

UNIT-3 RELATIONAL DATABASE MANAGEMENT SYSTEMS (BASIC)

SESSION 1: APPRECIATE THE CONCEPT OF DATABASE MANAGEMENT SYSTEM

SESSION 2: CREATE AND EDIT TABLES USING WIZARD AND SQL COMMANDS

SESSION 3: PERFORM OPERATIONS ON TABLE

SESSION 4: RETRIEVE DATA USING QUERY

SESSION 5: CREATE FORMS AND REPORTS USING WIZARD

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SESSION 1: APPRECIATE CONCEPT OF DATABASE MANAGEMENT SYSTEM

Relevant Knowledge

A database is an organized collection of data. You can visualize it as a container of information.

The data is typically organized to model relevant aspects of reality (for example, the availability of rooms in hotels), in a way that supports processes requiring this information (for example, finding a hotel with facilities such as Laundry, GYM etc...).

Suppose if you own a stationary shop, you need to keep detailed records of the materials available in your shop. You also need to store information about pricing, stock levels for reordering, old stocks, etc. While in the manual system, you would maintain several files with different bits of information; in the computerized system you would use database programs such as Microsoft Access, OpenOffice.org Base, and MySQL, to organize the data as per your business need.

The database concept has evolved since the 1960s to ease increasing difficulties in designing, building, and maintaining complex information systems (typically with many concurrent end-users, and with a large amount of diverse data).

In this lesson, you will learn database concepts and to work with a Database Management System (DBMS).

Database Management System

A database management system is a software package with computer programs that controls the creation, maintenance, and use of a database. It allows organizations to conveniently develop databases for various applications. A database is an integrated collection of data records, files, and other objects. A DBMS allows different user application programs to concurrently access the same database.

Well known DBMSs include Oracle, IBM DB2, Microsoft SQL Server, Microsoft Access, PostgreSQL, MySQL, FoxPro, and SQLite.

Data can be organized into two types:

- **Flat File:** Data is stored in a single table. Usually suitable for less amount of data.
- **Relational:** Data is stored in multiple tables and the tables are linked using a common field. Relational is suitable for medium to large amount of data.

Database Servers

Database servers are dedicated computers that hold the actual databases and run only the DBMS and related software. Typically databases available on the database servers are accessed through command line or graphic user interface tools referred to as Frontends; database servers are referred to as Back-ends. Such type of data access is referred to as a client-server model.

Advantages of Database

- **Reduces Data Redundancy**

The database management systems contain multiple files that are to be stored in many different locations in a system or even across multiple systems. Because of this, there were sometimes multiple copies of the same file which lead to data redundancy.

This is prevented in a database as there is a single database and any change in it is reflected immediately. Because of this, there is no chance of encountering duplicate data.

- **Sharing of Data**

In a database, the users of the database can share the data among themselves. There are various levels of authorisation to access the data, and consequently the data can only be shared based with the authorized users.

Many remote users can also access the database simultaneously and share the data between themselves.

- **Data Integrity**

Data integrity means that the data is accurate and consistent in the database. Data Integrity is very important as there are multiple databases in a DBMS. All of these databases contain data that is visible to multiple users. So it is necessary to ensure that the data is correct and consistent in all the databases and for all the users.

- **Data Security**

Data Security is an important concept in a database. Only authorised users should be allowed to access the database and their identity should be authenticated using a username and password. Unauthorised users should not be allowed to access the database under any circumstances as it violates the integrity constraints.

- **Privacy**

The privacy rule in a database states that only the authorized users can access a database according to its privacy constraints. To secure data levels are set in the database and a user can only view the data which is allowed to be seen. For example - In social networking sites, access constraints are different for different accounts a user may want to access.

- **Backup and Recovery**

Database Management System automatically takes care of backup and recovery. The users don't need to backup data periodically because this is taken care of by the DBMS. Moreover, it also restores the database after a crash or system failure to its previous condition.

- **Data Consistency**

Data consistency is ensured in a database because there is no data redundancy. Data Consistency means there should be multiple mismatching copies of the same data. All data appears consistently across the database and must be same for all the users viewing the database. Moreover, any changes made to the database are immediately reflected to all the users and there is no data inconsistency.

Features of Database

Let's look at the example of your address book. What do you store in an address book? You may have people's name, address, phone number and maybe even their birthdays. There is a common element here – people. In this example, each person is considered an **“ITEM”**.

So, database will store information about that person. When you were recording information in your address book, what did you ask the people? What is your address? What is your phone number? etc. Each question that we ask about our ITEM is a **“field”**. Now, say you make new friends and want to add their information to your address book. You will ask questions, get the answers and create a new **“record”**. So, a record is a set of information (made up of fields) stored in your database about one of the items. A **“value”** is the actual text or numerical amount or date that you put in while adding

information to your database. When you put all the information together in a grid (like you do in a spreadsheet), a collection of similar records creates a table.

There are some key features of a database:

1. A database can have one or many tables. An address book example is a very simple one, in real world there are many more details involved. A big company would have in its database, one table for its products, one table for its suppliers, one table for its customer details, one for orders received and maybe many others.
2. Each table in a database contains information about one type of item. So, a database is *a container that holds tables and other objects and manages how they can be used*.
3. Another very important thing to remember is that when we put in information, we may have people with the same name (there can be more than one Charu Arora) or the same address (members of a family). But when creating a database an important feature is **record uniqueness** in every table. it is important to be able to distinguish between different items having duplicate values.

Uniqueness helps to avoid accidental duplication of records caused by user or computer error. This can be achieved by using some number or value that uniquely identifies a record. If such a unique value does not exist in your fields, as the database designer, you can create a special additional field in a table where unique numbers or values can be assigned for each new entry. Therefore, every table has a key field which ensures that there are 100% unique values throughout the database.

4. Every database table should have one or more fields designated as key. You can assign a unique value to this key for differentiating records that may have similar names or addresses.

Look at the following example of student database:

Name	Standard	Section
Ram	X	A
Ravi	X	A
Ravi	X	A
Sanjay	X	B

In this table, it will be extremely difficult to differentiate between student records as they have names that are similar. To differentiate, you can add additional field - roll number - that will be unique for each record (example below).

Rollno	Name	Standard	Section
19	Ram	X	A
20	Ravi	X	A
21	Ravi	X	A
22	Sanjay	X	B

EXAMPLE OF RDBMS

You had used the example of an address book in the previous section. An address book uses only one table. But look at a different situation. If you are a dealer selling a single type of item and want to record details of your sales in the past month and also want the details of the client who purchased the item (name, address, phone, date purchased, number of items bought etc), what would you do?.

You create a table Sales with all the details:

OrderID	Customer Name	Customer Address	Phone	Sale Date	#ItemsBought
000789	Sheela Arora	xxxxxxNoida	2444490	01/11/12	3
000790	Vaibhav Mittal	xxxxGhaziabad	2443358	01/11/12	4
000791	Saurabh Tayal	xxxxNew Delhi	2678945	02/11/12	12
000792	Vaibhav Mittal	xxxxGhaziabad	2443258	02/11/12	23
000793	Prashant Singh	xxxxRohtak	6784534	02/11/12	4
000794	Shila Arora	xxxxxxNoida	2444490	03/11/12	18
000795	Vaibhav Mittal	xxxxGhazibad	2443258	03/11/12	45

Do you see a problem here? Every time you sell an item to Sheela or Vaibhav or any other customer (client) you need to store the details again. So, what is the solution? Create one table for client details and another for sale details. Since each record has to be unique, you can insert a ClientID field to uniquely identify each client in the client table. In the Sales table, you would give a point of reference which “points” to a particular record in the Client table.

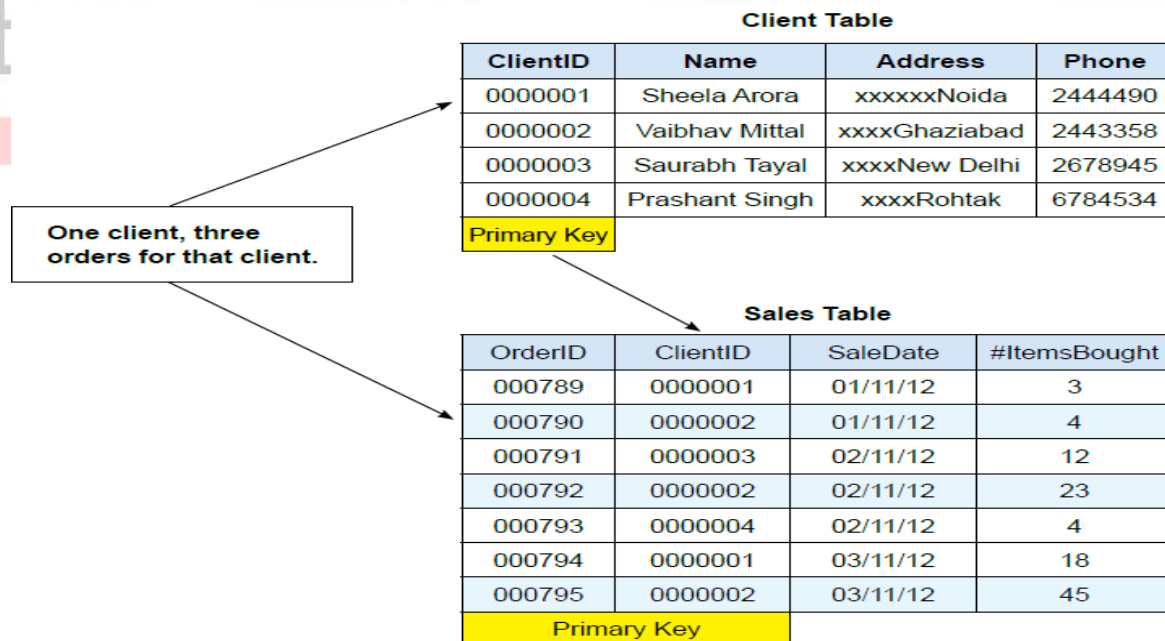
In the example here, the field ClientID occurs once in the Client table, but since one client can place many orders, it occurs a number of times in the Sales table. Since we cannot have an order without a customer, we call Client the parent and Sales the child table. Related tables like these share a common field. You store data about people once, but refer to those people many times in the database.

When data is to be stored, maintained, and retrieved from multiple tables then special database software are required known as Relational Database Management System.

In the RDBMS data can be integrated using keys. These are Primary Key, Composite Primary Key, and Foreign Key.

This unique field is called the **Primary Key (PK)**. A primary key is a unique value that identifies a row in a table. In our example, ClientID is the primary key in the Client table. Primary Keys are also indexed in the database, making it faster for the database to search for a record. When primary key constraint is applied on one or more columns then it is known as **Composite Primary Key**.

The referred field ClientID which occurs in the Sales table is called the **Foreign key (FK)**. Hence, the foreign key identifies a column or set of columns in one (referencing) table that refers to a column or set of columns in another (referenced) table. The “one” side of a relation is always the parent, and provides the PK attributes to be copied. The “many” side of a relation is always the child, into which the FK attributes are copied. Memorize it: one, parent, PK; many, child, FK.



Another point to remember is that the end users will/may never have direct access to the database. They can only see what you permit them to and can select only from the options you give them.

RDBMS

A *relational database* is a type of database. It uses a structure that allows us to identify and access data *in relation* to another piece of data in the database. Often, data in a relational database is organized into tables.

ACTIVITIES

1. Analyze database requirements for a retail shop. Record the business requirements and document. (You can use this information for creating a database to suit this business requirement)
2. Analyze database requirement for your school; visit different departments such as library, student admission center, to gather requirements. Document the business requirement. (You can use this information for creating a database to suit this requirement)

ASSESSMENT

Fill in the blanks:

1. A _____ is an organized collection of data.
2. A _____ is a software package that can be used for creating and managing databases.
3. A _____ is a database management system that is based on the relational model.
4. Three popular DBMS software are _____, _____, & _____.
5. A _____ is a unique value that identifies a row in a table.
6. Composite Key is a combination of _____ columns.

Short Answer Questions

1. What does DBMS stands for?
2. What does RDBMS stands for?
3. How is data organized in a RDBMS?

4.State the relationship and difference between a primary and foreign key?

SESSION2:CREATE AND EDIT TABLES USING WIZARD & SQL COMMANDS

Relevant Knowledge

Data in a relational database management system (RDBMS) is organized in the form of tables.

You will now quickly recap what you learnt in the last session and assimilate more concepts.

RDBMS

A relational database is a collective set of multiple data sets organized by tables, records and columns. Relational database establish a well-defined relationship between database tables. Tables communicate and share information, which facilitates data searchability, organization and reporting. A Relational database use Structured Query Language (SQL), which is a standard user application that provides an easy programming interface for database interaction

DATABASE OBJECTS

Tables:

A table is a set of data elements (values) that is organized using a model of vertical columns(which are identified by their name) and horizontal rows. A table has a defined number of columns, but can have any number of rows. Each row is identified by the values appearing in a particular column identified as a unique key index or the key field.

Columns or Fields or Attributes:

A column is a set of data values of a particular simple type, one for each row of the table. The columns provide the structure according to which the rows are composed. For example, cFirstName, or cLastName are fields in a row.

Rows or Records or Tuples:

A row also called a Record or Tuple represents a single, data item in a table. In simple terms, a database table can be visualized as consisting of rows and columns or fields. Each

row in a table represents a set of related data, and every row in the table has the same structure.

CREATING DATABASE USING OPENOFFICE

There are a variety of DBMS/RDBMS available; in this exercise, you will learn about OpenOffice Base an Open Source RDBMS.

- To open OpenOffice, click Start>Programs>OpenOffice.org 4 > OpenOffice.org.

Alternatively, you can also double-click on the OpenOffice.org 4 shortcut on the desktop if available. You should see a Window similar to the one displayed below



FIGURE 1

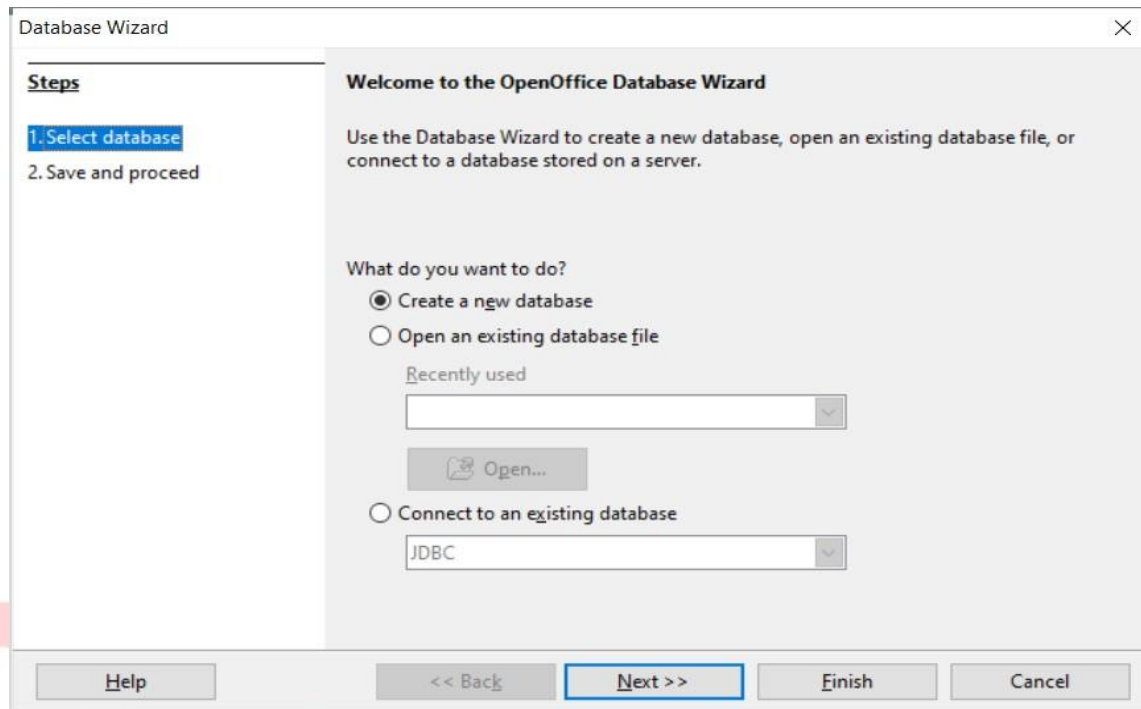
Select the option database to open the base application.

You can also directly open the OpenOffice Base Application by doing the following:

- Click Start>Programs>OpenOffice.org 4>OpenOffice.org Base.

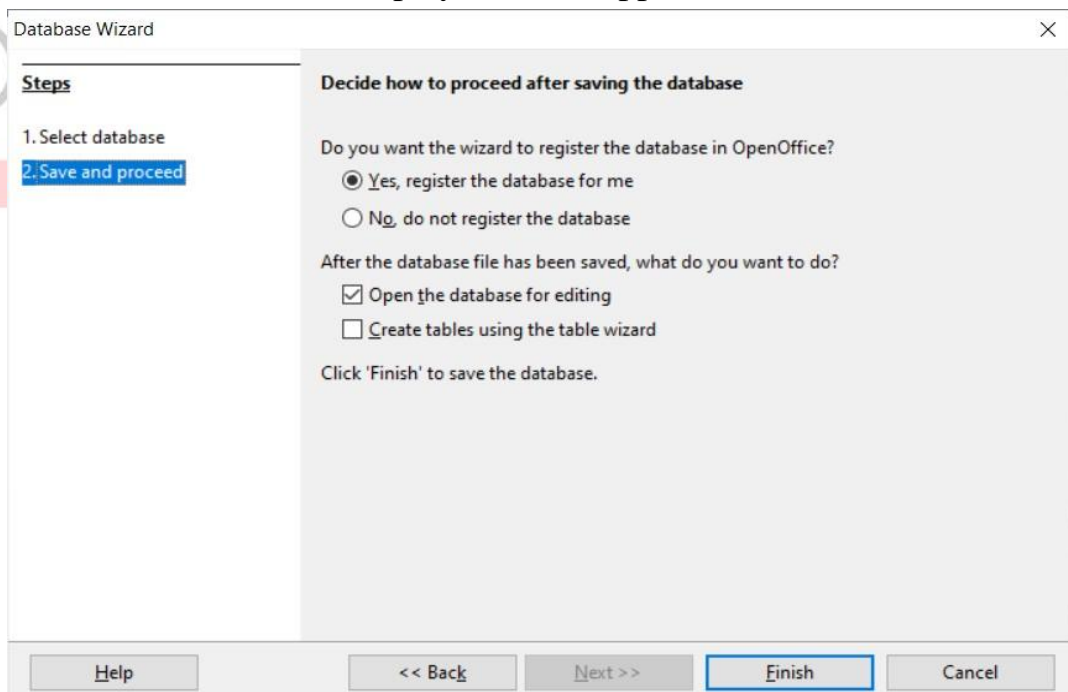
You should be guided through the Database Wizard for creating a database.

You will see a dialog box similar to the one displayed below.

**FIGURE 2**

You can create a new database by selecting the option Create a new database. You can also open an existing database file that you have already created by selecting the option Open an existing database file. Click Next.

A dialog box similar to the one displayed below appears.

**Figure 3**

Click Finish. The Save As dialog box appears as shown below.

Specify a name for the database in the File name: field and click Save. A window similar to the one displayed below.

Click Finish. The Save As dialog box appears as shown below.

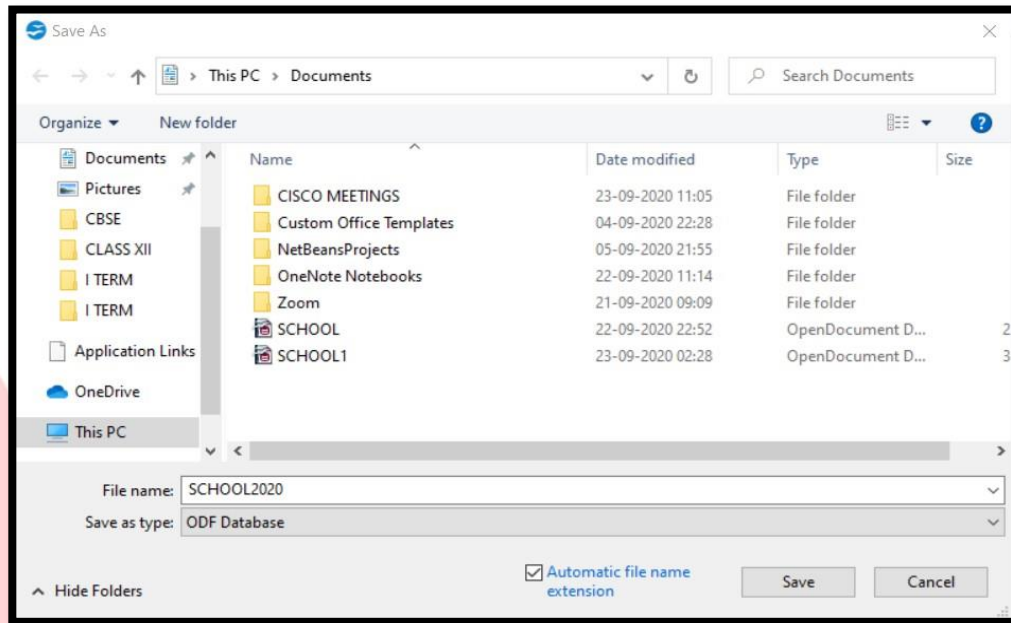


Figure 4

Specify a name for the database in the File name: field and click Save. A window similar to the one displayed below.

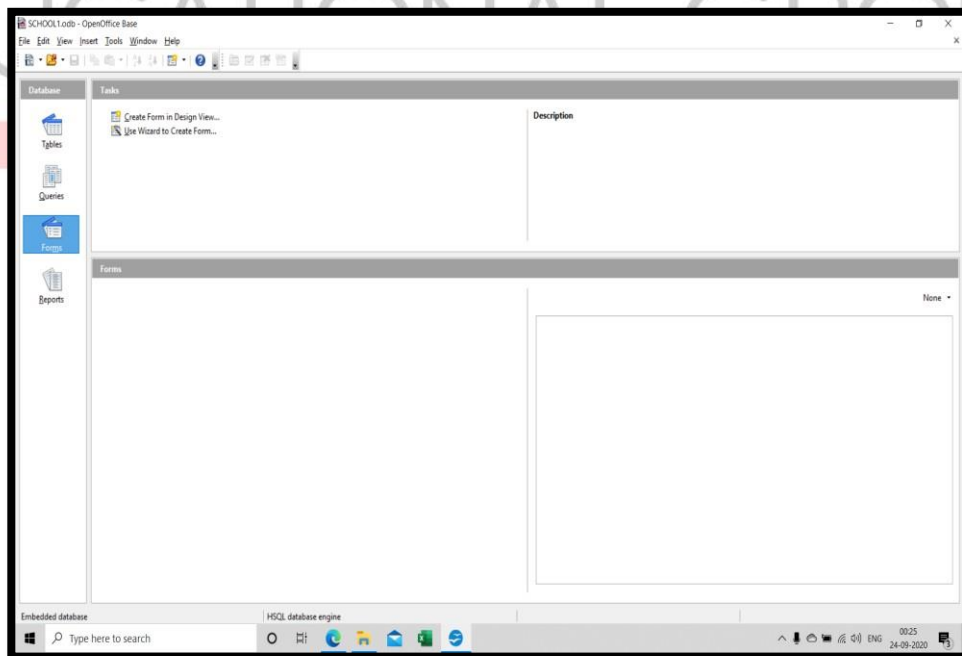


Figure 5

Now that you have created a database, you can work with the database as outlined in the next few sessions.

Steps To Create A Table Using Table Wizard

Tables are the basic building blocks of a database. You store the data in the database in the form of tables. In the previous exercise you have learnt how to create database objects in OpenOffice.

In this exercise you will learn how to create a table in a database.

After creating the database, you see a window as shown below.

There are different ways to create a table:

1. **Create table in Design View**
2. **Use Wizard to Create Table**

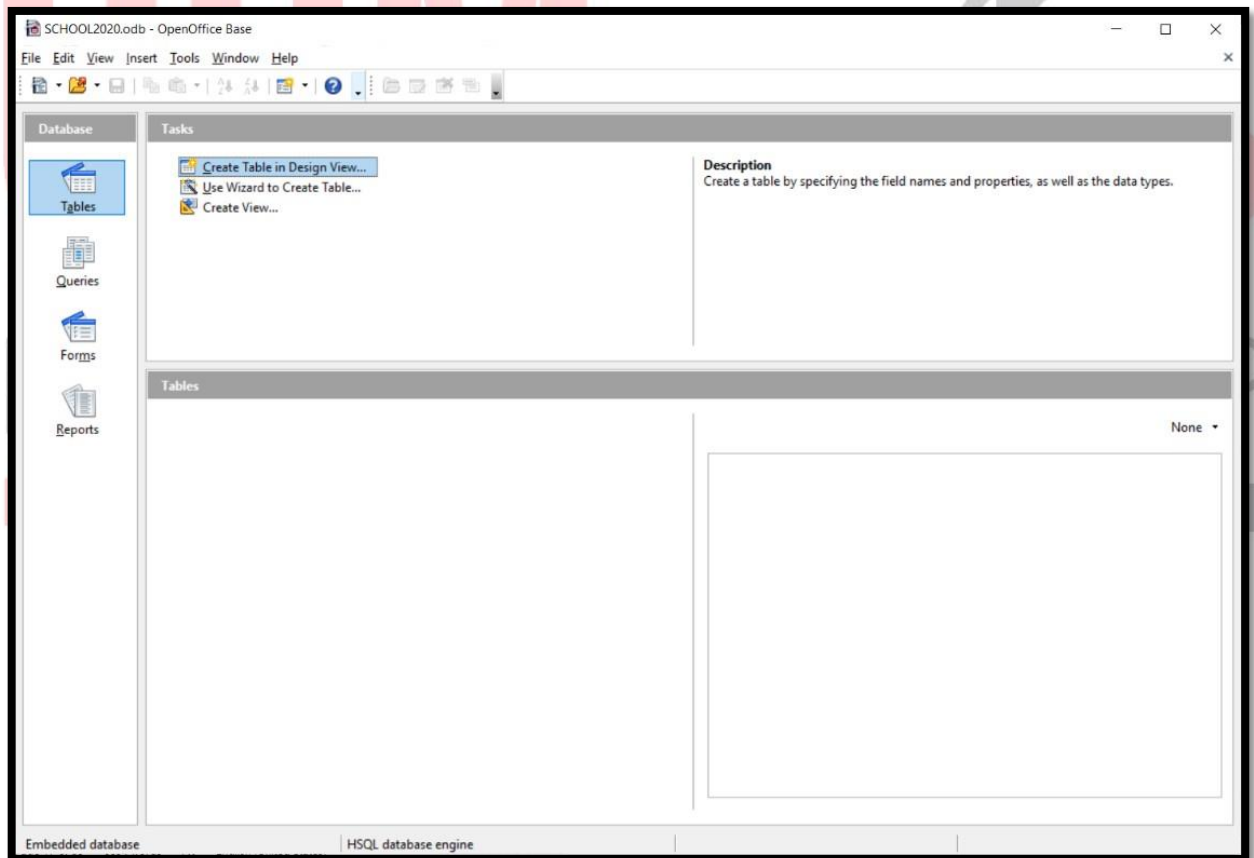


Figure 6

Use Wizard To Create Table:

A table can be created using the predefined steps and table structure(s) in Base.

The following are the steps to create a table:

Click on Tables > Use Wizard to Create Table , the window shown below will open

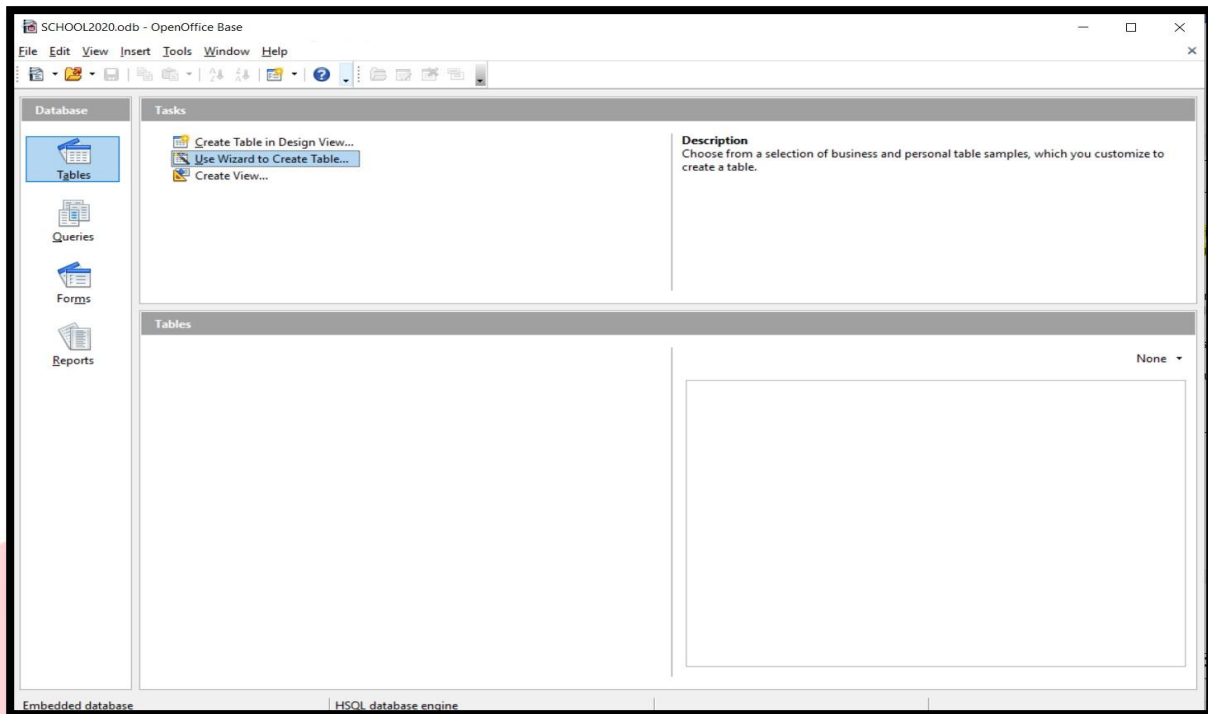


FIGURE 7

Click the Select Fields > Choose Category > Select the table (in the picture shown below “Business” category and “Customer” table has been chosen) > Click on Next Button.

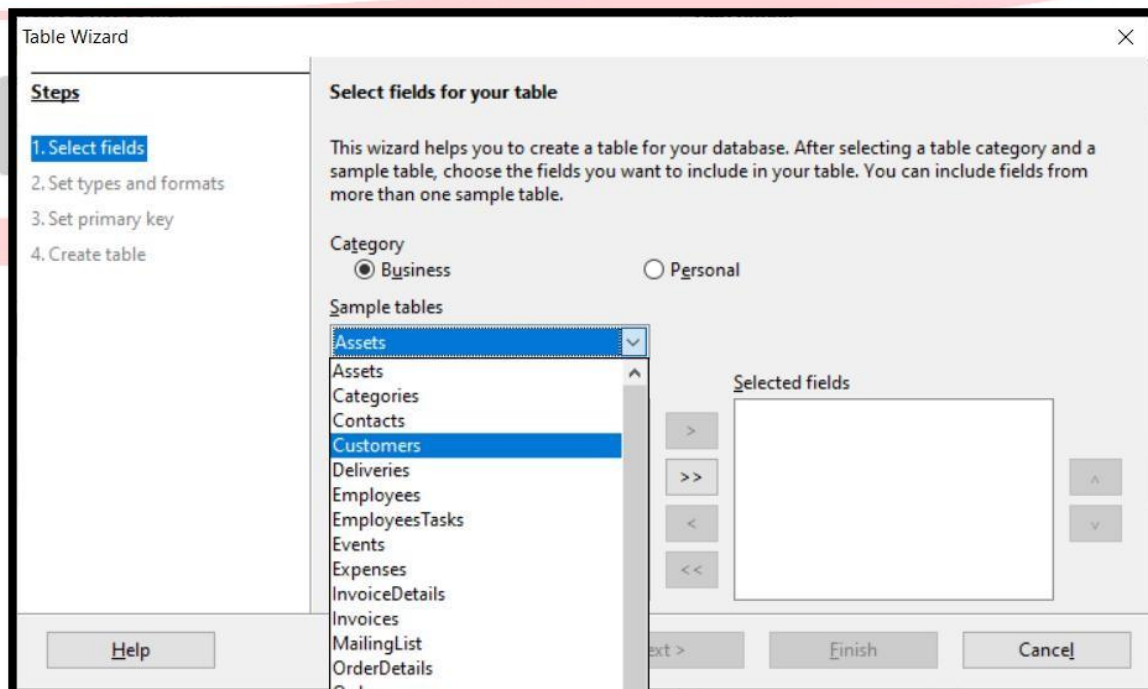




FIGURE 8

Select the fields as per the requirements and select on  buttons to add the predefined columns or select  to remove the fields from the Selected Fields Box. After selecting the fields click on Next Button.

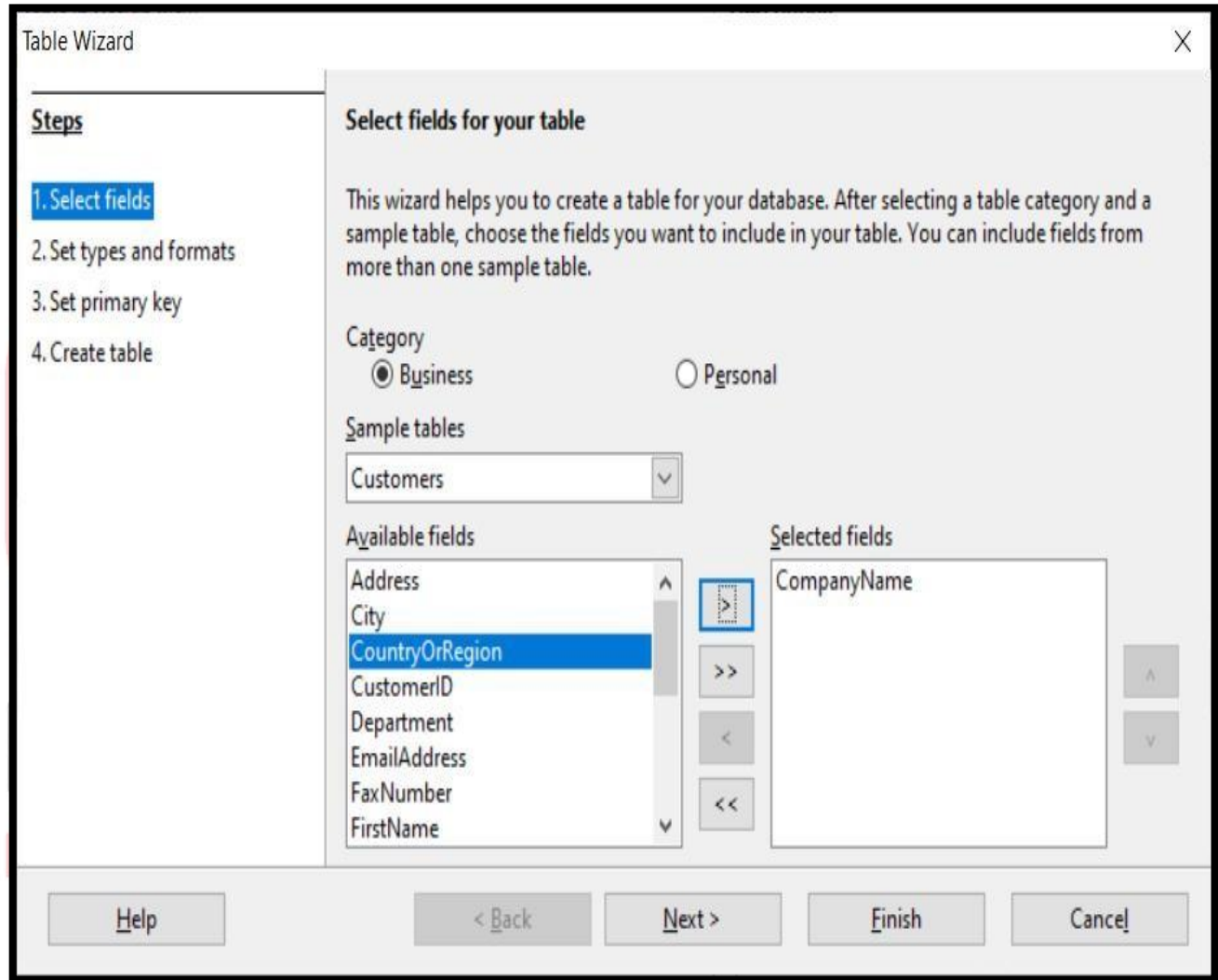


FIGURE 9

Once the fields will be selected the window to set the data types will open, By default all the fields will have Text[VARCHAR] data type which can be and other properties with default values but all of them can be selected as per the requirement.

Click on Next Button

The screenshot shows the 'Table Wizard' dialog box, specifically the 'Set field types and formats' step. On the left, a 'Steps' pane lists four steps: 1. Select fields, 2. Set types and formats (highlighted), 3. Set primary key, and 4. Create table. The main area is divided into two panes. The left pane, 'Selected fields', contains a list with 'CompanyName', 'City', and 'EmailAddress'. The right pane, 'Field information', shows details for the selected 'CompanyName' field: 'Field name' is 'CompanyName', 'Field type' is 'Text [VARCHAR]', 'Entry required' is 'No', and 'Length' is '50'. At the bottom, there are buttons for 'Help', '< Back', 'Next >', 'Finish', and 'Cancel'.

FIGURE 10

After setting the properties of the fields such as field name, type etc. The window to set the primary will open. Base automatically adds the column to be set as Primary Key which will help the user to enter the unique values and helps in creating the relationship with the other table to extract the data from multiple tables.

After setting the Primary Key click on Next Button.

The screenshot shows the 'Table Wizard' dialog box, specifically the 'Set primary key' step. On the left, the 'Steps' pane lists four steps: 1. Select fields, 2. Set types and formats, 3. Set primary key (highlighted), and 4. Create table. The main area contains a text box explaining that a primary key uniquely identifies each record and is recommended for every table. Below this, there are three options:

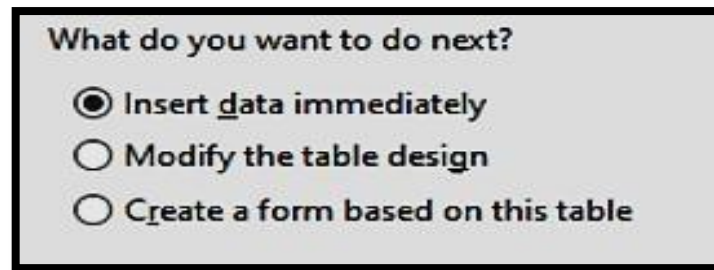
- ☒ Create a primary key
 - ☒ Automatically add a primary key (with an 'Auto value' checkbox below it)
 - ☐ Use an existing field as a primary key (with a 'Fieldname' dropdown and an 'Auto value' checkbox below it)
 - ☐ Define primary key as a combination of several fields (with 'Available fields' and 'Primary key fields' lists and arrows between them)

 The 'Available fields' list contains 'CompanyName', 'City', and 'EmailAddress'. The 'Primary key fields' list is empty. At the bottom, there are buttons for 'Help', '< Back', 'Next >', 'Finish', and 'Cancel'.

FIGURE 11

When the Primary Key will be set then window to rename the table will open. A user can either go ahead with the same table name or can change it.

In the same window options to work with the table will be given as :



The option to insert the data immediately will be selected by default . Click on Finish to insert the data in the table.

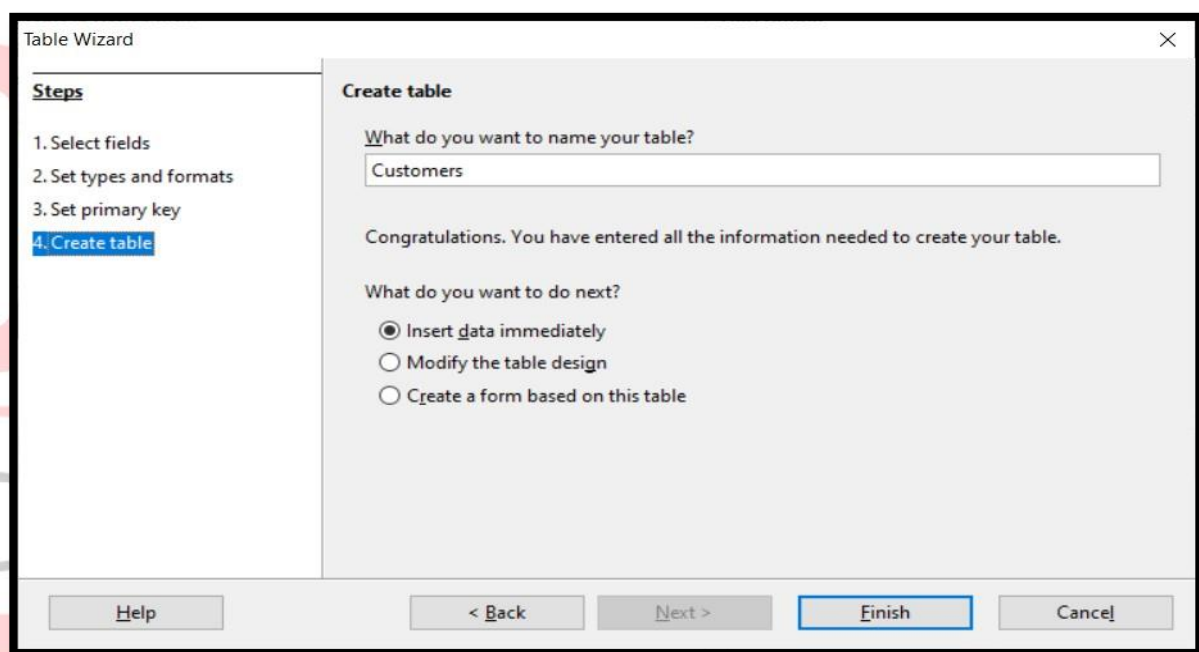


FIGURE 12

To insert the data the following window open:

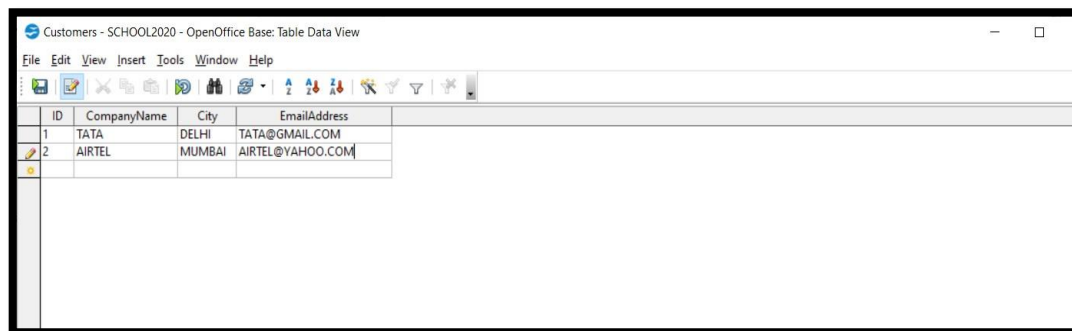


FIGURE 13

Creating table using Design View

1. Click on Create Table in Design View... option available under Tasks and a Table Design window appears as shown below.

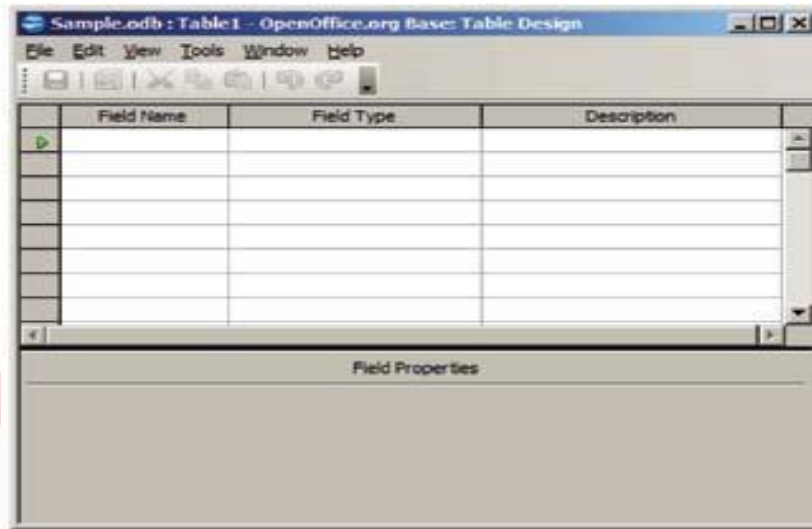


Figure 14

Specify the field name and data type of the field to be created by selecting the appropriate type available under Field type dropdown list.

Now create a table with the following fields displayed below:

Specify the field name and the data type for each field name. For example, the table contains the Name field and the data type of the Name is TEXT [VARCHAR]. You can specify the length of the field value.

Field Name	Data type	Length
Name	VARCHAR	50
Rollno	TINYINT	3
DOB	Date	DD/MM/YY
Class	Char	1
Phone	INTEGER	10
Email	VARCHAR	75
Colour	VARCHAR	15
Location	VARCHAR	30

After specifying the field name and data type for the field variables, save the table by clicking on **File>Save** shown below.

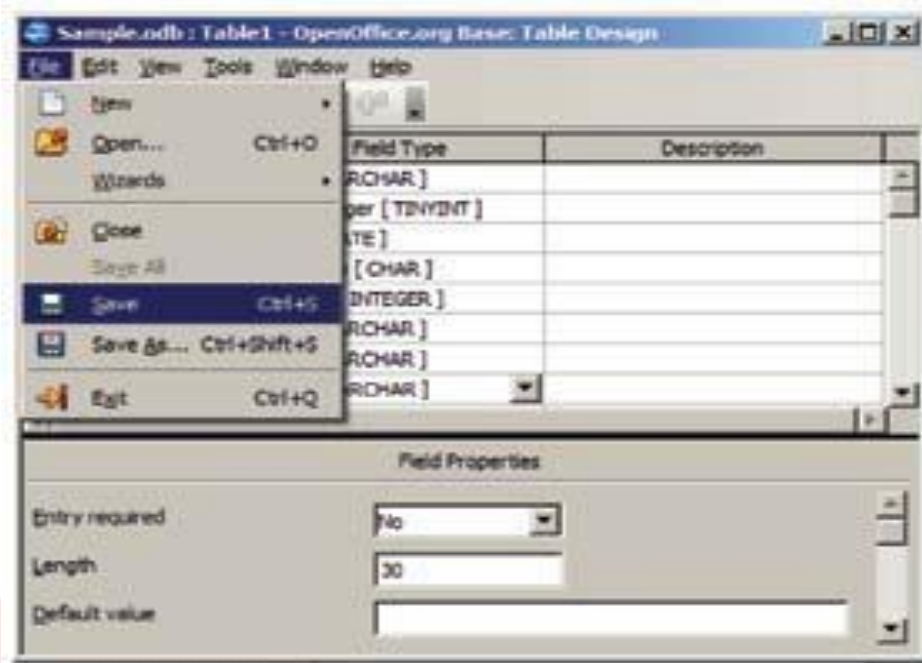


Figure 15

Specify the table name. The default name is Table1. Click OK.



Figure 16

A dialog box appears, similar to the one displayed below.



Figure 17

Options to set Primary Key

You are asked to set a primary key for the table you just created. You can select the appropriate option to set the primary key or leave the table without a primary key. If you click Yes, the application will set the primary key for the first field created automatically. If you click No, you should see a window similar to the one displayed below.

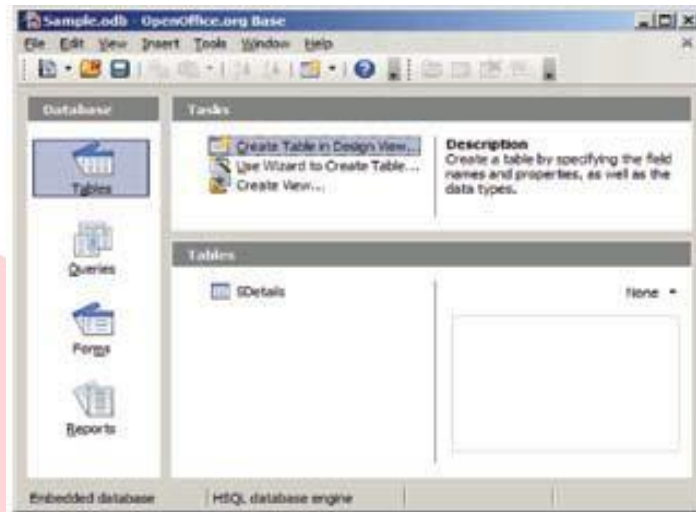


Figure 18

Notice the table by the name SDetails created and visible under Tables section.

Data Types:

Datatypes are used to identify which type of data (value) we are going to store in the database.

Fields themselves can be of different types depending on the data they contain. Data types in OpenOffice base are broadly classified into five categories listed below.

- **Numeric Types**
- **Alphanumeric Types**
- **Binary Types**
- **Date time**
- **Other Variable types**

Numeric Types:

Numeric data types are used for describing numeric values for the field used in the table of a database. Numeric data types in a database can be used for storing information such

as mobile number, roll number, door number, year of school admission, true or false statements, statistical values, etc.

The different types of numeric data types available are listed here.

Name	Data type	Description
BOOLEAN	Yes / No	Values as 0 or 1. Example: True or False, Yes or No.
TINYINT	Tiny Integer	Store integer range between 0 to 255
SMALLINT	Small Integer	Store integer range between -2^{15} to $+2^{15}-1$
INTEGER	Integer	Store integer range between -2^{31} to $+2^{31}-1$
BIGINT	Big Integer	Range between -2^{63} to $+2^{63}-1$
NUMERIC	Number	Maximum precision of $e^{(+/-)231}$
DECIMAL	Decimal	Maximum precision of $e^{(+/-)231}$
REAL	Real	2^{-1074} to $(2-2^{-52}) * 2^{1023}$
FLOAT	Float	2^{-1074} to $(2-2^{-52}) * 2^{1023}$
DOUBLE	Double	2^{-1074} to $(2-2^{-52}) * 2^{1023}$

Alphanumeric Types:

Name	Data type	Description
LONGVARCHAR	Memo	Stores up to the max length or number indicated by user. It accepts any UTF 8 Character.
CHAR	Text (fix)	Stores exactly the length specified by user. Pads with trailing spaces for shorter strings. Accepts any UTF 8 Character.
VARCHAR	Text	Stores up to the specified length. No padding (Same as long var char)
VARCHAR_IGNORE CASE	Text	Stores up the specified length. Comparisons are not case sensitive but stores capitals as you type them.

Binary Types:

Binary data types are used for storing data in binary formats. Binary data types in a database can be using for storing photos, music files, etc. In general, files of any format

can be stored using the binary data type. The different types of binary data types available are listed here.

Name	Data type	Description
LONGVARBINARY	Image	Stores any array of bytes (images, sounds, etc.). No validation required.
BINARY	Binary (fix)	Stores any array of bytes. No validation required.
VARBINARY	Binary	Stores any array of bytes. No validation required.

DATE TIME:

Date time data types are used for describing date and time values for the field used in the table of a database. Date time data types in a database can be used for storing information such as date of birth, date of admission, date of product sale, etc.

The different types of date time data types available are listed here.

Name	Description	Format
Date	Stores month, day and year information	1/1/99 to 1/1/9999
Time	Stores hour, minute and second information	Seconds since 1/1/1970
Timestamp	Stores date and time information	

Other Data Types:

Name	Description
Other/Object	Stores serialized Java objects " user application must supply serialization routines

Create the following records:

Name	Roll no	DOB	Class	Phone	Email	Color	Location
Ravi Kaul	23	13/08/99	X	123456	ravikaul@gmail.com	Blue	Delhi
Bijendar Dalal	13	15/01/99	X	567889	dalal@gmail.com	Green	Mumbai
Radha swami	7	01/02/00	X	234353	radhasw@gmail.com	Orange	Gujarat
Vikas Maheswari	32	17/11/98	X	233445	vikawari@gmail.com	Blue	Maharashtra
Vimla Rani	14	23/09/99	X	242526	Vimla99@gmail.com	Yellow	Orissa
Sandhya Reddy	26	19/12/98	X	213141	sandhyared@gmail.com	Blue	Delhi

To insert values into the table, just double-click the table name, you should see a window similar to the one displayed below.

Table Data View Dialog Box

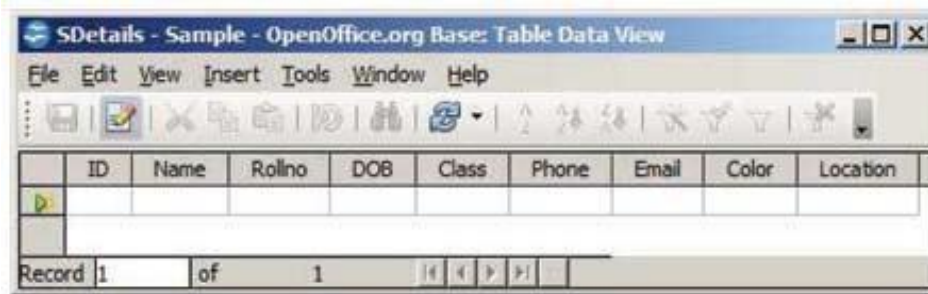


Figure 19

Start typing the records in the table with the data provided in the excel sheet and select **File > Save Current record** to save data in the table.

ACTIVITIES

1. Create a database for a stationery shop.
Hint: Create fields for items, price, colour, vendor, etc.
2. Create a database for a school library.
Hint : Create fields for book title, cost, provider, availability, etc
3. Create a database for maintaining a song collection.
Hint : Create fields for fields such as artist, movie, year released, etc.

ASSESSMENT

Fill in the blanks:

1. A table is a set of data elements that is organized using a model of vertical _____ and horizontal _____.
2. A _____ is a set of data values of a particular type, one for each row of the table.
3. A _____ represents a single, data item in a table.
4. _____ are used to identify which type of data we are going to store in the database.
5. There are _____ ways to create a table.
6. Field properties can be set in both the _____ and _____.

Short Answer Questions

1. In how many ways tables can be created in Base?
2. Why are data types used in DBMS /RDBMS?
3. List datatypes available in Numeric Datatype?

4. List datatypes available in Alphanumeric Datatype?
5. Define the structure of a table.
6. Differentiate between Tuples and Attributes of a table.
7. Name different Binary data types.

SESSION 3: PERFORM OPERATIONS ON TABLE

Relevant Knowledge

In Base, data is stored in tables which can be inserted, modified and removed using appropriate options.

You will now quickly recap what you learnt in the last session and assimilate more concepts.

Inserting Data In The Table

To insert the data in the table, follow the steps:
Select the table > Double click on it.

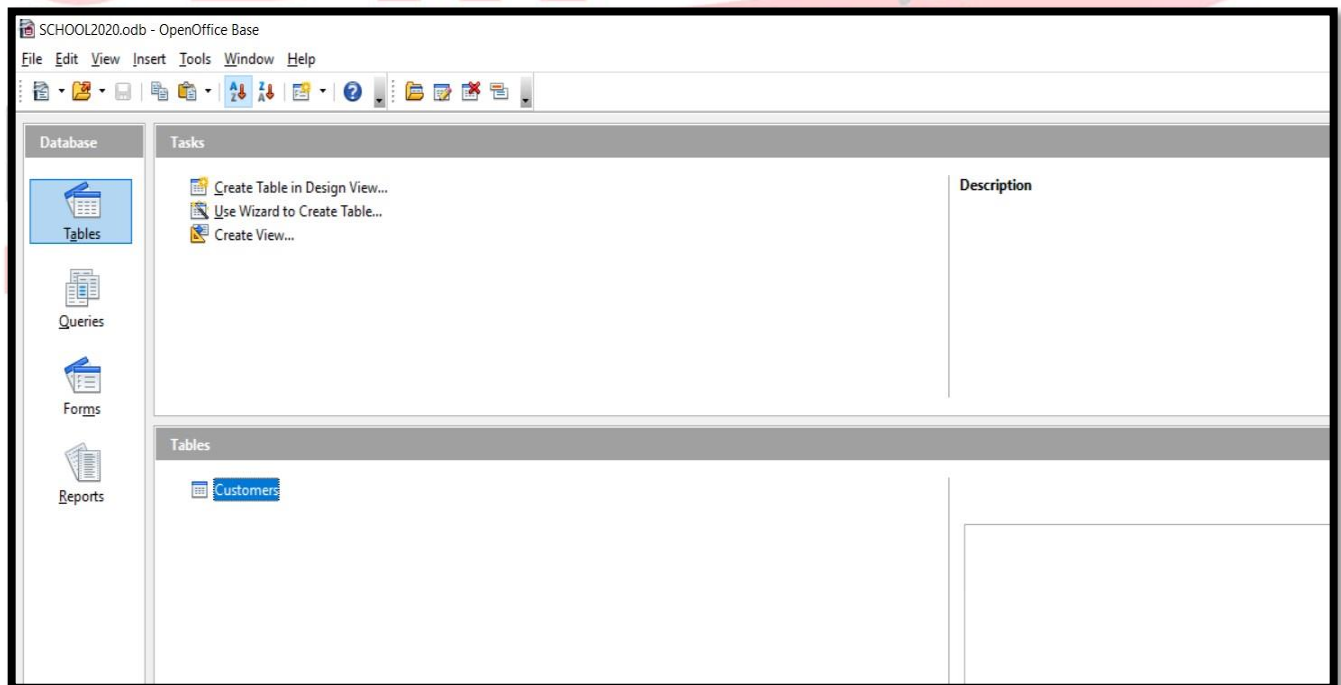


FIGURE 20

The table will open in Datasheet View in which data new data can be inserted and existing data can be updated or removed.

Customers - SCHOOL2020 - OpenOffice Base: Table Data View

File Edit View Insert Tools Window Help

ID	CompanyName	City	EmailAddress
1	TATA	DELHI	TATA@GMAIL.COM
2	AIRTEL	MUMBAI	AIRTEL@YAHOO.COM
3			

FIGURE 21

Editing Records In The Table

To edit the data either click on edit icon  or double on the data in the cell of a table and modifications can be done.

Customers - SCHOOL2020 - OpenOffice Base: Table Data View

File Edit View Insert Tools Window Help

ID	CompanyName	City	EmailAddress
1	TATA	DELHI	TATA@GMAIL.COM
2	AIRTEL	CHENNAI	AIRTEL@YAHOO.COM
3			

FIGURE 22

Deleting Records From The Table

To remove the data from the table, follow the steps:

Select the data > right click on selected data > select the Delete option

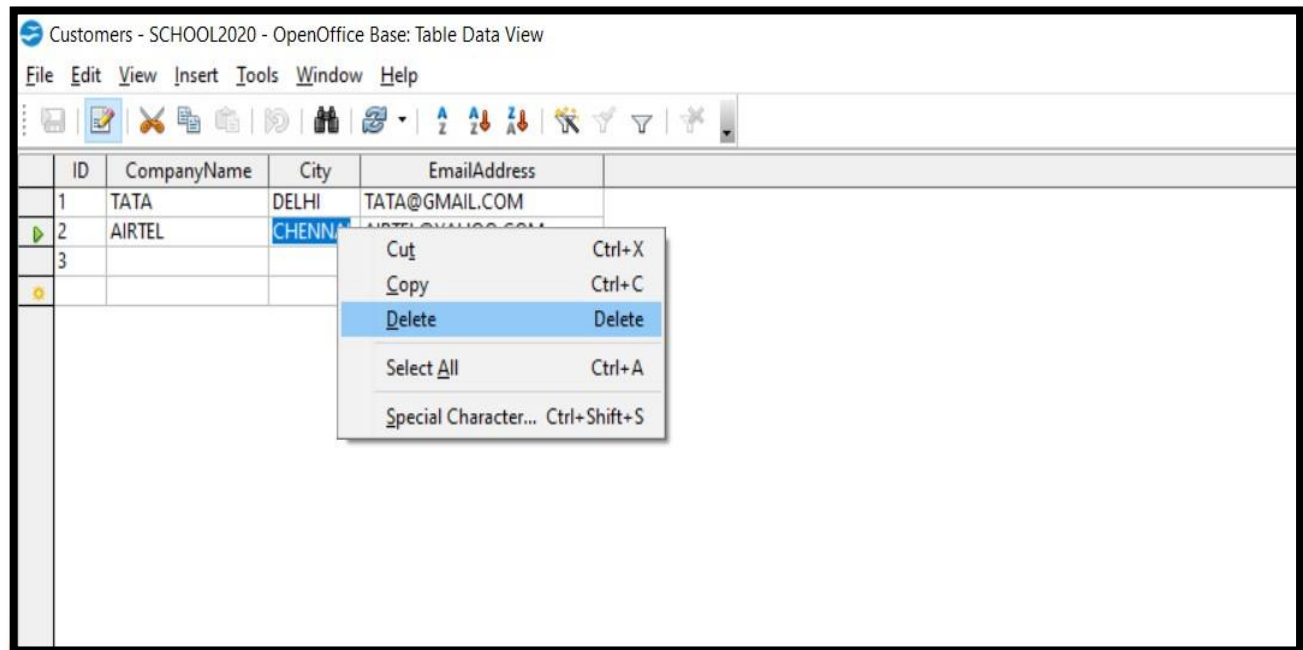


FIGURE 23

Field Properties

To change the field properties table structure in design view has to be changed. To set the field properties, steps will be followed as:

Select the table > Right click > Select the option Edit > the table Design View window will open

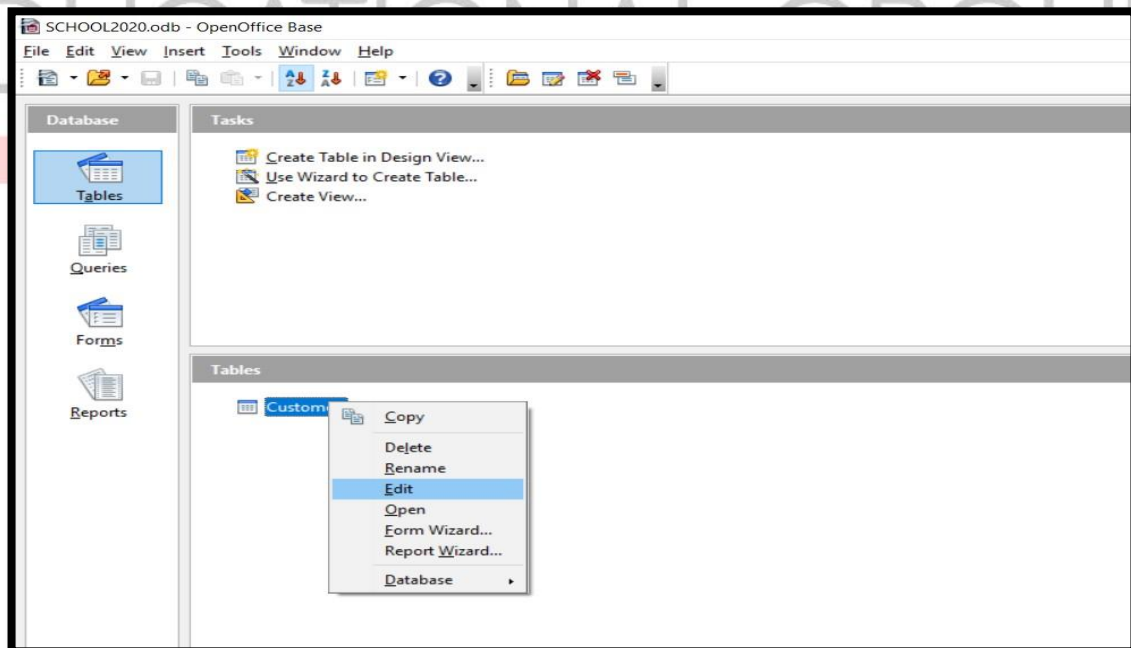


FIGURE 24

In design view there are different properties of fields according to the data type set for each field.

The properties of numeric type data is shown below in the figure.

Like **AutoValue** – if set to yes then field will get the auto numeric values.

Length – By default length of the field is 10 but the size of the field can be set to maximum length.

Default Value – A default value can be set for a field if user don't provide any value while entering the values in the table.

Format example – This property helps to set the format of the data entered in the field such as 91-222-333.

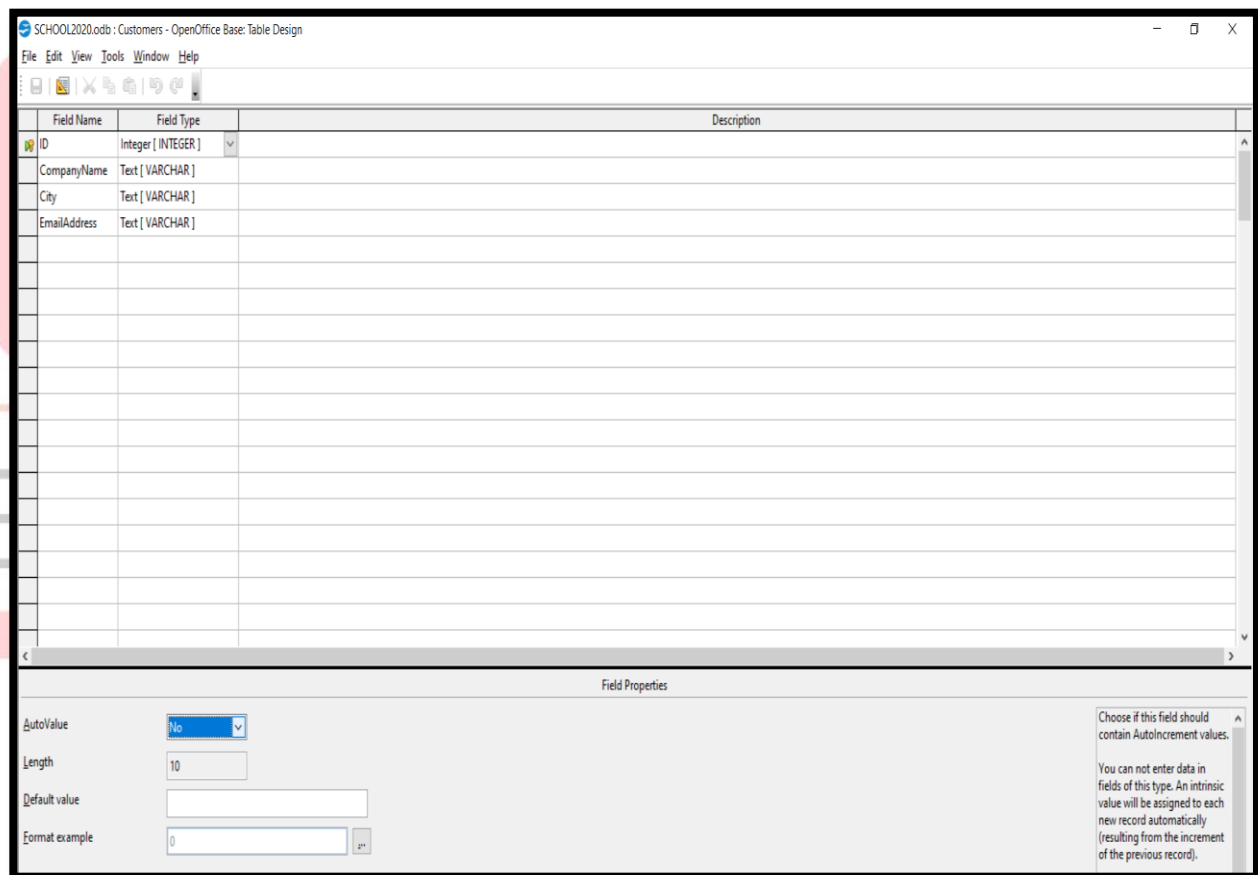


Figure 25

The properties of character type data is shown below in the figure.

Entry Required – if set to yes then it will be must to insert the value in the field which means that field cannot be left blank.

Length – By default length of the field is 10 but the size of the field can be set to maximum length.

Default Value – A default value can be set for a field if user don't provide any value while entering the values in the table.

Format example – This property helps to set the format of the data entered in the field such as 91-222-333.

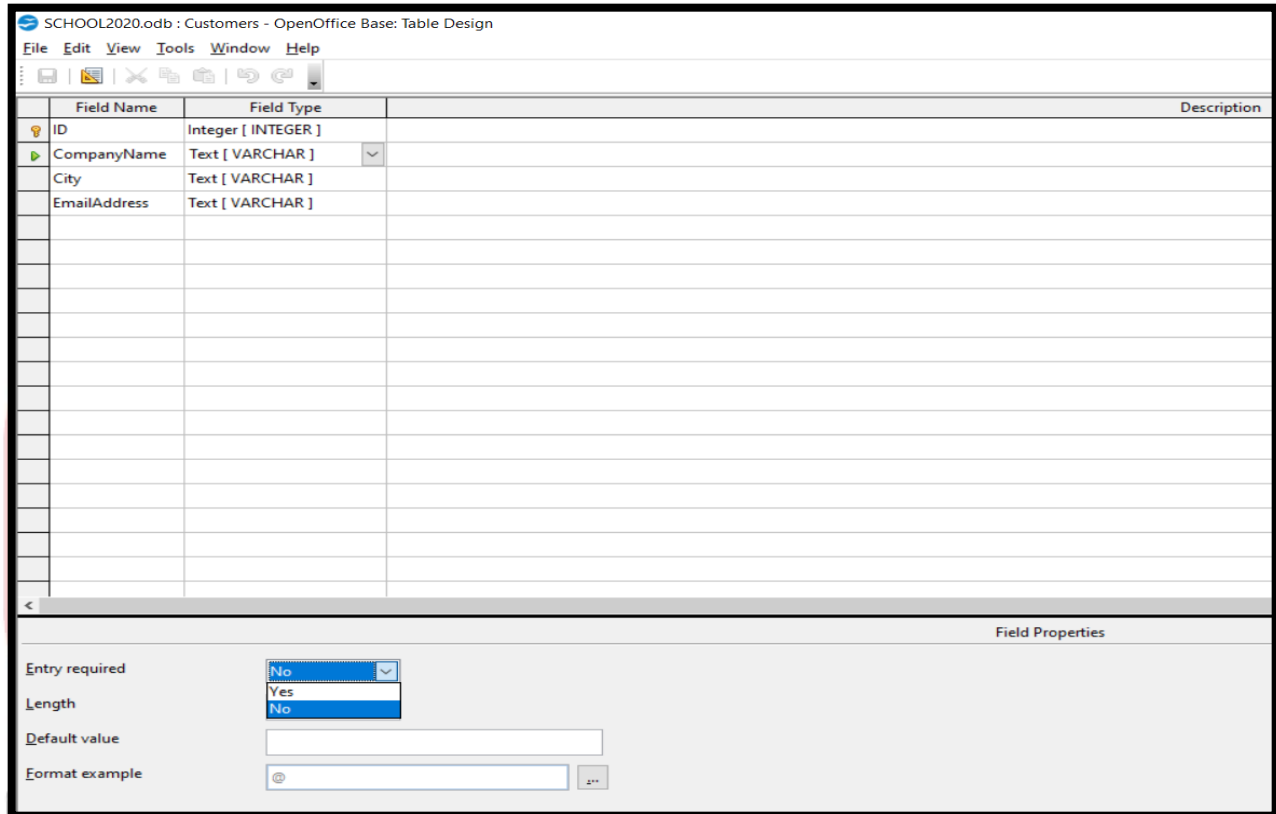


FIGURE 26

Sorting Data

Sorting means to arrange the data in either ascending order or descending order. Select the column(s) then click on sort buttons. The data will be displayed accordingly.

Unsorted Column (EMP_NAME)

The screenshot shows the 'Table Data View' window for a table named 'EMP'. The data is as follows:

EMP_ID	EMP_NAME	DESIGNATION	DPET_ID
101	JOHN	MANAGER	10
102	RIYA	TRAINEE	20
103	MAYAN	CLERK	10

Figure 27

Sorted Column (EMP_NAME)

The screenshot shows the 'Table Data View' window for a table named 'EMP'. The data is sorted by EMP_NAME in ascending order. The data is as follows:

EMP_ID	EMP_NAME	DESIGNATION	DPET_ID
101	JOHN	MANAGER	10
103	MAYAN	CLERK	10
102	RIYA	TRAINEE	20

Figure 28

Referential Integrity

Referential integrity is used to maintain accuracy and consistency of data in a relationship.

In Base, data can be linked between two or more tables with the help of primary key and foreign key constraints.

Referential integrity helps to avoid:

- Adding records to a related table if there is no associated record available in the primary key table.
- Changing values in a primary if any dependent records are present in associated table(s).
- Deleting records from a primary key table if there are any matching related records available in associated table(s).

Creating and Editing Relationships between Tables

A relationship refers to an association or connection between two or more tables. When you relate two tables, you don't need to enter the same data in separate tables.

Relationships between tables helps to:

- Save time as there is no need to enter the same data in separate tables.
- Reduce data-entry errors.
- Summarize data from related tables.

You can create a relationship between any two tables by selecting Relationships... option from the Tools menu.

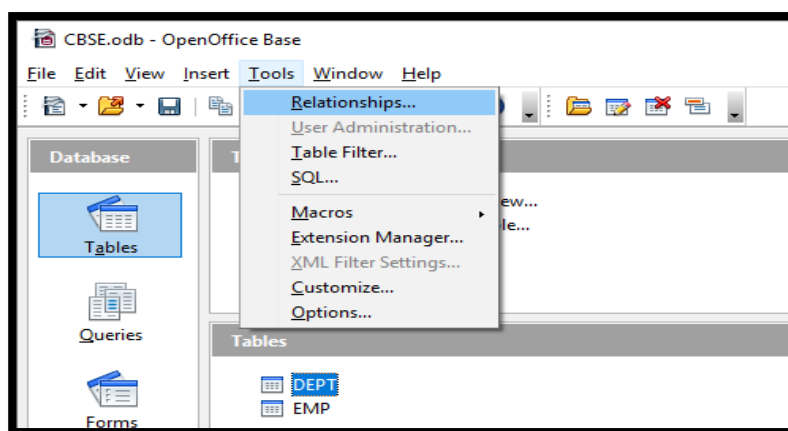


Figure 29

Add the tables in amongst which you want to create the relationship. Select the tables and click on Add button.

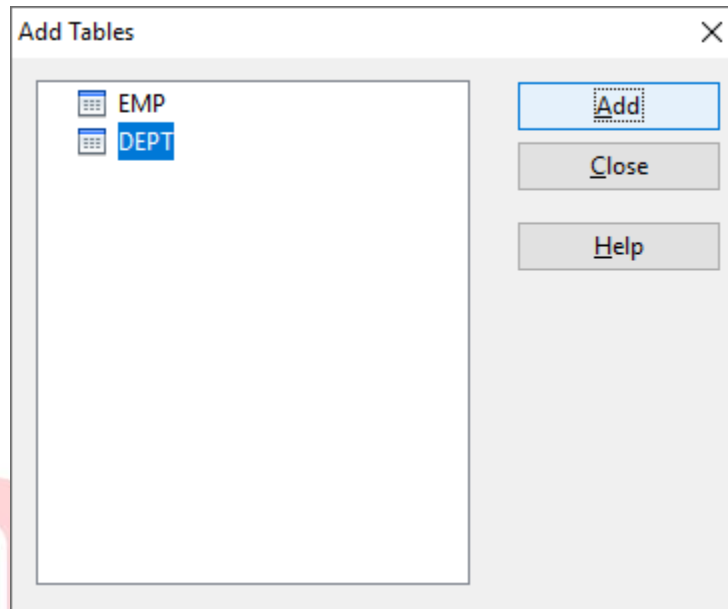


Figure 30

There are three types of relationships which can be created in tables:

1. **ONE to ONE**
2. **ONE to MANY OR MANY to ONE**
3. **MANY to MANY**

There are two ways to create the relationships between the tables:

- a. Click on Insert option and select New Relation... option in Relation Design window.

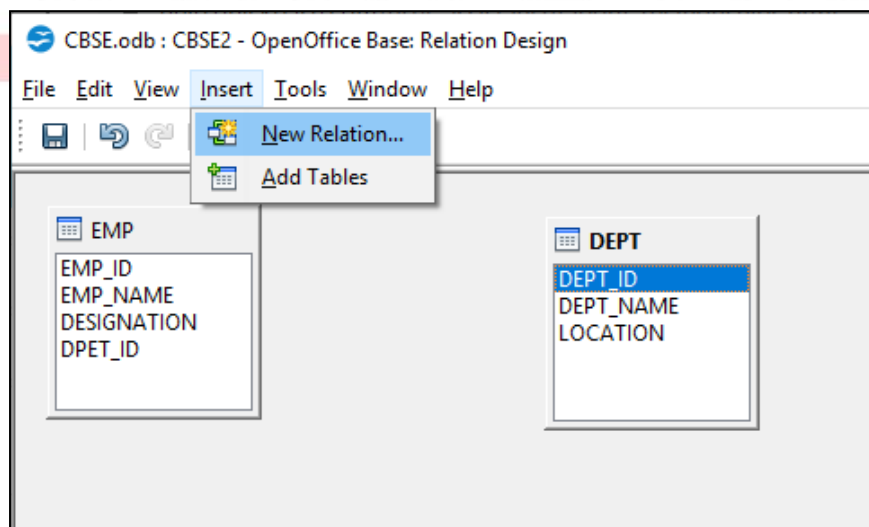


Figure 31

Select the options as required:

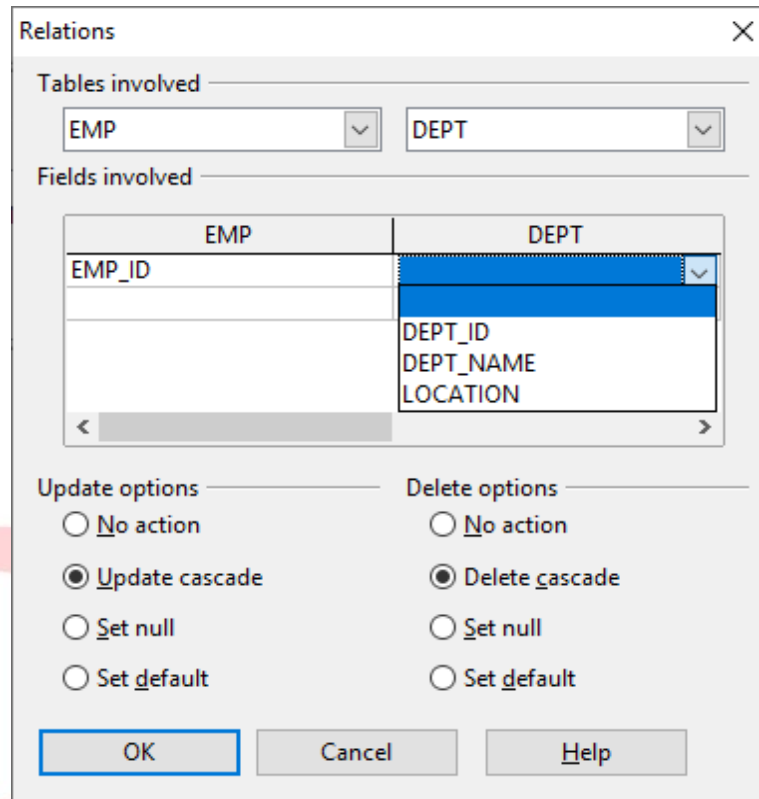


Figure 32

b. Drag the primary key column from one table and drop it on the key column of another table.

One to One Relationship

In this relationship, both the tables must have primary key columns. Example: In the given tables EMP and DEPT, EMP_ID in EMP table and DEPT_ID in DEPT table are the primary keys.

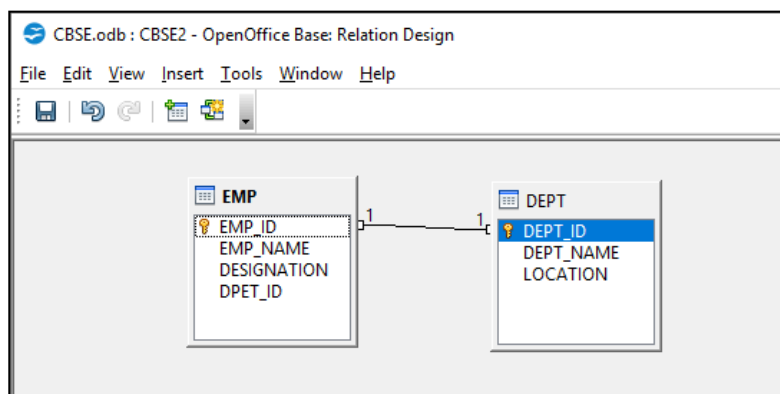


Figure 33

One to Many Relationship

In this relationship, one of the table must have primary key column.

It signifies that one column of primary key table is associated with all the columns of associated table.

Example: In the given tables EMP and DEPT, EMP_ID in EMP table is the primary key.

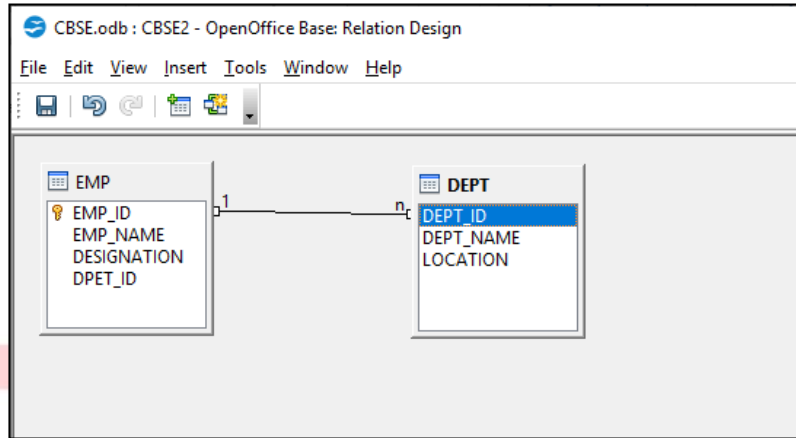


Figure 34

Many to Many Relationship

In this relationship, no table has the primary key column.

It signifies that all the columns of primary key table are associated with all the columns of associated table.

Example: In the given tables EMP and DEPT, there is no primary key.

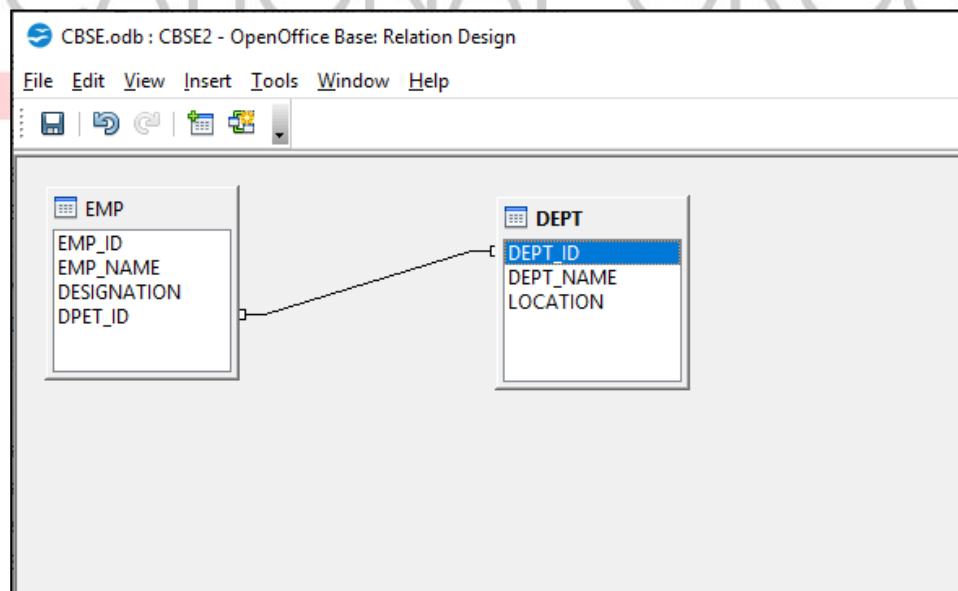


Figure 35

Remove the Relationships

The relationships applied on the tables can be removed also with the help of Delete option. Right Click on the relationship thread and select **Delete** option.

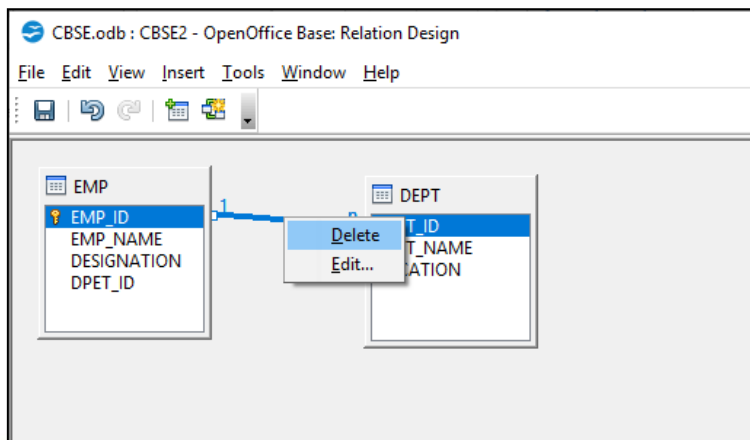


Figure 36

ACTIVITIES

Perform the following activities till you are confident:

1. Create a database to store your academic records using the guidelines below:

- Use your roll number as the file name for your database.
- Create fields such as subject name, required score, passing score and your percentage.
- Set the subject name field as the primary key. Populate your database with your most recent exam results.

ASSESSMENT

Fill in the blanks:

1. The types of languages used for creating and manipulating the data in the Database are _____ & _____.
2. A _____ is a standard for commands that define the different structures in a database.
3. A _____ is a language that enables users to access and manipulate data in a database.
4. A _____ is a part of DML involving information retrieval only.
5. A popular data manipulation language is _____.

6. _____ are the basic building blocks of a database.
7. There are _____ types of Relationships in a table.

Short Answer Questions:

1. What is the file extension for databases created using OpenOffice.Org Base?
2. List any three file formats that can be managed using OpenOffice.Org Base?
3. How many types of relationships can be created in Base? Explain each of them.
4. What do you mean by Sorting? In how many ways it can be done?
5. Explain Referential Integrity with the help of an example.

SESSION 4: RETRIEVE DATA USING QUERY

Relevant Knowledge

Having created the tables and entering data into them, now you want to extract some information.

That's when you query the database. As the name suggests, query is to collect specific information from the pool of data. A query helps us join information from different tables and filter that information. **Filtering** means that the query uses criteria you provide to hide some data and present only what you want to see.

Query Creation Using Wizard

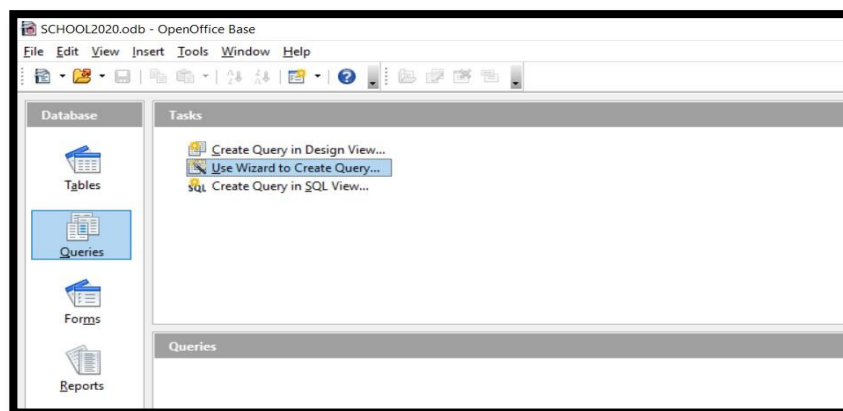


FIGURE 37

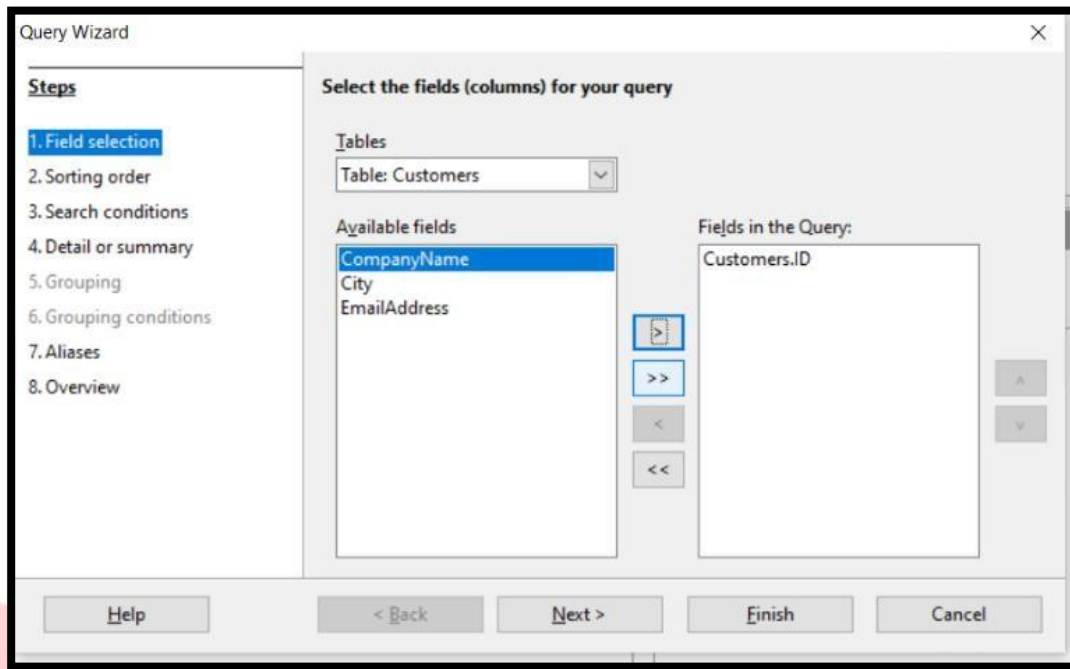


FIGURE 38

Click on Finish

ID	CompanyName	City	EmailAddress
1	TATA	DELHI	TATA@GMAIL.COM
2	AIRTEL	CHENNAI	AIRTEL@YAHOO.COM
3			

FIGURE39

Creation Of Query Using Design View

Some RDBMS provide a graphical means to create queries, but most RDBMS do not do so. That's where you use SQL (pronounced as "sequel") or Structured Query Language. Query languages are computer languages used to make queries into databases and information systems. Queries are commands that are used to define the data structure and also to manipulate the data in the database.

A SELECT statement retrieves zero or more rows from one or more database tables or database views. In most applications, SELECT is the most commonly used Data Manipulation Language(DML) command.

The SELECT statement has many optional clauses:

- WHERE specifies which rows to retrieve.
- ORDER BY specifies an order in which to return the rows.

To retrieve all the columns in a table the syntax is:

SELECT * FROM <TABLENAME>;

In order to execute queries click on the **Queries** option available on the left side under database section, click **Create Query in SQL View** as shown below.

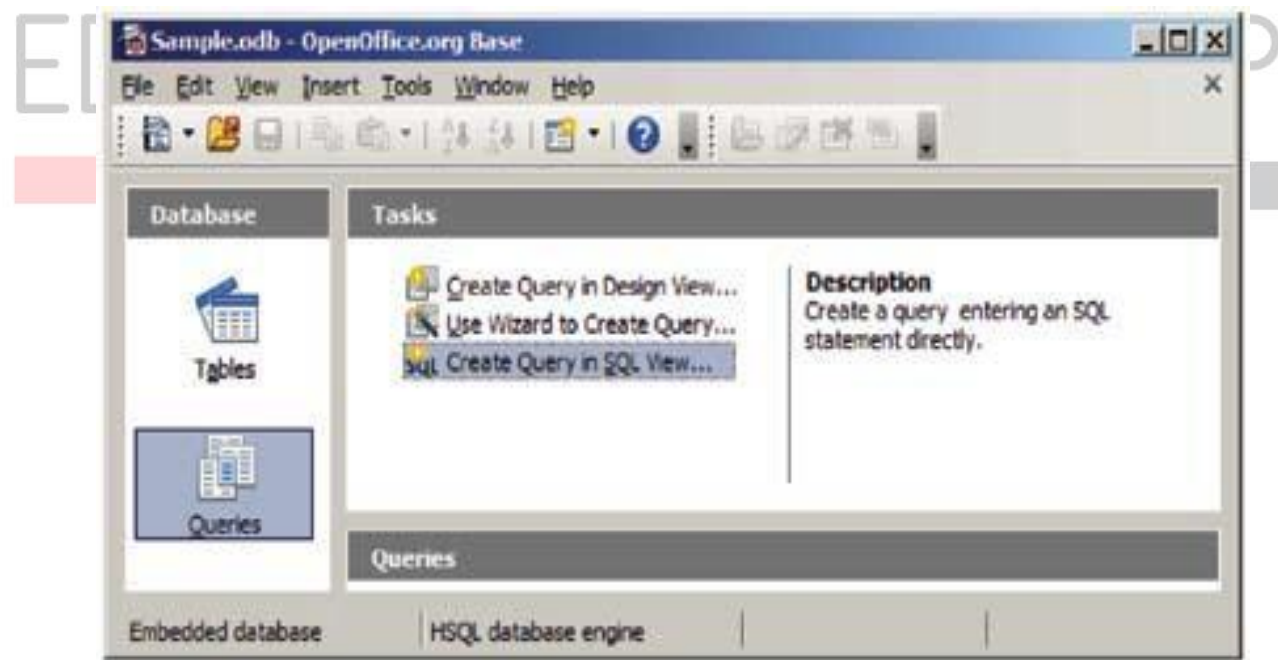


Figure 40

A window appears similar to the one displayed below.

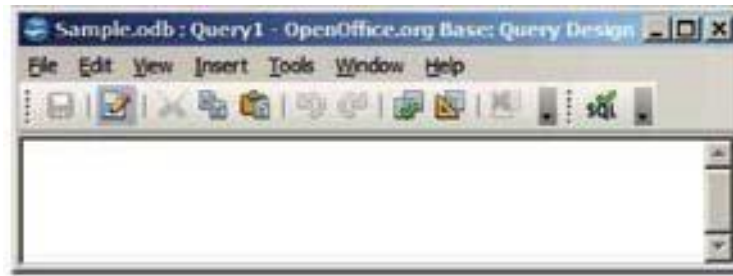


Figure 41

You can type the query in the above window and execute it by using the F5 function key or by clicking the 'SQL' icon in the window.

For example, if you want to display all the data in the table that you created in the early session, then the select statement will be:

Select * from SDetails;

After executing the select query the output will be shown similar to the one displayed below.

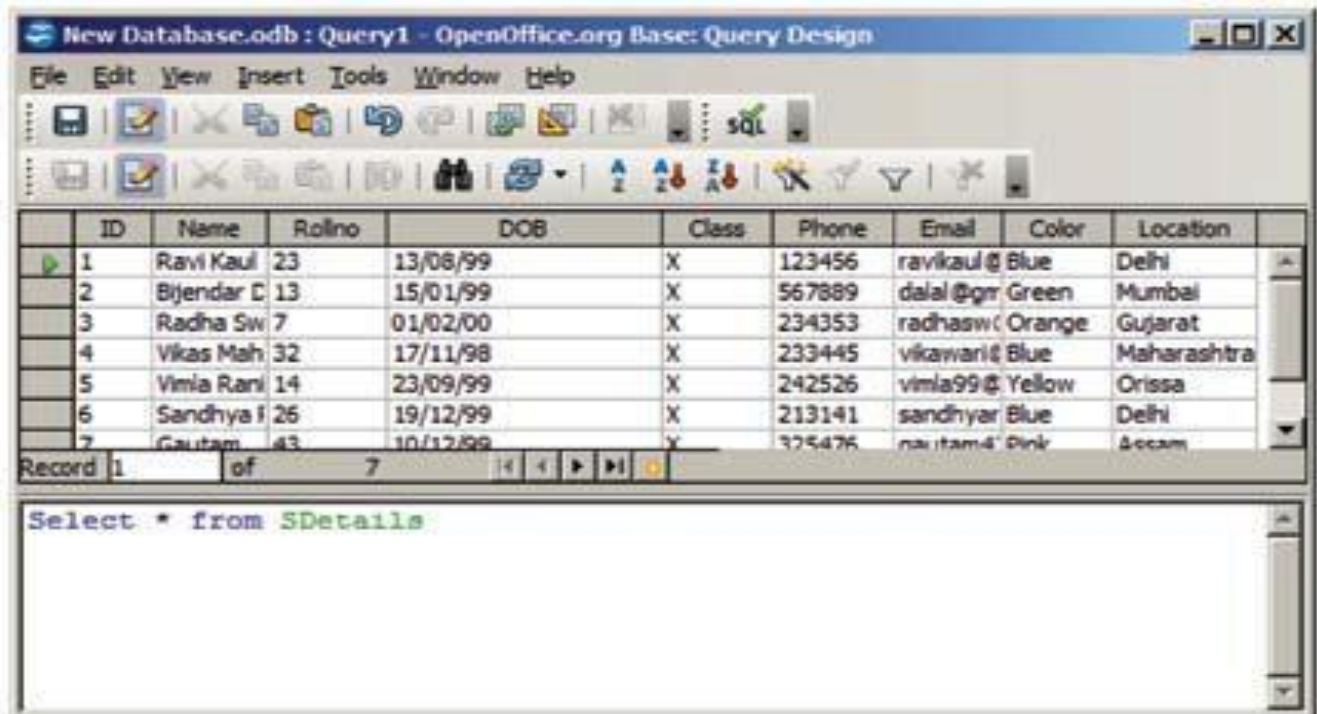


Figure 42

Performing calculations

In Base, simple calculations can be done on the data using arithmetic operators.

Example:

To display the salary of all the employees after incrementing by 1000 then the following SQL command will be executed in Base SQL Design

Select “EmployeeID”, “FirstName”, “Salary” +1000
from “Employee”

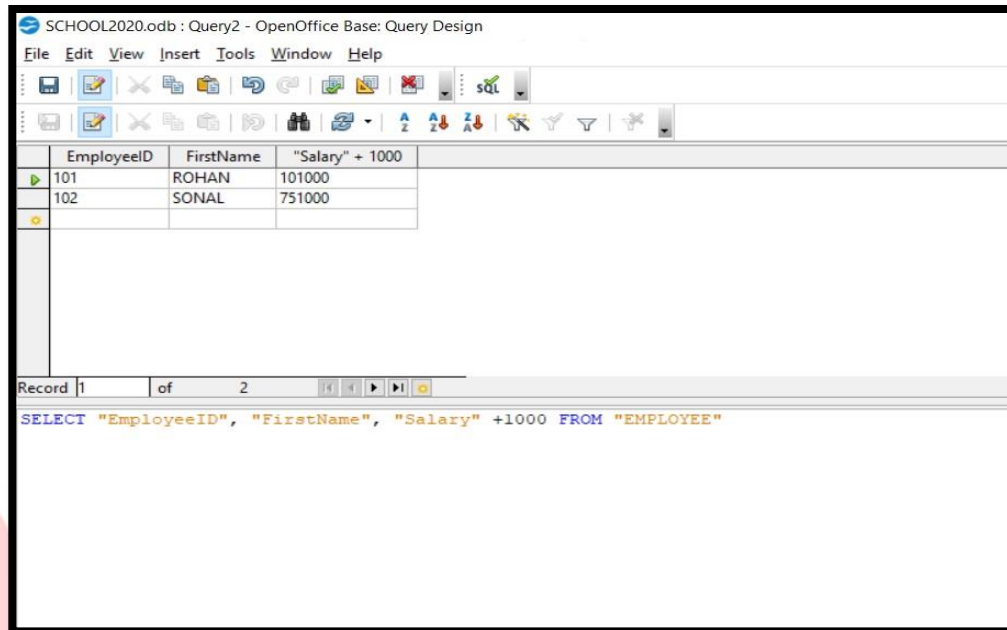


FIGURE 43

To display the salary of all the employees after decreasing by 10000 then the following SQL command will be executed in Base SQL Design

Select “EmployeeID”, “FirstName”, “Salary” - 10000
from “Employee”

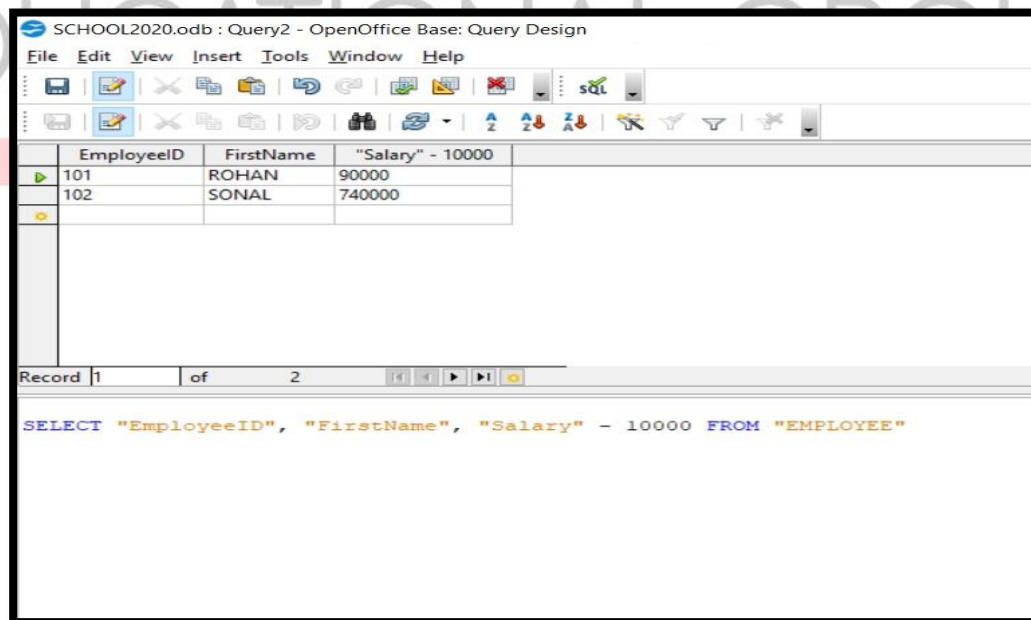


FIGURE 44

To display the salary of all the employees after incrementing it as twice the amount of present salary, then the following SQL command will be executed in Base SQL Design.

Select “EmployeeID”, “FirstName”, “Salary” * 2 from “Employee”

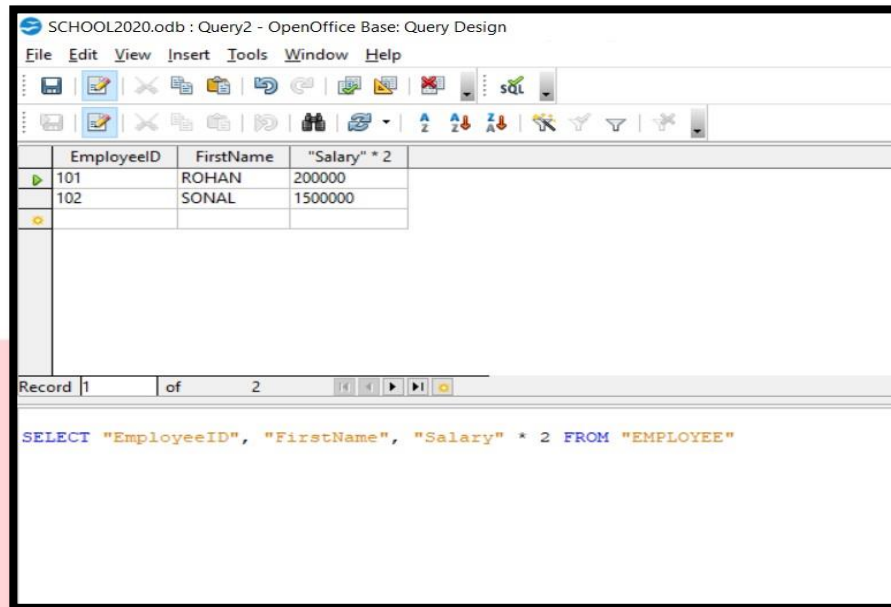


FIGURE 45

To display half of the salary amount paid to the employees, then the following SQL command will be executed in Base SQL Design.

Select “EmployeeID”, “FirstName”, “Salary”/2 from “Employee”

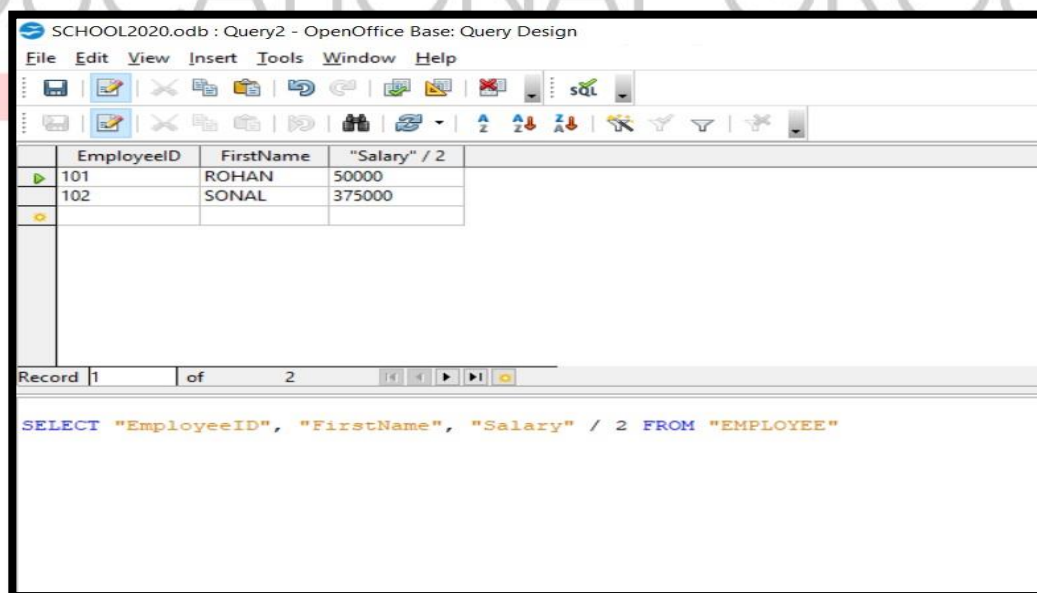


FIGURE 46

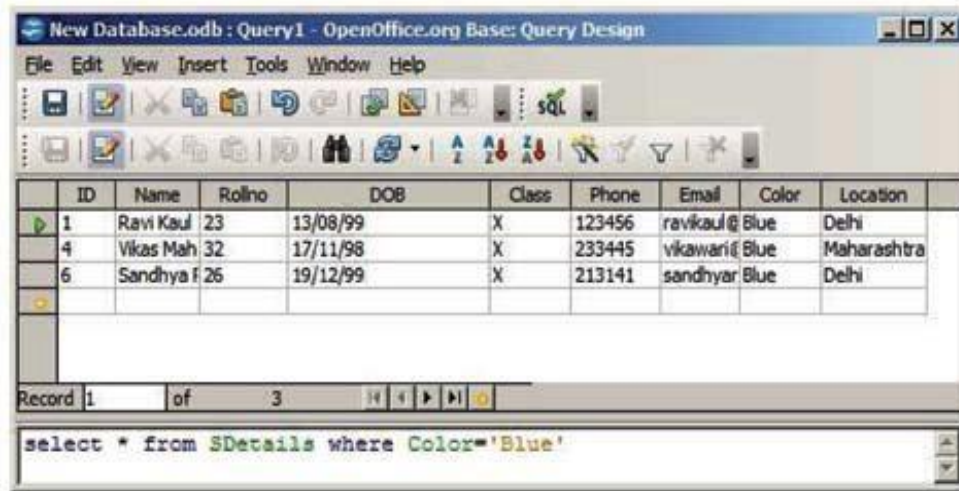
Grouping of Data

To display the records containing the same type of values “**WHERE**” clause can be used with the Select SQL Command.

To get details about the list of students whose favorite color is blue, you can use:

select * from SDetails where Color='Blue';

After executing the select query the output will be shown similar to the one displayed below.



ID	Name	Rollno	DOB	Class	Phone	Email	Color	Location
1	Ravi Kaul	23	13/08/99	X	123456	ravikaul@Blue	Blue	Delhi
4	Vikas Mah	32	17/11/98	X	233445	vikawari@Blue	Blue	Maharashtra
6	Sandhya f	26	19/12/99	X	213141	sandhyar@Blue	Blue	Delhi

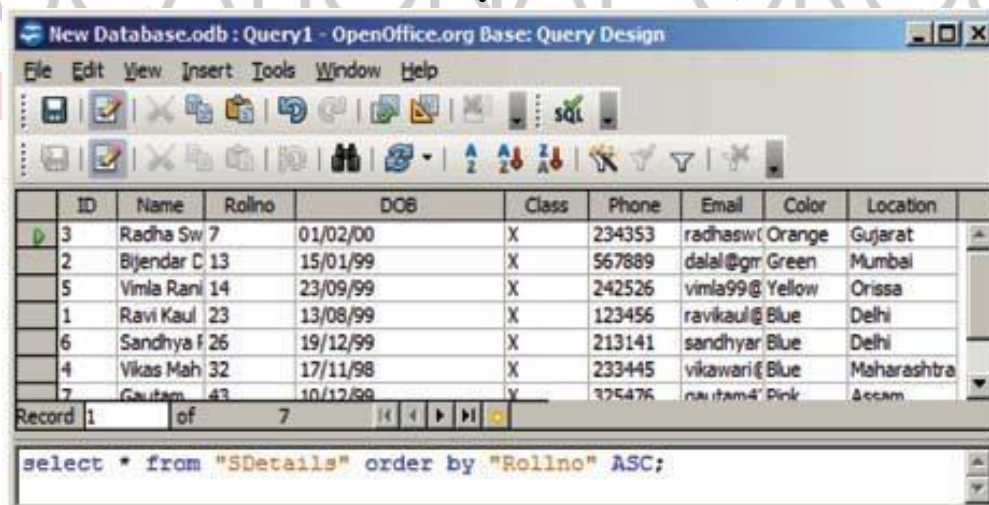
Record 1 of 3

select * from SDetails where Color='Blue'

Figure 47

To view records in ascending order of RollNo, from the table the select statement will be:

select * from SDetails order by “Rollno” ASC;



ID	Name	Rollno	DOB	Class	Phone	Email	Color	Location
3	Radha Sw	7	01/02/00	X	234353	radhasw@Orange	Orange	Gujarat
2	Bijendar C	13	15/01/99	X	567889	dalal@grn	Green	Mumbai
5	Vimla Rani	14	23/09/99	X	242526	vimla99@Yellow	Yellow	Orissa
1	Ravi Kaul	23	13/08/99	X	123456	ravikaul@Blue	Blue	Delhi
6	Sandhya f	26	19/12/99	X	213141	sandhyar@Blue	Blue	Delhi
4	Vikas Mah	32	17/11/98	X	233445	vikawari@Blue	Blue	Maharashtra
7	Gautam	43	10/12/99	Y	375476	nautam4@Pink	Pink	Assam

Record 1 of 7

select * from "SDetails" order by "Rollno" ASC;

Figure 48

You can add, modify or delete records using the Insert, Update and Delete commands.

To type and execute SQL commands, click on **Tools > SQL**. A window similar to the one below will be displayed.

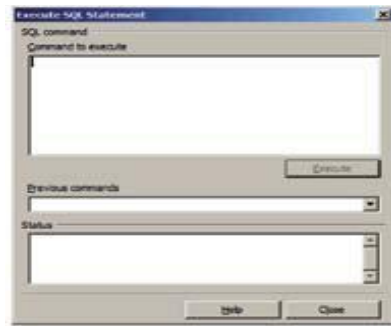


Figure 49

You can type the SQL Commands in the Command to execute space and click on **Execute**.

UPDATE statement

Update statement is used for modifying records in a database. The general syntax of the update statement is as follows:

UPDATE <table_name>

SET <column_name> = value [, column_name = value ...]

[WHERE <condition>];

To update a record using an **update statement**, type the following and click **Execute**.

Update SDetails set Location = 'Bhubaneswar' where Rollno = 14;

Execute select query to view the updated table. After execution you should see a window similar to the one displayed below.

ID	Name	Rollno	DOB	Class	Phone	Email	Color	Location
1	Ravi Kaul	23	12/8/99	X	123456	ravikaui@	Blue	Delhi
2	Bijendar Dalal	13	12/30/99	X	567889	dalal@gn	Green	Mumbai
3	Radha Swami	7	1/2/00	X	234353	radhasw@	Orange	Gujarat
4	Vikas maheswari	32	12/30/99	X	233445	vikawari@	Blue	Maharashtra
5	Vimla Rani	14	12/30/99	X	242526	vimla99@	Yellow	Bhubaneswar
6	Sandhya Reddy	26	12/30/99	X	213141	sandhyar@	Blue	Delhi
7	Gautam	43	10/12/99	X	325476	Gautam@	Pink	Assam
8	Ranjith Singh	67	12/10/99	X	435363	ranjith99@	White	Bihar

Figure 50

Activities

1. Open the database created in the previous activity. Use the select query statement to query and sort on subjects marks scored was greater than 50%.
2. Create a database for collecting and maintaining census data. Using queries display the data of people living in a specific area.

Hint : Create fields for fields such as First Name, Last Name, DOB, Place of birth, Employment Status, etc.

Assessment

Fill in the blanks

1. A _____ helps the user to systematically store information in the database.
2. A _____ enables users to view, enter, and change data directly in database objects such as tables.
3. _____ statement retrieves zero or more rows from one or more database tables or database views.
4. By default, data is arranged in _____ order using ORDER BY clause.
5. _____ statement is used for modifying records in a database.
6. _____ statement is used to remove one or more records in a Database.

Short Answer Questions:

1. Name DML commands.
2. What is the purpose of using queries?
3. Which clause of Select statement helps to display specific data?
4. Differentiate between Where and Orderby clause of SQL statements.
5. State the purpose of Update Command with the help of an example.

SESSION 5: CREATE FORMS AND REPORTS USING WIZARD

Relevant Knowledge

A form provides the user a systematic way of storing information into the database. It is an interface in a user specified layout that lets users to view, enter, and change data directly in database objects such as tables.

In this session, you will learn to create a form.

Creating Form Using Wizard

To create a form, Click on Forms option located under Database section (Figure below).

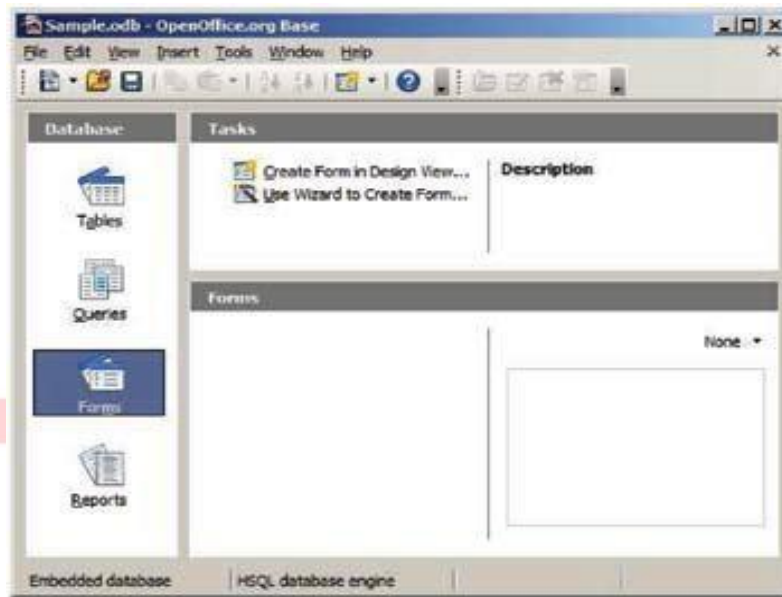


Figure 51

Steps To Create Form Using Wizard

Click Use Wizard to Create Form... option under Tasks group. The Form Wizard dialog box appears as shown below.



Figure 52

You can select selective fields to be sent onto the form by selecting the field name and clicking >button. You can select individual fields in a database or all fields in a database.

To use all the fields in the table in a form, click the >> button.

Notice the fields displayed under Fields in the forms section (Figure below).

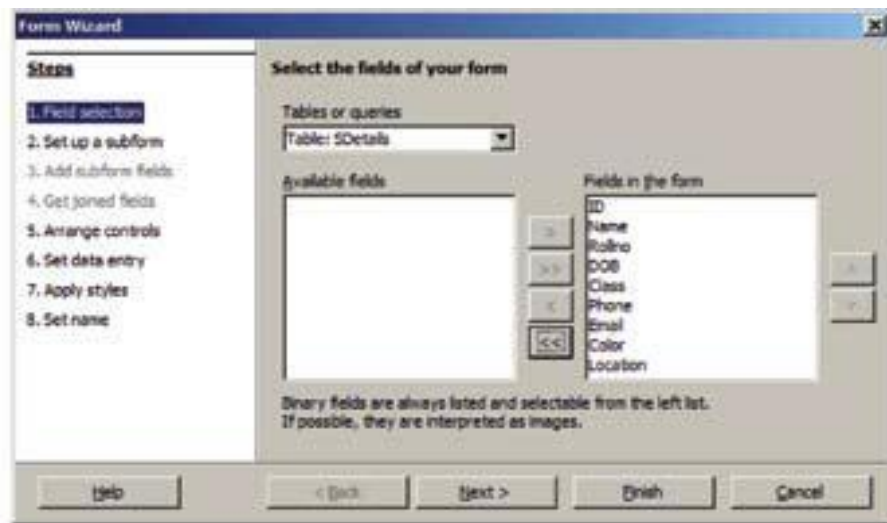


Figure 53

Click Next >. You see the Set up a sub form step dialog box of the wizard as shown below.

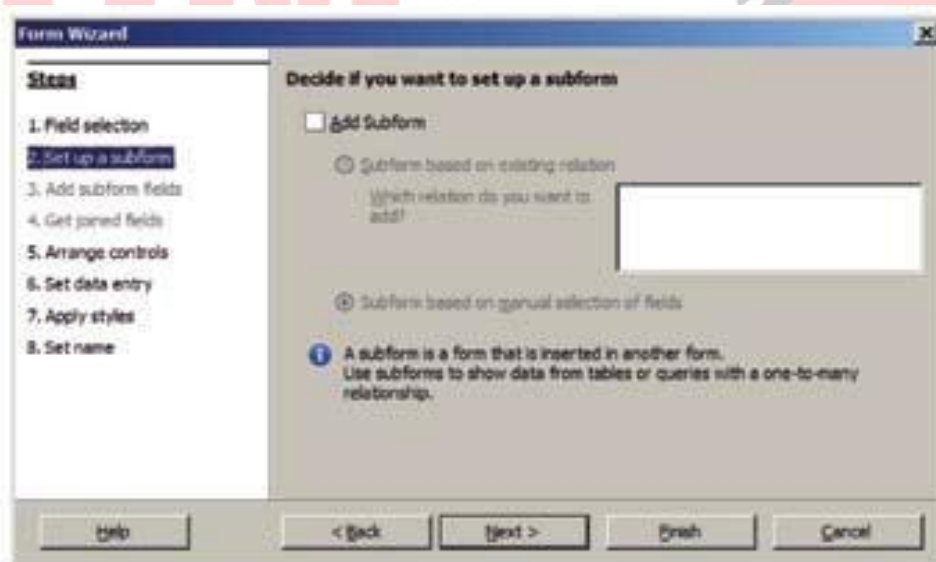


Figure 54

You can select the option **Add Subform** if you need to insert the contents in the table in a separate form. **Click Next>.**

Now you need to arrange selected fields in a form. You can use different styles from the list displayed below:

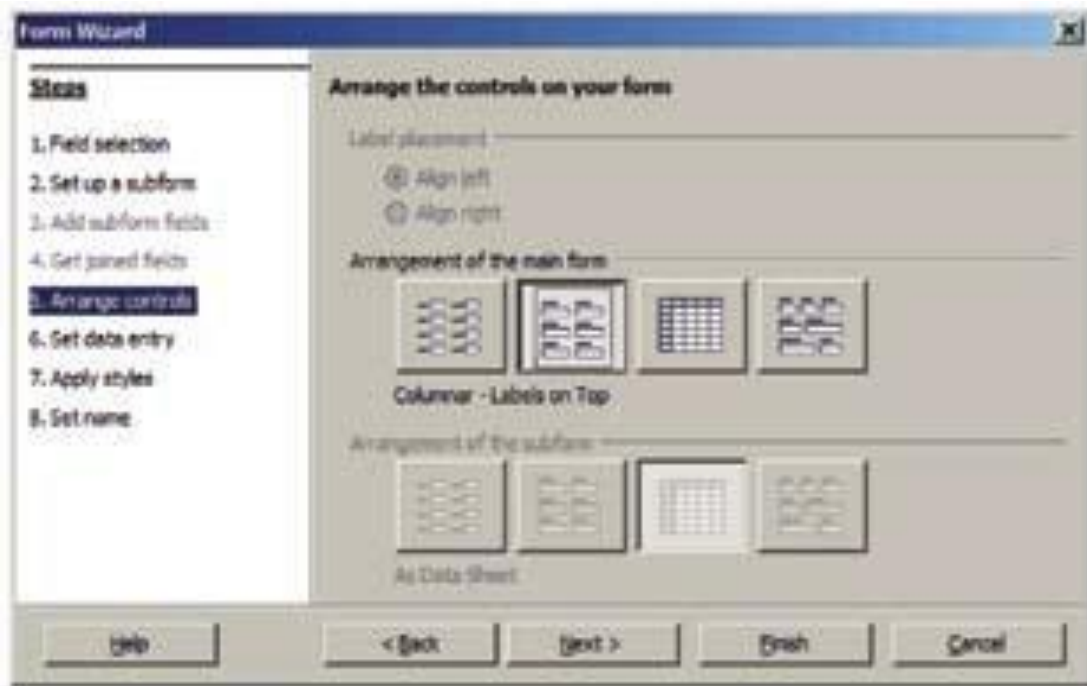


Figure 55

Once you have selected a style, click **Next >**

A dialog box appears wherein you can select the data entry model.

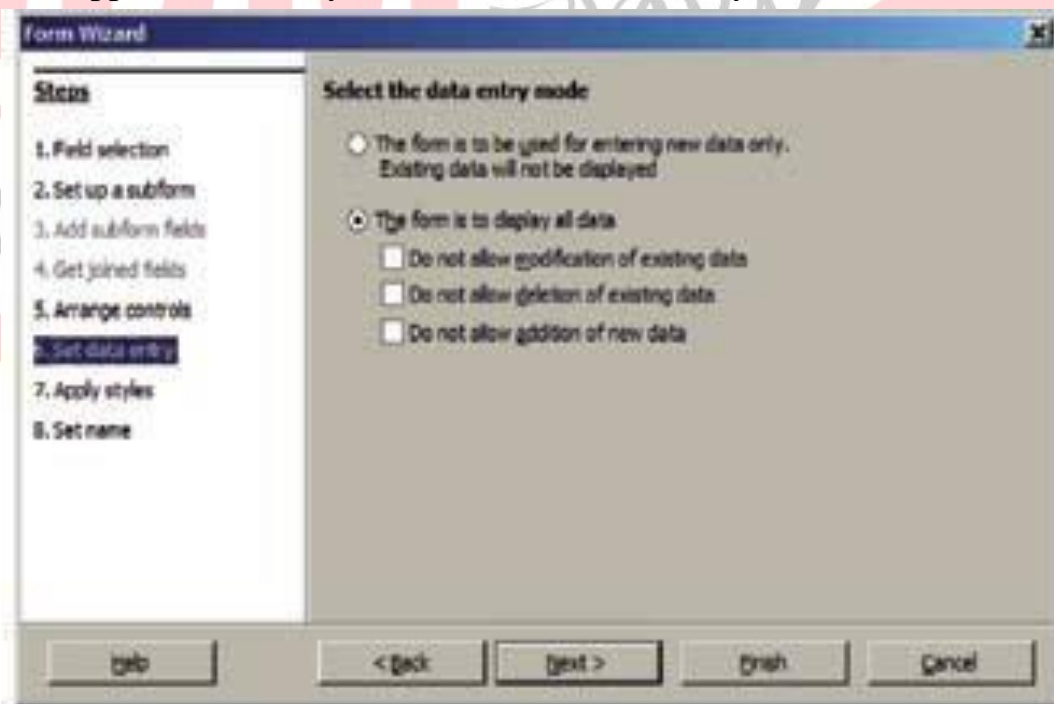


Figure 56

Click **Next >**. You should see a dialog box wherein you can specify the styles to be used in the form.

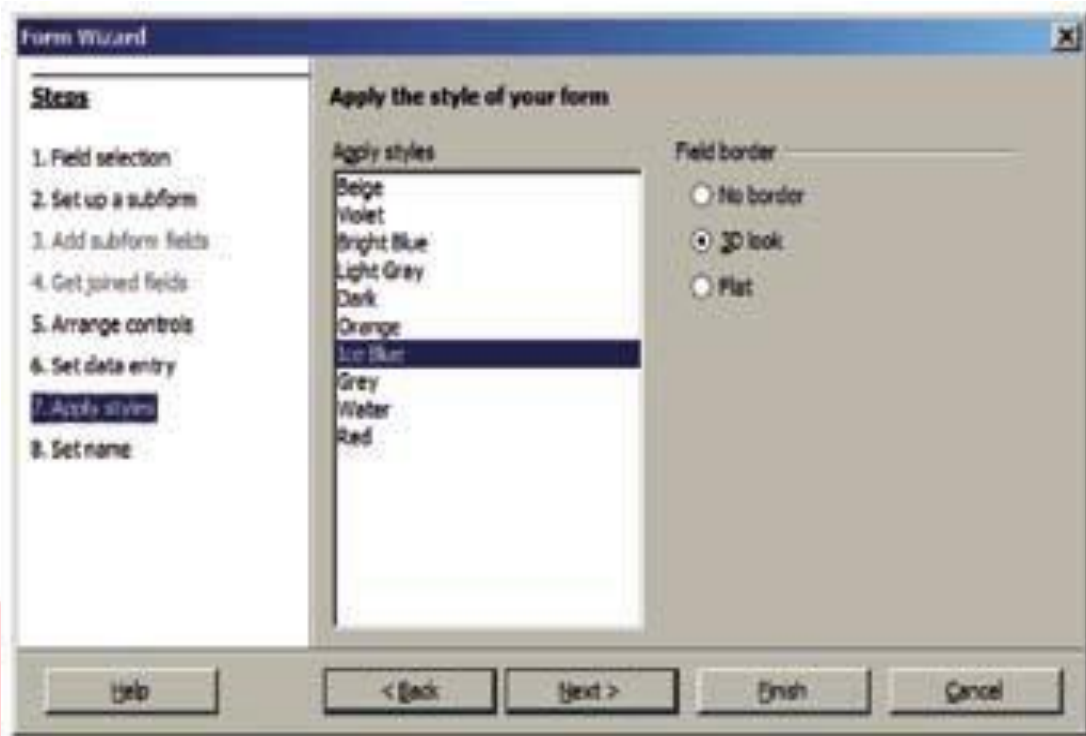


Figure 57

Click **Next >**. You see a dialog box where you can specify the name of the form. Click **Finish**.

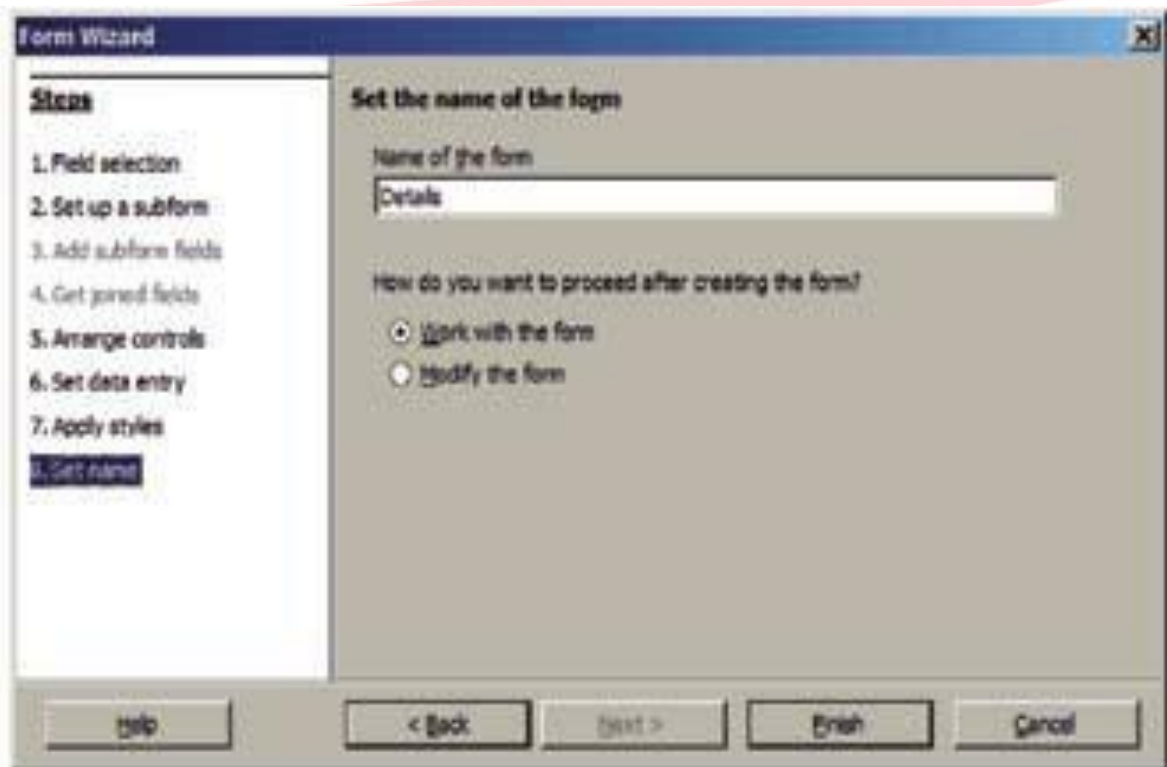


Figure 58

A form window appears. Notice that the records in the table are displayed automatically within the form that you just created.

Figure 59

Options To Enter Data From Forms



You can add new records to the table using the form by clicking the  symbol located at the bottom as shown below.



Figure 41

Once you click the  symbol, you will be displayed with a window for creating records (Figure below).

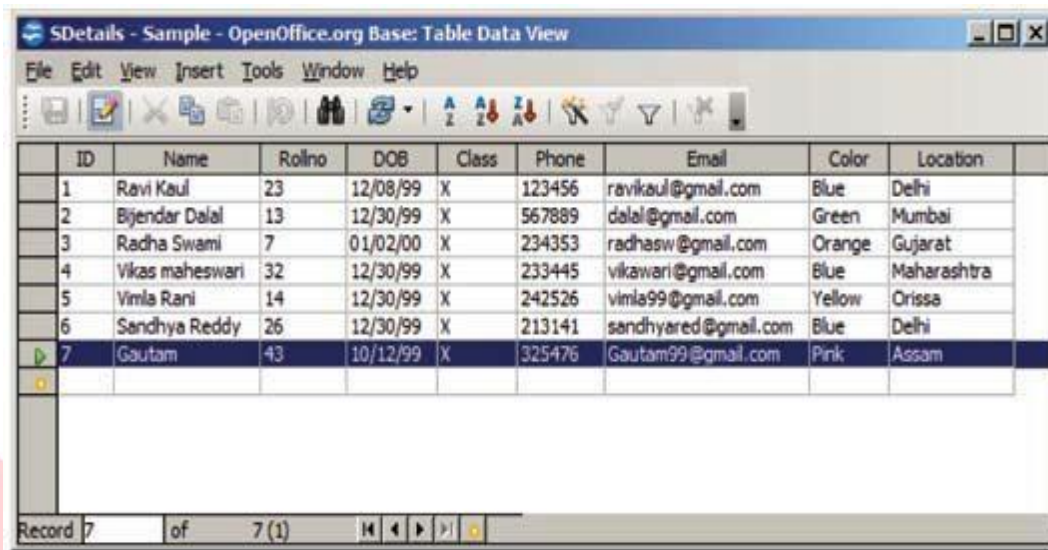
The screenshot shows a web browser window with a form titled 'Sample.odt: Details - OpenOffice.org Basic: Outsource Flow'. The form contains the following fields: ID, Name, Rollno, DOB, Class, Phone, Email, Color, and Location. The status bar at the bottom indicates 'Record 7 of 7' and 'Page 1/1: Default'.

Figure 60

You have learnt to create records using design view in the earlier sessions. You can add records using the form as displayed below. Type the following data in the textbox provided in the box as shown below:

Name	Gautam
Rollno	43
DOB	10/12/99
Class	X
Phone	325476
Color	Pink
Email	gautam43@gmail.com
Location	Assam

To view the saved records, Double-click **SDetails** (Table name) under **Tables** section. A window similar to the one below will be displayed; notice the record that you created using a form is also displayed along with other records (Figure below).



ID	Name	Rollno	DOB	Class	Phone	Email	Color	Location
1	Ravi Kaul	23	12/08/99	X	123456	ravikaul@gmail.com	Blue	Delhi
2	Bijender Dalal	13	12/30/99	X	567889	dalal@gmail.com	Green	Mumbai
3	Radha Swami	7	01/02/00	X	234353	radhasw@gmail.com	Orange	Gujarat
4	Vikas maheswari	32	12/30/99	X	233445	vikawari@gmail.com	Blue	Maharashtra
5	Vimla Rani	14	12/30/99	X	242526	vimla99@gmail.com	Yellow	Orissa
6	Sandhya Reddy	26	12/30/99	X	213141	sandhyared@gmail.com	Blue	Delhi
7	Gautam	43	10/12/99	X	325476	Gautam99@gmail.com	Pink	Assam

Figure 61

Now enter three more records using the form and view them using the above mentioned procedure.

Reports

A report helps to display the data in a summarized manner. It is used to generate the overall work outcome in a clear format. You can create reports in the database.

Concept Of Reports In Base

The reports can be created using Openoffice Base.

Creating Reports using wizard

Reports helps to get the summarized data. To create reports in Base, the table must be selected from using which data can be displayed in a format as required.

The steps to create followed are :

- Click on **Reports** section under Database in the OpenOffice base application.
- Once you select the option, you should see a window similar to the one displayed below.

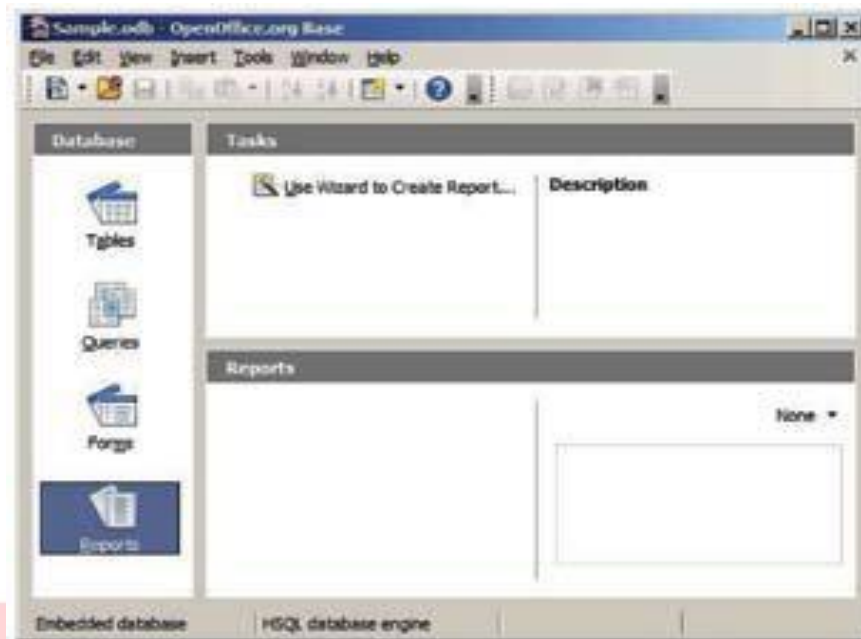


Figure 62

Now we can generate the report for the table created earlier. Click on **Use Wizard to Create Report...** option available under Tasks. Once you select the **Use Wizard to Create Report...** option. You should see a window similar to one displayed below.



Figure 63

You have to select all the table fields by selecting the >> button, once you click the button >> you should see a dialog box similar to the one displayed below.



Figure 64

Once you click **Next>**, you should see a dialog box similar to the one displayed below.

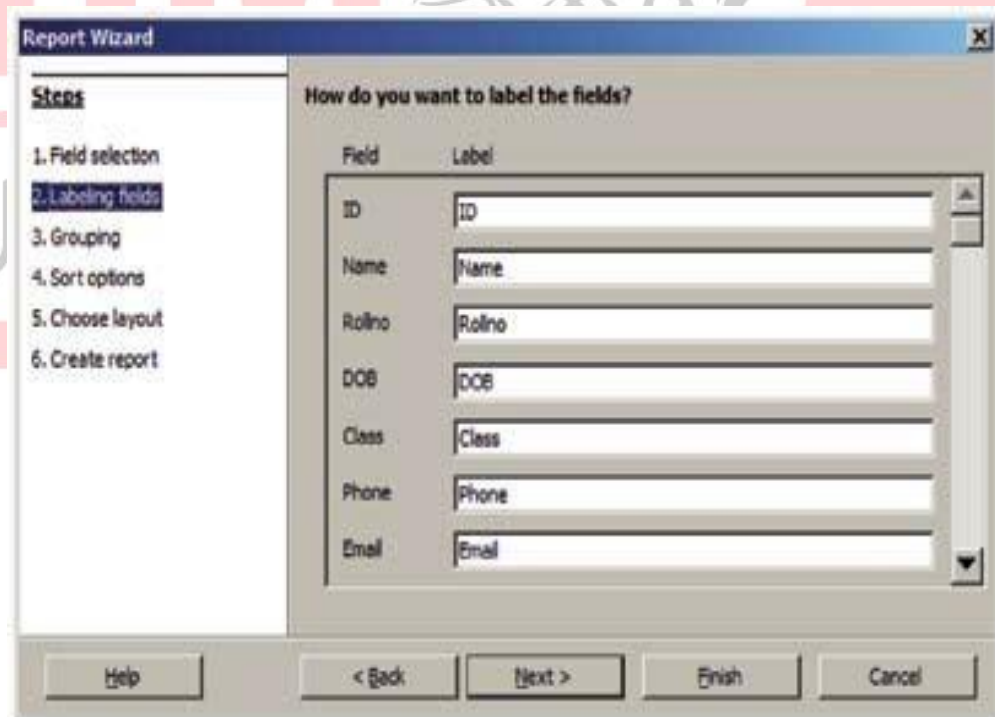
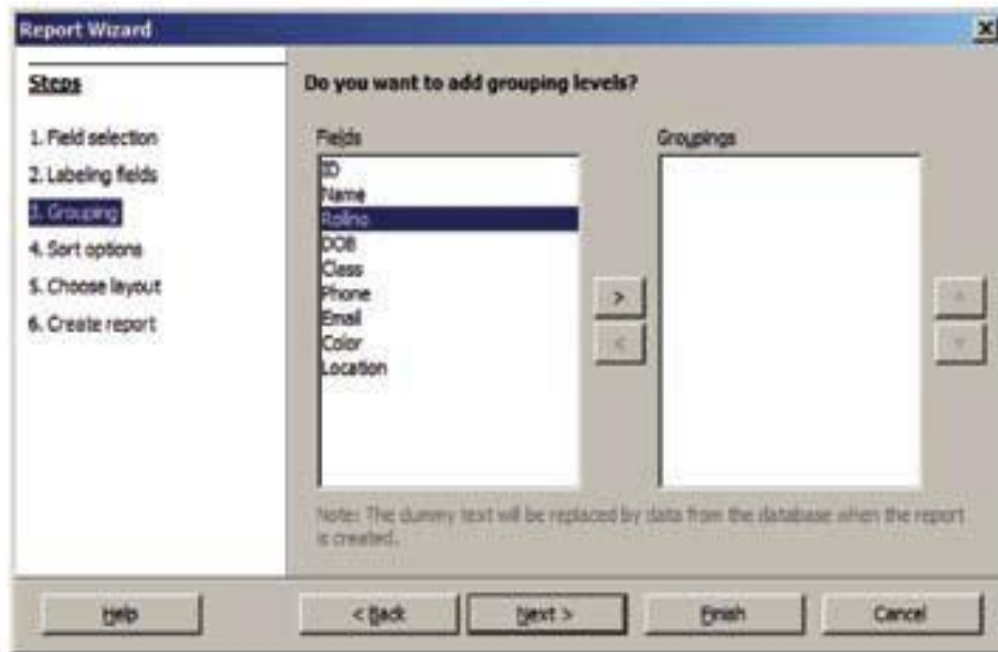


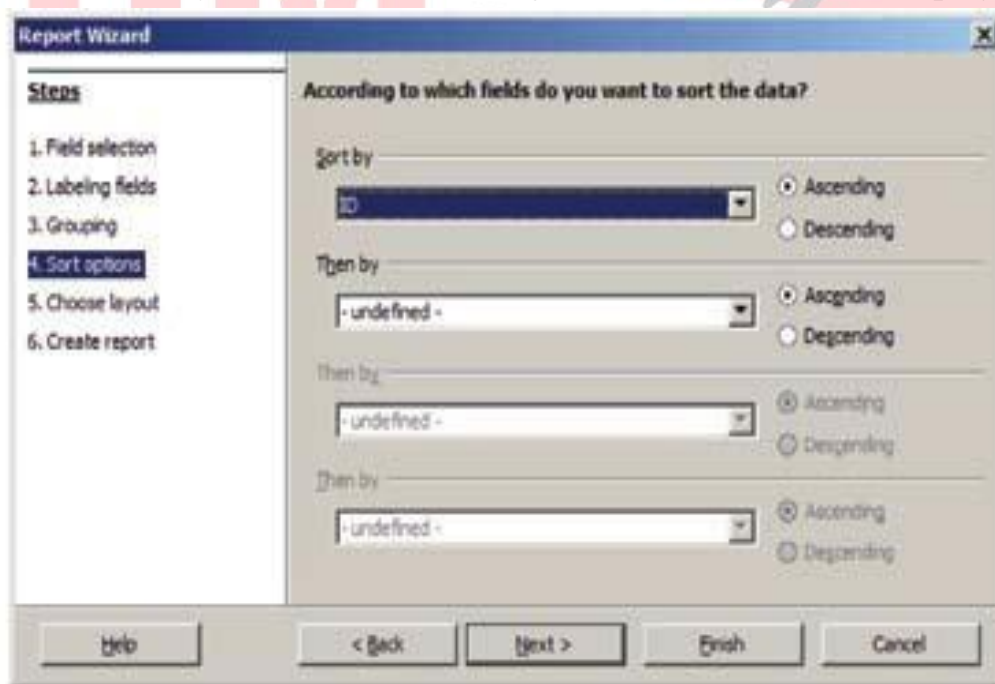
Figure 65

You can redefine the label of the fields in the reports or else you can set the default name. Once you click **Next >**, you should see a dialog box similar to the one displayed below.

**Figure 66**

You can define grouping for the fields of the table.

Once you click **Next >**, you should see a dialog box similar to the one displayed below.

**Figure 67**

You can sort the field variables in the report by selecting the appropriate field and sorting method.

Once you click **Next >**, you should see a dialog box similar to the one displayed below.

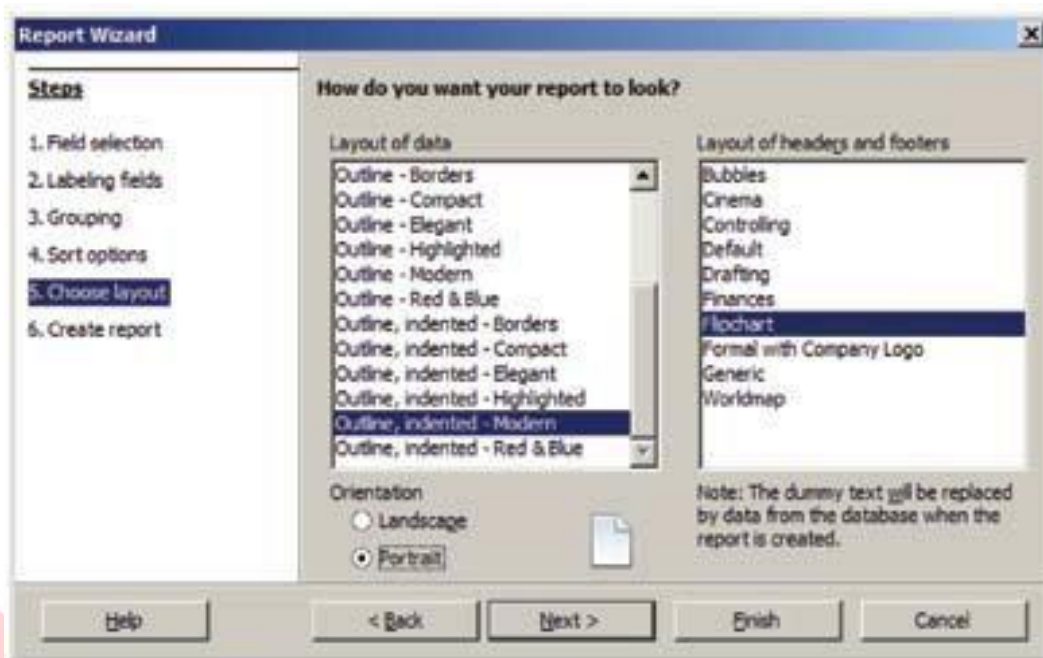


Figure 68

You can select the layout of the report by selecting the appropriate option available under the Layout of data down list and you can also select the orientation of the report.

Once you click **Next >**, you should see a dialog box similar to the one displayed below.

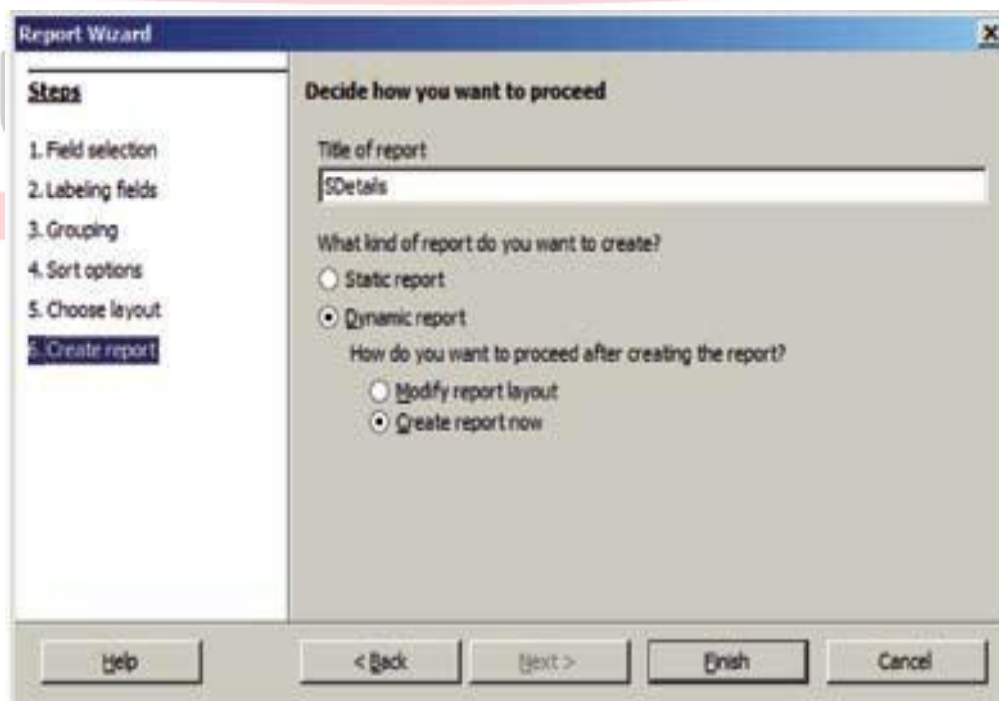


Figure 69

You can define a name for the report or you can use the name of the table itself for the report also.

Click **Finish**.

Once you click **Finish** you should see a window similar to the one displayed below with the report.

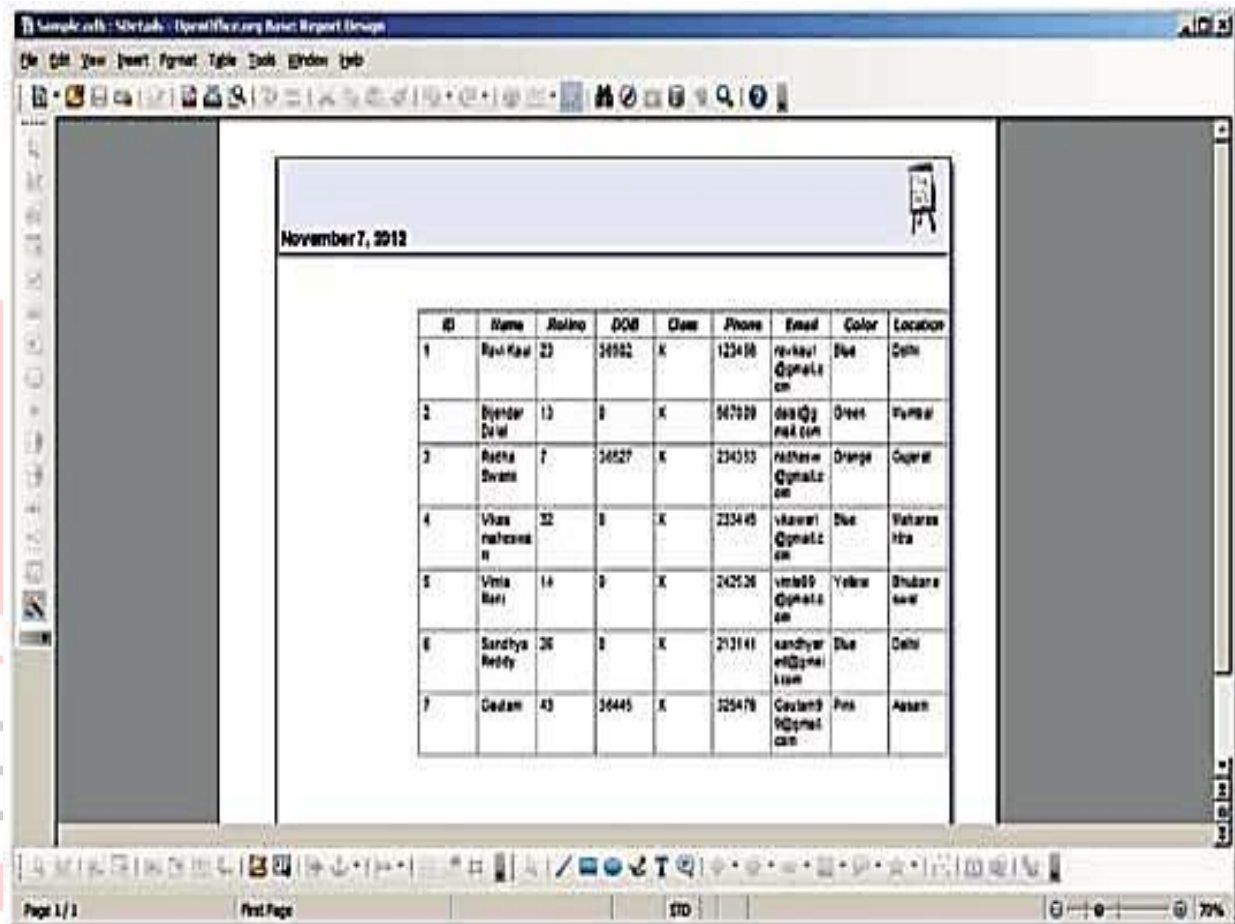


Figure 70

Now create a report containing only Name, RollNo and Phone details. Use different layouts for the report design.

ACTIVITIES

1. Create a form for the academic database created in the above activity. Populate the table with mark results using the form.
2. Create a report to display data from table stored in database created earlier. A report must display your entire academic score card.

Fill in the blanks:

1. To create a form you need to select _____ option available under Database section.
2. A _____ is helps to collect specific information from the pool of data in the database.
3. _____ is used to display the display the summary of data.
4. _____ are the interfaces with which the user interacts.
5. Data from multiple tables can be stored in _____.

Short Answer Questions:

1. Why there is a need to create Forms?
2. What is the purpose of creating Reports?
3. What are the prerequisites to create a Form and Reports?
4. Differentiate between Forms and Reports.
5. Can a form displays data from queries?
6. In how many ways Forms and Reports can be created in a database?