Technical Documentation

A: Supervisor: Social Economic Support Decision Engine

The complete system architecture, components, and execution flow of the **Social Economic Support Supervisor**, designed to assess an applicant's eligibility for financial assistance using AI agents and policy-aware vector-based reasoning.

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1. System Objective

The **Social Economic Support Supervisor** is responsible for making a financial support decision by:

- Evaluating **credit compliance** via uploaded credit reports.
- Measuring **financial hardship** via bank statements, liabilities, and declared information.
- Applying a deterministic rule-based logic to issue an **approval**, **soft decline**, or **conditional approval**.

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2. Components Overview

Component	Description
Agents (x2)	Specialized AI tools for credit evaluation and financial burden assessment
Supervisor	Master controller that invokes agents and composes the final output
LLM Backbone	GPT-4 Turbo from OpenAI for all text understanding and generation
Embedding Model	`text-embedding-3-large` from OpenAI for document similarity
Vector Store	Chroma (persistent) and InMemoryVectorStore (ephemeral)
Orchestration Framework	LangGraph with React agents + Supervisor pattern
Supporting Modules	LangChain chains, retrievers, memory objects

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3. Vector Stores Used

📦 A. Chroma Vector Store (Persistent)

- **Used by:** `credit_risk_evaluator_agent`
- **Purpose:** Stores credit policy document chunks semantically
- **Search Strategy:** `MMR` (Maximal Marginal Relevance) to ensure diversity in retrieval
- **Embedding Function:** `OpenAIEmbeddings(model="text-embedding-3-large")`
- **Directory:** `./credit_risk_policies`

📦 B. InMemoryVectorStore (Transient)

- **Used by:** `financial_burden_evaluator_agent`
- **Purpose:** Temporary in-RAM index of applicant's bank statement XLSX contents
- **Justification:** Lightweight and fast for single-session summarization

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4. Agents Breakdown

Agent 1: `credit_risk_evaluator_agent`

- **Input:** PDF credit report for the given Emirates ID
- **Steps:**
    1. **Summarize** the report using `load_summarize_chain`
    2. **Retrieve** relevant policy chunks from `credit_policy_vector_store` via `ConversationalRetrievalChain`

3. **Evaluate** policy violations (e.g., DTI > 0.6, defaults, etc.)

Output:

```
{
  "credit_risk": "High",
  "policy_matches": ["DTI > 0.6 results in soft decline"],
  "compliance_flag": false
}
```

Agent 2: `financial_burden_evaluator_agent`

- **Input:** XLSX bank statements (per Emirates ID)
- **Steps:**
    1. Load Excel using `UnstructuredExcelLoader`
    2. Embed using `InMemoryVectorStore`
    3. Summarize liabilities, income patterns, and net worth

Output:

```
{
  "net_worth": 15000,
  "debt_to_income": 0.65,
  "burden_score": 0.88
}
```

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5. Supervisor Logic

🧠 Supervisor Name: `social_support_supervisor`

- **Execution Pattern:** Sequentially invokes both agents
- **Final Task:** Applies hardcoded decision rules to combine outputs

Decision Rules:

- **Approved:**
  `credit_risk == "Low"` AND `debt_to_income < 0.5` AND `burden_score < 0.5` AND `compliance_flag == true`

- **Soft Decline:**
  `credit_risk == "High"` OR `debt_to_income > 0.8` OR `burden_score > 0.8` OR `compliance_flag == false`

- **Approved with Conditions:**
  Default fallback when none of the above conditions are met

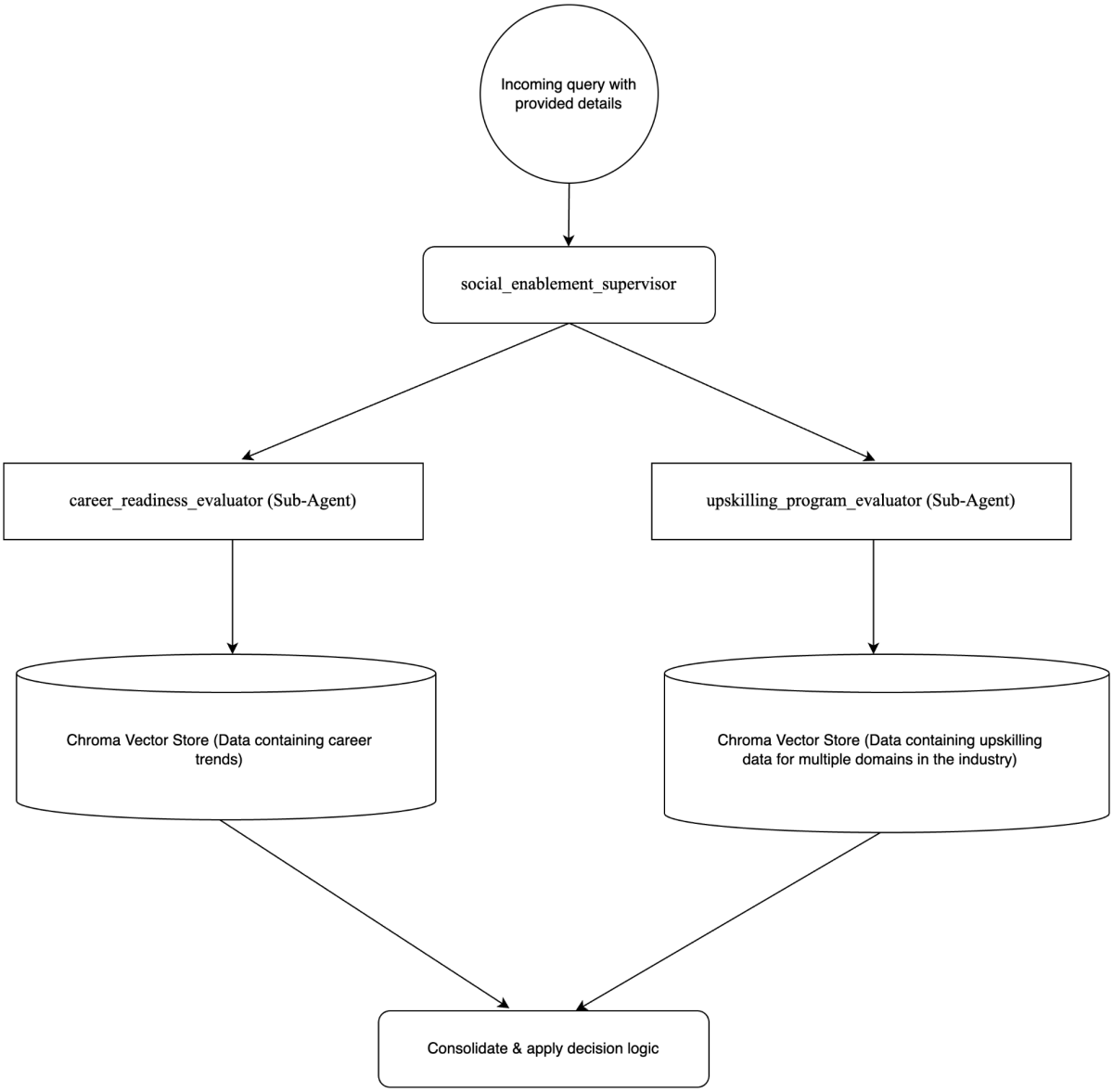
Final Output Example:

```
{
  "financial_support_decision": "Soft Decline",
  "reason": "High burden and non-compliant credit profile"
}
```

B: Supervisor: Enablement Planner Supervisor

This document outlines the full architecture, agents, orchestration flow, and vector-based AI components powering the Enablement Planner Supervisor—a career planning engine designed

to evaluate applicant readiness and recommend targeted upskilling paths.



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1. System Objective

The Enablement Planner Supervisor is designed to:

- Assess employability by analyzing resumes in the context of UAE job market demand.
- Extract in-demand skills, estimate rehire potential, and measure employment gaps.

- Recommend personalized upskilling and training programs aligned with applicant strengths and skill gaps.

It does this by combining insights from two purpose-built AI agents:

1. **Career Readiness Agent**
2. **Upskilling Program Agent**

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2. Components Overview

Component	Description
Agents (x2)	Specialized AI agents for resume-based career evaluation and training match
Supervisor	Master node that invokes both agents and consolidates outputs
LLM Backbone	GPT-4 Turbo (OpenAI) for summarization, reasoning, and structured output
Embedding Model	`text-embedding-3-large` (OpenAI) for high-quality similarity scoring
Vector Store	Chroma (persistent) only
Orchestration Framework	LangGraph (Supervisor + React Agents model)
Supporting Modules	LangChain chains, retrievers, memory, loaders

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3. Vector Stores Used

📦 A. Chroma Vector Store (Persistent)

- **Used by**:
  - `career_readiness_agent`
  - `upskilling_program_agent`
- **Databases**:
  - `career_trends_db` (UAE job market roles, tools, hiring trends)
  - `upskilling_training_db` (courses, bootcamps, certifications)
- **Search Type**: MMR (Maximal Marginal Relevance)
- **Embedding Model**: `OpenAIEmbeddings(model="text-embedding-3-large")`

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4. Agents Breakdown

Agent 1: career_readiness_agent

Input: Resume (PDF) for given Emirates ID

Steps:

- Load and summarize resume using `load_summarize_chain`
- Query `career_trends_db` for:
    - Job role alignment
    - In-demand tools matched
    - Rehire likelihood based on demand

Output:


```
{
  "employment_gap_months": 0,
  "career_alignment_score": 0.7,
  "in_demand_skills_matched": ["Python", "SQL", "Tableau"],
  "rehire_potential": "High"
}
```

Agent 2: upskilling_program_agent

Input: Same resume as above

Steps:

- Load and summarize resume
- Search `upskilling_training_db` to match gaps with career-boosting programs
- Return only topic-based recommendations

Output:


```
{
  "recommended_course_topics": [
    "Advanced Data Analytics",
    "Machine Learning",
    "Big Data Technologies"
  ]
```

}

LLM Role: Focus on skills that boost short-term employability

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5. Supervisor Logic

🧠 **Supervisor Name**: `enablement_planner_supervisor`

Execution Pattern: Always invokes **both agents**, consolidates responses.

Final Task: Composes a structured natural language recommendation combining:

- Career alignment
- Skill match
- Rehire potential
- Recommended programs

Final Output Example:

Based on the evaluations from both the career readiness and upskilling program agents, here is a comprehensive plan for your career development:

1. Employment Gap: You currently have no employment gap, which is advantageous for your immediate re-entry into the workforce.
2. Career Alignment Score: Your career alignment score is 0.7, indicating a good fit with your current career trajectory in IT/Data Analysis.
3. In-Demand Skills Matched: You have matched with key in-demand skills such as Python, SQL, and Tableau.
4. Rehire Potential: Your rehire potential is rated as high.
5. Recommended Course Topics: To further enhance your career, it is recommended that you pursue courses in Advanced Data Analytics, Machine Learning, and Big Data Technologies.