Microsoft Fabric Data Architecture for Fabrikam Manufacturing

Executive Summary

This architecture addresses Fabrikam Manufacturing's operational inefficiencies by implementing a unified Microsoft Fabric platform that consolidates data sources, enables real-time operational visibility, and supports advanced analytics. The solution drives improved decision-making across production, supply chain, and customer operations.

Architecture Overview

Data Sources Layer

The architecture ingests data from multiple critical business systems:

- **ERP Systems**: Transaction data
- **MES (Manufacturing Execution Systems)**: Manufacturing operations data
- **Maintenance Records**
- **CRM data**
- **IoT Sensor Networks**: Real-time data
- **External Systems**: Market data
- **Supplier Database**

Data Ingestion Layer

Data Flows Gen2 and **Event Stream** components handle:

- **Batch Processing**: Historical data from ERP, CRM, and supplier systems
- **Real-time Streaming**: Live sensor data, MES logs, and equipment status updates

Data Processing and Storage (Lakehouse Architecture)

Bronze Layer (Raw Data)

- Ingests raw data in native formats (CSV, JSON, text logs)
- Preserves complete data lineage and audit trail

Silver Layer (Cleansed and Enriched)

- **Data Quality Checks**: Automated validation, deduplication, and error correction
- **Business Rules Application**: Standardization and business logic implementation
- **Data Enrichment**: Integration and correlation across data sources
- **Notebook Processing**: Custom transformations using Spark and Python/Scala

Gold Layer (Business-Ready Analytics)

- **Dimensional Modeling**: Fact and dimension tables optimized for reporting
- **KQL Scripts**: Real-time query processing for operational dashboards
- Eventhouse Integration: High-performance analytics on streaming data
- **Notebook Analytics**: Advanced analytics and machine learning model preparation

Key Capabilities:

Real-time Operational Intelligence

- Live dashboards monitoring production performance, equipment health, and inventory levels
- Immediate visibility into supply chain disruptions and bottlenecks

Unified Data Governance

- Centralized data catalog with automated lineage tracking
- Consistent data quality standards across all sources
- Role-based access controls and security policies

Advanced Analytics Foundation

- Prepared datasets for predictive maintenance algorithms
- Customer segmentation and market trend analysis capabilities
- Supply chain optimization models and demand forecasting

Scalable Processing Architecture

- Auto-scaling compute resources based on workload demands
- Separation of storage and compute for cost optimization
- Support for both batch and streaming analytics workloads