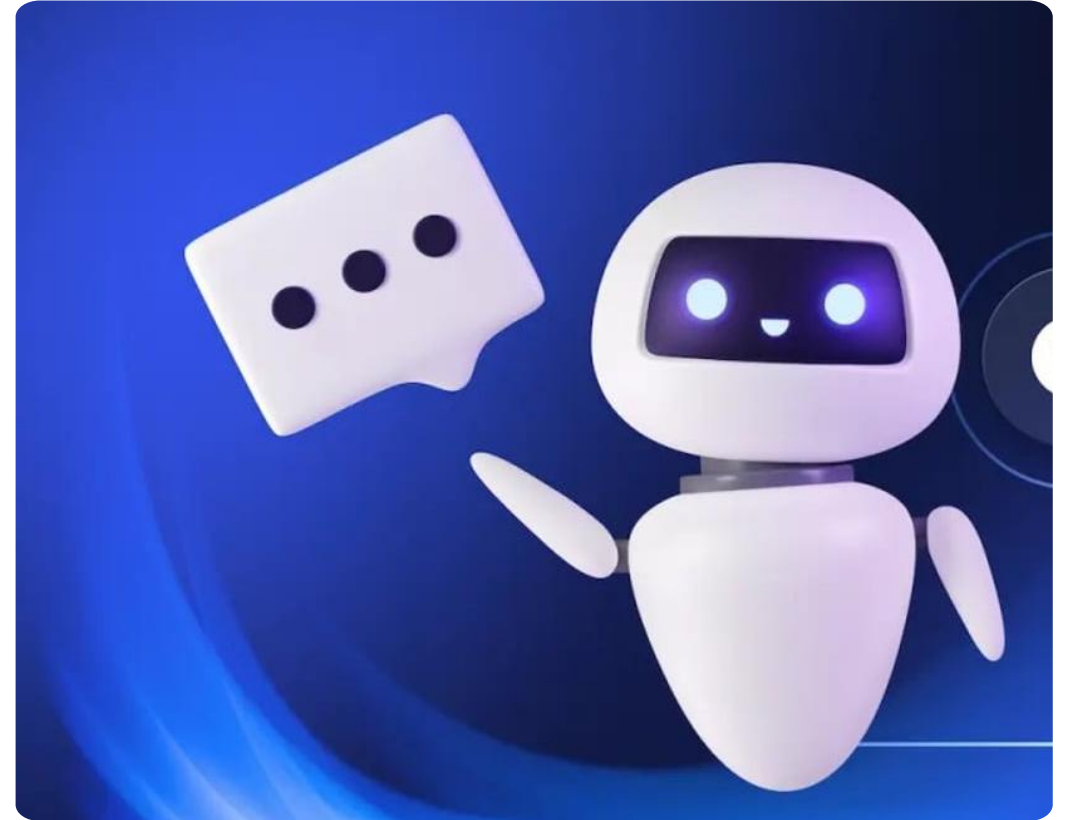


# ESILV Smart Assistant: An Agentic RAG Chatbot

Automating Student Services with Generative AI



# The Problem

## Context:

- High volume of repetitive questions (Admissions, Programs, Majors).
- Administrative staff overwhelmed by basic inquiries.
- Inefficient lead capture forms (static web forms have low engagement).

## The Need:

- A system available 24/7.
- Instant, accurate answers from official source documents.
- A conversational way to register prospective students.

# Project Objectives

1

## **Automated RAG (Retrieval Augmented Generation):**

- Answer student questions using *only* verified school brochures (PDFs).
- Reduce hallucination by grounding answers in retrieved context.

2

## **Agentic Registration:**

- Move beyond simple Q&A.
- Proactively guide users to register (Name, Email, Interest).
- Store data for the administration.

3

## **Modern Architecture:**

- Scalable, modular design using state-of-the-art LLM frameworks.

# High-Level Architecture

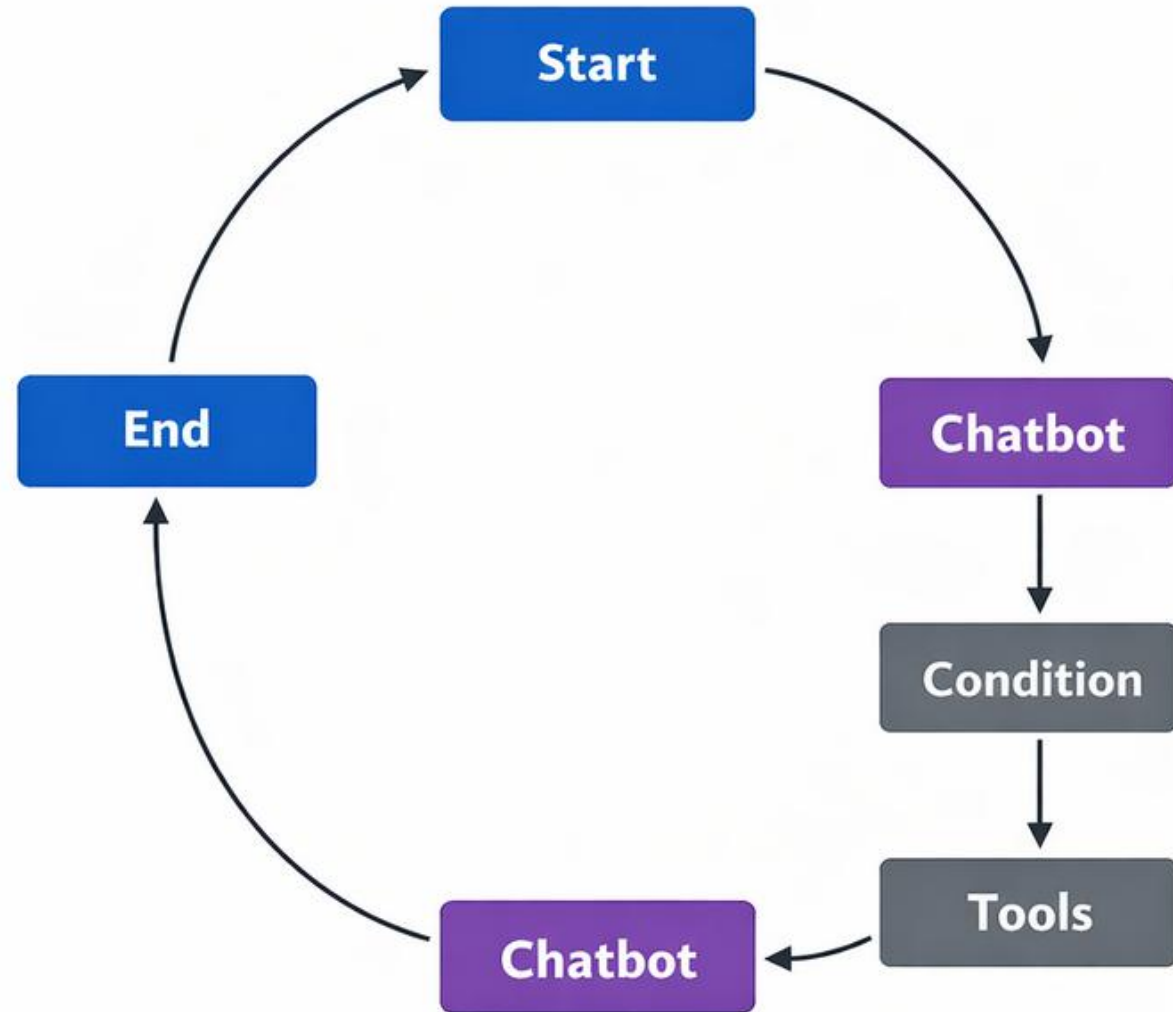
- **User Interface:** Streamlit (Web) & CLI (Terminal).
- **Orchestration Engine:** LangGraph (State Machine).
- **Brain:** Google Gemini 2.5 Flash (Fast, High Context).
- **Memory:** Short-term conversation history persistence.



# The "Agentic" Workflow

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- **Why not just a standard LLM?**
- Standard LLMs are linear. Our Agent is a **Graph**.
- **Nodes:**
  - Chatbot: Decides what to do (Talk or Act).
  - Tools: Executes code (Search vector DB, Save to JSON).
- **Loop:** The agent loops between Chatbot and Tools until the task is done.



# Key Pipeline 1 - RAG (Information Retrieval)



« What are the main courses in DIA A5? »



**Ingestion:** PDFs broken into 1000-char chunks → Embedded via embedding-001 → Stored in **ChromaDB**.



**Retrieval:** User Query → Vector Search (Top 5 matches).



**Generation:** Gemini synthesizes the answer using *only* the retrieved context.

# Key Pipeline 2 - Registration (Action)

"I want to sign up."

**Intent Detection:** Agent recognizes desire to register.

**Slot Filling Loop:**

- Agent checks History: *Do I have Name? Email? Interest?*
- **If missing:** Ask user specifically for that piece of info.
- **If complete:** Call `save_registration` tool.

**Completion:** Data saved to `data/registrations.json` and confirmation sent.

# Implementation & Tech Stack

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- **Language:** Python 3.9+
- **LLM:** Google Gemini 2.5 Flash
- **Frameworks:**
  - **LangChain / LangGraph:** For logic and tool binding.
  - **Streamlit:** For the frontend interface.
- **Database:**
  - **ChromaDB:** For vector storage (Knowledge Base).
  - **JSON:** For lightweight tabular storage (Registrations).



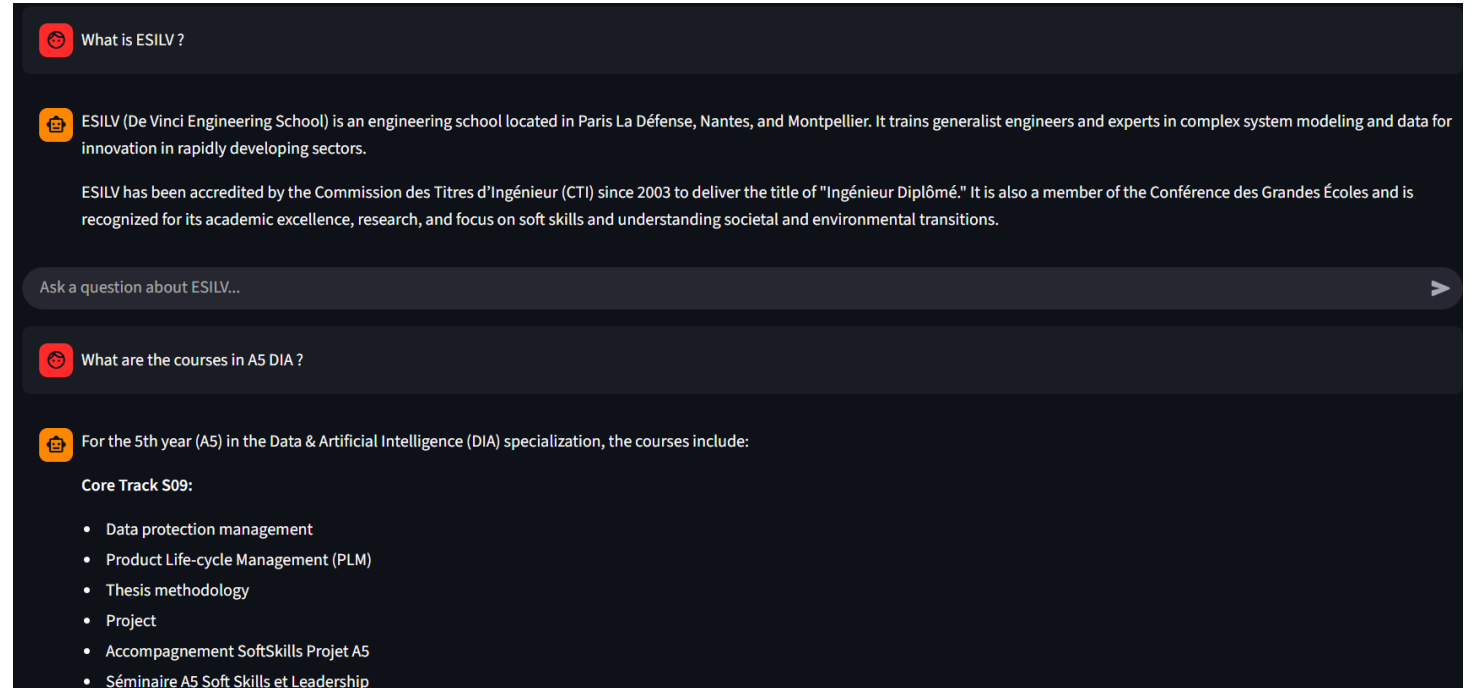


# Results

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## Qualitative Results:

- **Accuracy:** RAG successfully retrieves specific major details (e.g., IoT, Finance).
- **Speed:** Responses are fast



# Registering

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## Results:

- **Robustness:**  
Registration agent handles out-of-order inputs and corrections and asks all the necessary informations

The screenshot displays a chat interface with a dark background. It contains two question-and-answer pairs. Each question is preceded by a red circular icon with a white question mark. Each answer is preceded by an orange circular icon with a white document symbol. The first question is 'What is ESILV ?' and the answer describes ESILV as an engineering school in Paris, Nantes, and Montpellier, accredited by CTI since 2003. The second question is 'What are the courses in A5 DIA ?' and the answer lists courses for the 5th year (A5) in the Data & Artificial Intelligence (DIA) specialization, including a core track S09 with six items: Data protection management, Product Life-cycle Management (PLM), Thesis methodology, Project, Accompagnement SoftSkills Projet A5, and Séminaire A5 Soft Skills et Leadership. A search bar with the placeholder text 'Ask a question about ESILV...' and a right-pointing arrow is located between the two Q&A pairs.

**What is ESILV ?**

ESILV (De Vinci Engineering School) is an engineering school located in Paris La Défense, Nantes, and Montpellier. It trains generalist engineers and experts in complex system modeling and data for innovation in rapidly developing sectors.

ESILV has been accredited by the Commission des Titres d'Ingénieur (CTI) since 2003 to deliver the title of "Ingénieur Diplômé." It is also a member of the Conférence des Grandes Écoles and is recognized for its academic excellence, research, and focus on soft skills and understanding societal and environmental transitions.

Ask a question about ESILV...

**What are the courses in A5 DIA ?**

For the 5th year (A5) in the Data & Artificial Intelligence (DIA) specialization, the courses include:

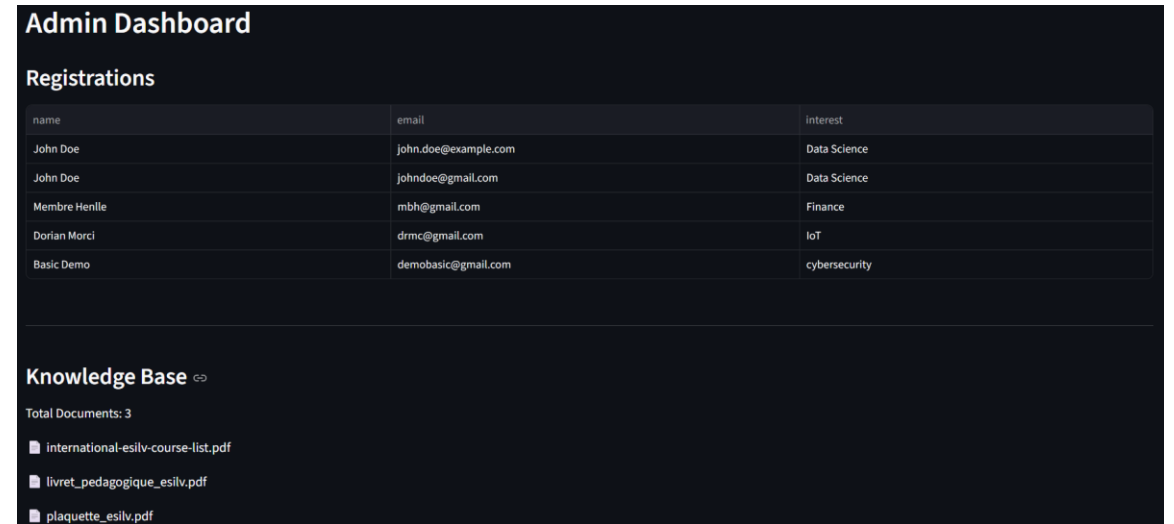
**Core Track S09:**

- Data protection management
- Product Life-cycle Management (PLM)
- Thesis methodology
- Project
- Accompagnement SoftSkills Projet A5
- Séminaire A5 Soft Skills et Leadership

# Admin tab

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- **Objective:** To provide administrators with full transparency into the chatbot's data collection and knowledge sources.
- **Feature 1: Lead Management (Registrations)**
- **Feature 2: Knowledge Base Audit**
- **Business Value:** Closes the loop between AI conversation and administrative action.



The screenshot shows an 'Admin Dashboard' with two main sections. The 'Registrations' section contains a table with 5 rows of user data. The 'Knowledge Base' section shows a list of 3 documents.

Admin Dashboard		
Registrations		
name	email	interest
John Doe	john.doe@example.com	Data Science
John Doe	john.doe@gmail.com	Data Science
Membre Henlle	mbh@gmail.com	Finance
Dorian Morcl	drmc@gmail.com	IoT
Basic Demo	demobasic@gmail.com	cybersecurity

Knowledge Base ⇄	
Total Documents: 3	
📄	international-esilv-course-list.pdf
📄	livret_pedagogique_esilv.pdf
📄	plaquette_esilv.pdf

# Knowledge Upload

- **"Dynamic Knowledge Management"**
- **Function:** Allows administrators to update the bot's brain without coding.
- **Key Features:**
  - **Drag-and-Drop:** Simple interface to upload new brochures (PDFs).
  - **Real-time Ingestion:** Immediately processes files (Split -> Embed -> Store).
  - **Feedback:** Provides instant success/failure notifications.

## ESILV Smart Assistant

Chat Upload Knowledge Admin

### Upload New Knowledge

Upload specific PDF documents to add them to the chatbot's knowledge base.

Choose a PDF file



Drag and drop file here

Limit 200MB per file • PDF

Browse files



**THANK YOU!**

Thank you for  
listening

- **Repository:** [github.com/Raphoum/llm\\_genai\\_project](https://github.com/Raphoum/llm_genai_project)