LOG ON TO ACCESS

CHAPTER-02

DATABASE AND DBMS

A database is an organised collection of related data so that it can be easily accessed, managed and updated. A **Database Management System (DBMS)** is a software program that enables us to create, modify and extract data from a database. DBMS can be based on different data models such as network, hierarchical and relational.

A DBMS based on the relational data model stores data in the form of tables and is called **Relational Database Management System (RDBMS).** In this chapter, we will learn about Microsoft Access, which is an example of RDBMS. Some other examples of RDBMS Oracle and Microsoft SQL Server.

Advantages of a Database

Some of the advantages of storing data in a database as compared to files are listed here.

- **Reduced Data Redundancy:** The duplication of data is referred to as data redundancy. In contrast to non-database systems, which maintain multiple copies of the same data at different locations, DBMS stores data at a central place. The user is not required to maintain multiple copies of the same data. Thus, DBMS prevents data duplication.
- **Reduced Update on Errors and Increased Consistency:** When the data is stored at multiple locations, there are chances that modifications are not carried out at all the places. Multiple-mismatching copies of the same data are known as data inconsistency. DBMS ensures data consistency by storing data at one place and ensuring that there is no duplication of data.
- **Improved Data Access to Users:** A DBMS stores data at a centralised location and facilitates sharing of data among multiple users according to their requirements. For example, users from all over the country access the database for booking railway tickets.
- **Improved Data Security:** One of the most important advantages of DBMS is data security. In DBMS, user IDs can be created with various levels of security. Users have limited rights and permissions. Only authorised users can access the data. Some may have the privilege of changing the data while others can only view the data.
- **Maintaining Standards:** A DBMS ensures that the stored data follows the organisation's own standards or national/ international standards. This ensures greater data integrity. This also aids in sharing data between different systems.

MICROSOFT ACCESS 2016

Microsoft Access is the. most popular RDBMS that comes as a part of the Microsoft Office suite. Access provides a graphical user interface for managing data. The databases created in Access 2013 are saved with the extension .accdb. Databases in Access 2016 are composed of four main objects—tables, queries, forms and reports. These objects allow us to enter, store, analyse and compile the data.

Let us learn more about these objects.

Objects in Access

The main objects that can be created in Access are as follows.

- **Tables:** They are used to store data in the form of rows (records) and columns (fields). A table is also referred to as a relation. We will learn more about tables in this chapter.
- **Queries:** Query let us find and work on the data resulting from one or multiple tables based on specified conditions.
- **Forms:** Forms provide a user interface that lets the users enter and change in the tables.
- **Reports:** If forms are for input, then reports are for output. Reports are used to display the data stored in database tables in a professional format for printing purposes. Figure 2.1 illustrates the relationship between the objects in Access.

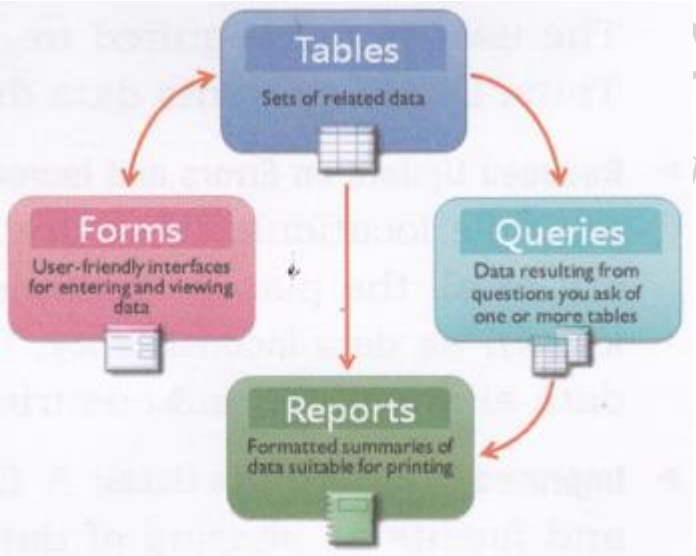


Fig. 2.1 *Objects in Access*

Starting Access

To start Access, type Access 2013 in the Search box and click on Access 2013 option. The Microsoft Access start up window opens as shown in Figure 2.3.

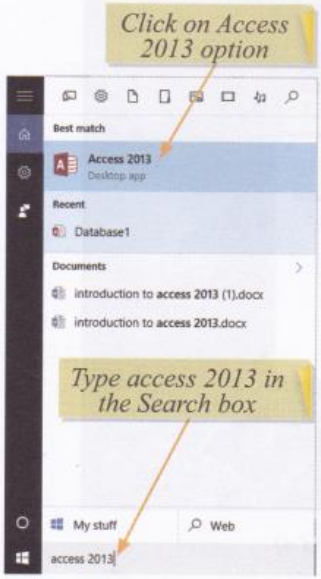


Fig. 2.2 *Starting Microsoft Access 2013*

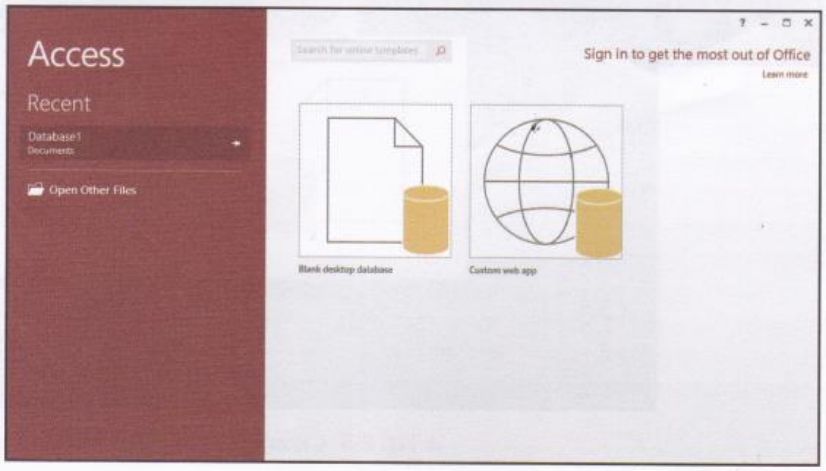


Fig. 2.3 *Access start up window*

CREATING A DATABASE

Follow the given steps to create a blank database in Access.

Step 1: Click on the **Blank desktop databas**e option.

Step 2: Type a name for the database in the **File Nam**e textbox.

Step 3: Click on the **Browse** button next to the File Name textbox and choose a location for the database.

Step 4: Click on the **Create** button. A blank database gets created. Access creates the database with an empty table named **Table1.** We will learn about working with tables after familiarising ourselves with the various components of the Access window shown in Figure 2.6.

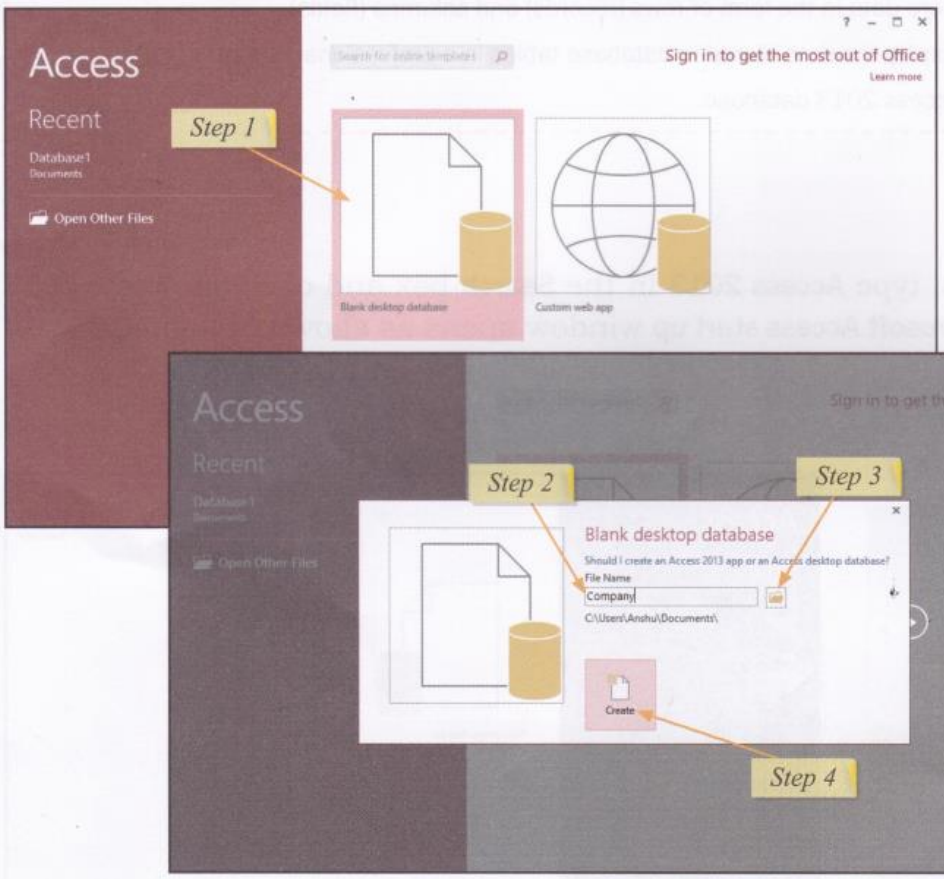


Fig. 2.4 *Creating a database (Step 1)*

Fig. 2.5 *Creating a database (Steps 2, 3 and 4)*

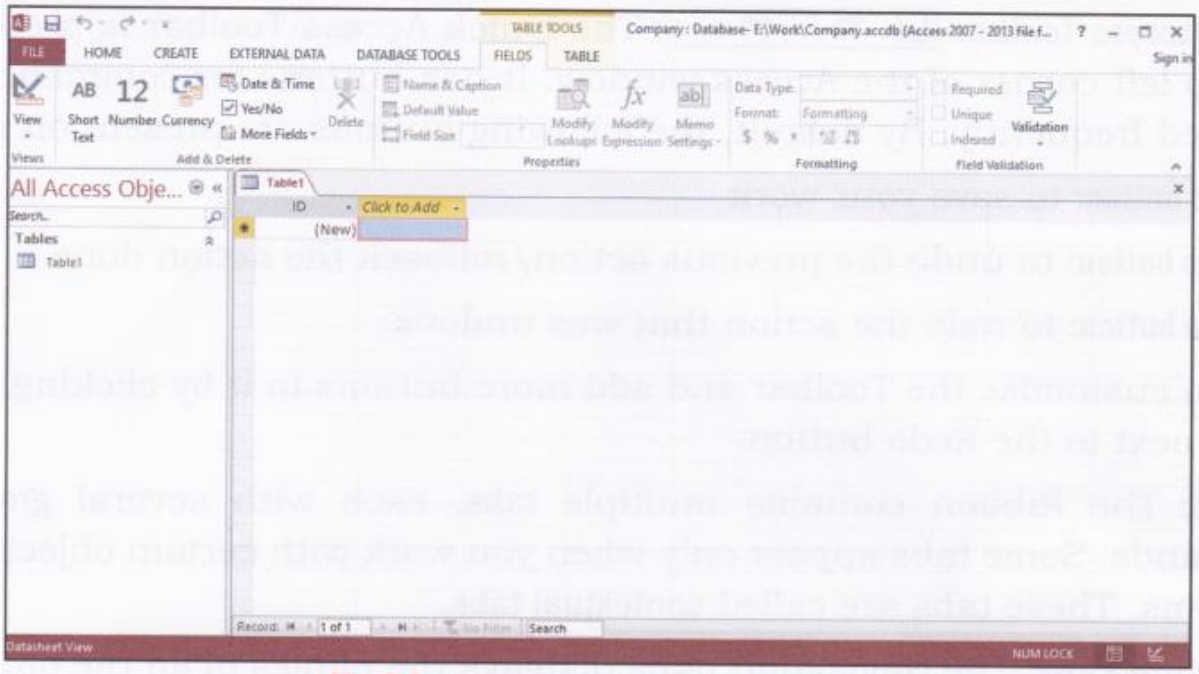


Fig. 2.6 *A new database with a blank table*

COMPONENTS OF THE ACCESS WINDOW

Let us get familiar with the various components of the Access window (Fig. 2.7).

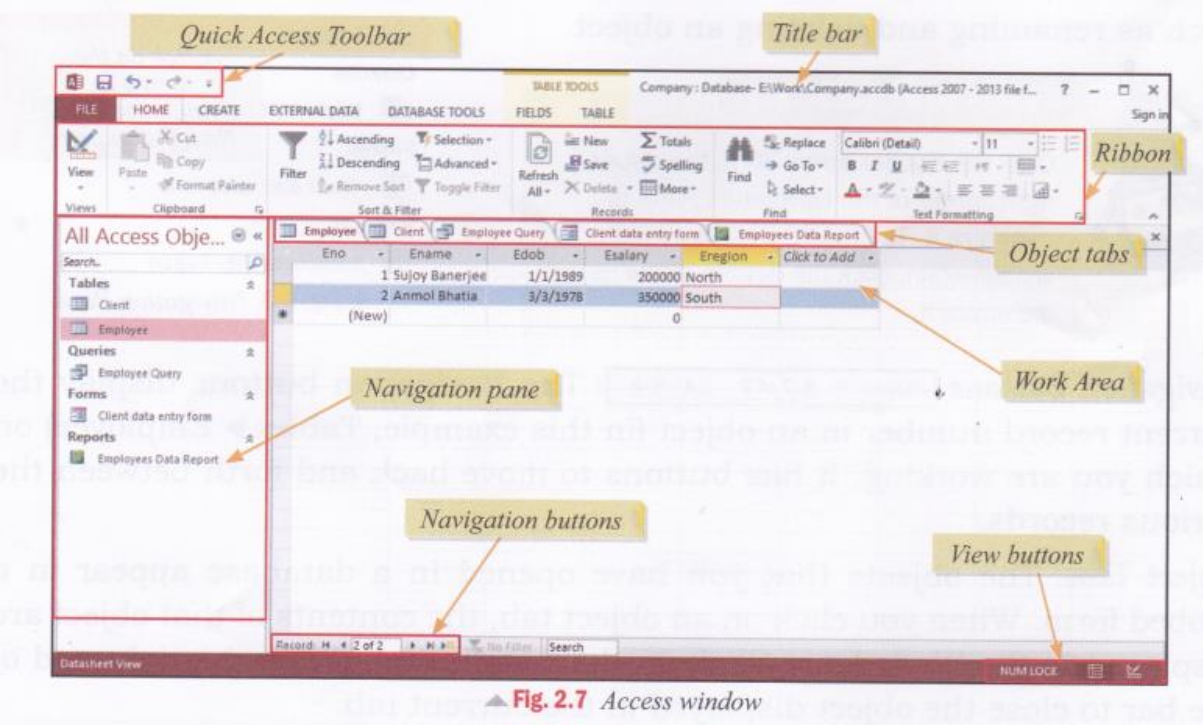
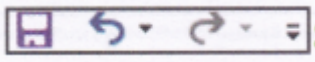


Fig. 2.7 *Access window*

- **Title Bar:** The Title Bar appears on the top of the window and displays the name of the document on which you are currently working.
- **Quick Access Toolbar**  : The Quick Access Toolbar is present on the top left corner of the Access window. It has buttons for commands that are used frequently. By default, the following buttons are present on it.
    1. Save button: to save your work
    2. Undo button: to undo the previous action/rollback the action done
    3. Redo button: to redo the action that was undone.

    We can customise the Toolbar and add more buttons to it by clicking on the arrow next to the Redo button.

- **Ribbon:** The Ribbon contains multiple tabs, each with several groups of commands. Some tabs appear only when you work with certain objects such as Forms. These tabs are called contextual tabs.
- **Navigation pane:** The Navigation pane displays the names of all the objects in the database. The objects are grouped on the basis of their type, for example, Tables, Queries and so on. We can double-click on an object name in the Navigation Pane

to open it. We can right-click on an object in the Navigation pane to perform various operations such as renaming and deleting an object.

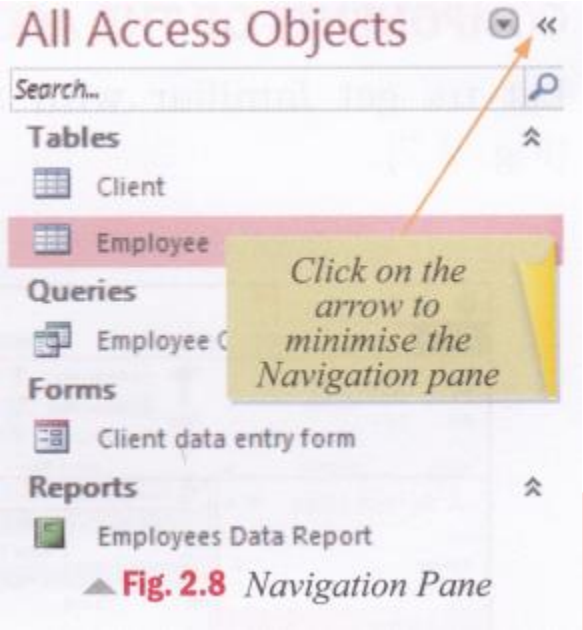
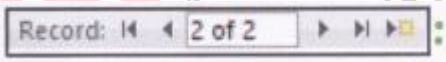


Fig. 2.8 *Navigation Pane*

- **Navigation Buttons** 

The Navigation buttons display the current record number in an object (in this example, Tables ▶ Employee) on which you are working. It has buttons to move back and forth between the various records.
- **Object Tabs:** The objects that you have opened in a database appear in a tabbed form. When you click on an object tab, the contents of that object are displayed in the Work Area. Click on the cross button (X) on the right end of the bar to close the object displayed in the current tab.

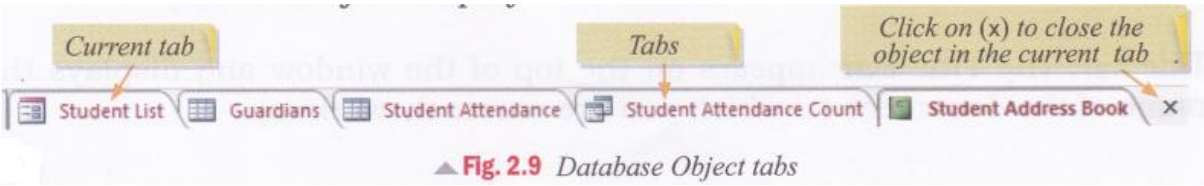


Fig. 2.9 *Database Object tabs*

- **Status Bar:** The Status bar appears at the bottom of the window. The view buttons  are present on the right side of the Status bar. Usually two common buttons that are present are Datasheet view and Design view.

TABLES IN ACCESS

The tables are the building blocks of a database and are used for storing data. A table is made up

of rows and columns. A database can have one or more tables.

Consider the following table that stores data about the employees in an organisation.

Eno	Ename	Esalary	Eaddress
1	Harish	10000	12-Park Street, New Delhi
2	Ramesh	25000	Flat No. 5, Vikas Apartment, Rohini, New Delhi
3	Kiran	7500	23/78, Hari Ganj, New Delhi
4	Harshita	12000	C-1/2 Rising Sun Apartments, Paschim Vihar, New Delhi

Record

Primary key

Field or Attribute

Components of a Table

The important components of a table are:

1. Field or Attribute: The columns in a table are known as fields or A field is a named unit of information. A field stores one type of information about all the objects or items. Every field has a data type that determines the type of values that can be stored under it. For example, the above table has four fields or attributes. The field Ename stores text values and the field Esalary stores numeric values. Let us learn more about field data types.

Field Data types

The various data types available in Access are given in Table 2.2.

Table 2.2 Data types in Access

Data Type	Description
Short Text	The fields with Short Text data type can store text or a combination of text and numbers such as names, addresses and postal codes. The fields with this data type can have a maximum of 255 characters.
Long Text	The fields with Long Text data type can store lengthy texts, that is, up to 65,536 characters. It can be used for storing detailed information such as synopsis of a book or a patient's medical history.
Number	The fields with this data type can store numbers.
Date/Time	The fields with this data type can store date and time values.
Currency	The fields with this data type can store currency values and then display them in different formats.
Autonumber	The fields with this data type store integers that are incremented automatically when a new row or record is added to a table.
Yes/No	The fields with this data type can store only one of the two possible values such as Yes/No, True/False or ON/OFF.
OLE Object	The fields with this data type can store files such as Word document, excel file and so on.
Hyperlink	The fields with this data type can store links to websites or email addresses.
Attachment	The fields with this data type can store files. For fields with this data type, multiple files can be attached per record.
Calculated	The fields with this data type store results of a calculation.
Lookup Wizard	This wizard creates a lookup field that displays a set of values.

After setting the data type for a field, we can set its properties. Let us learn more about field properties.

Field Properties

After we have decided on the data type of the table, we can set field properties. The Field properties let us have more control on data that can be entered in a particular field. Some of the field properties are listed in Table 2.3.

Table 2.3 Field properties in Access

Field Size	This property can be set for fields with **Short Text** or **Number** data types. • **For Text data types**, you can use this property to set the maximum number of characters for a text field. For example, if the value of this property is 20, then the user cannot enter more than 20 characters in the field. The default value for Field Size property is 50 for the Text data type. • **For Number data types**, the user can choose from one of the following options—Byte, Integer, Long Integer, Single, Double and Decimal. These options determine the range of values and size of the field.
Format	This property controls the manner in which data gets displayed. For example, for Date and Time data types, you can choose the different styles of displaying date and time such as Long Date (Thursday, June 13, 2013) or Short Date (6/13/2013).
Decimal Places	This property is valid for Number and Currency data types. It is used to specify the number of digits to be displayed to the right of the decimal point. Its value may vary from 1 to 15.
Caption	This property is used to give an alternate, more descriptive name to a field.
Default Value	This property is used to specify a value that gets displayed automatically when the records are created.
Validation Rule	This property is used to put conditions on the data that can be entered in a field. You cannot enter a value if it is not according to the validation rule. Examples of Validation rules are:

Validation Rule	Description
>=0	Value in the field must be greater than or equal to zero
Between 10 and 20	Value in the field must be between 10 and 20
="Delhi"	Value in the field can only be Delhi
In ("Delhi", "Mumbai")	Value in the field can be Delhi or Mumbai

Validation Text	This property is used to display an error message when the validation rule gets violated.
Required	This property can have only two values—Yes or No. It should be set to Yes if you want that a particular field should always get a value during the data entry.
Allow Zero Length	This property is available for fields with Short Text and Long Text data types. It can have two values—Yes or No. If the Required property is set to 'Yes' and the Allow Zero Length property is set to 'No', then a value must be entered in the field.

2. Record: The rows in a table are known as **records** A record stores complete information about an object or an item. For example, Table Employee (Table 2.1) has four records. Each record contains the complete information about an employee.

3. Primary key:A **primary key** is a field or combination of fields that uniquely identifies the records in a table. A primary key field cannot have repetitive values and cannot be left blank. In Table 2.1, Eno field can be made the primary key as every employee has a unique employee number.

Views of a Table

We can work on a table in two views—**Design view** and **Datasheet view.** Let us learn more about them.

Design view

In the Design view of the table, you can enter the field names, their data types and description. You can also set the field properties. The Design view window is divided into two panes—

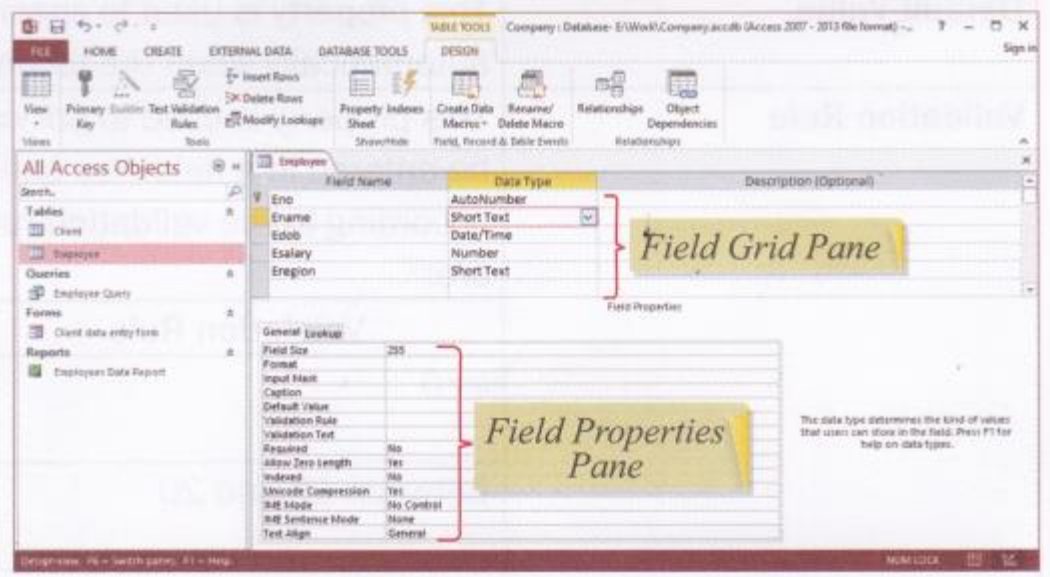


Fig. 2.10 *Design View of a table*

1. **Field Grid Pane:** Field Grid
   Pane is used for entering field names and their data types. You can also give an optional description about each field in this pane.
2. **Field Properties Pane:** Field Properties Pane is used to set properties for the fields in the table.

Datasheet view

You use the Datasheet view to enter data in the table. When you double-click the table name in the database window, the table opens in the Datasheet view.

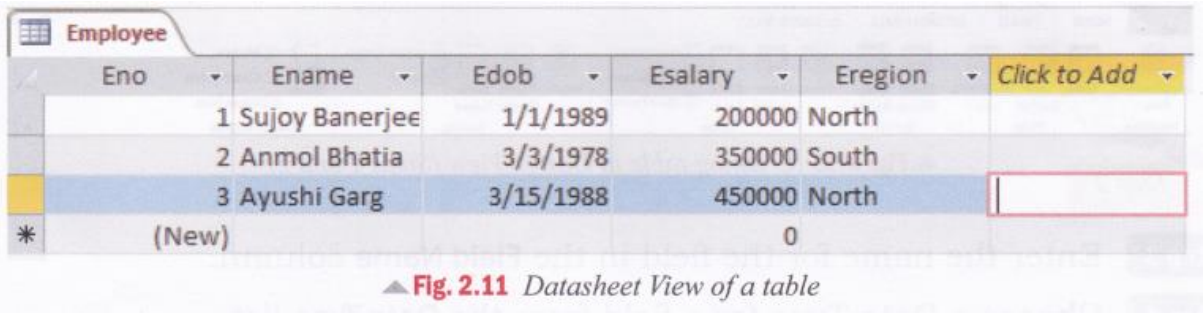


Fig. 2.11 *Datasheet View of a table*

Switching between Views

You can quickly switch from one view to another by following either of the two options:

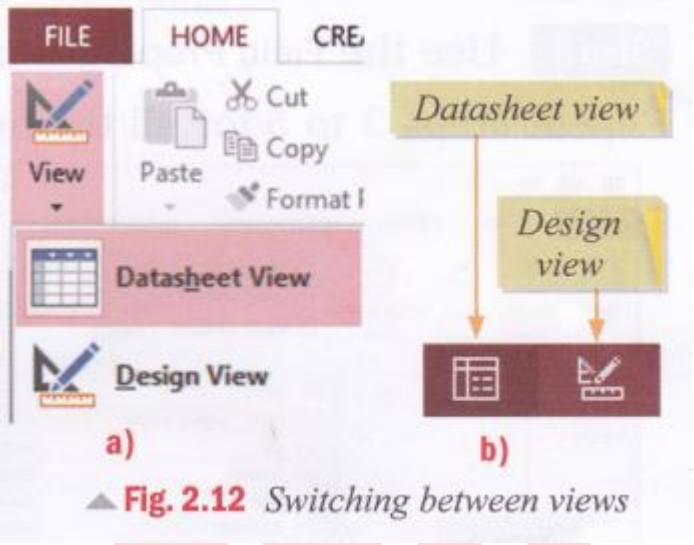


Fig. 2.12 *Switching between views*

- Click on the View option in the Views group on the Home tab to change to the desired view.
  (OR)
- Click on the Design view  or Datasheet view  buttons at the bottom-right corner of the Status bar.

CREATING A TABLE

There are various ways to create tables in Access. In this chapter, you will be learning to create tables in the Design view. This view lets you design the structure of a table by specifying the field names, their data types and properties.

The steps to create a table in the Design view are:

Step 1: Click on the Create tab.

Step 2: Click on the **Table Design** option in the Tables group. A new table is inserted in the database and it opens in the Design View. A new tab named **Design** appears in the Ribbon.

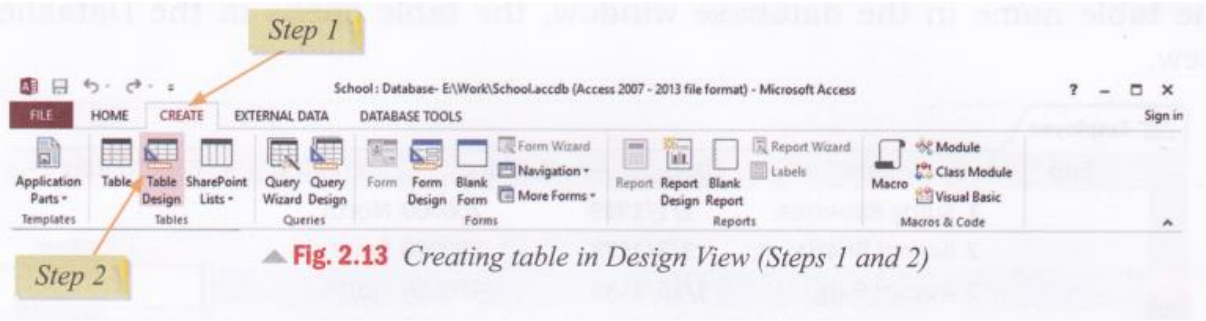


Fig. 2.13 *Creating table in Design View (Steps 1 and 2)*

Step 3: Enter the name for the field in the Field Name column.

Step 4: Enter the name for the field in the Field Name column.

Step 5: Use the Field Properties pane to set the properties for the fields.

Repeat steps 3 to 5 for all the fields in the table.

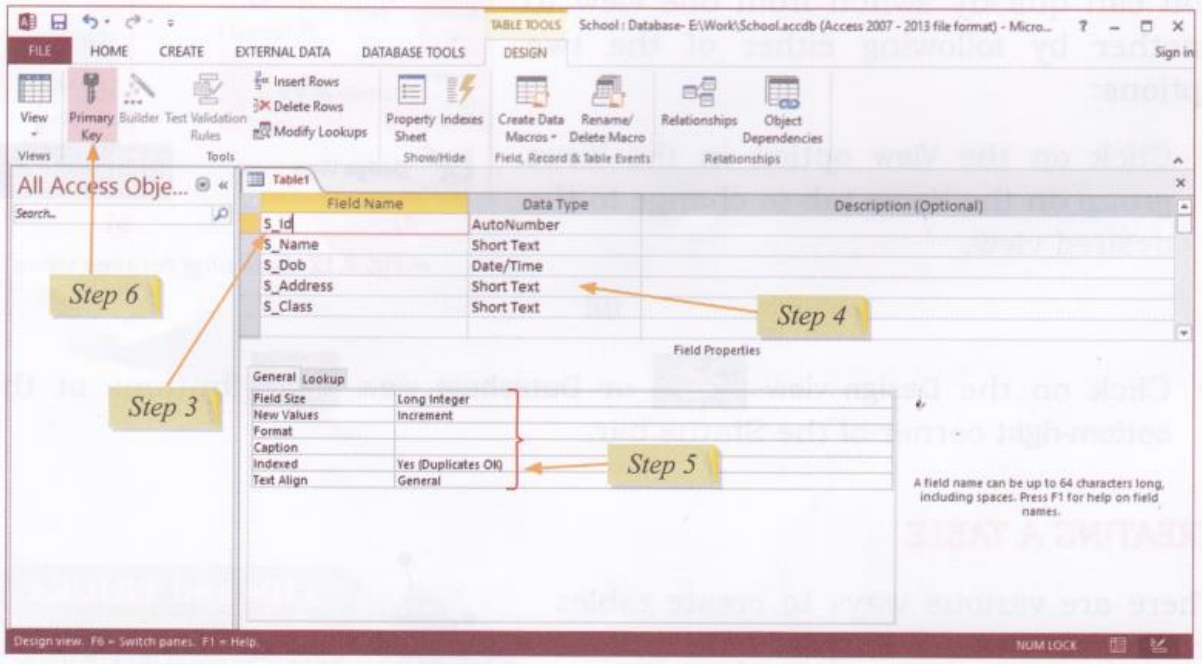


Fig. 2.14 *Creating table in Design View (Steps 3 to 6)*

Step 6: Place the cursor on the field to be set as the Primary key and click on 

the Primary Key option in the Tools group on the Design tab. You will notice that a key symbol appears next to the field.

Step 7: Click on the Save button on the Quick Access toolbar or Click on the File tab and choose the Save option. Save the table with an appropriate name.

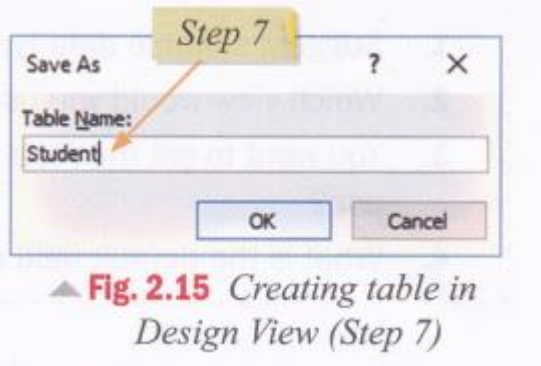


Fig. 2.15 *Creating table in Design View (Step 7)*

The table object is now added to the Navigation Pane.

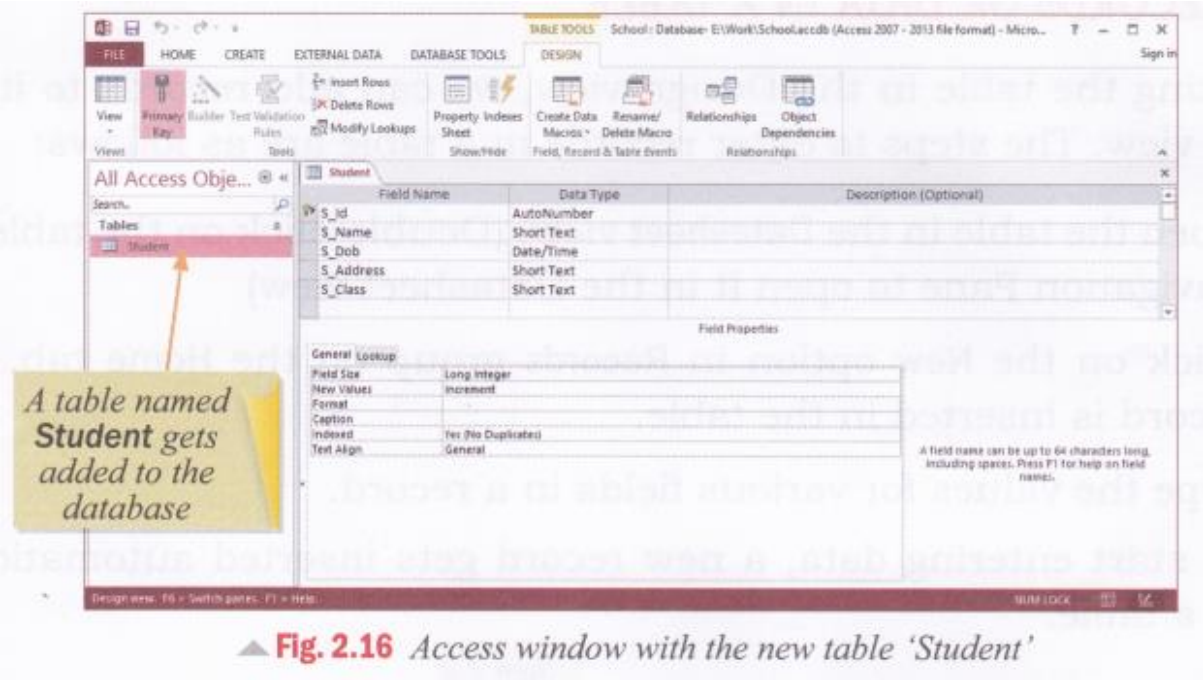


Fig. 2.16 *Access window with the new table 'Student'*

ADDING RECORDS OR DATA IN A TABLE

After creating the table in the Design view, we can add records to it in the Datasheet view. The steps to enter records in a table are as follows:

Step 1: Open the table in the **Datasheet** view. (Double-click on the table in the Navigation Pane to open it in the Datasheet view)

Step 2: Click on the **New** option in **Records** group on the **Home** tab. A new record is inserted in the table.

Step 3: Type the values for various fields in a record. When you start entering data, a new record gets inserted automatically at the end of a table.

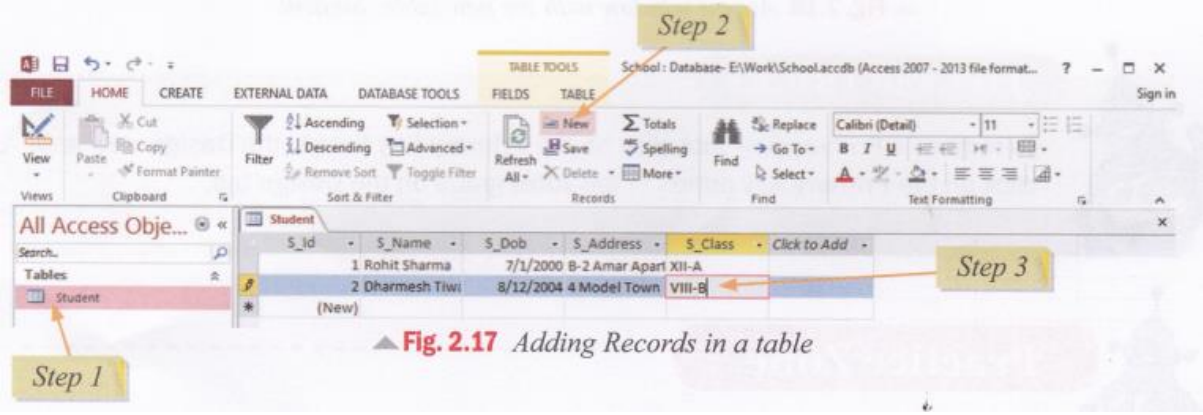
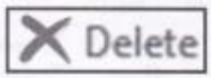


Fig. 2.17 *Adding Records in a table*

DELETING RECORDS IN A TABLE

Step 1: Open the table in the Datasheet view and follow these steps to delete a record. Select the record that needs to be deleted.

Step 2: Click on the **Delete** option 

in the **Records** group on the Home tab.

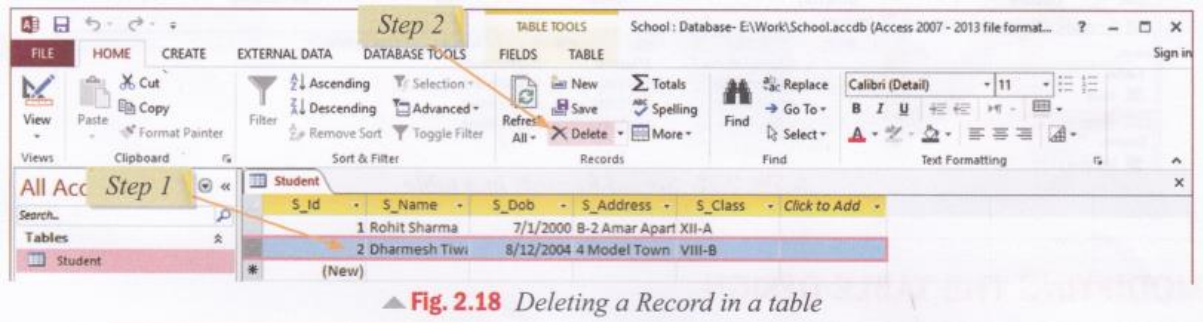


Fig. 2.18 *Deleting a Record in a table*

SORTING RECORD IN A TABLE

Open the table in the Datasheet view and follow these steps to sort records.

Step 1: Select the field on the basis of which you want to sort the records.

Step 2: Click on the **Ascending** or **Descending** option in the **Sort & filter** group on the **Home** tab. The records get sorted.

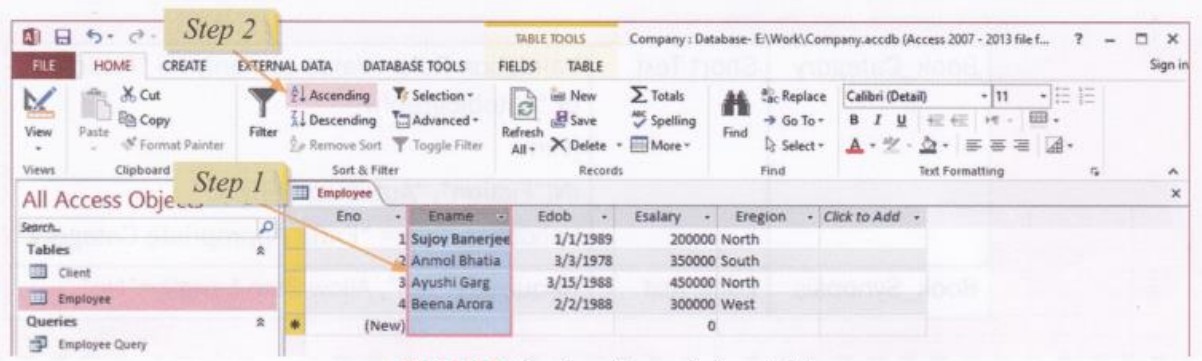


Fig. 2.19 *Sorting Records in a table*

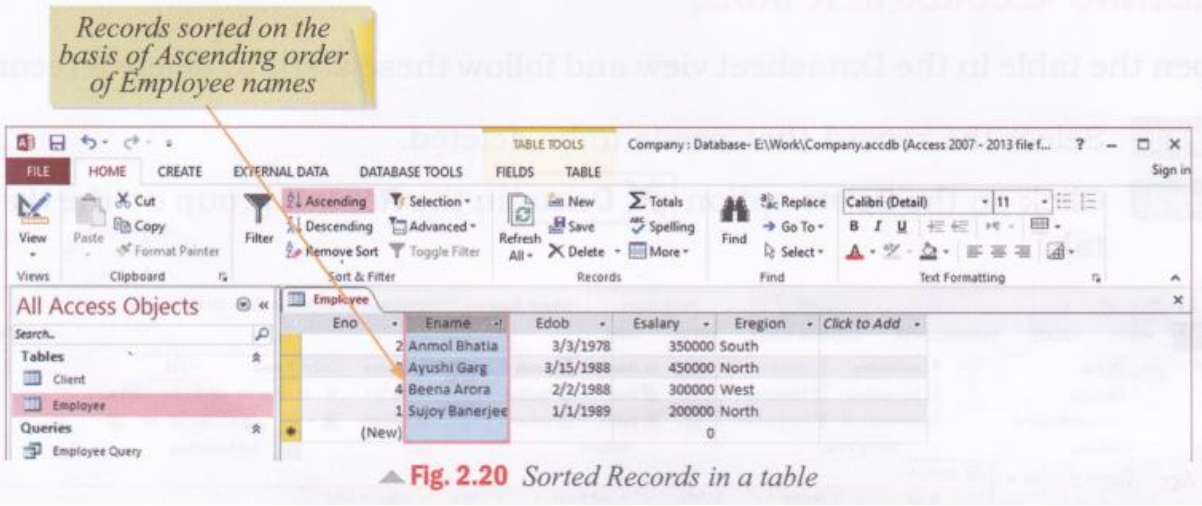


Fig. 2.20 *Sorted Records in a table*

MODIFYING THE TABLE DESIGN

We can make changes to the design of a table after it has been created. Let us learn how to insert and remove a field from a table.

Inserting a New Field

Open the table in **Design view** and follow the given steps to insert a field in the table.

Step 1: Place the cursor on the field before which you want to insert a new field.

Step 2: Click on the **Insert Rows** option in the **Tools** group on the **Design** tab. A new row is

inserted. Enter the field name, data type and properties for the new field.

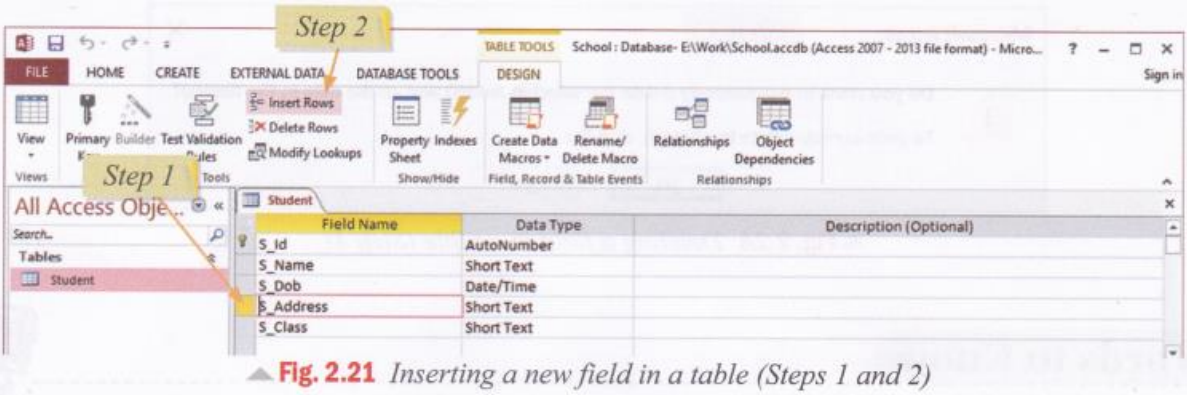


Fig. 2.21 *Inserting a new field in a table (Steps 1 and 2)*

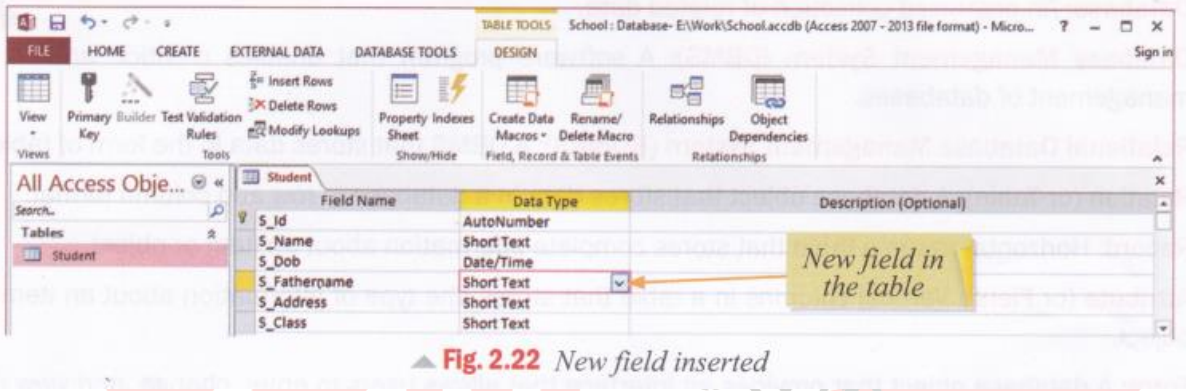


Fig. 2.22 *New field inserted*

Deleting a Field

Open the table in Design view and follow the given steps to delete a field in the table.

Step 1: Click the field that has to be removed.

Step 2: Click on the Delete Rows option in the Tools group on the Design tab.

Step 3: Before permanently deleting a field, Access displays a warning box confirming whether you want to delete the field permanently. Click on the Yes button.

The field is deleted from the table.

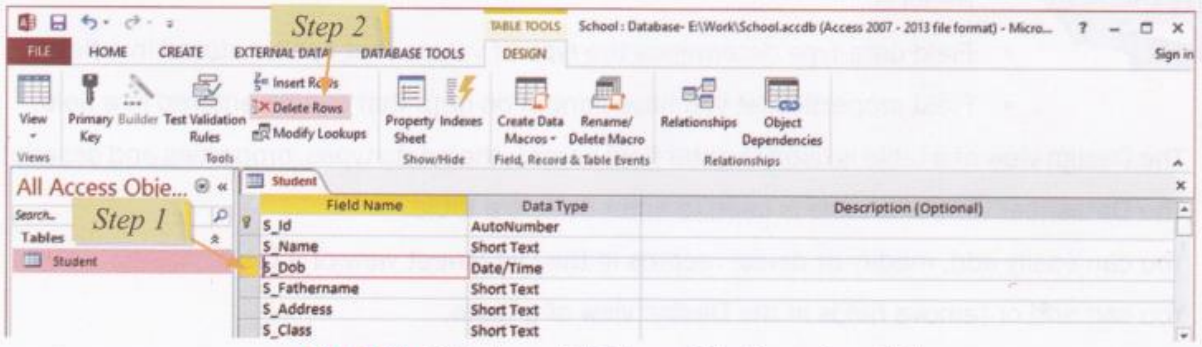


Fig. 2.23 *Deleting a field in a table (Steps 1 and 2)*

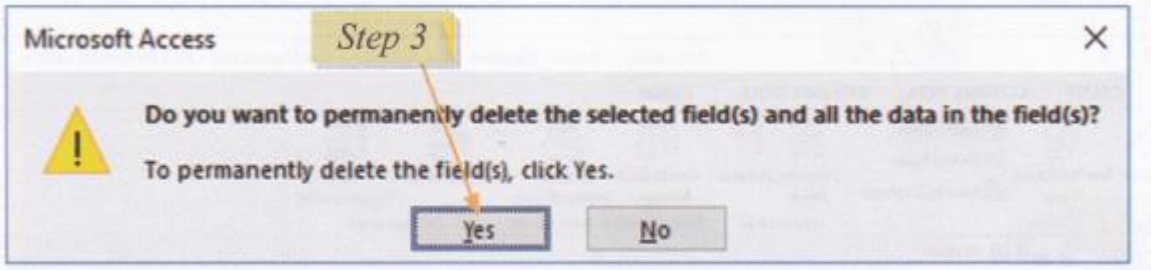


Fig. 2.24 *Deleting a field in a table (Step 3)*