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LAVAZZA
TORINO, ITALIA, 1895

AI PERSONAS

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Project Value Proposition

For **business units** struggling in **evaluating marketing performances, customer understanding, models and ideas testing**, our software allows **interacting with data-driven AI Personas** representing the different **market segments**

Sustainable Development Goals

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Our project is aligned with the **SDG 9 – Industry, Innovation and Infrastructure.**
By using advanced AI improve company's efficiency and effectiveness.

Project Goal

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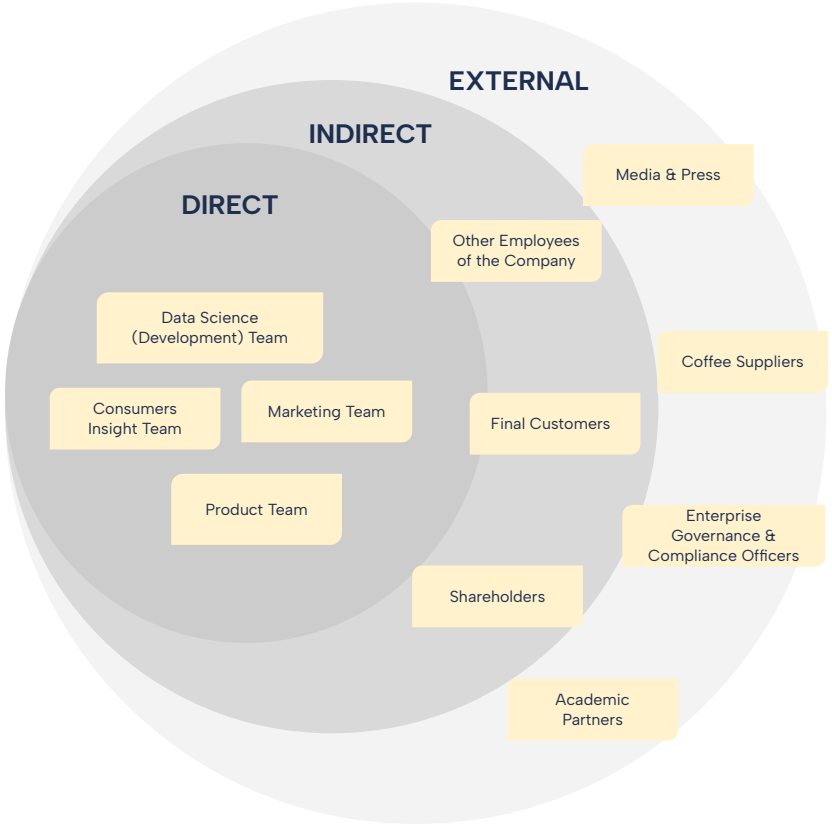
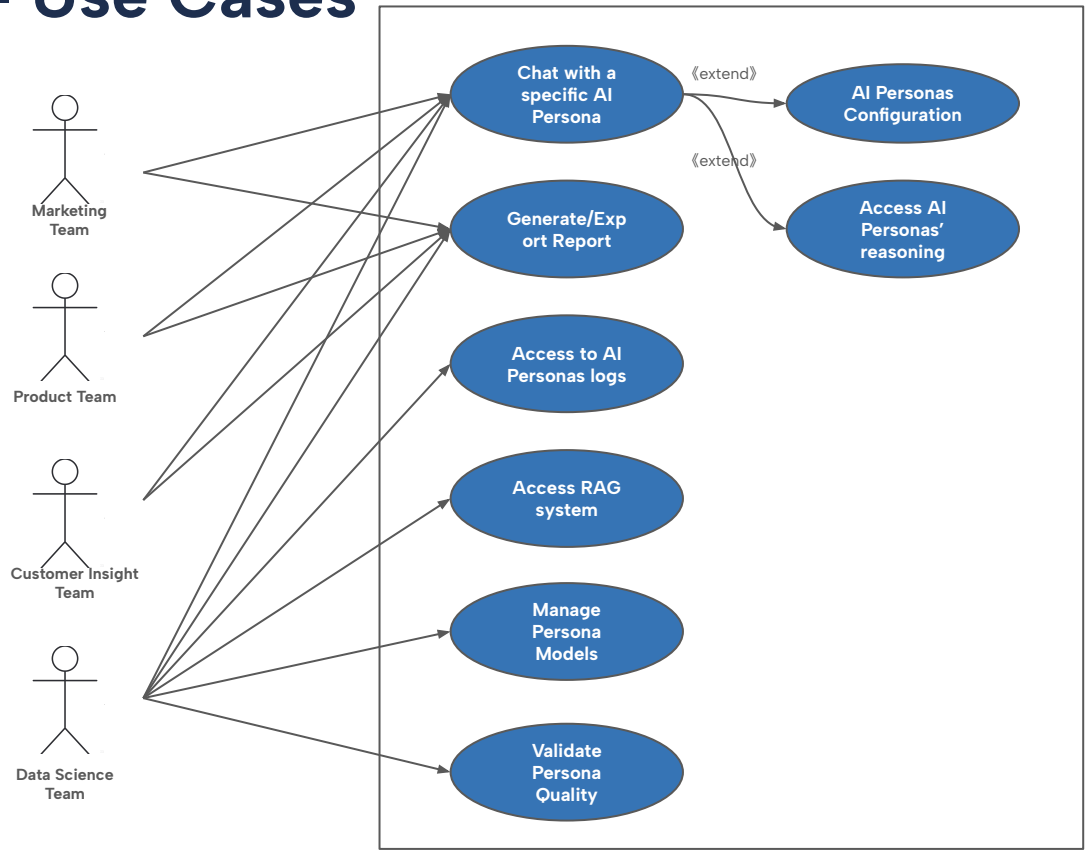
The goal is to develop a **software application** where employees can **interact** dynamically with **AI Personas** representing different **market segments** to:

- Identify weak ideas at an earlier phase by saving time and resources
- Enable focused market strategies
- Scale winning concepts efficiently and effectively

Design – Stakeholder Map



Design – Use Cases



Design – User Personas

Marco Rossi

Description: 40, Consumers Insight Department employee
Tasks and Goals: consumers' needs and behaviours identification to enhance company's strategic decisions
Pain points: high time demand for data collection and analysis

Giovanna Gallo

Description: 35, Product Department employee
Tasks and Goals: management of new products development meeting consumers' needs
Pain points: difficulty in effectively meeting needs, costly pre-launch products testing

Luca Verdi

Description: 30, Marketing Department employee
Tasks and Goals: planning of efficient and effective marketing campaigns, performance analysis
Pain points: advertisement campaigns uncertainty, costly testing

Giulia Cerullo

Description: 37, Data Scientist
Tasks and Goals: data preparation pipeline, market trends analysis, AI-driven decision support
Pain points: limited data availability, inefficient model testing on real consumers

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Design – User Stories

Marco Rossi

As a consumers insight department employee, **I want** a tool that can be used to facilitate the analysis of consumers' needs and behaviours **so that** I can accelerate product launches

Giovanna Gallo

As a product department employee, **I want** a feedback system that can provide immediate insights **so that** I can launch a winning product more easily

Luca Verdi

As a marketing department employee, **I want** a tool that can be used to assess and compare different marketing strategies **so that** I can launch efficient and effective marketing campaigns to scale product sales

Giulia Cerullo

As a data scientist, **I want** a new source of data and an environment to test models **so that** I can have larger training dataset and I can test my models before deployment

(*) An example of user journey is in the Appendix

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Design – Functional Requirements

Must have	• **Configure** AI Personas • Enable users to **interact** with created Personas • **Cite the source** of each answer • **Access RAG systems** (such as vector databases)
Should have	• Display **chain-of-thought reasoning** • **Generate and export** reports • **Store all AI Persona logs** for future processing • **Validate AI Persona quality**
Could have	• Enable **log exporting and importing** • **Authenticate** users with differentiated access levels. • **Include SOTA explainability techniques**
Won't have	• **Customize** the chat interface, including frontend layout, fonts, or styling options.

Design – Non Functional Requirements

Must have	• **Avoid hallucinations** and remain consistent with segment definitions • User-friendly and easy to use • Operate in English • Ensure data security • Compliant with GDPR, AI Act and other relevant laws.
Should have	• Supports multiple users to work on multiple AI personas
Could have	• Deliver real-time feedback
Won't have	• Large-scale concurrent request support.

Design – System Architecture Overview

UI

FE

Application Layer

Persona Configuration

Ingestion service

Q&A service

Report service

Auth

Communication Layer

RPC server

Cache

Event Broker/ Message Queue

Core Layer

Orchestrator

Prompt Construction

AI Persona Router

Input Handler

RAG

Persona registry

MCP Server

Memory

Explanation

Monitoring and Evaluation

Evaluation

Metric & Alerting

Data Storage

Business logic DB

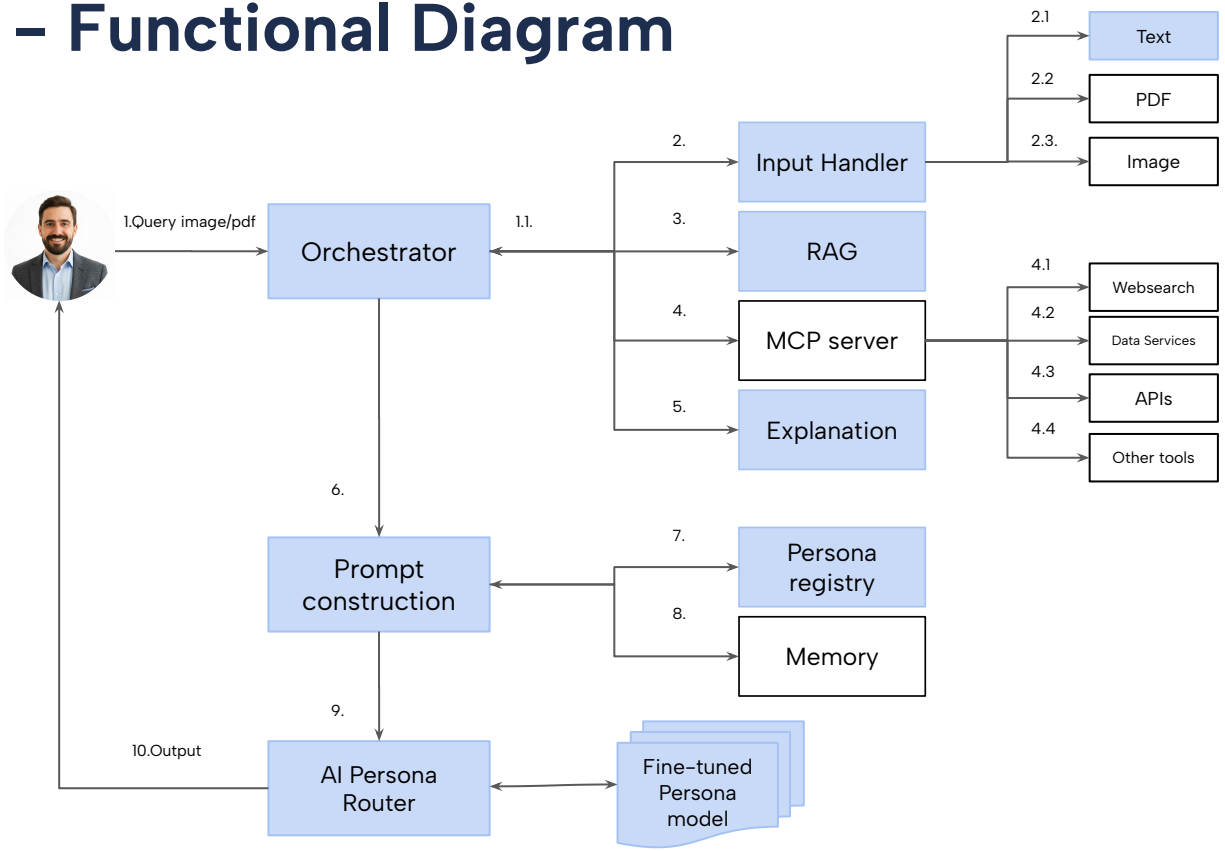
Object storage(S3)

Vector DB

Search engine

(*) More details in the Appendix

Design – Functional Diagram



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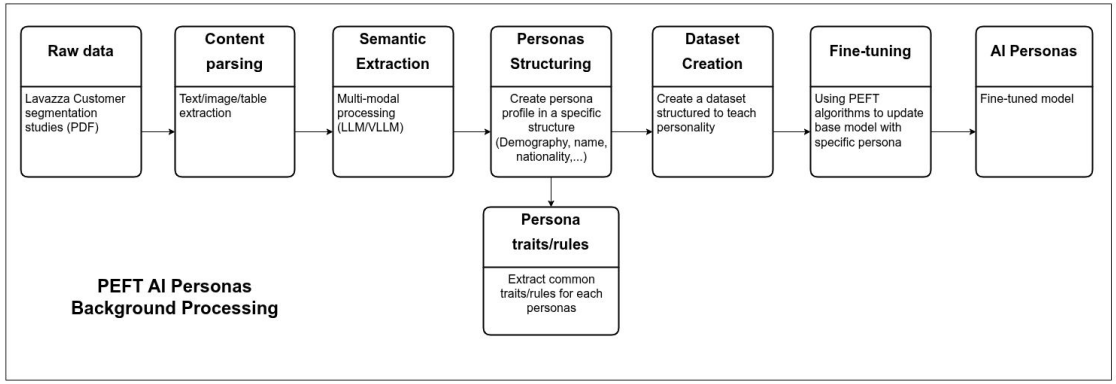

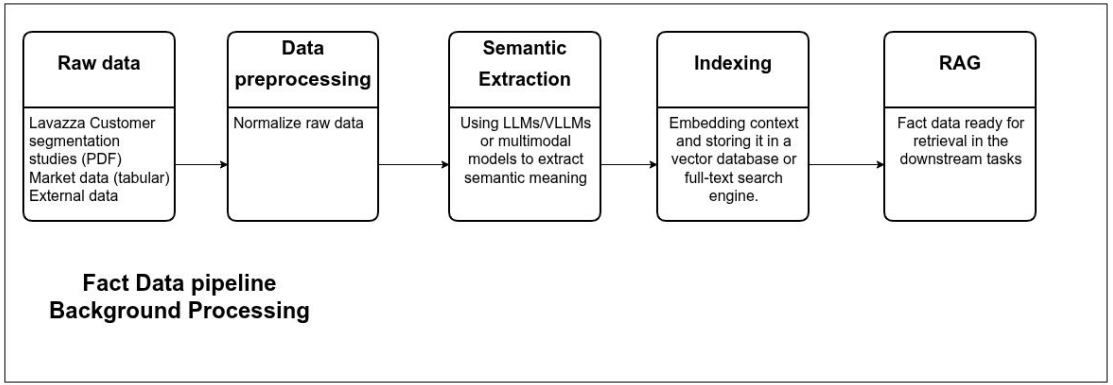

Design – Risks Analysis

Technical Risks

- Hallucinations and inaccurate responses: mitigate with RAG system
- Insufficient critical thinking: mitigate with RAG and prompt engineering
- Opacity: mitigate with RAG
- Inconsistent or generic personality: mitigate by fine-tuning (in case of limited resource use PEFT, smaller models, RAG with few-shot prompting)
- Performance evaluation difficulty

Design – Risks Analysis

Governance and Security Risks

- Privacy and compliance with AI Act and GDPR
- Proprietary data protection
- System integration difficulty with existing systems and infrastructure

Design – Risks Analysis

Data and Other Risks

- Data integration difficulty
- Data quality and bias
- Over relying on AI Personas

Manage

WB No	TASK TITLE	OWNER	COLLABORATORS	DEADLINE	PW
1	Project Conception and Initiation	Thanh	Others	19/11/2025	3.00
2	Design	Enrico	Others	19/11/2025	7.50
3	Management	XiaoNing	Others	19/11/2025	1.00
4	Data Foundation	Thanh	Others	10/12/2025	6.00
5	PEFT AI Persona	XiaoNing	Thanh	10/12/2025	4.00
6	Fact Data Ingestion	Enrico	Others	10/12/2025	2.50
7	Core Layer	Thanh	Others	07/01/2026	8.50
8	Application Layer	XiaoNing	Others	07/01/2026	2.00
9	UI	XiaoNing	Others	07/01/2026	1.50
10	Monitoring and Evaluation	Enrico	Others	07/01/2026	2.00
11	Deployment	Thanh	Others	07/01/2026	2.00
12	Testing	XiaoNing	Others	07/01/2026	2.00
13	Demo	Enrico	Others	07/01/2026	1.00
14	Communication	Enrico	Others	14/01/2026	5.00

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Thank You

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Appendix

Design – User Journey of Marco Rossi

Awareness

Marco Rossi **explores** the system's capabilities, its traceability features, and **configures** an AI Persona.

Consideration

Marco Rossi **chats** with the AI Persona, explores its characteristics, and reviews transparent, source-linked answers to understand how it represents its assigned consumer segment.

Conversion

Marco Rossi uses the persona for **concept testing** and receives realistic, critical **feedback** grounded in the persona's established profile.

Retention

As trust grows, the AI Persona **becomes part of** Marco Rossi's regular concept-validation workflows, offering traceable and compliant evaluations.

Advocacy

Marco Rossi extends its use across teams for workshops, ideation, and strategic discussions. The system becomes a trusted **long-term insight partner**.

Design

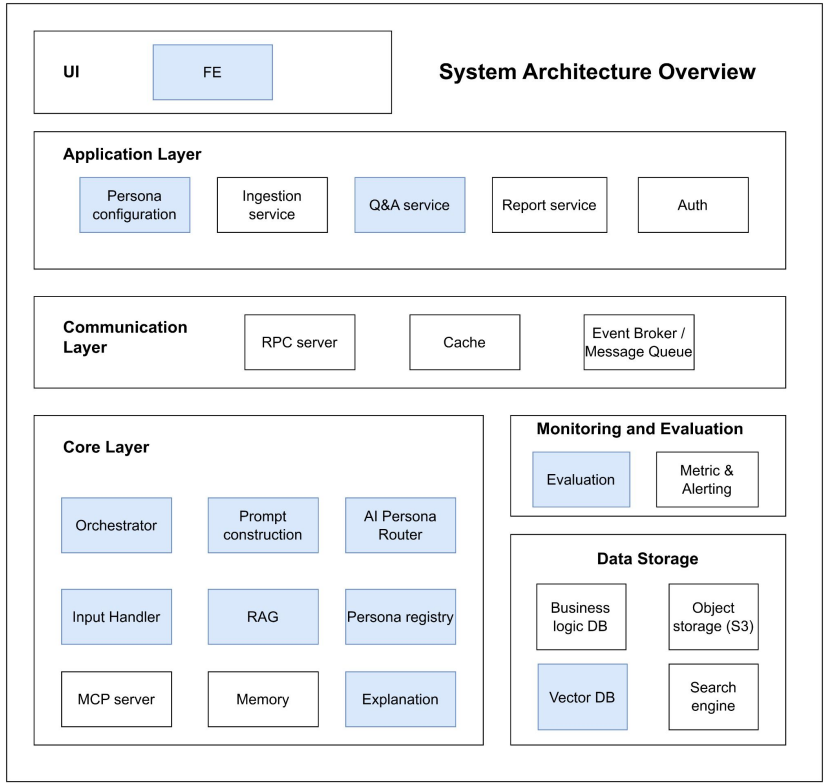
1. User Interface (UI)
The user interface serves as the system's entry point, built as a **Frontend (FE)** application. It enables users to interact seamlessly with the platform, submit queries, upload data, and view results or reports.

2. Application Layer
This layer contains the core application logic and manages all user-driven workflows.
Key components include:

- **Persona Configuration**: Enables users to select or customize AI personas dynamically.
- **Ingestion Service**: Handles ingestion of raw data such as PDFs or images and stores them in S3.
- **Report Service**: Generates structured, formatted reports from processed and analyzed data.
- **Q&A Service**: Manages interactive question-and-answer exchanges with the AI.
- **Auth Service**: Provides authentication and authorization for users, ensuring secure access and operations.

3. Communication Layer
This layer facilitates efficient communication and coordination among microservices.

- **RPC Server**: Enables direct service-to-service communication via Remote Procedure Calls.
- **Cache**: A high-speed memory layer that stores frequently accessed data to optimize performance.
- **Event Broker / Message Queue** (RabbitMQ or Kafka): Handles asynchronous communication and event-driven processing across services, ensuring reliability, scalability, and robust monitoring.

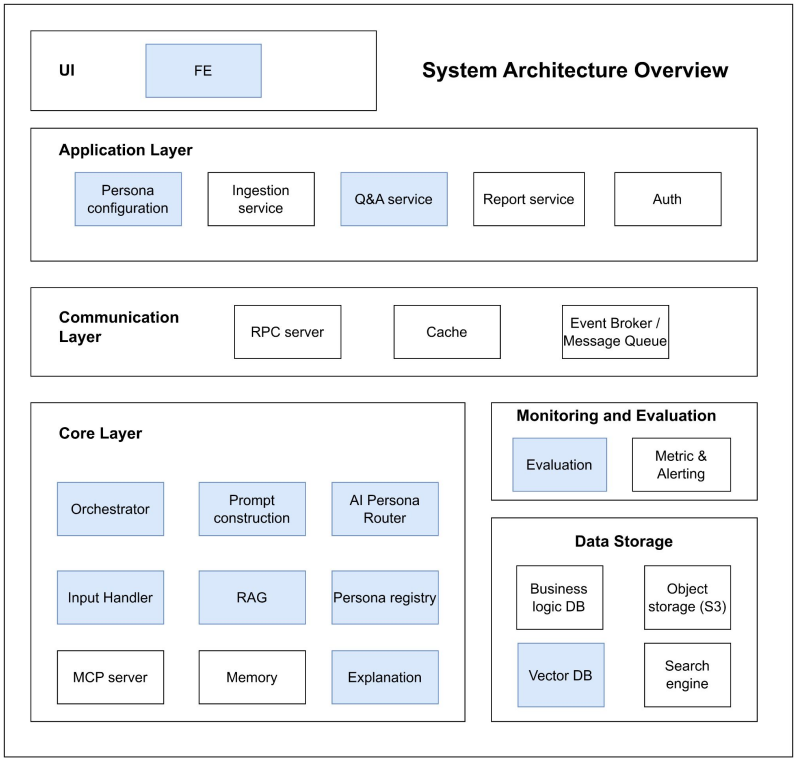


Design

4. Core Layer

The intelligence engine of the system—handles AI persona logic, LLM orchestration, and data-driven grounding.

- **Orchestrator**: The central coordinator of the Core Layer. When a request arrives, the Orchestrator manages the entire generation process, directing which services to call.
- **Input Handler**: Preprocesses and normalizes user inputs, including text extraction from PDFs and preparation of image data for AI analysis.
- **Prompt Construction**: Dynamically builds structured prompts by combining user input, persona rules, and retrieved data.
- **AI Personas**: Represents the fine-tuned Large Language Models (LLMs) tailored to embody distinct customer segment personalities.
- **RAG (Retrieval-Augmented Generation):** Provides factual grounding by retrieving relevant information from the Vector DB, ensuring responses remain accurate.
- **Persona Registry:** Stores the static attributes and behavioral definitions of each persona, guiding prompt construction and response tone.
- **Explanation:** This module allows for an in-depth explanation of the thought process behind the reasoning model and the data used in the thinking process.
- **MCP Server (Model Context Protocol Server)**: Enriches LLM interactions with real-time contextual or external domain data.
- **Memory**: It stores the recent history of the user's chat, allowing the persona to remember what was said earlier in the conversation and provide context-aware answers.



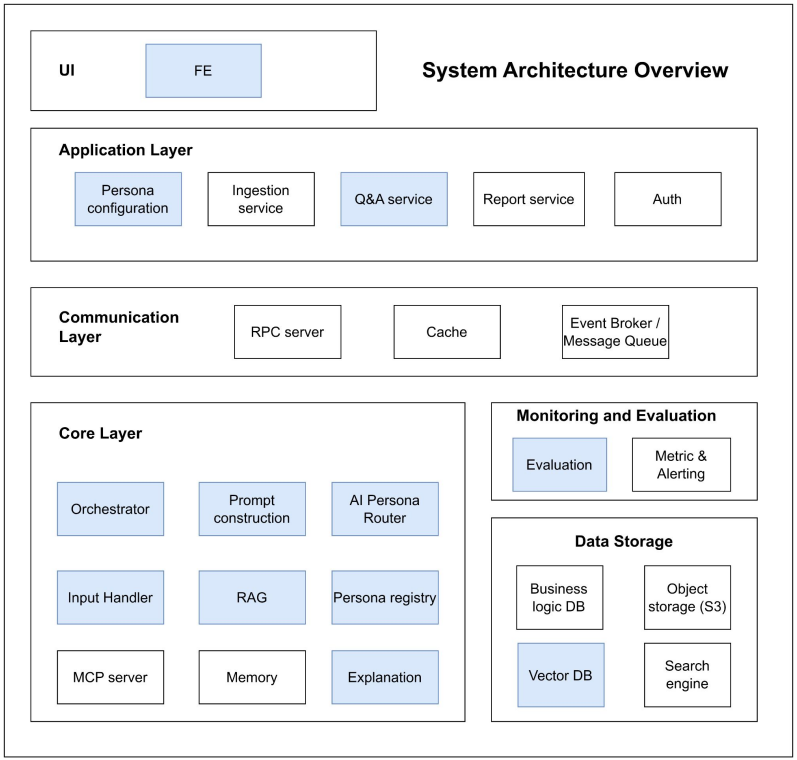
Design

5. Monitoring and Evaluation
A centralized observability layer that tracks performance, quality, and reliability across all services.

- **Evaluation Tools**: Measure the accuracy and quality of AI responses and data processing outcomes.
- **Metrics & Alerting**: Monitor key indicators such as latency, error rates, resource utilization, and token usage, triggering alerts for anomalies or system degradation.

6. Data Storage Layer
The persistence foundation of the system, designed for scalability, durability, and speed.

- **Business Logic Database**: Stores structured data such as user profiles, authentication records, saved reports, and persona definitions.
- **Object Storage (S3)**: Manages large, unstructured data files (e.g., raw PDFs, images, and uploaded datasets).
- **Vector Database**: Stores embeddings for persona-related documents, historical interactions, and reference materials — powering RAG retrieval and factual grounding.



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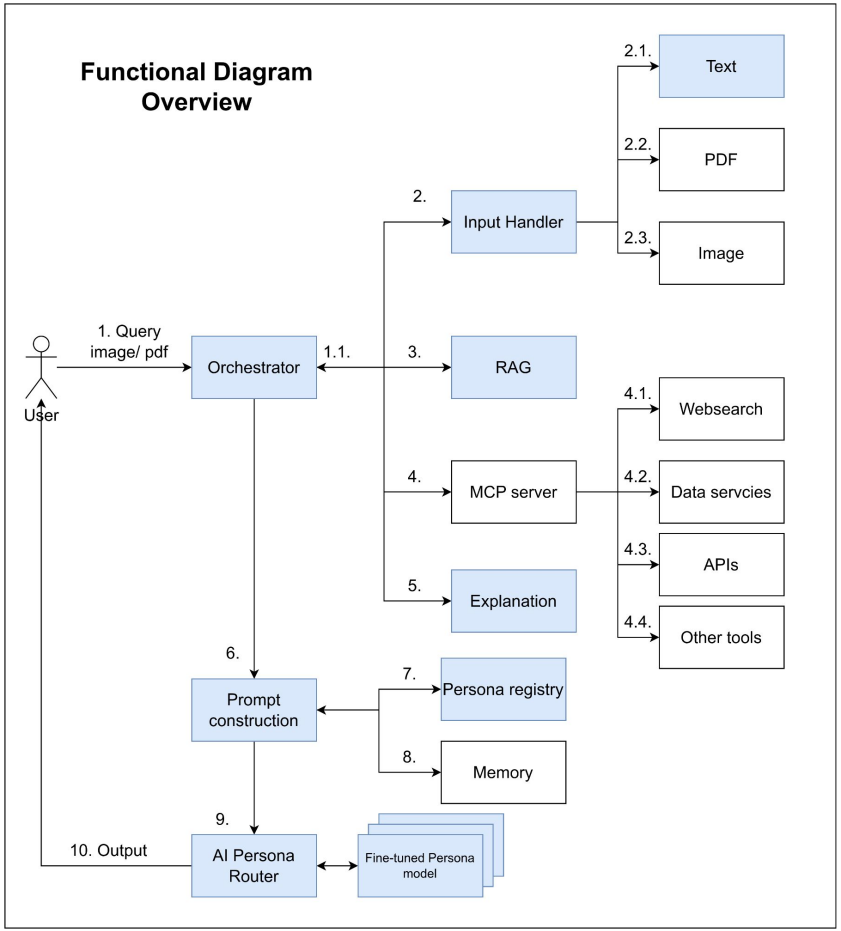

1. User Query Submission: User sends a query with optional attached files (image, PDF, etc.) to the Orchestrator.
1.1 Orchestrator Analysis: The Orchestrator analyzes the query and attachments to decide which services should be used.
2. Input Preprocessing: Inputs are preprocessed before passing to the model.
2.1 Text Input: Normalize text to make it easier to handle in later steps.
2.2 PDF Input: Parse, process, and extract meaningful information from PDF files.
2.3 Image Input: Process images and extract valuable information.
3. Context Retrieval (RAG System): Use the query and relevant input information to retrieve context (e.g., market data) via a RAG system.
4. Tool Selection & MCP Server Requests

- Decide which tools should be used to enrich the context.
- Send requests to the MCP server to gather corresponding context.

4.1 Web Search: Extract updated information from the internet (trends, real-time data, missing internal data, etc.).
4.2 Database Query: Retrieve useful data from internal or external databases.
4.3 External APIs: Call APIs to obtain additional information.
4.4 Other Tools: Use calculators, simulators, weather data extractors, or other utilities to enrich context.
5. Explanation: The explanation module will explain in detail the thought process of the reasoning model and the data used for the thinking process.
6. Prompt Construction: The Orchestrator aggregates useful context and passes it to Prompt Construction.
7. Persona Selection

- Apply the selected Persona profile, including: Demographics, Behavior Data, Transactional Data, ...

8. Memory Integration

- Extract useful information from chat history.

9. Persona Model Routing

- Route to a fine-tuned Persona model.
- Pass the enriched prompt and context.

10. Model Response

- Generate a response with: Specific personality,Tone, Linguistic style of the Persona