

# VPBank Technology Hackathon 2025

## General Brief

Challenge Statement	GEN-AI MULTIAGENT SYSTEMS FOR PROCESS AUTOMATION
Team Name	Team 91

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## Solutions Introduction

The process of evaluating banking loans for companies usually takes 48 hours to weeks, depending on the size of the loaning entities and their complexity. For Small and Medium businesses, the average time for traditional loaning is 14 days, which stems from the lack of documents provided by lending companies and the overwhelming workload a credit officer has to do.

Our solution provides an interactive method to analyze and summarize information from clients' financial documents with a Multi-Agent system and enables automation in creating appraisal documents and mail sending processes. The tool offers a reduction in time spent on such repetitive tasks and enables employees to handle other workloads.

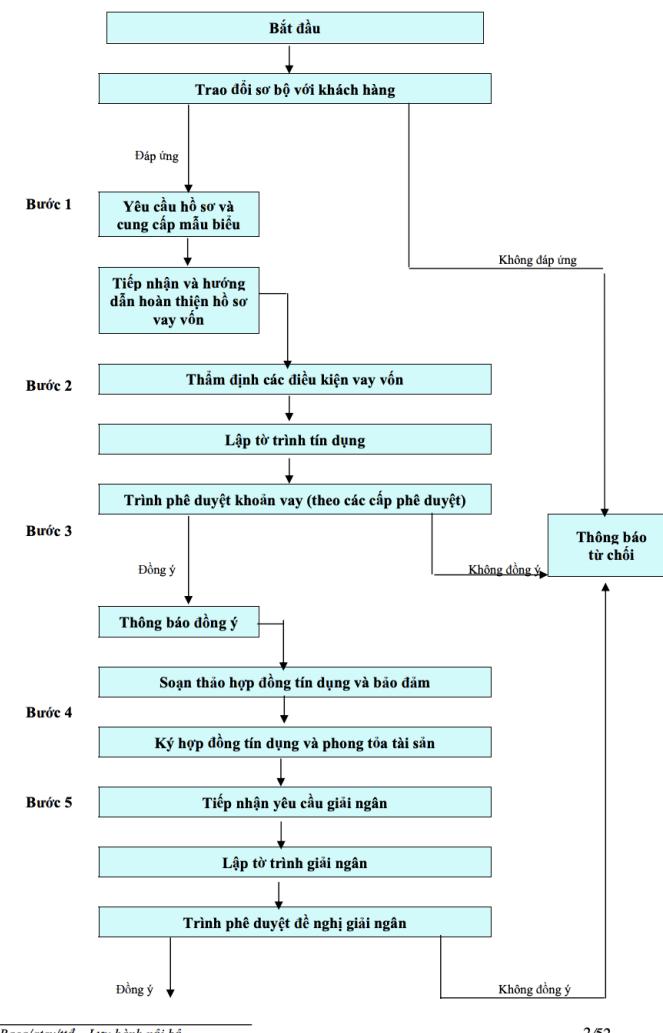
## Impact of Solution

The traditional credit assessment process in Vietnamese banks is heavily manual, fragmented, and reliant on human judgment, leading to inefficiencies in both time and accuracy ([Link](#)). This particularly burdens the SME segments (accounting for most of Vietnamese banks' clients), where businesses report loan application timelines stretching from several weeks to months ([Link](#)). For a sector that contributed to 45% of Vietnam's GDP ([Link](#)), such delays translate into missed opportunities for business growth, capital utilization, and economic contribution.

Moreover, this bottleneck not only strains bank resources but also limits SME's timely access to capital, hurting both business growth and the bank's competitiveness. When processing each loan application, the bank must spend a long processing time (from weeks to months), high human resources costs, while being put under risk of inconsistent evaluations between branches or officers. With growing loan demand and tighter regulatory scrutiny (e.g., under Circular 39/2016/TT-NHNN) ([Link](#)), banks are under pressure to improve speed, consistency, and auditability, yet legacy systems and siloed workflows prevent them from scaling efficiently.

Our solution helps with driving transformative benefits by automating the business assessment step (Step 2), from document ingestion to risk analysis and report generation. Each agent mimics a specific function traditionally handled by different

departments (legal validation, financial analysis, risk profiling), allowing real-time data synthesis, standardization, and decision support. For banks, this means faster time-to-credit, reduced processing costs, and enhanced compliance. For SME customers, it translates into improved access to finance, fewer document burdens, and transparent credit evaluations, especially for those with limited traditional collateral or thin-file histories.



Current competitors in the market are increasingly deploying AI tools to transform loan credit business assessment, especially for SMEs and household businesses transitioning to formal finance. However, those existing tools focus primarily on automating specific tasks such as overdraft approvals or document processing, often relying on rule-based automation or basic RPA. In contrast, emerging multi-agent AI

systems, like those developed by FPT, offer more sophisticated reasoning capabilities that can handle complex credit decisions and compliance requirements, but are still in early stages of deployment. Our solution stands out from existing AI tools in Vietnam's loan credit assessment market primarily due to its multi-agent system architecture, which enables interactive, context-aware analysis and summarization of client financial documents. Moreover, our multi-agent AI tool integrates multiple data inputs dynamically and automates the creation of required documents.

The competitive edge of our system lies in its domain-specific multi-agent architecture and is deeply integrated into the internal processes, from its use of a multi-AI agent system that distributes complex credit assessment tasks among specialized AI agents. This architecture aims to increase by 60% productivity gains for credit analysts and about 30% faster decision making ([Link](#)). By automating time-consuming and repetitive tasks such as document analysis, appraisal generation, and communication, our systems free employees to focus on strategic decisions. In comparison to existing market tools, our system not only accelerates turnaround but also enhances regulatory compliance and customer experience by providing transparent, auditable AI-driven insights. Thus, our solution uniquely combines advanced AI capabilities with practical operational benefits, positioning it as a transformative tool for banks aiming to deepen SME credit access and improve operational efficiency.

## Deep Dive into Solution

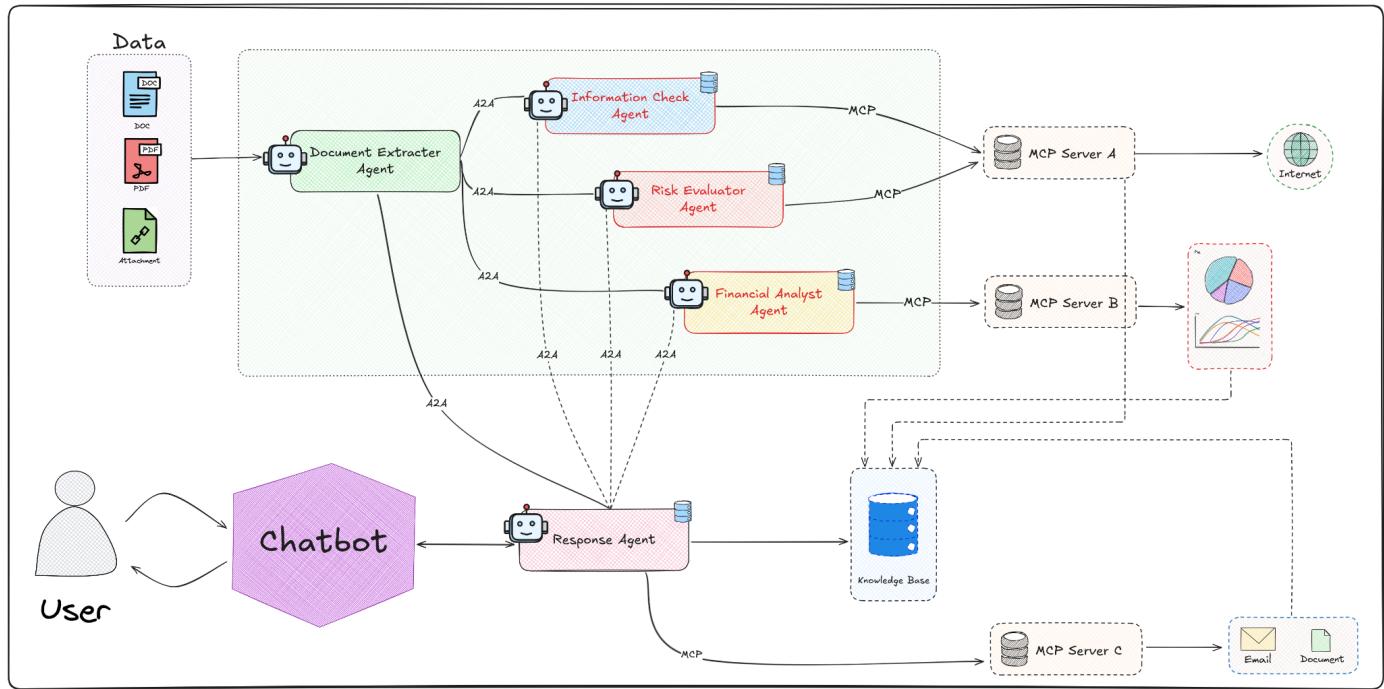
The problem our team is trying to solve consists of 2 major aspects: the risk analysis and financial situation evaluation. Both aspects need 2 distinct core agents to handle specific tasks within a domain, giving clear plans and familiarizing and using provided tools. They share the same resource from other agents except for the other core agent, which provides it to both through a Response Agent. Each core agent. The agent provides insight, evaluation, summaries of information, charts, scoring, or calculated data, not final judgment. The judgment relies on the user to take action, and the system only hands out suggestions, which can only help shorten the deciding process of the credit officers.

### General flow and list of agents:

The system contains two core agent groups: the Routing Agent Group and the Implementation Agent Group.

- The Routing Agent Group consists of two agents:
  1. **Document Extractor Agent:** Responsible for extracting data from documents and forwarding this information, along with data received from other agents, to the appropriate agents using an A2A protocol.
  2. **Response Agent:** Generates the final answer to the user query by retrieving data from the knowledge base or routing tasks to the Implementation Agent Group through A2A protocol when updates or out-of-knowledge-base processes are required.
- The Implementation Agent Group consists of three agents:
  1. **Information Check Agent:** Verifies and enriches company information using external sources (e.g., business registries, government APIs), confirming legal and business details, and stores validated data in the shared Knowledge Base.
  2. **Risk Evaluator Agent:** Assesses creditworthiness by analyzing verified data using scoring models and LLM-based heuristics, considering market conditions, news, and company strengths/weaknesses; results are stored in the Knowledge Base.

3. **Financial Analyst Agent:** Parses financial documents to compute KPIs, identify trends, and generate visual insights, which are made available for on-demand retrieval by the User or Response Agent.



About the toolset, powered by multiple MCP servers, this group provides specialized tools for data processing, including web crawling, data analysis, chart generation, and automated email delivery. Only agents in this group—such as the Information Check, Risk Evaluator, Financial Analyst, and Document Extractor—can ingest data into the shared Knowledge Base. The Response Agent retrieves this data and routes it as needed to support user queries and downstream tasks.

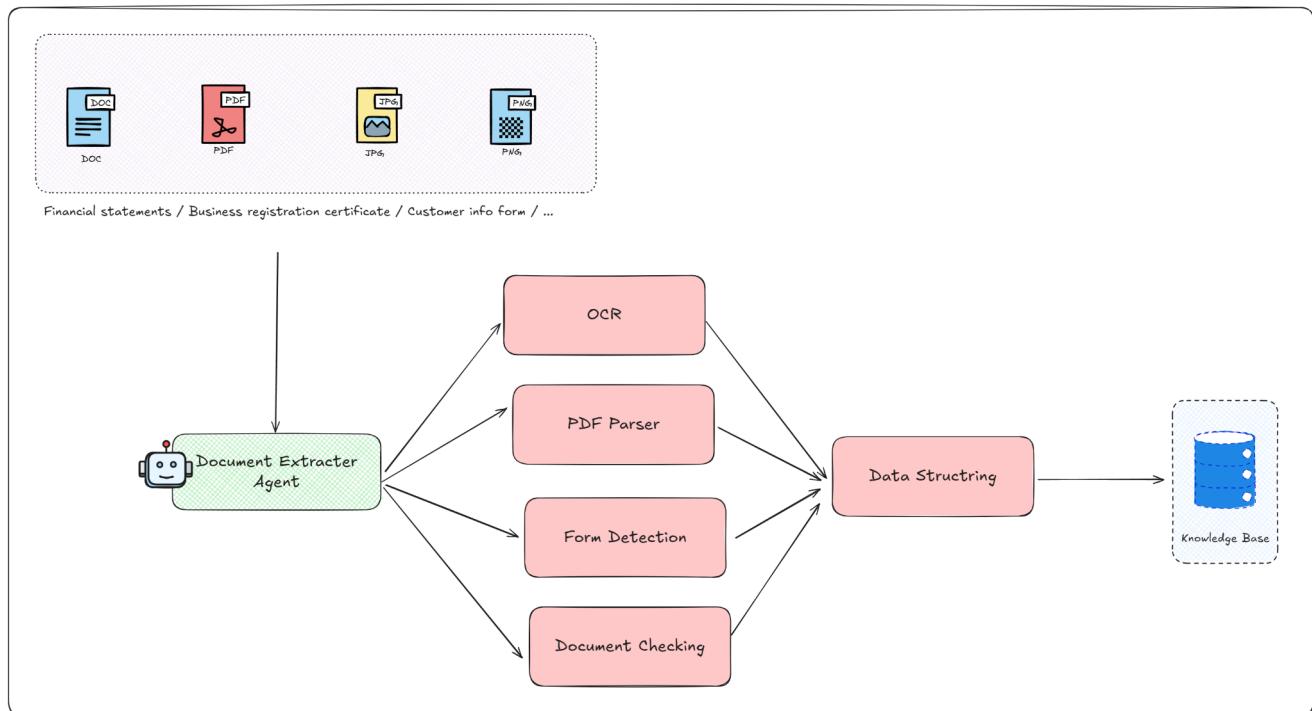
About the workflow, when the user uploads documents, the Document Extractor Agent first checks if they meet the processing requirements. If not, it uses A2A communication to return feedback to the user. If valid, it extracts necessary fields and forwards the data to the Implementation Agent Group. During processing, agents notify the Document Extractor Agent of completion or dependencies on other agents. After each step, agents store their processed data in the shared Knowledge Base.

Once the information has been collected and stored, the Response Agent is triggered. This agent aggregates outputs from all other agents and synthesizes them into a coherent summary. It can respond in natural language to the user via the chatbot,

generate detailed credit proposal documents, or send the results through email. It also updates a central Knowledge Base for future reference and stores final summaries in it, through the use of which it logs the completed results and attachments. An exemplary input and output of an agent is described as follows:

Agent Input	Agent Output
<p>&lt;USER UPLOAD DOCUMENTS&gt;</p> <p>USER QUERY:</p> <ul style="list-style-type: none"><li>- Create a Credit Report for Client A</li><li>- Send an email and attach this report to Mr.B for approve</li></ul>	<p>PLAN:</p> <ul style="list-style-type: none"><li>Step 1: Document Ingestion</li><li>Step 2: Information Verification</li><li>Step 3: Risk Evaluation</li><li>Step 4: Financial Analysis</li><li>Step 5: Proposal Generation &amp; Communication</li></ul> <p>COMMANDS: &lt;SEND Credit Proposal to UI&gt;</p> <p>PLAN:</p> <ul style="list-style-type: none"><li>Step 1: Generate Email</li><li>Step 2: Attach Document and send Email</li></ul> <p>COMMANDS: &lt;SEND Email&gt;</p>

## Document Extractor Agent:



The Document Extractor Agent handles tasks such as financial statements, business registration certificates, and customer information forms in various formats (DOC, PDF, JPG, PNG). This agent is responsible for converting unstructured or semi-structured input files into structured data usable across the multi-agent system. Upon receiving a document, the agent initiates one or more specialized submodules: OCR for extracting text from image-based files; PDF Parser for reading textual content from machine-readable PDFs; Form Detection to identify and extract data from standard form layouts; Document Checking to validate completeness and format compliance. The structured data is then stored in the central Knowledge Base, enabling downstream agents to perform higher-level analysis.

## Information Check Agent:

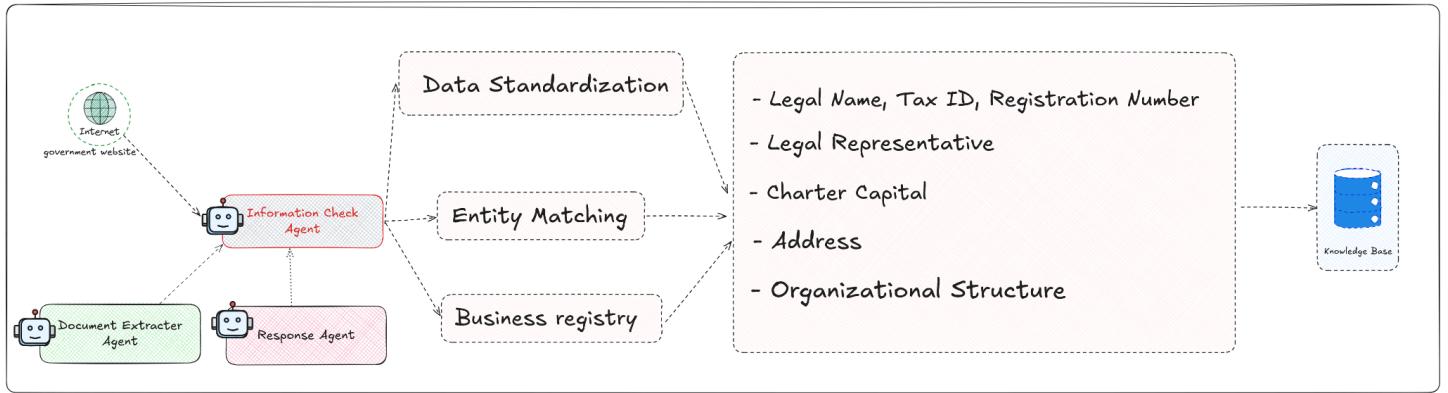


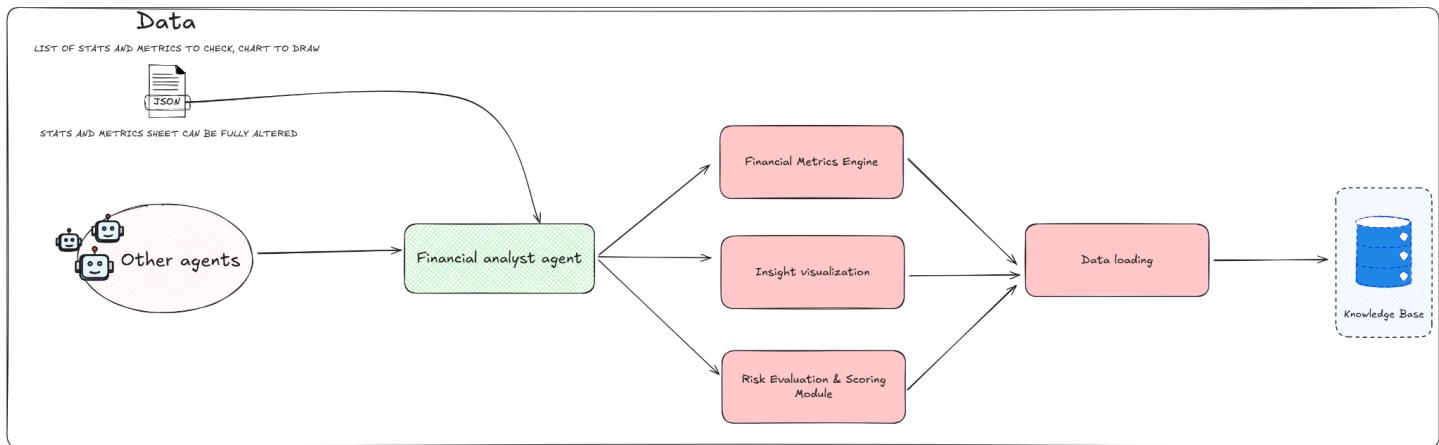
Figure 4:

The Information Check Agent verifies and standardizes key business information necessary for credit proposal evaluation. Leveraging both internally extracted data (Document Extractor Agent) and external trusted sources (such as government websites and business registries), this agent ensures the integrity and completeness of applicant data.

The agent performs three main functions: Data Standardization – Cleans and formats raw inputs to ensure consistent structure (e.g., name formatting, ID normalization); Entity Matching – Cross-verifies company identities across multiple sources to resolve ambiguities or duplicates.; Business Registry Lookup – Retrieves validated company attributes from official registries.

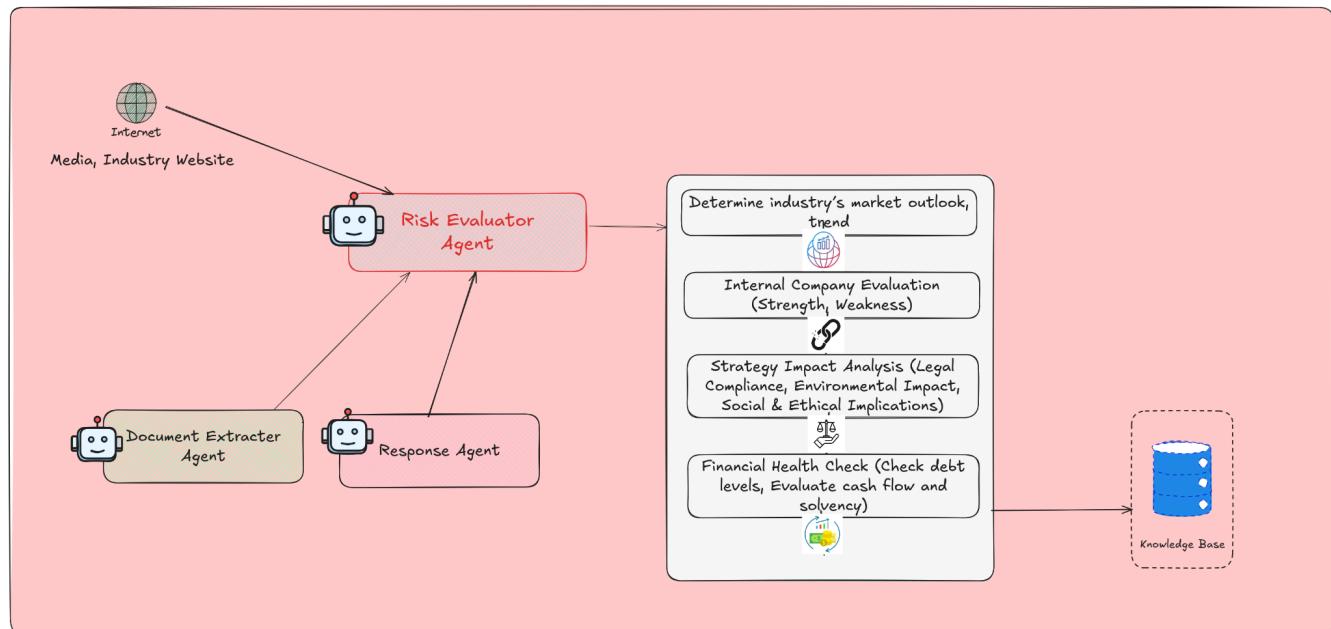
The result is a verified and enriched set of company metadata including: Legal Name, Tax ID, and Registration Number; Legal Representative; Charter Capital; Address; Organizational Structure. These verified data points are then committed to the Knowledge Base, making them accessible to other downstream agents in the multi-agent credit proposal system (e.g., Risk Evaluator, Financial Analyst).

## Financial Analyst Agent:



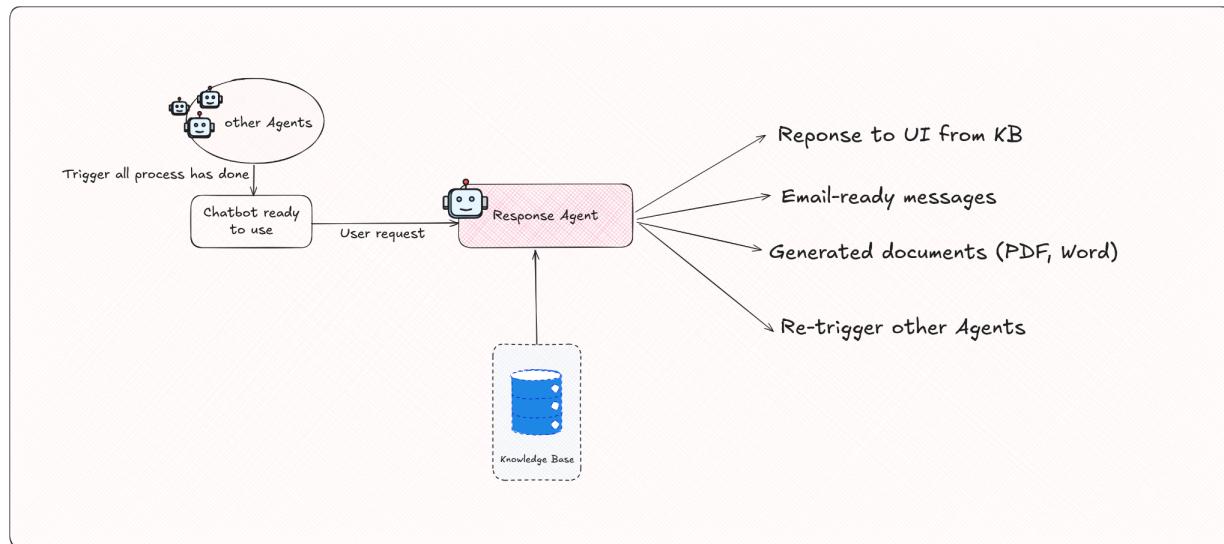
The **Financial Analyst Agent** serves as a central processor for evaluating financial performance and generating strategic insights within the credit proposal automation system. It receives structured financial data—such as statements and metric sheets—from both internal sources and upstream agents. Once triggered, the agent processes this data through three key modules: Financial Metrics Engine, which computes standard ratios and benchmarks (e.g., liquidity, profitability, debt ratios); Insight Visualization component, which translates complex data into digestible visual summaries and comparative charts; and Risk Evaluation & Scoring Module, which assigns a risk rating based on predefined models and thresholds. The resulting outputs are then routed through a Data Loading stage for integration into the centralized Knowledge Base, enabling informed decisions by downstream agents such as the Response Agent.

## Risk Evaluator Agent:



The **Risk Evaluator Agent** plays a key role in the automated credit proposal system by delivering comprehensive risk assessments. This agent leverages data from both structured internal sources—via the Document Extractor Agent—and unstructured external sources, such as industry websites and media channels. Its processing logic includes four core analytical modules: Industry Outlook Analysis, which determines market trends and forecasts; Internal Company Evaluation, assessing the target company's strengths and weaknesses; Strategic Impact Assessment, analyzing legal, environmental, social, and ethical implications; and Financial Health Check, where it examines debt levels, cash flow stability, and solvency. Outputs are stored in the shared Knowledge Base, making them accessible to the Response Agent and other components.

## Response Agent:

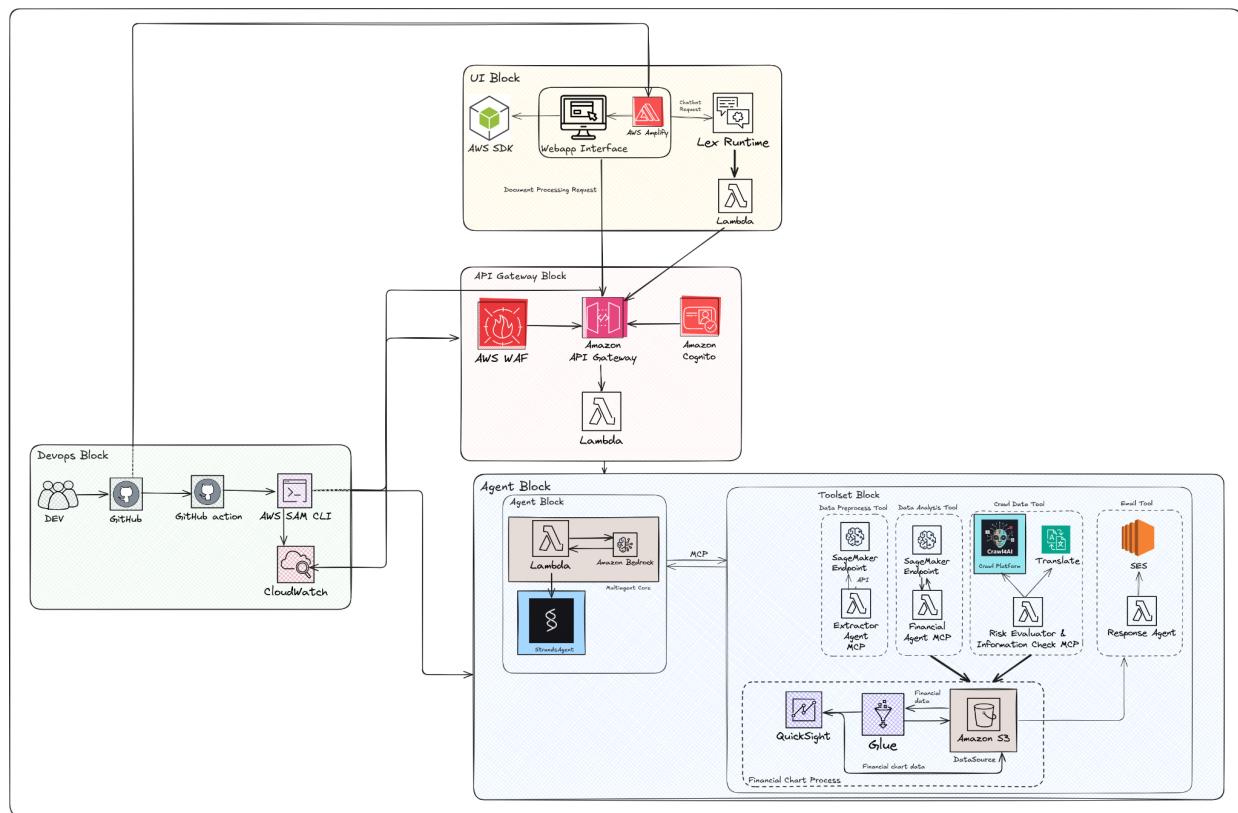


The **Response Agent** serves as the final orchestration component that consolidates, formats, and delivers results to the user. Once upstream agents complete their respective tasks, this agent is triggered either automatically or via chatbot-initiated user request. It structured outputs from the centralized **Knowledge Base**, and then transforms this data into multiple delivery formats, including: Summarized content for chatbot UI display; Email-ready messages tailored for communication with stakeholders; and Professionally formatted documents (PDF, Word) for proposal generation.

Additionally, the agent has the capability to **re-trigger specific agents** based on user feedback or data inconsistencies, thereby enabling iterative refinement without restarting the entire pipeline.

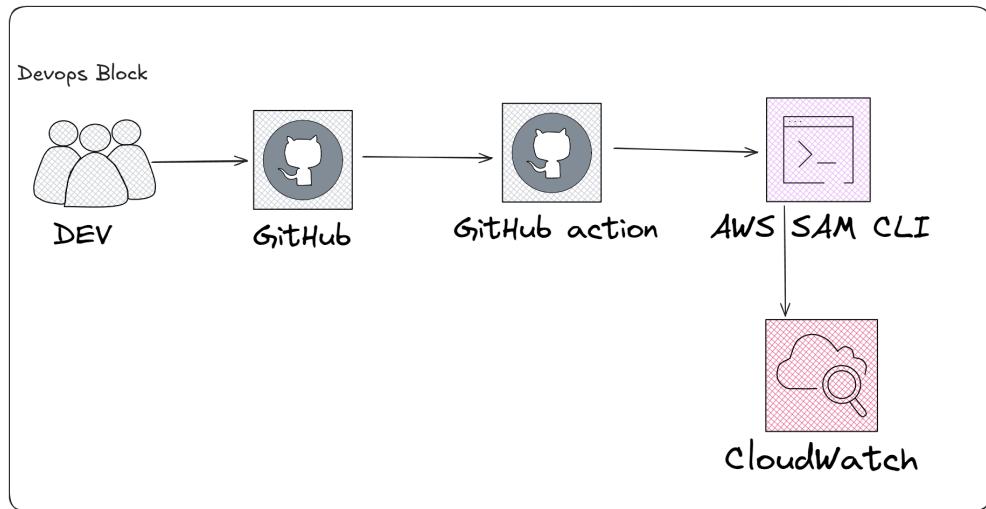
# Architecture of Solution

## a. Overview:



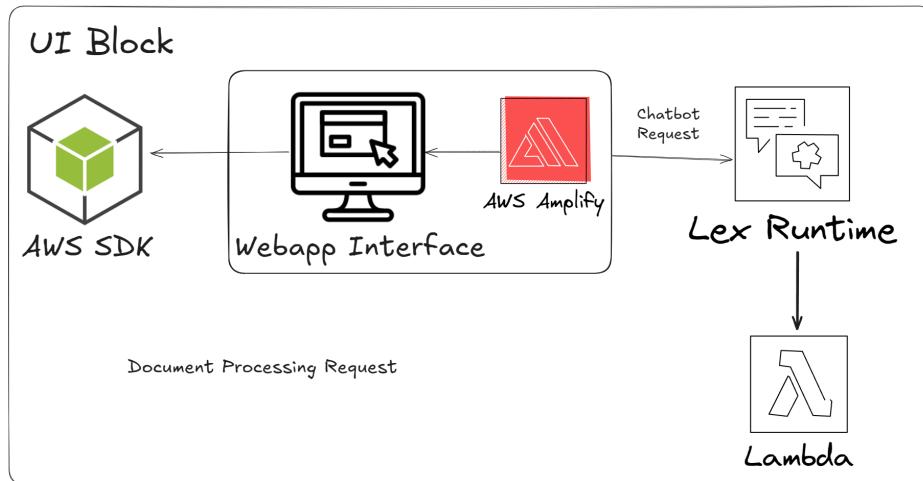
This AWS system architecture is a modular, serverless platform designed for intelligent document processing and financial analysis. It features a user interface hosted on AWS Amplify with chatbot support via Amazon Lex. API Gateway, secured by AWS WAF and Amazon Cognito, routes requests to Lambda functions and LLM-based agents powered by Amazon Bedrock. These agents communicate with task-specific tools like SageMaker (for extraction and analysis), Translate (for multilingual support), and QuickSight (for financial dashboards). Processed data is stored in Amazon S3 and visualized or emailed using SES. CI/CD is managed through GitHub Actions and AWS SAM CLI, with monitoring via CloudWatch.

**b. Devops Block:**



The Devops Block will be managed entirely through GitHub with the use of git actions, then the deploy through AWS SAM CLI for serverless service. This diagram represents a CI/CD workflow where the development team (DEV) collaborates through GitHub, pushing code that triggers GitHub Actions to automate the deployment process using the AWS SAM CLI. The SAM CLI builds and deploys serverless applications to AWS, such as Lambda functions and API Gateway, and the deployed resources are monitored through Amazon CloudWatch for logging and performance insights.

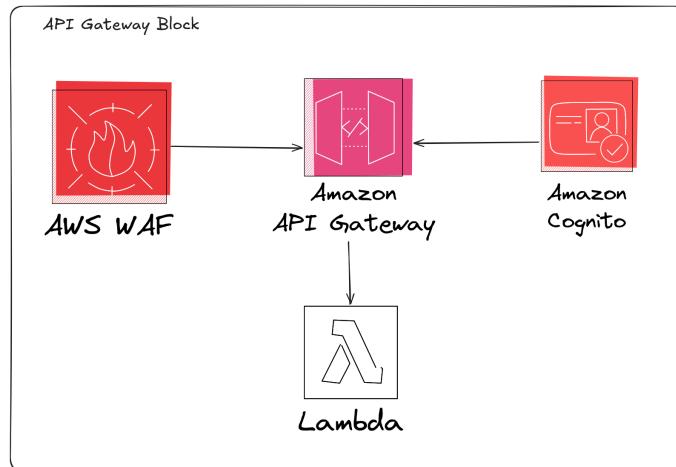
**c. User Interface Block:**



We built a basic web application as the user interface component of our system. The Webapp Interface, hosted via AWS Amplify, provides users with a responsive and scalable frontend experience. It communicates with Amazon Lex Runtime using the AWS SDK, enabling natural language interactions through chat. Lex Runtime interprets

user intents and slots, and when needed, triggers AWS Lambda functions to forward user queries to the API Gateway Block. Additionally, the web app can directly send document processing requests to the API Gateway Block, allowing backend services to handle tasks beyond chatbot interaction.

**d. API Gateway Block:**

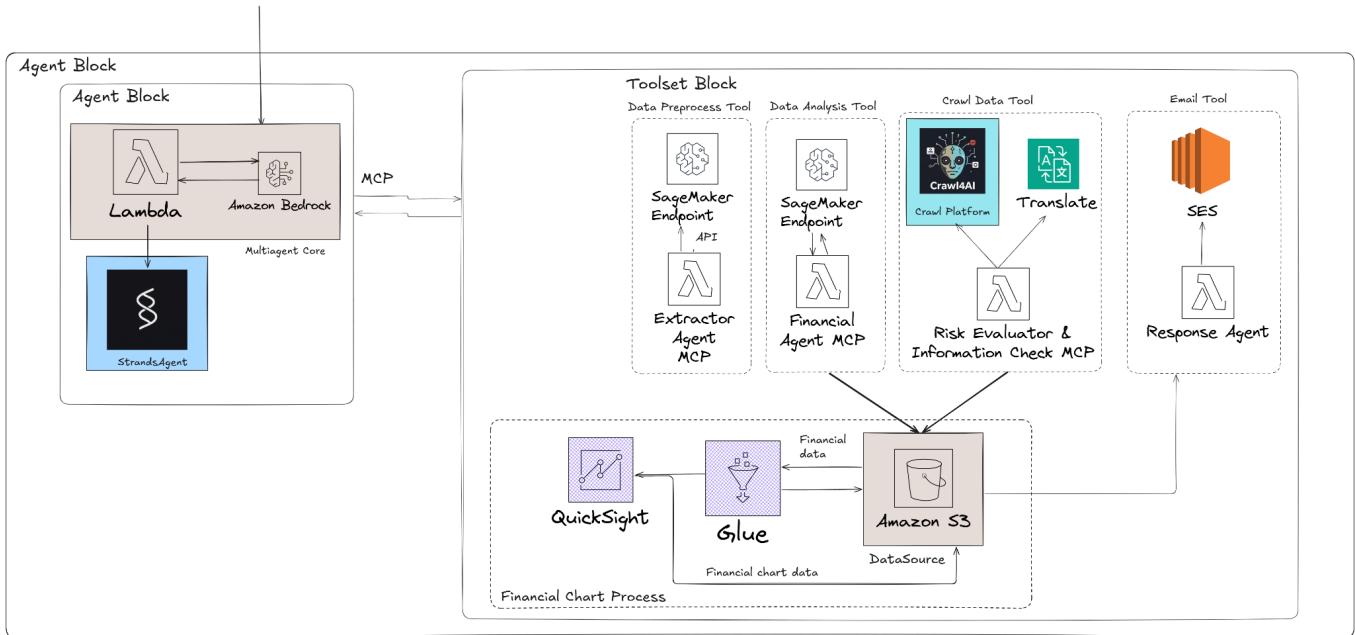


This API Gateway Block architecture showcases a fully serverless and secure approach to exposing backend functionality. At the core is Amazon API Gateway, which acts as the entry point for external requests. It integrates with AWS Lambda, enabling serverless execution of backend logic without the need to provision or manage servers.

To enhance security and access control, AWS WAF (Web Application Firewall) is positioned in front of API Gateway to filter and block malicious traffic such as SQL injection or DDoS attacks. Additionally, Amazon Cognito handles authentication and authorization, ensuring that only verified users can invoke APIs.

**e. Agent Block:**

To build an agent block, we need three clearly defined components: datasources, a reasoning or decision-making core (LLM), and an action module. Additionally, integration layers like APIs or middleware or frameworks are required to make.



This multi-agent system is composed of three main blocks: **Data Source**, **LLM Model Hosting**, and **Agent Toolset**. The **Data Source** block, primarily using Amazon S3, serves as the entry point for data. The **LLM Model Hosting** block leverages Amazon Bedrock to run the core agent logic via StrandsAgent. Finally, the **Agent Toolset** integrates various AWS services such as Textract, SageMaker, Lambda, and Glue, along with external tools like Crawl4AI and SMTP, to perform tasks such as data extraction, processing, translation, and communication.

**Amazon S3** serves as the central storage bucket that contains all processed information from the various agents. After completing their respective tasks, the **Information Check Agent**, **Risk Analysis Agent**, and **Financial Analyst Agent** store their processed data in this bucket. The **Response Agent** then retrieves relevant data from Amazon S3 to respond directly to user queries or forwards the necessary information to the appropriate agent for further processing, ensuring a smooth and coordinated workflow within the multi-agent system.

**StrandsAgent** serves as the core framework for building the **Multi-Agent Control Plane (MCP)**, enabling **Agent-to-Agent (A2A) communication**, managing **LLM inference**, and orchestrating interactions between components across the system.

The **Document Extractor Agent** first utilizes a Vision-Language Model (VLM) like **VinternLM**, deployed through **Amazon SageMaker**, to generate an overview of the

document. This model helps create missing requirements checking tools and the information extracted based on the set of fields provided. The AWSExtract is another option if the performance of the VinternLM model is not good.

The **Information Check Agent** and **Risk Analysis Agent**, both deployed on **AWS Lambda** for scalable and event-driven execution, leverage the **Crawl4AI** framework to collect essential company information from external sources. Once gathered, the data is processed and cleaned using **AWS Glue**, ensuring it is structured, accurate, and ready for further evaluation and risk assessment.

The **Financial Analyst Agent** leverages **Amazon QuickSight** to visualize and analyze financial data. It generates dynamic charts and interactive dashboards that offer insights into key financial metrics, trends, and anomalies, enabling informed decision-making based on the structured data provided by upstream agents. When advanced analysis is required, the agent utilizes **Amazon SageMaker** to host a large language model (**LLM**) for in-depth financial evaluation and forecasting.

The **Response Agent** also utilizes **Amazon SES (Simple Email Service)** to send email notifications, enabling seamless communication with users based on the processed information.