Cloud Monitoring and Analytics Platform

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Project Overview

Business Use Case: Global Market is a B2B novelty goods importer and distributor operating from the Houston, Texas. They sell to retailers across the United States including specialty stores, supermarkets, computing stores, tourist attraction shops, and some wholesalers. After recent expansion, they built a data warehouse for analytical reporting.

However, they face below challenges:-

1. The business lacks a semantic layer that would separates different functions like sales, marketing, procurement and logistics without any complexity.
2. Analysts need to create IT tickets to request an engineer to get the data for them which is time-consuming, costly and often result in inconsistent data copies.
3. Complex security and governance. Need to limit the data view according to region or territory.
4. Difficulties in handling chilled food requirements due to lack of a monitoring system that could monitor the chiller room's temperature.

Project Overview

Solution :

Azure Analysis Service (AAS) model

Power BI Service

- **P1:** Build a dimensional model per business process
- **P2:** Provision self-service reporting to enable business to focus on their key priorities rather than writing technical queries to analyze data
- **P3:** Implement row-level security on AAS model

AAS model RLS

- **P4:** Build a streaming solution for real-time infrastructure monitoring and anomaly detection

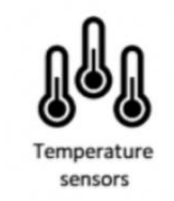
Azure Event Hub, Stream Analytics

Tech Stack

Service/Tool	Use	Benefits
Azure Analysis Service (AAS) model	AAS is a PaaS service that provides enterprise-grade data models in the cloud. Used to perform ad hoc data analysis using tools like Power BI and Excel.	• Scalability: Provides Live connection mode in Power BI, removing 1 GB size limitations • Pause/Resume to save cost • High performance and easy maintenance
Azure Event Hubs and Stream Analytics	Event Hubs is a fully managed, real-time data ingestion service. It enables us to stream millions of events per second from any source. Stream Analytics - Real-time analytics and complex event-processing engine. The patterns identified can be used to trigger actions and initiate workflows such as creating alerts, feeding information to a reporting tool, or storing transformed data for later use.	• Stream analytics use familiar SQL that is extensible with JavaScript and C# custom code for more advanced features. • Visualization through an automatically updating dashboard with a "real time" view. • Assist managers with real-time decision-making on perishable goods planning.
Power BI	BI tool which allows users to connect to multiple data sources, transform data, create reports and share them.	• Power BI service (SaaS) provides collaboration by apps and workspace, admin control features, security, paginated and embedded reports, gateway connections etc.

Project Architecture

Real-Time Processing



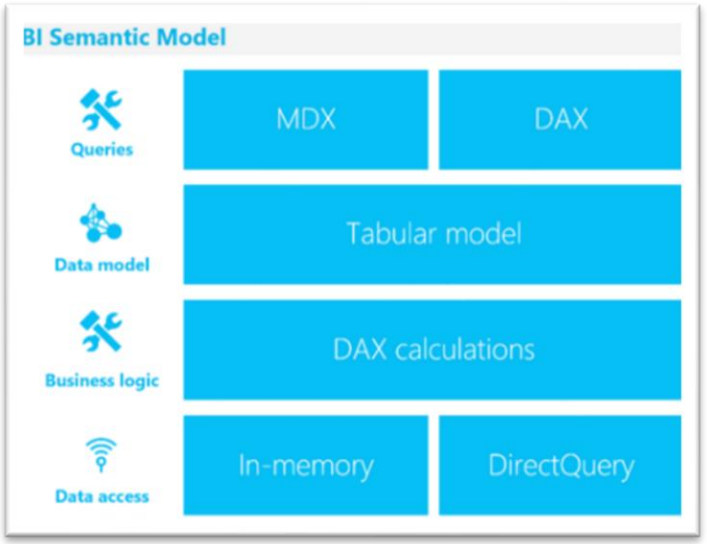
Event Hub

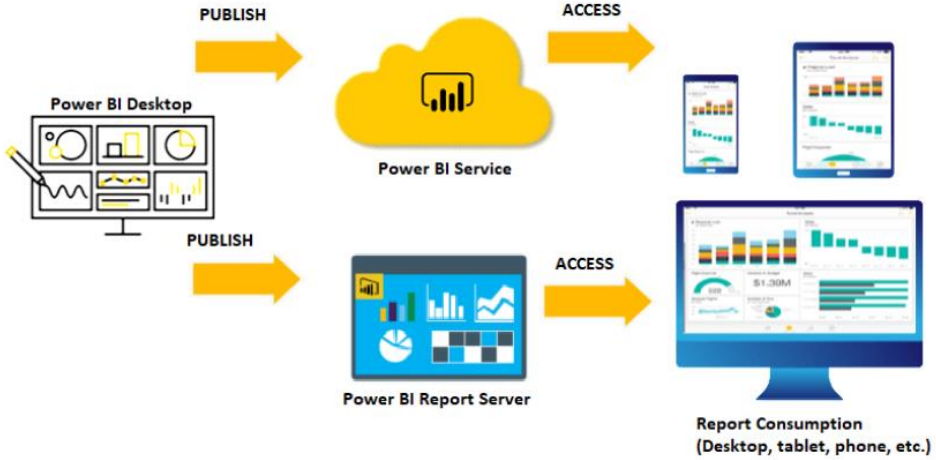
Azure Stream Analytics

Push Stream Dataset

Live Monitoring

Batch Processing

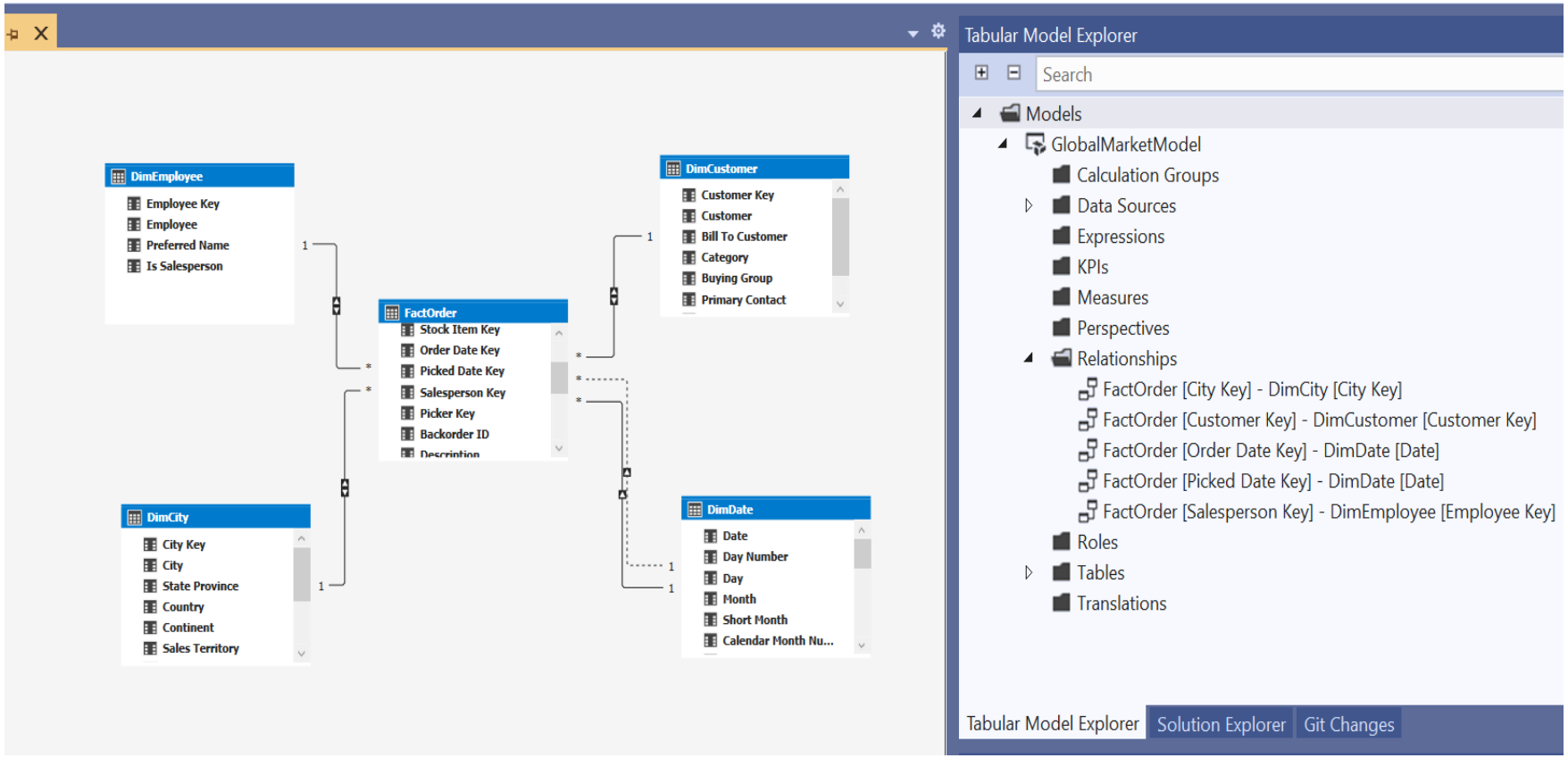




Approach

- A Purchase Order tabular model is created with Global Market Data Warehouse as the data source. Using star schema, we create appropriate bi-directional relationships which will enable us to cross-filter or slice in both directions of the relationships. We also create some calculated columns and measure for future reporting.
- We create roles in the model to limit users to see data within their assigned territory. This will implement row-level security within our data model.
- A .NET application is created to simulate temperature sensors readings. The live event streams are ingested into Azure Event Hub.
- We build a query in Azure Stream Analytics which consumes data from the event hub and outputs the maximum, minimum, and average temperature per sensors in a tumbling window of 6 seconds.
- The streaming output is stored as a Power BI dataset. This adds a real-time, automated channel to our reporting infrastructure where we can visualize sensor data and actions on anomalies.

Purchase Order (PO) Model



Star schema PO model to support analytical queries related to purchase orders by vendors or item categories, picker/packer productivity or order demand per demographic.

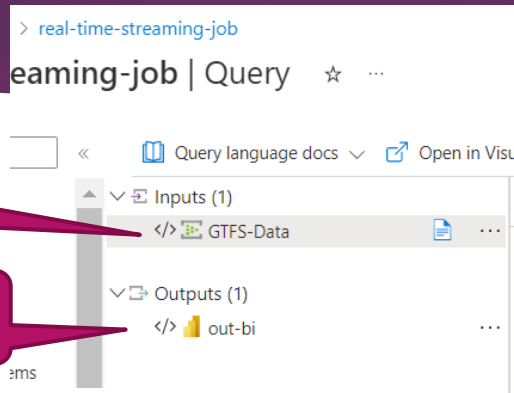
Fact Grain: Order Line #

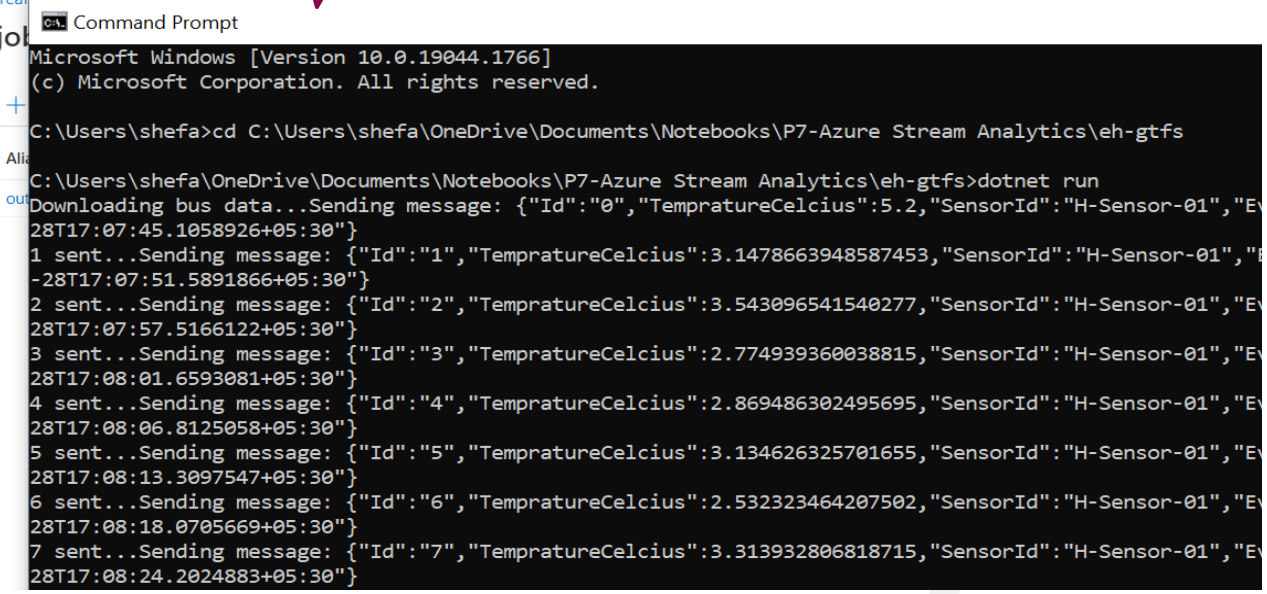
Azure Event Hub and Stream Analytics

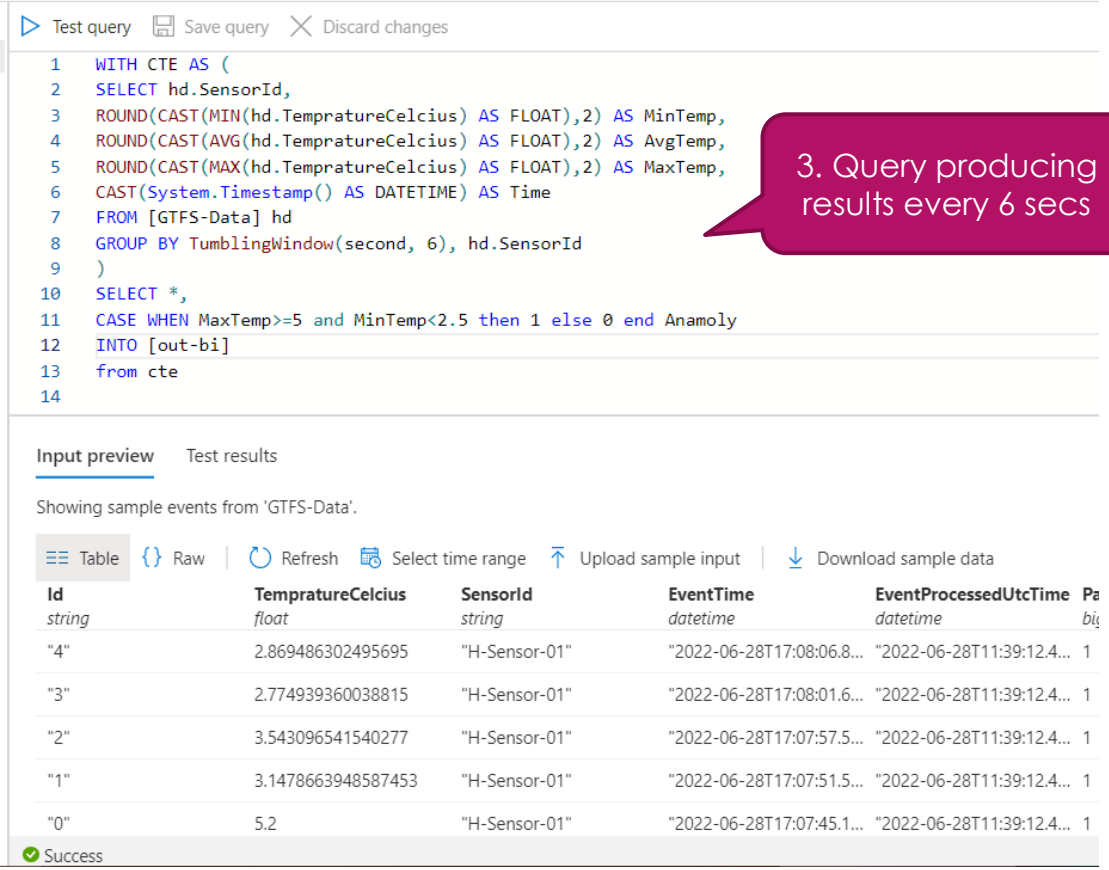
1. Send data to Event Hub

2. Input: Event Hub

4. Output: Power BI

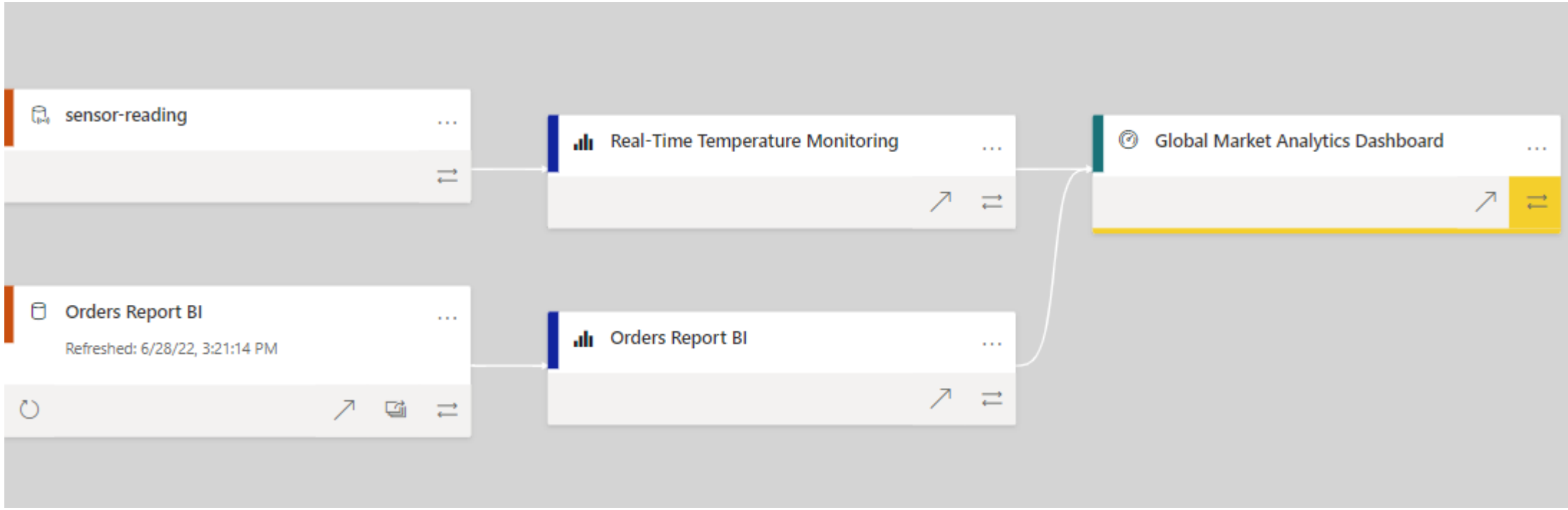




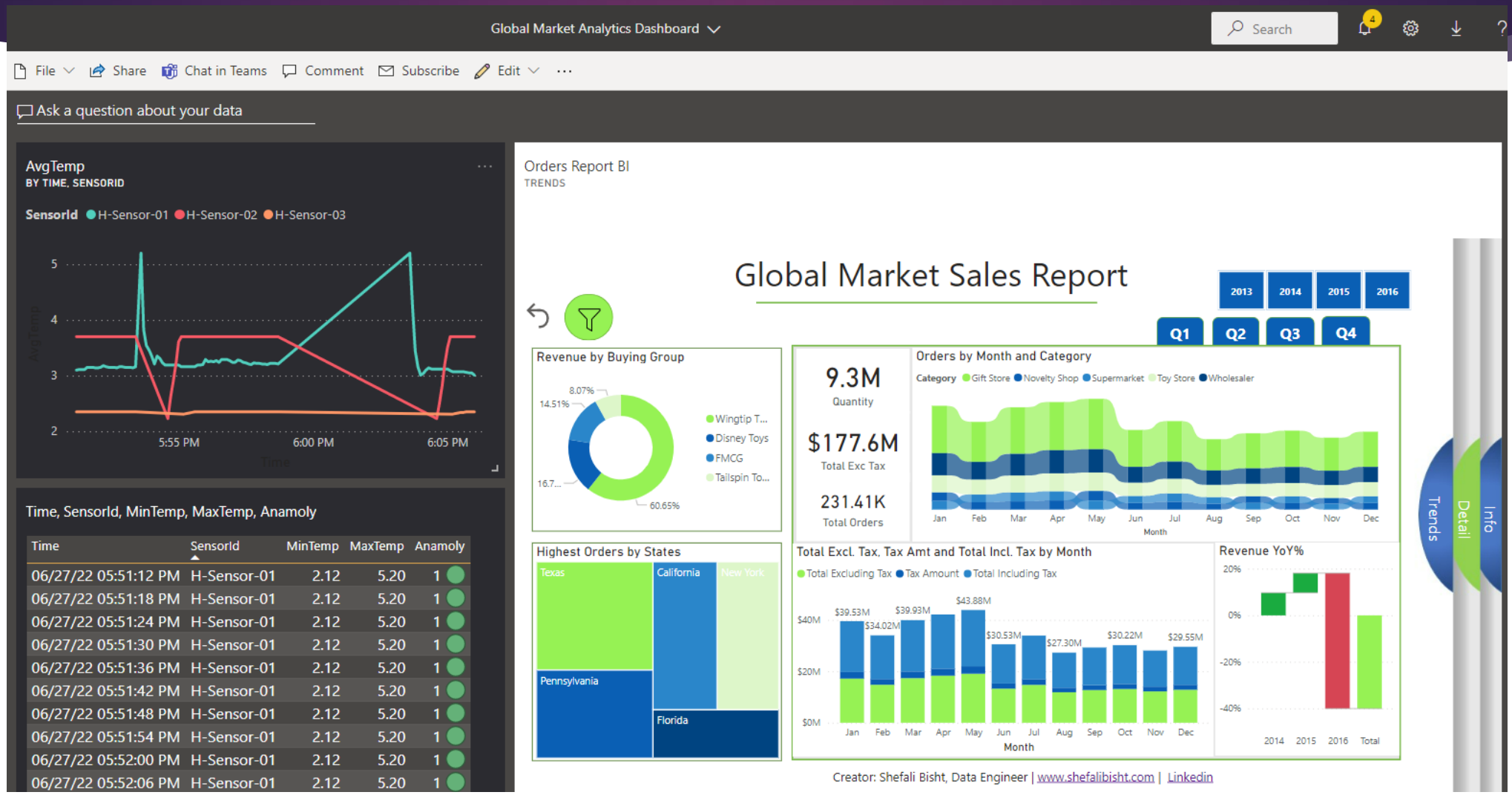


3. Query producing results every 6 secs

Global Analytics Dashboard Lineage

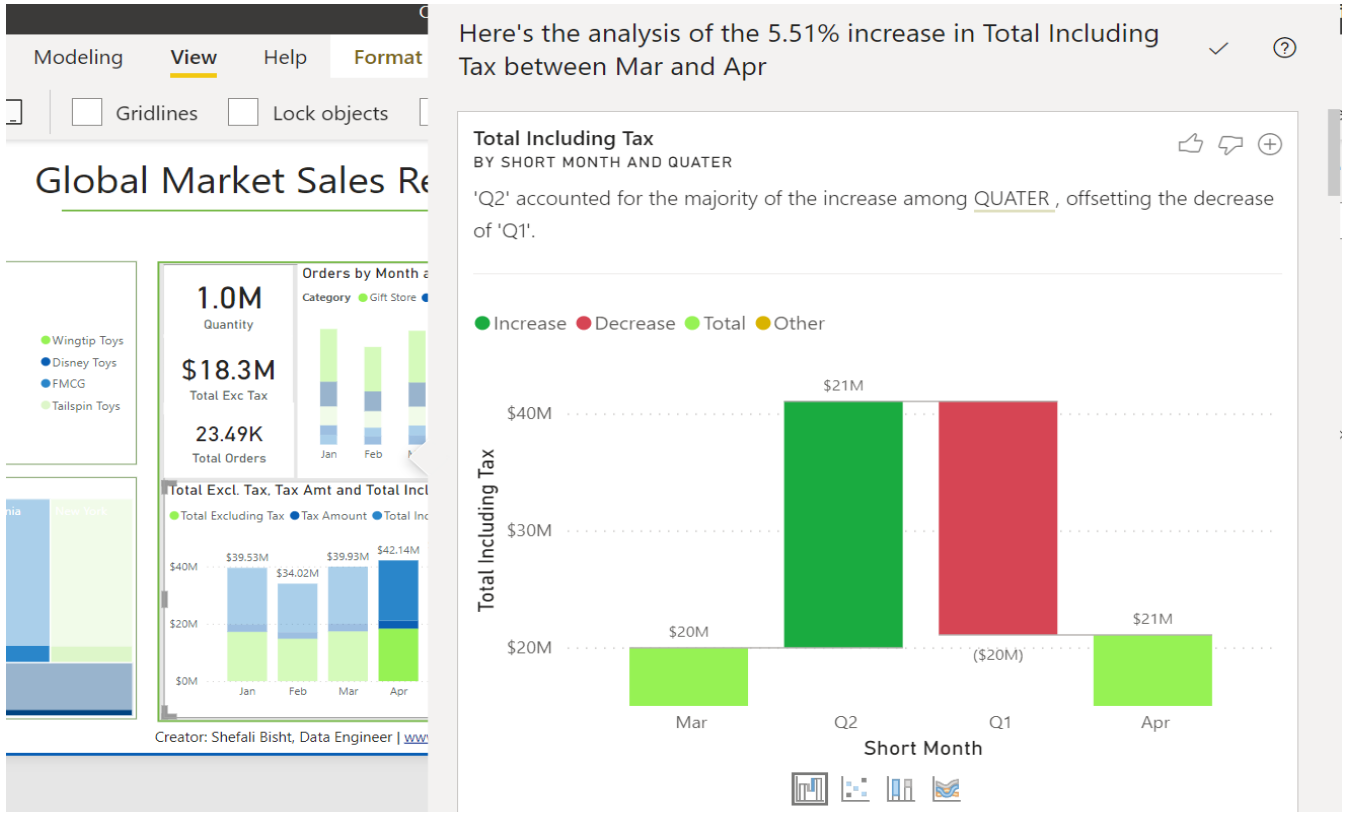


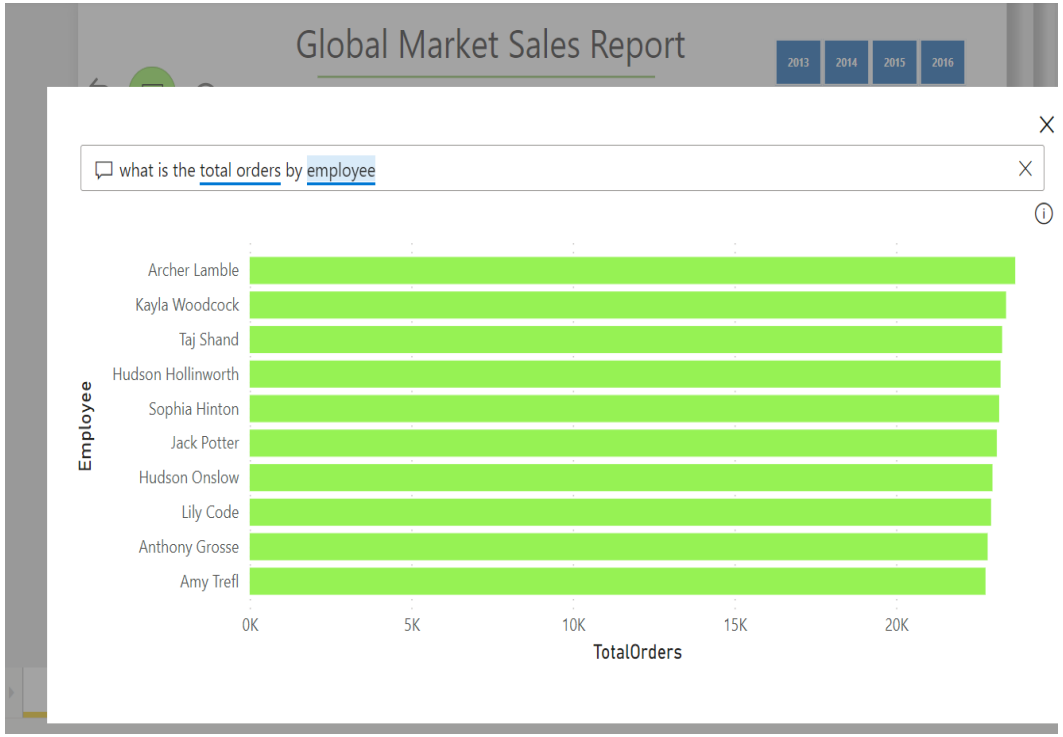
Global Analytics Dashboard



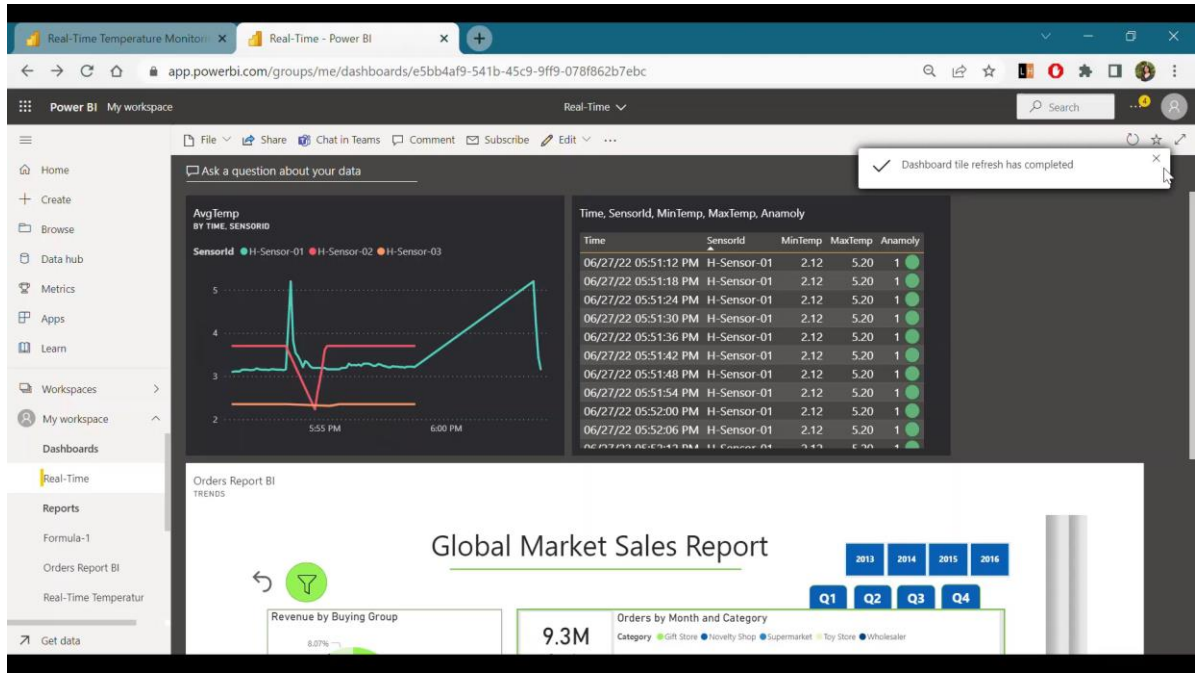
View Report

Power BI - Trends





Dashboard to monitor temperature in real-time



Click to View

Thank You!