INTRODUCTION TO BUSINESS INTELLIGENCE
LECTURE 1

University of Gdańsk

Agenda

- Lecture program
- Bibliography
- Form of credit
- Lecture 1 - theoretical foundations of a data warehouse

Lectures 1-7

1. Introduction to the subject of data warehouse and decision support systems
2. Data warehouse architecture
3. Data mining methods and OLAP systems
4. Data warehouse modeling - data integration
5. Data warehouse implementation methodologies
6. Business Intelligence principles
7. Creating data models; An example of building a model; Data warehouse management

Bibliography

Obligatory

Kimball R., Ross M., The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling, John Wiley & Sons, 2013

Aspin A., Business Intelligence with SQL Server Reporting Services, Springer Apress, 2015

Larson B., Microsoft Sql Server 2016 Reporting Services, McGraw Publishing, 2016

Course available at pe.ug.edu.pl

Bibliography

Optional

Wrycza S., Maślankowski J., Informatyka ekonomiczna. Teoria i zastosowania., chapter Systemy Business Intelligence, PWN 2019 [optional, only in Polish]

Hughes R., Agile Data Warehousing Project Management, 1st Edition, Business Intelligence Systems Using Scrum, Morgan Kaufmann, 2012

Collier K.W., Agile Analytics: A Value-Driven Approach to Business Intelligence and Data Warehousing, Addison Wesley, 2012

Inmon W., Building the Data Warehouse. Fourth edition., John Wiley & Sons, New York 2005

Documentation MS SQL Server Analysis Services, https://docs.microsoft.com/en-us/sql/analysis-services/multidimensional-modeling-adventure-works-tutorial

Characteristics of the subject

Lectures: 15h

Form of credit: Test - 20 questions, including 5 multiple choice

Characteristics of the subject

Objectives of the course: Acquiring skills related to the implement Business Intelligence systems.

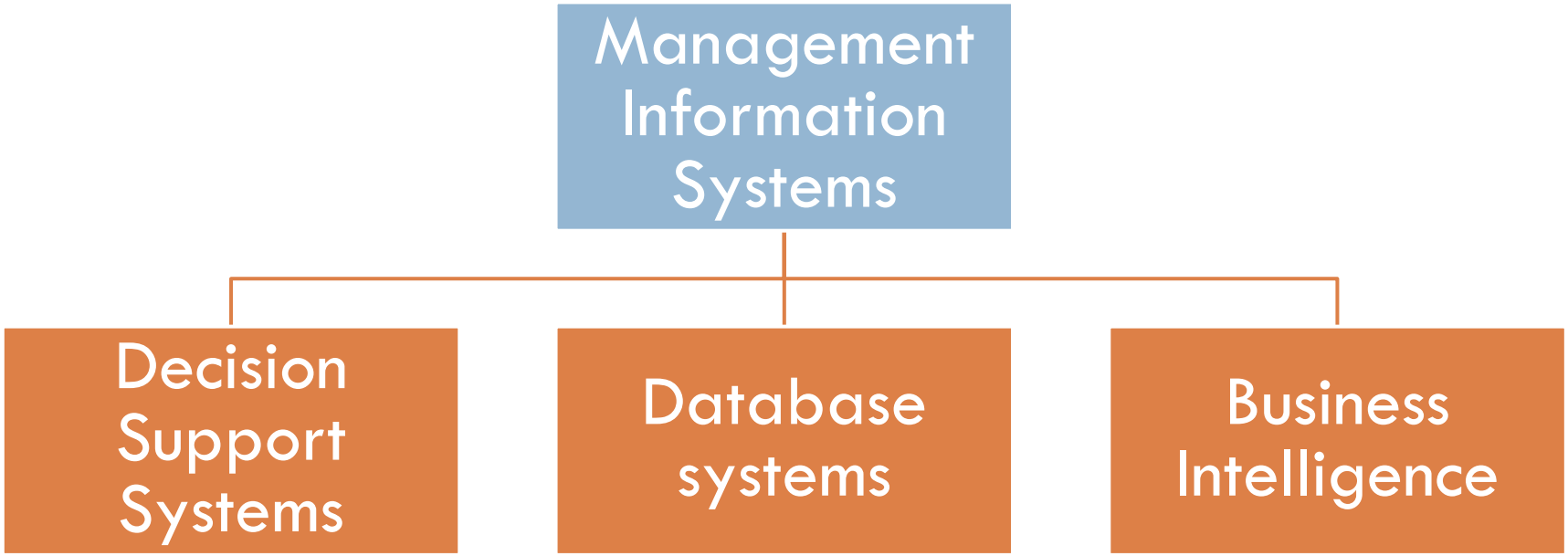
Skills and competences: the ability to build a Business Intelligence systems using complex data models.

Lecture 1

Theoretical foundations of a data warehouse

University of Gdańsk

Data warehouses



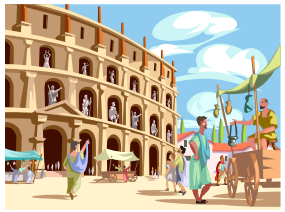
Purpose of building a data warehouse

The data warehouse should provide decision makers with relevant information.

Data warehouse is a core component of Business Intelligence system, i.e. its repository.

Business Intelligence components deliver additional reporting services to create, among others, Business Intelligence dashboards.

History

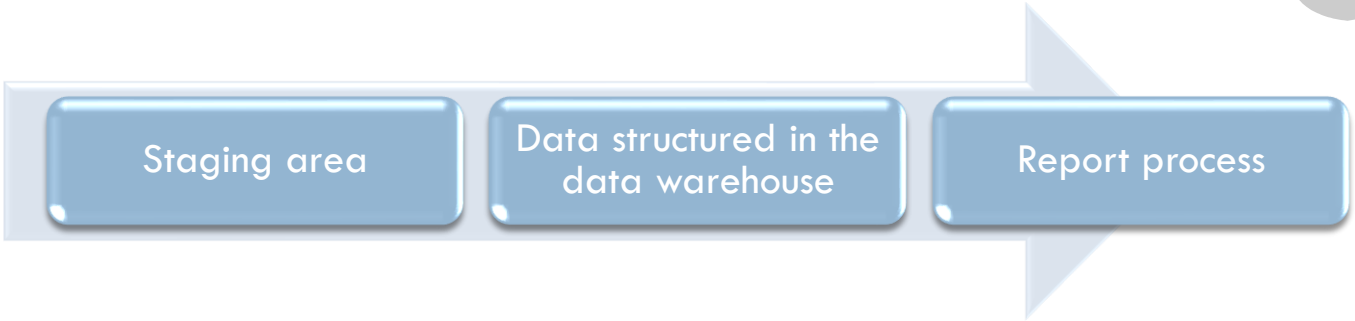


60ties (Data Mart) → 1988 (IBM Ireland) → 1991 (Building the Data Warehouse, B. Inmon) → 1996 (The Data Warehouse Lifecycle Toolkit)

The following are considered to be the creators of the data warehouse:

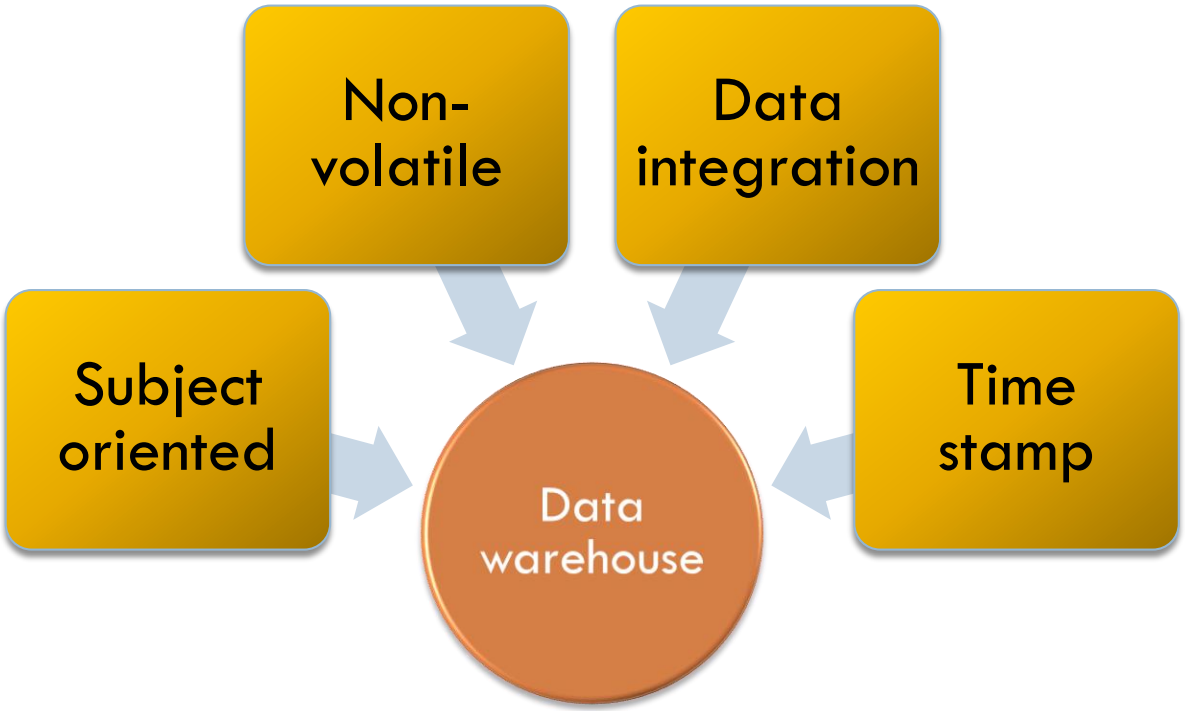
- **Bill Inmon** (definition of the term),
- **Ralph Kimball** (rules for slowly changing dimensions).

Definition of a data warehouse by R. Kimball

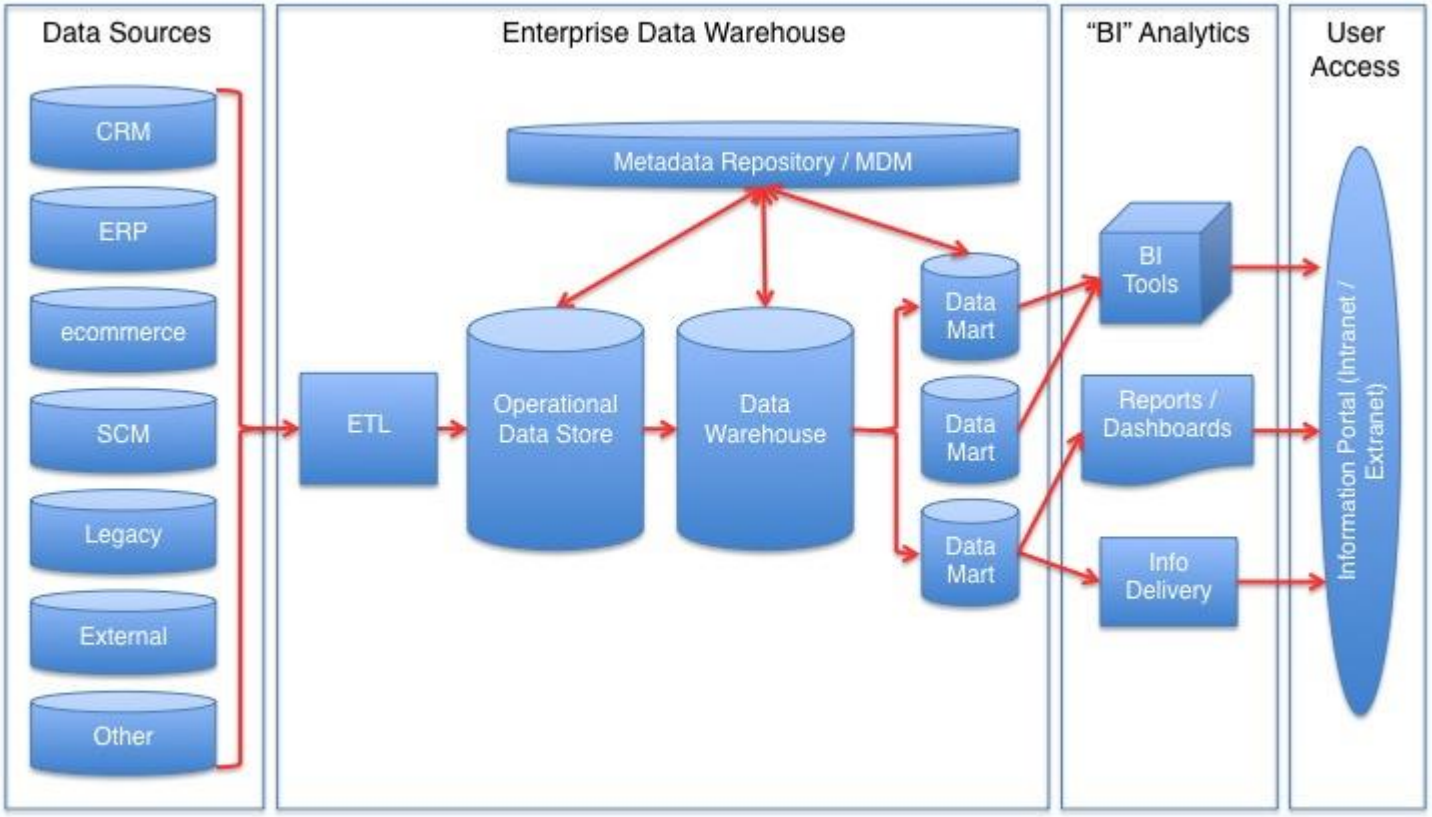


A data warehouse is a **copy** of **transactional data**, specifically **structured** for querying and **reporting**.

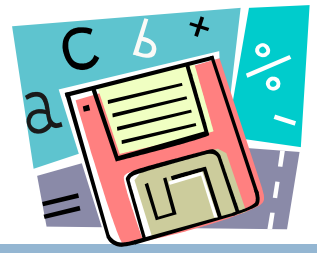
Data warehouse definition by B.Inmon (four attributes)



Data warehouse at a glance

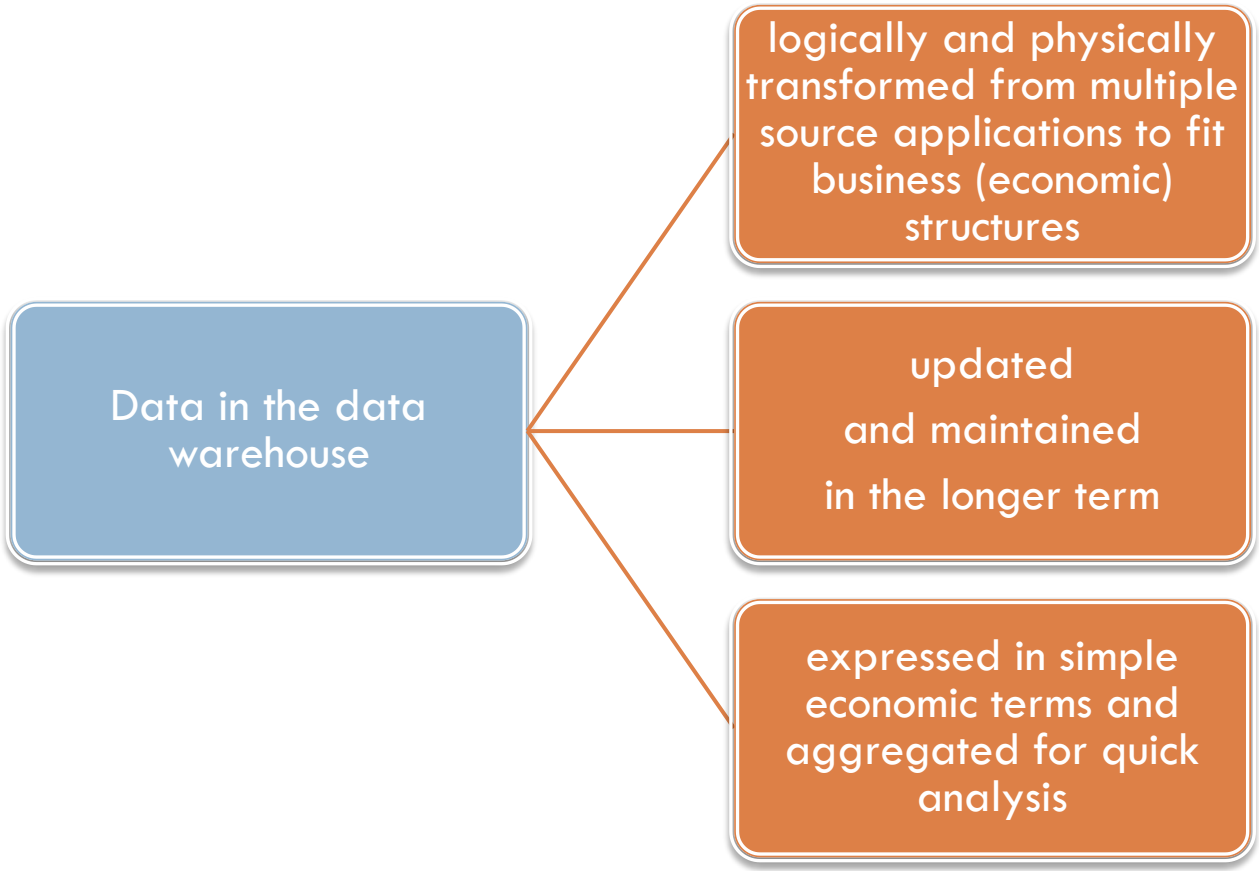


Database and data warehouse

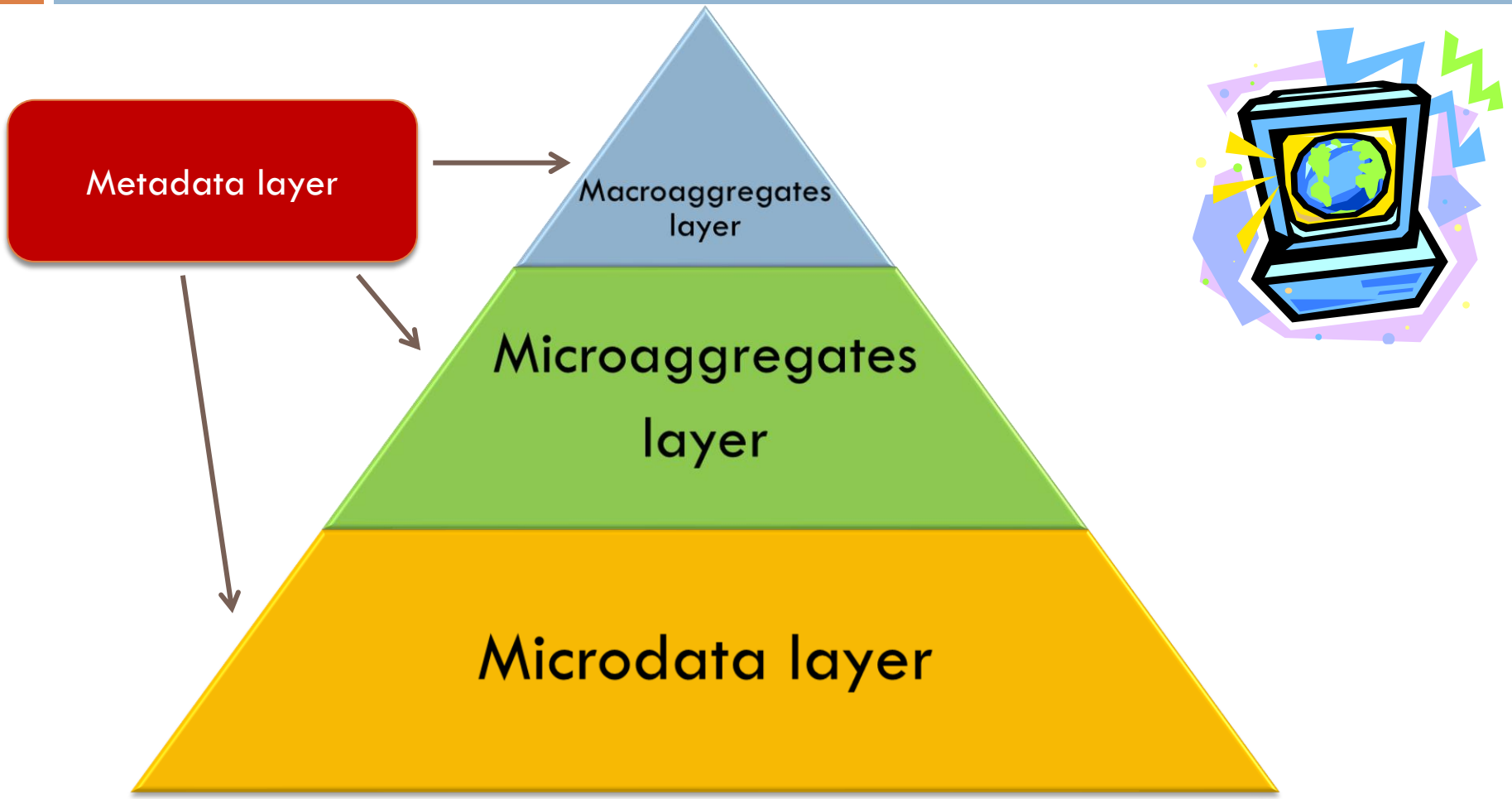


	Transaction systems /Database/	Analytical systems /Data Warehouse/
Goal	OLTP (On Line Transaction Processing)	OLAP (On Line Analytical Processing)
Interaction	Entering, updating, deleting data and queries; Single transactions	Inquiries; Aggregate transactions
Type of the data	Current	Current and historical
Basic Project	3NF – 3 Normal Form	Multi-dimensional design (usually star or snowflake schema)

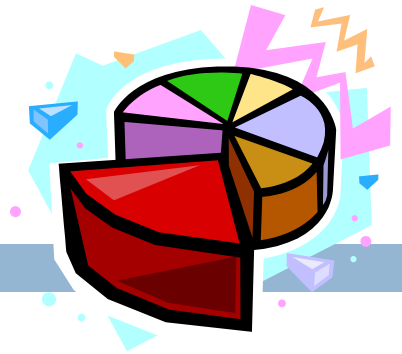
Characteristics of data collected in the warehouse

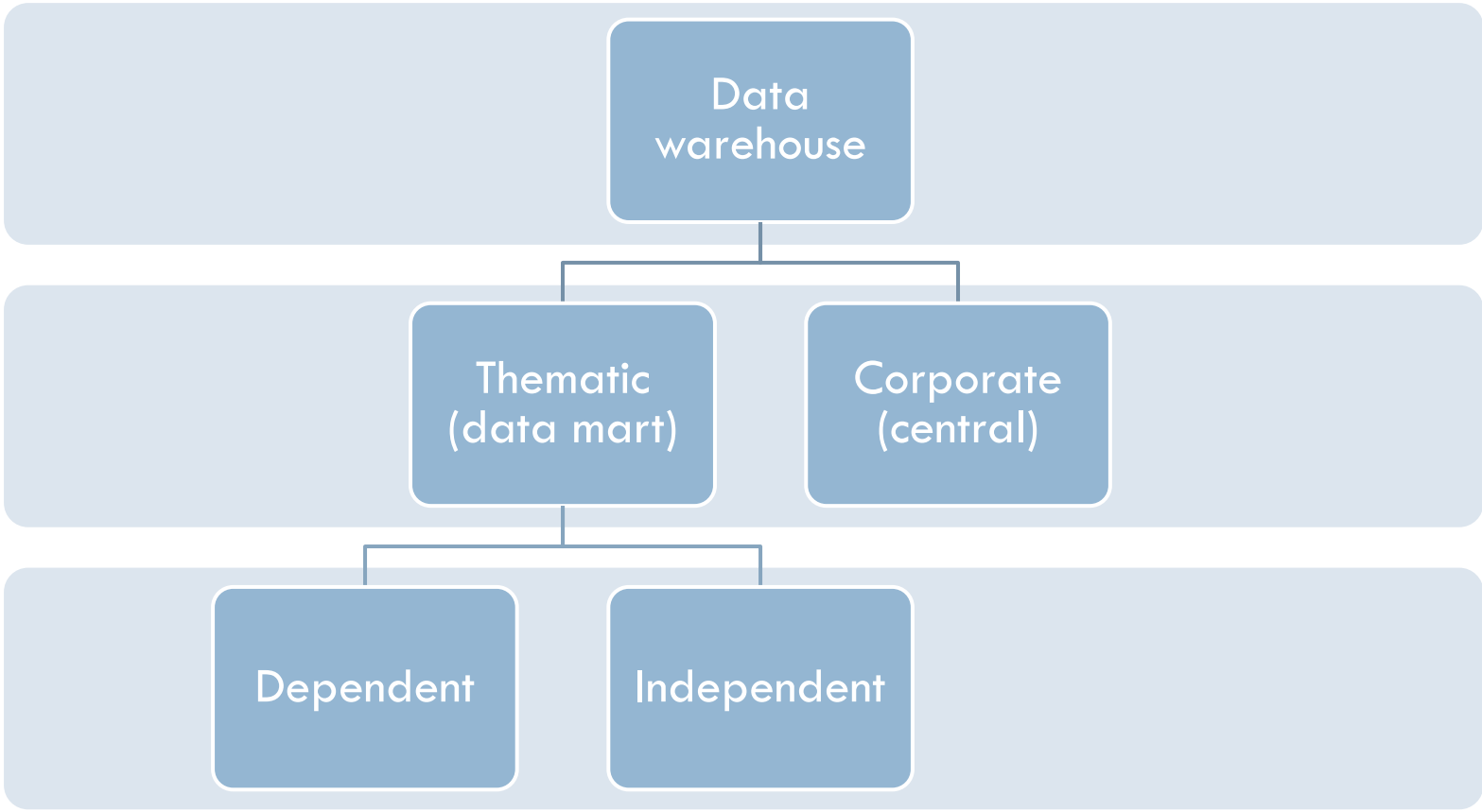


Typical layers of data warehouse



Data warehouse classification



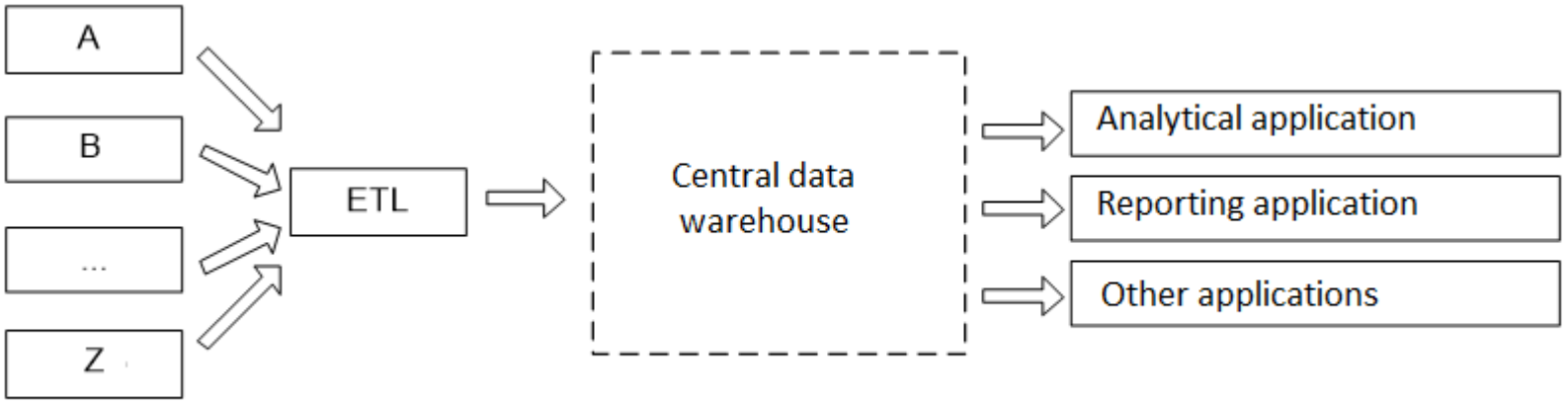


Classification of data warehouses corporate data warehouses

Corporate data warehouse

- otherwise a **central** data warehouse
- an extensive, **centralized** environment that provides management with information about the course of processes in the company, in order to use them later in the decision-making process

Corporate data warehouse

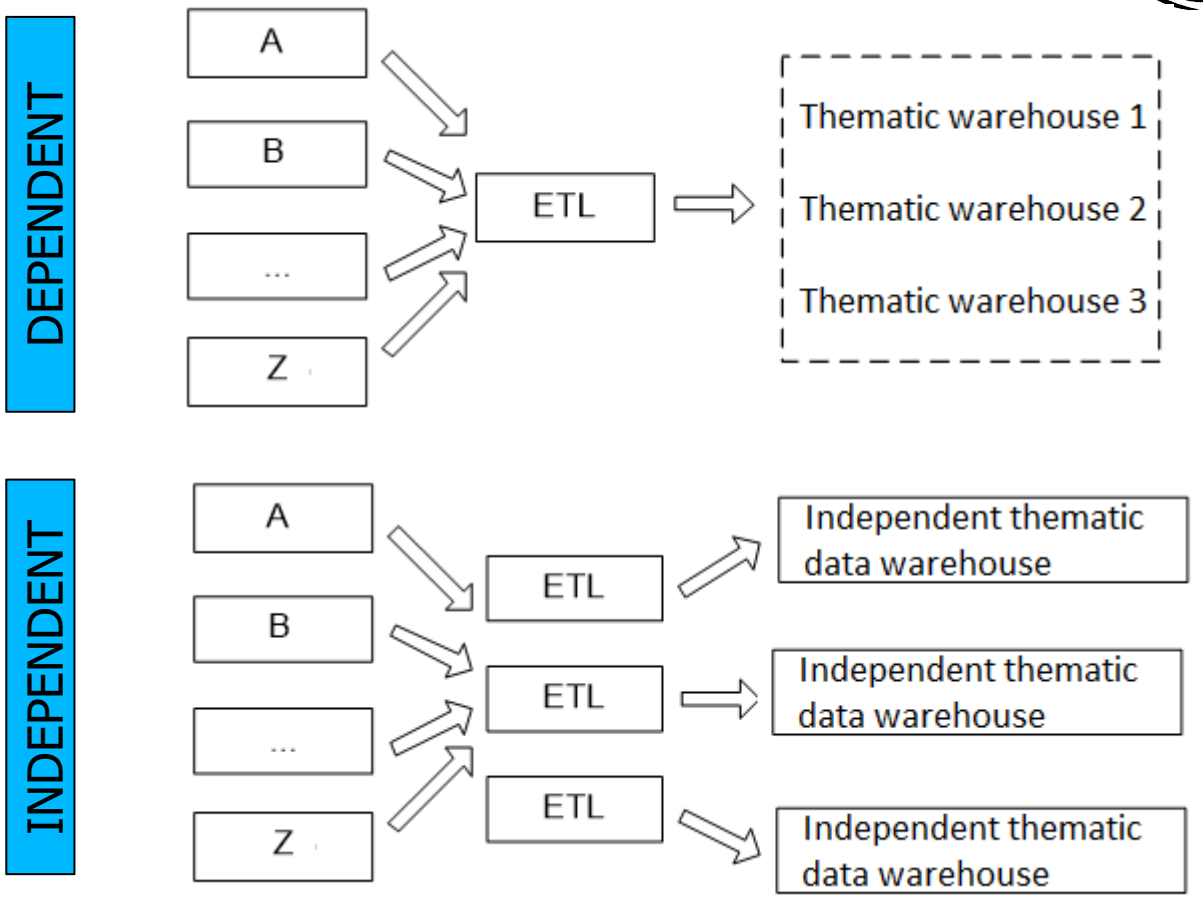


Data warehouse classification - thematic data warehouses

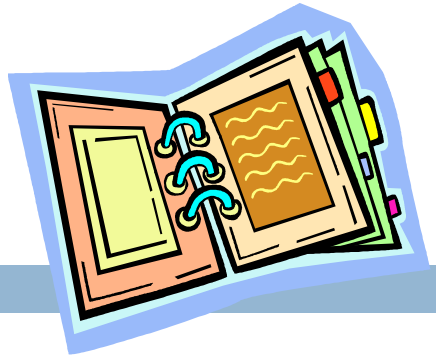
Thematic data warehouse (data mart)

- it contains only **one area** of the company's activity
- other name: data store, small data warehouse
- usually implemented for a **department, branch** or **geographic location** of the company

Dependent and independent thematic data warehouses



Classification of thematic data warehouses



Stages of development of thematic data warehouses:

- **decentralized** thematic wholesalers to a degree that prevents their subsequent integration,

- data warehouse model composed of a **central** data warehouse collecting data from thematic warehouses.

Application: drill-down data analysis.

Thematic data warehouses - implementation rules

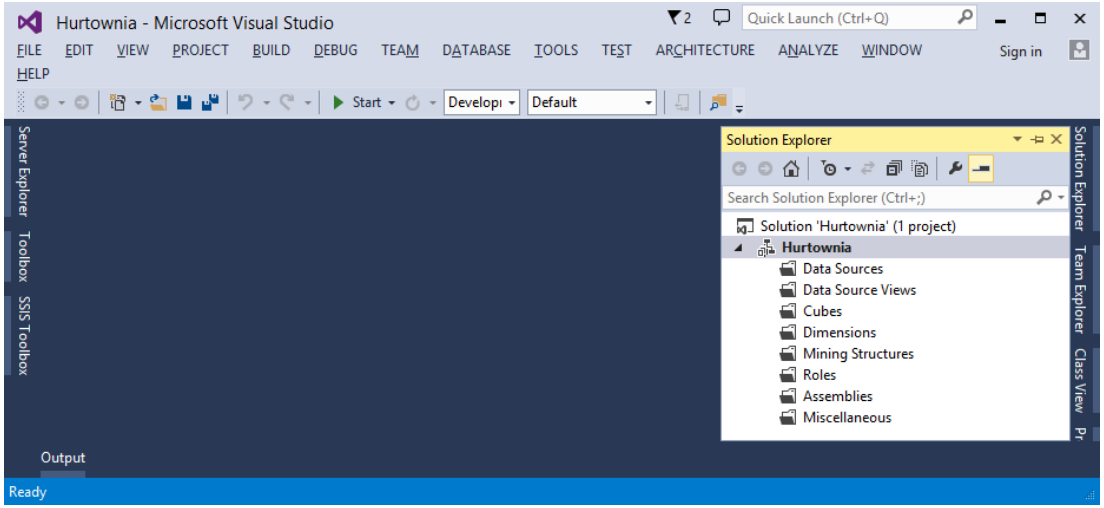
Four rules

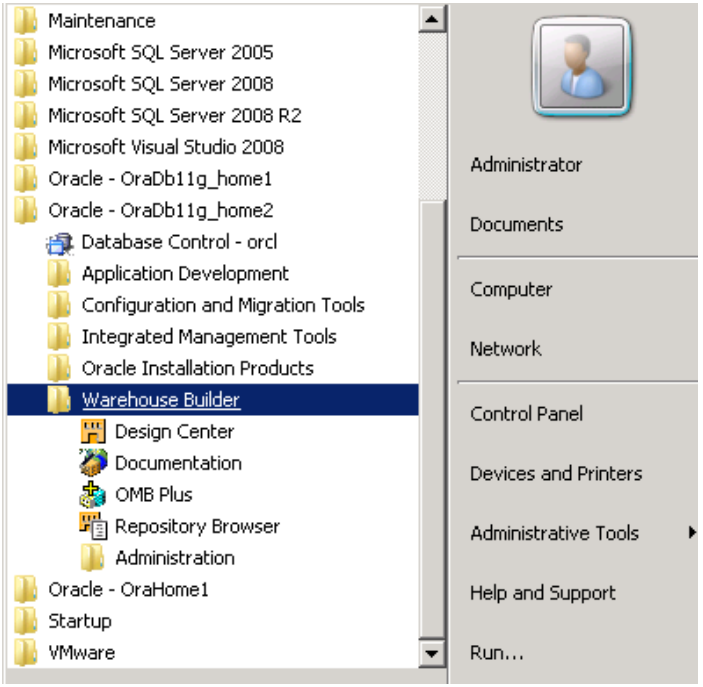
- thematic data warehouses should be a **component** of the data warehouse,
- thematic data warehouses should not be used for **direct access** to data,
- thematic data warehouses should not be used for entities in which there are specific **local business rules**, as well as when there is a need to **integrate** local data,
- the **costs** and **benefits** of implementing this technology should be compared with the results of using a traditional direct access wholesaler.

Data warehouse suppliers

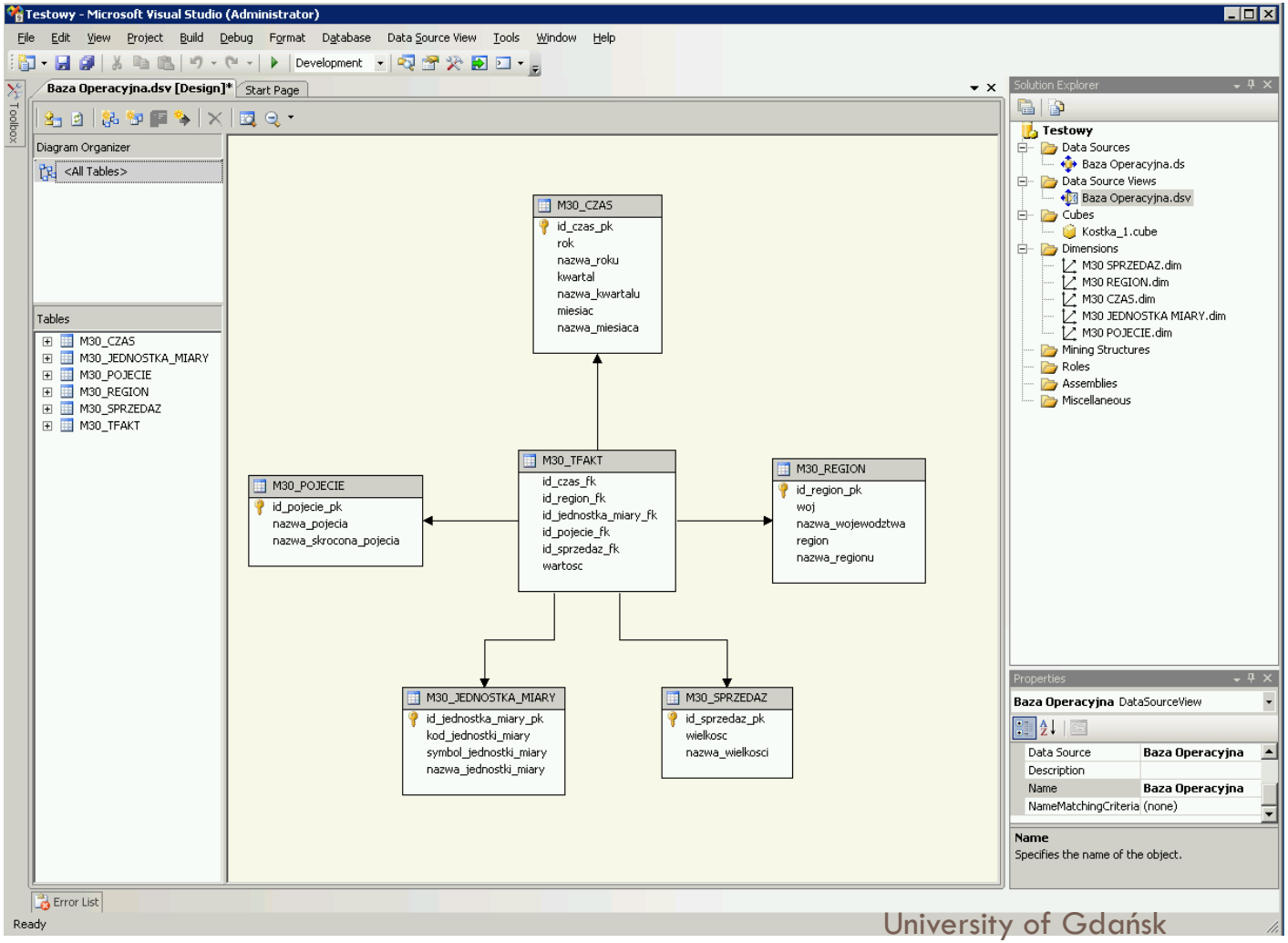
- Microsoft
- Oracle
- Teradata
- SAS
- Apache
- ...

Tools

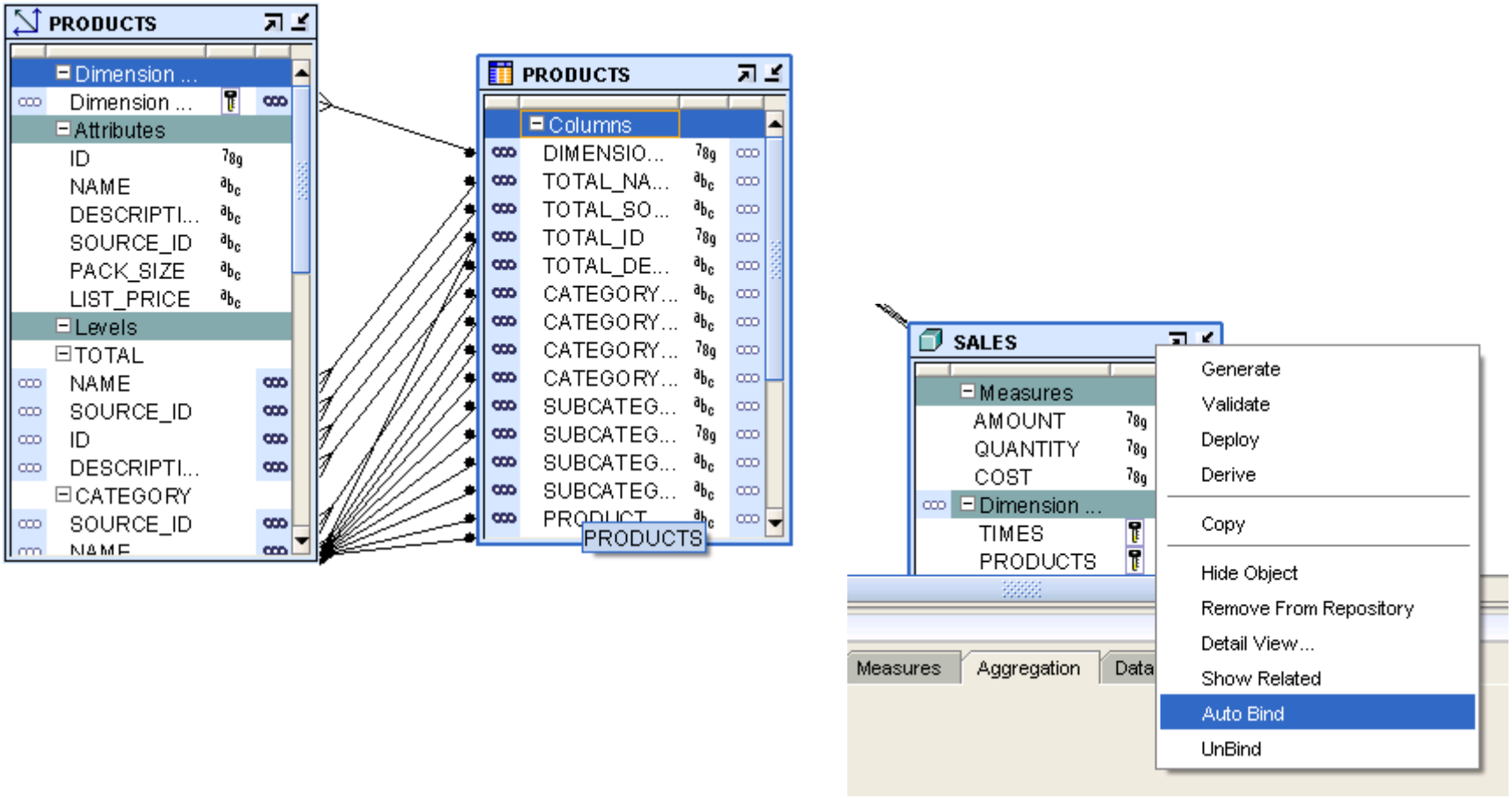

Hurtownia - Microsoft Visual Studio
Quick Launch (Ctrl+Q)
FILE EDIT VIEW PROJECT BUILD DEBUG TEAM DATABASE TOOLS TEST ARCHITECTURE ANALYZE WINDOW HELP
Sign in
Start
Default
Server Explorer
Toolbox
SSIS Toolbox
Solution Explorer
Search Solution Explorer (Ctrl+;)
Solution 'Hurtownia' (1 project)
Hurtownia
Data Sources
Data Source Views
Cubes
Dimensions
Mining Structures
Roles
Assemblies
Miscellaneous
Team Explorer
Class View
Output
Ready


Maintenance
Microsoft SQL Server 2005
Microsoft SQL Server 2008
Microsoft SQL Server 2008 R2
Microsoft Visual Studio 2008
Oracle - OraDb11g_home1
Oracle - OraDb11g_home2
Database Control - orcl
Application Development
Configuration and Migration Tools
Integrated Management Tools
Oracle Installation Products
Warehouse Builder
Design Center
Documentation
OMB Plus
Repository Browser
Administration
Oracle - OraHome1
Startup
VMware
Administrator
Documents
Computer
Network
Control Panel
Devices and Printers
Administrative Tools
Help and Support
Run...

Microsoft SQL Server Data Tools



Oracle Warehouse Builder



Question

- Which are the characteristics of a data warehouse?
  - volatile data
  - time stamp
  - possibility of update and delete
  - subject oriented