# YOUR MONEY MENTOR

**Siva Sakthi Balan Sudhakar Sundarambal**

sivasakthibalanss@gmail.com

**Mentor: Dr. Junaid Qazi**

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**Cloud Architecture for Smart Financial Services**

## 1. Introduction

### 1.1 Overview of Smart Financial Systems

The financial sector is undergoing a digital shift with cloud computing, AI, and big data playing central roles. Cloud-based financial systems enable faster decision-making, real-time fraud detection, customer personalization, and scalable infrastructure. Leveraging Azure services, this architecture addresses modern financial challenges with a secure and intelligent platform.

## 2. Mission & Objectives

### 2.1 Mission Statement

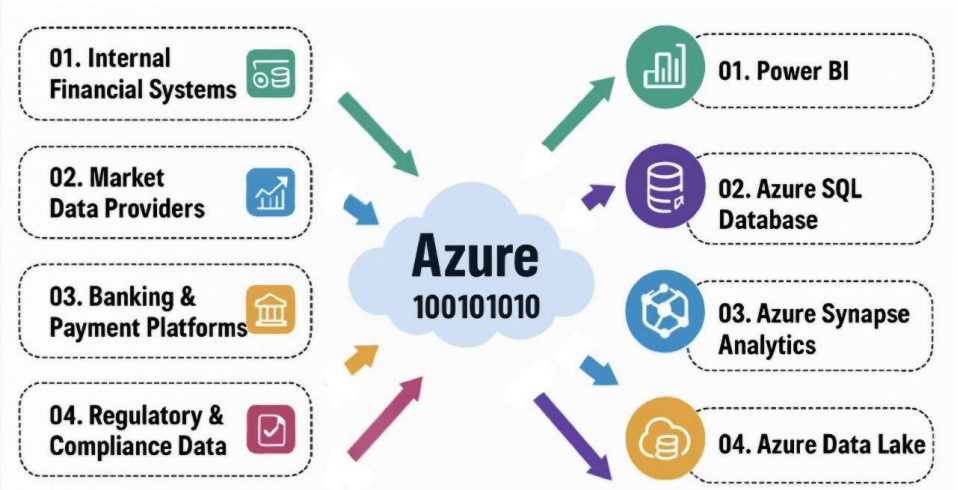
To develop a cloud-native, intelligent financial system on Microsoft Azure that offers secure, scalable, and real-time services including payments, analytics, and fraud detection.

### 2.2 Objectives

- Deliver real-time data processing and financial analytics
- Enable intelligent automation for customer services and fraud detection
- Ensure high availability, scalability, and regulatory compliance
- Provide a unified and secure digital financial platform

## 3. Design and Discovery Phase

### 3.1 Understanding Financial Sector Requirements



### 3.2 Identifying Key Challenges and Opportunities

- Threat of cyber-attacks and data breaches
- Demand for digital financial services
- Need for regulatory compliance
- Integration with legacy systems
- Opportunity in AI-based financial forecasting

## 4. Data Sources

### Streaming Data Sources

**1. Financial Market APIs (e.g., IEX Cloud, Alpha Vantage, Polygon.io)**

**What it provides:**
Real-time access to stock prices, forex rates, crypto values, indices, and more.

**Outputs:**

- **Live Market Dashboards** – Display current prices and market movements.
- **Trading Signals** – Auto-trigger buy/sell actions based on live price rules.
- **Market Alerts** – Notifications for price thresholds, volatility, or trends.
- **Portfolio Updates** – Real-time valuation of investment portfolios.

### Batch Data Sources

**2. Internal Financial Systems (e.g., SAP, Oracle, Dynamics 365)**

**What it provides:**
Manages internal operations like invoicing, payroll, GL, and tax.

**Outputs:**

- **P&L Reports** – Analyse profit across departments or regions.
- **Cash Flow Statements** – Monitor liquidity and operating cash.
- **Budget Forecasts** – Project upcoming expenses or revenue.
- **Audit-Ready Reports** – Provide compliance documentation.

**3. SQL Databases**

**What it provides:**
Stores structured, historical transactional and customer data.

**Outputs:**

- **Trend Analysis** – Spot financial patterns across time.
- **Customer Financial Behaviour** – Credit history, spending, etc.
- **Credit Risk Profiles** – Identify high-risk customers.
- **Custom Reports** – Dynamic queries for any financial scenario.

**4. Market & Financial Data Providers (e.g., Bloomberg, Morningstar, Refinitiv)**

**What it provides:**
Curated economic, company, and market data — not real-time, but updated regularly.

**Outputs:**

- **Economic Outlook Reports** – GDP, inflation, interest rate trends.
- **Valuation Models** – DCF, P/E ratios, etc.
- **Benchmarking** – Compare company performance against sector.
- **Market Trends** – Monthly or quarterly insights.

**5. Key Deliverables (Financial Sector)**

**5.1 Real-Time Fraud Alerts via Mobile App**

- **Delivery Method:** Mobile App (Push Notifications/SMS/Email)
- **What We Deliver:** Instant fraud detection alerts, Suspicious transaction notifications, Login anomaly alerts

**5.2 Credit Risk and Financial Health Reports**

- **Delivery Method:** Power BI dashboards, downloadable PDF reports
- **What We Deliver:** Credit risk scores, Debt-to-income ratio, Loan eligibility analysis, financial behaviour summaries

**5.3 Forecasting Models for Investments and Lending**

- **Delivery Method:** Power BI dashboards, Automated forecast reports
- **What We Deliver:** Loan repayment probability, Investment return predictions, Risk-adjusted lending models

**5.4 Real-Time Financial Reports (Cash Flow, Transactions)**

- **Delivery Method:** Live dashboards in Power BI, Weekly/monthly email reports
- **What We Deliver:** Transaction volumes, Revenue & expenses summary, Cash inflow/outflow analytics, Budget vs. actuals

**5.5 Account and Asset Management Dashboard**

- **Delivery Method:** Web-based dashboards, Mobile app views
- **What We Deliver:** Asset performance overview, Account balances, Portfolio value, Investment diversification charts

**6. Cloud Architecture Phases**

**1. Data Ingestion (Streaming and Batch Data)**

This stage involves collecting raw data from different sources, such as transaction systems, external APIs, and internal databases.

**Streaming Data Ingestion:**

- **Azure Event Hubs**:
    - **Purpose:** Real-time ingestion of transactional data, payment system data, and financial application logs.
    - **How:** Event Hubs allows high-throughput, real-time data streaming from mobile apps, websites, or financial transaction systems.

**Batch Data Ingestion:**

- **Azure Data Factory**:
    - **Purpose:** Scheduled data ingestion from various sources like financial databases, third-party financial APIs, and external data sources.

- **How:** Batch processing allows for the loading of data in bulk at regular intervals (e.g., daily batch jobs for historical transactions, credit scores, or user profiles).

**Data Sources:**

- **Financial Market APIs**
- **Internal Financial Systems**
- **SQL Databases**
- **Market & Financial Data Providers**

**2. Data Processing (Data Cleansing and Transformation)**

In this stage, raw data is cleaned, transformed, and standardized before storage and analysis.

**Real-Time Data Processing:**

- **Azure Stream Analytics**:
  - **Purpose:** Process real-time data streams and perform actions like filtering, aggregating, or analysing data as it arrives.
  - **How:** For example, fraud detection could be performed in real-time, where suspicious transactions are flagged immediately.

**Batch Data Processing:**

- **Azure Databricks**:
  - **Purpose:** Process and clean large volumes of historical data in batch mode, such as transforming raw financial data into structured formats.
  - **How:** Data pipelines in Databricks or HDInsight clean and transform raw transactional data for further analysis, including dealing with missing values, handling duplicates, and standardizing formats.

**Data Transformation:**

- **Azure Data Factory**:
  - **Purpose:** Orchestrate ETL (Extract, Transform, Load) pipelines for large-scale data processing and transformations.
  - **How:** Data can be transformed from various raw sources (JSON, XML, CSV) into structured data, such as relational tables for easy querying.

**3. Data Storage (Gold Layer)**

Once the data is cleansed and transformed, it's stored in appropriate data storage systems for easy access and future analysis.

**Structured Data Storage:**

- **Azure SQL Database**:
    - **Purpose:** Store structured, transactional data such as account balances, transaction logs, and user profiles.
    - **How:** Relational storage for consistent, fast querying of real-time transactional data.

**Data Lake (For Big Data Analytics):**

- **Azure Data Lake Storage**:
    - **Purpose:** Store raw and processed data at scale, enabling analytics on big data (e.g., transaction history, market trends).
    - **How:** It provides storage for both structured and unstructured data, and supports advanced analytics tools like Azure Synapse and Databricks.

**4. Data Analysis and Insights (Analytics and Machine Learning)**

In this stage, advanced analytics and machine learning models are applied to the stored data to derive meaningful insights.

**Real-Time Analytics:**

- **Azure Synapse Analytics**:
    - **Purpose:** Analyse and aggregate large volumes of financial data from different sources to derive real-time insights (e.g., identifying financial trends, analysing customer behaviour).
    - **How:** Performs SQL-based analysis on large datasets to generate KPIs, trend analysis, and financial reports.

**Data Aggregation:**

- **Azure Data Factory**:
    - **Purpose:** Aggregate data from different sources and transform it into business insights.
    - **How:** Uses data pipelines to aggregate and process data in stages, making it ready for reporting and predictive models.

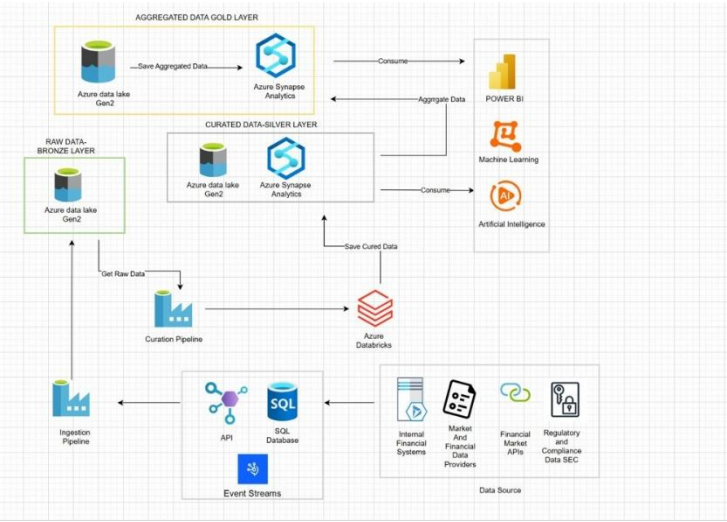
### 5. Output Visualization and Reporting

Finally, insights from the data analysis are presented visually in dashboards and reports for business users and decision-makers.

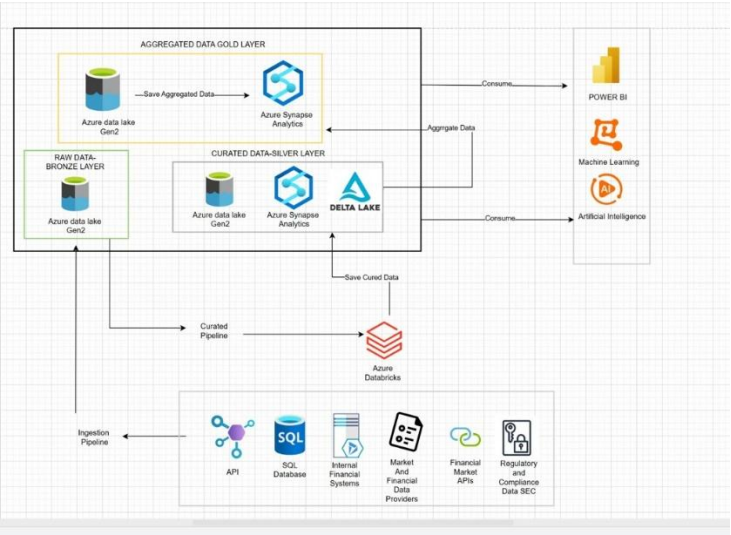
**Visualization and Reporting:**

- **Power BI**:
    - **Purpose:** Visualize key metrics, KPIs, and insights to allow business decision-makers to understand real-time data such as transaction volumes, revenue, fraud detection results, and customer performance.
    - **How:** Power BI can be used to create interactive dashboards and reports based on data stored in Azure SQL, Azure Synapse, or Azure Data Lake.

**Initial Phase**

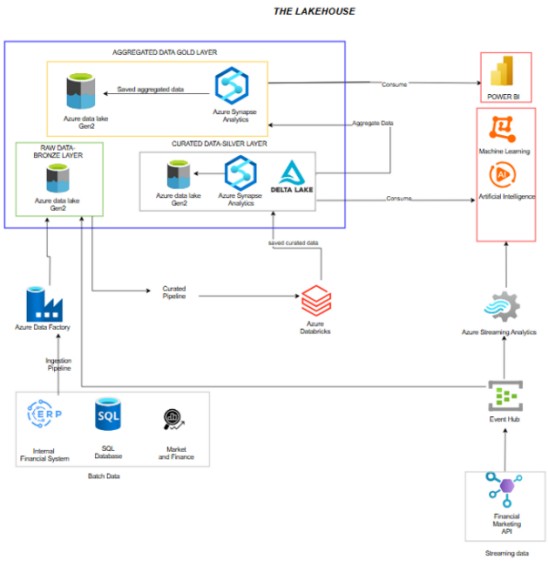



**Second Phase**

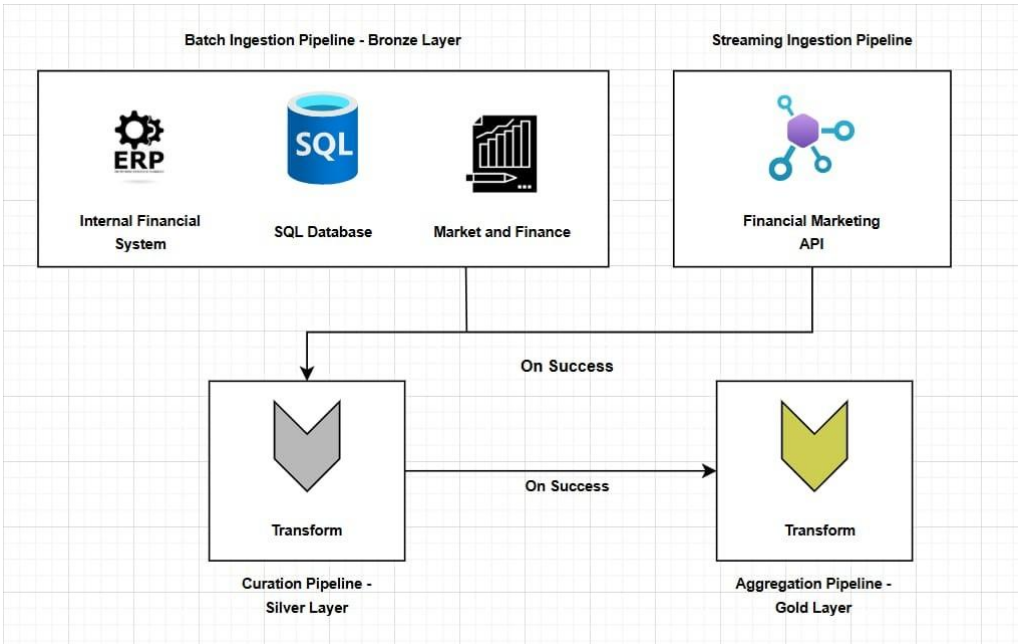



**LinkedIn:** [Siva Sakthi Balan]

## Final Phase




## 7. Process of Creating Pipeline




### 7.1 Bronze Layer (Ingest Data)

- Data ingested from APIs, apps, and transactions using **Azure Event Hubs** and **Data Factory**

### 7.2 Silver Layer (Curate Data)

- Clean and structure data using **Azure Databricks**

### 7.3 Gold Layer (Aggregate Data)

- Aggregated KPIs, reports, and training sets for ML using **Synapse Analytics**

### 7.4 Pipeline Approach

- Orchestrated with **Azure Data Factory**, logs monitored via **Azure Monitor**
- Automated retries and alerts for pipeline steps

### 7.5 Pipeline Failure

- Alerting through **Azure Monitor Alerts**
- Auto-healing pipelines with retry policies
- Logging and root cause analysis in **Log Analytics**

## 8. Conclusion

### 8.1 Summary of Project Outcomes

This Azure-based cloud architecture empowers financial organizations with:

- Real-time fraud prevention
- Intelligent data insights and reporting
- Scalable cloud infrastructure
- End-to-end security and compliance
- Automation of routine tasks via AI and Logic Apps