



# Bank-iMitra

**BANK CUSTOMER CHATBOT WITH PROMPT ENGINEERING, RAG, AND AGENTIC AI**

BANK-MCP

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# Project Problem Statement

- ▶ Build an intelligent banking assistant that can:
  - ▶ Answer customer queries about interest rates, loan options, fees, dispute timelines, card limits, and general banking policies using **cited policy text**.
  - ▶ Execute customer actions such as **block card**, **initiate dispute**, and **fetch account balance** through tool integrations.
- ▶ **Expected Output**
  - ▶ A unified chatbot system that may output something like this:
  - ▶ Answers customer queries with cited policy text.
  - ▶ Executes banking actions through tool integrations.
  - ▶ Returns structured, auditable responses suitable for production banking workflows.

# High Level Flow

UI (Streamlit) | Orchestrator (intent + agents) | Action API | Knowledge store (FAISS)

- ▶ High-level flow (text):
  - ▶ User uploads documents or types a question in UI.
  - ▶ UI sends the prompt to an orchestration service (chat endpoint).
  - ▶ Orchestrator classifies intent; either:
    - ▶ FAQ -> retrieve supporting documents (FAISS) and return an answer, or
    - ▶ Action -> request authentication (if needed) and call a domain action (e.g., block card) and return result.
- ▶ Business benefits / value:
  - ▶ Faster self-service (balance checks, card controls).
  - ▶ Document-driven answers (uploaded documents become searchable knowledge).
  - ▶ Clear separation of conversational behavior and domain operations reduces risk for production actions.

# Libraries/Tech stack

1. Retrieval-Augmented Generation (RAG)
2. Agentic AI Architecture
  - RouterAgent
  - AnswerAgent
  - ActionAgent

- ▶ LLM ( GPT – Open AI)
- ▶ Streamlit (UI)
- ▶ FastAPI + Pydantic (orchestrator and action API)
- ▶ requests (for HTTP between services)
- ▶ FAISS (+ numpy) for vector search (index binaries exist)
- ▶ PDF extraction tooling (pdfminer or similar)
- ▶ JSON and file storage for index metadata
- ▶ NLU-NLU (Natural Language Understanding)

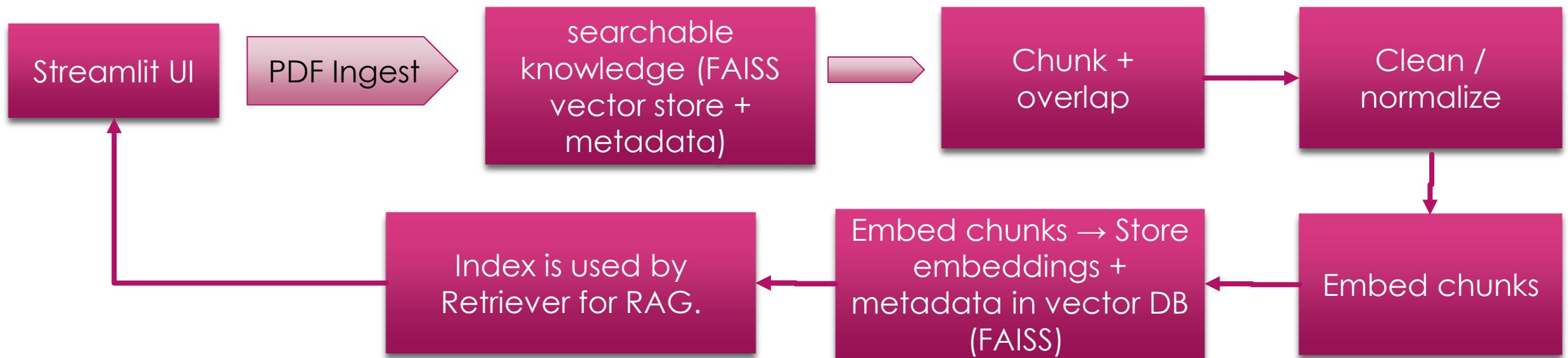
**GitHub Repo:**

[https://github.com/pankajmishra/pkm\\_genairep](https://github.com/pankajmishra/pkm_genairep)

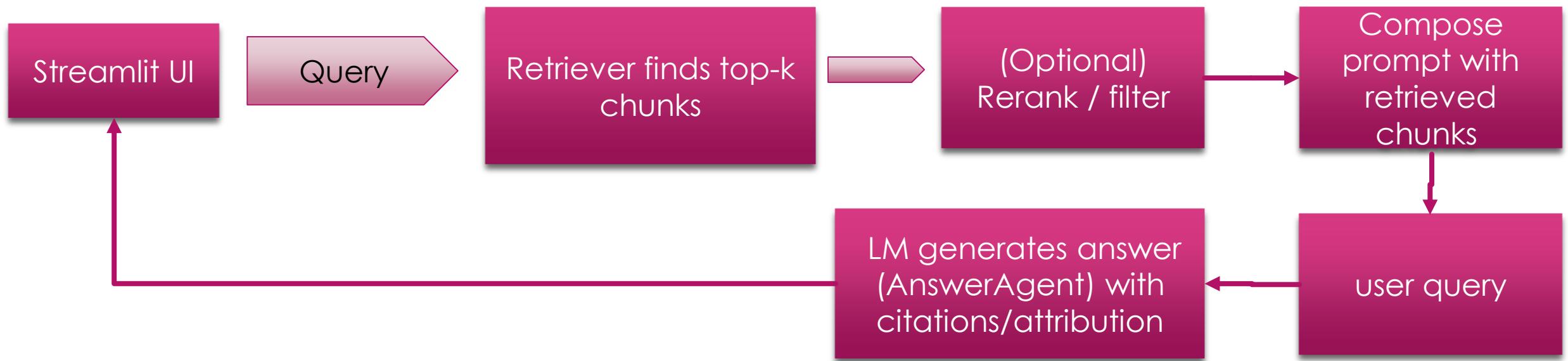
# Data Flow

- ▶ Data flow & control flow (detailed)
  - ▶ Streamlit -> POST /chat -> orchestrator
  - ▶ orchestrator:
    - ▶ classify\_intent(user\_text)
    - ▶ redact\_pii(user\_text)
    - ▶ if faq:
      - ▶ AnswerAgent -> retriever -> FAISS index -> fetch documents -> compose answer -> return
    - ▶ if action:
      - ▶ validate authentication & account\_id
      - ▶ ActionAgent.execute(action\_name, params) -> likely calls action API endpoints (requests.post)
      - ▶ return action result

# Ingestion Flow



# Query Flow



# Future Scope:

- ▶ Orchestrator currently performs simple text checks to route actions — this is a demo pattern and can be hardened (explicit intent labels, robust NLU).
- ▶ Action endpoints use in-memory stores (ACCOUNTS/DISPUTES) — It can be replaced with persistent/data store & transactional handling for production.
- ▶ PII redaction occurs in orchestrator before sending to AnswerAgent/ActionAgent — keep that step and extend to logging scrubbing.
- ▶ Authentication gating: orchestrator checks authenticated flag and account\_id before action invocation; integrate real auth provider for production.

# Demo: BANK-iMitra ( MCP-Model Context Protocol)

Document Upload

Upload a PDF document (?)

Drag and drop file here  
Limit 200MB per file • PDF

Browse files

Index Status

Index loaded: 34 chunks

Documents: 2

- HSDC\_Bank\_Card\_policy.pdf (25 chunks)
- sbi\_bank\_saving\_policy.pdf (9 chunks)

Bank-iMitra System

Upload PDF documents and query them with AI-powered answers and citations

Ask a Question ?

Enter your question:  
What is Premium & Cobrand Cards?

Send Query

FAQ Query

Answer

Premium & Co-Brand Cards are a category of credit cards offered by HDFC Bank, classified broadly along with Classic and Super Premium Cards. These cards include variants that are co-branded with various partners and offer features distinct from Classic and Super Premium categories. Specific details about the products under Premium & Co-Brand Cards are not provided in the given contexts.

Citations

## Home Screen

- Demo notes (how to run/what to show) Start action API (`server_fastapi.py`) on port 8001
- Start orchestrator (`server_orchestrator.py`) on port 8000
- Run Streamlit app (`app.py`); upload a PDF (optional)
- Demonstrate FAQ path and Action path (balance, block)

# Usage Steps – Home Screen

The screenshot shows the iMitra web application interface. On the left, there's a sidebar with sections for "Document Upload" (with a file upload area), "Index Status" (showing "Index loaded: 34 chunks"), and a list of "Documents: 2" including "HSDC\_Bank\_Card\_policy.pdf" and "sbi\_bank\_saving\_policy.pdf". The main content area features the "Bank-iMitra System" logo and a central "Ask a Question ?" input field where the user has typed "What is Premium & Cobrand Cards?". Below the input field is a red "Send Query" button. A green "FAQ Query" section follows. At the bottom, there's an "Answer" section with a detailed description of Premium & Co-Brand Cards and a "Citations" section.

iMitra

localhost:8501

Document Upload

Upload a PDF document

Drag and drop file here  
Limit 200MB per file • PDF

Browse files

Index Status

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Citations

# Usage Steps

The diagram illustrates the usage steps of the Bank-iMitra System, showing the process from document upload to query execution.

**Step 1: Home Page**

The first screenshot shows the main interface of the Bank-iMitra System. It features a sidebar with "Document Upload" and "Index Status". Under "Document Upload", there is a "Drag and drop file here" area with a limit of 200MB per file. A "Browse files" button is also present. Under "Index Status", it shows "Index loaded: 34 chunks". The central area displays the "Bank-iMitra System" logo and the text "Upload PDF documents and query them with AI-powered answers and citations". A green message bar indicates "Index loaded successfully!". Below this is the "Ask a Question ?" section, which includes an "Account Settings" link, a question input field ("e.g., What is the ATM withdrawal limit? or Block my card"), and a red "Send Query" button. At the bottom, there is an "Example Queries" section with two examples: "What is the ATM withdrawal limit?" and "What are the account balance requirements?".

**Ingest pdf**

A large pink arrow points from the "Ask a Question ?" section of the first screenshot to the "Document Upload" section of the second screenshot, indicating the flow of the process.

**Step 2: Document Upload**

The second screenshot shows the "Document Upload" page. It has a "Drag and drop file here" area with a limit of 200MB per file. A "Browse files" button is available. A file named "bank\_accounts\_detail.pdf" (59.8KB) is shown in the upload area. A red "Ingest Document" button is prominently displayed below the file preview.

**Step 3: Final State**

The third screenshot shows the final state of the system. The "Index Status" section now shows "Index loaded: 34 chunks". The "Documents" section lists "HSDC\_Bank\_Card\_policy.pdf (25 chunks)" and "sbi\_bank\_saving\_policy.pdf (9 chunks)". The "Ask a Question ?" section is identical to the first screenshot, with the "Send Query" button highlighted in red. The "Example Queries" section at the bottom is also identical.

# Ingestion Completed with Prompt ready

**Document Upload**

Upload a PDF document

Drag and drop file here  
Limit 200MB per file • PDF

Browse files

bank\_accounts\_detail.pdf 59.8KB X

Ingest Document

---

**Index Status**

Index loaded: 36 chunks

---

**Documents: 3**

- HSDC\_Bank\_Card\_policy.pdf (25 chunks)
- bank\_accounts\_detail.pdf (2 chunks)
- sbi\_bank\_saving\_policy.pdf (9 chunks)



**Bank-iMitra System**

Upload PDF documents and query them with AI-powered answers and citations

Index loaded successfully!

---

**Ask a Question ?**

Account Settings

Account ID: **acct\_125**

Authenticated

Account **changed to acct\_125. Cleared loaded index and uploaded files for this session. Please ingest documents for the new account.**

Enter your question:  
e.g., What is the ATM withdrawal limit? or Block my card

# Action Query - Classification

## Data Sampling:

```
{  
  "acct_123": {  
    "balance": 1250.75,  
    "cards": [{"last4": "4242", "status": "active"}]  
  },  
  "acct_124": {  
    "balance": 3420.10,  
    "cards": [{"last4": "1111", "status": "active"}]  
  },  
  "acct_125": {  
    "balance": 875.00,  
    "cards": [{"last4": "2222", "status": "blocked"}]  
  },  
  "acct_126": {  
    "balance": 5600.50,  
    "cards": [{"last4": "3333", "status": "active"}]  
  },  
  "acct_127": {  
    "balance": 150.25,  
    "cards": [{"last4": "4444", "status": "inactive"}]  
  },  
  "acct_128": {  
    "balance": 9999.99,  
    "cards": [{"last4": "5555", "status": "active"}]  
  }  
}
```

## Ask a Question ?

### Account Settings

Account ID

acct\_125

Authenticated

Enter your question:

What is account balance of account?

**Send Query **

 Action Query

## Action Result

```
 {  
   "status" : "ok"  
   "balance" : 875  
}
```

# FAQ Query with – Routing, RAG, LLM, faiss-Facebook AI

## Similarity Search

**Document Upload**

Upload a PDF document ?

Drag and drop file here  
Limit 200MB per file • PDF

Browse files

---

**Index Status**

Index loaded: 36 chunks

Documents: 3

- HSDC\_Bank\_Card\_policy.pdf (25 chunks)
- bank\_accounts\_detail.pdf (2 chunks)
- sbi\_bank\_saving\_policy.pdf (9 chunks)

**Ask a Question ?** 

> Account Settings

Enter your question:

What is procedure of Issuance of Credit Cards?

**Send Query** 

Processing your request...

**Example Queries** 

**Example FAQ:** What is procedure of Issuance of Credit Cards?

**FAQ Query**

**Answer**

Credit cards are issued by the Bank at its sole discretion, subject to adherence to the Bank's credit norms and documentation requirements. The Bank may issue any types of credit cards permissible under applicable laws and RBI regulations, in physical and/or virtual form. Add-on cards may also be issued to persons having a predefined relationship with the primary cardholder. All required information, including terms and conditions such as the Most Important Terms and Conditions (MITC), Key Fact Statement (KFS), and Card Member Agreement (CMA), are communicated transparently to the applicant at the time of issuance to maximize transparency and customer convenience.

**Citations**

▼ Citation 1: HSDC\_Bank\_Card\_policy.pdf (Chunk 13)

Source: HSDC\_Bank\_Card\_policy.pdf

Chunk Index: 13

▼ Citation 2: HSDC\_Bank\_Card\_policy.pdf (Chunk 3)

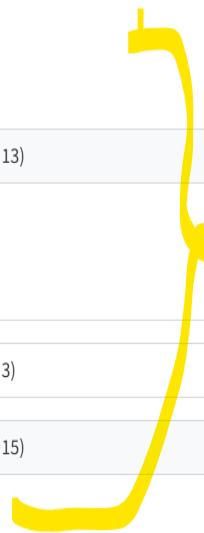
Source: HSDC\_Bank\_Card\_policy.pdf

Chunk Index: 3

▼ Citation 3: HSDC\_Bank\_Card\_policy.pdf (Chunk 15)

Source: HSDC\_Bank\_Card\_policy.pdf

Chunk Index: 15



# FAQ Query – Taking context from other uploaded PDF

### Document Upload

Upload a PDF document

Drag and drop file here  
Limit 200MB per file • PDF

Browse files

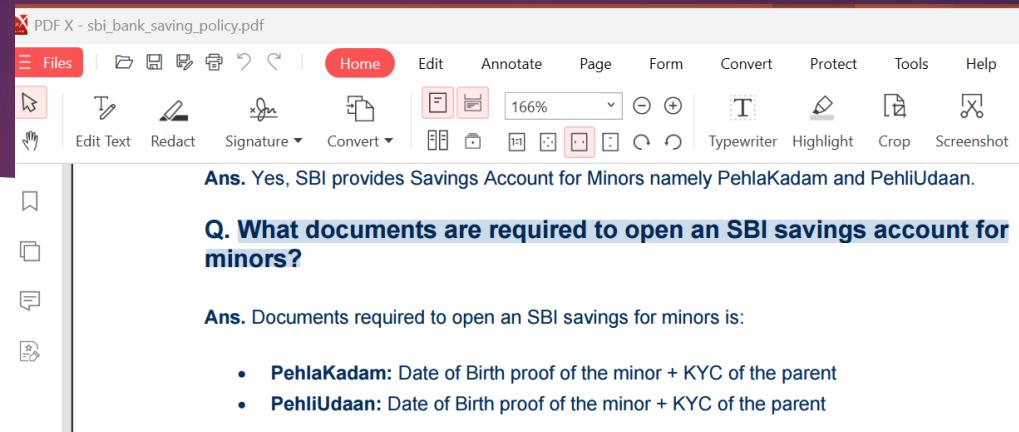
---

### Index Status

✓ Index loaded: 36 chunks

Documents: 3

- HSDC\_Bank\_Card\_policy.pdf (25 chunks)
- bank\_accounts\_detail.pdf (2 chunks)
- sbi\_bank\_saving\_policy.pdf (9 chunks)



Ans. Yes, SBI provides Savings Account for Minors namely PehlaKadam and PehliUdaan.

**Q. What documents are required to open an SBI savings account for minors?**

Ans. Documents required to open an SBI savings for minors is:

- **PehlaKadam:** Date of Birth proof of the minor + KYC of the parent
- **PehliUdaan:** Date of Birth proof of the minor + KYC of the parent

Enter your question:  
What documents are required to open an SBI savings account for minors?

Send Query

FAQ Query

**Answer**

The documents required to open an SBI savings account for minors include those needed for the PehlaKadam and PehliUdaan accounts. However, the exact list of documents is not fully provided in the available context.

**Citations**

▼ Citation 1: sbi\_bank\_saving\_policy.pdf (Chunk 1)

Source: sbi\_bank\_saving\_policy.pdf

Chunk Index: 1

**Example FAQ:** What documents are required to open an SBI savings account for minors?

# FAQ Query – Taking Context from 3<sup>rd</sup> PDF File

**Document Upload**

Upload a PDF document

Drag and drop file here  
Limit 200MB per file • PDF

Browse files

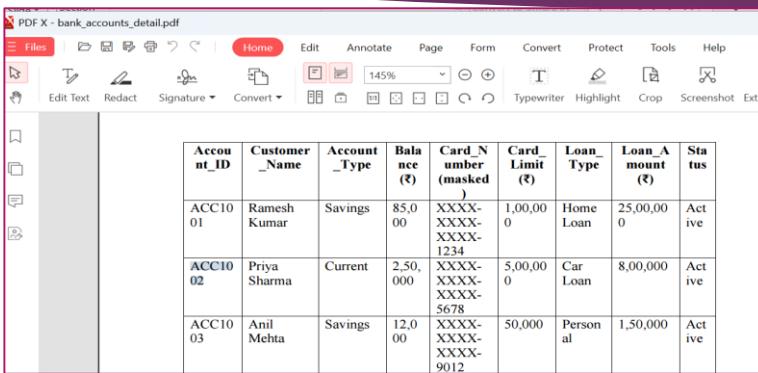
---

**Index Status**

✓ Index loaded: 36 chunks

Documents: 3

- HSDC\_Bank\_Card\_policy.pdf (25 chunks)
- bank\_accounts\_detail.pdf (2 chunks)
- sbi\_bank\_saving\_policy.pdf (9 chunks)



| Account_ID | Customer_Name | Account_Type | Balance (₹) | Card_Number (masked) | Card_Limit (₹) | Loan_Type | Loan_Amount (₹) | Status |
|------------|---------------|--------------|-------------|----------------------|----------------|-----------|-----------------|--------|
| ACC1001    | Ramesh Kumar  | Savings      | 85,00       | XXXX-XXXX-XXXX-1234  | 1,00,000       | Home Loan | 25,00,000       | Active |
| ACC1002    | Priya Sharma  | Current      | 2,50,00     | XXXX-XXXX-XXXX-5678  | 5,00,000       | Car Loan  | 8,00,000        | Active |
| ACC1003    | Anil Mehta    | Savings      | 12,00       | XXXX-XXXX-XXXX-9012  | 50,000         | Personal  | 1,50,000        | Active |

**Example FAQ:** What documents are required to open an SBI savings account for minors?

**Ask a Question ?**

➤ Account Settings

Enter your question:  
Give Account holder name of Account "ACC1002" and Account Type

Send Query

**FAQ Query**

**Answer**

The account holder name for Account 'ACC1002' is Priya Sharma and the account type is Current.

**Citations**

▼ Citation 1: bank\_accounts\_detail.pdf (Chunk 0)

Source: bank\_accounts\_detail.pdf

Chunk Index: 0

# Detailed Tech

- ▶ Components and responsibilities:
  - ▶ Streamlit Frontend (app.py)
    - ▶ UI elements: file upload, example queries, query entry, authentication flags.
    - ▶ Manages session\_id, account\_id, authenticated flag.
    - ▶ Calls Orchestrator at /chat (HTTP POST) with a JSON payload: {session\_id, user\_text, account\_id, authenticated}
  - ▶ Orchestrator Service (server\_orchestrator.py)
    - ▶ Exposes /chat POST endpoint (Pydantic model ChatRequest).
    - ▶ Uses:
      - ▶ classify\_intent(text) — detect faq vs action (from agents.py)
      - ▶ redact\_pii(text) — remove/replace PII before processing
      - ▶ AnswerAgent — for FAQ/knowledge responses (retrieval + composition)
      - ▶ ActionAgent — executes domain actions (block\_card, get\_balance, raise\_dispute)
    - ▶ Basic routing logic:
      - ▶ if intent == 'faq' -> AnswerAgent.answer(redacted)
      - ▶ else action routing: naive string checks (e.g., 'block' -> block card; 'balance' -> get balance)
    - ▶ Returns a JSON response with session\_id, intent and either parsed response (FAQ) or action\_result.

- ▶ Action API (server\_fastapi.py)
    - ▶ Exposes domain endpoints:
      - ▶ POST /block\_card {account\_id, card\_last4, reason}
      - ▶ POST /get\_balance {account\_id}
      - ▶ POST /raise\_dispute {account\_id, transaction\_id, reason}
    - ▶ Holds in-memory ACCOUNTS and DISPUTES dictionaries (demo data).
    - ▶ Performs domain changes and returns status JSON.
  - ▶ Retrieval & Indexing
    - ▶ FAISS index files (faiss\_index.bin, faiss\_meta.json, faiss\_raw.json) used by AnswerAgent/retriever to locate relevant document chunks.
    - ▶ Ingestion code exists (ingest.py + retriever.py) to generate the index from PDFs.
  - ▶ Agents & Tools (agents.py, tools.py, prompts.py)
    - ▶ Agents implement intent classification, PII redaction, retrieval + answer composition, and action execution (wrapping calls to action API).
- ▶ Data flow & control flow (detailed)
- ▶ Streamlit -> POST /chat -> orchestrator
  - ▶ orchestrator:
    - ▶ classify\_intent(user\_text)
    - ▶ redact\_pii(user\_text)
    - ▶ if faq:
      - ▶ AnswerAgent -> retriever -> FAISS index -> fetch documents -> compose answer -> return
    - ▶ if action:
      - ▶ validate authentication & account\_id
      - ▶ ActionAgent.execute(action\_name, params) -> likely calls action API endpoints (requests.post)
      - ▶ return action result

# Thanks You

- ▶ **GitHub Repo:**
- ▶ [https://github.com/pankajmishra/pkm\\_genairep](https://github.com/pankajmishra/pkm_genairep)
- ▶ **Contact:**
  - ▶ [pankaj.mishra15@in.ey.com](mailto:pankaj.mishra15@in.ey.com)
  - ▶ [pankaj.Mishra.7@gmail.com](mailto:pankaj.Mishra.7@gmail.com)