Teach Computer Science

Introduction to databases

Answer the following questions.

TRUE or FALSE

File systems have better storage techniques that databases

TRUE or FALSE

File systems have better storage techniques that databases



TRUE or FALSE

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

TRUE or FALSE

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



What is it and why?

TRUE or FALSE

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

TRUE or FALSE

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



TRUE or FALSE

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



TRUE or FALSE

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



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



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.





Industrial management

Aviation management



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.

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Structure of a table: Example

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

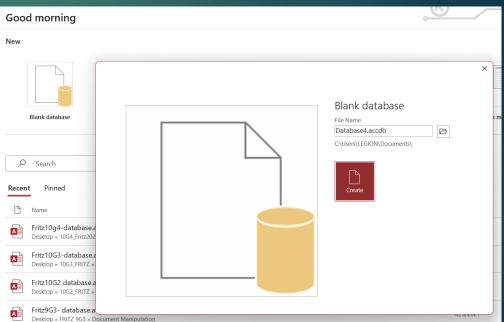
Primary key

- 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".



Creating a database using Microsoft Access

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employee : Database- C:\Users\LEGION\Documents\employee.accdb (Access 2007 -

ii. Select the table design view to design the table.Enter the table name as "Employee_details".

File	Home	Create	Ex	ternal Data	Database To	ools	Help Ta	able Fields	Table	Q	Tell me w	hat you wa	ant to do		
View Views	AB Short M Text	12 [Number Cu	2	☐ Date & Tir /	× Delete	E De	me & Capti fault Value Id Size		Modify Lookups I	fx Modify Expression	<mark>ab]</mark> Memo Settings ∽	Data Type: Format: \$%	Formatting P ↓ ←0 .00 .00 →0 Formatting	~	
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Search		Q	*	(New		•					Save As		?	×	
Tables		^									Table Nan				
Ta	DIEI										Employee		ОК	Cancel	

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	
Floating point numbers	Real numbers	Number
Characters	Letters	
Character strings	Words and combinations of characters	Text
Boolean	'True' or 'False'	Yes/No

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Creating a database using Microsoft Access

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

						employee : D	atabase- C:\Us	ers\LEGION\Docı	uments\employ	ee.accdb (Access 2007	7 - 2016 file for	mat) - Access
File	Home	Create	External Data	Database Too	ols Help T	able Design	, Л Tell r	ne what you w	ant to do			
Views	Primary E Key	kuilder Test		ete Rows	Property Sheet Sheet		Rename/ Delete Macro & Table Events	Relationships Relationships	Object Dependencies			
89	~ C' ~	~										
All A	ccess	⊙ <	Employee_deta									
Search		Q	Fiel	d Name	Data AutoNumber	туре				Description (Op	otional)	
Tables		~			AutoNumber							
	nployee_det											
				<u> </u>								
								Field Pro	perties			
			General Lookup									
			Field Size	Long Integ	er							
			New Values	Increment								
			Format Caption									
			Indexed	Yes (No Du	iplicates)							
			Text Align	General								A field name can be up to 6
											i	ncluding spaces. Press F1 for

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"

Gender	Text	
Date of birth	Date/Time	
Department	Text	
Date of joining	Date/Time	
Salary	Currency	
General Lookup		
General Lookup	1	
Encourance and	1	
Field Size		
Field Size Format		
Field Size Format Input Mask		
Field Size Format Input Mask Caption	1 	
Field Size Format Input Mask Caption Default Value		



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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: Table:	Employee Name Employee_details	Department Employee_details	Salary Employee_details
Sort:	cmproyee_detans	emproyee_detans	emproyee_decums
Show:	V	V	
Criteria:	(2 <u>5 - 5</u> 0)	1 Alexandre	>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: _____







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- 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.

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?



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