

# Components of Automation System in Data Analytics in Automation Systems

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Course: 23MCT305 - Data Analytics in Automation System

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## What is Automation in Data Analytics?

Systematic collection, processing, and analysis of data with minimal human intervention



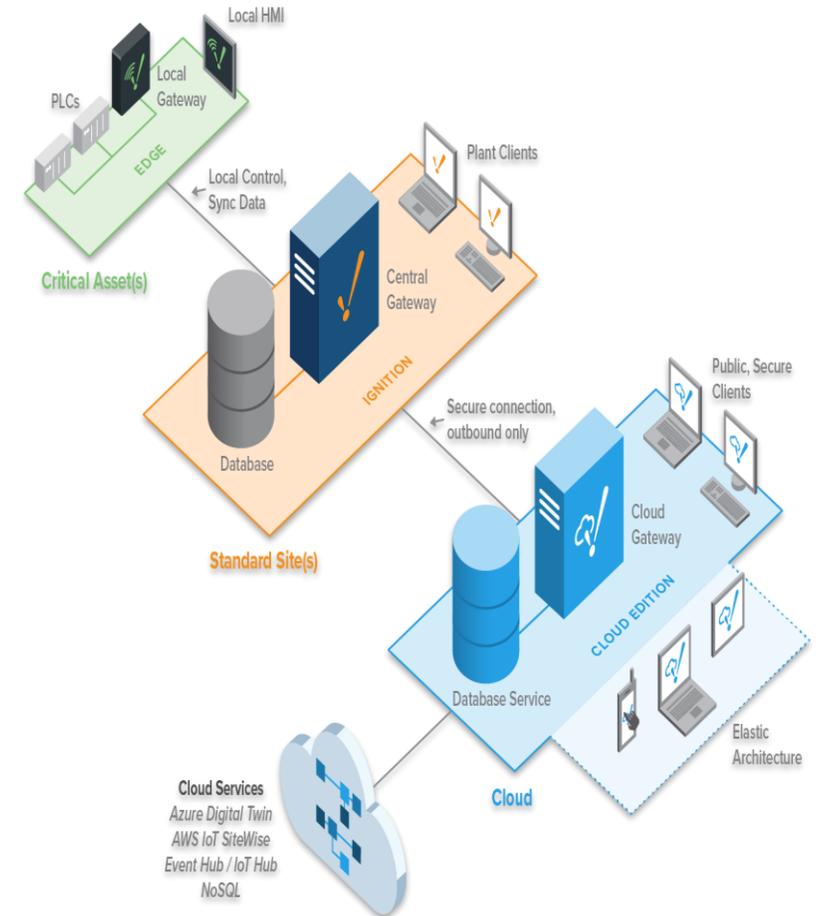
## Benefits and Importance

Enhanced efficiency, reduced errors, real-time insights, cost savings



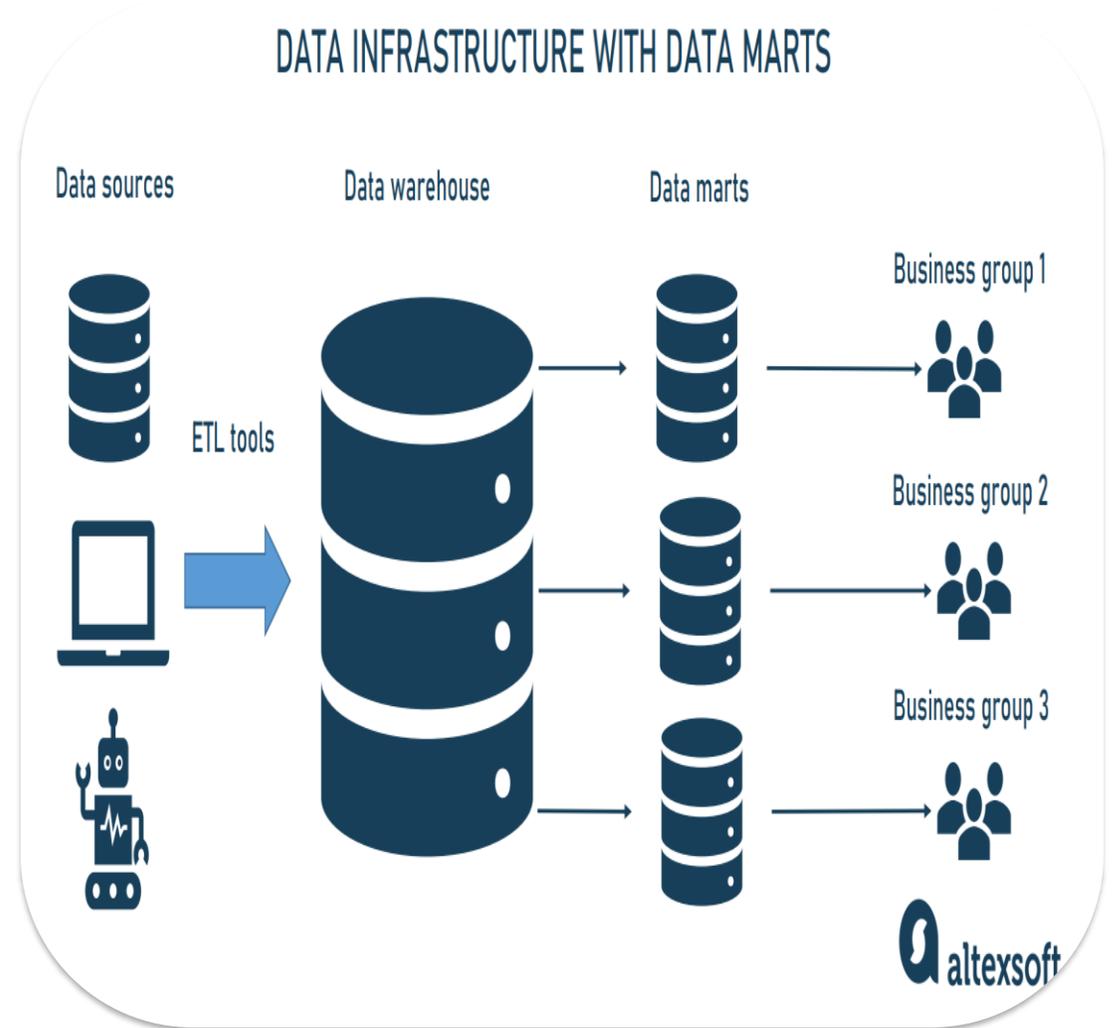
## Application Areas

Manufacturing, healthcare, finance, energy, retail, smart cities



# Core Components of Automation System

- 1  **Data Collection**
- 2  **Data Processing**
- 3  **Data Storage**
- 4  **Data Analysis**
- 5  **Data Visualization**





## Sensors and IoT Devices

Smart sensors, IoT gateways, wireless networks



## Data Acquisition Systems

Analog/digital converters, signal processors



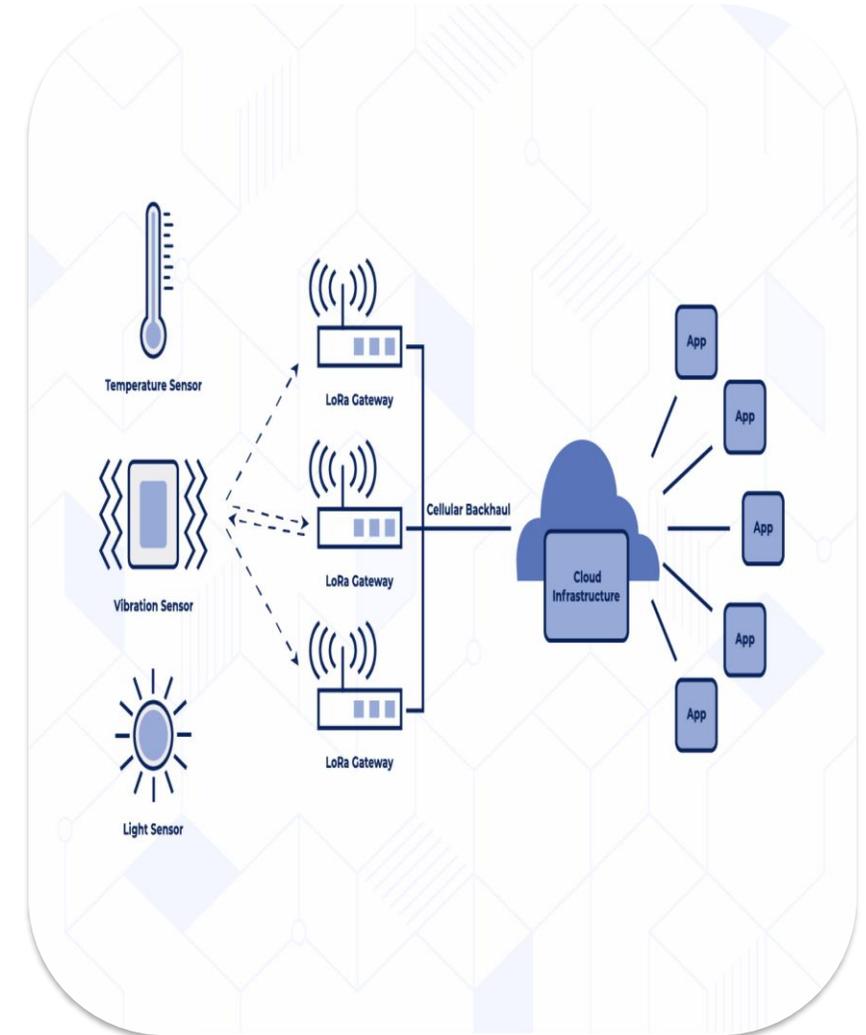
## Real-Time Monitoring

Continuous data streams, instant alerts



## Multi-Source Data Integration

Unified collection from diverse sources





## Data Cleaning and Validation

Removing errors, duplicates, inconsistencies



## Transformation and Normalization

Standardizing formats, scaling values



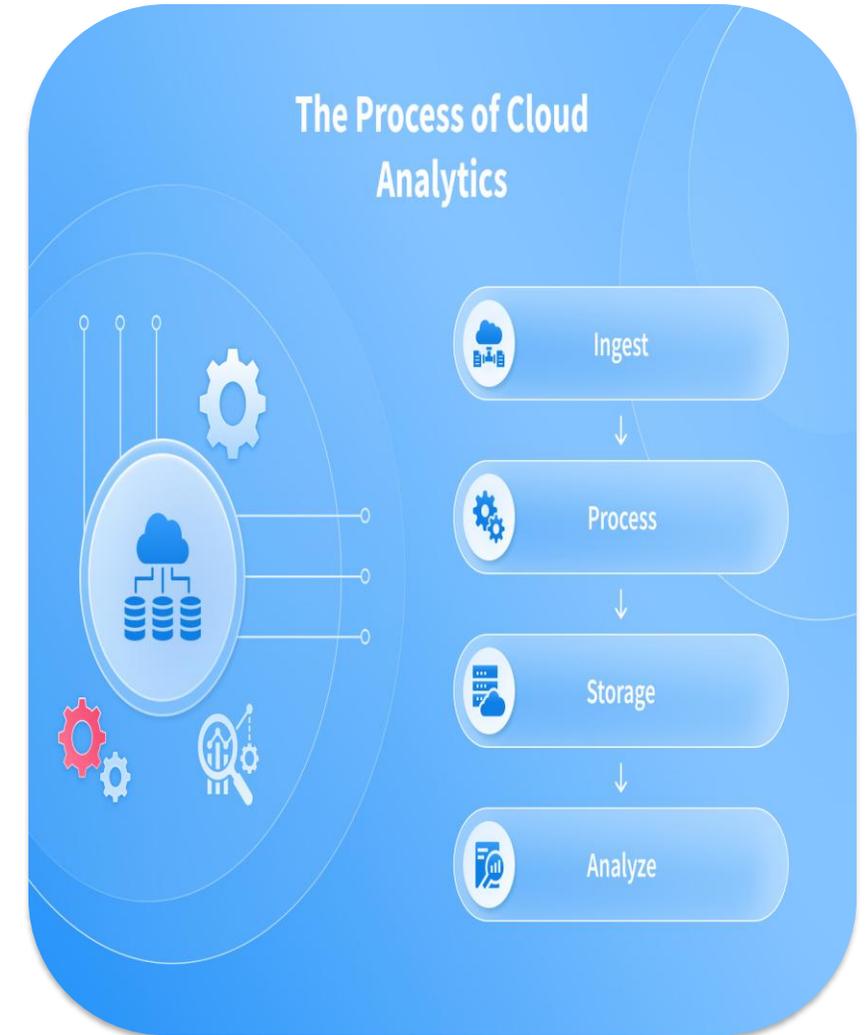
## ETL Processes

Extract, Transform, Load workflows



## Real-Time Processing

Stream processing, instant insights



# Data Storage



## Database Management

Relational and NoSQL databases



## Cloud Storage Solutions

AWS, Azure, Google Cloud storage



## Data Warehouses

Centralized data repositories



## Data Lakes

Raw data storage for analytics



## Scalability and Security

Elastic scaling, encryption, access control



# Data Analysis



## Statistical Analysis

Descriptive and inferential statistics



## Machine Learning Algorithms

Supervised and unsupervised learning



## Predictive Analytics

Forecasting future trends and outcomes



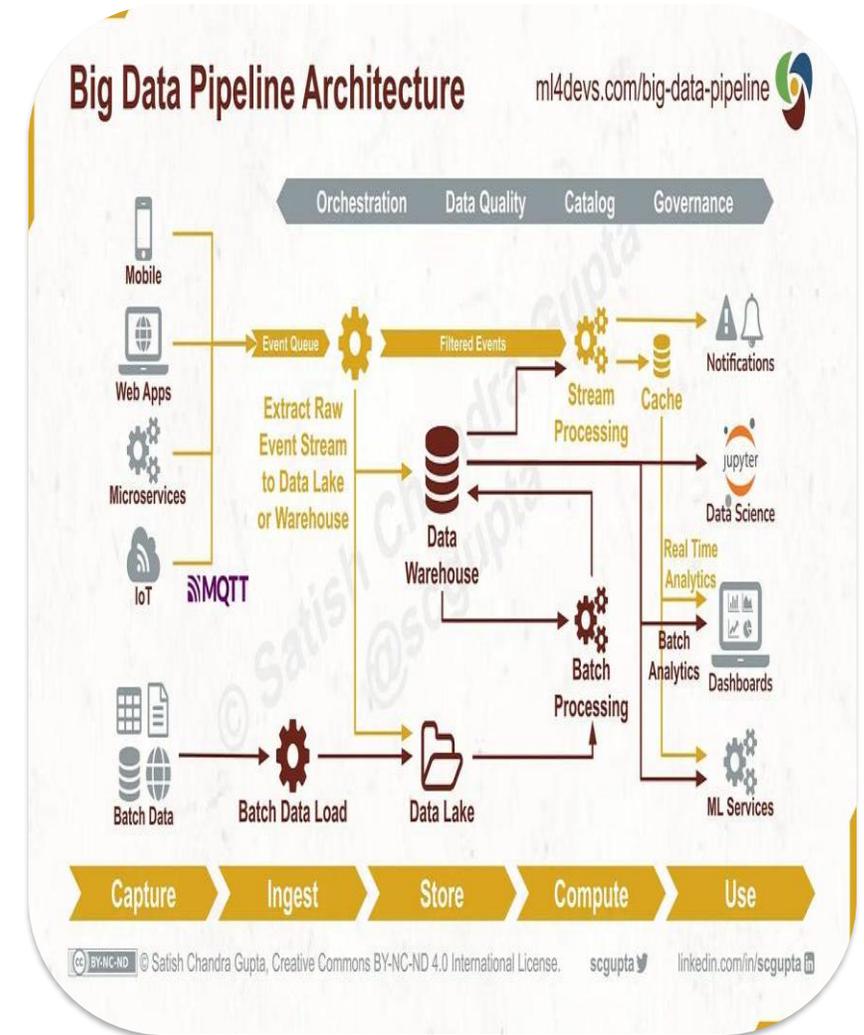
## Pattern Recognition

Identifying trends and anomalies



## Decision Support

Data-driven decision making



# Data Visualization



## Interactive Dashboards

User-friendly visual interfaces



## Real-Time Monitoring

Live data updates and alerts



## Charts and Graphs

Bar charts, line graphs, pie charts



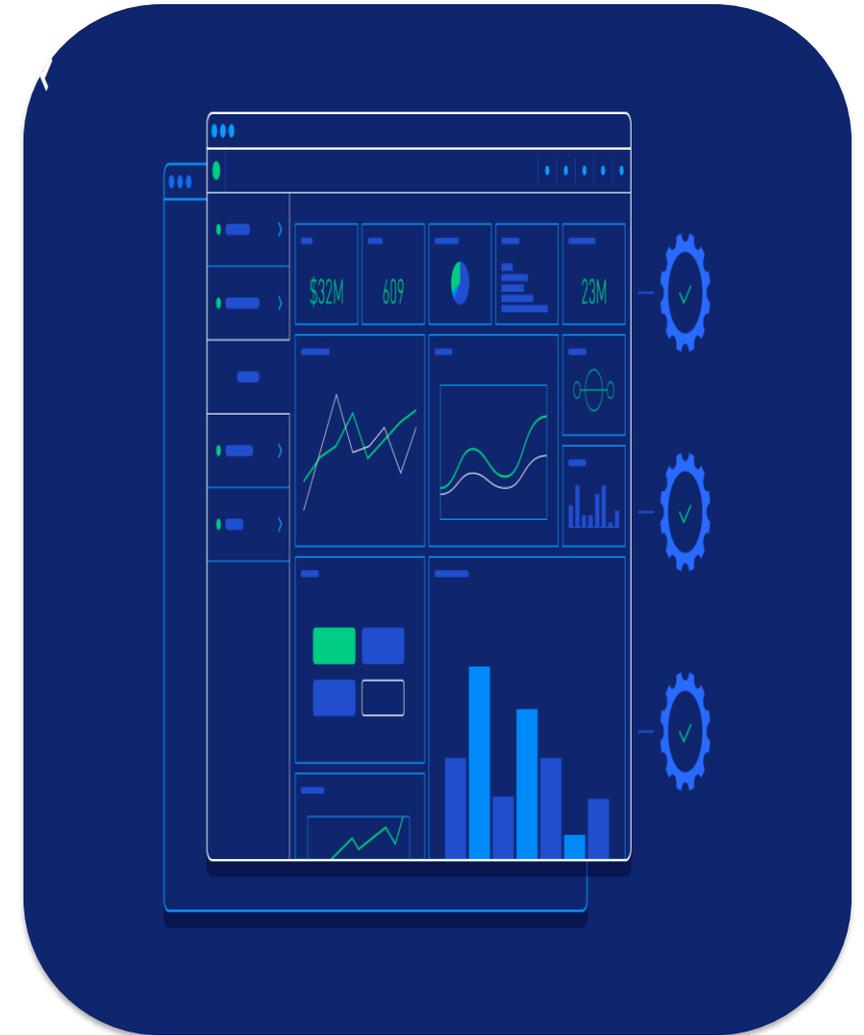
## Reporting Tools

Automated reports and insights



## Data Storytelling

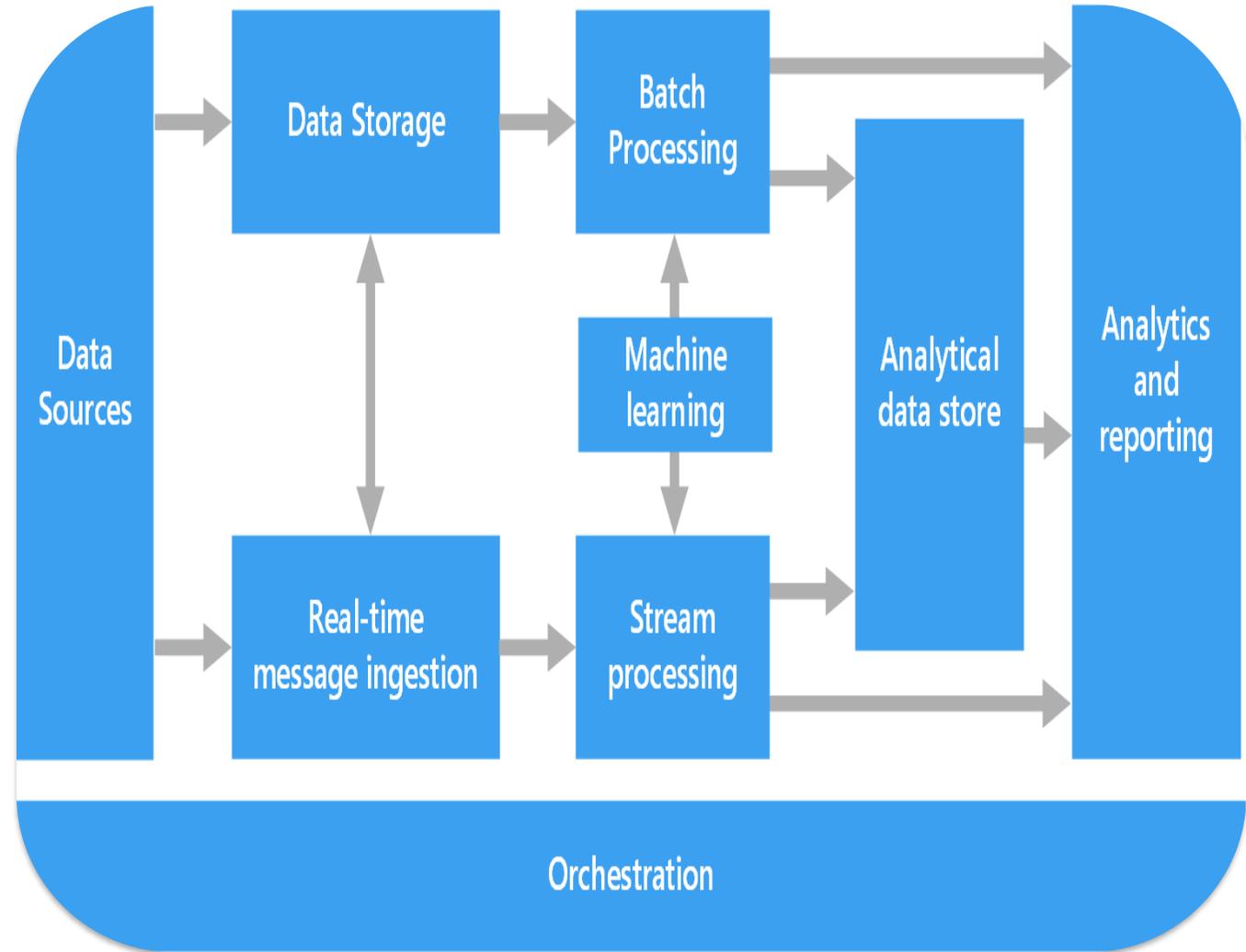
Communicating insights effectively



# Mind Map: Component Integration and Data Flow

## 🧠 GenAI-Generated Mind Map

Integration points and data flow between core components



🕒 **Data Collection** →

⚙️ **Data Processing** →

📄 **Data Storage** →

📊 **Data Analysis** →

📑 **Data Visualization**

# Recap: Key Takeaways



## Five Core Components

Data Collection, Processing, Storage, Analysis, and Visualization



## Seamless Data Flow Process

Continuous transformation from raw data to actionable insights



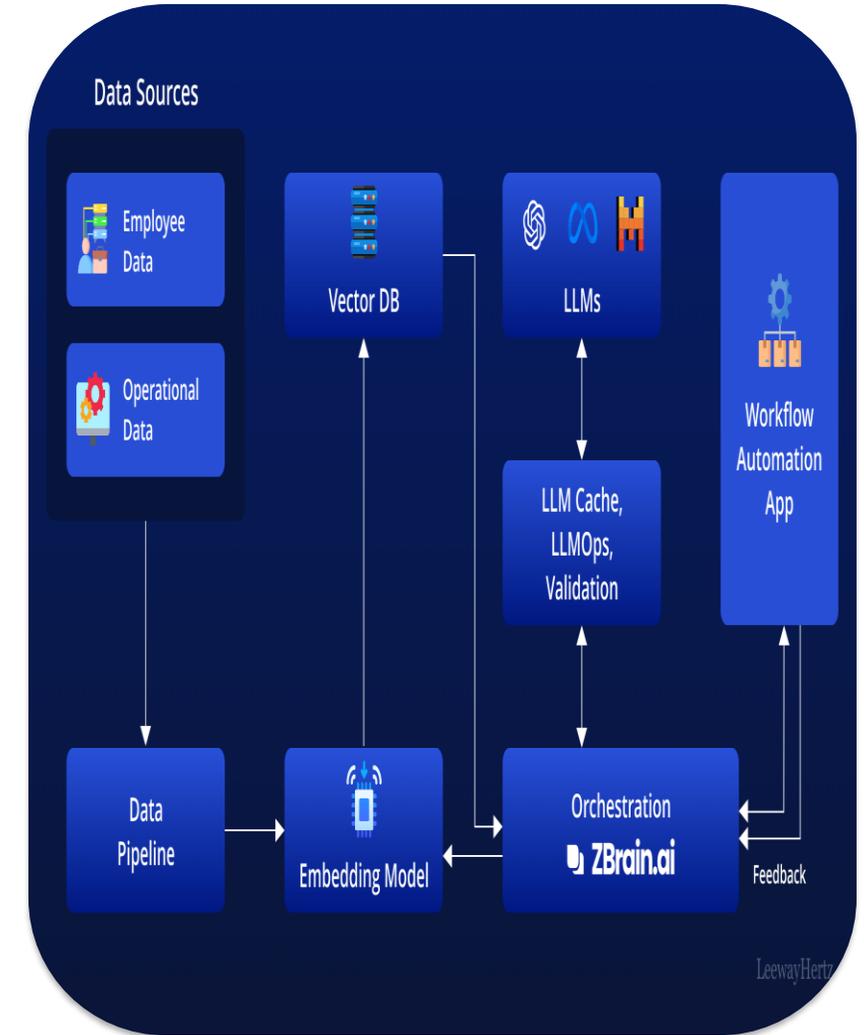
## System Integration Strategy

Unified architecture ensuring efficient communication and scalability



## Critical Role of Each Component

Every element essential for successful automation and analytics



# Summary and Future Directions



## Seamless Component Integration

Unified architecture enables efficient data flow and processing across all stages



## Future with AI and Machine Learning

Advanced algorithms will enhance predictive capabilities and automation intelligence



## Industry Impact and Innovation

Transforming operations through real-time analytics and automated decision-making



## Continuous Improvement in Automation Systems

Ongoing advancements in technology drive efficiency and accuracy

