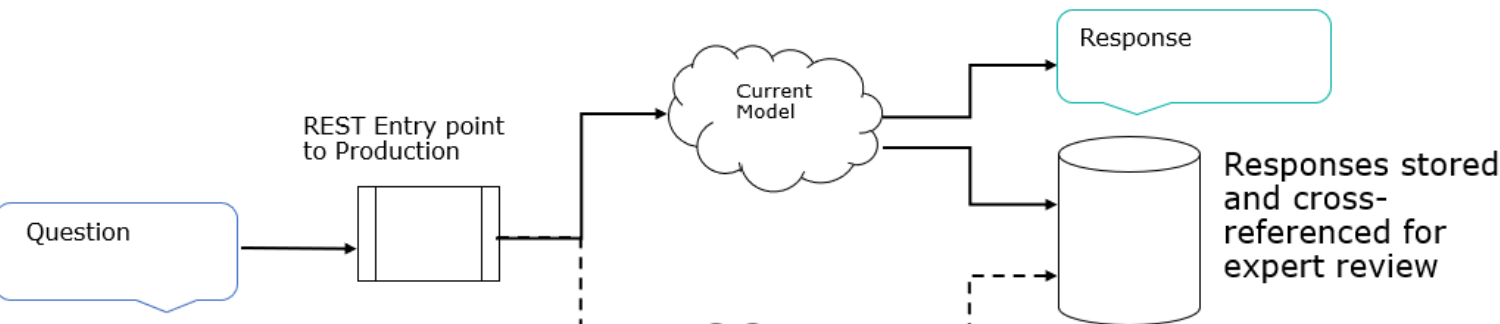
Translate and Redaction Workflow



Private Models, including running LLMs locally, are an option for organizations with significant data security and privacy concerns

Automatic validation of new Models

- The AI space is very fast moving
- Can we be confident when switching to a new model?
- IRIS Interoperability manages our solution can silently assess new models

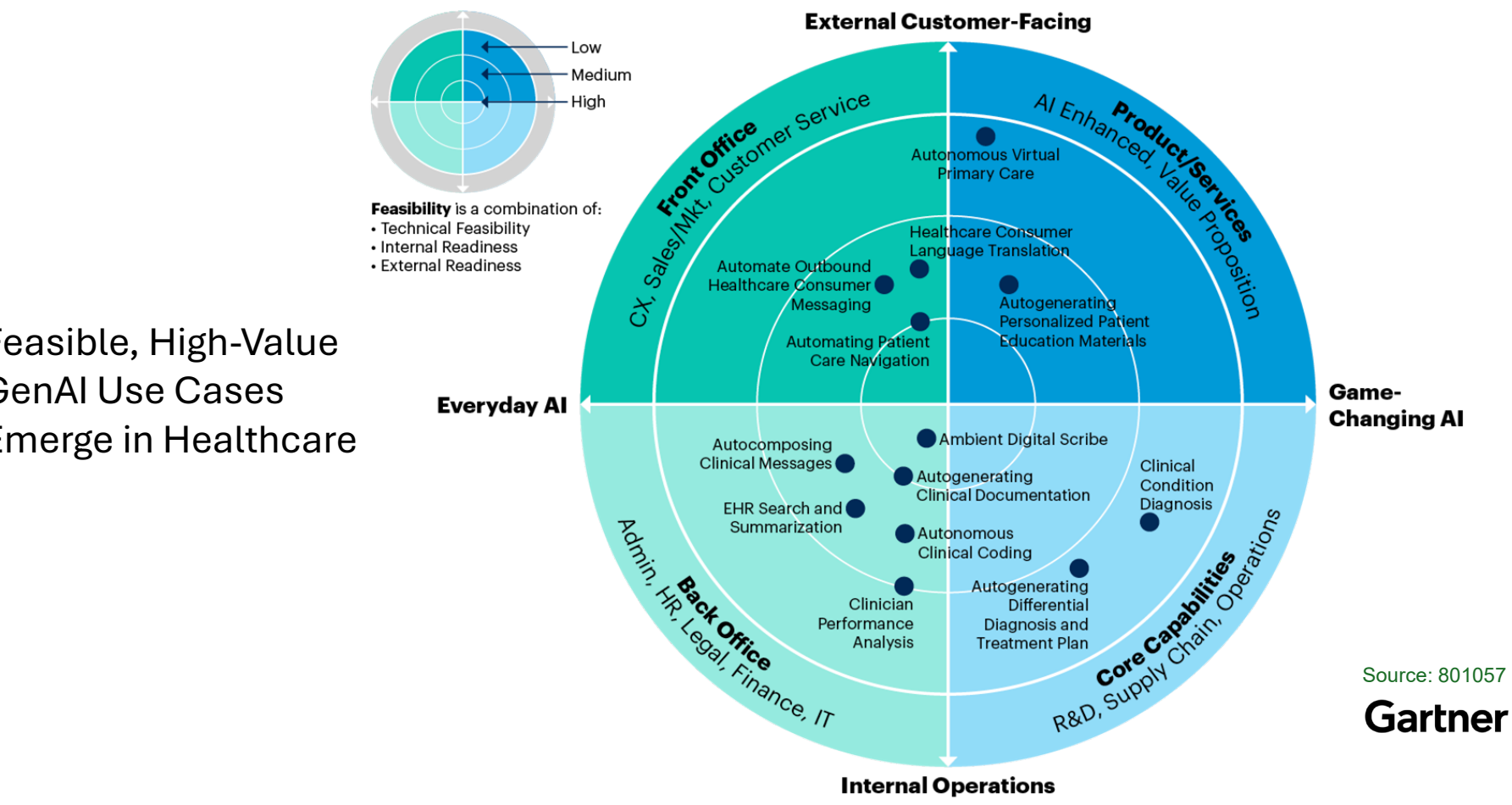


Easy Adoption for Current Customers

InterSystems already services a large fraction of the healthcare market. For these customers, adding genAI is a relatively simple extension of their current applications

80 countries with digital health solutions built on InterSystems	2/3 of the US population has one or more records in an InterSystems-based solution
>1B health records are managed in InterSystems technologies globally	150M People covered by InterSystems HealthShare-based information exchanges
29 countries with InterSystems TrakCare EHR deployed	3/5 largest US health insurers rely on InterSystems
>400B healthcare messages pass through InterSystems integration engines a year in the US alone	4.3M US veterans have received care in the community through >21.5M referrals processed through the InterSystems based CCRA system

GenAI in HealthCare & Challenges



Big challenges with HealthCare data

1. Data is fragmented across many different systems and formats
2. Privacy laws restrict transfer of data outside hospital systems
3. High need for accuracy and auditability

Try genAI development with InterSystems IRIS –get hands on for free at:

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