

## 6

## Database and DBMS— An Introduction

### Learning Objectives

Database is an organised collection of data. DBMS, an acronym for Data Base Management System, is an application software for creating and managing databases. It provides facility to create, update, retrieve and manage data.

In this topic, children will know and understand about the basics of creating a database and will develop the ability to design simple query statements.

The database concept is one of the oldest ways to maintain records in a conventional file-oriented data collection system. The manual system of maintaining files to keep records is time-consuming, inaccurate and at times unreliable. Computerised database system helps overcome these limitations and provides centralised control over data.

Computerised data collection and manipulation system have replaced the conventional record keeping system by using application programs. The various components have a logical relationship that help access data easily. A collection of programs required to store and retrieve data from a database is called Database Management System (DBMS). It is an application package which arranges all records in an orderly manner so that information can be accessed easily.

Let us take an example of a database file:

**Admission: 2012-2014**

Sl. No.	Reg. No.	Name	Father's Name	Date of Birth	Class	Last School Attended
1.	187/11	Akash Kumar	Mr. B. K. Shaw	15/08/01	VIII	D. B. M. S.
2.	177/12	Krishna Kant	Mr. K.S. Kant	22/10/02	IX	K. S. M. S.
3.	156/12	Rishi Sharma	Mr. N.K Sharma	10/01/02	IX	M. N. P. S.
4.	194/11	Suraj Patel	Mr. G. S. Patel	16/04/01	VIII	K. P. S.
5.	188/11	Prayash Sagar	Mr. P. K. Sagar	18/06/01	IX	D. P. S.

### Knowledge Scope



Managing of Database and DBMS, Uses of database with examples, Create and Save a database, Primary Key, Querying a Database

The above data file shows the names of the students who have taken admission in the session 2012-2014.

When you make a query in the above data file for the students of Class IX, the file shows the following records:

The record of students who have taken admission in Std. IX:

Sl. No.	Reg. No.	Name	Father's Name	Date of Birth	Class	Last School Attended
1.	177/12	Krishna Kant	Mr. K.S. Kant	22/10/02	IX	K. S. M. S.
2.	156/12	Rishi Sharma	Mr. N.K Sharma	10/01/02	IX	M. N. P. S.
3.	188/11	Prayash Sagar	Mr. P. K. Sagar	18/06/01	IX	D. P. S.

### Advantages of Computerised Database System

- It minimises duplication of data by integrating and sharing data files.
- It saves storage space.
- The user can rely on the results, as they are generated by computer.
- It also allows the user to make different types of queries depending upon the situation.
- The file can be easily updated if changes are made.

### MS Access

MS Access is a Database Management package which is a part of MS Office. It provides handy tools to work with data fields that help operate, maintain and manipulate various records effectively.

### Commonly used features in MS Access

Some of the features of MS Access used on a frequent basis are explained below:

#### Table

It is defined as a group of related data organised in columns and rows in a datasheet. The columns contain a number of headings (such as personal number, first name, last name, address, city, pin code, telephone number etc.) and are known as Fields. A set of fields comprises a record and a set of similar records make a table.

#### Primary key

Primary key is a unique field by which records are identified in a table. *For example*, In a table of student's record, the 'Registration Number' can be called as the primary key.

#### Query

Query helps you retrieve information from a table as and when required. So, the basis of extracting information from a database is known as 'Query'.

#### Forms

When a query is made, the system retrieves the information from the table and makes it

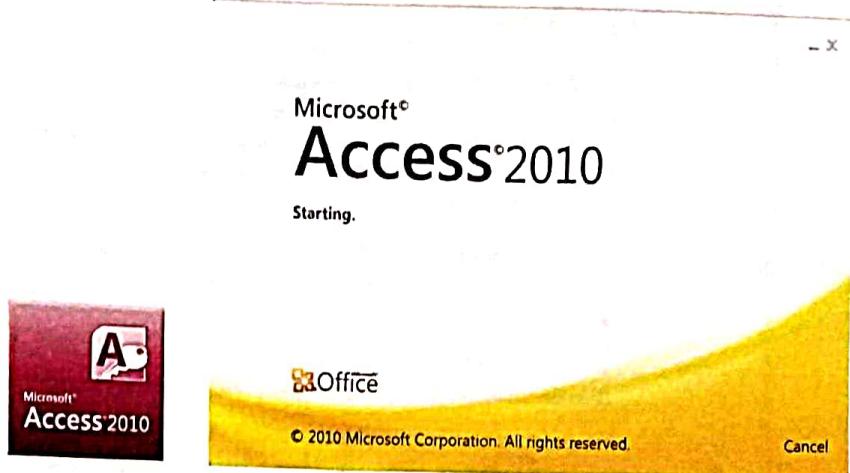
available to the user. Thus, the format of displaying the information from a particular table is called 'Form'.

## Report

The end product of data manipulation in DBMS as per the user's choice is known as 'Report'. You may get the report as a hard copy or a soft copy. The reports are generally created after making queries on the database.

## Start with MS Access

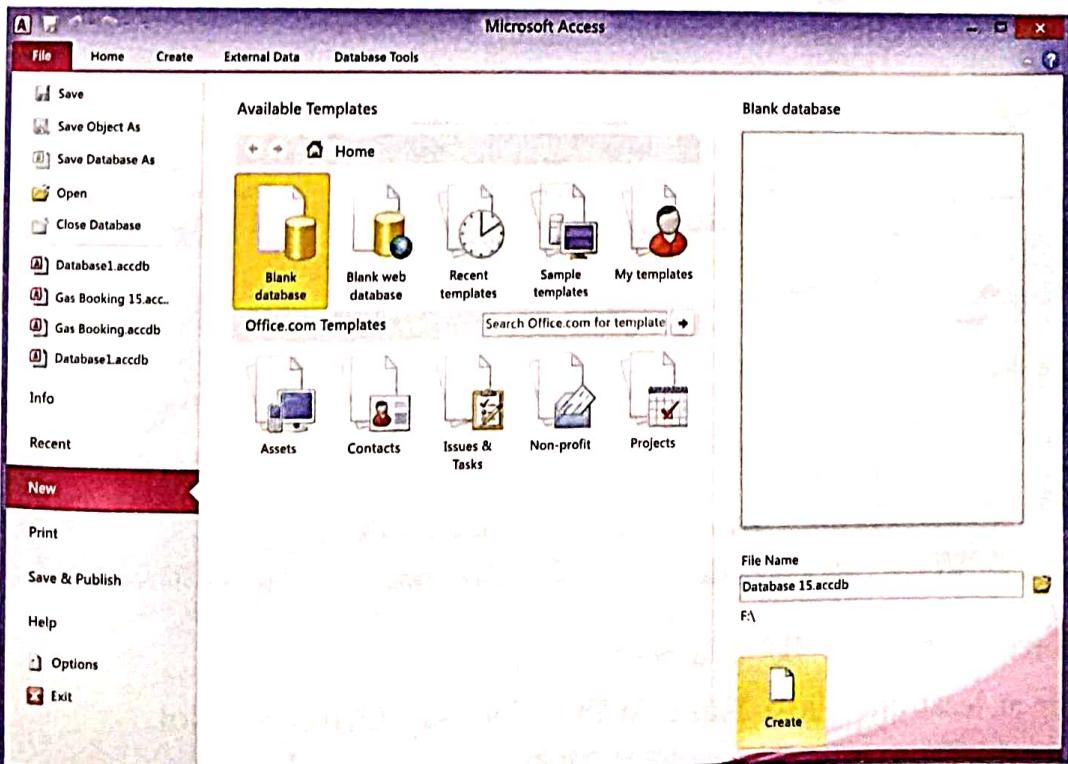
MS Access 2010 is equipped with more features than the previous versions. When you click MS Access icon, the default window will open. The 'File' button, present just below 'Quick Access Tool Bar', provides access to some basic functions. When you click 'File' tab, it displays the default 'Backstage' view.



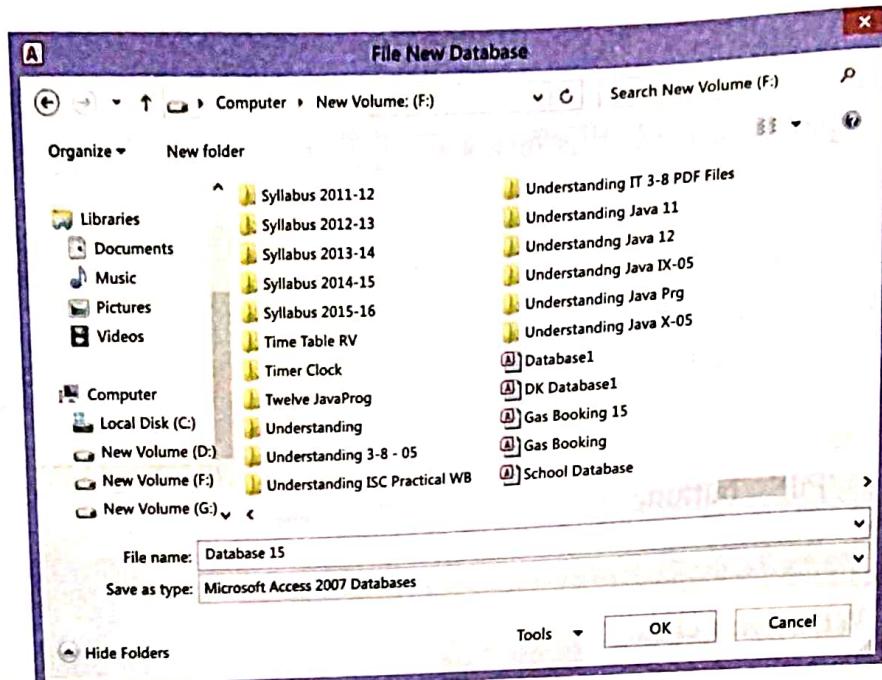
## Creating a new Database

Click 'MS Access 2010' icon, it displays the default backstage view. To start your work on MS Access, perform these steps:

- Click 'New'. You will notice that 'Available Templates' and 'Blank Database' options are displayed in the Backstage view. By default, 'Blank database' is selected.
- Now, click 'Browse' button. The 'File New Database' window will open.
- Select the location where you want to keep your database (say, F-drive).



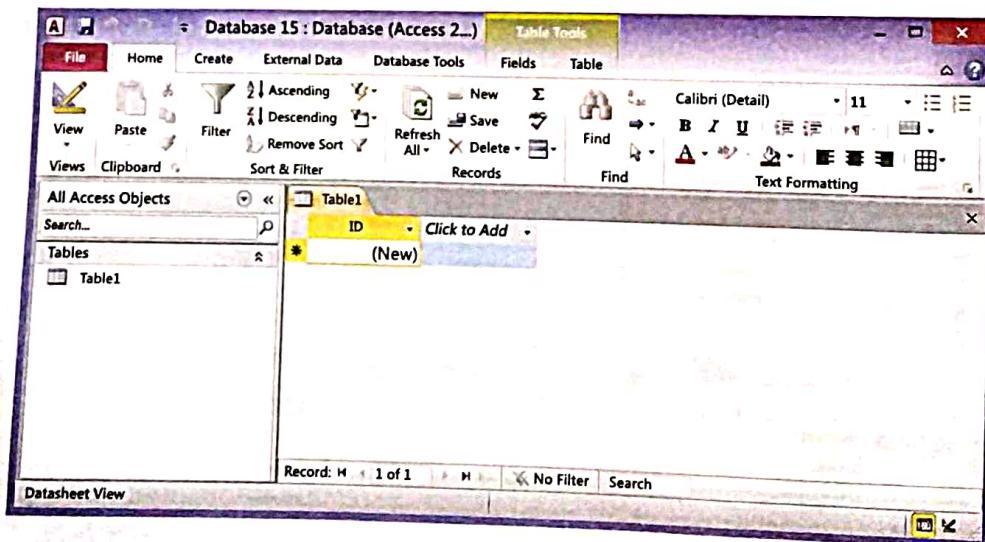
- Enter the file name (say, Database 15.accdb) in the ‘File name’ box.
- Click ‘OK’.



The file name will be seen in the ‘File name’ box. Finally, click ‘Create’ button. Thus, ‘Database 15’ window will open (as shown).

### Creating a Table with Field names

After you click ‘Create’ button the system will create ‘Table 1’. You will notice that the window is divided into two different panes. The left pane shows the different tables and the right pane allows you to enter fields and data in the table. By default, the table is created in Data Sheet view (as shown). It has a field name ‘ID’, which is considered the ‘Primary Key’. Other fields can be added by clicking ‘Click to Add’.

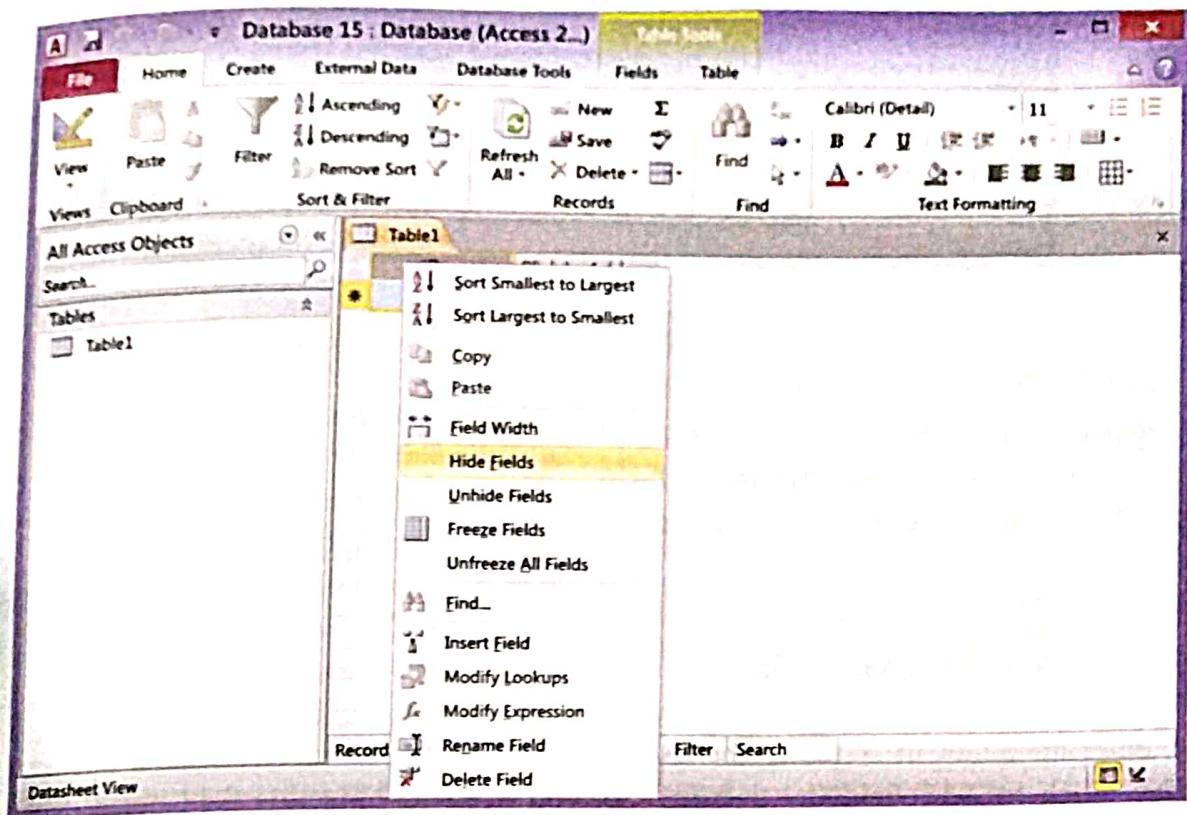


If you don't want to use ‘ID’ as a field name,

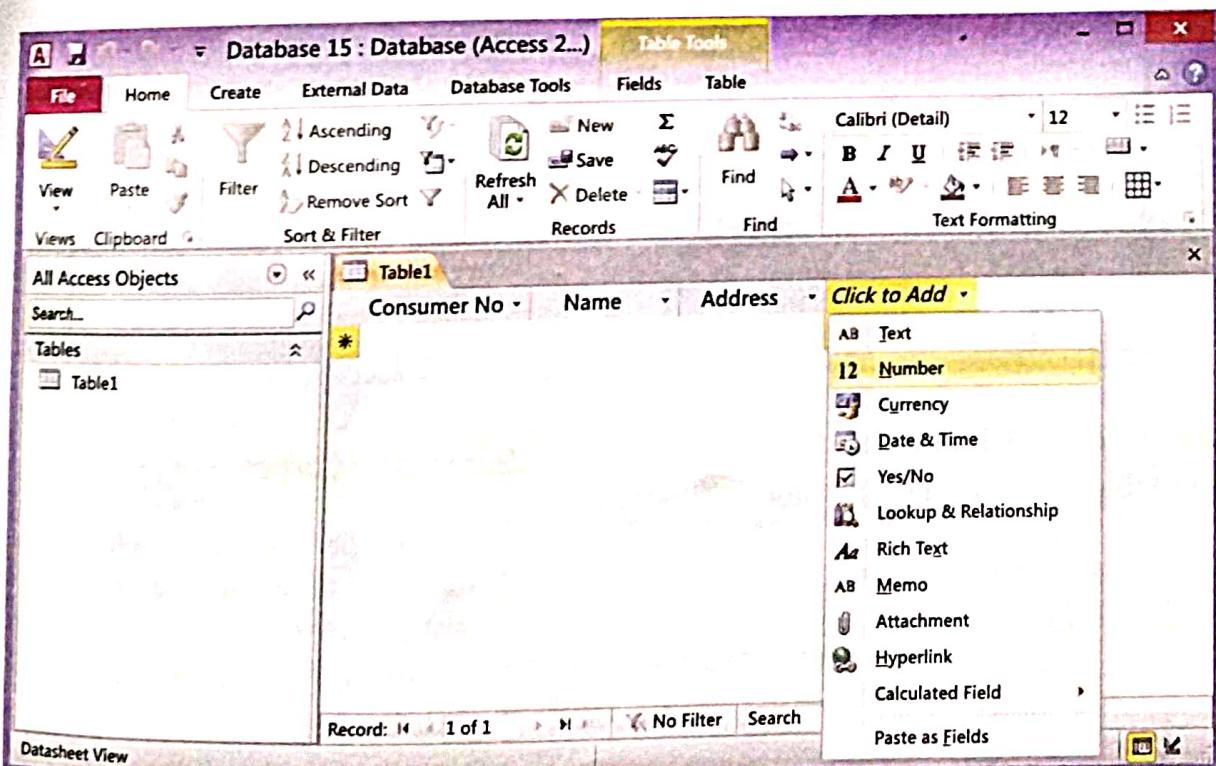
- Enter at least one ‘Field Name’ in the table (say, Consumer No).
- Select the ID field name and right-click.

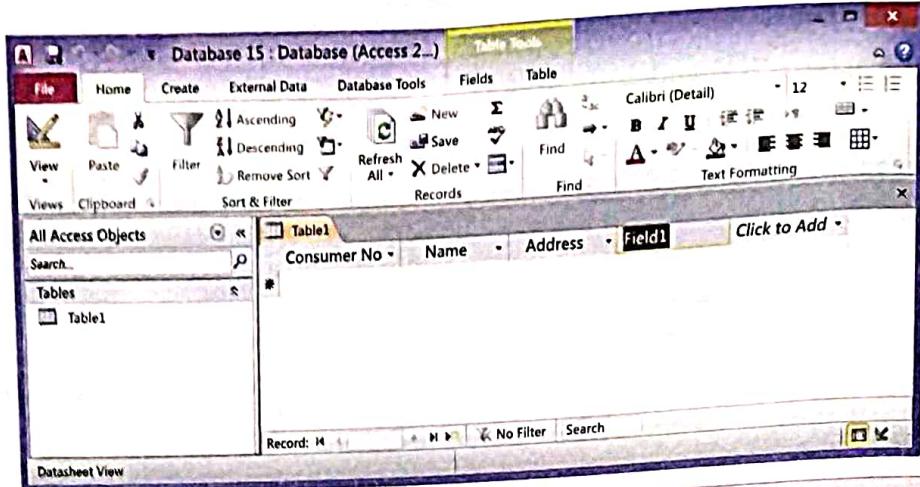
- Click 'Hide Fields'.

Thus, the Field name 'ID' will hide and you can use any other field as the Primary Key' (say, Consumer No).



- Double-click 'Click to Add' heading and rename the field with an appropriate data type. It is to be noted that the system doesn't accept any special character in the field name. If you enter a special character, the system will display a message asking you to re-enter the field name.





By default, the system provides 'Click to Add' column after all the other fields. So, you need to delete the default column name (Field 1, etc.) after adding the required number of fields in the table.

### Hide 'Click to Add' Field

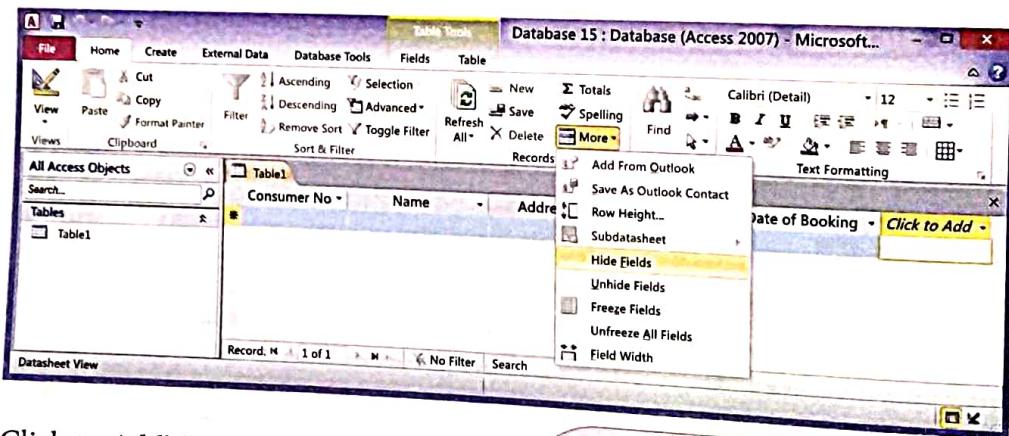
While entering fields in a table, the system provides 'Click to Add' field (by default). So, you need to hide this field before saving the table. To hide 'Click to Add' field, perform these steps:

- Click 'More' button that is available in the Ribbon under 'Home' tab.
- Select 'Hide Fields' from the drop-down list.

### Knowledge Corner



1. The field name ID set by the system is the 'Primary Key'.
2. The field name ID can't be deleted but can be hidden.
3. After writing at least one field in the table, the field name ID can be hidden.
4. Special characters are not allowed in the 'Field Name' in the table.



Thus, 'Click to Add' field is hidden from the existing table. Finally, save the table.

### Knowledge Corner



1. At the time of creating fields, 'Click to Add' field allows adding fields in the existing table.
2. To 'Unhide Fields', click 'More' button.
3. Click 'Unhide Fields'.
4. Put tick in the box adjacent to the 'Click to Add' field. *Note*

## Enter data in a Table

After writing the fields name, you can start entering data in the table. Now, click on each field and enter appropriate data. Press 'Enter' key after the completion of record in the table. You will notice that the cursor automatically shifts to the next line. While entering records in the table, the system also displays the number of records entered in the table. The number of records can be seen just below the table.

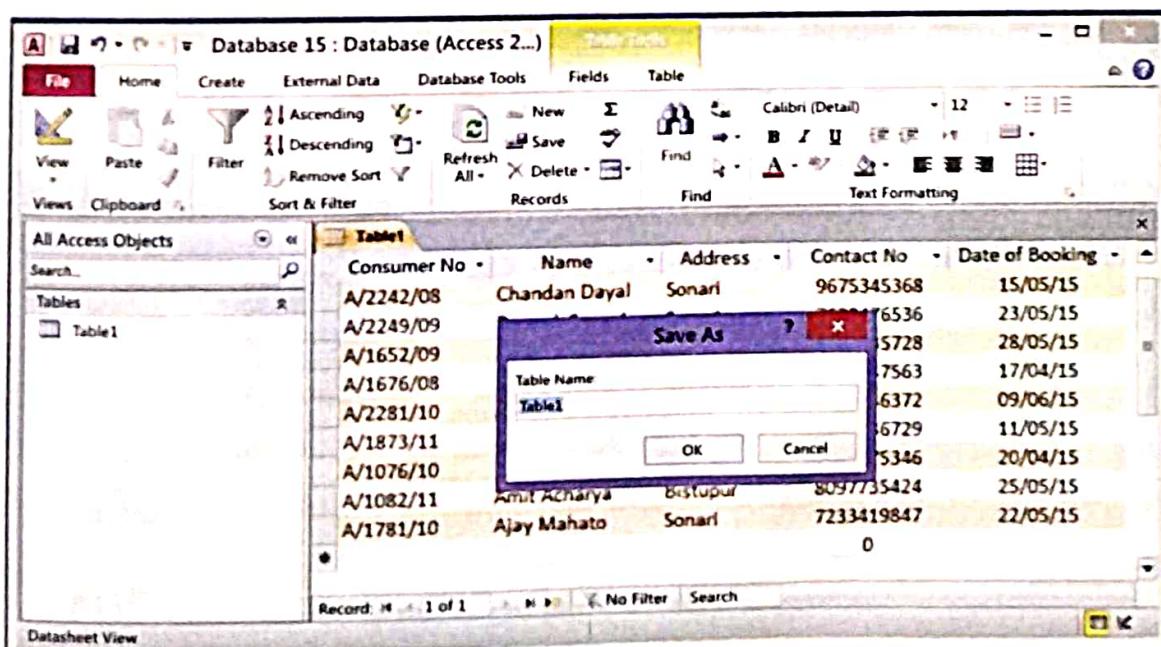
The screenshot shows the Microsoft Access application window titled "Database 15 : Databas (Access 2...)" with the "Table Tools" ribbon selected. On the left, the "All Access Objects" pane shows a table named "Table1". The main area displays "Table1" with 10 records. The columns are labeled: Consumer No., Name, Address, Contact No., and Date of Booking. The data entries are as follows:

Consumer No.	Name	Address	Contact No.	Date of Booking
A/2231/08	Akash Agarwal	Kadma	7236547534	12/05/15
A/2242/08	Chandan Dayal	Sonari	9675345368	15/05/15
A/2249/09	Deepak Sanyal	Sonari	7689476536	23/05/15
A/1652/09	Sanjeev Mehta	Bistupru	8095435728	28/05/15
A/1676/08	Rishi Raj	Sakchi	7293847563	17/04/15
A/2281/10	Amit Khanna	Kadma	7548746372	09/06/15
A/1873/11	Sanjay Kumar	Kadma	9476536729	11/05/15
A/1076/10	Kunal Tyagi	Sakchi	8908875346	20/04/15
A/1082/11	Amit Acharya	Bistupur	8097735424	25/05/15
A/1781/10	Ajay Mahato	Sonari	7233419847	22/05/15

## Save a Table

After entering data in the table, it is time to save the table. Perform these steps:

- Click 'File' button.
- Click 'Save' button.
- The 'Save As' dialog box appears.
- Enter Table name. The system accepts 'Table 1' (by default). If Table 1 is already present, the system takes Table 2 (by default).



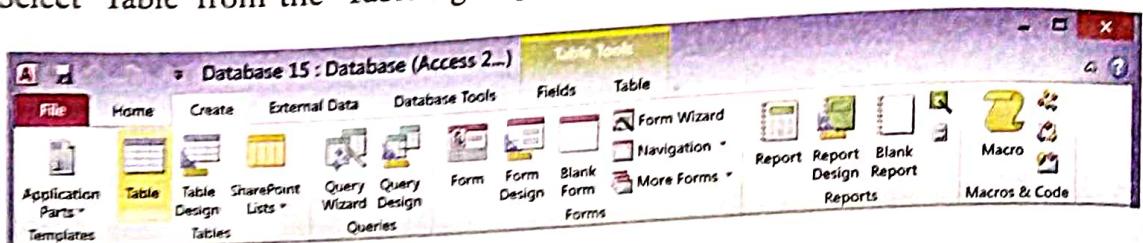
- Click 'OK'.

Thus, the content of 'Table 1' will save.

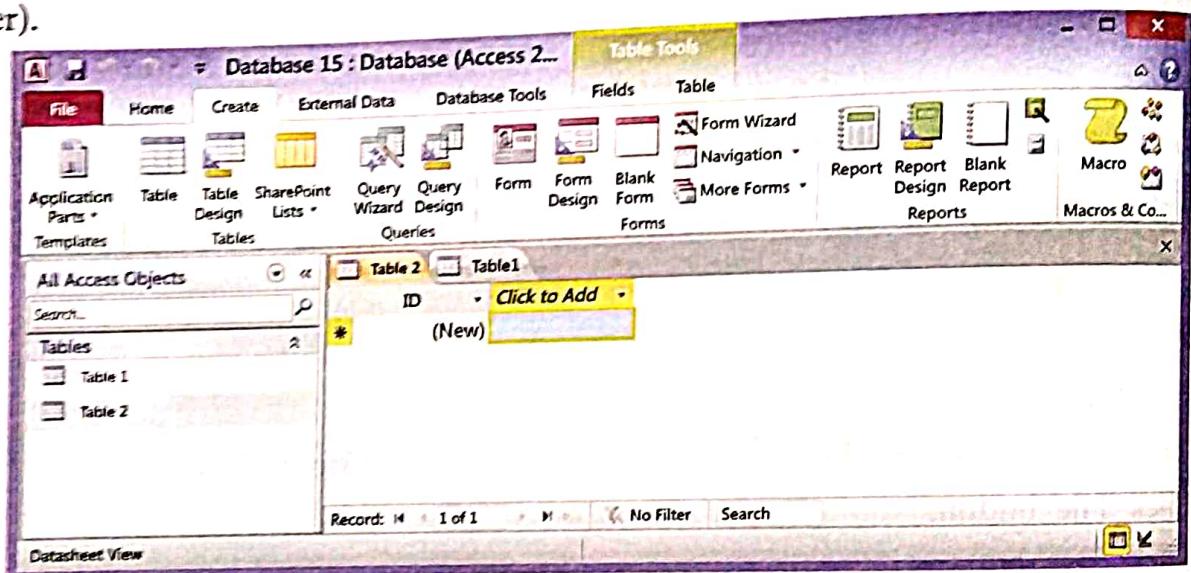
Now, close the table by clicking (x) button. Thus, 'Table 1' closes.

If you want to create another table in the same database 'Database 15',

- Click 'Create' Tab on the menu bar.
- Select 'Table' from the 'Tables' group.

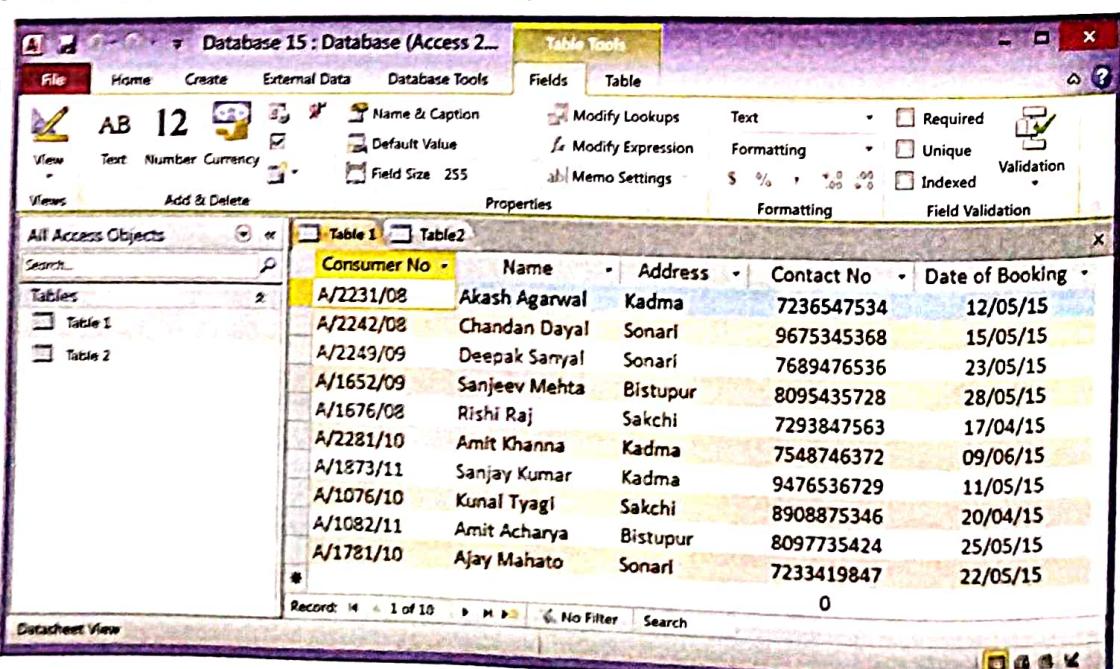


Thus, 'Table 2' will open. Repeat the process to enter the field names (as explained earlier).



After entering the data, close the table.

If you want to see the content of 'Table 1', double-click 'Table 1' located in the left pane.



## Views of a Table

Generally, the tables that are created in the system can be seen in two different views. They are:

1. Datasheet View: It is the default view of the table. It shows all the fields and the records as entered by the user. In this format you can easily edit the content of the table.

The screenshot shows the Microsoft Access application window titled "Database 15 : Database (Access 20...)" with the "Table Tools" ribbon selected. On the left, a ribbon bar includes "File", "Home", "Create", "External Data", "Database Tools", "Fields", and "Table". The "View" tab is highlighted. A sidebar on the left lists "Datasheet View", "PivotTable View", "PivotChart View", and "Design View". The main area displays a table named "Table1" with the following data:

Consumer No	Name	Address	Contact No	Date of Booking
A/2231/08	Akash Agarwal	Kadma	7236547534	12/05/15
A/2242/08	Chandan Dayal	Sonari	9675345368	15/05/15
A/2249/09	Deepak Sanyal	Sonari	7689476536	23/05/15
A/1652/09	Sanjeev Mehta	Bistupur	8095435728	28/05/15
A/1676/08	Rishi Raj	Sakchi	7293847563	17/04/15
A/2281/10	Amrit Khanna	Kadma	7548746372	09/06/15

Record: 14 1 of 10 > N < No Filter Search

2. Design View: In this view, the records are not visible. You can see all the field names along with their data types. Here, you can add or delete a field name (if you want). The changes in the field name will be incorporated in your table where you can enter records.

The screenshot shows the Microsoft Access application window titled "Database 15 : Database (Access 20...)" with the "Table Tools" ribbon selected. The "Design" tab is highlighted. The main area displays the "Table1" design grid with the following columns:

Field Name	Data Type	Description
[D]	AutoNumber	
Consumer No	Text	
Name	Text	
Address	Text	
Contact No	Number	
Date of Booking	Text	

## Inserting a Field

When you want to add more information, you can insert more fields in the database table. This task can be done by following these steps:

- Open the required table (say, Table 1) in Datasheet view.
- Select the field after which you want to insert a new field.
- Make a right-click and select 'Insert Field' from the drop-down list.

The screenshot shows the Microsoft Access 2007 interface. A context menu is open over a table named 'Table1'. The menu path 'Delete Field' is highlighted in yellow. Other options visible in the menu include 'Sort & Filter', 'Find', and 'Text Formatting'.

Consumer No	Name	Address	Contact No	Date of Birth
A/2231/08	Akash Agarwal	Kadma	7236547534	21/05/15
A/2242/08	Chandan Dayal	Sonari	9675345368	16/05/15
A/2249/09	Deepak Samyal	Sonari	7689476536	23/05/15
A/1652/09	Sanjeev Mehta	Bistupur	8095435728	28/05/15
A/1676/08	Rishi Raj	Sakchi	7293247563	17/04/15
A/2281/10	Amit Khanna	Kadma	7548746372	09/06/15
A/1873/11	Sanjay Kumar	Kadma	9476536729	11/05/15
A/1076/10	Kunal Tyagi	Sakchi	8908875346	20/04/15
A/1082/11	Amit Acharya	Bistupur	8097735424	25/05/15
A/1781/10	Ajay Mahato	Sonari	7233419847	22/05/15

Thus, a blank column will be inserted. Write down an appropriate name for the new field (say, Booking No). Now, you can enter the data for the new field. Finally, save the table.

The screenshot shows the Microsoft Access 2007 interface with the 'Booking No' field added to the table structure. The 'Booking No' column is highlighted in yellow. The table now has six columns: Consumer No, Name, Address, Contact No, Booking No, and Date of Birth. The data remains the same as in the previous screenshot.

Consumer No	Name	Address	Contact No	Booking No	Date of Birth
A/2231/08	Akash Agarwal	Kadma	7236547534	12/05/15	
A/2242/08	Chandan Dayal	Sonari	9675345368	15/05/15	
A/2249/09	Deepak Samyal	Sonari	7689476536	23/05/15	
A/1652/09	Sanjeev Mehta	Bistupur	8095435728	28/05/15	
A/1676/08	Rishi Raj	Sakchi	7293247563	17/04/15	
A/2281/10	Amit Khanna	Kadma	7548746372	09/06/15	
A/1873/11	Sanjay Kumar	Kadma	9476536729	11/05/15	
A/1076/10	Kunal Tyagi	Sakchi	8908875346	20/04/15	
A/1082/11	Amit Acharya	Bistupur	8097735424	25/05/15	
A/1781/10	Ajay Mahato	Sonari	7233419847	22/05/15	

### Knowledge Corner

- To delete a field, select the field to be deleted.
- Make a right-click and select 'Delete Field' from the drop-down list.
- The field as well as the content will delete.

### Adding a Record

You can always add more information to a table to keep it updated. Perform these steps:

- Open the required table (say, Table 1) in Datasheet view.
- Place the pointer where you want to add new records (i.e. just after the last record of the table).
- Enter the new records in the table.

Consumer No	Name	Address	Contact No	Date of Booking
A/2231/08	Akash Agarwal	Kadma	7236547534	12/05/15
A/2242/08	Chandan Dayal	Sonari	9675345368	15/05/15
A/2249/09	Deepak Sanyal	Sonari	7689476536	23/05/15
A/1652/09	Sanjeev Mehta	Bistupur	8095435728	28/05/15
A/1676/08	Rishi Raj	Sakchi	7293847563	17/04/15
A/2281/10	Amit Khanna	Kadma	7548746372	09/06/15
A/1873/11	Sanjay Kumar	Kadma	9476536729	11/05/15
A/1076/10	Kunal Tyagi	Sakchi	8908875346	20/04/15
A/1082/11	Amit Acharya	Bistupur	8097735424	25/05/15
A/1781/10	Ajay Mahato	Sonari	7233419847	22/05/15

Finally, save and close the table. Thus, new records will be incorporated in your table.

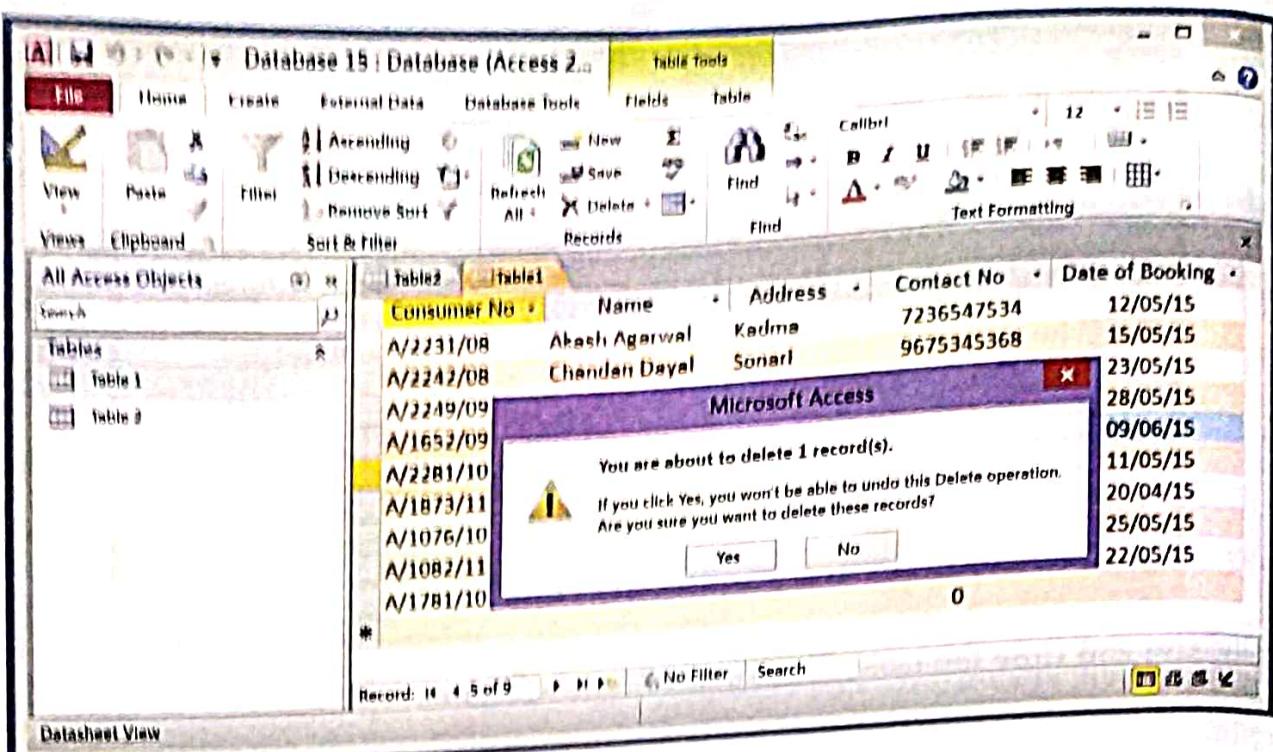
### Deleting a Record

You can remove duplicate or unwanted data from an existing table. Perform these steps:

- Open the required table (say, Table 1) in Datasheet view.
- Place the pointer and select the record which is to be deleted. The record will be highlighted.

Consumer No	Name	Address	Contact No	Date of Booking
A/2231/08	Akash Agarwal	Kadma	7236547534	12/05/15
A/2242/08	Chandan Dayal	Sonari	9675345368	15/05/15
A/2249/09	Deepak Sanyal	Sonari	7689476536	23/05/15
A/1652/09	Sanjeev Mehta	Bistupur	8095435728	28/05/15
Rishi Raj	Sakchi	7293847563	17/04/15	
Amit Khanna	Kadma	7548746372	09/06/15	
Sanjay Kumar	Kadma	9476536729	11/05/15	
Kunal Tyagi	Sakchi	8908875346	20/04/15	
Amit Acharya	Bistupur	8097735424	25/05/15	
Ajay Mahato	Sonari	7233419847	22/05/15	

- Right-click the selected record and click 'Delete Record'. The system asks for confirmation from the user before deleting it permanently from the table.
- Click 'Yes' to confirm, otherwise 'No'.

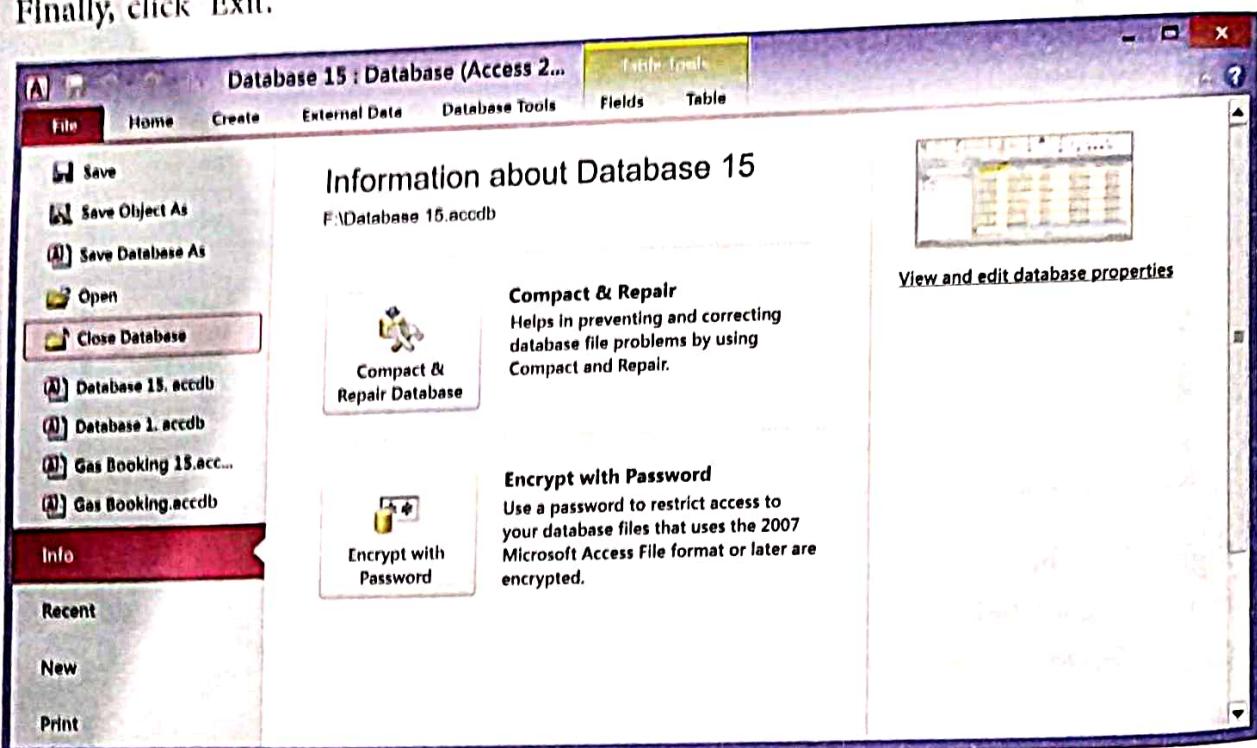


On clicking 'Yes', the selected record gets deleted from the table permanently.

### Close Database

To close the database package, follow these steps:

- Click 'File' button.
- Click 'Close Database'. It closes the database package (MS Access).
- Finally, click 'Exit'.



## Querying

A query is a convenient way of gathering relevant data and analysing them in different ways. A query can be used as the source of records for forms, reports, and data access pages. A query also allows you to get information from multiple tables and sort it in a particular order. After selecting fields for records from different tables, you can perform calculations on groups of records with sorting or summarising.

### Creating a Query

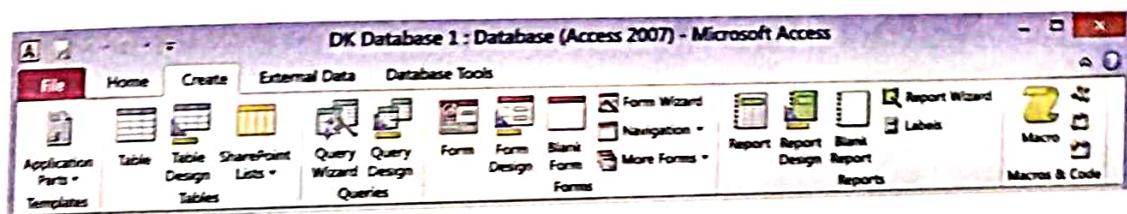
Tables, forms, or, reports are linked together by a query. There are many types of queries that you can create in MS Access. After creating a database (say, db1), the database window opens up, where you can create a query in two different ways:

1. Creating query in Design view
2. Creating query by using Wizard

### Creating a Query in Design View (Simple Query)

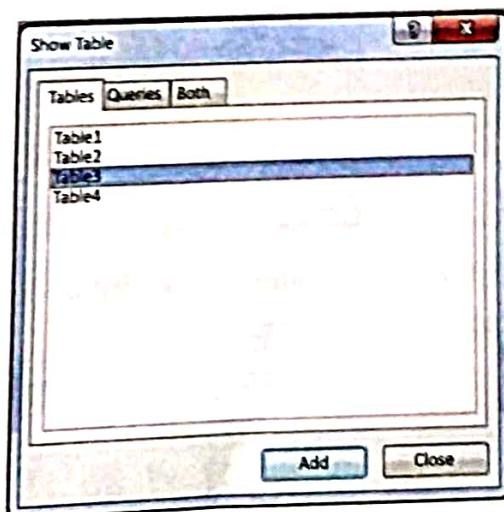
Design view provides simple query in a table created in a database. The relevant fields are selected according to the need of the user to analyse the records for further studies. You can follow these steps to make a simple query in the table.

- Click 'Start' button and select 'Open'.
- Select your database (say, DK Database1) from the 'Open' window. It displays the list of Tables on the left pane of the window, which have been created in the database.
- Click 'Create' tab which is available on the Ribbon area.
- Select and click 'Query Design' from the Ribbon area.

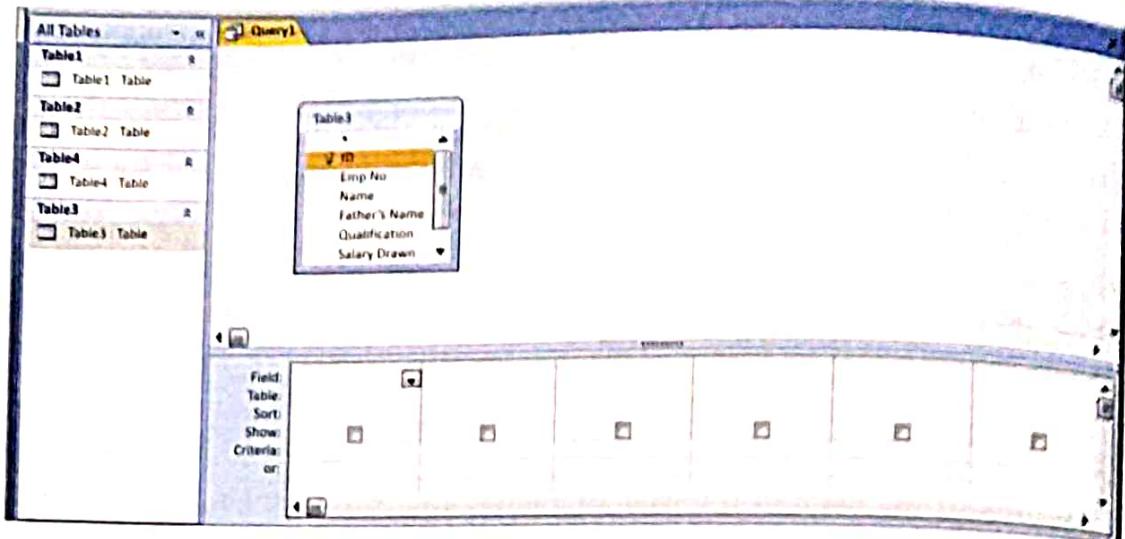


- 'Show Table' window appears on the screen. Click on 'Tables' which displays the list of created tables.
- Select the table (say, Table 3) on which you want to make a simple query.
- Click on 'Add' button and finally on 'Close'.
- The 'Query 1' window appears on the screen. It is divided into two different panes. The upper part of the pane displays the table with the fields. The lower part of the pane displays the design grid which contains the following headings:

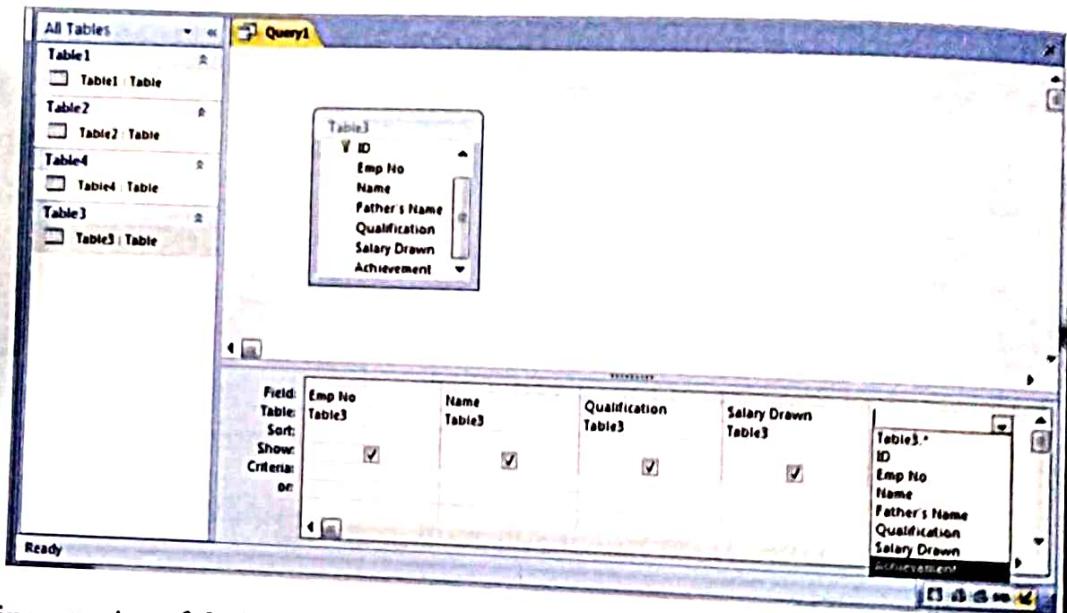
- **Field** : It displays all the fields of the selected table.
- **Table** : It displays the name of the current table.
- **Sort** : It allows sorting of data either in ascending or descending order.



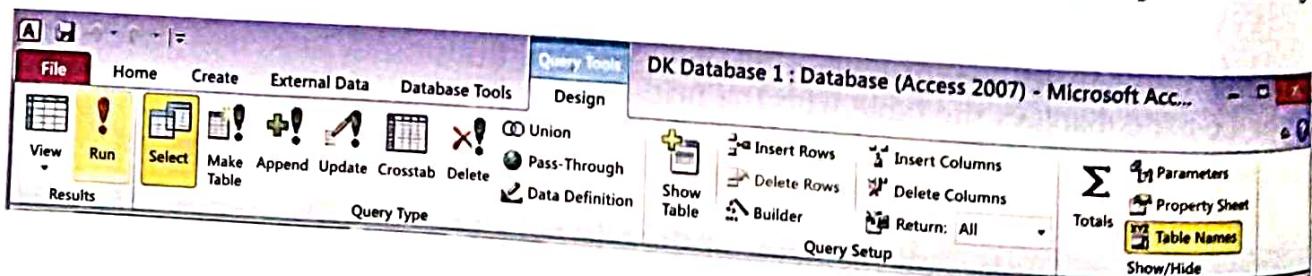
- **Show** : Checking this box means that the fields will be visible at the time of running a query.
- **Criteria**: It is used to specify the condition on the basis of which the records are filtered.
- **Or** : It allows to specify multiple criteria which is used as 'OR' condition.



Now, in the lower part of the window, select the desired field by clicking ( $\blacktriangledown$ ) in each column on which you want to make your query (as shown). You will also notice that the name of the table appears just below the field (by default).



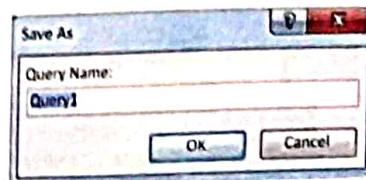
After making queries of different fields, click 'Run' button on the 'Results' group in the 'Design' tab of the Ribbon.



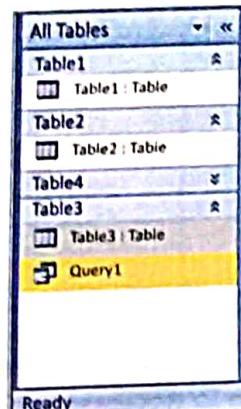
The result of the query is thus displayed in the datasheet view (as shown).

A screenshot of the Microsoft Access application interface. The main window shows a query results grid titled 'Query1'. The columns are 'Emp No.', 'Name', 'Qualification', 'Salary Drawn', and 'Achievement'. The data includes records for Mr. Sanjay Singh, Mr. Jaswant Sehgal, Mr. Mohan Kumar, Mr. Rupak Vajpayee, Mr. Kunal Vats, Mr. Manoj Kaushal, Mr. R.K. Menon, Mr. S.J. Garg, Mr. Dipak Suman, and Mr. Vishal Anand. The 'All Tables' pane on the left lists 'Table1', 'Table2', 'Table4', 'Table3', and 'Query1'. A 'Ready' status bar is at the bottom.

The system makes the query name as 'Query 1' (by default). Click on 'Save' and 'Save As' window appears on the screen. If you want to make any change in the Query name then enter an appropriate name in the box, otherwise click OK.

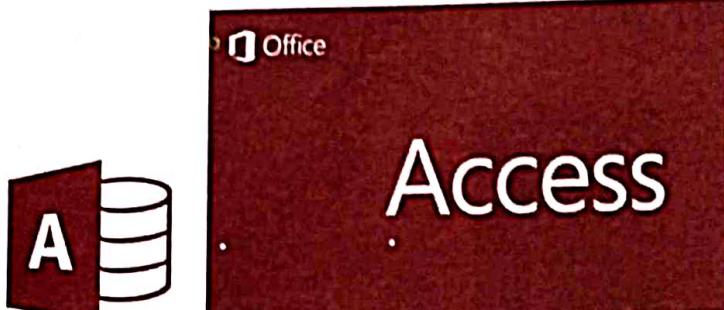


Thus, 'Query 1' is saved in the DK Database1, which is displayed in the left pane of the window.



## Updates on MS Access 2013

Microsoft Access 2013 has a different look that distinguishes it from Microsoft Access 2010. It has been especially designed for professional database analysis. The database files prepared in MS Access 2013 are saved with the same extension as those prepared in MS Access 2010 (\*.accdb). Here, you will learn about some new features that MS Access 2013 provides:



## Compatible with Windows 8

MS-Access 2013 is fully compatible with Windows 8 operating system. It also incorporates the latest touch technologies designed for laptop, tablet and mobile devices.

## Starting screen

MS Access opens with new start up screen that provides easy access to new database templates, recent databases and their locations in the system.

## Cloud access

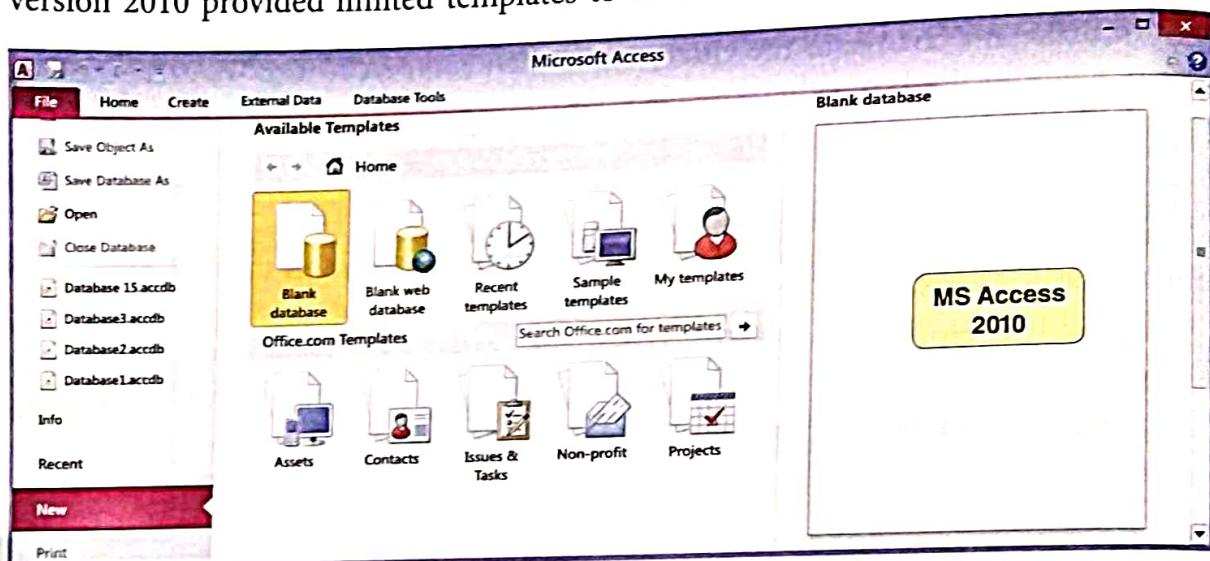
It is fully supported by Microsoft Office 365 account that enables you to save databases on the 'cloud'. It serves as a SharePoint document library or a Microsoft SkyDrive site that can be accessed and shared through web browsers. You can now take your work to the Internet without losing data.

## Video transcripts

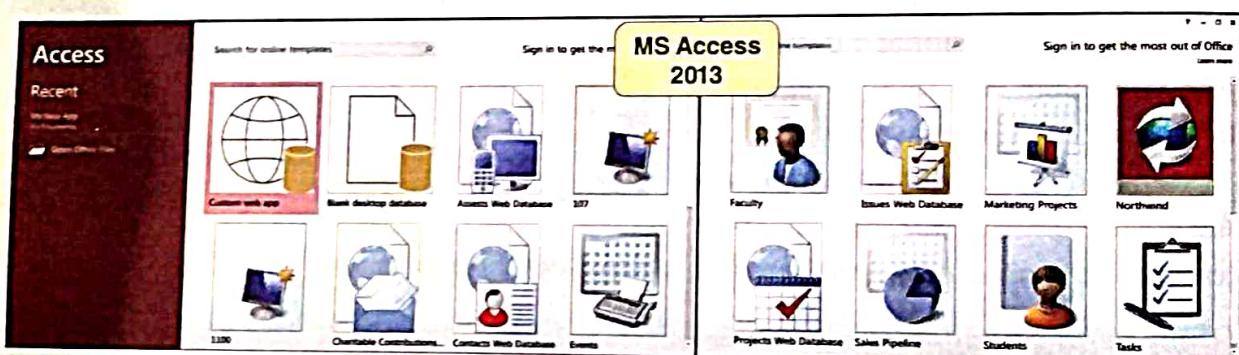
It has become easier to use Internet to access databases. Now, you can even project movie based databases on the Internet and reach more people.

## More Database Options

The version 2010 provided limited templates to create database.



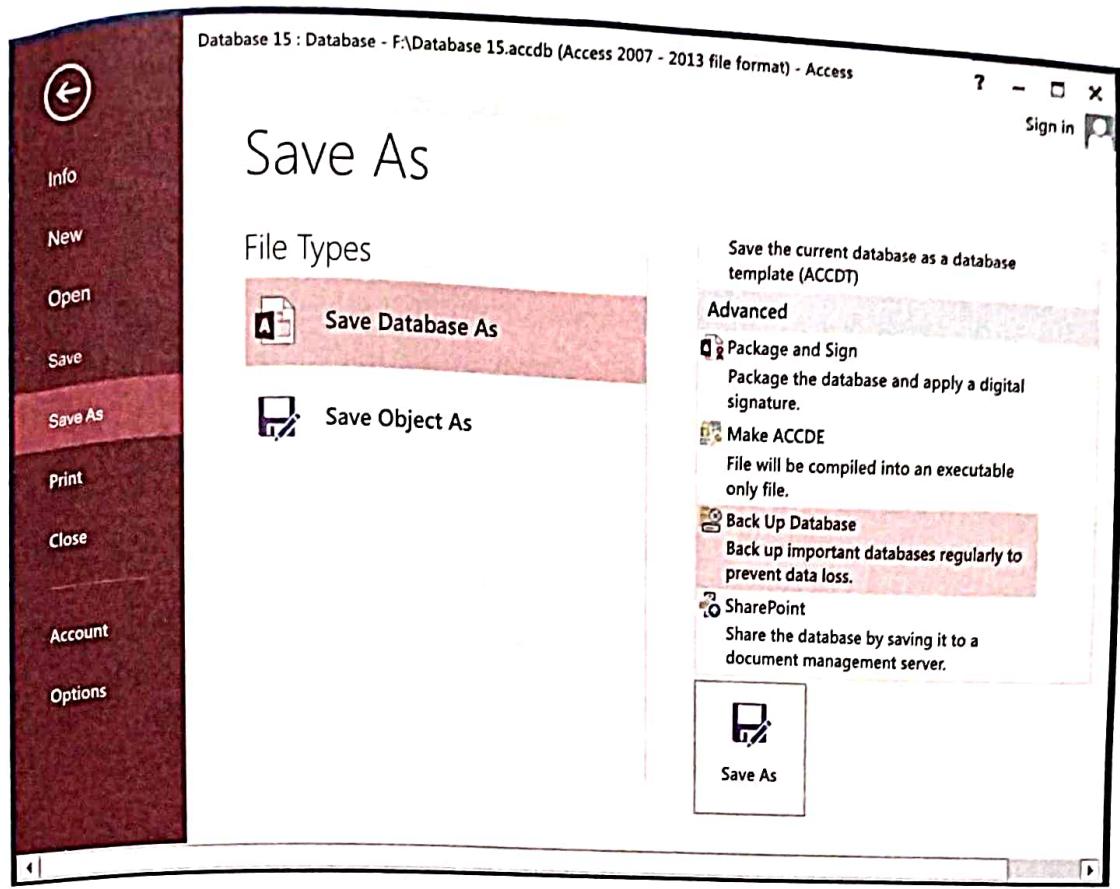
But, MS Access 2013 provides a range of pre-designed templates suitable for different kinds of work such as creating tables.



The interface is also bigger and easier to navigate as it now has built-in-buttons for editing items.

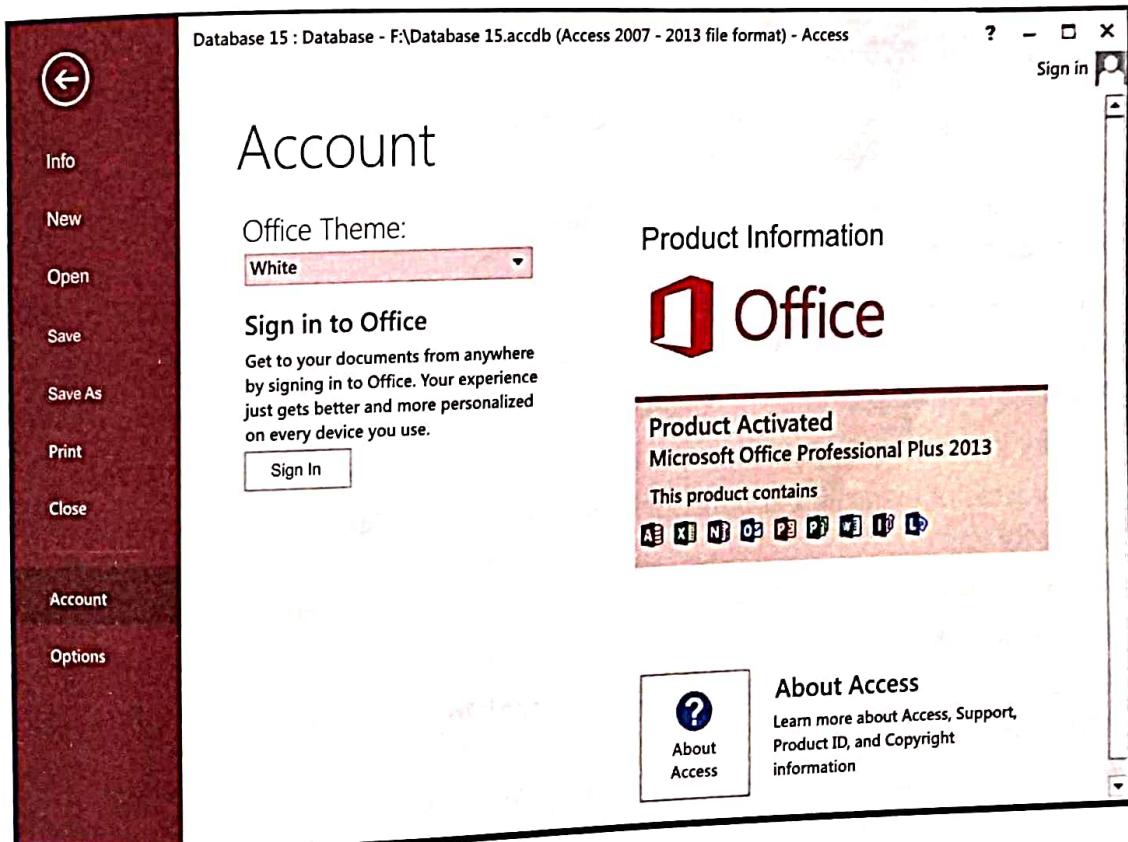
## Backup Data Option

Have you ever taken any appropriate actions to protect your database in the event of a hardware failure, disaster or other data loss? It is important to have a back-up of Access databases so that the information is not lost. Microsoft Access provides built-in functionality to help you back up your databases and protect your organisation.



## Linking to Account

MS Access 2013 provides an option to sign in to Office 365 to access all your databases. It also manages the Office Theme. By default, the office theme is white but you can change it to light gray or dark gray.



Information about Office product and its activation will also be displayed.

## Format Specifications

Generally, the system accepts and displays date, month and time in dd/mm/yy format. But, you can customise the format. The following table describes the different formats.

Format specification	Description
d	It displays the day as a number without a leading zero (e.g.: 1).
dd	It displays the day as a number with a leading zero (e.g.: 01).
ddd	It displays the day as an abbreviation (e.g.: Sun).
dddd	It displays the full name of the day. (for example, Sunday).
m	It displays the month as a number without a leading zero (e.g.: January is represented as 1).
mm	It displays the month as a number with a leading zero (e.g.: 12/01/15).
mmm	It displays the month as an abbreviation (e.g.: Jan).
mmmm	It displays the full month name (e.g.: January).
y	It displays the year number (0-9) without leading zeros.
yy	It displays the year in two-digit numeric format with a leading zero, if applicable.
yyy	It displays the year in four-digit numeric format (if applicable).
yyyy	It displays the year in four-digit numeric format.

Similarly, you can also customise time (second, minute, hour).

## Chapter at a Glance

- A collection of programs required to store and retrieve data from a database is called Database Management System (DBMS).
- It is an application package which arranges all records in an orderly manner so that information can be accessed easily.
- A DBMS package minimises duplication of data by integrating and sharing data files.
- MS Access is a Database Management package which is a part of MS Office.
- A table is defined as a group of related data organised in columns and rows in a datasheet.
- Primary key is a unique field by which records are identified in a table.
- The process of extracting information from a database as per the User's choice is known as 'Query'.
- The final copy of data manipulation in DBMS as per the user's choice is known as 'Report'.
- The default extension of a database file is \*.accdb.
- A table created in a database system can be seen in two different views viz. Design view and Datasheet view.
- In a database, query can be created in two different ways:
  - (i) Creating query in Design view
  - (ii) Creating query by using Wizard