Lecture 4: Microsoft Business Intelligence

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- (MSBI) is a suite of tools that provides solutions for Business Intelligence and Data Warehousing.
- It includes three main components:

1. **SQL Server Integration Services (SSIS):** is a data integration tool used for ETL (Extract, Transform, Load) operations.
- It helps in automating the process of extracting data from various sources, transforming it according to business rules, and loading it into the data warehouse.

Key Features→
- Data extraction from multiple sources (e.g., SQL Server, Excel, XML, flat files),
- Data transformation using various tasks and transformations,
- Data loading into a destination (e.g., SQL Server, data warehouse)

ETL (data importing and exporting tools)
- Extract data from a MySQL database.
- Transform the data to clean and format it.
- Load the cleaned data into a SQL Server data warehouse.

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2. SQL Server Analysis Services (SSAS)

SSAS is an analytical data engine used in decision support and business analytics. It provides online analytical processing (OLAP) and data mining functionalities.

Key Features:

•Creation of OLAP cubes for multidimensional analysis

•Support for complex analytical queries

•Data mining capabilities for predictive analytics

• Example→Creating a sales **analysis cube** to analyze sales data across different dimensions like time, geography, and products.

•Analysis cube→ OLAP (Online Analytical Processing) cube, is a data structure that allows fast analysis of data.

•Storage→ OLTP, or Online Transaction Processing→like SQL→ data processing focused on handling a large number of short, transactional operations, which include insertions, updates, and deletions.

OLAP

a) Dimensions: These are perspectives or entities concerning which an organization wants to keep records. Common dimensions include Time, Geography, Products, Customers, etc.

b) Measures: These are the actual data values that we want to analyze. Measures are typically numeric and can be aggregated (e.g., sum, average). Common measures include Sales Amount, Order Quantity, Profit, etc.

c) Hierarchies: These are logical structures that organize members of a dimension into levels of detail. For example, a Time dimension might have a hierarchy consisting of Year > Quarter > Month > Day.

d) Attributes: These are descriptive elements of dimensions. For example, in a Product dimension, attributes might include Product Name, Product Category, and Product Subcategory.

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3. SQL Server Reporting Services (SSRS)

SSRS is a reporting tool that allows the creation, management, and delivery of both tabular and graphical reports. It supports a wide range of data sources and can generate reports in various formats (PDF, Excel, HTML).

Key Features→

•Report creation using Report Builder or SQL Server Data Tools

•Support for multiple data sources

•Delivery of reports through email, file share, or on-demand

Example →

Creating a financial report that pulls data from the data warehouse and displays it in a user-friendly format with charts and tables.

Examples of OLTP

Banking Systems→ Handling deposits, withdrawals, and transfers.
E-commerce→Processing orders, payments, and inventory updates.
Reservation Systems→ Booking flights, hotels, or rental cars.
Retail Point of Sale (POS)→ Managing sales transactions and inventory updates.
Customer Relationship Management (CRM): Managing customer data and interactions in real-time.

OLTP is often compared with **OLAP** (Online Analytical Processing). While OLTP focuses on transaction-oriented tasks, OLAP is designed for complex queries and data analysis, dealing with historical data and supporting business intelligence applications.
•**OLTP**→Transactional, high volume, short transactions, real-time processing, highly normalized database.
•**OLAP**→ Analytical, lower volume, complex queries, historical data analysis, denormalized database.