KycHub

Agentic Alert Resolution System

Objective: Design and implement a simplified, working model of the Agentic Alert Resolution System (AARS) to automatically investigate and resolve pre-generated banking transaction monitoring alerts.

Goal: Demonstrate the ability to structure a multi-agent application, leverage external tools (simulated), apply conditional reasoning (SOPs), and produce a compliant, auditable resolution.

Part 1: Banking Domain Analysis & Alert Scenarios (5 Alerts)

The candidate must first understand and document the investigation path for five distinct alert types.

Alert ID	Scenario Name	TMS Trigger/Rule	Required Investigative Tools/Data	Resolution Pathway
A-001	**Velocity Spike (Layering)**	5+ transactions exceeding $5,000 within 48 hours, coupled with large inbound credit 2 hours prior.	**DB Tool:** Historical Transaction Lookback (90 days). **Context Tool:** Customer's Declared Income/Source of Funds.	If lookback shows no prior high velocity: **Escalate (SAR Prep).** If velocity spike is due to known business cycle: **Close (False Positive).**
A-002	**Below-Threshold Structuring**	3 cash deposits in 7 days, each between $9,000 and $9,900.	**DB Tool:** Linked Accounts Check (cross-reference customer ID with associated accounts). **Context Tool:** Geographic/Branch proximity of deposits.	If linked accounts confirm aggregate >$28k: **Escalate (SAR Prep).** If deposits are geographically diverse and legitimate business receipts: **RFI (Ask purpose/source).**

A-003	**KYC Inconsistency (Business vs. Transaction)**	Individual Profile (Retail) sending $20,000 wire to an MCC coded as 'Precious Metals Trading'.	**Context Tool:** KYC Occupation/Employer. **Context Tool:** Adverse Media Search (OSINT).	If occupation is confirmed as 'Jeweler' or 'Trader': **Close (False Positive).** If profile is 'Teacher' or 'Student': **Escalate (SAR Prep).**
A-004	**Sanctions List Hit (Minor Match)**	Transaction counterparty name is a fuzzy match (80% similarity score) to an entity on the internal sanctions watchlist.	**Context Tool:** Sanctions List Look-up (Specific Entity ID). **DB Tool:** Counterparty's historical relationship and banking jurisdiction.	If specific ID is a true match or the bank jurisdiction is high-risk: **Escalate (Block/SAR Prep).** If proven false positive (common name): **Close (False Positive).**
A-005	**Dormant Account Activation**	An account dormant for 12+ months receives an inbound wire of $15,000 and is immediately followed by a large ATM withdrawal.	**Context Tool:** KYC Profile Age & Risk Rating. **Context Tool:** RFI Generation Logic.	If KYC Risk is Low and RFI tool is available: **RFI (Ask for funds purpose).** If KYC Risk is High and withdrawal is international: **Escalate (SAR Prep).**

Part 2: Implementation Requirements

The candidate must implement the core Agentic Hub and Spokes components using a programming language (e.g., Python) and an Agent framework (e.g., LangChain, CrewAI, or a custom class-based agent architecture).

KycHub

1. Data Simulation (Input)

The candidate must create the following data structures:

- **Alert Input:** A dictionary/JSON structure for each of the 5 alerts, including `alert_id`, `scenario_code`, and `subject_id`.
- **Database Mock:** A minimal set of Python classes or dictionaries to simulate the **Historic Transactions** and **KYC Profiles** databases. (e.g., `db_kyc = {'CUST-101': {'income': 50000, 'occupation': 'Teacher'}}`)
- **SOPs/Meta Configuration:** A simple config file or dictionary defining the resolution rules (e.g., `RUL-A001: IF Velocity > 5 AND Income_Match == False THEN ESCALATE`).

2. Agentic Components

The candidate must define and implement the logic for the following agents:

Agent Component	Core Functionality to Implement
Orchestrator Agent (Hub)	**Routing Logic:** Takes the Alert ID, uses the scenario code to identify the required Spoke Agents, and initiates the investigation sequence.
Investigator Agent (Spoke)	**DB Query Simulation:** Executes a simulated `db_query_history` method, returning a calculated fact (e.g., *"Historical Max Txn: $1,200"*).
Context Gatherer Agent (Spoke)	**KYC Query Simulation:** Executes a simulated `get_kyc_profile` method, returning relevant profile data.
Adjudicator Agent (Spoke)	**Reasoning Logic:** Accepts all findings. Applies if/then/else logic based on the mock SOPs. **Output:** A structured JSON resolution (`recommendation`, `rationale`, `confidence`).
Action Execution Module (AEM)	**Execution Simulation:** Based on the Adjudicator's decision, it executes the correct action, printing the result to the console.

3. Tool Simulation (Console-Based Output)

KYC HUB

Since real-world integrations are impossible, the candidate must simulate tool usage by printing clear, auditable output to the console:

- **RFI Tool Simulation:** If the decision is `REQUEST_INFORMATION`, the AEM must print: `"Action Executed: RFI via Email. Drafted message for Customer: [Customer_Name] requesting Source of Funds."`
- **IVR Tool Simulation:** If the decision requires IVR (e.g., A-005), the AEM must print: `"Action Executed: IVR Call Initiated. Script ID 3 used for simple verification. Awaiting Customer Response..."`
- **SAR Prep Simulation:** If the decision is `ESCALATE_FOR_SAR`, the AEM must print: `"Action Executed: SAR Preparer Module Activated. Case [Alert_ID] pre-populated and routed to Human Queue. Rationale: [Adjudicator Rationale]."`

Part 3: Evaluation Criteria

Criteria	Weight	Description
Agentic Architecture	40%	Correct implementation of the Hub and Spokes pattern (Orchestrator delegating to specialized agents). Clear separation of concerns and tool-use.
Resolution Logic	30%	Accuracy of the Adjudicator's decision-making against the defined 5 SOPs/scenarios. Effective use of simulated data (KYC/History) to justify the resolution.
Tool Integration	20%	Correct conditional calling and clear, auditable console output simulating the RFI, IVR, and SAR Prep actions based on the Adjudicator's output.
Code Quality & Documentation	10%	Clean, well-documented code. Clear explanation of the agent's Chain-of-Thought process.