**Database Explanations**

# Adventureworks2017 Database

## Database introduction

AdventureWorks is a database example provided by Microsoft to illustrate features and best practices in the field of databases. While AdventureWorks does not represent a real company, its fictional scenario simulates an imaginary industrial business engaged in manufacturing, selling, and reselling bicycles, accessories, and components.

In detail, AdventureWorks2017 simulates the operations of a company that:

1. **Manufactures bicycles:** The database contains information about the production of different types of bicycles, including models, parts, and manufacturing processes.
2. **Sells products:** It manages transactions related to the sale of bicycles, accessories, and components to customers. This includes data on orders, customers, sales, payments, etc.
3. **Resells products:** The database also simulates resale operations, which could include managing suppliers, bulk product purchases, and other aspects related to the supply chain.
4. **Stores operational data:** AdventureWorks2017 stores common operational data needed for the daily management of the business, such as information about employees, suppliers, warehouses, etc.
5. **Facilitates business analysis:** As a demonstration database, it also provides opportunities for business analysis, reporting, and data exploration to illustrate how businesses can leverage their data to make informed decisions.

In summary, AdventureWorks2017 serves as an educational example for understanding data modeling, relationships between entities, business transactions, inventory management, and other aspects of a fictional company involved in the manufacturing and sale of products.

## Database structure

The backup files AdventureWorks2017.bak and AdventureWorksDW2017.bak represent two different databases associated with the AdventureWorks system. These databases serve different purposes in the context of data management and information systems.

**OLTP (Online Transaction Processing) - AdventureWorks2017.bak:**

* This database is designed to support online transactional operations.
* OLTP manages real-time transactions, such as adding, modifying, or deleting data.
* AdventureWorks2017.bak is primarily used to store current operational data, such as orders, customers, products, and other daily transactions.
* It is optimized for fast reads and writes to maintain data consistency in real-time.

**Data Warehouse - AdventureWorksDW2017.bak:**

* This database is designed to support online analytical processing (OLAP) and reporting activities.
* A data warehouse is optimized for the analysis of large volumes of historical data rather than real-time transactions.
* AdventureWorksDW2017.bak stores aggregated, historical, and consolidated data, making it an ideal choice for reporting, business analysis, and complex queries.
* Data in a data warehouse is often organized to facilitate the quick retrieval of information for in-depth analysis.

**To create a Data Warehouse** (AdventureWorksDW2017.bak) from an OLTP system (AdventureWorks2017.bak), you would typically use a process known as ETL (Extract, Transform, Load). This involves extracting relevant data from the OLTP database, transforming it to meet the requirements of analytical processing, and then loading it into the Data Warehouse.

**The ETL process** may involve aggregating and consolidating data, handling historical records, and creating a schema optimized for analytical queries. Tools such as SQL Server Integration Services (SSIS) or other ETL tools can be used to automate this process, ensuring that data consistency and integrity are maintained during the transformation.

**By implementing ETL, you can bridge the gap between the transactional nature of the OLTP system and the analytical requirements of the Data Warehouse**, enabling efficient reporting, analysis, and decision-making based on historical and consolidated data.

## Database Diagrams

### OLTP (Online Transaction Processing) - AdventureWorks2017.bak

### 1.3.2 Data Warehouse - AdventureWorksDW2017.bak

## 1.3 Limits of the Database

**AdventureWorks is a useful educational database for learning and experimentation.** However, it has certain limitations for the accurate calculation of productivity in the industrial sector.

**1. Lack of granular data:**

* **Absences and illnesses:** The lack of daily details on absences and illnesses makes it difficult to accurately calculate effective working time and, consequently, individual productivity.
* **Employee timesheets:** Without accurate tracking of arrival and departure times, it is impossible to calculate the exact duration of work performed.

**2. Limited product information:**

* **Product status:** The database does not differentiate between raw, work-in-progress (WIP), and finished goods. This distinction is essential for accurate tracking of production progress and calculating productivity per product.

**3. Lack of maintenance data:**

* **Maintenance interventions:** Without information on maintenance interventions, it is impossible to measure the impact of downtime on production and calculate overall efficiency.

**4. Other missing data:**

* **HR data:** Employee skills and qualifications, employee turnover rate
* **Customer data:** Order and delivery history, customer complaints and returns
* **Production data:** Scrap and loss details, rework, energy and resource consumption data

## Alternative solutions:

* **Enrich the database:** If possible, add fields to capture missing data, such as timesheets, product details, and maintenance interventions.
* **Use other data sources:** Combine AdventureWorks with other, more comprehensive data sources to get a more accurate view of production and performance.
* **Opt for specialized tools:** Software dedicated to production management and time tracking can offer a more robust solution for calculating productivity.

**Example of using enriched AdventureWorks:**

A food company uses AdventureWorks to track the production of its yogurt. It has enriched the database with data on employee timesheets, product details (raw materials, progress status), and maintenance interventions. This allows it to calculate productivity per production line and identify areas for improvement.

**Conclusion**

**AdventureWorks can be a useful tool for calculating productivity in the industrial sector, but it is important to be aware of its limitations and to implement alternative solutions to obtain accurate and actionable results.**