

**Database:** A database is a collection interrelated data from which some information can be extracted. The collection of the data must be logically coherent with some inherent meaning.

**Database Management:** Earlier the organizations followed the fragmented approach to data processing by designing files to specially suit different application systems. Since the different departments in organizations have large amount of data to share this approach leads to some major disadvantages. The evaluation of database management was accompanied and promoted by:

1. Advances in computing: Hardware, OS and Networking.
2. Drawbacks of the prevalent approach of Data Management.
  - Data Redundancy: *Since the files and applications programs are written over a long period of time, data in the files is likely to be get repeated. This may also lead to inconsistency i.e. various copies of the same data may contain different information. Data redundancy could also occur due to duplication of data at different locations.*
  - Data Isolation: *Since data is scattered at various file, and files may be in different formats, it is difficult to write new application programs to retrieve the appropriate data.*

**Introduction to DBMS:** A **DBMS** is a general-purpose software system that enables users to define and manipulate databases. It provides an environment wherein data can be stored and retrieved from the databases easily and most efficiently. The main drawbacks of the DBMS that it cannot represent Many-to-Many relationship.

#### **Relational Model:**

- Data organized in terms of rows and columns in a table known as relations.
- The position of a row in a table is of no importance.
- The intersection of a row and a column must give a single value and not a set of values.
- Column names must be unique.

**Tables:** A fundamental structure of Relational Database Management System. It stores data in records (rows) and fields (columns).

**Creating A Blank Database In Access:** If you want to design your own database, you can create a blank database. Creating your own database gives you the flexibility to specify the tables to be included in the database. It thus offers you more flexibility and control over the design of a database. You can create a blank database by selecting it in the initial screen only. After creating the database structure, you can make tables in it, rename fields according to your requirements and enter data as well. You can also include new fields as well as delete unwanted fields from your database. You can delete the fields you don't require any longer by selecting the 'Delete' option from the 'Edit' menu. You can also specify a Primary key for your Tables. If you have not created a Primary Key for your Tables then Access will automatically ask you to create one when you close your database.

#### **Create a database using the Database Wizard**

1. When Microsoft Access first starts up, a dialog box is automatically displayed with options to create a new database or open an existing one. If this dialog box is displayed, click **Database Wizard**, and then click **OK**.  
If you have already opened a database or closed the dialog box that displays when Microsoft Access starts up, click **New Database** on the toolbar.
2. On the **Databases** tab, double-click the icon for the kind of database you want to create.
3. Specify a name and location for the database.
4. Click **Create** to start defining your new data

**Create a table by using the Table Wizard**

1. If you haven't already done so, switch to the Database window. You can press F11 to switch to the Database window from any other window.
2. Click **Tables** under **Objects**, and then click **New** on the Database window toolbar.
3. Double-click **Table Wizard**.
4. Follow the directions in the **Table Wizard** dialog boxes.

**Note** If you want to modify or extend the resulting table, you can do so in Design view when you have finished using the Table Wizard.

**Create a table from scratch in Design view**

1. If you haven't already done so, switch to the Database window. You can press F11 to switch to the Database window from any other window.
2. Click **Tables** under **Objects**, and then click **New** on the Database window toolbar.
3. Double-click **Design View**.
4. Define each of the fields in your table.

How?

5. Define a primary key field before saving your table.

How?

**Note** You don't have to define a primary key, but it's usually a good idea. If you don't define a primary key, Microsoft Access asks if you want it to create one for you when you save the table.

6. When you are ready to save your table, click **Save** on the toolbar, and then type a name for the table following Microsoft Access object-naming rules.

**Create a new table from existing data**

Microsoft Access provides two ways to create a table from existing data:

- You can import or link data from another Microsoft Access database or data in a variety of file formats from other programs.
- You can perform a make-table query to create a table based on data in a current table. For example, you can use make-table queries to archive old records, to make backup copies of your tables, to select a group of records to export to another database, or to use as a basis for reports that display data from a specific time.

**Primary Key:**

One or more fields whose value or values uniquely identify each record in a table. A primary key cannot allow Null values and must always have a unique index. A primary key is used to relate a table to foreign keys in other tables. A 'Primary Key' ensures that each record in the database remains unique and that there exist no two similar records. The primary key of a table performs two duties.

1. Because it is guaranteed to be unique on every record, it enforces entity integrity.
2. It serves as an anchor referential integrity.

**Foreign Key:**

A foreign key is a copy of the primary key in the parent table that is inserted in the child table to create relationship between two.

**Should I import or link a table?**

You can link a table only in a Microsoft Access database, not a Microsoft Access project.

**Reasons to import data into a table**

If you know that you will use your data only in Microsoft Access, you should import it. Microsoft Access generally works faster with its own tables, and, if you need to, you can modify the imported table to meet your needs just like any other table that is created in Microsoft Access.

**How should I import a table?**

1. To import Tables, on the **File Menu**, point to **Get External Data** and then click to **Import**.

- In the **Import** dialog box, in the Files of Types Box, Select **ODBC Databases()**.

### Reasons to link data from an external table

If a program other than Microsoft Access is also updating the data that you want to use in your Access database, you should link it. Using this approach, the current methods of updating, managing, and sharing the data can remain in place, and you can use Microsoft Access to work with the data as well. For example, you can create queries, forms, and reports that use the external data, combine external data with the data in Microsoft Access tables, and even view and edit the external data while others are using it in the original program.

You can also link tables from other Microsoft Access databases. For example, you might want to use a table from another Microsoft Access database that is shared on a network. This is particularly useful if you want to store all of your tables in one database on a network server, while keeping forms, reports, and other objects in a separate database that is copied among users of the shared database. You can easily split an existing database into two databases by using the **Database Splitter** subcommand on the **Database Utilities** command on the **Tools** menu.

### Add a field to a table in Design view

- Open the table in Design view.
- To insert the field within the table, click in the row below where you want to add the field, and then click **Insert Rows** on the toolbar.  
To add the field to the end of the table, click in the first blank row.
- Click in the **Field Name** column and type the name for the field, following Microsoft Access object-naming rules.
- In the **Data Type** column, keep the default (**Text**); or click in the **Data Type** column, click the arrow, and select the data type you want..
- In the **Description** column, type a description of the information this field will contain. This description is displayed on the status bar when adding data to the field and is included in the Object Definition of the table. The description is optional.
- If you want, set field properties for the field in the bottom part of the window.

### Field data types available in Microsoft Access

The following table summarizes all the field data types available in Microsoft Access, their uses, and their storage sizes.

Data type	Use for	Size
Text	Text or combinations of text and numbers, such as addresses. Also numbers that do not require calculations, such as phone numbers, part numbers, or postal codes..	Up to 255 characters. Microsoft Access only stores the characters entered in a field; it does not store space characters for unused positions in a Text field. To control the maximum number of characters that can be entered, set the <b>FieldSize</b> property.
Memo	Lengthy text and numbers, such as notes or descriptions..	Up to 64,000 characters.
Number	Numeric data to be used for mathematical calculations, except calculations involving money (use Currency type). Set the <b>FieldSize</b> property to define the specific Number type.	1, 2, 4, or 8 bytes. 16 bytes for Replication ID (GUID) only.

Date/Time	Dates and times.	8 bytes.
Currency	Currency values. Use the Currency data type to prevent rounding off during calculations. Accurate to 15 digits to the left of the decimal point and 4 digits to the right.	8 bytes.
AutoNumber	Unique sequential (incrementing by 1) or random numbers automatically inserted when a record is added.	4 bytes. 16 bytes for Replication ID (GUID) only.
Yes/No	Fields that will contain only one of two values, such as Yes/No, True/False, On/Off.	1 bit.
OLE Object	Objects (such as Microsoft Word documents, Microsoft Excel spreadsheets, pictures, sounds, or other binary data), created in other programs using the OLE protocol, that can be linked to or embedded in a Microsoft Access table. You must use a bound object frame in a form or report to display the OLE object.	Up to 1 gigabyte (limited by disk space).
Hyperlink	Field that will store hyperlinks. A hyperlink can be a UNC path or a URL.	Up to 64,000 characters.
Lookup Wizard	Creates a field that allows you to choose a value from another table or from a list of values using a combo box. Choosing this option in the data type list starts a wizard to define this for you.	The same size as the primary key field that is also the Lookup field; typically 4 bytes.

### Format Property

You can use the **Format** property to customize the way numbers, dates, times, and text are displayed and printed. For example, if you've created a Price text box, you can set its **Format** property to **Currency** and its **Decimal Places** property to 2 or Auto. If you enter **4321.678** in the control, the number would be displayed as \$4,321.68.

You can use one of the predefined formats or you can create a custom format by using formatting symbols.

**Validation Rule:** A rule that sets limits or conditions on what can be entered in one or more fields. A validation rule for the field is checked when you move to different record.

**Validation Text:** Access displays a message specified in validation text property whenever the rule violates. The maximum length for the Validation Text property setting is 255 characters.

**Default Value:** The Default Value property specifies text or an expression that's automatically entered in a control or field when a new record is created. For example, if you set the Default Value property for a text box control to =Now(), the control displays the current date and time. The maximum length for a Default Value property setting is 255 characters.

**Required:** You can use the Required property to specify whether a value is required in a field. If this property is set to Yes, when you enter data in a record, you must enter a value in the field, and the value cannot be Null.

**Allow Zero Length** You can use the Allow Zero Length property to specify whether a zero-length string (" ") is a valid entry in a table field.

**Input Mask:** You can use the **Input Mask** property to make data entry easier and to control the values users can enter in a text box control. For example, you could create an input mask for a Phone Number field that shows you exactly how to enter a new number: (\_\_\_\_) \_\_\_\_-\_\_\_\_. It is often easier to use the Input Mask Wizard to set the property for you.

**Retrieving Record Using Queries In Access:** A Database is a huge collection of data. Think of a situation when you want to access a particular piece of data. Let us consider a Database of students. You want to access the records of only those students whose names start with 's'. Query is the feature that handles problem of this kind. A Query can be used to find out specific information from your database. You can construct a Query and specify the criteria as names beginning with 's'. Access offers different kinds of Queries to work with. For example, there is the 'Select Query' that lets you retrieve some specific data based on your requirements. The 'Select Query' will enable you to set some criteria on the basis of which the data is to be retrieved. Selecting the Query option in the database window can make queries. You can specify the criteria and then run the query by clicking on the 'Run Query' button on the toolbar. The result sent back by the Query can be sorted according to your requirements. The result can be arranged in the ascending or the descending order.

**Queries:** There are many types of queries in Access which are briefly discussed below:

1. **Select Query:** A select query is the most common type of query. It retrieves data from one or more tables and displays the results in a datasheet where you can update the records (with some restrictions). You can also use a select query to group records and calculate sums, counts, averages, and other types of totals.
2. **Parameter Query:** A parameter query is a query that when run displays its own dialog box prompting you for information, such as criteria for retrieving records or a value you want to insert in a field. You can design the query to prompt you for more than one piece of information
3. **Crosstab Queries:** A crosstab query displays summarized values (sums, counts, and averages) from one field in a table and groups them by one set of facts listed down the left side of the datasheet and another set of facts listed across the top of the datasheet.
4. **Action Queries:**
  - a. **Delete Query:** Deletes a group of records from one or more tables. For example, you could use a delete query to remove products that are discontinued or for which there are no orders. With delete queries, you always delete entire records, not just selected fields within records.
  - b. **Append Query:** Adds a group of records from one or more tables to the end of one or more tables. For example, suppose that you acquire some new customers and a database containing a table of information on those customers. To avoid typing all this information in, you'd like to append it to your Customers table.
  - c. **Update Query:** Makes global changes to a group of records in one or more tables. For example, you can raise prices by 10 percent for all dairy products, or you can raise salaries by 5 percent for the people within a certain job category. With an update query, you can change data in existing tables.
  - d. **Make Table Query:** Creates a new table from all or part of the data in one or more tables.

## 5. SQL Queries

- a. **Union Query:** This type of query combines fields (columns) from one or more tables or queries into one field or column in the query's results. For example, if you have six vendors that send new inventory lists each month, you can combine these lists into one result set using a union query, and then create a make-table query based on the union query to make a new table.
- b. **Pass Through Query:** This type of query sends commands directly to ODBC databases, such as Microsoft FoxPro, using commands that are accepted by the server. For example, you can use a pass-through query to retrieve records or change data.
- c. **Data definition Query:** This type of query creates, deletes, alters tables, or creates indexes in a database.
- d. **Sub Query:** This type of query consists of an SQL SELECT statement inside another select query or action query. You can enter these statements in the **Field** row of the query design grid to define a new field, or in the **Criteria** row to define criteria for a field.

**Creating Forms In Access:** Forms are used in MS Access for the visual presentation of data. They can display one record at a time so that you can easily edit your data as well as enter new data. Forms provide a more structured view of your data. Access offers you a form wizard to assist you in designing forms. The form wizard provides several types of layouts, which determine the arrangement of information on the form. At the same time, you can also specify a style for your Forms. Styles enhance the appearance of your Forms. After the form is created, it displays the field names that you have selected as well as the data for the first record. It also displays some navigation buttons at the bottom of the form so as to enable you to move to different records. Here you can add, delete and edit your data. Moreover, you can also sort your data in the ascending or the descending order. For sorting data in ascending or descending order, select 'Sort' option from the 'Records' menu and then select ascending or descending option.

### Create a form by using AutoForm

AutoForm creates a form that displays all fields and records in the underlying table or query. If the record source you select has related tables or queries, the form will also include all the fields and records from those record sources.

1. In the Database window, click **Forms** under **Objects**.
2. Click the **New** button on the Database window toolbar.
3. In the **New Form** dialog box, click one of the following wizards:
  - o AutoForm: *Columnar*: Each field appears on a separate line with a label to its left.
  - o AutoForm: *Tabular*: The fields in each record appear on one line, with the labels displayed once at the top of the form.
  - o AutoForm: *Datasheet*: The fields in each record appear in row-and-column format, with one record in each row and one field in each column. The field names appear at the top of each column.
4. Click the table or query that contains the data you want to base your form on.
5. Click OK.

Microsoft Access applies the last autoformat you used to the form. If you haven't created a form with a wizard before or haven't used the AutoFormat command on the Format menu, it uses the Standard autoformat.

### Create a form with a wizard

1. In the Database window, click Forms under Objects.

2. Click the New button on the Database window toolbar.
3. In the New Form dialog box, click the wizard that you want to use. A description of the wizard appears in the left side of the dialog box.
4. Click the name of the table or other record source that includes the data you want to base your form on.
5. Click OK.

### **Create a report using Auto Report**

AutoReport creates a report that displays all fields and records in the underlying table or query.

1. In the Database window, click Reports under Objects.
2. Click the New button on the Database window toolbar.
3. In the New Report dialog box, click one of the following wizards:
  - o AutoReport: Columnar. Each field appears on a separate line with a label to its left.
  - o AutoReport: Tabular. The fields in each record appear on one line, and the labels print once at the top of each page.
4. Click the table or query that contains the data you want to base your report on.
5. Click OK.

### **Create a blank report and select a record source**

1. In the Database window, click **Reports** under **Objects**.
2. Click the **New** button on the Database window toolbar.
3. In the **New Report** dialog box, click **Design View**.
4. Click the name of the table or query that contains the data you want to base your report on. (If you want an unbound report, don't select anything from this list.)
5. Click **OK**.