INTRODUCTION TO DATABASES, MYSQL, MS ACCESS, PHARMACY DRUG DATABASE

For Class- B.Pharmacy 2nd Semester

Subject- COMPUTER APPLICATIONS IN PHARMACY (BP205T)

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Introduction to Databases

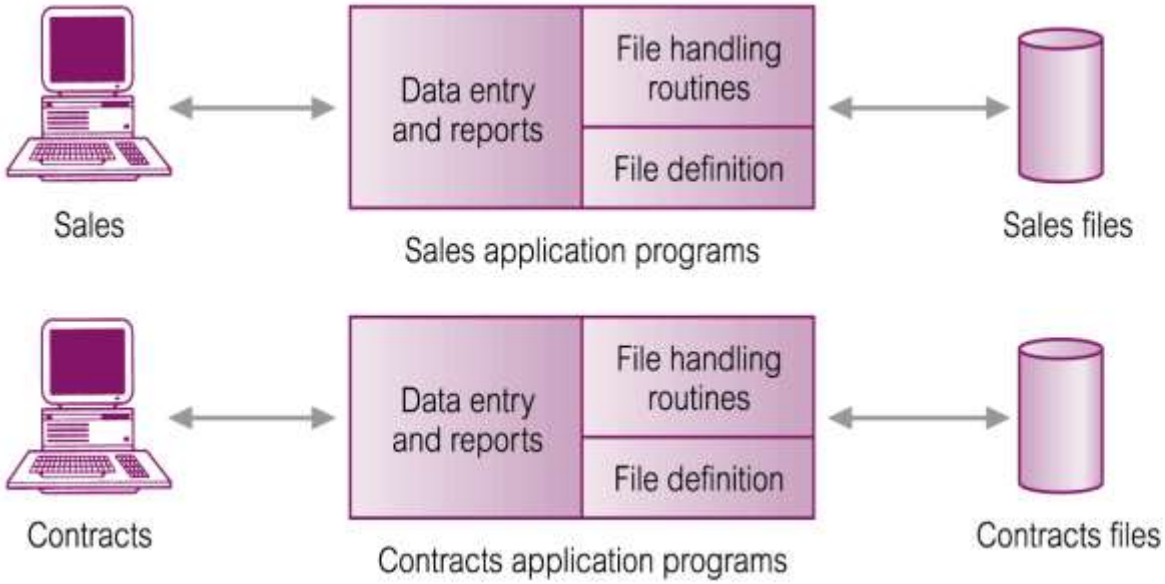
Objectives

* Characteristics of file-based systems.
* Problems with file-based approach.
* Meaning of the term database.
* Some common uses of database systems.
* Meaning of the term Database Management System (DBMS).

File-Based Systems

* A file system is a method for storing and organizing computer files and the data they contain to make it easy to find and access them. File systems may use a storage device such as a hard disk or CD-ROM and involve maintaining the physical location of the files.
* Each program defines and manages its own data.

File-Based Processing :Example



File Based System

Sales Files

PropertyForRent (propertyNo, street, city, postcode, type, rooms, rent, ownerNo)
PrivateOwner (ownerNo, fName, lName, address, telNo)
Client (clientNo, fName, lName, address, telNo, prefType, maxRent)

Contracts Files

Lease (leaseNo, propertyNo, clientNo, rent, paymentMethod, deposit, paid, rentStart, rentFinish, duration)
PropertyForRent (propertyNo, street, city, postcode, rent)
Client (clientNo, fName, lName, address, telNo)

Disadvantages of simple file system

* **Separation and isolation of data**
  * **Each program maintains its own set of data.**
  * **Users of one program may be unaware of potentially useful data held by other programs.**

* **Duplication of data**
  * **Same data is held by different programs.**
  * **Wasted space and potentially different values and/or different formats for the same item.**

Disadvantages of simple file system

- **Data dependence**
  - **File structure is defined in the program code.**
- **Incompatible file formats**
  - **Programs are written in different languages, and so cannot easily access each other's files.**
- **Fixed Queries/Proliferation of application programs**
  - **Programs are written to satisfy particular functions.**
  - **Any new requirement needs a new program.**

Need of Database Approach

* **Arose because:**
  * **Definition of data was embedded in application programs, rather than being stored separately and independently.**
  * **No control over access and manipulation of data beyond that imposed by application programs.**

* **Result:**
  * **the database and Database Management System (DBMS).**

Database

* **Shared collection of logically related data (and a description of this data), designed to meet the information needs of an organization.**

* **System catalog (metadata) provides description of data to enable program–data independence.**

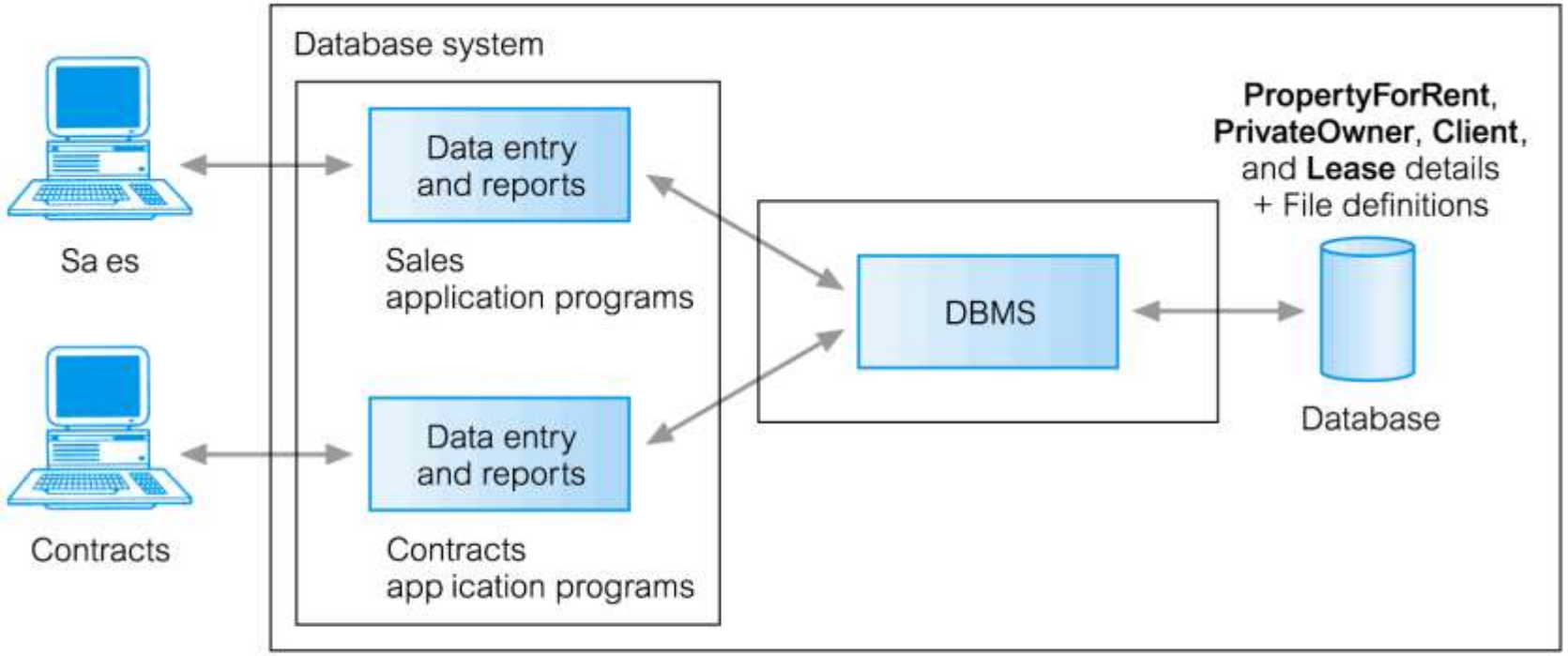
* **Logically related data comprises entities, attributes, and relationships of an organization's information.**

Database Management System (DBMS)

* **A software system that enables users to define, create, maintain, and control access to the database.**

* **(Database) application program: a computer program that interacts with database by issuing an appropriate request (SQL statement) to the DBMS.**

Database Management System (DBMS) : Example



PropertyForRent (propertyNo, street, city, postcode, type, rooms, rent, ownerNo)
PrivateOwner (ownerNo, fName, lName, address, telNo)
Client (clientNo, fName, lName, address, telNo, prefType, maxRent)
Lease (leaseNo, propertyNo, clientNo, paymentMethod, deposit, paid, rentStart, rentF nish)

Examples of Database Applications

* Purchases from the supermarket
* Purchases using your credit card
* Booking a holiday at the travel agents
* Using the local library
* Taking out insurance
* Renting a video
* Using the Internet
* Studying at university

MySQL and its Commands

1.0. Introduction

- MySQL is the most popular open source SQL database management system,
- Database is a separate application that stores a collection of tables with related data.
- We use RDBMS to store and manage huge volume of data. This is called relational database, because all the data is stored into different tables and relations are established using primary keys or other keys known as foreign keys.
- RDBMS is a software:
  - ✓ which enables to implement a database with tables, columns and indexes.
  - ✓ Guarantees the referential integrity between rows of various tables.
  - ✓ Updates the indexes automatically
  - ✓ Interprets an SQL query and combines information from various tables.
- MySQL is a fast and easy to use, RDBMS being used for many small and big businesses.

2.0. What is MySQL ?

- Most popular open source SQL database management system
- Developed, distributed and supported by oracle corporation.
- Provide best open source RDBMS being developing web based software applications.
- Supports including Windows, the major operating systems Linux, UNIX, Mac.
- Widely accepted.
- MySQL uses a standard form of the well known SQL data language.
- Used by many of the larger online products today.
- Used part of lamp stack, it is used to create the backbone of many of the popular web site, social networking sites.

3.0. Development of MySQL

- Created by Swedish Company, MySQL AB, fonded by Michael Widenius, David Axmark & Allan Larsson during 1994
- First internal release on 23rd May 1995
- Released Windows version on 8th Jan. 1998 (W95 and NT)
- Latest version 5.6.23 on 02 Feb. 2015

4.0. MySQL installation

- Windows: MySQL database server can be installed either w/or others OS
- Download from "dev.mysql.com", pick the version from MySQL community server, depends of your PC capacity.
- Other: a part of lamp stack or independently as r unable program
- And some other all in one software (eg. WAMP server)

5.0. Features of MySQL

- **Open source**: User no need to pay anything for MySQL. Open source GPL(General Public Licenses),
- **Multi-User support**: Multiple clients have concurrent access to one or more databases simultaneously.
- **Portability:** MySQL works on many operating system.
- **Understand SQL**: MySQL understand SQL, which is the standard language of choice for all modern database system.
- **High Performances**:
  - ✓ works very quickly and well even with large data sets.
  - ✓ Support large database up to 50 million rows.

Cont.....

- **Ease to use:** It is easy to use. It is simple to install and implement. User can install MySQL within a few minutes.
- **Speed:** MySQL is the fast. Respont the request data faster than others.
- **Small in size**: MySQL has a modest distribution size, especially compared to the huge disc space footprint of certain other database system.
- **Runs** many of the world's most demanding websites/search engines/social networks etc.

  eg.:IRCTC, Google, yahoo, youtube etc.

6.0. MySQL data types

MySQL uses many different data types which were categorized into 3 parts:

6.1. Numeric Data type,

6.2. Date and Time and

6.3. String data types.

6.1. Numeric Data Types:

- ✓ **INT**: Numeric data type. maximum number of digits may be specified in parenthesis

The following data types are use for maximum numbers of data storage and retrieval

- ✓ **INYINT**
- ✓ **SMALLINT**
- ✓ **BIGINT**
- ✓ **FLOAT**
- ✓ **DOUBLE**
- ✓ **DECIMAL**

Cont.....

6.2. Date and Time Types:

- ✓ **DATE:** Format: YYYY-MM-DD
- ✓ **DATETIME**: Date and time combination. Format: YYYY-MM-DD HH:MI:SS
- ✓ **TIMESTAMP:** This values are stored as the number of seconds. Format like YYYY-MM-DD HH:MI:SS
- ✓ **TIME**: Format: HH:MI:SS
- ✓ **YEAR:** Year in two-digit or four-digit. [eg. two digit: 80 to 90, representing years from 1980 to 1990]

6.3. Text (String) Types:

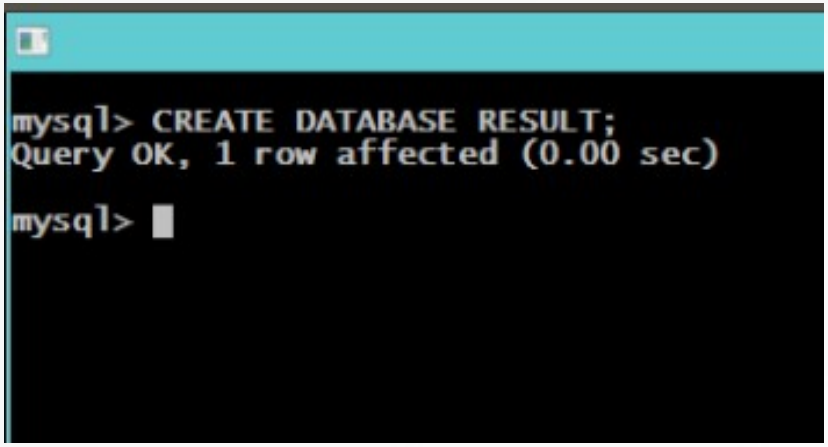
- ✓ **CHAR**: Fixed length string(contain letters, numbers, and characters). The **fixed** size is specified in parenthesis. Can store up to 255 characters.
- ✓ **VARCHAR:** Field is a set of character data of indeterminate legth. The **maximum** size is specified in parenthesis. Can store up to 255 characters
- ✓ **TINYTEXT**: Holds a string with a maximum length of 255 characters
- ✓ **BLOB or TEXT:** These are use for huge data storing. Holds a string with a maximum length of more than 65 thousand characters.
- ✓ **MEDIUMBLOB or MEDIUMTEXT:** Holds a string with a maximum length of more than 16 lakh characters.
- ✓ **LONGBLOB or LONGTEXT:** Holds a string with millions of characters
- ✓ **ENUM:** You enter the possible values in this format: ENUM('X','Y','Z').

7.0. Basic MySQL Commands

1. **CREATE** : (DDL). That allows to create database.

Command: **CREATE DATABASE** <database name>;

For eg.: **CREATE DATABASE RESULT**;



Now we will show the RESULT database is created or not.

Command: SHOW DATABASES;

N:B: The RESULT database is created.

Cont.....

2. **DROP** (DDL): This command allows us to remove database or entire objects from the database. Be careful while deleting any database because you will lose your all the data available in your database

Command: **DROP DATABASE** <database name>;

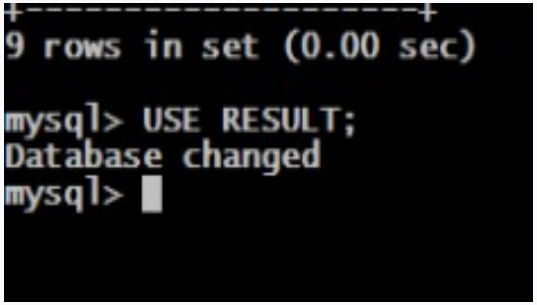
or **DROP TABLE** <table name>;

3. **USE database**: Now we will create table. Before creating the table we need to select the specific database, in which database you are going to create tables and store the data.....

Command: USE <database name>;

For eg.: We will use the database RESULT.

Command: USE RESULT;



Cont.....

4. **CREATE TABLE**: We selected a specific database. Now create the table.

Command: **CREATE TABLE** <table name> (column1 data type, column2 data type, column3);

Eg.: **CREATE TABLE SEM2 (REGNO INT NOT NULL, NAME VARCHAR(100), SUBJECT VARCHAR(30), MARKS INT NOT NULL);**

```
9 rows in set (0.00 sec)

mysql> USE RESULT;
Database changed
mysql> CREATE TABLE SEM2 (RGNO INT NOT NULL, NAME VARCHAR(100), SUBJECT VARCHAR(30), MARKS INT NOT NULL);
Query OK, 0 rows affected (0.34 sec)

mysql>
```

5. **DROP TABLE:** Same as previous drop command.

Cont.....

6. **INSERT INTO (DML)**: To insert data into MySQL table, you would need to use SQL INSERT INTO command. You can insert data into MySQL table by using following command

Command:INSERT INTO <table name> (column1, column2, column3) values (.....);

For eg.: We will insert values into SEM2 table

Command: INSERT INTO SEM2 (REGNO, NAME, SUBJECT, MARKS)

VALUES (1234, 'BWSRANG', 'INFORMATION STORAGE AND RETRIEVAL', 80);

Cont.....

```
mysql> INSERT INTO SEM2 (RGNO, NAME, SUBJECT, MARKS)
    -> VALUES (1235,'DASHRATH','RM',70);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO SEM2 (RGNO, NAME, SUBJECT, MARKS)
    -> VALUES (1236,'ALONGBAR','MANAGEMENT',90);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO SEM2 (RGNO, NAME, SUBJECT, MARKS)
    -> VALUES (1237,'VIJAY','DDC',80);
Query OK, 1 row affected (0.36 sec)

mysql> INSERT INTO SEM2 (RGNO, NAME, SUBJECT, MARKS)
    -> VALUES (1238,'THANG','ISR',90);
Query OK, 1 row affected (0.36 sec)
```

Cont.....

7. SELECT (DRL): Use for retrieve data from database. Use for selecting various attributes or column of a table. The SQL SELECT command is used to fetch data from MySQL database

Command: SELECT* FROM <table name>;

SELECT* FROM SEM2;

```
mysql> SELECT* FROM SEM2;
+------+----------+------------+-------+
| RGNO | NAME     | SUBJECT    | MARKS |
+------+----------+------------+-------+
| 1234 | BWSRANG  | ISR        |    80 |
| 1235 | DASHRATH | RM         |    70 |
| 1236 | ALONGBAR | MANAGEMENT |    90 |
| 1237 | VIJAY    | DDC        |    80 |
| 1238 | THANG    | ISR        |    90 |
+------+----------+------------+-------+
5 rows in set (0.00 sec)
```

Cont.....

If you want to retrieve some attributes from the table

command: SELECT <column1> FROM <table> WHERE <condition>;

eg. 1: SELECT SUBJECT FROM SEM2 WHERE MARKS='80';

You can retrieve different condition from table:

eg.2: SELECT* FROM SEM2 WHERE MARK >'80';

here all the greater than 80 marks from SEM2 table will be retrieved.

Cont.....

```
mysql> SELECT* FROM SEM2;
+-------+-----------+-------------+--------+
| RGNO  | NAME      | SUBJECT     | MARKS  |
+-------+-----------+-------------+--------+
|  1234 | BWSRANG   | ISR         |     80 |
|  1235 | DASHRATH  | RM          |     70 |
|  1236 | ALONGBAR  | MANAGEMENT  |     90 |
|  1237 | VIJAY     | DDC         |     80 |
|  1238 | THANG     | ISR         |     90 |
+-------+-----------+-------------+--------+
5 rows in set (0.00 sec)

mysql> SELECT* FROM SEM2 WHERE MARKS >'80';
+-------+-----------+-------------+--------+
| RGNO  | NAME      | SUBJECT     | MARKS  |
+-------+-----------+-------------+--------+
|  1236 | ALONGBAR  | MANAGEMENT  |     90 |
|  1238 | THANG     | ISR         |     90 |
+-------+-----------+-------------+--------+
2 rows in set (0.00 sec)

mysql> SELECT* FROM SEM2 WHERE MARKS <'80';
+-------+-----------+---------+--------+
| RGNO  | NAME      | SUBJECT | MARKS  |
+-------+-----------+---------+--------+
|  1235 | DASHRATH  | RM      |     70 |
+-------+-----------+---------+--------+
1 row in set (0.00 sec)

mysql> SELECT* FROM SEM2 WHERE MARKS ='80';
+-------+-----------+---------+--------+
| RGNO  | NAME      | SUBJECT | MARKS  |
+-------+-----------+---------+--------+
|  1234 | BWSRANG   | ISR     |     80 |
|  1237 | VIJAY     | DDC     |     80 |
+-------+-----------+---------+--------+
2 rows in set (0.00 sec)

mysql>
```

Cont.....

8. Where clause: We have seen SQL SELECT command to fetch data from MySQL table. It works like an if condition in any programming language. We can use a conditional clause called **WHERE** clause to filter out results. Using WHERE clause, we can specify a selection criteria to select required records from a table.

- ✓ **WHERE** clause is an optional part of **SELECT** command.
- ✓ You can specify any condition using WHERE clause. (area, mark less than and greater than etc.)
- ✓ You can specify more than one conditions using AND or OR operators.
- ✓ A WHERE clause can be used along with **DELETE** or **UPDATE SQL** command also to specify a condition.

Cont.....

9. **UPDATE (DML)**: There may be a requirement where existing data in a MySQL table needs to be modified. You can do so by using SQL UPDATE command. This will modify any field value of any MySQL table. The WHERE clause is very useful when you want to update selected rows in a table.

Command: UPDATE <table name>

SET COLUMN1=values

WHERE <condition>;

eg.: UPDATE SEM2

SET SUBJECT='ISR' WHERE NAME ='BWSRANG';

Cont.....

10. **DELETE (DML)** : Use for delete data from table (only specific data). If you want to delete a record from any MySQL table, then you can use SQL command DELETE FROM. You can delete records in a single table at a time.

    Command: DELETE FROM

    eg.: DELETE FROM SEM2 WHERE MARK='90';

11. **ALTER (DDL):** Use for modifies an existing database objects. MySQL ALTER command is very useful when you want to change a name of your table, any table field or if you want to add or delete an existing column in a table.

    Command: (Add)

    ALTER TABLE SEM2 ADD POINT INT;

    Command: (Drop)

    ALTER TABLE SEM2 DROP POINT;

    eg.: ALTER TABLE SEM2

    MODIFY NAME VARCHAR(100) NOT NULL;

8.0. MySQL Constraints

Constraints are used to specify rules for the data in table.

- **NOT NULL:** Used to represent a column can not have value(empty).

eg.: SELECT ID, NAME, AGE, ADDRESS, SALARY FROM CUSTOMERS WHERE SALARY IS NOT NULL;

- **DEFAULT**: Provide a default value for a column when none is specified.
- **UNIQUE**: Ensures that all the values in columns are unique. (different)
  - ✓ Duplication can not be happen.

    eg. Roll No., date of birth.
- **PRIMARY KEY**: Combination of NOT NULL and UNIQUE.
- **FOREIGN KEY** : Uniquely identify a row / record in any other database table.
- **CHECK**: The check constraints ensures that all values in a column specify certain condition.
- **INDEX**: Use to create and retrieve data from database very quickly.

MS ACCESS

INTRODUCTION

- Microsoft Access is a Relational Database Management System (RDBMS), designed primarily for home or small business usage.
- Access is known as a *desktop* database system because it's functions are intended to be run from a single computer. This is in contrast to a *server* database application (such as SQL Server), where it is intended to be installed on a server, then accessed remotely from multiple client machines.

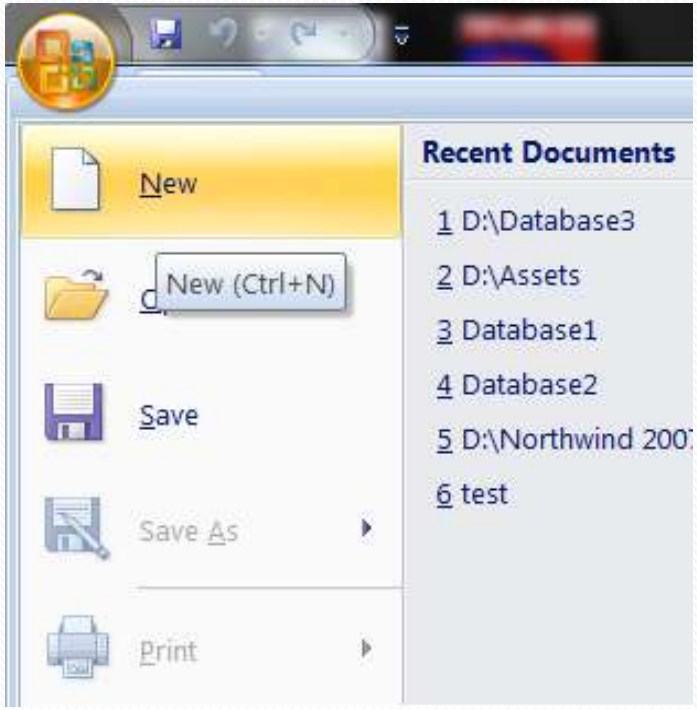
BASICS

- A **Table** is an arrangement of data in a row and column.
- A **field** is a column in a table that contains particular information about a record.
- A **Primary Key** is a field uniquely identifies every record in a table.
- A **Record** is a set of information stored about a particular entry.

- **Forms** are used to customize formats for adding, editing, deleting or displaying data.
- **Queries** display information from one or more tables based on a selection criteria.
- **Reports** contain data from one or more tables and databases that can be printed. Selective fields and records can be displayed in a report.
- **Macros** perform a fixed set of tasks every time they are run.

All about Tables

- Opening up MS Access and creating a table.



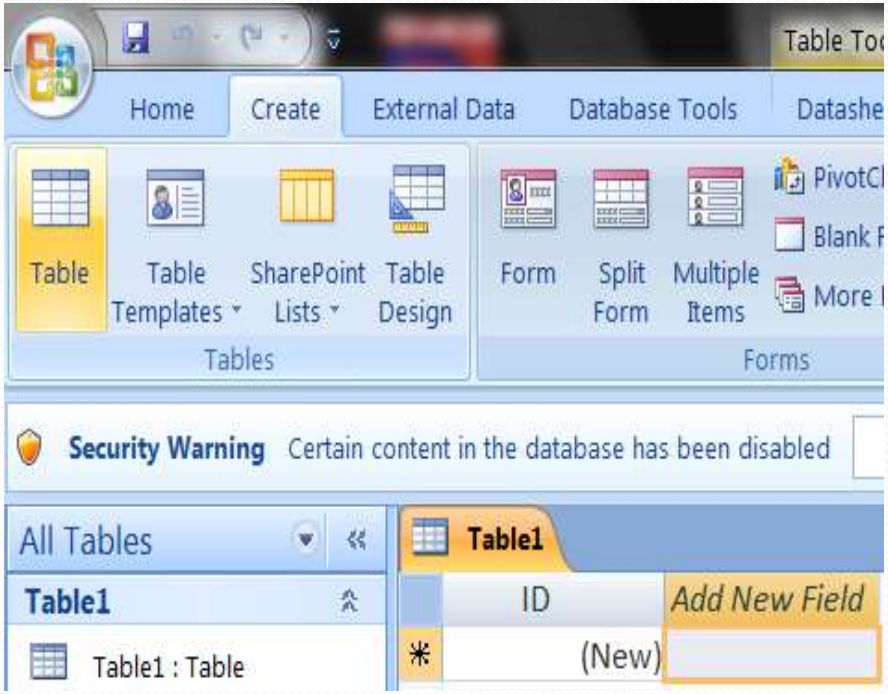
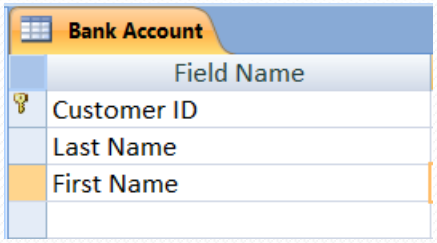
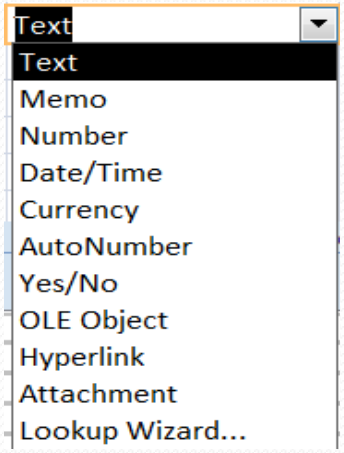


Table Design Toolbar

Creating Fields

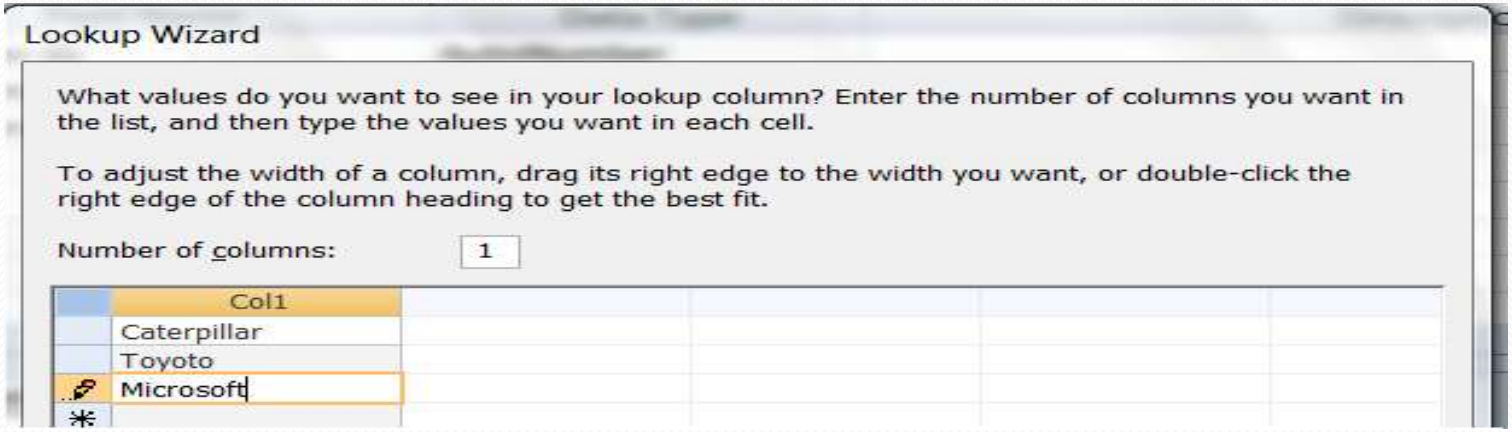


Defining data types



- **Text** data type is used to store all valid printable characters. Default size is 50.
- **Memo** data type is used to create a text field in which size of the values can vary widely.
- **Number** data type enables you to enter numeric data.
- **Currency** data type enables you to enter monetary data.
- **Date/Time** data type can store date and time values.
- **Yes/No** data type, also known as a logical type, stores data that can have only two values.

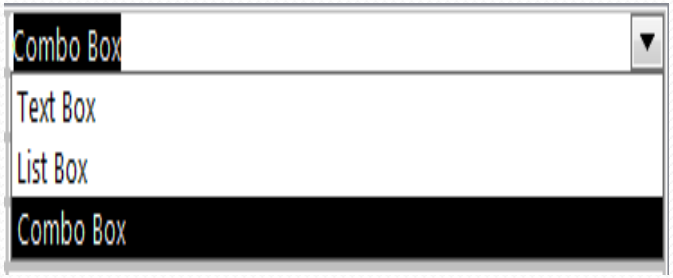
- **Auto number** data type stores an integer that is incremented or decremented automatically as you add or delete records.
- **OLE** object type can store any type of object such as video clip, a picture or a word document.
- **Lookup Wizard** is a field that displays a list that looks up data from an existing table or from a fixed set of user-defined values.



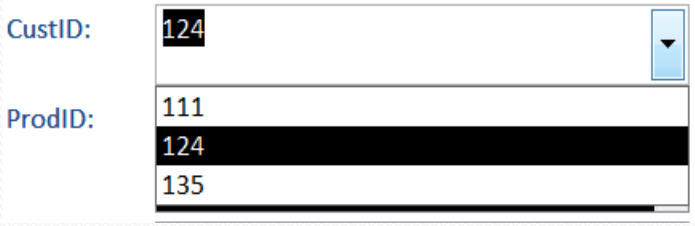
- Display control

General | Lookup

Display Control	Combo Box
Row Source Type	Value List
Row Source	"Caterpillar";"Toyoto";"Microsoft"
Bound Column	1
Column Count	1
Column Heads	No
Column Widths	1"
List Rows	16
List Width	1"
Limit To List	No
Allow Multiple Values	No
Allow Value List Edits	Yes
List Items Edit Form	
Show Only Row Source Valu	No

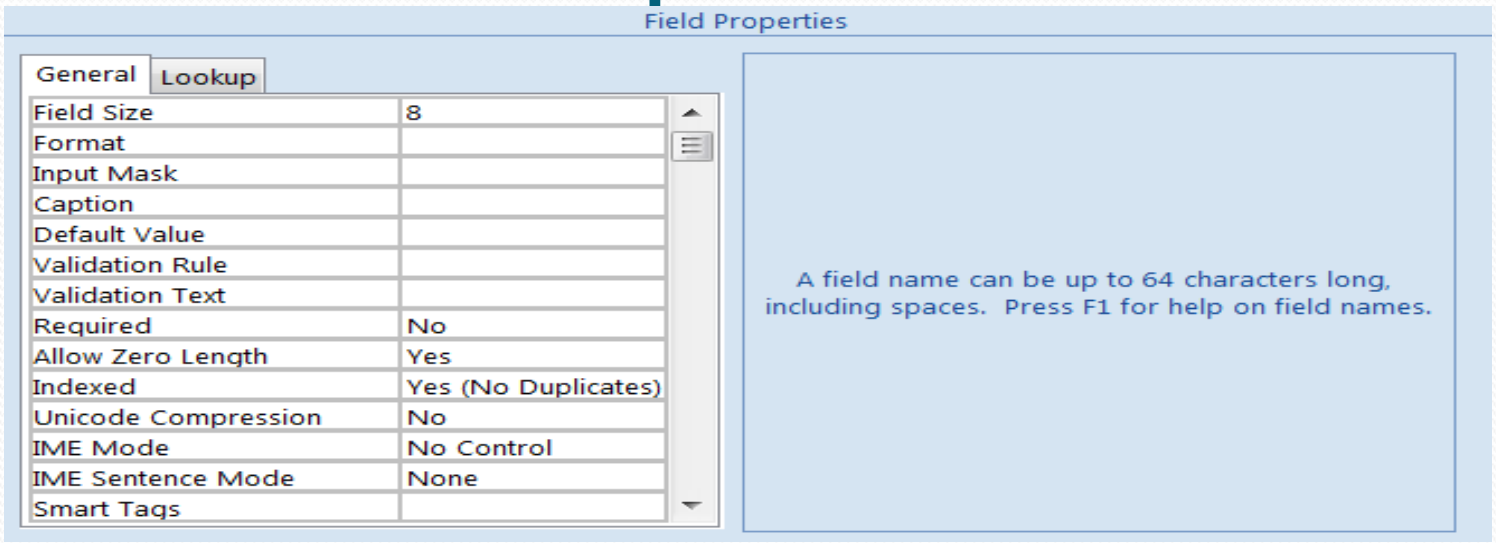


- Combo box

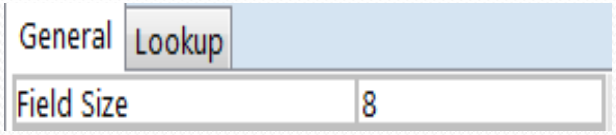


- List box

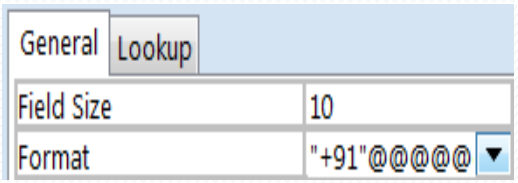
Field Properties Pane

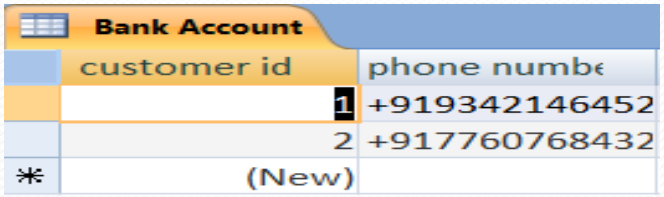


- **Field size** determines the amount of data that can be stored in a field

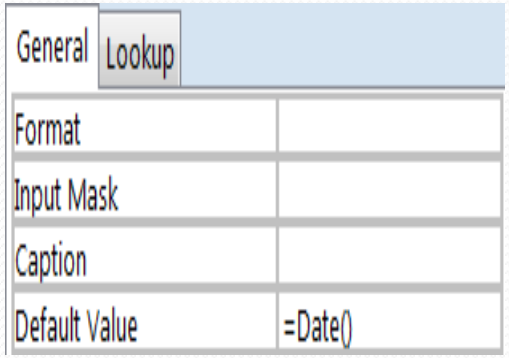


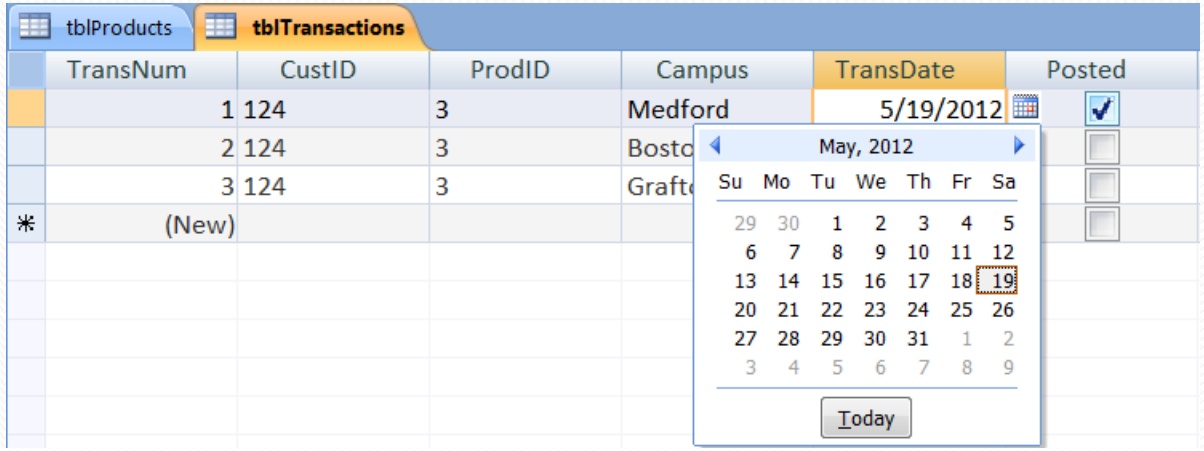
- **Formats** allow you to display your data in a form that differs from the actual keystrokes used to enter the data.



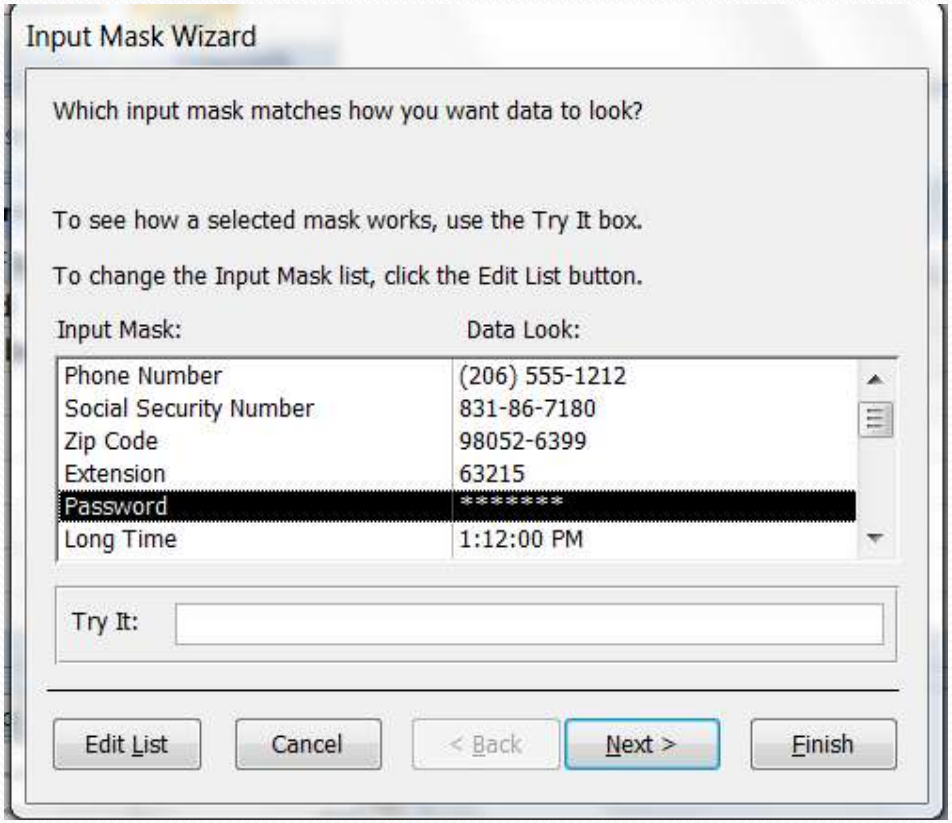


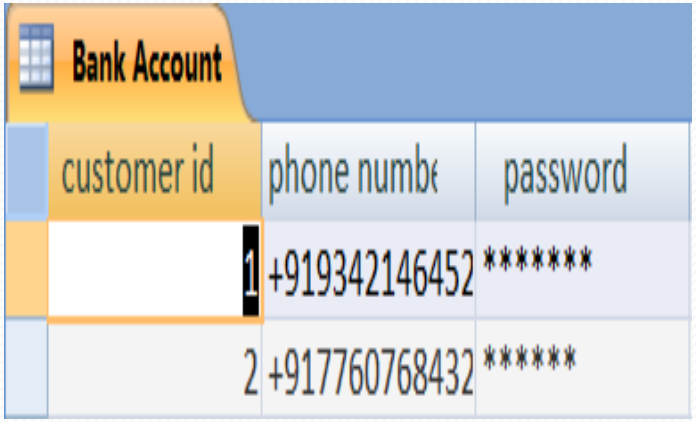
- **Default Value** is one that is displayed automatically for the field when you add a new record to the table.





- **Input Mask** allows you to have more control over data entry by defining data-validation for each character that is entered in the field.

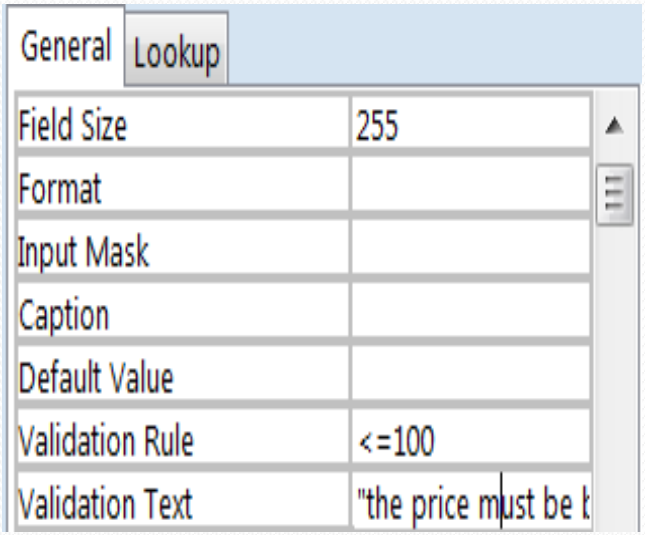


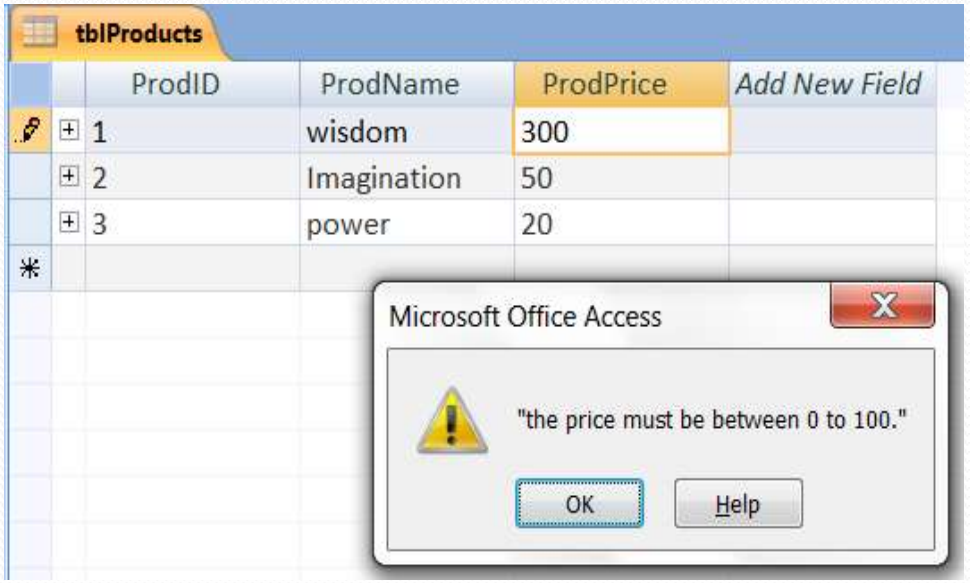


- **Data Validation** enables you to limit values that can be accepted into a field.

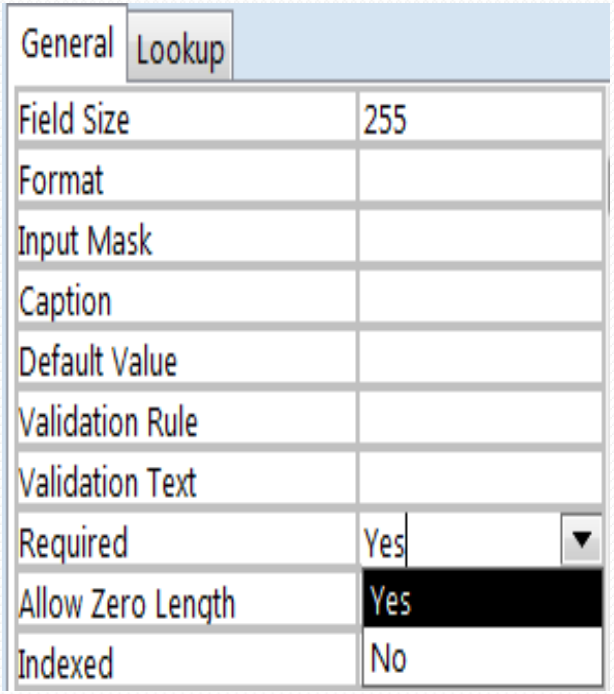
I. Validation Rule to set the rule.
(ex: <=100)

II. Validation text to display error message.
(ex: “please enter a valid customer ID”)



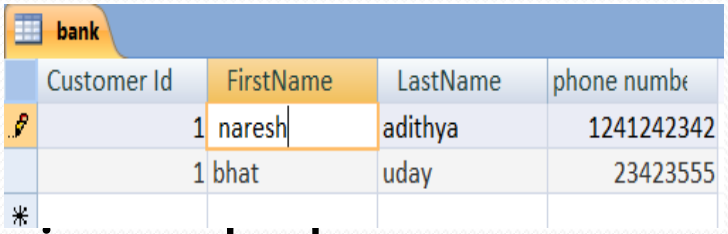


- **Required** enables you to enter a Yes value for Required if a field should always receive a value during data entry.

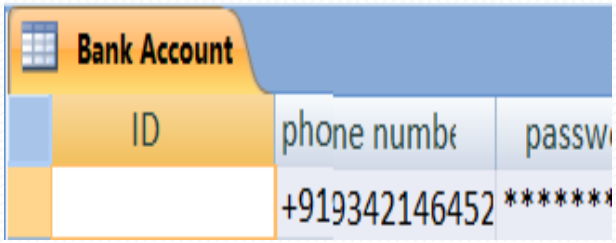


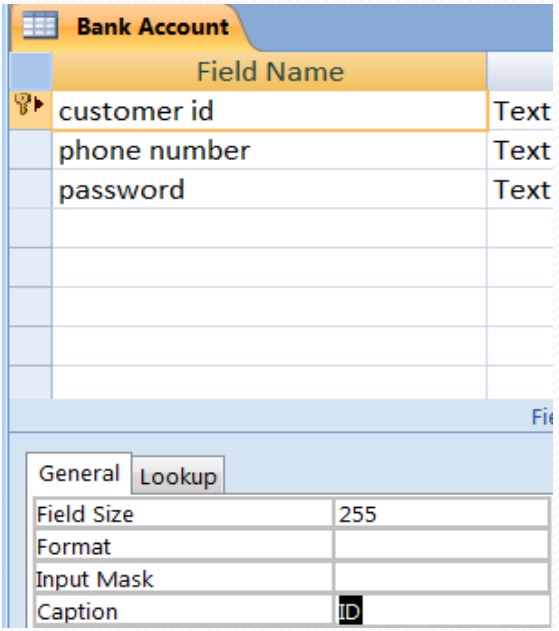
- **Indexed**

1. Unique Index(no duplicates).
2. Duplicate Index(with duplicates).



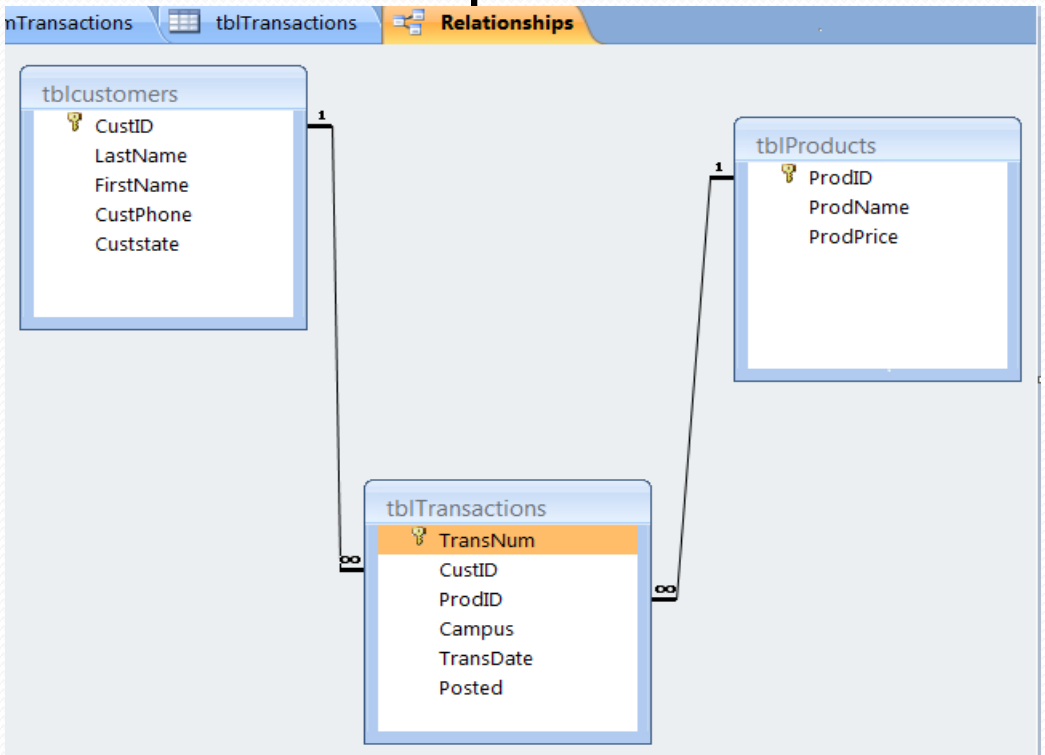
- **Caption** is used when you want to display an alternate name for the field on forms an reports.





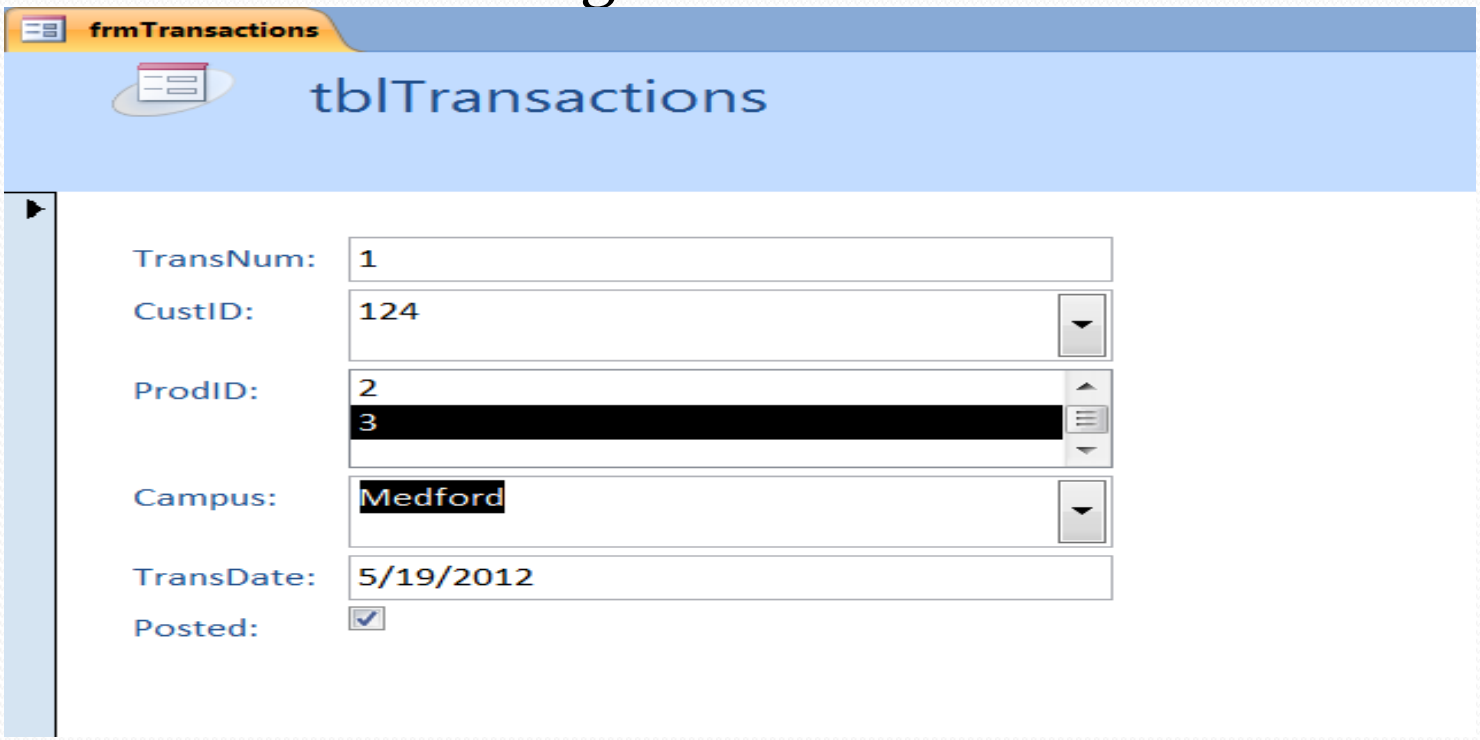
Creating Relationships

- One-to-many relationships.
- Many-to-many relationships.
- One-to-one relationships.

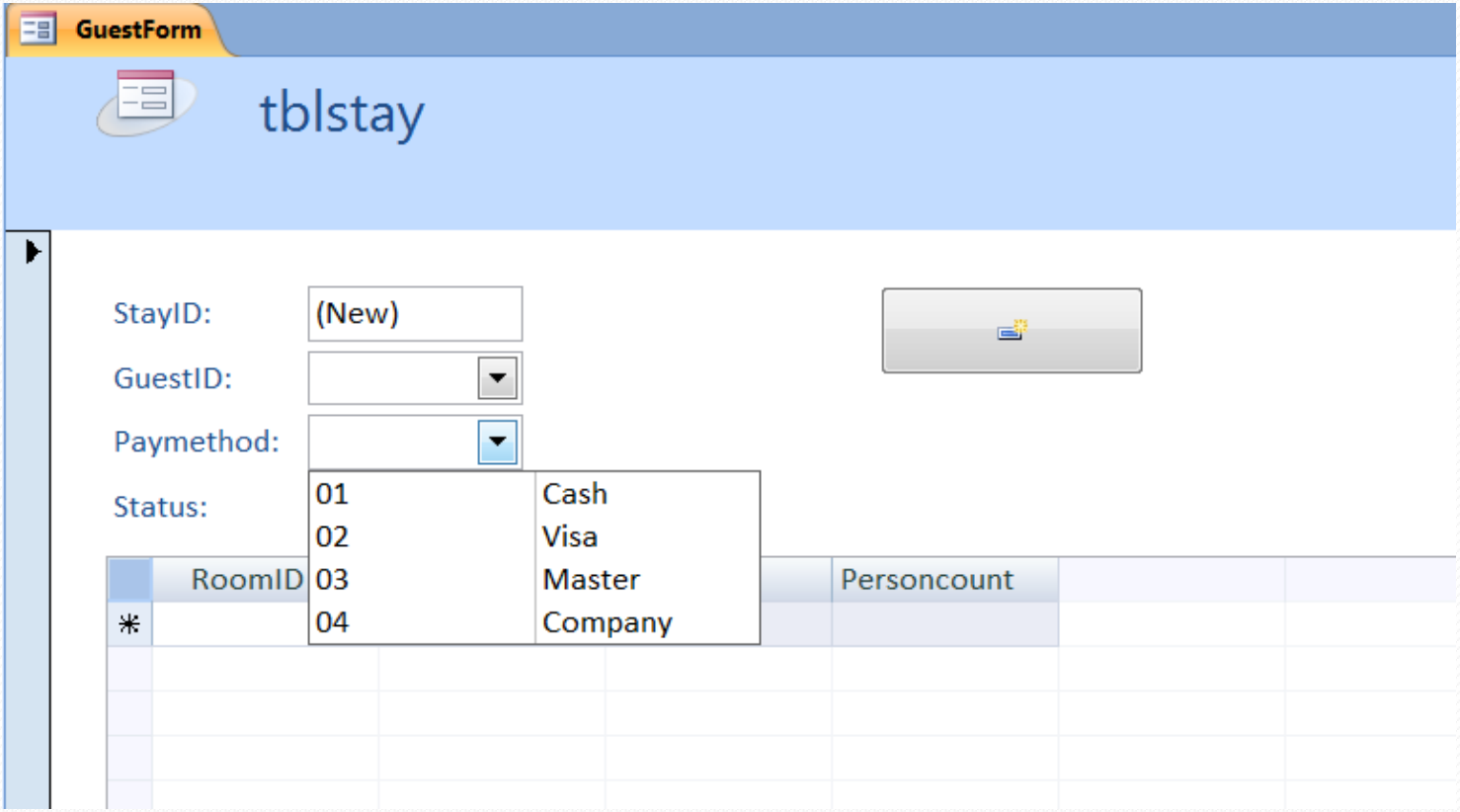


Forms

- It helps to arrange fields and view many more on a single screen. You can also add enhanced Data Validation and editing controls.



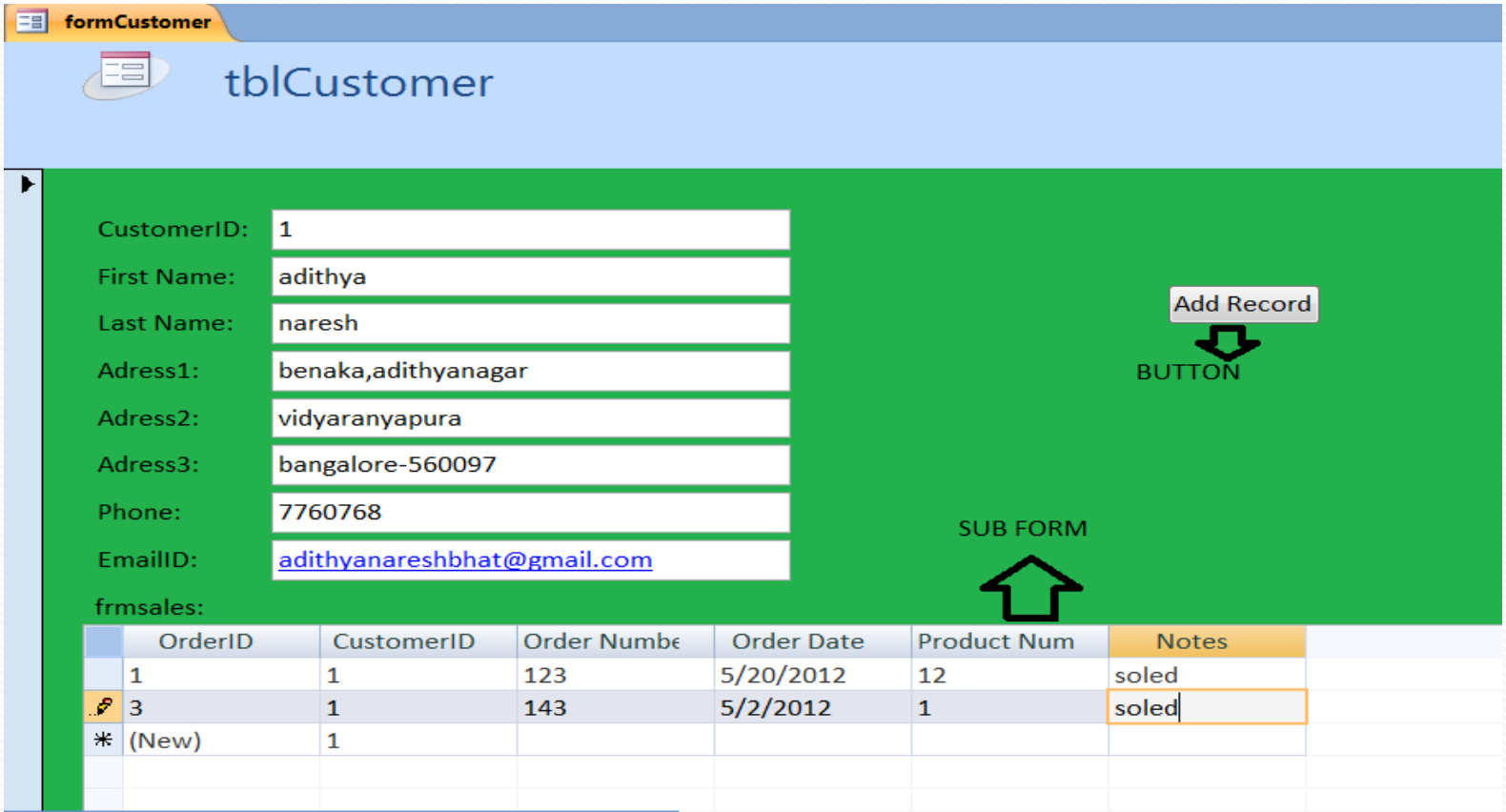
- Creating forms with buttons.



- Button lets you add a new data into the existing table.

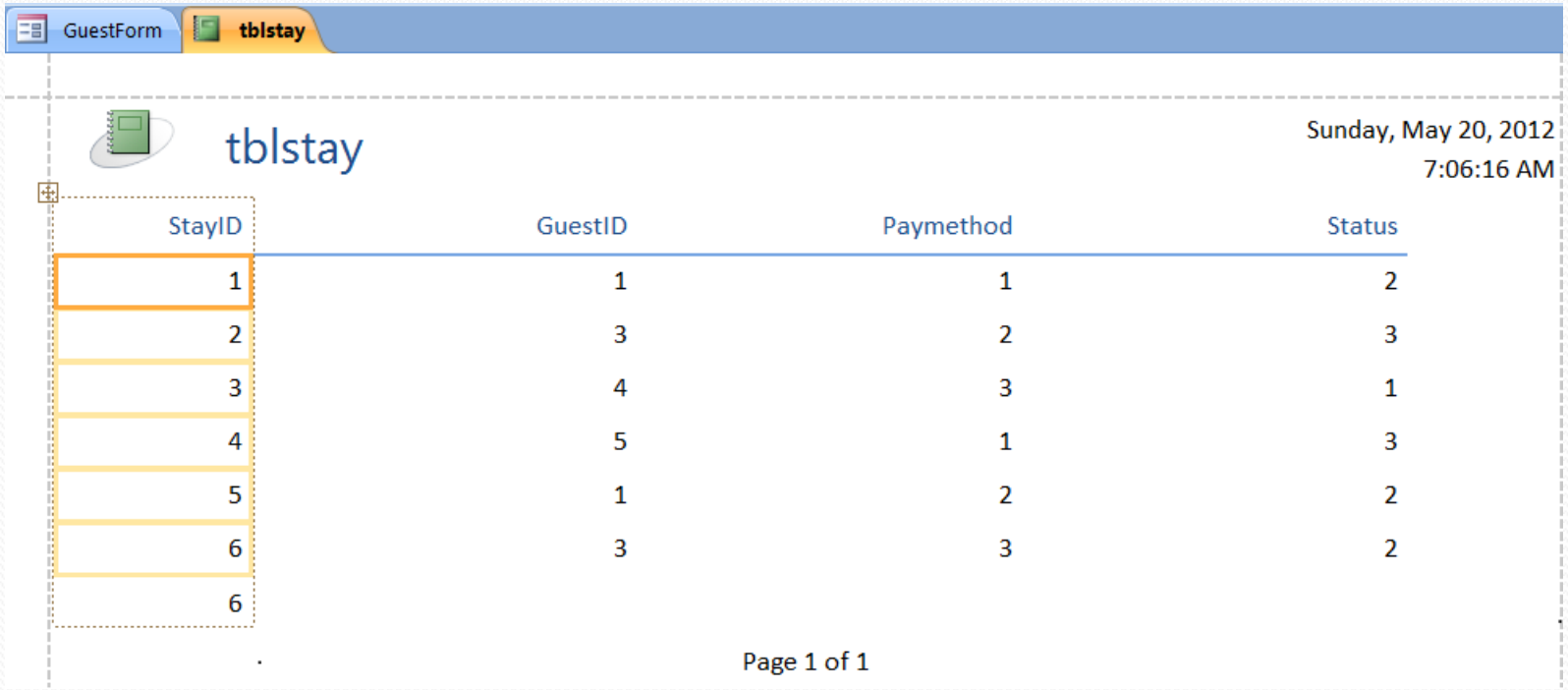
Sub Forms

- Used to create a form to accept data in two tables that are related by a one-to-many relationship.



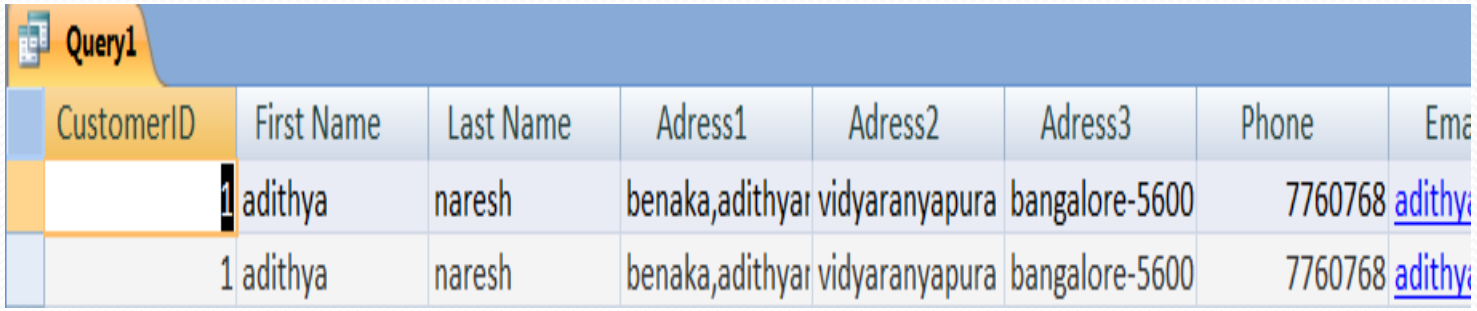
Reports

- A report is a flexible way of viewing and printing summary information. It enables you to display information to the required level of detail.



Queries

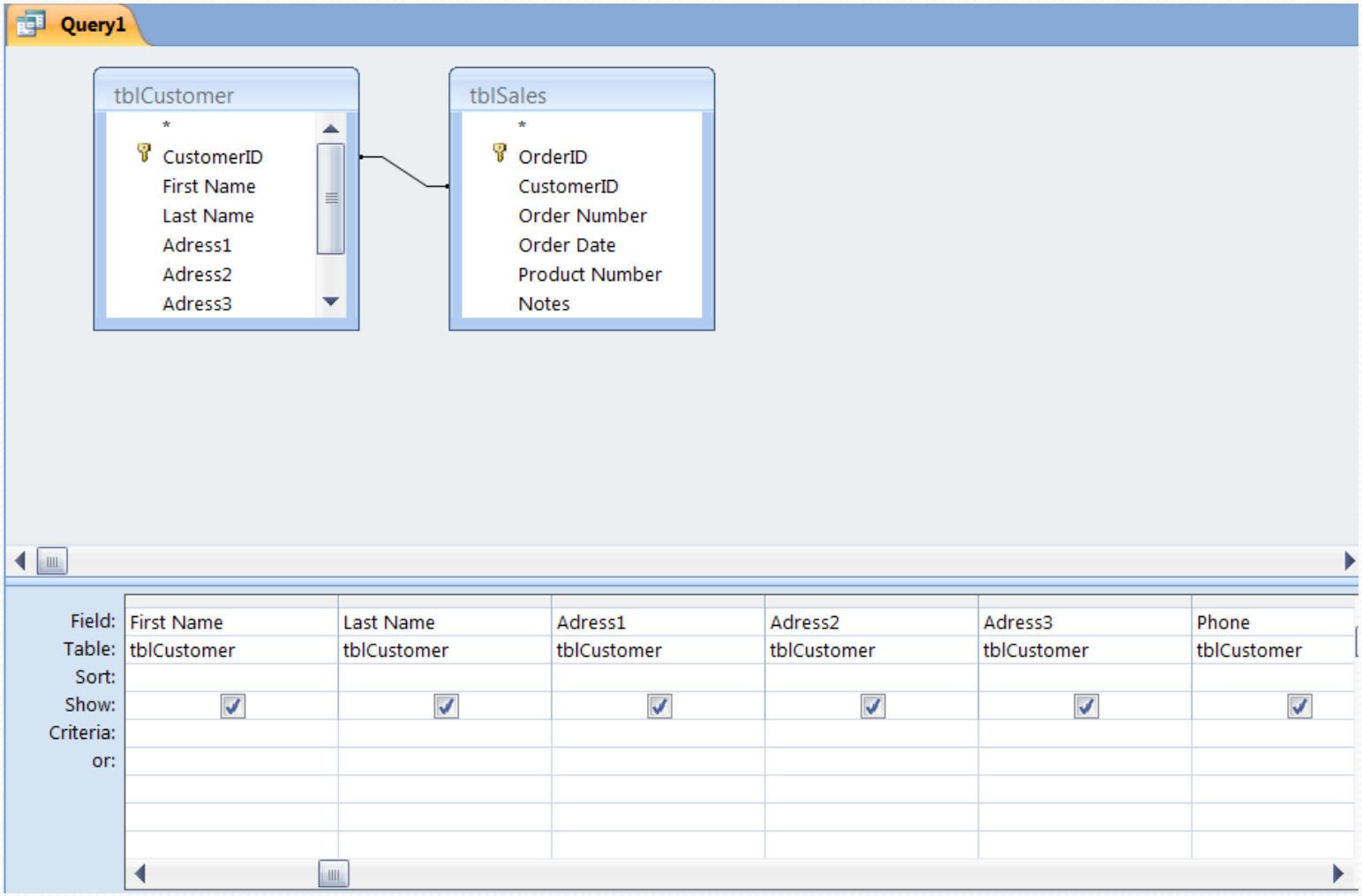
- The process of accessing the database and retrieving data selectively is known as querying. The data thus retrieved can then be formatted according to user's requirements.
- Datasheet view of Query.



Query1

CustomerID	First Name	Last Name	Adress1	Adress2	Adress3	Phone	Ema
1	adithya	naresh	benaka,adithyar	vidyaranyapura	bangalore-5600	7760768	adithya
1	adithya	naresh	benaka,adithyar	vidyaranyapura	bangalore-5600	7760768	adithya

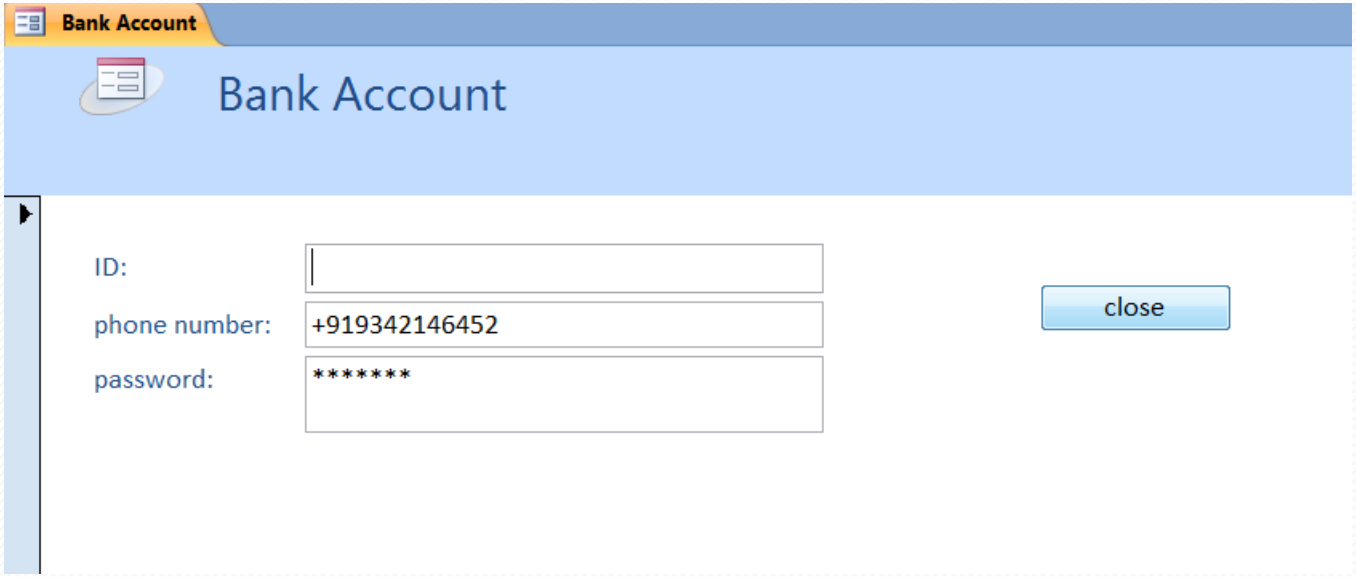
- Design view of Query.

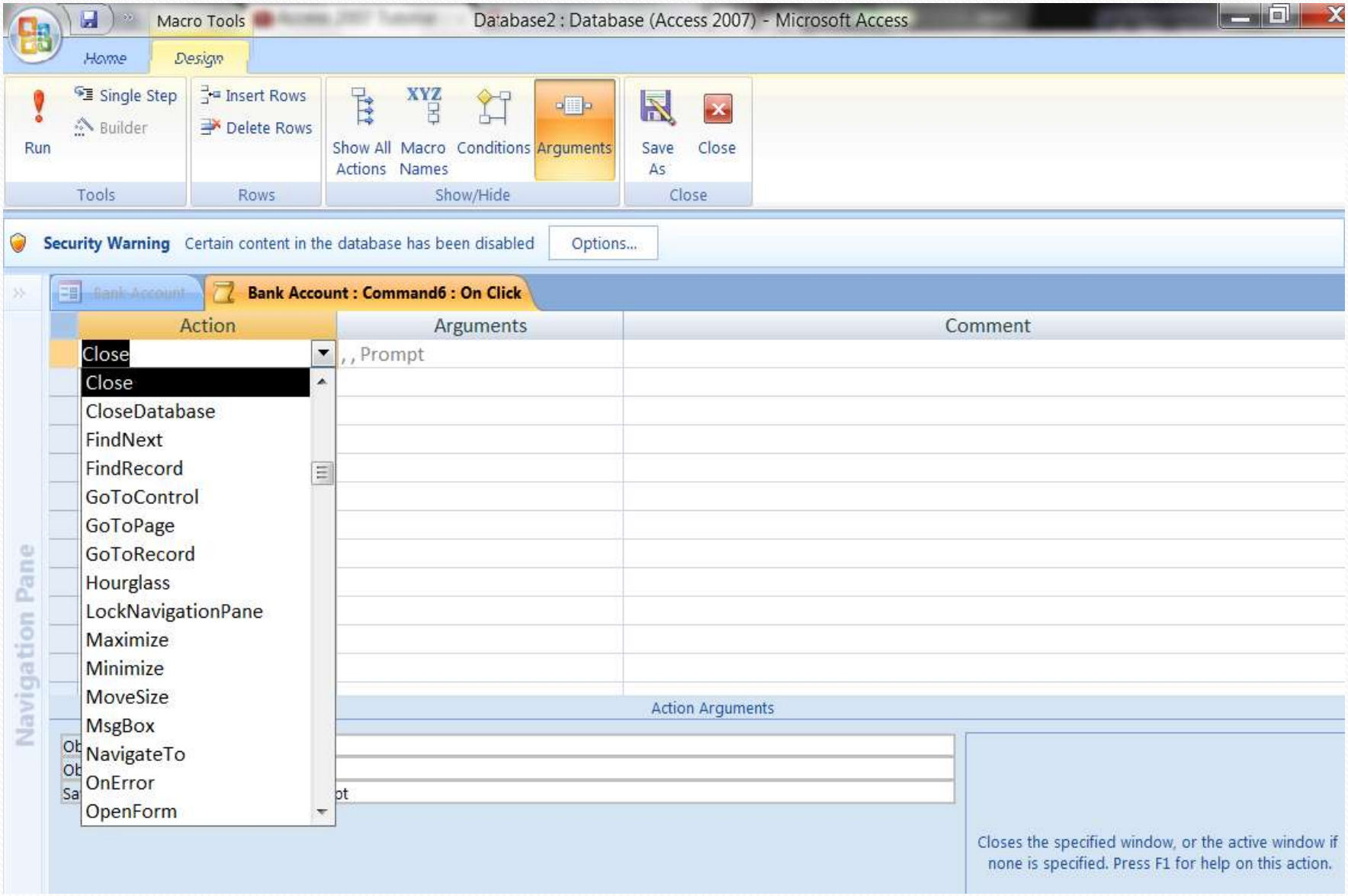


Macros

- Macros are small programs that perform a specialized task every time they are run.

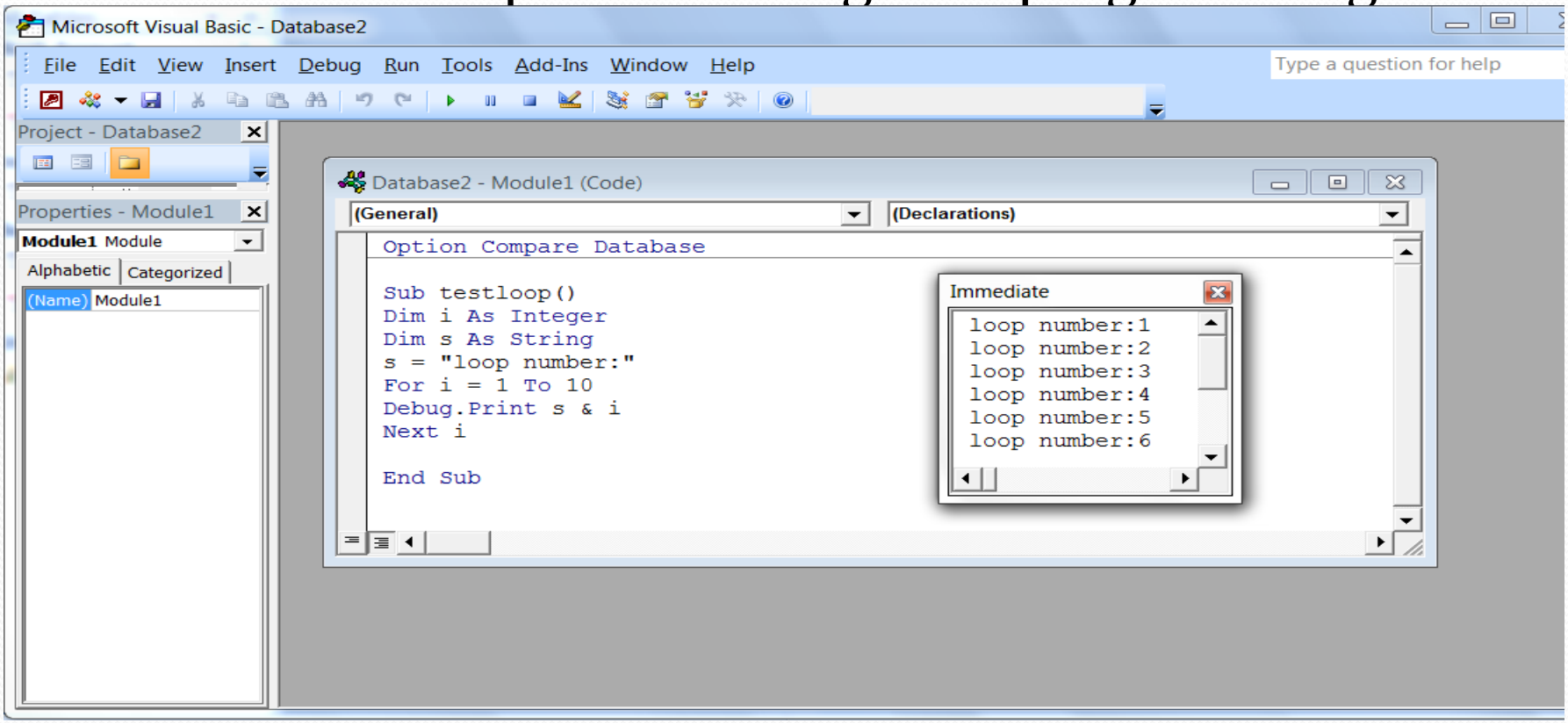
Ex: I want to close a form.




Macro Tools
Database2 : Database (Access 2007) - Microsoft Access
Home
Design
Run
Single Step
Builder
Tools
Insert Rows
Delete Rows
Rows
Show All Actions
Macro Names
Conditions
Arguments
Show/Hide
Save As
Close
Close
Security Warning
Certain content in the database has been disabled
Options...
Bank Account
Bank Account : Command6 : On Click
Action
Arguments
Comment
Close
, , Prompt
Close
CloseDatabase
FindNext
FindRecord
GoToControl
GoToPage
GoToRecord
Hourglass
LockNavigationPane
Maximize
Minimize
MoveSize
MsgBox
NavigateTo
OnError
OpenForm
Action Arguments
Navigation Pane
Closes the specified window, or the active window if none is specified. Press F1 for help on this action.

Modules

- Macros contain modules to enhance the user with more actions to perform using VBA programming.



PHARMACY DRUG DATABASE

Pharmacy drug database refers to the collection and compilation of data related to various drugs that can be used by physicians and other healthcare professionals to ensure provision of best pharmaceutical services to the patients.

DynaMed
A clinical reference tool created by physicians for physicians and other healthcare professionals for use primarily at the 'point-of-care' with clinically-organized summaries.

Essential Evidence Plus
An evidence-based, point-of-care clinical research database with access to information on pharmaceutical topics, guidelines, abstracts, and summaries.

Facts & Comparisons
Drug information, comparative data tables, drug identifier tools, and drug interaction tools. Includes Trissel's IV Compatibility.

Herbal Medicines Compendium
A resource published by the U.S. Pharmacopoeial Convention (USP) that provides standards for herbal ingredients used in herbal medicines. Contact the Health Sciences Librarian for login information.

Lexi-Comp
Drug identification, patient education, drug calculators, toxicology, and IV Compatibility. For use by pharmacy students and faculty only.

Micromedex
Drug information, comparisons, interactions, and identification. Includes Trissel's IV Compatibility and RED BOOK.

Natural Medicines
Information on dietary supplements, natural medicines, and complementary alternative and integrative therapies.

USP
Access is available for the USP-NF(English), Food Chemicals Codex (FCC), and Herbal Medicines Compendium. The username and password for these can be obtained from the Health Sciences Librarian for Pharmacy and Nursing.