



RDBMS Concepts

Lesson 01: Introduction to
Database



Lesson Objectives

- Introduction to databases
- Data Models in Database
- Properties of RDBMS
- Data Integrity
- T-SQL Language
- MAX DB, MS SQL, DB6, all supported DBs overview





Introduction to database

- Database
 - Organized collection of related data which captures the essential properties of objects and records the relationships among them.
- Database system
 - It is an integrated collection of related files, along with details of interpretation of data.
- Database Management System (DBMS)
 - A set of computer programs for organizing the information in a database.
- A DBMS supports the structuring of the database in a standard format and provides tools for data input, verification, storage, retrieval, query and manipulation.



Characteristics of DBMS

- Data persistence –Stored on some hardware and persist after access.
- Concurrency –Multiuser access
- Managed Transactions – Data manipulation and saving of work
- Query language – for retrieval of data
- Data recoverability – To recover from failure



Data Model

- Data models define how the logical structure of a database is modelled.
- Data models define how data is connected to each other and how they are processed and stored inside the system.
- The most popular data model in DBMS is the Relational Model.
- It is more scientific a model than others.

- The main highlights of this model are –
 - Data is stored in tables called relations.
 - Relations can be normalized.
 - In normalized relations, values saved are atomic values.
 - Each row in a relation contains a unique value.
 - Each column in a relation contains values from a same domain.



Relational DBMS

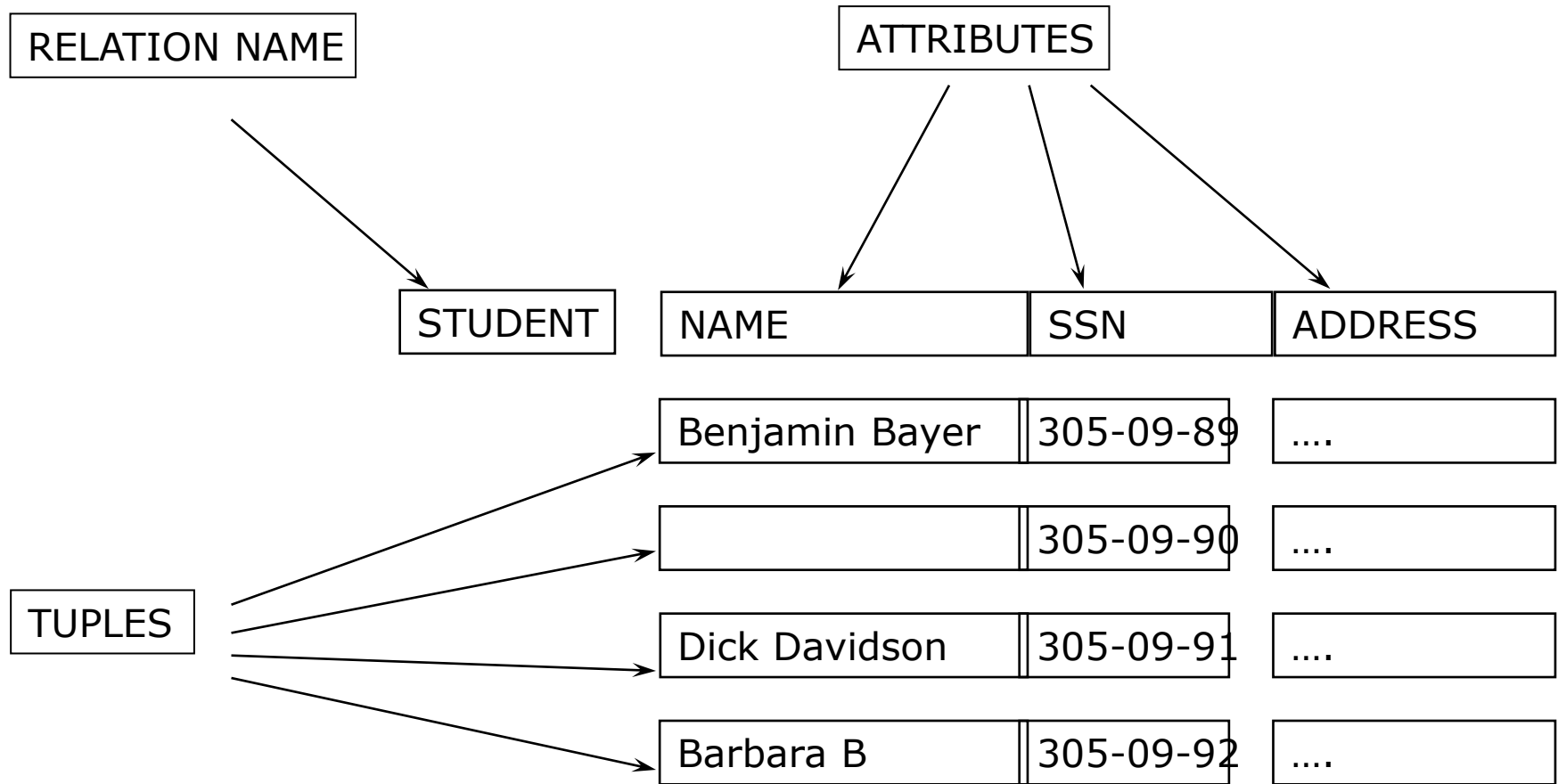
- A DBMS is said to be a Relational Data Base Management System (RDBMS) if it follows the following main criteria:
- Represents data as two-dimensional tables called relations .Data is organized as tables of data values.
- Primary unit of storage is called table which contains rows and columns.
- Relationships are maintained by common data values stored in the related tables.
- Tables can be related to one another through common column values called keys.
- Should be able to retrieve the data stored in such tables using `SELECT`, `JOIN` and `PROJECT` operators.



Properties of RDBMS

- Values are atomic.
- All of the values in a column have the same data type.
- Each row is unique.
- The sequence of columns is insignificant.
- The sequence of rows is insignificant.
- Each column has a unique name.

Relational Database Model





Example: Relational Database

STORE

Store Name | City

INVENTORY

Store Name | Part No | Quantity

ORDERS

Store Name | Part No | Vendor No | Order No | Quantity

PART

Part No | Description

VENDOR

Vendor No | Vendor Name

STORE

Store 1 | Colombo
Store 2 | Kandy

INVENTORY

Store 1 | P1 | 50
Store 1 | P3 | 20
Store 2 | P2 | 100
Store 2 | P1 | 30

ORDERS

Store 1 | P3 | 3428 | 0052 | 10
Store 2 | P2 | 3428 | 0098 | 7
Store 2 | P3 | 3428 | 0098 | 15
Store 2 | P4 | 5726 | 0099 | 1

PART

P1 | Printer
P2 | Diskette
P3 | Disk Drive
P4 | Modem

VENDOR

3428 | East West
5726 | DMS



Data Integrity

- Database integrity defines the validity and consistency of stored information. Integrity is generally defined in terms of constraints, which are consistency rules that the database is not allowed to violate.
- Types of data integrity
- Maintaining data integrity requires an understanding of the two types of data integrity: physical integrity and logical integrity. Each is a set of processes and methods that enforces data integrity.
- **Physical integrity**
- Physical integrity is the protection of the completeness and accuracy of that data as it's stored, maintained in storage, and retrieved. When natural disasters strike, the power goes out, or a disk drive crashes, the physical integrity of data is compromised. Human error, storage erosion, and a host of other issues can also make it impossible for data processing managers, system programmers, applications programmers, and internal auditors to obtain accurate data.



Data Integrity

▪Logical integrity

- Logical integrity keeps data unchanged as it's used in different ways in a relational database. Logical integrity protects data from human error and hackers as well, but in a much different way than physical integrity does. There are four types of logical integrity:
- Entity integrity. Entity integrity relies on the creation of primary keys — the unique values that identify pieces of data — to ensure that data isn't listed more than once and that no field in a table is null. It's a feature of relational systems which store data in tables that can be linked and used in a variety of ways.
- Referential integrity. Referential integrity refers to the series of processes that make sure data is stored and used uniformly. Rules embedded into the database's structure about how foreign keys are used ensure that only appropriate changes, additions, or deletions of data occur. Rules may include constraints that eliminate the entry of duplicate data, guarantee that data entry is accurate, and/or disallow the entry of data that doesn't apply.
- Domain integrity. Domain integrity is the collection of processes that ensure the accuracy of each piece of data in a domain. In this context, a domain is a set of acceptable values that a column is allowed to contain. It can include constraints and other measures that limit the format, type, and amount of data entered.
- User-defined integrity. User-defined integrity involves the rules and constraints created by the user to fit their particular needs. Sometimes entity, referential, and domain integrity aren't enough to safeguard data. Often, specific business rules must be taken into account and incorporated into data integrity measures.

T-SQL Language



- T-SQL or Transact SQL is the query language specific to the Microsoft SQL Server product.
- It can help perform operations like retrieving the data from a single row, inserting new rows, and retrieving multiple rows.
- It is a procedural language that is used by the SQL Server



Databases supported by SAP

- The below databases are supported by SAP
- SAP DB (ada) or Version 7.5 MaxDB (sdb) or higher
- Microsoft SQL Server
- Oracle
- IBM DB2/390 (db2)
- IBM DB2/400 (db4)
- IBM DB2 UDB (db6)
- SAP HANA Database



SAP supported DBs overview

MaxDB is a relational database management system that is developed from SAP AG, which is compliant to **ANSI SQL 92**. It was developed for supporting large SAP environments that need enterprise-level functionalities while performing database operations.

MS SQL Server is a relational database management system (RDBMS) developed by Microsoft. This product is built for the basic function of storing retrieving data as required by other applications. It can be run either on the same computer or on another across a network

Oracle database is a relational database management system (RDBMS) from Oracle Corporation.

DB2 is a database product from IBM. It is a Relational Database Management System (RDBMS). DB2 is designed to store, analyse and retrieve the data efficiently.

Talking about DB2 we need to consider in fact three products with a different codebase.

- DB2 running on mainframes using z/OS (formerly known as OS/390),
- DB2 running on the operating system i5 (aka as OS/400)
- DB2 for Linux, UNIX and Windows.

The current official names for these IBM products are:

- DB2 for z/OS
- DB2 for i5/OS
- DB2 9 for Linux UNIX and Windows ('Linux UNIX and Windows' is sometimes abbreviated as 'LUW')
 - The above is called as DB6



SAP supported DBs overview

- SAP HANA is an in-memory database and development platform by SAP.
- SAP HANA (High-performance Analytic Appliance) is a multi-model database that stores data in its memory instead of keeping it on a disk.
- This results in data processing that is magnitudes faster than that of disk-based data systems, allowing for advanced, real-time analytics.

SUMMARY

- In this module, you learned about the following:
 - Introduction to databases
 - Data Models in Database
 - Properties of RDBMS
 - Data Integrity
 - T-SQL Language
 - MAX DB, MS SQL, DB6, all supported DBs overview

Review Question

- ❖ 1. A relational database consists of a collection of_____
- Tables
- Fields
- Keys
- ❖ Question 2 DBMS provides only single user access
- True/False
- ❖ Question 3: A _____is an association among several entities?

