Laboratory work 2

1. Explain the difference between DDL and DML, give the following examples:

a. at least 3 DDL commands;

b. at least 4 DML commands.

DDL:

DDL is Data Definition Language which is used to define data structures. For example: create table, alter table are instructions in SQL.

DML:

DML is Data Manipulation Language which is used to manipulate data itself. For example: insert, update, delete are instructions in SQL.

Difference between DDL and DML:

DDL:

It is used to create database schema and can be used to define some constraints as well.

It basically defines the column (Attributes) of the table.

Basic command present in DDL are CREATE, DROP, RENAME etc.

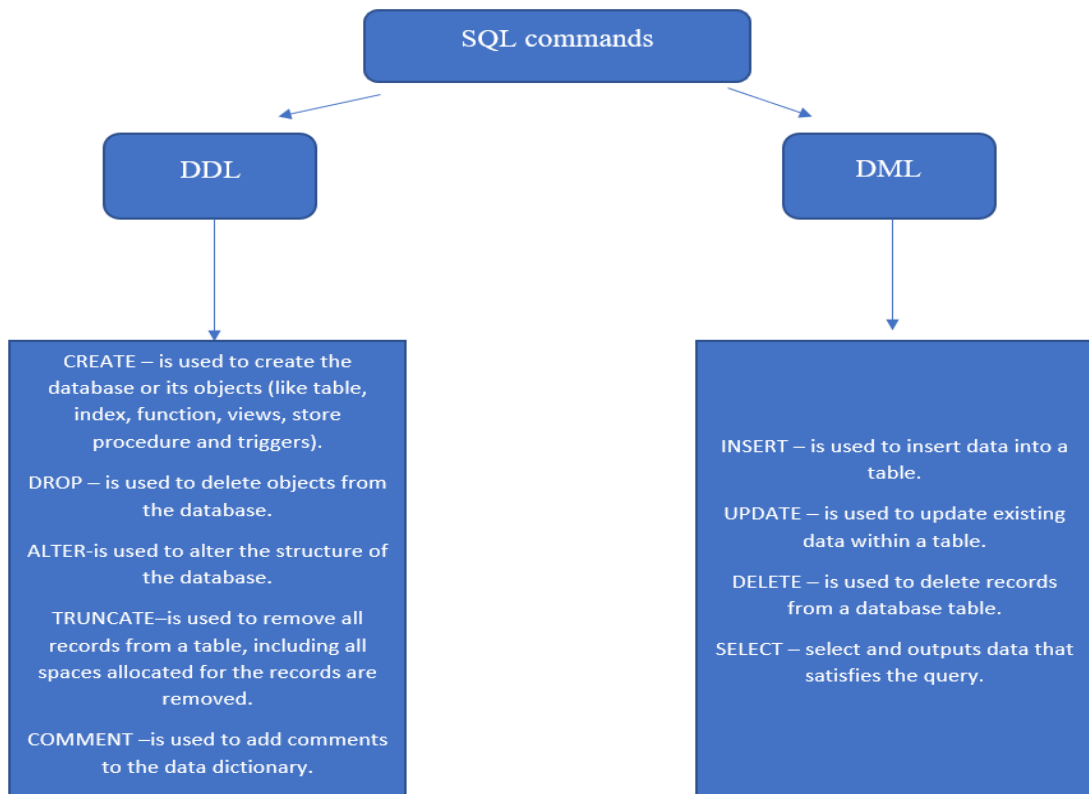DDL does not use WHERE clause in its statement.

DML:

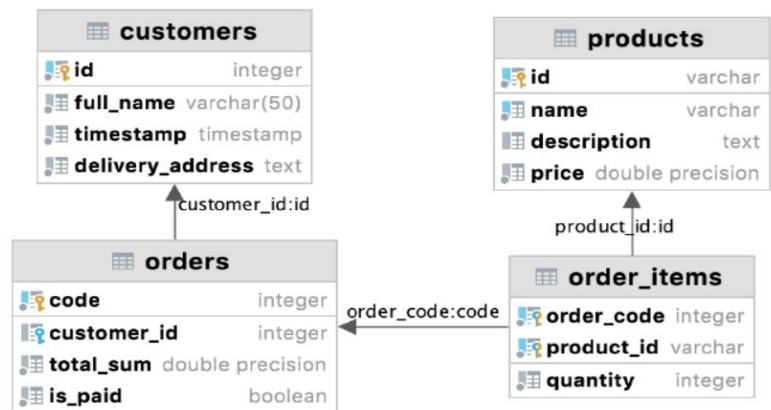It is used to add, retrieve or update the data.

It add or update the row of the table.

BASIC command present in DML are UPDATE, INSERT, DELETE, MERGE etc.

DML uses WHERE clause in its statement.

```
                    SQL commands

        DDL                          DML

CREATE – is used to create the
database or its objects (like table,
index, function, views, store
procedure and triggers).
                                    INSERT – is used to insert data into a
DROP – is used to delete objects from    table.
the database.
                                    UPDATE – is used to update existing
ALTER-is used to alter the structure of   data within a table.
the database.
                                    DELETE – is used to delete records
TRUNCATE–is used to remove all       from a database table.
records from a table, including all
spaces allocated for the records are   SELECT – select and outputs data that
removed.                             satisfies the query.

COMMENT –is used to add comments
to the data dictionary.
```

2. Write SQL statements to create tables in the figure below:


```
      customers                            products
  id          integer              id              varchar
  full_name   varchar(50)          name            varchar
  timestamp   timestamp            description     text
  delivery_address  text           price   double precision

                customer_id:id                product_id:id

      orders                               order_items
  code          integer            order_code  integer
  customer_id   integer            product_id  varchar
  total_sum  double precision       quantity    integer
  is_paid       boolean
                    order_code:code
```

grey circle - not null, blue column - unique; quantity, total_sum, price > 0

```sql
create table customers(
    id integer primary key,
    full_name varchar(50) not null,
    timestamp timestamp not null,
    delivery_address text not null
);

create table products(
    id varchar primary key,
    name varchar not null,
    description text not null,
    price double precision not null check ( price > 0 )
);

create table orders(
    code int unique not null primary key,
    customer_id int,
    total_sum double precision not null check ( total_sum > 0 ),
    is_paid boolean
);

create table order_items(
    order_code int unique not null references orders,
    product_id varchar not null references products,
    primary key (order_code, product_id),
    quantity int not null check ( quantity > 0 )
);
```

3. Write SQL statements describing tables with appropriate *data types*
   and *constraints* satisfying the following conditions*(maybe you need
   additional tables to store data atomically and efficiently)*:
   a. a students table storing data such as full name, age, birth date,
      gender, average grade, information about yourself, the need for a
      dormitory, additional info.
   b. an instructors table storing data such as full name, speaking
      languages, work experience, the possibility of having remote lessons.
   c. a lesson participants table storing data such as lesson title, teaching
      instructor, studying students, room number.

```sql
CREATE DATABASE SECOND;
CREATE table students (
    full_name varchar(100) PRIMARY KEY,
    age integer NOT NULL,
    birth_date timestamp NOT NULL,
    gender varchar(10) NOT NULL,
    average_grade double precision NOT NULL,
    dormitory_need boolean NOT NULL,
    add_information text
);
CREATE table instructors(
    instructor_id integer PRIMARY KEY,
    full_name text NOT NULL,
    speaking_language varchar(50) NOT NULL,
    work_experience integer NOT NULL
);
CREATE TABLE participants(
    lesson_title varchar(50) PRIMARY KEY,
    teaching_instructor varchar(10) NOT NULL,
    room_number integer NOT NULL
);
```

4. Give examples of insertion, update and deletion of data on tables from exercise 2.

```sql
insert into products(id, name, description, price)
values ('11111', 'book', 'subject', '111.111');
update products set name = 'book 2' where name = 'book';
delete from products where id = '11111';
```