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**Exercise #1**

**1) DDL** (Data Definition Language) is used to define data structures, while **DML** or Data Manipulation Language is used to manipulate data itself. It means that **DDL** is used to create database schema and can be used to define constraints, **DML** is used to add, retrieve, or update the data.

a. Basic commands for **DDL** are: CREATE, DROP, ALTER

b. Basic commands for **DML** are: UPDATE, INSERT, SELECT, DELETE

**Exercise #2**

CREATE TABLE customers(  
 id integer CONSTRAINT mainKey PRIMARY KEY,  
 full\_name varchar(50) NOT NULL,  
 timestamp timestamp NOT NULL,  
 delivery\_address text NOT NULL  
);

CREATE TABLE products(  
 id varchar CONSTRAINT productKey PRIMARY KEY,  
 name varchar UNIQUE NOT NULL,  
 description text,  
 price double precision NOT NULL CHECK (price > 0)  
);

CREATE TABLE orders(  
 code integer PRIMARY KEY,  
 customer\_id integer,  
 total\_sum double precision NOT NULL,  
 is\_paid boolean NOT NULL,  
 CONSTRAINT fk\_customer FOREIGN KEY(customer\_id) REFERENCES customers(id),  
 CONSTRAINT posCondition CHECK (total\_sum > 0)  
);

CREATE TABLE order\_items(  
 order\_code integer,  
 product\_id varchar,  
 quantity integer NOT NULL,  
 CONSTRAINT fk\_order FOREIGN KEY(order\_code) REFERENCES orders(code),  
 CONSTRAINT fk\_product FOREIGN KEY(product\_id) REFERENCES products(id),  
 CONSTRAINT pk\_order\_items PRIMARY KEY(order\_code,product\_id),  
 CONSTRAINT pos\_quantity CHECK ( quantity > 0 )  
);

**Exercise #3**

**a.**

CREATE TABLE students(  
 id integer PRIMARY KEY,  
 full\_name varchar(70) NOT NULL,  
 age integer NOT NULL,  
 birth\_date date NOT NULL,  
 gender char(1) not null,  
 average\_grade real NOT NULL,  
 self\_information varchar,  
 dormitory\_need boolean NOT NULL,  
 additional\_info text,  
 CONSTRAINT id\_pos CHECK ( id > 0 ),  
 CONSTRAINT age\_limit CHECK ( age >= 1 AND age <= 80 ),  
 CONSTRAINT grade\_limit CHECK ( average\_grade >= 0 AND average\_grade <= 4.0 )  
);

**b.**

CREATE TABLE instructors(  
 id integer PRIMARY KEY,  
 full\_name varchar(70) NOT NULL,  
 work\_experience integer NOT NULL,  
 remote\_lessons\_possibility real NOT NULL,  
 CONSTRAINT id\_pos CHECK ( id > 0 ),  
 CONSTRAINT experience\_min CHECK ( work\_experience >= 0 ),  
 CONSTRAINT rem\_les\_pos\_lim CHECK ( remote\_lessons\_possibility >= 0 and remote\_lessons\_possibility <= 100.0 )  
);

CREATE TABLE instructor\_languages(  
 insctructor\_id integer NOT NULL,  
 speaking\_language varchar(15) NOT NULL,  
 CONSTRAINT id\_pos CHECK ( insctructor\_id > 0 ),  
 CONSTRAINT fk\_instructor\_id FOREIGN KEY(insctructor\_id) REFERENCES instructors(id),  
 CONSTRAINT pk\_instr\_language PRIMARY KEY (insctructor\_id,speaking\_language)  
);

**c.**

CREATE TABLE lesson\_participants(  
 lesson\_title varchar NOT NULL,  
 instructor\_id integer NOT NULL,  
 student\_id integer NOT NULL,  
 room\_number integer NOT NULL,  
 CONSTRAINT room\_pos CHECK ( room\_number > 0 ),  
 CONSTRAINT id\_pos CHECK ( instructor\_id > 0 AND student\_id > 0 ),  
 CONSTRAINT fk\_instructor\_id FOREIGN KEY (instructor\_id) REFERENCES instructors(id),  
 CONSTRAINT fk\_student\_id FOREIGN KEY (student\_id) REFERENCES students(id),  
 CONSTRAINT pk\_lesson\_participants PRIMARY KEY (lesson\_title,instructor\_id,student\_id)  
);

**Exercise # 4**

**INSERT** examples:

INSERT INTO customers VALUES (1,'Temirbolat','2001-01-31 04:20:05','Erzhanov 39');  
INSERT INTO customers VALUES (2,'Temirlan','2000-02-24 04:20:05','Tole Bi 59');  
INSERT INTO customers VALUES (3,'Tamerlan','1999-03-24 04:20:05','Turgut Ozala 27');

INSERT INTO products(id,name,description,price) VALUES ('228229','Oil','Good Light Oil',500);  
INSERT INTO products(id,name,description,price) VALUES ('Mf24O','Butter','Yellow butter',800);  
INSERT INTO products(id,name,description,price) VALUES ('413ESE','Water','Gassed Water',200);

INSERT INTO orders(code,customer\_id,total\_sum,is\_paid) VALUES (1000,1,5000,True);  
INSERT INTO orders VALUES (1001,2,4500,False);  
INSERT INTO orders VALUES (1002,3,5600,True);

INSERT INTO order\_items VALUES(1001,'228229',50);  
INSERT INTO order\_items VALUES(1000,'Mf24O',20);  
INSERT INTO order\_items VALUES(1002,'413ESE',5);  
INSERT INTO order\_items VALUES(1001,'Mf24O',25);

**UPDATE** examples:

UPDATE customers  
SET full\_name = 'Temirkhan'  
WHERE id = 2;

UPDATE orders  
SET is\_paid = True  
WHERE is\_paid = False;

UPDATE order\_items  
SET quantity = quantity \* 1.5;

**DELETE** examples:

DELETE FROM order\_items  
WHERE order\_code = 1000;

DELETE FROM order\_items  
WHERE order\_code = 1001 AND quantity > 20;