

Catering and Tourism Training Institute

Learning Guide

LEVEL IV

FOS, FBSS, HOMA, HKL

(2nd Year Regular & Extension)

Unit of Competence:-Design Database

Module Title:- Designing Database

Module Code:- CST FBS4 09 0912

Definition of Database:-

A database is a self-describing collection of integrated records.

From this definition of Database, it is important to understand each part of this definition.

A database is Self-describing

This implies database contains, in addition to the user source data, a description of its own structure. This description is called a Data Dictionary (also called a metadata).

A database is a collection of integrated records

Database is formed from the standard hierarchy of data as:

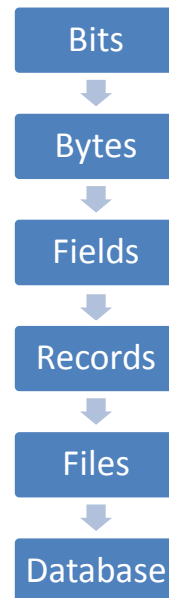
Bits are aggregated into Bytes or Characters;

Characters are aggregated into Fields;

Fields are aggregated into Records;

Records are aggregated into Files; and

Finally, Files are aggregated into Database.



Database includes:-Files of user data, Description of itself in the metadata, indexes that are used to represent relationships among the data and Application Metadata (the structure of data entry form, or report).

Answer the following questions.

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1. Define Database briefly and clearly?/2 points/
2. Before to be called as database, the database formed from the standard hierarchy of data as **bit, byte, field, record, file and database**. Describe the standards. /3 points/
3. What are the objectives of designing database? List and describe the objectives. /3 points/
4. Explain the use of Primary Key. /3 points/
5. Describe the types of data type in a database. /4 points/

Information Sheet #2

LO2: Develop Database

Database Design Principles

In creating database, database schema defines database's structure, its tables, relationships, domains and business rules. Database schema is a design, the foundation on which database and applications are built.

Database design tools have a set of tools to facilitate the design and creation of the database and its applications. It typically includes tools for creating tables, forms, queries, and reports. Database can be modeled by Relational database model, Hierarchical Database Model, Network and Object models. In this module database design for relational database will be discussed.

A relational database organizes the data in tables (or relations). A table is made up of Rows and Columns

Database Design Objectives

- Eliminate Redundancy
- Ensure Data Integrity
- Ensure Accuracy , etc
- Ensure Consistency

Database Design is more art than science, as you have to make many decisions.

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The design process consists of the following steps:

1) **Determine the purpose of your database**

This helps you to prepare the remaining steps.

2) **Find and organize the information required**

Gather all of the types of information you might want to record in the database, such as product name and order number.

3) **Divide the information into tables**

Divide your information items into major entities or subjects, such as Products or Orders. Each subject then becomes a table.

4) **Turn information items into columns**

Decide what information you want to store in each table. Each item becomes a field, and is displayed as a column in the table. For example, an Employees table might include fields such as Last Name and Hire Date.

5) **Specify primary keys**

Choose each table's primary key. The primary key is a column that is used to uniquely identify each row. An example might be Product ID or Order ID.

6) **Set up the table relationships**

Look at each table and decide how the data in one table is related to the data in other tables. Add fields to tables or create new tables to clarify the relationships, as necessary.

7) **Refine your design**

Analyze your design for errors. Create the tables and add a few records of sample data. See if you can get the results you want from your tables. Make adjustments to the design, as needed.

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Apply the data normalization rules to see if your tables are structured correctly. Make adjustments to the tables, as needed.

Information Sheet #3. Database Software Functions

Ms Access is one of the application software that allows you to manage your information in one database file. Within Access there are four major areas: **Tables, Queries, Forms and Reports**

Operation Sheet #1. Database Software Functions

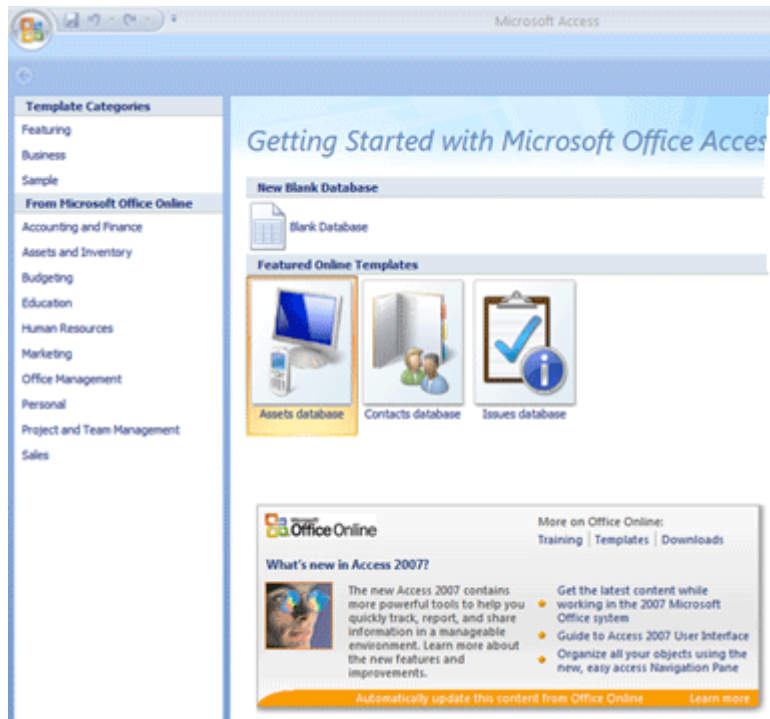
Starting MS Access


To start Ms Access follow the following steps

Start → All Programs → Microsoft Office → Microsoft Office Access 2007

Creating new Database

When you start Office Access 2007 by clicking the Windows **Start** button or a desktop shortcut (but not when you click on a database), the **Getting Started with Microsoft Office Access** page appears. This page shows what you can do to get started in Office Access 2007.



For example, you can create a new blank database, create a database from a template, or open a recent database (if you have opened some databases before). You can also go directly to Microsoft Office Online to learn more about 2007 Microsoft Office system and Office Access 2007, or you can click the **Microsoft Office Button**  and use the menu to open an existing database.

Open a new blank database

1. Start Access from the **Start** menu or from a shortcut.

The Getting Started with Microsoft Office Access page appears.

2. On the **Getting Started with Microsoft Office Access** page, under **New Blank Database**, click **Blank Database**.
3. In the **Blank Database** pane, in the **File Name** box, type a file name or use the one that is provided for you.
4. Click **Create**.

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The new database is created, and a new table is opened in Datasheet view.

Office Access 2007 provides a number of templates with the product, and you can download more from Microsoft Office Online. What is a template? In the context of Office Access 2007, it is a predesigned database complete with professionally designed tables, forms, and reports. Templates give you a big head start when you create a new database.

Based on the database design the following database objects can be created

- **Tables** store your data in your database
- **Queries** ask questions about information stored in your tables
- **Forms** allow you to view data stored in your tables
- **Reports** allow you to print data based on queries/tables that you have

Information Sheet#4

Table fields and attributes

Creating Tables

A table contains data about a particular subject, such as employees or products. Each *record* in a table contains information about one item, such as a particular employee. A record is made up of *fields*, such as name, address and telephone number. A record is also commonly called a row, and a field is also commonly called a column.

ID	Company	First Name	Last Name
1	Company A	Anna	Bedecs
2	Company B	Antonio	Gratacos Solsona
3	Company C	Thomas	Axen

- 1) Record or records
- 2) Field or column

Your database can contain many tables, each storing information about a different subject. Each table can contain many fields of different types, including text, numbers, dates, and pictures.

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The following list shows some common examples of tables you might create.

- A customers table that lists your company's customers and their addresses
- A catalog of products you sell, including prices and pictures for each item
- A tasks table that tracks tasks and due dates
- An inventory of equipment or stock on hand


You should plan and design your database carefully to ensure its correctness and to avoid having to make too many changes later. For information about planning and designing your database, see the article [Database design basics](#)

A simple database, such as a contact list, might use only a single table. Many databases, however, use several tables. When you create a new database, you create a new file on your computer that acts as a container for all of the objects in your database, including your tables.

You can create a table by creating a new database, by inserting a table into an existing database, or by importing or linking to a table from another data source — such as a Microsoft Office Excel 2007 workbook, a Microsoft Office Word 2007 document, a text file, or another database. When you create a new blank database, a new empty table is automatically inserted for you. You can then enter data to start defining your fields.

Operation Sheet #2. Creating a Table with field properties


Create a new table in a new database

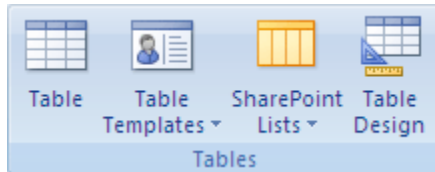
1. Click the **Microsoft Office Button** , and then click **New**.
2. In the **File Name** box, type a file name. To change the location, click the folder icon to browse.
3. Click **Create**.

The new database is opened, and a new table named Table1 is created and opened in Datasheet view.

Create a new table in an existing database

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1. Click the **Microsoft Office Button** , and then click **Open**.
2. In the **Open** dialog box, select and open the database.
3. On the **Create** tab, in the **Tables** group, click **Table**.



The following table describes the data types available for fields in Office Access 2007.

Data type	Stores	Size
Text	Alphanumeric characters Use for text, or text and numbers that are not used in calculations (for example, a product ID).	Up to 255 characters.
Memo	Alphanumeric characters (longer than 255 characters in length) or text with rich text formatting. Use for text greater than 255 characters in length, or for text that uses rich text formatting. Notes, lengthy descriptions, and paragraphs with formatting such as bold or italics are good examples of where you would use a Memo field.	Up to 1 gigabyte of characters, or 2 gigabytes of storage (2 bytes per character), of which you can display 65,535 characters in a control.
Number	Numeric values (integers or fractional values). Use for storing numbers to be used in calculations, except for monetary values (use the Currency for data type for monetary values).	1, 2, 4, or 8 bytes, or 16 bytes when used for replication ID.

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Date/Time	<p>Dates and times.</p> <p>Use for storing date/time values. Note that each value stored includes both a date component and a time component.</p>	8 bytes.
Currency	<p>Monetary values.</p> <p>Use for storing monetary values (currency).</p>	8 bytes.
AutoNumber	<p>A unique numeric value that Office Access 2007 automatically inserts when a record is added.</p> <p>Use for generating unique values that can be used as a primary key. Note that AutoNumber fields can be incremented sequentially, by a specified increment, or chosen randomly.</p>	4 bytes or 16 bytes when used for replication ID.
Yes/No	<p>Boolean values.</p> <p>Use for True/False fields that can hold one of two possible values: Yes/No or True/False, for example.</p>	1 bit (8 bits = 1 byte).
OLE Object	<p>OLE objects or other binary data.</p> <p>Use for storing OLE objects from other Microsoft Windows applications.</p>	Up to 1 gigabyte.
Attachment	<p>Pictures, Images, Binary files, Office files.</p> <p>This is the preferred data type for storing digital images and any type of binary file.</p>	<p>For compressed attachments, 2 gigabytes.</p> <p>For uncompressed attachments, approximately 700k, depending on the degree to which the attachment can be compressed.</p>
Hyperlink	Hyperlinks.	Up to 1 gigabyte of characters, or 2 gigabytes

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	Use for storing hyperlinks to provide single-click access to Web pages through a URL (Uniform Resource Locator) or files through a name in UNC (universal naming convention) format. You can also link to Access objects stored in a database.	of storage (2 bytes per character), of which you can display 65,535 characters in a control.
Lookup Wizard	Not actually a data type; instead, this invokes the Lookup Wizard. Use to start the Lookup Wizard so you can create a field that uses a combo box to look up a value in another table, query or list of values.	Table or query based: The size of the bound column. Value based: The size of the Text field used to store the value

A new table is inserted in the database and the table is opened in Datasheet view.

Information Sheet #5

Primary Key

Primary key is a field that uniquely identifies a record. So from the given set of fields we should assign that do not repeat itself in the record. For example IDNO is given uniquely for every entity in the organization

NOTE:-For phone numbers, part numbers, and other numbers that you don't intend to use for mathematical calculations, you should select the Text data type, instead of the Number data type.

For the Text and Number data types, you can specify the field size or data type more specifically by setting the **FieldSize** property.

Information Sheet#6.

Table Relationship


You can create a table relationship by using the Relationships window, or by dragging a field onto a datasheet from the **Field List** pane. When you create a relationship between tables, the common fields are not required to have the same names, although it is often the case that they do. Rather, those fields must have the same data type. If the primary key field is an AutoNumber field, however, the

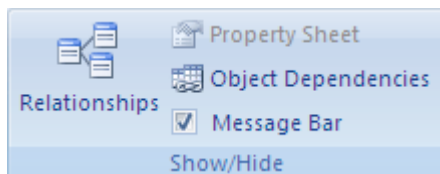
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foreign key field can be a Number field if the **FieldSize** property of both fields is the same. For example, you can match an AutoNumber field and a Number field if the **FieldSize** property of both fields is Long Integer. When both common fields are Number fields, they must have the same **FieldSize** property setting.

Operation Sheet #4.

Creating Table Relationship

1. Click the **Microsoft Office Button** , and then click **Open**.
2. In the **Open** dialog box, select and open the database.
3. On the **Database Tools** tab, in the **Show/Hide** group, click **Relationships**.



4. If you have not yet defined any relationships, the **Show Table** dialog box automatically appears. If it does not appear, on the **Design** tab, in the **Relationships** group, click **Show Table**.

The **Show Table** dialog box displays all of the tables and queries in the database. To see only tables, click **Tables**. To see only queries, click **Queries**. To see both tables and queries, click **Both**.

5. Select one or more tables or queries and then click **Add**. When you have finished adding tables and queries to the Relationships window, click **Close**.

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6. Drag a field (typically the primary key) from one table to the common field (the foreign key) in the other table. To drag multiple fields, press the CTRL key, click each field, and then drag them.

The **Edit Relationships** dialog box appears.

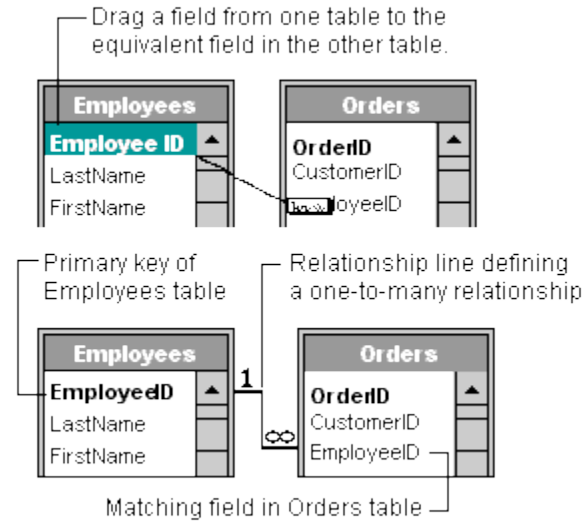
7. Verify that the field names shown are the common fields for the relationship. If a field name is incorrect, click the field name and select a new field from the list.

To enforce referential integrity for this relationship, select the **Enforce Referential Integrity** check box. For more information about referential integrity, see the Understanding Referential Integrity and the Enforce Referential Integrity sections.

8. Click **Create**.

The relationship line is drawn between the two tables. If you selected the **Enforce Referential Integrity** check box, the line appears thicker at each end. In addition, again only if you selected the **Enforce Referential Integrity** check box, the number **1** appears over the thick portion of the line on one side of the relationship, and the infinity symbol (∞) appears over the thick portion of the line on the other side.

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NOTES


- **To create a one-to-one relationship** Both of the common fields (usually the primary key and foreign key fields) must have a unique index. This means the **Indexed** property for these fields should be set to **Yes (No Duplicates)**. If both fields have a unique index, Access creates a one-to-one relationship.
- **To create a one-to-many relationship** The field on the "one" side (typically the primary key) of the relationship must have a unique index. This means the **Indexed** property for this field should be set to **Yes (No Duplicates)**. The field on the "many" side should *not* have a unique index. It can have an index, but it must allow duplicates. This means the **Indexed** property for this field should be set to either **No**, or **Yes (Duplicates OK)**. When one field has a unique index and the other does not, Access creates a one-to-many relationship.

Create a table relationship by using the Field List pane

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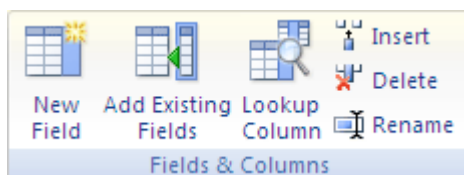
In Office Access 2007, you can add a field to an existing table that is open in Datasheet view by dragging it from the **Field List** pane. The **Field List** pane shows fields available in related tables and also fields available in other tables. When you drag a field from an "other" (unrelated) table and then complete the Lookup Wizard, a new one-to-many relationship is automatically created between the table in the **Field List** pane and the table to which you dragged the field. This relationship, created by Access, does not enforce referential integrity by default. To enforce referential integrity, you must edit the relationship. See the section Change a table relationship for more information.

Open a table in Datasheet view

1. Click the **Microsoft Office Button** , and then click **Open**.
2. In the **Open** dialog box, select and open the database.
3. In the Navigation pane, right-click the table to which you want to add the field and create the relationship, and click **Datasheet View** on the shortcut menu.

Open the Field List pane

- On the **Datasheet** tab, in the **Fields & Columns** group, click **Add Existing Fields**.



The **Field List** pane appears.

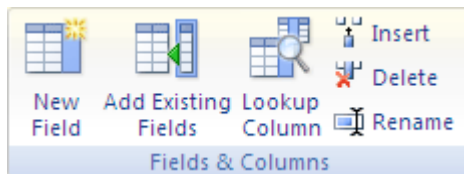
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The **Field List** pane shows all of the other tables in your database, grouped into categories. When you work with a table in Datasheet view, Access displays fields in either of two categories in the **Field List** pane: **Fields available in related tables** and **Fields available in other tables**. The first category lists all of the tables that have a relationship with the table you are currently working with. The second category lists all of the tables with which your table does not have a relationship.

In the **Field List** pane, when you click the plus sign (+) next to a table name, you see a list of all the fields available in that table. To add a field to your table, drag the field that you want from the **Field List** pane to the table in Datasheet view.

Add a field and create a relationship from the Field List pane

1. On the **Datasheet** tab, in the **Fields & Columns** group, click **Add Existing Fields**.



The **Field List** pane appears.

2. Under **Fields available in other tables**, click the plus sign (+) next to a table name to display the list of fields in that table.
3. Drag the field that you want from the **Field List** pane to the table that is open in Datasheet view.
4. When the insertion line appears, drop the field in position.

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The **Lookup Wizard** starts.

5. Follow the instructions to complete the **Lookup Wizard**.

The field appears in the table in Datasheet view.

When you drag a field from an "other" (unrelated) table and then complete the Lookup Wizard, a new one-to-many relationship is automatically created between the table in the **Field List** and the table to which you dragged the field. This relationship, created by Access, does not enforce referential integrity by default. To enforce referential integrity, you must edit the relationship. See the section [Change a table relationship for more information](#)

Information Sheet #6.

Entering data in a Table

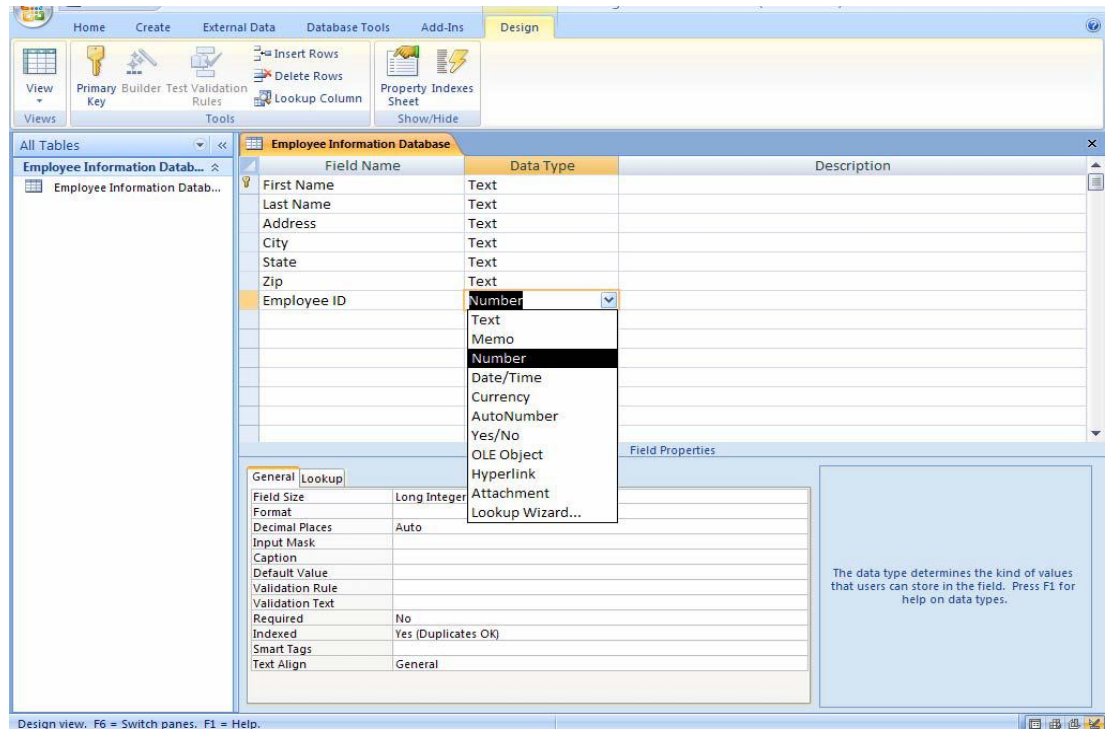
To Enter Fields in a Table:

- 1) Type a name for the first field in the table
- 2) Press **Enter**
- 3) Select a data type
- 4) Press **Enter**
- 5) Type a description for the field
- 6) Press **Enter**

Continue this until all necessary fields have been entered into the table.

Note: The order that you enter the field names is the order the fields will appear in the table and on a form.

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To View the Datasheet:

Click the View button on the Ribbon

Once you have entered the fields and set the data types it is now time to enter the records in a table.

To Enter Data in a Table:

- 1) Make sure you are in **Datasheet View**
- 2) Enter the data into the table by pressing the tab key to move from one cell to another
- 3) When you have completed the record (row), press **Enter then save it**

Self-check test #2

LO2: Develop Database

Create a blank database for the following scenario./15 points/

CTTI is an organization that contains Departments and Employees. An employee belongs to only one department, but the departments can have more than one employee.

1. Create a database called Human Resource Management/HRM/ and save in your folder.
2. Create two tables **Department** /DID, DNAME / and **Employee**/EID,ENAME, EAGE, EGENDER, ESALARY, EDEPARTMENT/
3. Assign primary key to the tables.

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4. Create relationship between the two tables.
5. Use departments /Finance, Audit, Tourism, Hotel, Planning and Support
5. Add at least 15 records for employee tables accordingly.

Information Sheet#7.

LO3: Develop queries, forms & report

Creating Query

You use Queries to view, change, and analyze data in different ways. You can also use them as a source of records for forms and reports.

Operation sheet #2

Creating Query

To Create a Query:

- 1) Click the **Create** tab on the Ribbon
- 2) Click **Query Design** icon
- 3) Double-click **Create Query** in Design View
- 4) Select the table that you would like to base your Query on
- 5) Click **Add**
- 6) Close the **Show Table** window

The table(s) will now be displayed in the upper part of the Query Design Screen by boxes containing the tables' fields.

- 7) Double click on the field names in the field list window which you would like to include in the Query

Defining Criteria in the Query

In order to control which records are displayed, you must define criteria in a Query. The most common type of Query is the **Select Records Query** which will be discussed below.

To Define Criteria for your Query:

- 1) Position your cursor in the criteria row in the field for which you wish to define the criteria for
- 2) Enter the criteria
- 3) Click the Run Query button

Operation sheet #2

Creating Report

Reports can be based on tables or queries and can be made with the Report Wizard.

To Create a Report Using the Report Wizard:

- 1) Click the **Create** tab on the Ribbon
- 2) Click the **Report Wizard** icon
- 3) Select the table or query upon which the report will be based
- 4) Select the fields that you want to include on the report by double clicking on them
- 5) Click **Next**
- 6) If you would like to add grouping to your report, select the field you wish to group by double clicking on it (*Example: City*)

Self check Test #3

LO3: Create queries and reports

Perform the activities below based on the above tables.

1. Create query that displays employees whose age is >25.
2. Create query that displays female employee whose age is 30
3. Create query that shows male employee from Finance department or male.
3. Create Employee report

Information sheet #8

LO4: Test & Finalize Database

Create your own database as per discussed above.

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Apply the rules and principles as explained above