# Database Systems 1
# Lab – Introduction to Access


Department of Information Technology
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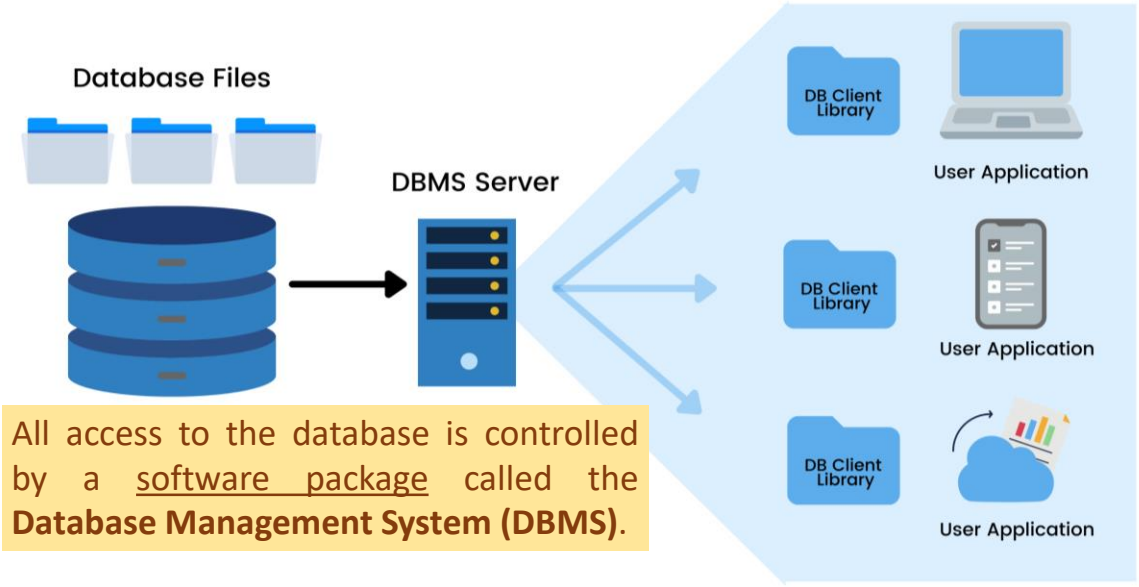
# Database Management System (DBMS)




All access to the database is controlled by a software package called the **Database Management System (DBMS)**.

# Relational vs. Non-Relational Database

| Relational | Non-Relational |
|---|---|

**student**

| id | name | surname | age |
|---|---|---|---|
| 1 | John | Brown | 19 |
| 2 | Emma | Carly | 23 |

**student.json file body:**

```
[
  {
    "id": 1,
    "name": "John",
    "surname": "Brown",
    "age": 19
  },
  {
    "id": 2,
    "name": "Emma",
    "surname": "Carly",
    "age": 23
  }
]
```

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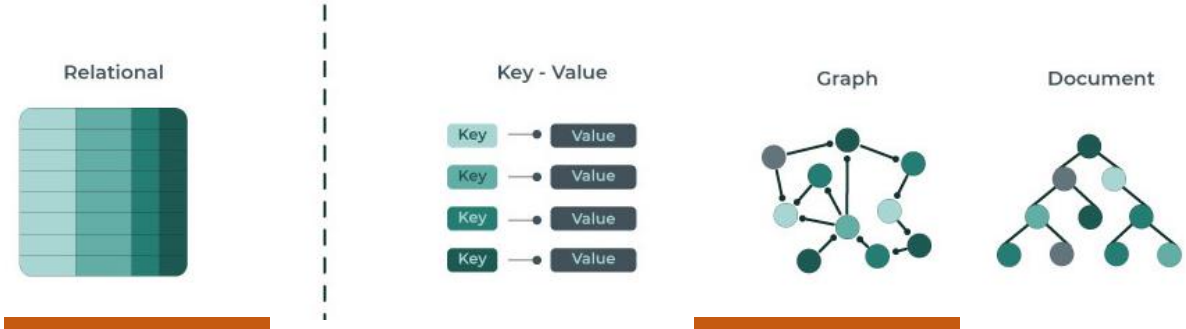
# Relational vs. Non-Relational Database




**SQL Database Systems**

**No-SQL Database Systems**

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# SQL Language

- **SQL** (**<u>Structured Query Language</u>**) is used for
  - managing and manipulating relational databases.
- **SQL** is designed to <u>interact with databases</u>
  - by defining, querying, updating, and managing the data within them.

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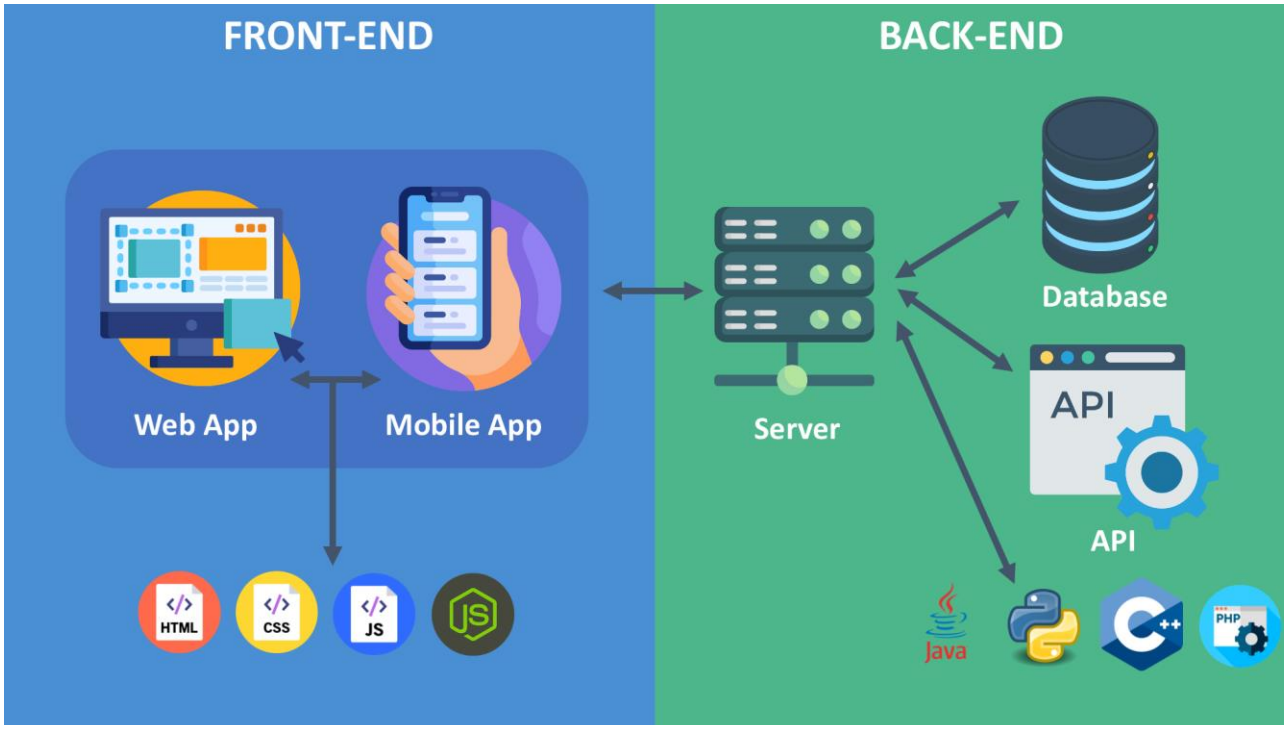



# RDBMS Software

Microsoft SQL Server

MySQL

ORACLE DATABASE

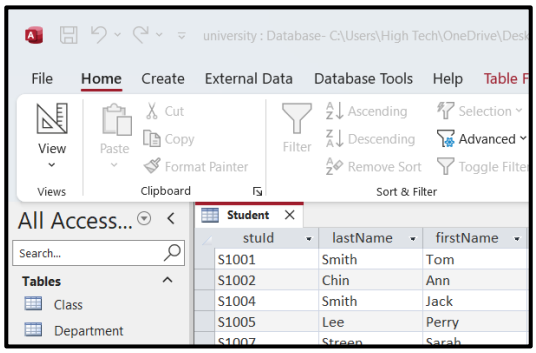
MariaDB

PostgreSQL

IBM DB2

# Microsoft Access

- **Microsoft Access** is a database management system from Microsoft that combines
  - the **relational Access Database Engine** with
  - a **graphical user interface** and
  - **software-development tools**.

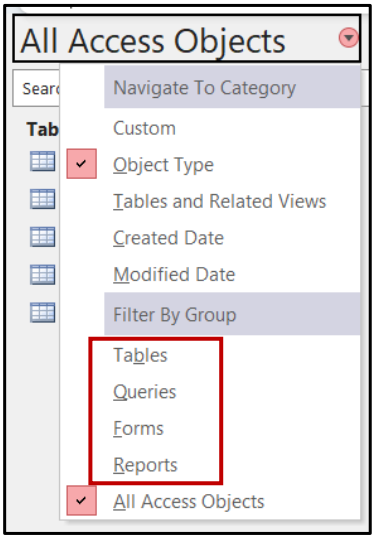



# Microsoft Access File Extensions

- Access 2007 and newer version databases end with **.accdb** file extension – for example, **sales.accdb**
- Databases made in older versions of Access have the file extension **.mdb**

# Microsoft Access Database Objects

- Four Main Access Database Objects:
  - **Tables**
  - **Forms**
  - **Queries**
  - **Reports**




# Tables

- Tables are core database objects.
- Two most common table views are:
  - **Datasheet view** → To display and modify the table's data
  - **Design view** → To display and modify the table's structure.

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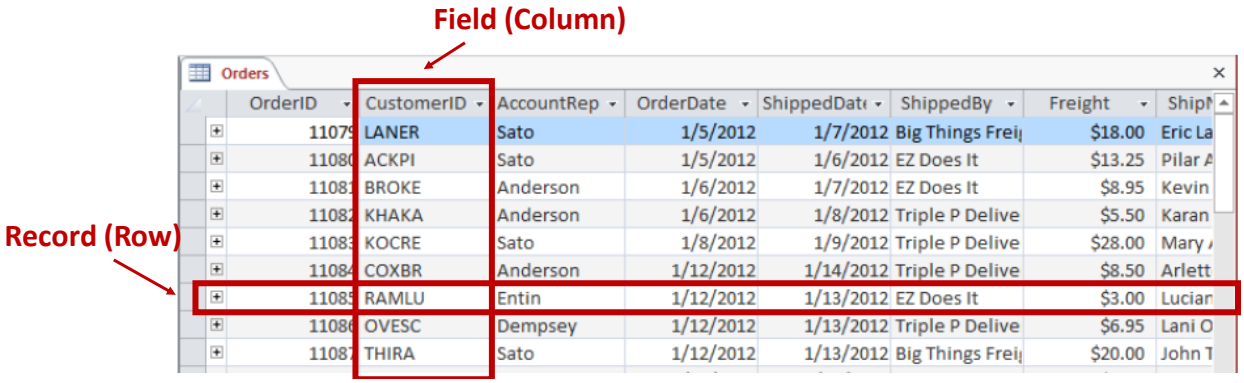
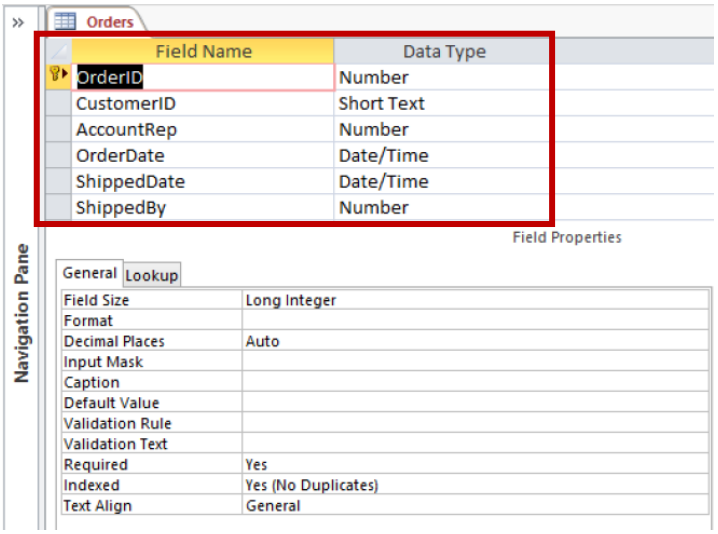
# Datasheet View

- **Datasheet view** displays the table's data in **fields (columns)** and **records (rows)**. The first row contains column headings (field names).




# Design View

- **Design view** displays the underlying table structure.



# Data Types in MS Access

| Data Type | Usage | Size |
|---|---|---|
| **Short Text** | Alphanumeric data (names, titles, etc.) | Up to 255 characters |
| **Long Text** | Large amounts of alphanumeric data: sentences and paragraphs. | Up to about 1 gigabyte (GB) |
| **Number** | Numeric data | 1, 2 or 4 bytes |
| **Large Number** | Numeric data | 8 bytes |

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# Data Types in MS Access

| Data Type | Usage | Size |
|---|---|---|
| **Date/Time** | Dates and Times | 8 bytes |
| **Currency** | Monetary data, stored with 4 decimal places of precision. | 8 bytes |
| **AutoNumber** | Unique value generated by Access for each new record | 4 bytes (16 bytes for ReplicationID) |
| **Yes/No** | Boolean (true/false) data; Access stores the numeric value zero (0) for false, and -1 for true. | 1 byte |

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# Data Types in MS Access

| Data Type | Usage | Size |
|---|---|---|
| **Hyperlink** | A link address to a document or file on the Internet, on an intranet, on a local area network (LAN), or on your local computer | Hyperlink data type can contain up to 2048 characters |
| **Attachment** | You can attach files such as pictures, documents, spreadsheets, or charts. | Up to about 2 GB |
| **Calculated** | You can create an expression that uses data from one or more fields. | Dependent on the data type of the Result Type property |

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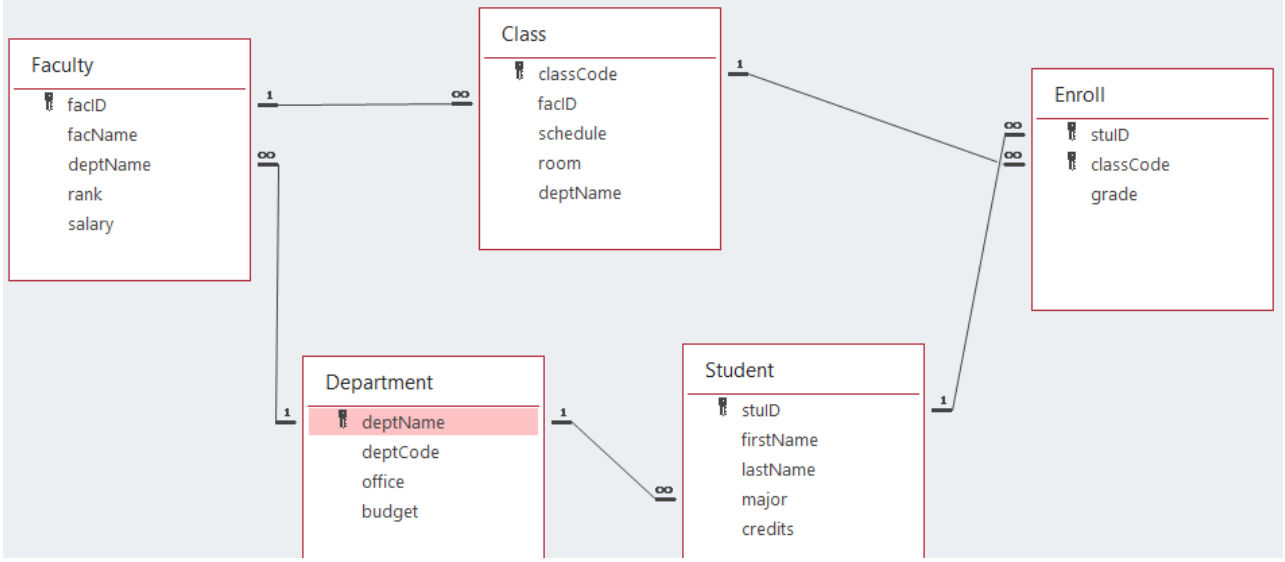
# Let's Create Our First Database in Access



# Department Table

**Design View**

| Field Name | Data Type |
|---|---|
| deptName | Short Text |
| deptCode | Short Text |
| office | Short Text |
| budget | Currency |

**Datasheet View**

| deptName | deptCode | office | budget |
|---|---|---|---|
| Biology | BI03 | B210 | $7,000.00 |
| English | EN05 | E231 | $3,000.00 |
| History | HI01 | H111 | $2,000.00 |
| IT | IT04 | IT205 | $5,000.00 |
| Mathematics | MA02 | M101 | $3,500.00 |
| Sport | SP06 | S101 | $6,000.00 |

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# Student Table

**Design View**

| Field Name | Data Type |
|---|---|
| stuID | Short Text |
| firstName | Short Text |
| lastName | Short Text |
| major | Short Text |
| credits | Number |

**Datasheet View**

| stuID | firstName | lastName | major | credits |
|---|---|---|---|---|
| S1001 | Tom | Smith | History | 90 |
| S1002 | Ann | Chin | Mathematics | 36 |
| S1004 | Smith | Jack | English | 75 |
| S1005 | Lee | Perry | History | 3 |
| S1007 | Streep | Sarah | English | 81 |
| S1010 | Burns | Edward | Biology | 63 |
| S1011 | Roberts | Mike | English | 66 |
| S1012 | Damon | Tom | IT | 90 |
| S1013 | McCarthy | Owen | Mathematics | 27 |
| S1015 | Jones | Mary | Sport | 42 |
| S1017 | Ford | Jennifer | History | 45 |
| S1018 | Nolan | Ryan | English | 50 |
| S1020 | Rivera | Jane | IT | 15 |

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# Faculty Table

**Design View**

| Field Name | Data Type |
|---|---|
| facID | Short Text |
| facName | Short Text |
| deptName | Short Text |
| rank | Short Text |
| salary | Currency |

**Datasheet View**

| facID | facName | deptName | rank | salary |
|---|---|---|---|---|
| BI01 | Adams | Biology | Lecturer | $3,000.00 |
| CS01 | Byrne | IT | Assistant Prof | $2,000.00 |
| CS02 | Smith | IT | Assistant Lec | $1,400.00 |
| CS03 | John | IT | Lecturer | $1,800.00 |
| EN01 | Smith | English | Professor | $5,000.00 |
| EN02 | Leonardo | English | Assistant Lec | $1,500.00 |
| EN03 | Kate | English | Lecturer | $1,700.00 |
| HI01 | Kim | History | Assistant Prof | $2,500.00 |
| MA01 | Julia | Mathematics | Assistant Lec | $1,100.00 |
| SP01 | Maria | Sport | Professor | $4,000.00 |
| SP02 | Sarah | Sport | Lecturer | $2,000.00 |

# Class Table

**Design View**

| Field Name | Data Type |
|---|---|
| classCode | Short Text |
| facID | Short Text |
| schedule | Short Text |
| room | Number |
| deptName | Short Text |

**Datasheet View**

| classCode | facID | schedule | room | deptName |
|---|---|---|---|---|
| B226 | BI01 | Monday | 4211 | Biology |
| C126 | CS03 | Monday | 9311 | IT |
| C321 | CS03 | Sunday | 9308 | IT |
| C413 | CS02 | Tuesday | 9308 | IT |
| C416 | CS03 | Thursday | 9311 | IT |
| E227 | EN01 | Thursday | 1206 | English |
| E314 | EN03 | Monday | 1204 | English |
| E414 | EN03 | Sunday | 1210 | English |
| H115 | HI01 | Sunday | 2108 | History |
| M235 | MA01 | Thursday | 5204 | Mathematics |
| M425 | MA01 | Monday | 5210 | Mathematics |
| S226 | SP02 | Tuesday | 1304 | Sport |

# Enroll Table

**Design View**

| | Field Name | Data Type |
|---|---|---|
| 🔑 | stuID | Short Text |
| 🔑 | classCode | Short Text |
| | grade | Number |

**Datasheet View**

| stuID | classCode | grade |
|---|---|---|
| S1002 | M235 | 76 |
| S1004 | E227 | 50 |
| S1005 | H115 | 93 |
| S1007 | E227 | 82 |
| S1007 | E414 | 71 |
| S1010 | B226 | 75 |
| S1011 | E227 | 33 |
| S1011 | E314 | 58 |
| S1012 | C413 | 60 |
| S1012 | C416 | 50 |
| S1013 | M235 | 90 |
| S1015 | S226 | 89 |
| S1017 | H115 | 79 |
| S1020 | C321 | 40 |
| S1020 | C413 | 45 |
| S1020 | C416 | 48 |

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# Relationships Between Tables