Teach Computer Science

Introduction to databases

KNOWING WHAT YOU KNOW

Answer the following questions.

KNOWING WHAT YOU KNOW

TRUE or FALSE

File systems have better storage techniques that databases

KNOWING WHAT YOU KNOW

TRUE or FALSE

File systems have better storage techniques that databases

FALSE

KNOWING WHAT YOU KNOW

TRUE or FALSE

A secondary key is used in the database to prevent duplication of records.

KNOWING WHAT YOU KNOW

TRUE or FALSE

A <u>secondary</u> key is used in the database to prevent duplication of records.

FALSE

What is it and why?

KNOWING WHAT YOU KNOW

TRUE or FALSE

Data integrity is assured in a database by using validation techniques.

KNOWING WHAT YOU KNOW

TRUE or FALSE

Data integrity is assured in a database by using validation techniques.

TRUE

KNOWING WHAT YOU KNOW

TRUE or FALSE

A record consists of various tables. Each record consists of several fields.

KNOWING WHAT YOU KNOW

TRUE or FALSE

A record consists of various tables. Each record consists of several fields.

FALSE

What is it and why?

Lesson Objectives

Students will learn about:

- Database and its structure
- Creating a simple database using Microsoft Access
- Providing validation checks in database
- Running queries to filter data

1.

Content

What is a database?

- A database is an organised collection of data, which allows users to obtain and process information according to their requirements.

Advantages of using database

- Databases are better storage techniques compared to file systems.

- The data is only stored once and, hence, data duplication is avoided.

- The data is consistent as the changes need to be made only once. These changes are then reflected for all the users using the database.
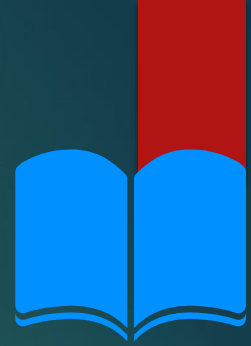
Software for databases

Creating and managing databases

Microsoft Access, My SQL, Oracle, IBM Db2 and PostgreSQL

Programming languages

Python, JavaScript, Microsoft Visual Basic and Delphi are used to customise and interact with databases

Query languages

SQL is used to customise and retrieve information from the database

Structure of a database

- Data in a database is stored in the form of tables.
- A flat-file database is a database with only one table. For example: contact details, product details, etc.
- A table consists of various records.
- Each record consists of several fields.

Structure of a table

	Field 1	Field 2	Field 3
Record 1	Data (1, 1)	Data (1, 2)	Data (1, 3)
Record 2	Data (2, 1)	Data (2, 2)	Data (2, 3)

Structure of a database: Example

- An employee database consists of information related to employees working in the organisation.
- Each record is related to an employee.
- Various fields are used to store employee's information such as name, gender, date of birth, etc.

Structure of a table: Example

| Employee number	Name	Gender	Date of birth	Department	Date of joining	Salary
Record 1						
Record 2						

Primary key

- To prevent data duplication, each record uses a primary key field, which is unique. It can be automatically generated.

- A primary key may be just numbers or a combination of letters and numbers.

- In the employee table, an employee number is unique for each employee and serves as the primary key.
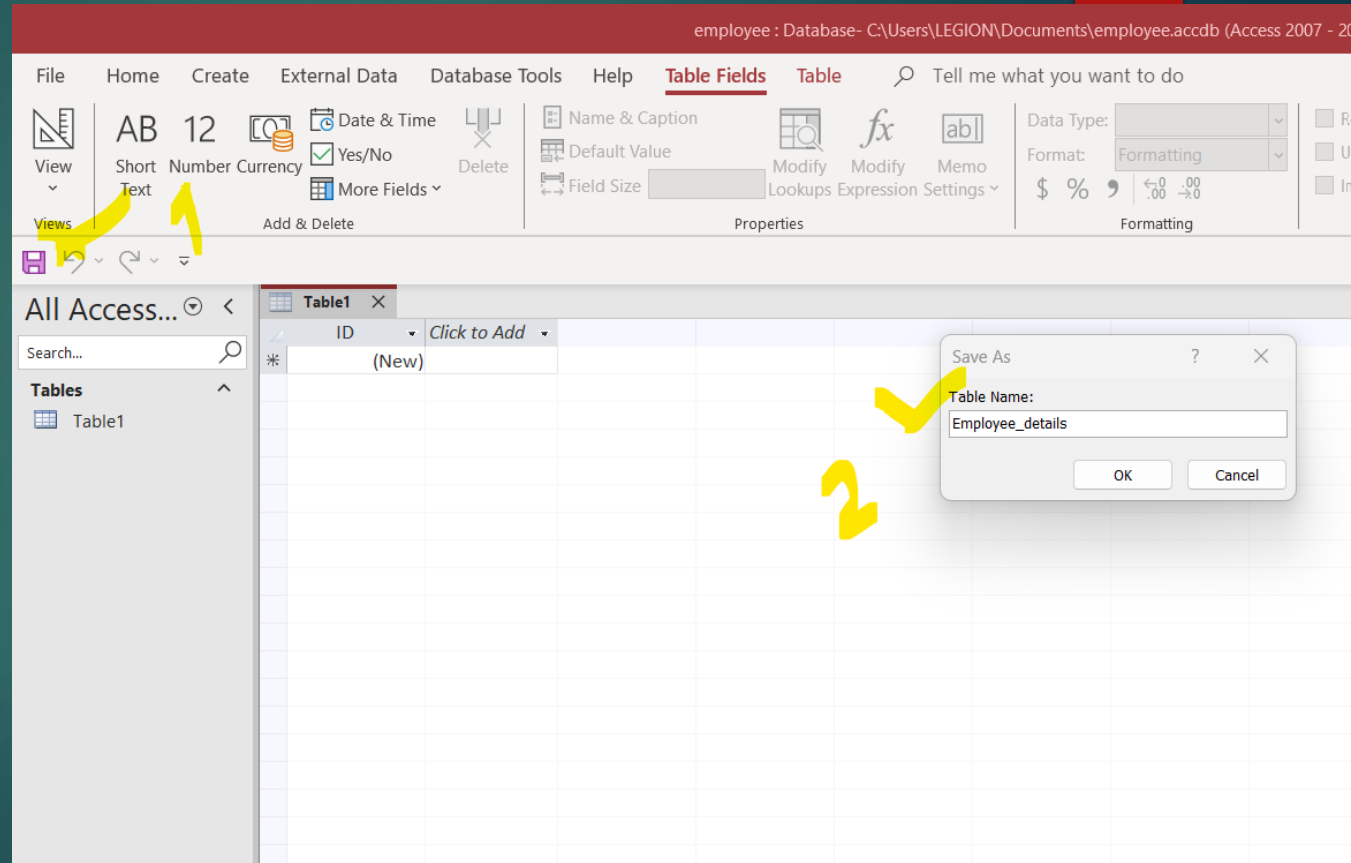
Creating a database using Microsoft Access

- Microsoft Access is used widely to create databases. Let us create a database to store the information of employees.

i. Open Microsoft Access and create a blank database and name the file "Employee".
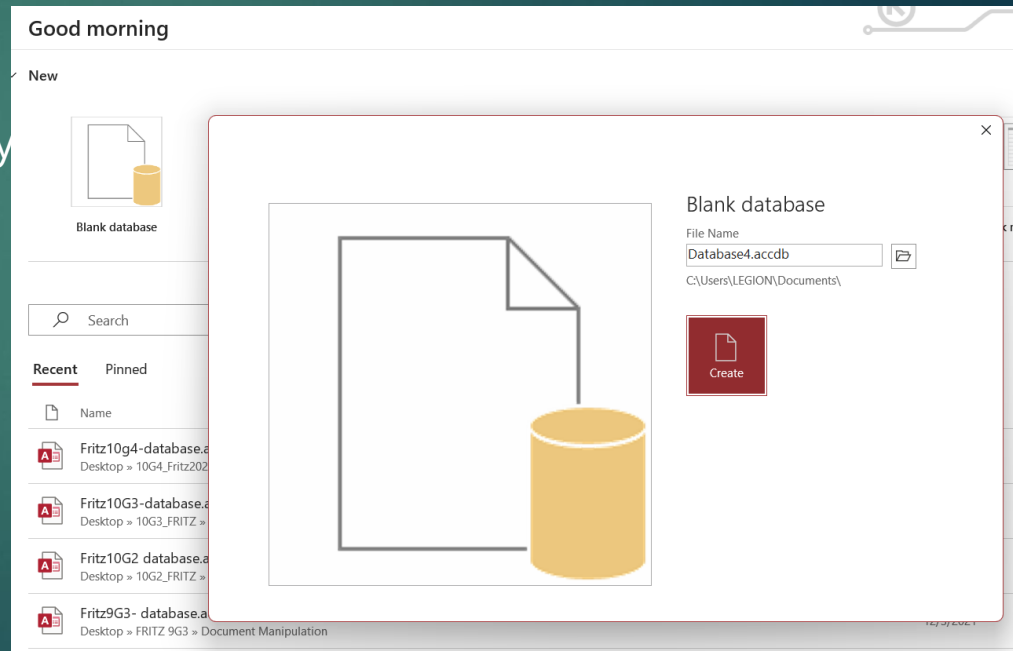
ii. Select the table design view to design the table. Enter the table name as "Employee_details".

Creating a database using Microsoft Access

iii. Select the primary key field. Name it as "Employee ID" and its data type is assigned as "AutoNumber". Common data types used are:

Data type	Used to represent	Data type in Access
Integers	Whole numbers	Number
Floating point numbers	Real numbers	
Characters	Letters	Text
Character strings	Words and combinations of characters	
Boolean	'True' or 'False'	Yes/No

Creating a database using Microsoft Access

iv. Now, enter the other field names as shown in the figure.

Validation checks in database

- Data integrity is assured in a database by using validation techniques.

- Now, let us improve this database by including validation checks for the field "Gender".

- The gender field can only consist of values "M" or "F". Hence, three validation checks can be used:

  i.   Length check: length of the text is 1.

  ii.   Format check: only "M" or "F"

  iii. Presence check: this field cannot be left blank

Validation checks for the field "Gender"
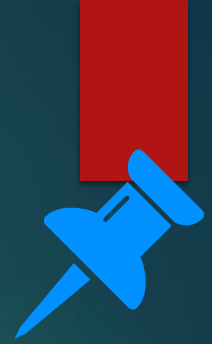
Running Queries

- Queries are created using "Query Design" in the create tab.

- A query to obtain employee names and the department of the employees whose salary is more than £2000 is given.

- Once the "Run" button is clicked, the results are displayed to the user.

Field:	Employee Name	Department	Salary
Table:	Employee_details	Employee_details	Employee_details
Sort:			
Show:	☑	☑	☐
Criteria:			>2000
or:			

Let's review some concepts

Database

A database is an organised collection of data, which allows users to obtain and process information according to their requirements.

Structure of a database

Data in a database is stored in the form of tables.

Table

A table consists of various records. Each record consists of several fields.

KNOWING WHAT YOU LEARNED

Go to:

https://joinmyquiz.com

Join code: _____

2.

Activity

Activity-1

Duration: 15 minutes

1. Create a student database to store the details of all the students in your class.

a) What are the fields required? Specify the data type of each field.

b) What validation checks are required for this table?

c) Create a query of your choice.

3.

End of topic questions

End of topic questions

1. What is a database? What are the advantages of using a database?

2. What are the applications of the database?

3. Name a few software used to design a database?

4. Why do we need programming languages for database?

5. What are query languages used for?

End of topic questions

6. How is a database structured?

7. What data types are available in Microsoft Access?

8. Explain how validation checks are done in Microsoft Access?

THANK YOU

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