



AEROCLOUD: Transforming Airports Through Cloud Technology

Cloud Architecture



WRITTEN BY: SASHIDHAR KODAMAGUNDLA
Professor Dr. Junaid Qazi

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By combining Internet of Things (IoT), Artificial Intelligence (AI), and real-time data, AeroCloud enhances decision-making, streamlines services, and elevates the airport experience for all stakeholders.

Aero Cloud is a modern airport cloud architecture platform that acts as the digital backbone for airport operations. It empowers airports with the ability to integrate technology, data, and operations in a seamless and scalable way.

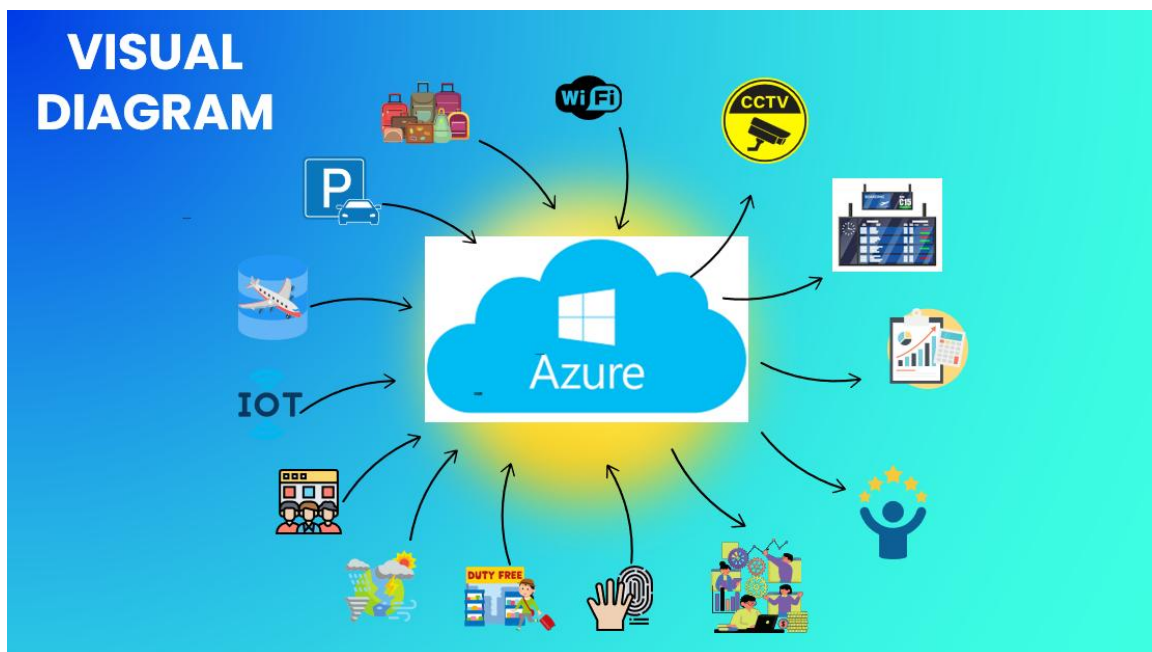


Our mission at Aero Cloud is to make air travel smoother, smarter, and more secure. Through the power of cloud technology and intelligent automation, AeroCloud helps airports deliver better service, achieve higher safety standards, and manage resources efficiently.

4.Objectives

- Enable real-time decision making with live data feeds.
- Optimize key airport functions including baggage handling, aircraft turnaround, and passenger flow.
- Strengthen airport security using AI and automated systems.
- Improve financial performance and ensure sustainable operations.

5.Visual Diagram to understand Airport Requirements.



6.Data Sources

AeroCloud pulls data from various sources to provide actionable insights:



6.1. Streaming Data Sources (Real-Time)

- IOT
- Security cameras (live surveillance)
- Kiosks (check-in data)
- Baggage Handling (luggage tracking)
- Biometrics (identity verification)
- Flight Status APIs (arrival/departure/gate updates)

6.2. Batch Data Sources (Periodic Processing)

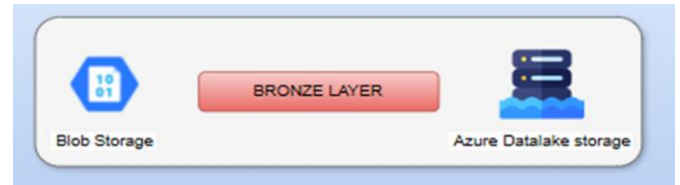
- Parking data (vehicle entry/exit logs)
- WiFi logs (passenger movement trends)
- Visitor and passenger data (demographic analytics)
- Retail and inventory data (Rent, stock levels)

7. Data Architecture Layers

The Aero Cloud data pipeline consists of four layers:

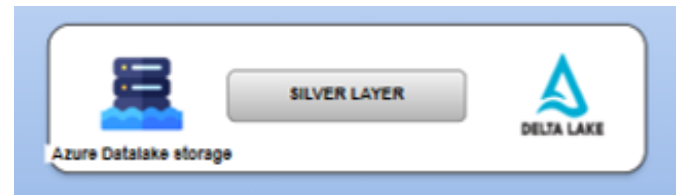
7.1. Bronze Layer (Raw Data Ingestion)

- First touchpoint for all unprocessed data
- Stores raw data from IoT and other systems in Azure Blob Storage and Data Lake



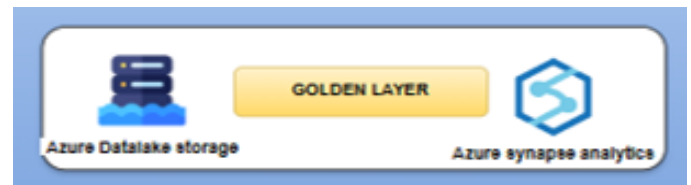
7.2. Silver Layer (Curation)

- Cleansed and validated data
- Removes duplicates and errors
- Stored in Delta Lake for structured use



7.3. Gold Layer (Aggregation)

- Aggregated, summarized datasets for business use
- Combines cross-functional data (e.g., security + satisfaction metrics)



- Enables dashboards, KPIs, and executive reporting

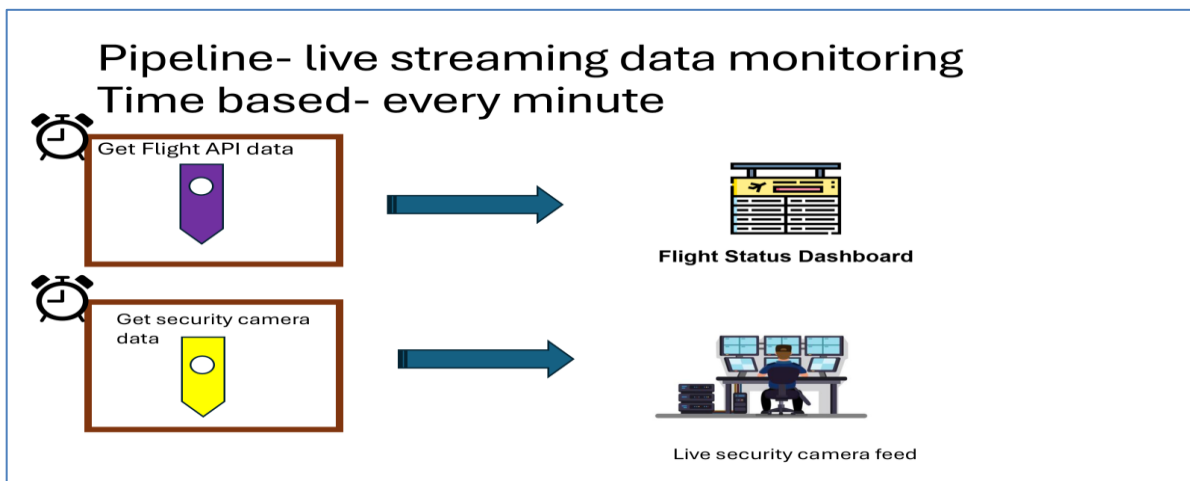
7.4. Consumer Layer (Consumption)

- Final layer for data consumption
- Powers reporting tools, dashboards, and alerts
- Supports use cases like security monitoring, operational insights, and financial tracking using Azure Synapse Analytics

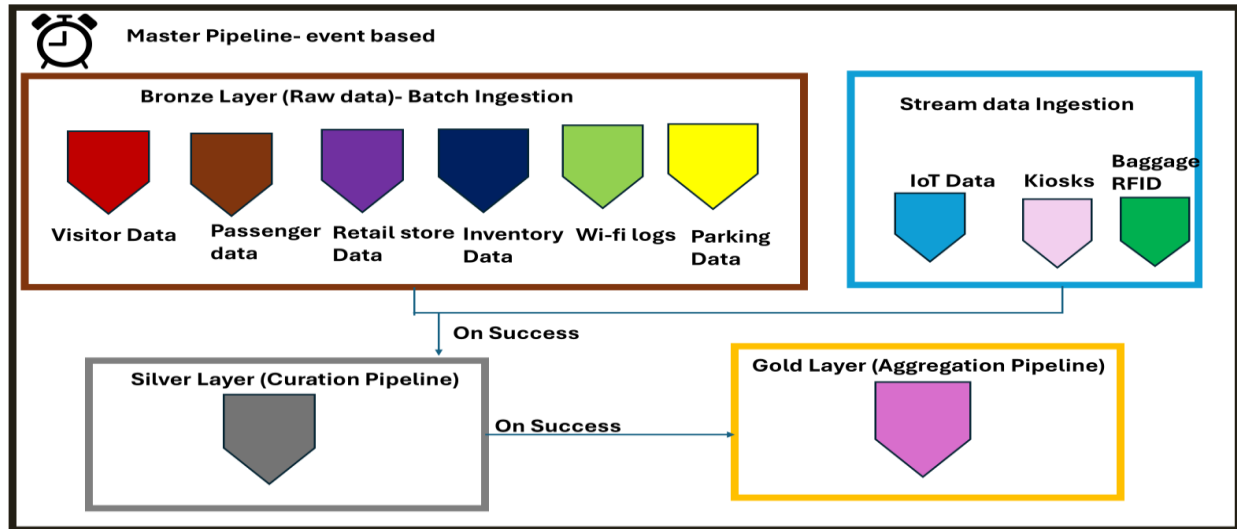


8. Pipeline Approaches

- Time-Based Pipelines: Execute at regular intervals for predictable workloads
- Event-Based Pipelines: Triggered by specific actions (e.g., new passenger check-in, bag scan)
- Fail Strategy: Built-in pipeline failover strategies to ensure system reliability and minimize downtime



8.1. PIPELINE- EVENT BASED APPROACH



9. Pipeline Fail Strategy

- Pipelines deployed may fail due to unforeseen circumstances — server unresponsive, network connectivity issues, API unresponsive or IoT device malfunction.
- Retry mechanism — Number of retries and delay between each attempt.
- 3 retries and delay of 30 seconds — default in Azure Data Factory which handles batch ingestion.
- Change default retry value from 0 in Azure Synapse Analytics.
- Monitor pipeline runs and trigger runs in Azure Synapse Analytics.

Pipeline fail strategy



Diagnostic settings in Azure Synapse Analytics- captures pipeline logs- sends log files to Log Analytics, Event Hub or Storage container

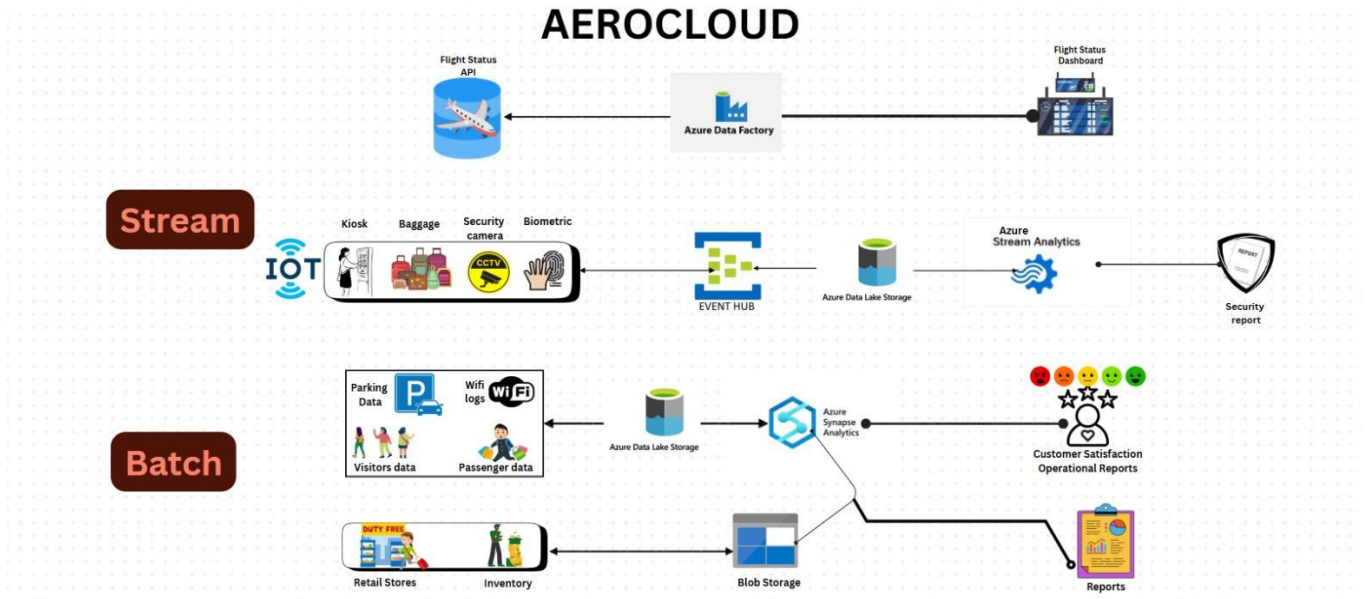


Azure Monitor- set alerts when pipeline fails- Alert Rule- Action groups can be set for email and text message alerts.

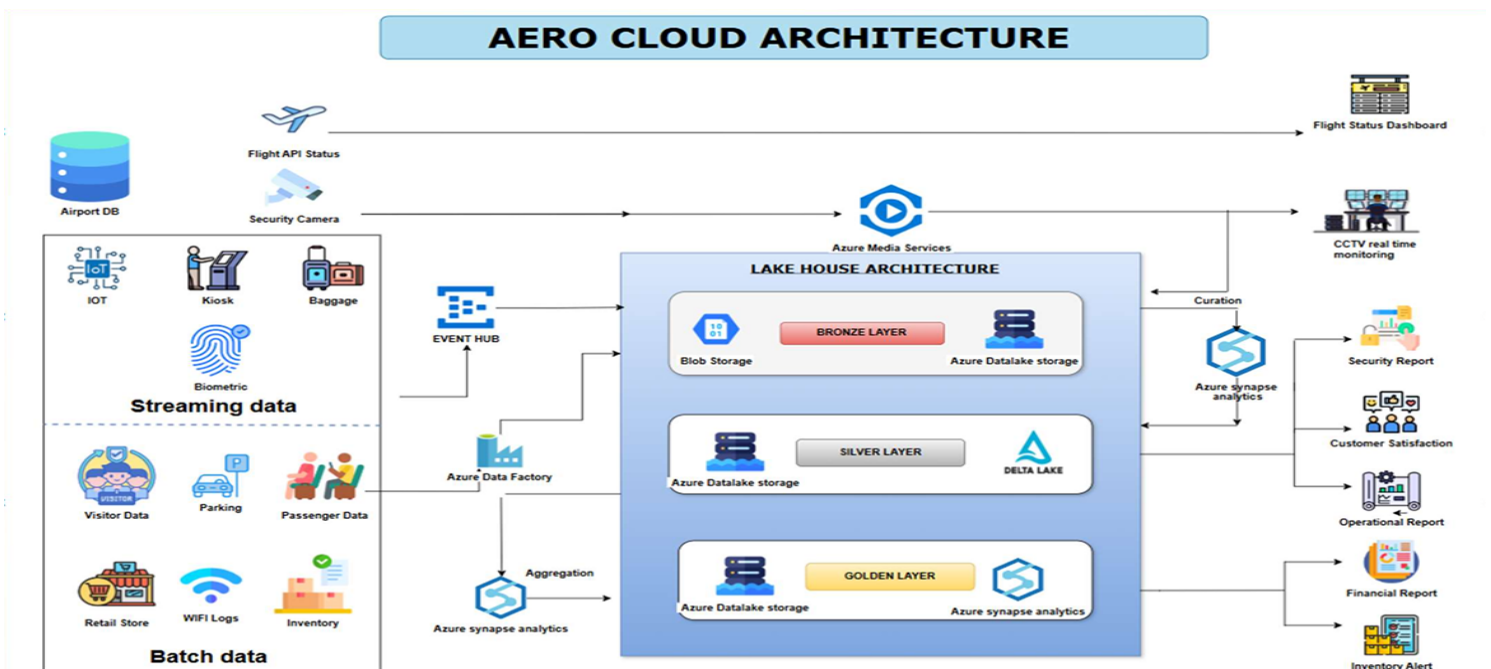


Azure Logic Apps- Automate recovery or restart pipeline run

10. Initial Architecture



10.1 Final Architecture



11. Conclusion

Aero Cloud is not just a technological upgrade; it's a strategic shift towards smarter, data-driven airport operations. By leveraging the full potential of cloud platforms and intelligent systems, AeroCloud enables airports to meet the demands of modern air travel while enhancing safety, service quality, and sustainability.