Team,

After completing the transformation and cleaning of our staging tables for customers, products, and sales, I moved forward with comparing the OLTP and OLAP systems we’re using. This report summarizes what I found, why the design matters, and how these choices affect performance and business intelligence.

1. Introduction: Understanding OLTP vs. OLAP

Before diving into design differences, it’s important to clarify what each system does:

* OLTP (Online Transaction Processing) is the system that handles our day-to-day operations. Every time a sale is made, a record is written into the transactional database. These systems are optimized for speed and accuracy, recording data quickly and consistently. Think of OLTP as the flow of inventory in our stores.
* OLAP (Online Analytical Processing) is designed for data analysis and reporting. Instead of processing transactions, it summarizes and organizes historical data to reveal trends. OLAP systems are typically used in data warehouses and business intelligence tools.  
  Think of OLAP as the operational birds eye view where we can see trends and analytics we might not be able to see up close.

2. Design Differences: Normalization vs. Star Schema

OLTP databases are normalized, which means data is stored in many small, related tables to avoid redundancy. For example, a customer’s name, address, and orders would all be in separate tables linked by keys. This structure keeps the data clean and consistent but makes reporting more complicated because you must join multiple tables every time you want to analyze something.

In contrast, OLAP systems (like our new data warehouse) use a star schema design.

* The FactSales table holds the measurable data – quantities and sales amounts.
* Dimension tables (like DimCustomer, DimProduct, and DimDate) hold descriptive information.  
  Each dimension links directly to the fact table, forming a simple, star-shaped pattern.

This design allows analysts to easily run queries like *“total sales by region,” “top customers,”* or *“sales by year.”* The result is faster reporting and much simpler SQL.

3. Performance Comparison

To test the difference, I ran several aggregate queries on both the FactSales (OLAP) and StgSales (staging/OLTP) tables.

Sales by Region

A screenshot of a computer

AI-generated content may be incorrect.

This test highlights OLAP’s strength: analyzing trends over time. OLTP systems aren’t built for time-based aggregation – those queries would require heavy computation and could slow down the operational database.

4. Business Risks of Using OLTP for Reporting

Using OLTP systems for reporting introduces several risks:

* Performance Degradation: Heavy analytical queries can slow down transaction processing. This can affect customers and staff using the live system.
* Incomplete Insights: OLTP data often reflects current transactions only, not historical or summarized trends. Business leaders would miss long-term patterns.
* Complex Querying: Because OLTP tables are normalized, generating even simple reports requires many joins, increasing both complexity and query time.
* Potential Data Locking: Running large reports on active transactional systems can lock tables or delay inserts/updates.

In short, using OLTP for analytics is like trying to fly a plane while rebuilding the engine – it’s possible, but risky and inefficient.

5. Recommendation

Based on the results and performance tests, it’s clear that OLAP data warehouses are the right choice for business intelligence and reporting.

They:

* Deliver faster query results
* Simplify report building
* Reduce system load on operational databases
* Provide consistent, historical insights across time periods

Moving forward, we should continue building and optimizing our star schema warehouse as the foundation for BI tools such as Power BI and Excel dashboards. This structure ensures accuracy, performance, and scalability as our data grows.

Best,  
Connor Gaskill