LAB BOOK 3

COMP41090 SQL PROGRAMMING

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MSc COMPUTER SCIENCE (CONVERSION)

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Question 1

Figure 1.1 – Inserting new information

```
SQL> SET AUTOCOMMIT OFF;
SQL> INSERT INTO customer (cust_nbr, fname, lname) VALUES ( 110, 'Wayne', 'Roone
y');

1 row created.

SQL> INSERT INTO customer (cust_nbr, fname, lname) VALUES ( 111, 'David','Beckha
m');

1 row created.

SQL> INSERT INTO employee (emp_id, fname, lname, MANAGER_EMP_ID) VALUES( 401,'Ga
reth', 'Bale', 300);

1 row created.

SQL> INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALU
ES(1026, 110, 401, 1200.23);

1 row created.

SQL> INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALU
ES(1027, 111, 401, 1100.49);

1 row created.

SQL> COMMIT;

Commit complete.

SQL> SELECT * FROM customer;

  CUST_NBR FNAME                LNAME
---------- -------------------- --------------------
       100 John                 Smith
       101 David                Williams
       102 Angelina             Wolf
       103 Natalie              Clarrins
       104 Carl                 Sagan
       105 Renata               Jones
       106 Julie                DeValera
       107 Bruce                Ezell
       108 Mark                 Pruitt
       109 Nigel                Kennedy
       110 Wayne                Rooney

  CUST_NBR FNAME                LNAME
---------- -------------------- --------------------
       111 David                Beckham

12 rows selected.

SQL> SELECT * FROM employee;

    EMP_ID FNAME                LNAME                MANAGER_EMP_ID
---------- -------------------- -------------------- --------------
       304 Reno                 Lopez                           304
       305 Stewart              Fulbright                       305
       300 Jason                Chase                           304
       301 James                Mason                           304
       302 Mila                 Freeman                         305
       303 Michael              Berry                           305
       401 Gareth               Bale                            300

7 rows selected.
```

SQL USED

Please Note: SQL is also included within the text file "sql.txt" included with the zip file.

```
1| SET AUTOCOMMIT OFF;
2| INSERT INTO customer (cust_nbr, fname, lname) VALUES ( 110, 'Wayne', 'Rooney');
3| INSERT INTO customer (cust_nbr, fname, lname) VALUES ( 111, 'David','Beckham');
4| INSERT INTO employee (emp_id, fname, lname, MANAGER_EMP_ID) VALUES( 401,'Gareth', 'Bale', 300);
5| INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(1026, 110, 401, 1200.23);
6| INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(1027, 111, 401, 1100.49);
7| COMMIT;
8| SELECT * FROM customer;
9| SELECT * FROM employee;
10| SELECT * FROM cust_order;
```

In line 1, **AUTOCOMMIT** is set to **OFF** in order to prevent the SQL statements from automatically implementing changes to the database. Two new customers, one employee, and two orders are inserted on Lines 2 – 6. Line 7 commits the data. Lines 8 - 10 demonstrate that the data was added successfully (see Figure 1.2).

Figure 1.2 – Display new information added

```
SQL> SELECT * FROM cust_order;

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- --------------------
      1000        100          300     400.99
      1001        100          301        800
      1002        100          302      90.99
      1003        101          303        200
      1004        101          300       1000
      1005        101          301       78.1
      1006        102          302     330.25
      1007        102          303      890.5
      1008        102          300        220
      1009        103          301       1300
      1010        103          302      99.99

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- --------------------
      1011        103          303      300.5
      1012        104          300     770.25
      1013        104          301        230
      1014        104          302       90.1
      1015        105          303        143
      1016        105          300     184.99
      1017        105          301      988.1
      1018        106          302       34.5
      1019        106          303      23.99
      1020        107          300     189.25
      1021        107          301        412

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- --------------------
      1022        108          302      231.5
      1023        108          303     444.99
      1024        109          300       12.1
      1025        109          301      129.5
      1026        110          401    1200.23
      1027        111          401    1100.49

28 rows selected.
```

Question 2

Figure 2.1 – Demonstration of rollback functionality

```
SQL> SET AUTOCOMMIT OFF;
SQL> INSERT INTO customer (cust_nbr, fname, lname) VALUES ( 112, 'Kim', 'Jong-un
');

1 row created.

SQL> INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALU
ES(1028, 112, 401, 200.20);

1 row created.

SQL> ROLLBACK;

Rollback complete.

SQL> SELECT * FROM customer;

  CUST_NBR FNAME                LNAME
---------- -------------------- --------------------
       100 John                 Smith
       101 David                Williams
       102 Angelina             Wolf
       103 Natalie              Clarrins
       104 Carl                 Sagan
       105 Renata               Jones
       106 Julie                DeValera
       107 Bruce                Ezell
       108 Mark                 Pruitt
       109 Nigel                Kennedy
       110 Wayne                Rooney

  CUST_NBR FNAME                LNAME
---------- -------------------- --------------------
       111 David                Beckham

12 rows selected.

SQL> SELECT * FROM cust_order;

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- --------------------
      1000        100          300     400.99
      1001        100          301        800
      1002        100          302      90.99
      1003        101          303        200
      1004        101          300       1000
      1005        101          301       78.1
      1006        102          302     330.25
      1007        102          303      890.5
      1008        102          300        220
      1009        103          301       1300
      1010        103          302      99.99

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- --------------------
      1011        103          303      300.5
      1012        104          300     770.25
      1013        104          301        230
      1014        104          302       90.1
      1015        105          303        143
      1016        105          300     184.99
      1017        105          301      988.1
      1018        106          302       34.5
      1019        106          303      23.99
      1020        107          300     189.25
      1021        107          301        412

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- --------------------
      1022        108          302      231.5
      1023        108          303     444.99
      1024        109          300       12.1
      1025        109          301      129.5
      1026        110          401    1200.23
      1027        111          401    1100.49

28 rows selected.
```

SQL USED

```
1| SET AUTOCOMMIT OFF;
2| INSERT INTO customer (cust_nbr, fname, lname) VALUES ( 112, 'Kim', 'Jong-un');
3| INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(1028, 112, 401, 200.20);
4| ROLLBACK;
5| SELECT * FROM customer;
6| SELECT * FROM cust_order;
```

Autocommit is set to off to prevent information being automatically saved to the database. Line 2 – 3 inserts a new customer and a new order. Line 4 uses the **ROLLBACK** keyword to disregard the previous **INSERT** statements. Lines 5 – 6 demonstrate that the information was not inserted into the tables (see Figure 2.1).

Question 3

SQL USED:

```
1| INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(1036, 111, 401, 333.44);
2| INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(1037, 110, 401, 76.65);
3| SAVEPOINT qthree;
4| INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(1036234567864, 110, 401, 22.54);
5| SELECT * FROM cust_order;
6| ROLLBACK TO qthree;
7| SELECT * FROM cust_order;
8| COMMIT;
```

- In lines 1-2 , two new orders are inserted.
- On line 3, a **SAVEPOINT** is created which saves a snapshot of the state of the database.
- In line 4, an order number is inserted that exceeds the maximum number length, therefore the order fails (see Figure 3.1).
- Line 5 demonstrates that the order was not entered (Figure 3.2).
- Line 6 returns the state of the database to the **SAVEPOINT** qthree using **ROLLBACK.**

Figure 3.1 - Before Rollback:

```
SQL> INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALU
ES(1036, 111, 401, 333.44);

1 row created.

SQL> INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALU
ES(1037, 110, 401, 76.65);

1 row created.

SQL> SAVEPOINT qthree;

Savepoint created.

SQL> INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALU
ES(1036234567864, 110, 401, 22.54);
INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(10
36234567864, 110, 401, 22.54)
                                                                             *
ERROR at line 1:
ORA-01438: value larger than specified precision allowed for this column
```

Figure 3.2 – Demonstration that information was not added

Run SQL Command Line

```
SQL> SELECT * FROM cust_order;

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- --------------------
      1000        100          300     400.99
      1001        100          301        800
      1002        100          302      90.99
      1003        101          303        200
      1004        101          300       1000
      1005        101          301       78.1
      1006        102          302     330.25
      1007        102          303      890.5
      1008        102          300        220
      1009        103          301       1300
      1010        103          302      99.99

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- --------------------
      1011        103          303      300.5
      1012        104          300     770.25
      1013        104          301        230
      1014        104          302       90.1
      1015        105          303        143
      1016        105          300     184.99
      1017        105          301      988.1
      1018        106          302       34.5
      1019        106          303      23.99
      1020        107          300     189.25
      1021        107          301        412

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- --------------------
      1022        108          302      231.5
      1023        108          303     444.99
      1024        109          300       12.1
      1025        109          301      129.5
      1026        110          401    1200.23
      1027        111          401    1100.49
      1028        111          401     222.25
      1029        110          401     100.99
      1030        110          401     100.99
      1031        111          401     666.44
      1032        110          401      88.77

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- --------------------
      1033        110          401      66.55
      1034        111          401     333.44
      1035        110          401      76.65
      1036        111          401     333.44
      1037        110          401      76.65

38 rows selected.

SQL> ROLLBACK TO qthree;
```

Figure 3.3 – Clarification that after rollback the information is the same

```
SQL> SELECT * FROM cust_order;

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- ---------
      1000        100          300     400.99
      1001        100          301        800
      1002        100          302      90.99
      1003        101          303        200
      1004        101          300       1000
      1005        101          301       78.1
      1006        102          302     330.25
      1007        102          303      890.5
      1008        102          300        220
      1009        103          301       1300
      1010        103          302      99.99

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- ---------
      1011        103          303      300.5
      1012        104          300     770.25
      1013        104          301        230
      1014        104          302       90.1
      1015        105          303        143
      1016        105          300     184.99
      1017        105          301      988.1
      1018        106          302       34.5
      1019        106          303      23.99
      1020        107          300     189.25
      1021        107          301        412

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- ---------
      1022        108          302      231.5
      1023        108          303     444.99
      1024        109          300       12.1
      1025        109          301      129.5
      1026        110          401    1200.23
      1027        111          401    1100.49
      1028        111          401     222.25
      1029        110          401     100.99
      1030        110          401     100.99
      1031        111          401     666.44
      1032        110          401      88.77

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE CATEGORY
---------- ---------- ------------ ---------- ---------
      1033        110          401      66.55
      1034        111          401     333.44
      1035        110          401      76.65
      1036        111          401     333.44
      1037        110          401      76.65

38 rows selected.
```

Figure 3.4 – Commiting the information

```
SQL> COMMIT;

Commit complete.
```

OPTION 2

In option 2, outlined below, the savepoint is created after the failed insert (on line 4). This may be the more logical sequence of SQL code. Similarly, the database is returned to the state of the savepoint. Lines 5 and 7 demonstrate that the tables were not updated with the failed insert (see Figures 3.5 and 3.7).

```
1| INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(1038, 111, 401, 333.44);
2| INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(1039, 110, 401, 76.65);
3| INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(1036234567864, 110, 401, 22.54);
4| SAVEPOINT qthree3;
5| SELECT * FROM cust_order;
6| ROLLBACK TO qthree3;
7| SELECT * FROM cust_order;
8| COMMIT;
```

Figure 3.5 – Option 2 Before Rollback

```
SQL> INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALU
ES(1036234567864, 110, 401, 22.54);
INSERT INTO cust_order (order_nbr, cust_nbr, sales_emp_id, sale_price) VALUES(10
36234567864, 110, 401, 22.54)
                                                                             *
ERROR at line 1:
ORA-01438: value larger than specified precision allowed for this column


SQL> SAVEPOINT qthree3;

Savepoint created.
```

Figure 3.5 – Table before Rollback

```
SQL> SELECT * FROM cust_order;

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE
---------- ---------- ------------ ----------
      1000        100          300     400.99
      1001        100          301        800
      1002        100          302      90.99
      1003        101          303        200
      1004        101          300       1000
      1005        101          301       78.1
      1006        102          302     330.25
      1007        102          303      890.5
      1008        102          300        220
      1009        103          301       1300
      1010        103          302      99.99

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE
---------- ---------- ------------ ----------
      1011        103          303      300.5
      1012        104          300     770.25
      1013        104          301        230
      1014        104          302       90.1
      1015        105          303        143
      1016        105          300     184.99
      1017        105          301      988.1
      1018        106          302       34.5
      1019        106          303      23.99
      1020        107          300     189.25
      1021        107          301        412

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE
---------- ---------- ------------ ----------
      1022        108          302      231.5
      1023        108          303     444.99
      1024        109          300       12.1
      1025        109          301      129.5
      1026        110          401    1200.23
      1027        111          401    1100.49
      1028        111          401     222.25
      1029        110          401     100.99
      1030        110          401     100.99
      1031        111          401     666.44
      1032        110          401      88.77

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE
---------- ---------- ------------ ----------
      1033        110          401      66.55
      1034        111          401     333.44
      1035        110          401      76.65
      1036        111          401     333.44
      1037        110          401      76.65
      1038        111          401     333.44
      1039        110          401      76.65
```

Figure 3.6 - Rollback

```
SQL> ROLLBACK TO qthree3;

Rollback complete.
```

Figure 3.7 – Table after rollback

```
SQL> SELECT * FROM cust_order;

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE
---------- ---------- ------------ ----------
      1000        100          300     400.99
      1001        100          301        800
      1002        100          302      90.99
      1003        101          303        200
      1004        101          300       1000
      1005        101          301       78.1
      1006        102          302     330.25
      1007        102          303      890.5
      1008        102          300        220
      1009        103          301       1300
      1010        103          302      99.99

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE
---------- ---------- ------------ ----------
      1011        103          303      300.5
      1012        104          300     770.25
      1013        104          301        230
      1014        104          302       90.1
      1015        105          303        143
      1016        105          300     184.99
      1017        105          301      988.1
      1018        106          302       34.5
      1019        106          303      23.99
      1020        107          300     189.25
      1021        107          301        412

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE
---------- ---------- ------------ ----------
      1022        108          302      231.5
      1023        108          303     444.99
      1024        109          300       12.1
      1025        109          301      129.5
      1026        110          401    1200.23
      1027        111          401    1100.49
      1028        111          401     222.25
      1029        110          401     100.99
      1030        110          401     100.99
      1031        111          401     666.44
      1032        110          401      88.77

 ORDER_NBR   CUST_NBR SALES_EMP_ID SALE_PRICE
---------- ---------- ------------ ----------
      1033        110          401      66.55
      1034        111          401     333.44
      1035        110          401      76.65
      1036        111          401     333.44
      1037        110          401      76.65
      1038        111          401     333.44
      1039        110          401      76.65
```

Question 4

SQL USED:

```
1| connect / as sysdba;
2| CREATE USER q4 IDENTIFIED BY q4;
3| GRANT CONNECT, CREATE SESSION TO q4;
4| GRANT SELECT, INSERT, UPDATE, DELETE ON adoyle.employee TO q4;
5| connect q4;
6| //enter password
7| SELECT * FROM adoyle.employee;
```

This question demonstrates the creation of a user and the granting of privileges. In order to create the user, sysdba was logged onto. On line 2 the user is created, the ***identified by*** keyword assigns a password for the user to logon with. On line 3, the user is granted ***connect*** *and* ***create session*** privileges (as user **adoyle** was).

Line 4 grants the user the required privileges, with the **ON** keyword also added to limit the privileges to a specific table. Note the inclusion of **adoyle** before **employee**, since **adoyle** is the owner of the table.

Lines 5 – 7 demonstrate how the user can now **select** from the table (see Figure 4.3).

Figure 4.1 – Creating a new user

```
SQL> connect / as sysdba;
Connected.
SQL> CREATE USER q4 IDENTIFIED BY q4;

User created.
```

Figure 4.2 – Granting connect and session privilege to new user

```
SQL> GRANT CONNECT, CREATE SESSION TO q4;

Grant succeeded.
```

Figure 4.3 – Granting required privileges and demonstration of their use

```
SQL> GRANT SELECT, INSERT, UPDATE, DELETE ON adoyle.employee TO q4;

Grant succeeded.

SQL> connect q4;
Enter password:
Connected.
SQL> SELECT * FROM adoyle.employee;

    EMP_ID FNAME                LNAME                MANAGER_EMP_ID
---------- -------------------- -------------------- --------------
       304 Reno                 Lopez                           304
       305 Stewart              Fulbright                       305
       300 Jason                Chase                           304
       301 James                Mason                           304
       302 Mila                 Freeman                         305
       303 Michael              Berry                           305
       401 Gareth               Bale                            300

7 rows selected.
```

Figure 4.4 – Double Session

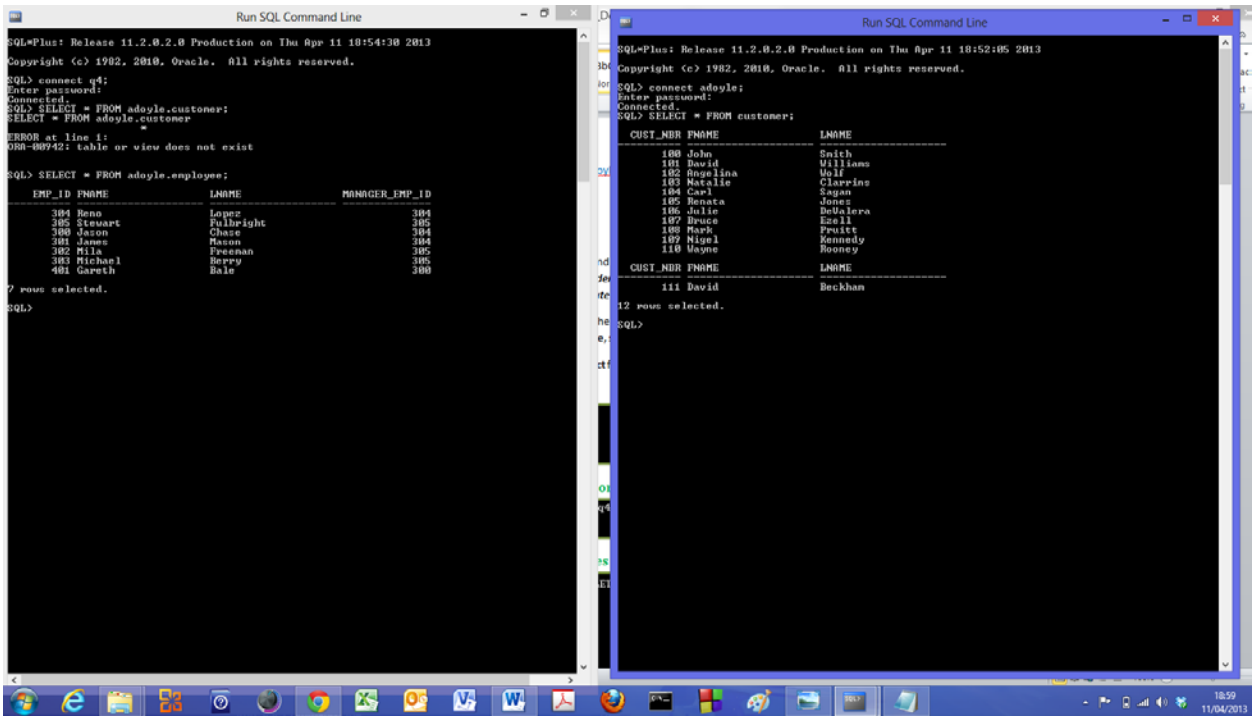


Figure 4.4 above shows a double instance of the SQL command line, which demonstrates how **q4** is not allowed access to the customer table, but can access the employee table (left-hand instance of Figure 4.4). The right-hand instance of the command line shows the user **adoyle** accessing the customer table.

Question 5

SQL USED:

```
1| REVOKE DELETE ON adoyle.employee FROM q4;
2| connect q4;
3| //enter password
4| DELETE FROM adoyle.employee
5| WHERE lname = 'Monster';
```

This question demonstrates the use of the **REVOKE** keyword, which allows you to remove privileges from users. Again, the **ON** keyword is used to specify the table for the **revoke** to be carried out on, and the **FROM** keyword allows you to specify which user is affected.

Lines 4 – 5 demonstrate an attempt to delete content from the **employee** table whilst logged in as **q4**. The **revoke** has been successful because the error message *"insufficient privileges"* is output to the screen (see Figure 5.2).

Figure 5.1 – Revoking Privilege

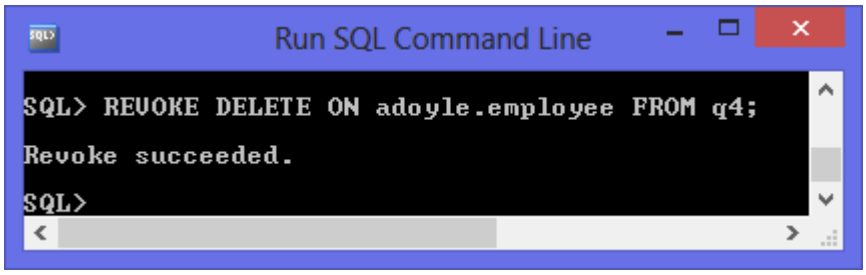
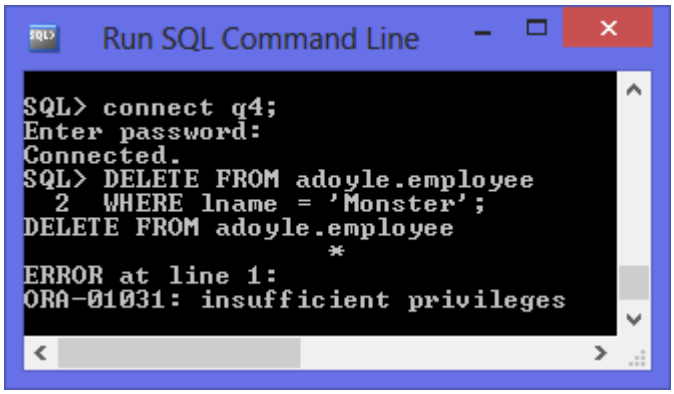


Figure 5.2 – Attempting to delete

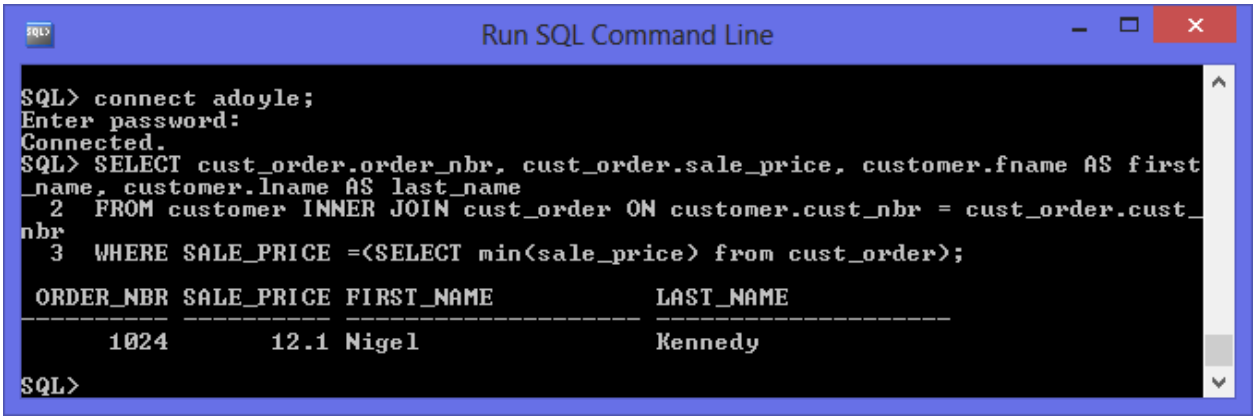


Question 6

SQL USED:

```
1| SELECT cust_order.order_nbr, cust_order.sale_price, customer.fname AS first_name, customer.lname AS last_name
2| FROM customer INNER JOIN cust_order ON customer.cust_nbr = cust_order.cust_nbr
3| WHERE SALE_PRICE =(SELECT min(sale_price) from cust_order);
```

Figure 6.1 - Output of customer with smallest order

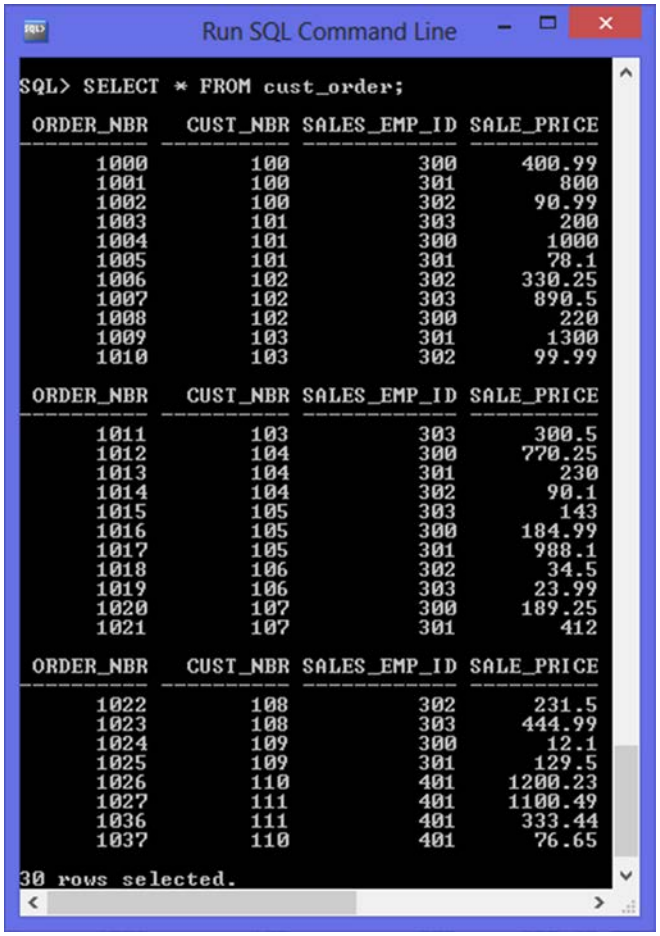


This question demonstrates how to display information based on a specific criteria, in this case being the customer who had place the smallest value order.

The relevant headings are selected on line 1 of the SQL code above. The **customer** and **cust_order** tables are joined by the attribute **cust_nbr** (using the **ON** keyword).

The criteria is specified using the **WHERE SALE PRICE =** statement. As shown on line 3 of the SQL code, the minimum value is selected from the **cust_order** table using the **min** function.

Figure 6.2 - Cust_order table to verify correct information obtained:



Question 7

To be submitted at a later stage, as discussed in class on 09th April 2013.