Cloud Architecture

Canadian Blood Services

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Agenda

Existing Architecture

Problem Statement

Objective

Vision

Proposed Cloud Architecture

Pipeline Design and Strategy

Deployment & Monitoring Strategy

Data Access & Security

Existing Architecture

On-premises

Relational Database Management System (RDBMS)

Blood donor information

Blood inventory

Patients Database

Problem Statements

Limited Visibility

Scalability Constraints

Disaster Vulnerability

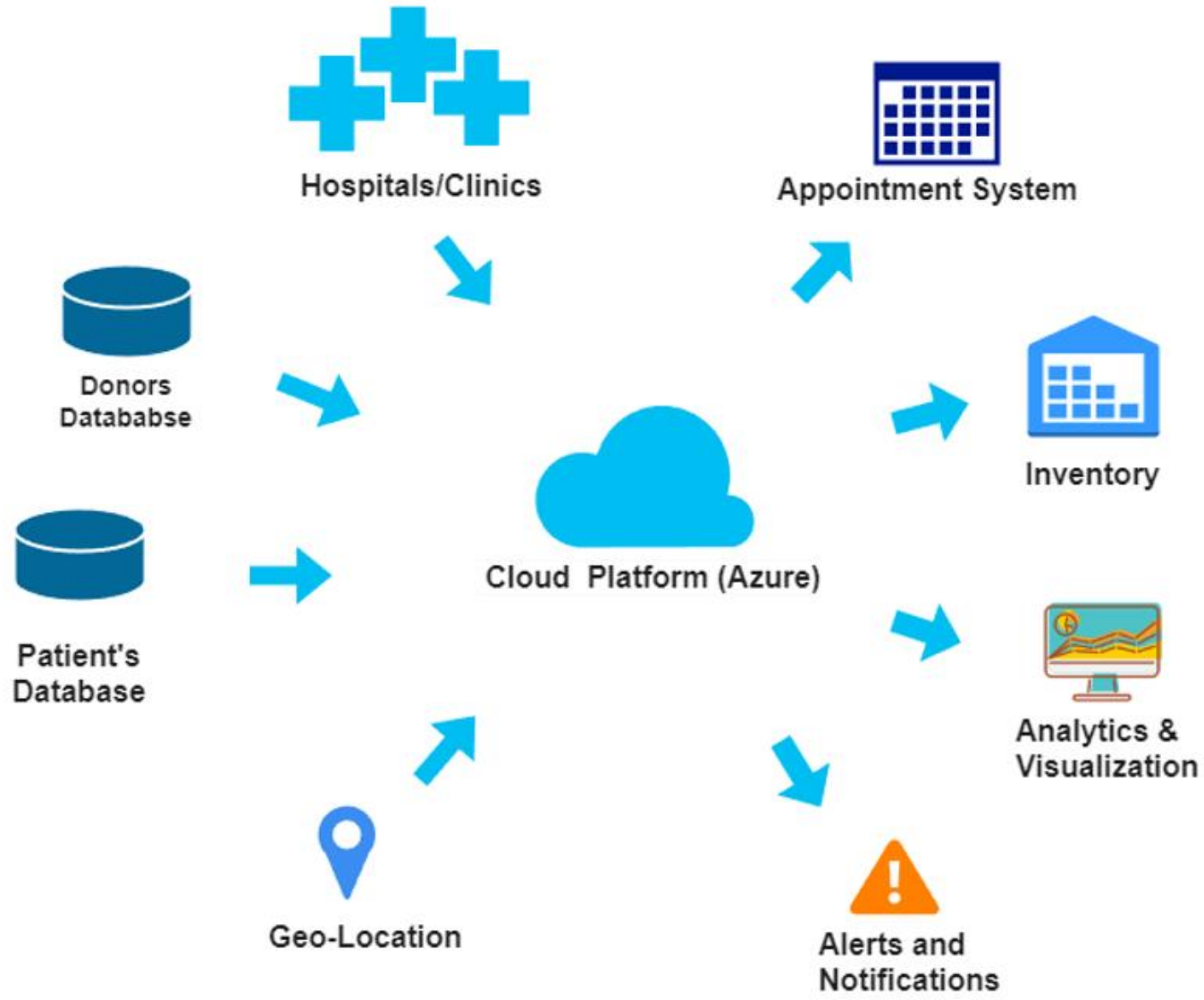
Objective

Migrate the existing RDBMS of Canadian Blood Services to a Cloud Platform

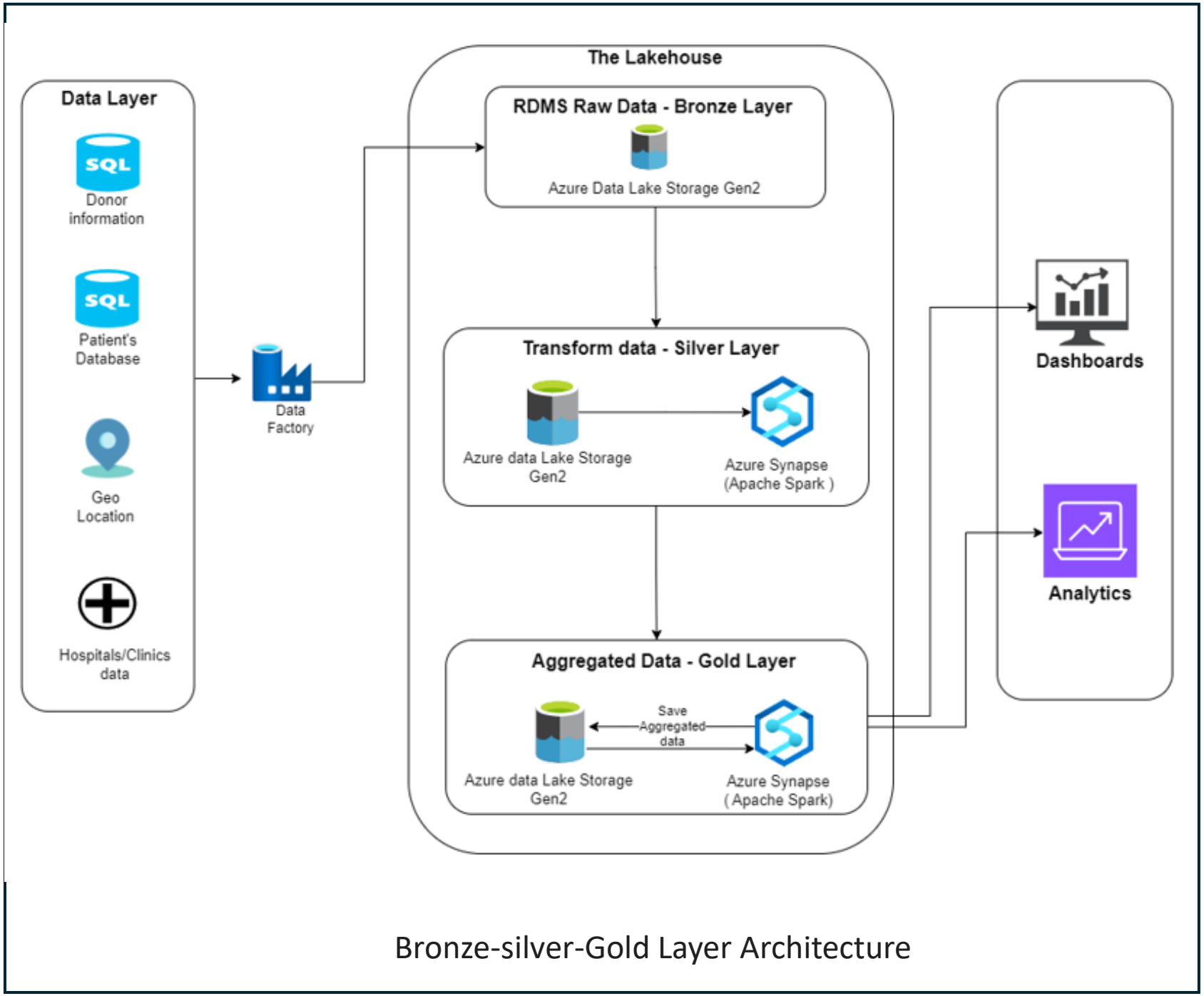
Leverage below benefits:

- Scalability
- Disaster recovery
- Security benefits

Vision

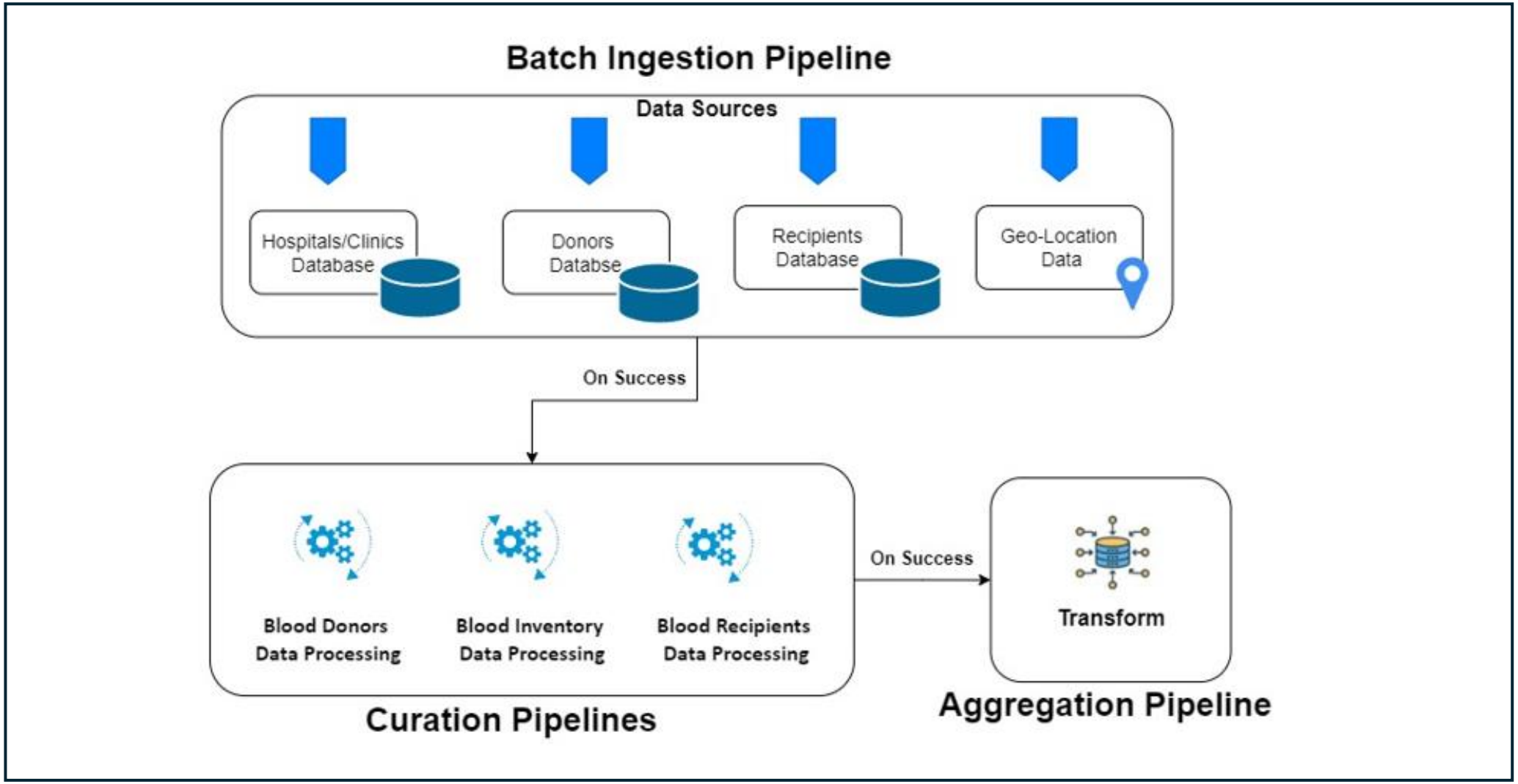

Hospitals/Clinics
Appointment System
Donors
Datababse
Inventory
Cloud Platform (Azure)
Patient's
Database
Analytics &
Visualization
Geo-Location
Alerts and
Notifications

Proposed Cloud Architecture



Bronze-silver-Gold Layer Architecture

Data Pipeline - Parent-child approach



Components of Pipeline

Sources

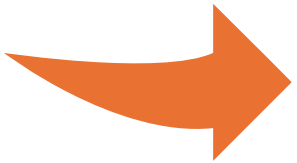
Ingestion

Transformation

Data Sources

- Existing SQL Databases (RDBMS)
  - Hospitals data
  - Donors Database
  - Recipient's Database
  - Geo-location

Ingestion Strategy



Batch Processing

Why Batch Processing?

Efficiency for Stable Data

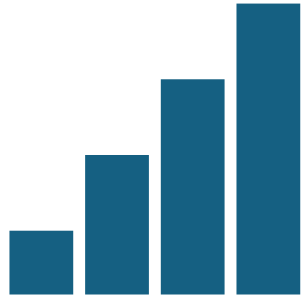
Reduced Resource Consumption

Simplified Development and Management

Data Integrity

Batch Frequency

Every 24 hours



At 12 am.

Pipeline Triggers in Production

Schedule Trigger

- Will **Run at Regular Intervals.**
- To ingest new blood donor registrations and inventory updates from the previous day.

Event based Trigger

- To check blood availability.
- **Trigger :** blood request from a hospitals

How will the final data be published to end users?

API App

Dashboards and Reports

- visualize key blood bank metrics (e.g., blood type availability by location)

Public Dashboards

- Awareness about blood donation
- General blood inventory trends

Deployment Strategy

Infrastructure as Code (IaC)

Azure Resource Manager (ARM) templates (JSON files)

CI/CD (Continuous Integration and Continuous Delivery/Deployment)

automates testing and deployment

identify and fix bugs

consistent and repeatable deployments - reliable blood bank system

Blue-Green Deployment

Two identical production environments

For Disaster recovery

Pipeline Monitoring Strategy

Monitoring Tool

Azure Data Factory's - built-in monitoring capabilities

Key Metrics to Monitor

Pipeline execution status

Execution time

Data processing metrics

Alerts & Notifications

Development strategy

Tools

Azure Data Factory

Version Control System(Git)

Integrated Development Environment (IDE)

Development language

Python

Environments

Development

Testing

Production

Data access to user and security

Role-Based Access Control (RBAC)

API Authentication – Azure Active Directory (AAD)

References

- Canadian Blood Services
  - https://www.blood.ca/en/blood
- Diagrams: Draw.io
  - https://app.diagrams.net/
- Lecture Slides
  - https://learn.sait.ca/d2l/le/content/637608/viewContent/16889552/View

Questions?
Thank You

Individual Contribution

- Brainstorming：All Team members
- Architecture/Pipeline Design & Creation: Bhavini/Riya/Sukhmandeep
- Deployment Strategy: Sekhar
- Presentation Creation: Bhavini