

CE208-Database Management Systems

Intro

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0.1 CE208-Database Management Systems

0.1.1 Week-1 (Intro)

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Download PDF-MS¹, PDF-MD², DOCX-MD³, PPTX-MD⁴, PPTX-MS⁵

0.1.2 Outline

- What is Database?
- Database Examples
- Database
- What is Database Management System?
- Classification of Database Management Systems

0.1.3 Outline

- Hierarchical databases
 - Network databases
 - Relational databases
 - Object Oriented databases
- Why use a database?
- Advantages of the Database Approach
- Database Management Systems

¹../files/week-1.pdf

²week-1.tr.md_slide.pdf

³week-1.tr.md_word.docx

⁴week-1.tr.md_slide.pptx

⁵../files/week-1.pptx

0.1.4 Outline

- Database Structure
 - Table
 - Data Types
 - MYSQL Data Types
 - Key
 - Primary key
 - Foreign key
 - Database Design
-

0.2 What is Database?

- It is an information repository where data that is related to each other is kept.
 - The collection of data arranged in accordance with the purpose of use
 - They are information stores with their logical and physical definitions.
-

0.3 Database Examples

- University - Student Affairs Information System
 - Hospital - Patient, doctor, treatment, equipment, financial information
 - A commercial company - Customer, Product, Sales, Payment, Delivery information
 - Bank - Customer, deposit, credit card, credit information
-

0.4 Database

- The database concept was first introduced in the 1980s.
 - It is used in everywhere from a simple web application up to large and complex data of international organizations
 - Database applications are needed in many areas.
-

0.5 What is Database Management System?

It is a software system in which various complex following operations are performed.

- Creating a new database,
 - Editing the database
 - To use,
 - Develop
 - to take care of (maintanance)
-

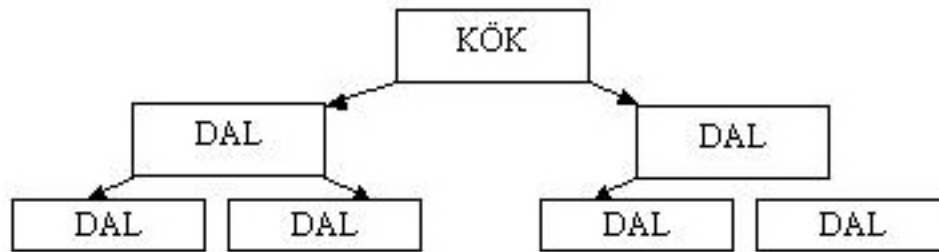
0.6 Classification of Database Management Systems

- By Data Model
 - Hierarchical
 - Network
 - relational
 - Object Oriented

- By Number of Users
 - single user
 - multi-user
-

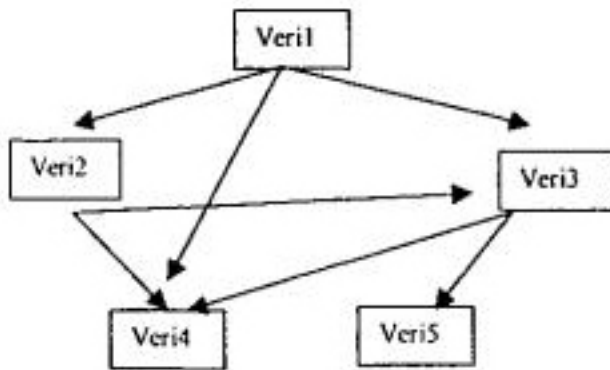
0.6.1 Hierarchical databases

- It is the first model used for databases.
- Hierarchical databases store information in a tree structure.



0.6.2 Network databases

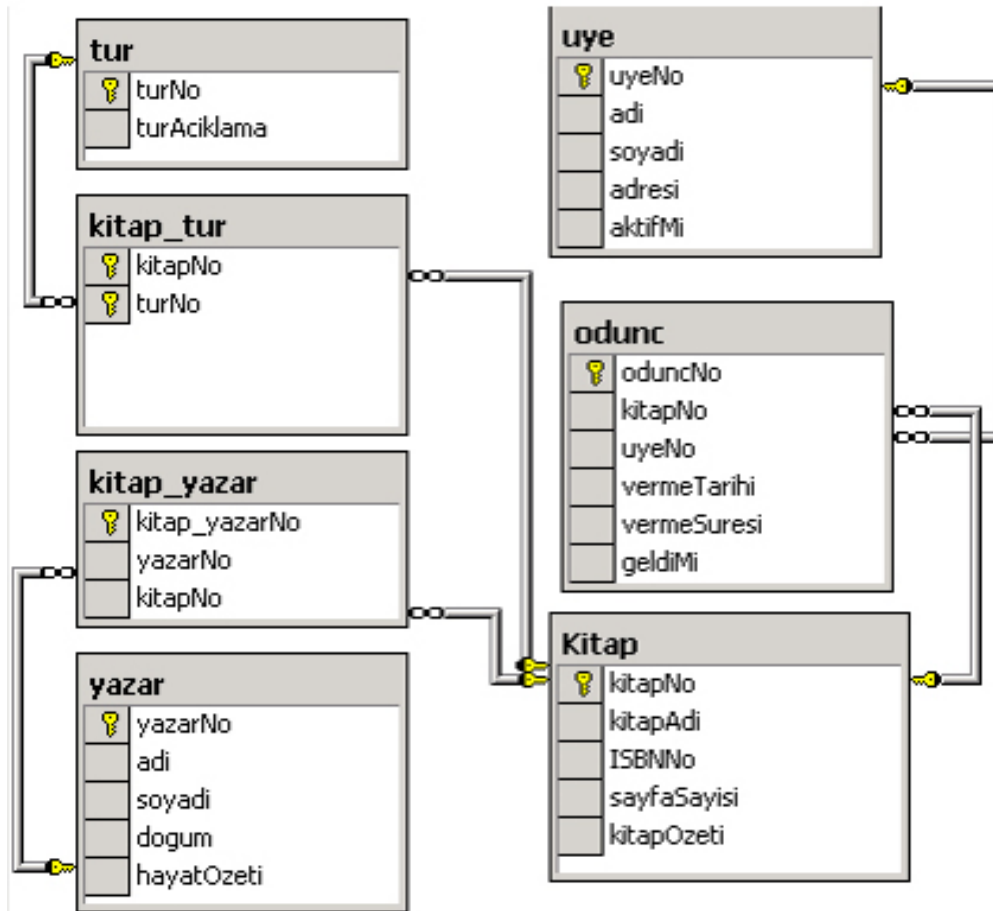
- When hierarchical databases were insufficient, a structure in which data was stored in the form of graphs, which is a more advanced version of trees, emerged at the end of the 1960s.



0.6.3 Relational databases

- It was developed in the early 1970s.
 - In this system, data is stored in tabular form.
 - Connections between tables are represented by mathematical relationships.
 - Almost all database programs today have this structure.
-

0.6.4 Relational databases



0.6.5 Object Oriented databases

- Objects used in many word processor and spreadsheet programs today are also used in databases.
- Object-oriented database means a database created and used in an object-oriented language such as
 - C++,
 - C#,
 - java,
 - Visual Basic.

0.7 Why use a database?

- The traditional approach to holding, storing and accessing data uses the approach of grouping data into separate files.
- With the increase in data and the need to access and edit data at the same time, the traditional approach has been inadequate.

0.8 Advantages of the Database Approach

- Preventing duplication of common data;
- Ensuring centralized control and consistency of data

- Ensuring data sharing
 - Hiding physical structure and access method complexities from the user with multi-layered architectures,
 - Presenting only the data that is of interest to each user in easy, understandable structures
-

0.9 Advantages of the Database Approach

- Ease of application software development with the analysis, design and development tools provided.
 - Providing the necessary facilities for data integrity,
 - Ensuring the desired level of security and confidentiality
 - Solving operational problems such as backup, reboot, repair
-

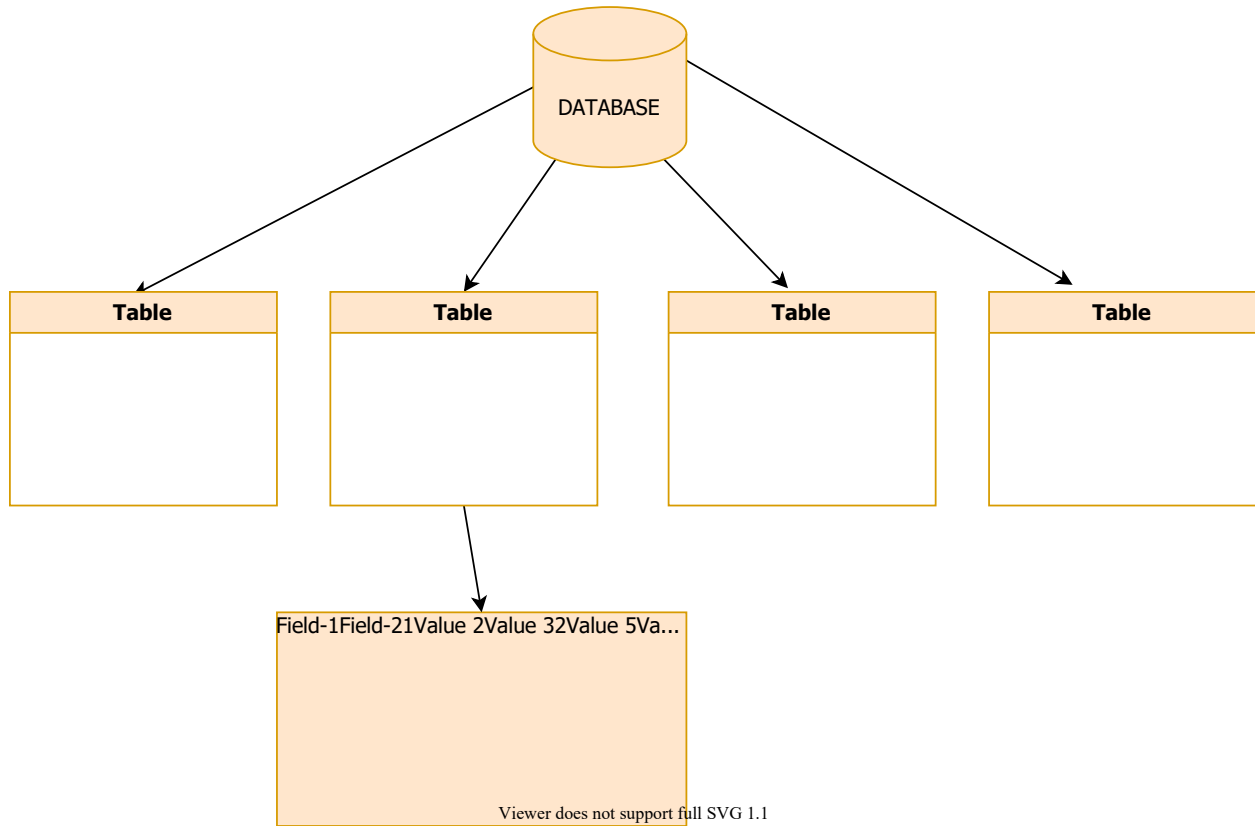
0.10 Database Management Systems

- Oracle database
 - IBM DB/2
 - Adaptive Server Enterprise
 - Informix
 - Microsoft Access
 - Microsoft SQL Server
 - Microsoft Visual FoxPro
 - MySQL
-

0.11 Database Management Systems

- PostgreSQL
 - Progress
 - SQLite
 - Teradata
 - CSQL
 - OpenLink Virtuoso
-

0.12 Database Structure



0.13 Table

- A database consists of data stored in tables.
- Tables are a group of data that is formed by arranging data in rows and columns.
- For example, 2 tables are created to store the course content and student information in the database:
 - Student information
 - contents

0.14 Table

- Each piece of information in the table is called a **record** , and the columns are called a **field** .
- For example, in the student information table, following information is included.
 - Student number,
 - Name and surname,
 - date of birth,
 - Place of birth,
 - E mail address

0.15 Table

Ogr_no	Ad_soyad	d_tarih	d_yeri	e-mail
1	Ayşe Öztürk	01.11.1979	Konya	ayse@gazi.edu.tr

Ogr_no	Ad_soyad	d_tarih	d_yeri	e-mail
2	Sema Özdemir	24.05.1975	Ankara	sema@gazi.edu.tr
3	Serdar Gülpınar	06.06.1983	Adana	serdar@gazi.edu.tr
4	Mehmet Efe	11.02.1978	Niğde	mehmet@gazi.edu.tr
5	Zerrin Polat	22.08.1980	Antalya	zerrin@gazi.edu.tr
6	Ulviye Kubah	12.12.1984	İstanbul	ulviye@gazi.edu.tr

0.16 Table

Fields

Ogr_no	Ad_soyad	d_tarih	d_yeri	e-mail
--------	----------	---------	--------	--------

Record

1	Ayşe Öztürk	01.11.1979	Konya	ayse@gazi.edu.tr
2	Sema Özdemir	24.05.1975	Ankara	sema@gazi.edu.tr

0.17 Data Types

- In order to have information about the structure of the records kept in the database, some properties of the fields must be defined beforehand.
- *For example*, the personnel registration number must be made up of integers, names and surnames must be words.

0.17.1 MYSQL Data Types

- Numeric
- Date and Time
- Textual (String)
- Spatial

0.17.2 MYSQL Data Types

0.17.2.1 TINYINT :

- For very small integer values
- When Signed is defined, the values are between -128 and 127.
- Unsigned defined range is between 0 and 255.

0.17.3 MySQL Data Types

0.17.3.1 SMALLINT :

- For small integer values
 - When Signed is defined, the values are between -32768 and 32767.
 - Unsigned defined range is 0 to 65535.
-

0.17.4 MySQL Data Types

0.17.4.1 MEDIUMINT :

- For medium-sized integer values.
 - When Signed is defined, the values are between -8388608 and 8388607.
 - Unsigned defined range is between 0 and 16777215.
-

0.17.5 MySQL Data Types

0.17.5.1 INT(n):Integer

- For normal-sized integer values.
 - When Signed is defined, the values are between -2147483648 and 2147483647.
 - Unsigned defined range is between 0 and 4294967295.
-

0.17.6 MySQL Data Types

0.17.6.1 BIGINT :

- For large integer values.
 - Can take integer value -9223372036854775808 to 9223372036854775807
-

0.17.7 MySQL Data Types

0.17.7.1 FLOAT :

- Keeps numbers with their fractions.
 - Max. character width is taken as a parameter. (up to 23 digits)
-

0.17.8 MySQL Data Types

0.17.8.1 DOUBLE:

- Keeps numbers with their fractions.
 - Max. character width is taken as a parameter. (24 to 53 digits)
-

0.17.9 MySQL Data Types

0.17.9.1 DECIMAL:

- Keeps numbers with their fractions.
 - The integer part can have a maximum 64 digits, and the fractional part a maximum 30 digits.
-

0.17.10 MySQL Data Types

0.17.10.1 DATETIME:

- Datetime information in Year+Month+Day+Hour+Minute+Second format

YYYY-MM-DD HH:MM:SS

0.17.11 MySQL Data Types

0.17.11.1 TIMESTAMP:

- Time information from January 1, 1970 to January 18, 2038, in the format Year+Month+Day+Hour+Minute+Second.

YYYYMMDDHHMMSS

0.17.12 MySQL Data Types

0.17.12.1 DATE:

- Date field that can change from 1000-01-01 to 9999-12-31.

YYYY-MM-DD

0.17.13 MySQL Data Types

0.17.13.1 CHAR(n):

- Fixed-length data with n characters.
-

0.17.14 MySQL Data Types

0.17.14.1 TEXT:

- A text field that can hold up to 65535 characters.
-

0.17.15 MySQL Data Types

0.17.15.1 MEDIUMTEXT:

- Text field up to 16777215 characters
-

0.17.16 MySQL Data Types

0.17.16.1 VARCHAR(n):

- Characters of varying size, not exceeding n
-

0.17.17 MySQL Data Types

0.17.17.1 BOOL:

- A data type that takes the value 0 or 1. or True/ False
-

0.18 Key

- A key forces one or more fields to be entered as qualifiers for a row.
 - There are 2 types of keys:
 - Primary Key
 - Foreign Key
-

0.19 Primary key

- It is the key data that will enable access to a record.
 - For example, there are two Ahmet among the students. Each student must have a unique number in order to find the Ahmet we want while searching.
 - For example student number could be a primary key
 - Multiple fields can have primary keys together
-

0.20 Foreign key

- A foreign key is a set of attributes in a table that refers to the primary key of another table. The foreign key links these two tables.
-

0.21 Foreign key

Persons Table

PersonID	LastName	FirstName	Age
1	Hansen	Ola	30
2	Svendson	Tove	23
3	Pettersen	Kari	20

0.22 Foreign key

Orders Table

OrderID	OrderNumber	PersonID
1	77895	3

OrderID	OrderNumber	PersonID
2	44678	3
3	22456	2
4	24562	1

0.23 Foreign key

- Notice that the “PersonID” column in the “Orders” table points to the “PersonID” column in the “Persons” table.
 - The “PersonID” column in the “Persons” table is the **PRIMARY KEY** in the “Persons” table.
 - The “PersonID” column in the “Orders” table is a **FOREIGN KEY** in the “Orders” table.
 - The **FOREIGN KEY** constraint prevents invalid data from being inserted into the foreign key column, because it has to be one of the values contained in the parent table.
-

0.24 Database Design

- Objects are defined
 - **Library system:** books, members, types, loan movements
-

0.25 Designing a database

- A table is created for each object:
 - book,
 - members,
 - types,
 - woodc_movements
-

0.26 Designing a database

- A key field is selected for each table
 - **book table:** *book no*
 - **Members table:** *Userno*
-

0.27 Designing a database

- A column is added to the table for each property of the objects
 - **Book table:** book number, year, author, name, related field
-

0.28 Designing a database

- Additional tables are created for recurring object properties.
 - **request table:**

userno	request_date	Book_name	Book_date	Book_author	Related_field
.
.

0.29 Designing a database

- Fields that are not directly related to the table are determined.
 - The address of the member who borrowed the book in the loan transactions table is not directly related to this table.
 - This data should be included in the **members table** where member information is kept.

0.30 Designing a database

- Relationships between tables should be defined.
 - The relationship between the **fields** in a **table** is defined.
 - For example, the **userno** field in the **members table** should be associated with the **userno** field in the **request table**.

0.31 Resources

- Köseoğlu, K. (2005). Veri Tabanı Mantığı. Şefik Matbaası. İstanbul
- Alokoç Burma, Z. (2005). Veritabanı Yönetim Sistemleri ve SQL / PL - SQL / T - SQL. Seçkin Yayıncılık. Ankara

End – Of – Week – 1 – Module