CORK INSTITUE OF TECHNOLOGY

Module SOFT7022 (Database Design) – Robinson Duque

Course Work - Project 2 (30% of Total)

Student Name: _____Ishan Dias_____

Student Code: ___R00164860_____

Student Class (Group): _____SD2A_

Develop a basic application in a general purpose procedural language (e.g., Java or PHP) that uses a DBMS (MySQL) to store data. You must investigate, organise and implement all technical aspects of the Application Design. You are to build an application system for an application area of your own choice e.g. a Bank, a Shop, a Sports Fixtures System, a Timetabling System, a Flight Booking Systems, etc. It is up to the student to determine how this system will operate and to design a database that will support its operation.

Please NOTE: Your topic must be original and cannot be based on any similar assignment that you may receive in other modules.

The project will run over a number of weeks, thus some marks will be assigned to project management. As manager/supervisor, I require the following:

- Well managed time allocation to solve the problem i.e. you should devise and communicate a plan of action with progress updates so that at each stage I can be confident that the project will be completed on time i.e. not crammed at the end. Note, you could opt for weekly plan, with reviews in lab.
- List of references where you sourced code/explanations of concepts.
- Reporting of problems, and potential problems, in a timely manner.
- Verifiable work by you. If you turn up at labs each week and have your work reviewed then that is one way to do this; however, if you wish to work 'outside' of class/lab times, then you need some other approach.

Final hand-up/deliverable

1. Final PDF document is required. Use the format that comes with this document where you can also check the marking schema for every section. The documentation includes 5 sections and two appendixes. Detailed instructions are included in each section.
2. The PDF document must be signed, there is a section for this purpose.
3. A zip file including your database and application code.

The deliverable files must be uploaded using the respective Blackboard option.

1. SYSTEM DESCRIPTION (20pts)

1.1. (10pts) System Description (max 300 words):

Describe the application system of your choice. The description should be similar to the online wine shop exercise from Project 1. Your description should answer the following questions:

(2pts) What system or problem are you trying to solve?
(2pts) Which are the system entities and their atributes?
(2pts) What are the relationships among the entities?
(2pts) Are there any cardinalities constraints in the relationships?
(2pts) Text is clear and well written.

For this project I am going to design a database for an online retail shop. In this database design each customer can make many orders and each customer is identified by their name, ID, Phone number, email and address as well as each order is identified by their Order ID, OrderDate and Customer Name. Many Orders will just belong to one customer. When a customer orders a product many orders will consist of many products as well as many products will belong to many orders. The products are identified by Product ID, Product Name, Product Info and Product Price and both the Orders and Products will have a Quantity. When the shop is running low on products the supplier will supply those products. Therefore, many products belongs to many suppliers and many suppliers supply many products. The company identifies the supplier by their Supplier ID, Name, Phone, email and Address.

When the shop is running low on products the supplier will supply those products

1.2. (10pts) Solving Approach (max 300 words):

Describe how you will solve the problem in terms of:
- (4pts) Design techniques
- (2pts) Technical issues (e.g., software solutions, programming language, etc)
- (2pts) Security
- (2pts) Text is clear and well written.

Design Techniques: Before I designed this Database I wanted to visually see the relationships between each entity, their cardinalities and the attributes that belonged to those entities. In order to do this I applied the modelling technique where I created an ER diagram. Creating an ER diagram also helped me because it gave me a visual representation of what my database would look like. Then I will use the Normalization technique which will help me to identify my primary and foreign keys. This technique will also help me to remove any functional, partial and transitive dependencies which will finally give me an illustration of my final tables and layout. This will be helpful when I'm inserting the data to create my tables because now I know what to insert.

Technical issues: The software that I will be using to create the tables will be in MySQL and the language that I will be using for this software is SQL. I will also be using Java in the IntelliJ IDE to create my application and GUI.

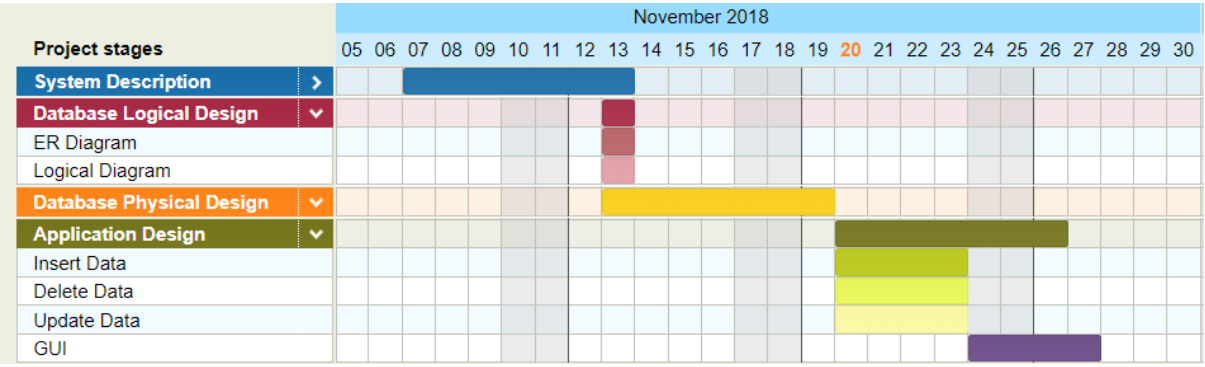
Security: To secure my database I've to make sure that some of my information won't get deleted by mistake. For example, let's suppose that I delete a product that belongs to a

customer. It shouldn't delete that customer by cascading. Another example would be if I had a foreign key with cascade delete. Cascade delete will automatically delete corresponding records in the child tables if a record in the parent table is deleted.

2. PLANIFICATION AND PROJECT EXECUTION (10pts)

(5pts) Chronogram:

Create a Gantt Chart indicating the main activities and tasks related to the project and include a snapshot here. e.g., analysis, design, implementation, deployment, documentation. In this link you can see an example (https://www.projektovymanazment.sk/gantt-chart-historia-sucasnost/), remember that there are only 4 weeks to complete the project, so it should be a simplified version.



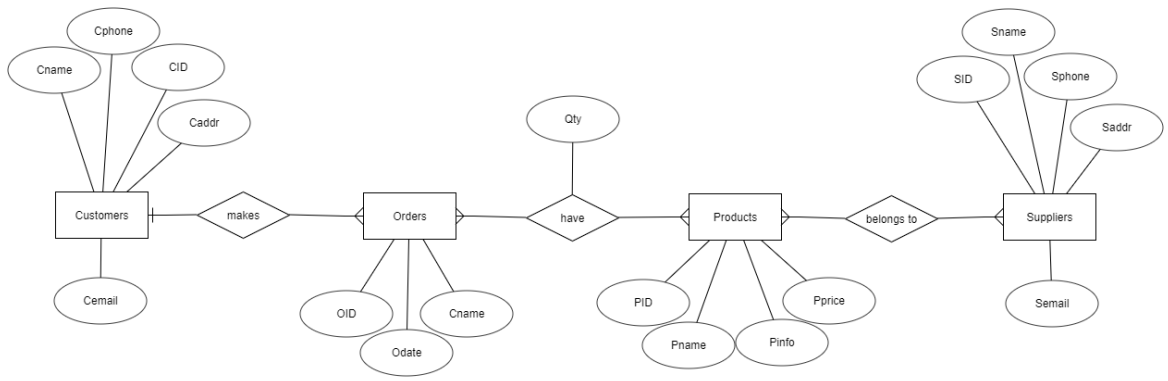
(5pts) In the **Appendix A**, keep track of your progress in form of a log, describe the progress in the activities as well as the problems and the studied solutions. The log should have at least one entry for each activity in your chronogram.

3. DATABASE LOGICAL DESIGN (15pts)

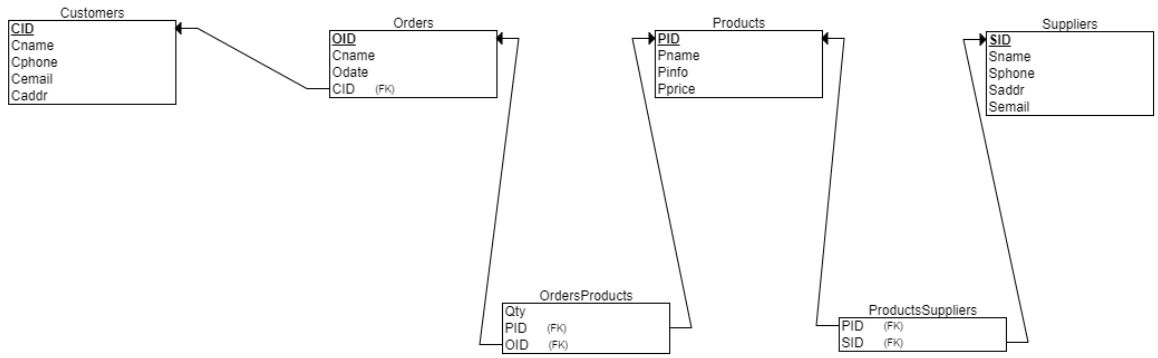
Create a logical ER model of the system database and include a snapshot here.

- (5pts) Identify relations and attributes.
- (5pts) Identify primary keys.
- (5pts) Identify foreign keys.

ER Diagram



Relational Schema



4. DATABASE PHYSICAL DESIGN (30pts)

Include here the SQL code of your **database design**, make sure that it matches your logical design in terms of:
- (5pts) Relations (tables)
- (5pts) Attributes and data types
- (5pts) Primary keys
- (5pts) Foreign keys

```
CREATE DATABASE dbproject;

use dbproject;

CREATE TABLE Customers
(
  CID INT NOT NULL UNIQUE,
  Cname VARCHAR(15) NOT NULL,
  Cphone VARCHAR(15) NOT NULL,
  Cemail VARCHAR(30) NOT NULL,
  Caddr VARCHAR(45) NOT NULL,
  PRIMARY KEY (CID)
);

CREATE TABLE Orders
(
  OID INT NOT NULL UNIQUE,
  Cname VARCHAR(15) NOT NULL,
  Odate VARCHAR(15) NOT NULL,
  CID INT NOT NULL,
  PRIMARY KEY (OID),
  FOREIGN KEY (CID) REFERENCES Customers(CID)
);

CREATE TABLE Products
(
  PID INT NOT NULL UNIQUE,
```

```
  Pname VARCHAR(30) NOT NULL,
  Pinfo VARCHAR(40) NOT NULL,
  Pprice FLOAT NOT NULL,
  PRIMARY KEY (PID)
);

CREATE TABLE Suppliers
(
  SID INT NOT NULL UNIQUE,
  Sname VARCHAR(15) NOT NULL,
  Sphone VARCHAR(15) NOT NULL,
  Semail VARCHAR(30) NOT NULL,
  Saddr VARCHAR(45) NOT NULL,
  PRIMARY KEY (SID)
);

CREATE TABLE OrdersProducts
(
  Qty INT NOT NULL,
  PID INT NOT NULL,
  OID INT NOT NULL,
  FOREIGN KEY (PID) REFERENCES Products(PID),
  FOREIGN KEY (OID) REFERENCES Orders(OID)
);

CREATE TABLE ProductsSuppliers
(
  PID INT NOT NULL,
  SID INT NOT NULL,
  FOREIGN KEY (PID) REFERENCES Products(PID),
  FOREIGN KEY (SID) REFERENCES Suppliers(SID)
);
```

(10pts) Use **Appendix B** to include SQL inserts of at least 10 registers per table.

5. APPLICATION DESIGN (25pts)

Attach a zip file including your application code and fill the tables below to indicate where in your code the functinality is implemented. It is strongly recommended to view the suggested video links to complete this section.

5.1. (5pts) Create system functionality to insert data into each table of your database.

Table	File	Insert Function Name
Customers	Database_Project.java	`insertCustomersTable(Statement s, Integer CID, String Cname, String Cphone, String Cemail, String Caddr)`
Orders	Database_Project.java	`insertOrdersTable(Statement s, Integer OID, String Cname, String Odate, Integer CID)`
Products	Database_Project.java	`insertProductsTable(Statement s, Integer PID, String Pname, String Pinfo, float Pprice)`
Suppliers	Database_Project.java	`insertSuppliersTable(Statement s, Integer SID, String Sname, String Sphone, String Semail, String Saddr)`
OrdersProducts	Database_Project.java	`insertOrdersProductsTable(Statement s, Integer Qty, Integer PID, Integer OID)`
ProductsSuppliers	Database_Project.java	`insertProductsSuppliersTable(Statement s, Integer PID, Integer SID)`

* The values in the table are examples, use as many rows as necessary.

Suggested links for this activity:
https://www.youtube.com/watch?v=2i4t-SL1VsU&t=3s
https://www.youtube.com/watch?v=Q4T7jg0Lv4E

5.2. (5pts) Create system functionality to update data from each table of your database.

Table	File	Update Function Name
Customers	Database_Project.java	`updateCustomersTable(Statement s, int CID, String Cemail)`
Orders	Database_Project.java	`updateOrdersTable(Statement s, int OID, String Odate)`
Products	Database_Project.java	`updateProductsTable(Statement s, int PID, String Pname)`
Suppliers	Database_Project.java	`updateSuppliersTable(Statement s, int SID, String Saddr)`
OrdersProducts	Database_Project.java	`updateOrdersProductsTable(Statement s, int PID, int Qty)`
ProductsSuppliers	Database_Project.java	`updateProductsSuppliersTable(Statement s, int PID, int SID)`

* The values in the table are examples, use as many rows as necessary. The minimum requirement to get the 5pts is to create one update function per table.

Suggested link for this activity:
https://www.youtube.com/watch?v=vwNmYVipzeA

5.3. (5pts) Create system functionality to delete data from each table of your database.

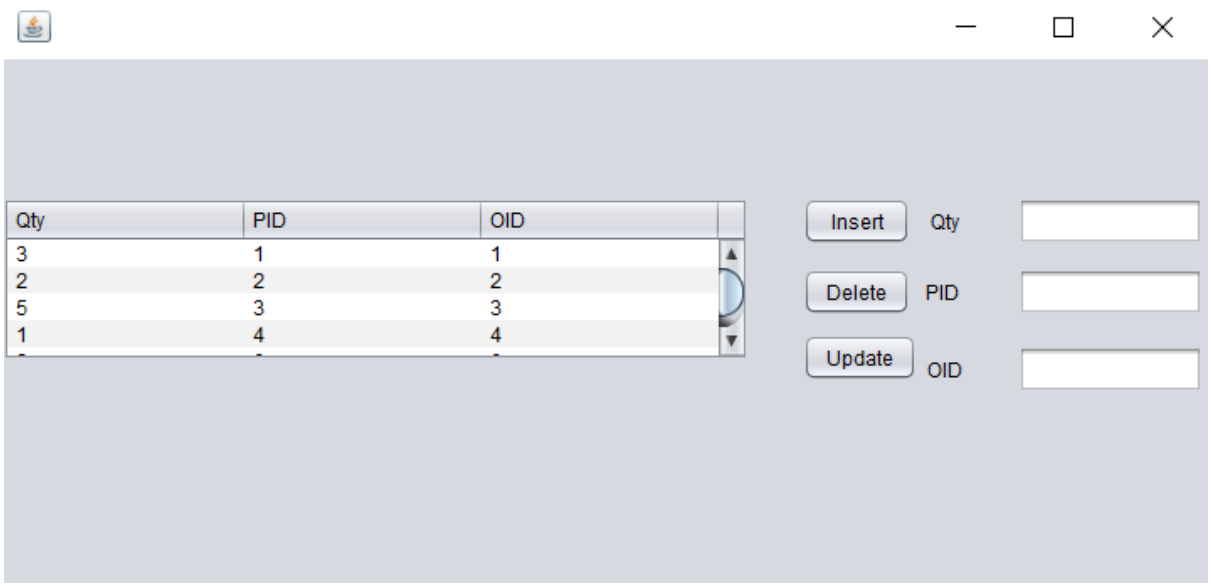
Table	**File**	**Delete Function Name**
Customers	Database_Project.java	`deleteCustomersTable(Statement s, Integer CID)`
Orders	Database_Project.java	`deleteOrdersTable(Statement s, Integer OID)`
Products	Database_Project.java	`deleteProductsTable(Statement s, Integer PID)`
Suppliers	Database_Project.java	`deleteSuppliersTable(Statement s, Integer SID)`
OrdersProducts	Database_Project.java	`deleteOrdersProductsTable(Statement s, Integer Qty)`
ProductsSuppliers	Database_Project.java	`deleteProductsSuppliersTable(Statement s, Integer PID)`

* The values in the table are examples, use as many rows as necessary. The minimum requirement to get the
5pts is to create one delete function per table.

Suggested link for this activity:
https://www.youtube.com/watch?v=_KuFESrNgsQ

5.4. (10pts) Create a GUI to insert, update, and delete data into a table of your database. Include a snapshot of the GUI.

Table	**File**	**GUI Function Name**
OrdersProducts (**Insert Values**)	DatabaseGUI.java	jButton1ActionPerformed(java.awt.event.ActionEvent evt)
OrdersProducts (**Delete Values**)	DatabaseGUI.java	jButton2ActionPerformed(java.awt.event.ActionEvent evt)
OrdersProducts (**Update Values**)	DatabaseGUI.java	jButton3ActionPerformed(java.awt.event.ActionEvent evt



* The values in the table are examples, use as many rows as necessary. The minimum requirement to get the 10pts is to create one GUI to insert, update, and delete registers from a single table.

Suggested links for this activity:
https://www.youtube.com/watch?v=Ax3130B7kYQ
https://www.youtube.com/watch?v=AzeJEEeGl_w
https://www.youtube.com/watch?v=gU3DLOsw0Eg

I hereby certify that this material which I now submit for assessment, is entirely my own work and has not been taken from the work of others, save and to the extent, that such work has been cited and acknowledged within the text of my work

__Ishan Dias_____
Signed

Appendix A

ACTIVITY LOG

Start Date	Activity/task	Description	Comments	End Date
7/11/18	System Description	During this period of time I came up with ideas to create my database. I was basically thinking and placing all my ideas on paper. I used techniques such as normalization and modelling to create my database. I also had to think of using a programming language such as Java or Python for the Application Design aspect of the project.	The thought process and making this database took a while to figure out. For example, what would be my primary and foreign keys as well as other constraints which I wanted to apply to my database.	13/11/18
13/11/18	Database Logical Design	For this part I managed to create an ER Diagram and a Relational Schema diagram for my database which didn't really take that much time since I already planned it out as I was designing the database.	I had 2 many-to-many relationships so in that case I had to make to extra tables.	13/11/18
13/11/18	Database Physical Design	For the physical design I took the code that was already created for me on ERDPLUS website where I	I had a problem where I didn't allocate the VARCHAR() I needed for some of the attributes such as Caddr	19/11/18

		created my ER and Relational Schema Diagrams and inserted into MySQL Workbench. And then I created 10 registers per table.	which is the customers address. So then I had to change the VARCHAR() of the attribute so SQL will then insert that address into the customers table.	
20/11/18	Database Application Design	For the application design aspect of the project I used Java and the InteliiJ IDEA. So firstly, I had to connect MySQL Workbench to InteliiJ where I occurred some problems. This was mainly because of the port number so I took the port number out and kept at as localhost when I was coding in Java. After I did this MySQL Workbench and InteliiJ connected and I was able to implement my Insert, Update and Delete methods.	I had an Issue with deleting a customer due to the foreign key constraints. SQL gave me an error saying “cannot delete or update a parent row: a foreign key constraint fails”. This is because foreign keys provide data integrity so that’s why SQL didn’t let me delete that customer. Therefore, to solve this issue I had to delete from the last table which was the ProductsSuppliers table and work all the way up to the customers table to delete that customer that I initially wanted to delete.	26/11/18
24/11/18	GUI	I had to install NetBeans IDE as well as another file called rs2xml which was instructed in the video. I had to add this file and the J connector file into the	Making the GUI for the first time was actually okay however, there were a lot of steps that had to be done step by step in order to create the main functionality of	27/11/18

		library of NetBeans. The JDK was already in the library as I configured it at the beginning of the installation process. I made a simple GUI where I can Insert, Delete and Update my OrdersProducts Table.	the GUI. Overall it was quite enjoyable.	

* Add as many rows as necessary.

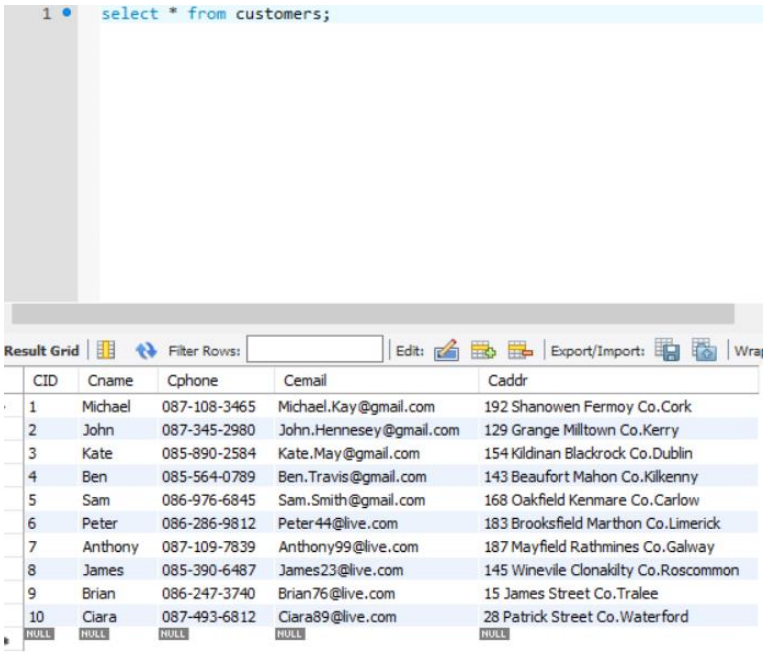
Appendix B

DATABASE SQL SAMPLE DATA

* Add at least 10 registers in every table.

Customers Table

INSERT INTO customers VALUES (0001,'Michael','087-108-3465', 'Michael.Kay@gmail.com', '192 Shanowen Fermoy Co.Cork');
INSERT INTO customers VALUES (0002,'John','087-345-2980', 'John.Hennesey@gmail.com', '129 Grange Milltown Co.Kerry');
INSERT INTO customers VALUES (0003, 'Kate','085-890-2584', 'Kate.May@gmail.com', '154 Kildinan Blackrock Co.Dublin');
INSERT INTO customers VALUES (0004, 'Ben', '085-564-0789', 'Ben.Travis@gmail.com', '143 Beaufort Mahon Co.Kilkenny');
INSERT INTO customers VALUES (0005, 'Sam', '086-976-6845', 'Sam.Smith@gmail.com', '168 Oakfield Kenmare Co.Carlow');
INSERT INTO customers VALUES (0006, 'Peter','086-286-9812', 'Peter44@live.com', '183 Brooksfield Marthon Co.Limerick ');
INSERT INTO customers VALUES (0007, 'Anthony', '087-109-7839', 'Anthony99@live.com', '187 Mayfield Rathmines Co.Galway');
INSERT INTO customers VALUES (0008, 'James', '085-390-6487', 'James23@live.com', '145 Winevile Clonakilty Co.Roscommon');
INSERT INTO customers VALUES (0009, 'Brian', '086-247-3740', 'Brian76@live.com', '15 James Street Co.Tralee');
INSERT INTO customers VALUES (0010, 'Ciara', '087-493-6812', 'Ciara89@live.com', '28 Patrick Street Co.Waterford');



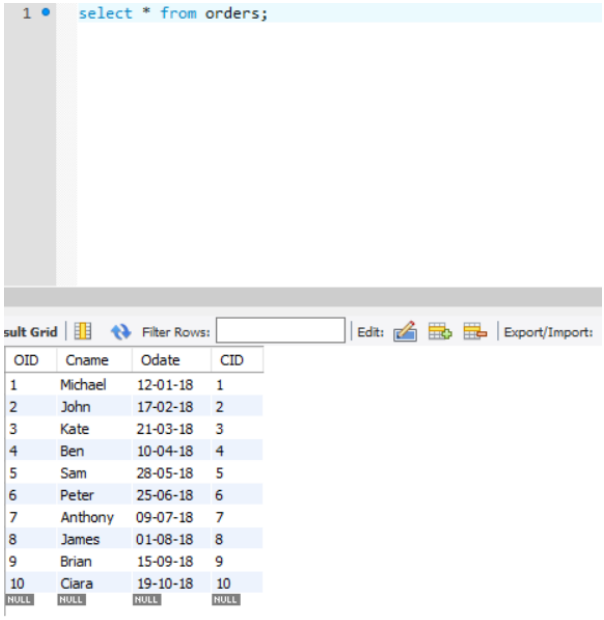
```
1 •  select * from customers;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap

CID	Cname	Cphone	Cemail	Caddr
1	Michael	087-108-3465	Michael.Kay@gmail.com	192 Shanowen Fermoy Co.Cork
2	John	087-345-2980	John.Hennesey@gmail.com	129 Grange Milltown Co.Kerry
3	Kate	085-890-2584	Kate.May@gmail.com	154 Kildinan Blackrock Co.Dublin
4	Ben	085-564-0789	Ben.Travis@gmail.com	143 Beaufort Mahon Co.Kilkenny
5	Sam	086-976-6845	Sam.Smith@gmail.com	168 Oakfield Kenmare Co.Carlow
6	Peter	086-286-9812	Peter44@live.com	183 Brooksfield Marthon Co.Limerick
7	Anthony	087-109-7839	Anthony99@live.com	187 Mayfield Rathmines Co.Galway
8	James	085-390-6487	James23@live.com	145 Winevile Clonakilty Co.Roscommon
9	Brian	086-247-3740	Brian76@live.com	15 James Street Co.Tralee
10	Ciara	087-493-6812	Ciara89@live.com	28 Patrick Street Co.Waterford
NULL	NULL	NULL	NULL	NULL

Orders Table

INSERT INTO orders VALUES(0001,'Michael','12-01-18',0001);
INSERT INTO orders VALUES(0002,'John','17-02-18', 0002);
INSERT INTO orders VALUES(0003,'Kate','21-03-18', 0003);
INSERT INTO orders VALUES(0004,'Ben','10-04-18', 0004);
INSERT INTO orders VALUES(0005,'Sam','28-05-18', 0005);
INSERT INTO orders VALUES(0006,'Peter','25-06-18', 0006);
INSERT INTO orders VALUES(0007,'Anthony','09-07-18', 0007);
INSERT INTO orders VALUES(0008,'James','01-08-18', 0008);
INSERT INTO orders VALUES(0009,'Brian','15-09-18',0009);
INSERT INTO orders VALUES(0010,'Ciara','19-10-18',0010);



OID	Cname	Odate	CID
1	Michael	12-01-18	1
2	John	17-02-18	2
3	Kate	21-03-18	3
4	Ben	10-04-18	4
5	Sam	28-05-18	5
6	Peter	25-06-18	6
7	Anthony	09-07-18	7
8	James	01-08-18	8
9	Brian	15-09-18	9
10	Ciara	19-10-18	10
NULL	NULL	NULL	NULL

Products Table

INSERT INTO products VALUES(0001,'Reeses','Contains Peanuts',1.12);
INSERT INTO products VALUES(0002,'Donut','Gluten Free', 2.00);
INSERT INTO products VALUES(0003,'Diet Coke','Contains Artificial Sweeteners',2.50);
INSERT INTO products VALUES(0004,'Pringles','A Potato and Wheat Based Snack',2.15);
INSERT INTO products VALUES(0005,'Chicken Sandwich','2 Sandwiches inside each pack',3.50);
INSERT INTO products VALUES(0006,'Porridge','Contains Cinnamon',2.50);
INSERT INTO products VALUES(0007,'A Dozen Eggs','Freshly Farmed Eggs',2.70);
INSERT INTO products VALUES(0008,'Low Fat Milk','Keep Refrigerated',2.20);
INSERT INTO products VALUES(0009,'Pacracetamol','12 Tablets in Each Packet',1.50);
INSERT INTO products VALUES(0010,'Ice Cream','Contains Vanilla Extract',2.30);

```
1 •  select * from products;
```

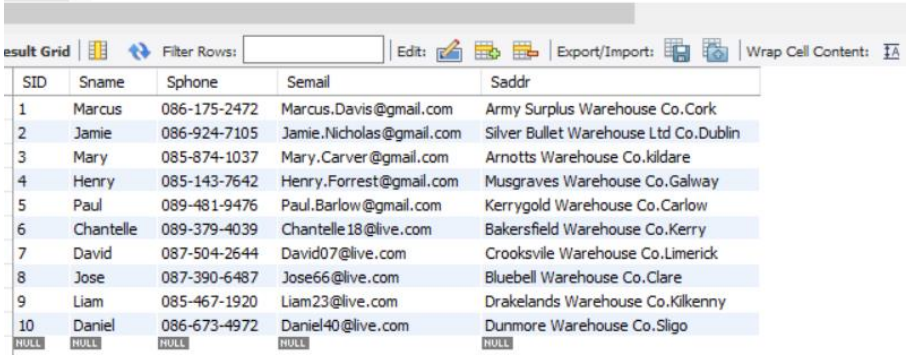
esult Grid | Filter Rows: | Edit: | Export/Import:

PID	Pname	Pinfo	Pprice
1	Reeses	Contains Peanuts	1.12
2	Donut	Gluten Free	2
3	Diet Coke	Contains Artificial Sweeteners	2.5
4	Pringles	A Potato and Wheat Based Snack	2.15
5	Chicken Sandwich	2 Sandwiches inside each pack	3.5
6	Porridge	Contains Cinnamon	2.5
7	A Dozen Eggs	Freshly Farmed Eggs	2.7
8	Low Fat Milk	Keep Refrigerated	2.2
9	Pacracetamol	12 Tablets in Each Packet	1.5
10	Ice Cream	Contains Vanilla Extract	2.3
NULL	NULL	NULL	NULL

Suppliers Table

INSERT INTO suppliers VALUES (0001,'Marcus','086-175-2472', 'Marcus.Davis@gmail.com', 'Army Surplus Warehouse Co.Cork');
INSERT INTO suppliers VALUES (0002,'Jamie','086-924-7105', 'Jamie.Nicholas@gmail.com', 'Silver Bullet Warehouse Ltd Co.Dublin');
INSERT INTO suppliers VALUES (0003, 'Mary','085-874-1037', 'Mary.Carver@gmail.com', 'Arnotts Warehouse Co.kildare');
INSERT INTO suppliers VALUES (0004, 'Henry', '085-143-7642', 'Henry.Forrest@gmail.com', 'Musgraves Warehouse Co.Galway');
INSERT INTO suppliers VALUES (0005, 'Paul', '089-481-9476', 'Paul.Barlow@gmail.com', 'Kerrygold Warehouse Co.Carlow');
INSERT INTO suppliers VALUES (0006, 'Chantelle','089-379-4039', 'Chantelle18@live.com', 'Bakersfield Warehouse Co.Kerry ');
INSERT INTO suppliers VALUES (0007, 'David', '087-504-2644', 'David07@live.com', 'Crooksvile Warehouse Co.Limerick');
INSERT INTO suppliers VALUES (0008, 'Jose', '087-390-6487', 'Jose66@live.com', 'Bluebell Warehouse Co.Clare');
INSERT INTO suppliers VALUES (0009, 'Liam', '085-467-1920', 'Liam23@live.com', 'Drakelands Warehouse Co.Kilkenny');
INSERT INTO suppliers VALUES (0010, 'Daniel', '086-673-4972', 'Daniel40@live.com', 'Dunmore Warehouse Co.Sligo');

```
1 • select * from suppliers;
```

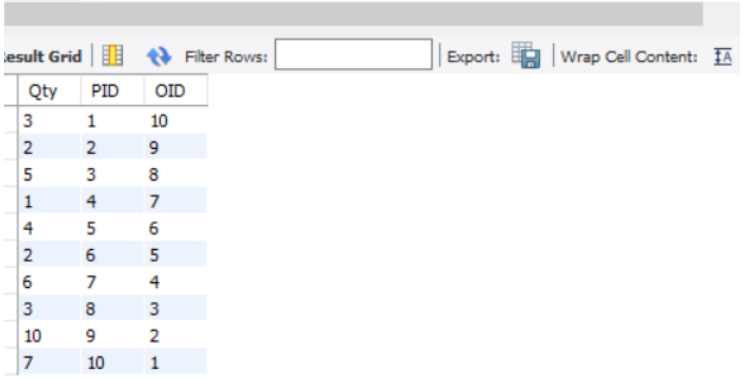


SID	Sname	Sphone	Semail	Saddr
1	Marcus	086-175-2472	Marcus.Davis@gmail.com	Army Surplus Warehouse Co.Cork
2	Jamie	086-924-7105	Jamie.Nicholas@gmail.com	Silver Bullet Warehouse Ltd Co.Dublin
3	Mary	085-874-1037	Mary.Carver@gmail.com	Arnotts Warehouse Co.kildare
4	Henry	085-143-7642	Henry.Forrest@gmail.com	Musgraves Warehouse Co.Galway
5	Paul	089-481-9476	Paul.Barlow@gmail.com	Kerrygold Warehouse Co.Carlow
6	Chantelle	089-379-4039	Chantelle18@live.com	Bakersfield Warehouse Co.Kerry
7	David	087-504-2644	David07@live.com	Crooksvile Warehouse Co.Limerick
8	Jose	087-390-6487	Jose66@live.com	Bluebell Warehouse Co.Clare
9	Liam	085-467-1920	Liam23@live.com	Drakelands Warehouse Co.Kilkenny
10	Daniel	086-673-4972	Daniel40@live.com	Dunmore Warehouse Co.Sligo
NULL	NULL	NULL	NULL	NULL

OrdersProducts Table

INSERT INTO ordersproducts VALUES (0003,0001,0010);
INSERT INTO ordersproducts VALUES (0002,0002,0009);
INSERT INTO ordersproducts VALUES (0005,0003,0008);
INSERT INTO ordersproducts VALUES (0001,0004,0007);
INSERT INTO ordersproducts VALUES (0004,0005,0006);
INSERT INTO ordersproducts VALUES (0002,0006,0005);
INSERT INTO ordersproducts VALUES (0006,0007,0004);
INSERT INTO ordersproducts VALUES (0003,0008,0003);
INSERT INTO ordersproducts VALUES (0010,0009,0002);
INSERT INTO ordersproducts VALUES (0007,0010,0001);

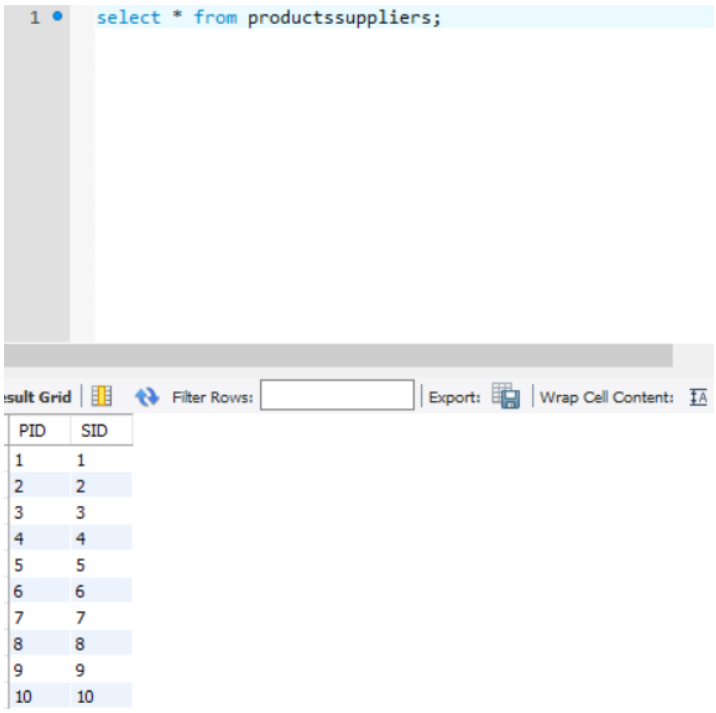
```
1 • select * from ordersproducts;
```



Qty	PID	OID
3	1	10
2	2	9
5	3	8
1	4	7
4	5	6
2	6	5
6	7	4
3	8	3
10	9	2
7	10	1

ProductsSuppliers Table

INSERT INTO productssuppliers VALUES (0001,0001);
INSERT INTO productssuppliers VALUES (0002,0002);
INSERT INTO productssuppliers VALUES (0003,0003);
INSERT INTO productssuppliers VALUES (0004,0004);
INSERT INTO productssuppliers VALUES (0005,0005);
INSERT INTO productssuppliers VALUES (0006,0006);
INSERT INTO productssuppliers VALUES (0007,0007);
INSERT INTO productssuppliers VALUES (0008,0008);
INSERT INTO productssuppliers VALUES (0009,0009);
INSERT INTO productssuppliers VALUES (0010,0010);



PID	SID
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10