Carleton University

COMP 3005 - Fall 2017

Database Management Systems

Assignment #6

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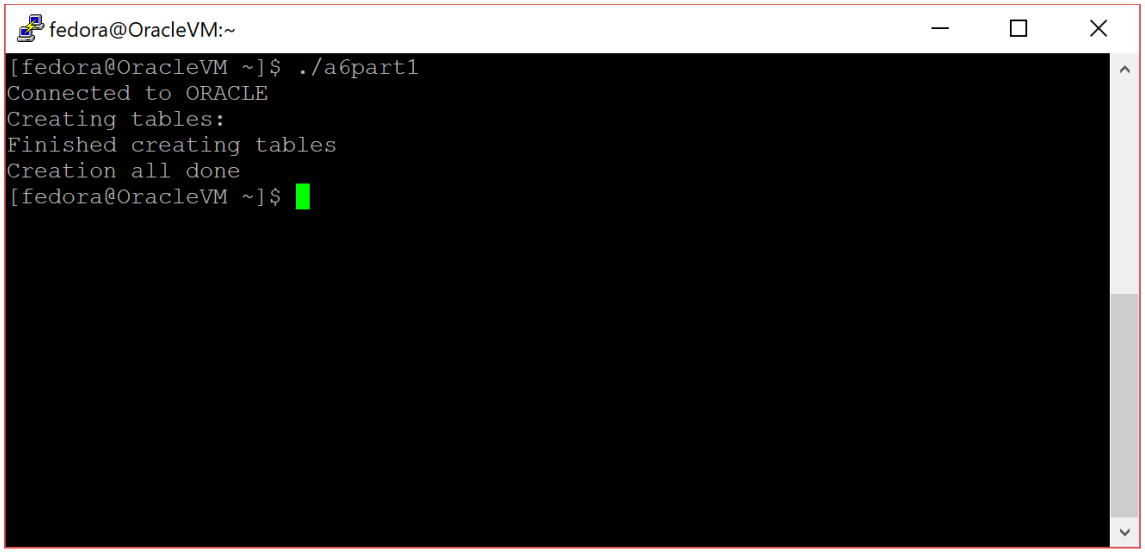
Assignment #6

Part 1

a6part1.pc

```
#include <stdio.h>
exec sql include sqlca;
exec sql begin declare section;
char sqlstmt1[1024];
char sqlstmt2[1024];
char sqlstmt3[1024];
  char *MYID= "fedora/thisvmsucks";
exec sql end declare section;

int main(){
  exec sql connect :MYID;
  if (sqlca.sqlcode == 0)
      printf("Connected to ORACLE\n");
  else
      printf("Connect Failed\n");

/*  create table account using dynamic methid 1          */
        printf("Creating tables:\n");
        strcpy(sqlstmt1,
        "create table Bank(B# varchar(4) NOT NULL, Name varchar(20) NOT NULL,
         ↪  City varchar(20) NOT NULL, primary key (B#))" );
        strcpy(sqlstmt2,
        "create table Customer(C# varchar(4) NOT NULL, Name varchar(20) NOT NULL,
         ↪  Age int NOT NULL, City varchar(10) NOT NULL,  primary key (C#))" );
        strcpy(sqlstmt3,
        "create table Account (C# varchar(4) NOT NULL, B# varchar(4) NOT NULL,
         ↪  Balance int NOT NULL, primary key (C#,B#), foreign key (C#)
         ↪  references Customer(C#) ON DELETE CASCADE, foreign key (B#)
         ↪  references Bank(B#) ON DELETE CASCADE)");

  exec sql set transaction read write;
  exec sql execute immediate :sqlstmt1;
        exec sql execute immediate :sqlstmt2;
```

```
29          exec sql execute immediate :sqlstmt3;
30  printf("Finished creating tables\n");
31
32  finish:
33  printf("Creation all done\n");
34  exit(0);
35
36    if (sqlca.sqlcode == 0)
37        printf("Table created \n");
38    else
39        printf("Table not created\n");
40
41  }
```



Part 2

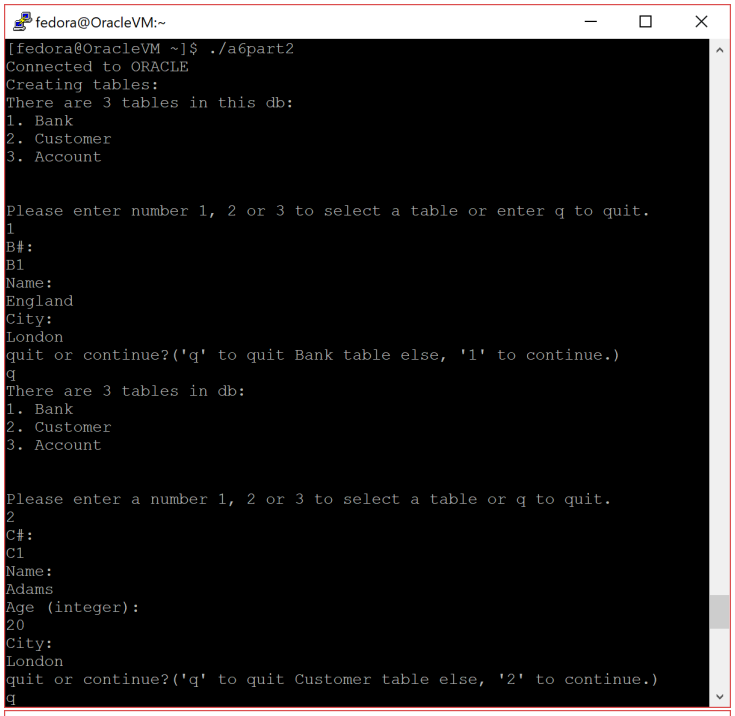
a6part2.pc

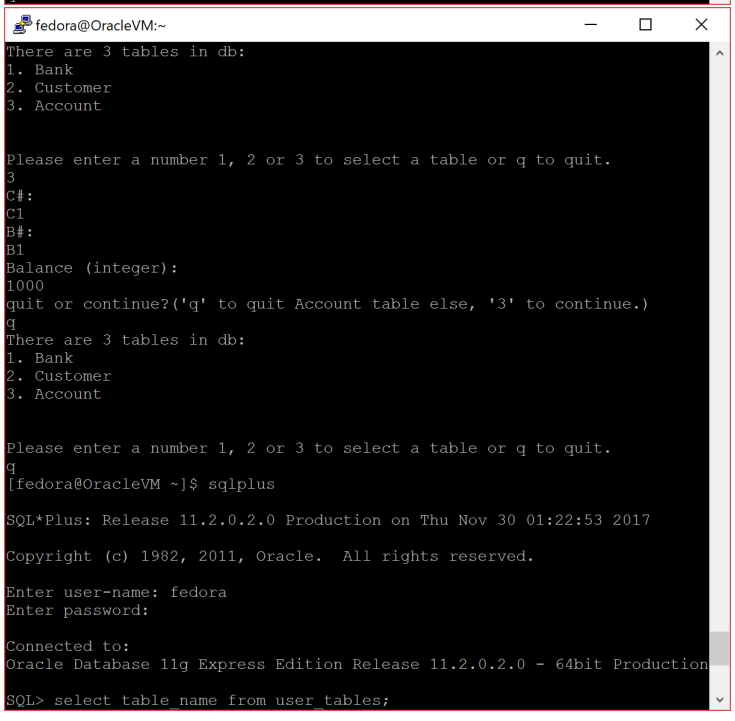
```
1  #include <stdio.h>
2  exec sql include sqlca;
3  exec sql begin declare section;
4  char bnum[5];
5  char bname[20];
6  int age;
```

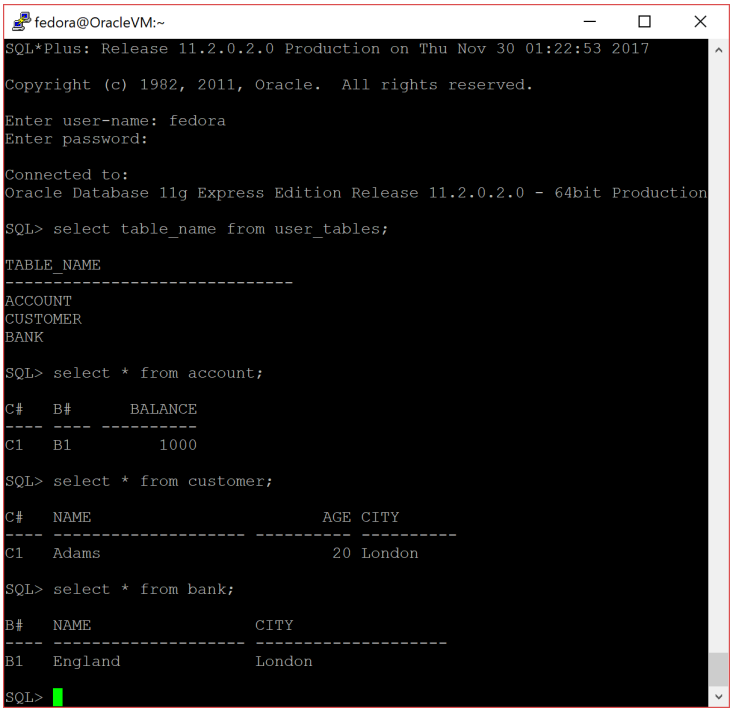
```
7  char bcity[20];
8  char cnum[5];
9  char cname[10];
10 char ccity[10];
11 int balance;
12 char sqlstmt[1024];
13 char pick[2];
14 char *MYID = "fedora/thisvmsucks";
15 exec sql end declare section;
16 int main() {
17   exec sql connect : MYID;
18   if (sqlca.sqlcode == 0)
19     printf("Connected to ORACLE\n");
20   else
21     printf("Connect Failed\n");
22   printf("Creating tables:\n");
23   strcpy(sqlstmt,
24          "create table Bank(B# varchar(4) NOT NULL, Name varchar(20) NOT NULL, "
25          "City varchar(20) NOT NULL, primary key (B#))");
26   exec sql set transaction read write;
27   exec sql execute immediate : sqlstmt;
28   strcpy(sqlstmt,
29          "create table Customer(C# varchar(4) NOT NULL, Name varchar(20) NOT "
30          "NULL,  Age int NOT NULL, City varchar(10) NOT NULL,  primary "
31          "key (C#))");
32   exec sql execute immediate : sqlstmt;
33   strcpy(sqlstmt,
34          "create table Account (C# varchar(4) NOT NULL, B# varchar(4) NOT "
35          "NULL, Balance int NOT NULL, primary key (C#,B#), foreign key (C#) "
36          "references Customer(C#) ON DELETE CASCADE, foreign key (B#) "
37          "references Bank(B#) ON DELETE CASCADE)");
38   exec sql execute immediate : sqlstmt;
39       printf("There are 3 tables in this db: \n");
40       printf("1. Bank \n");
41       printf("2. Account \n");
42       printf("3. Customer \n");
43       printf("\n\n");
44       printf("Please enter number 1, 2 or 3 to select a table or enter q to quit.
          ↪  \n");
45       scanf("%s", &pick);
46       while (strcmp(pick, "q") != 0) {
```

```
47              if (strcmp(pick, "1") == 0) {
48                  while (strcmp(pick, "q") != 0) {
49                      printf("B#:\n");
50                      scanf("%s", &bnum);
51                      printf("Name:\n");
52                      scanf("%s", &bname);
53                      printf("City:\n");
54                      scanf("%s", &bcity);
55                      strcpy(sqlstmt, "insert into Bank values (:v1, :v2, :v3)");
56                      exec sql prepare s from : sqlstmt;
57                      exec sql execute s using : bnum, : bname, : bcity;
58                      printf("quit or continue?('q' to quit Bank table else, '1' to
                         ↪  continue.)\n");
59                      scanf("%s", &pick);
60                  }
61              }
62              if (strcmp(pick, "2") == 0) {
63                  while (strcmp(pick, "q") != 0) {
64                      printf("C#:\n");
65                      scanf("%s", &cnum);
66                      printf("Name:\n");
67                      scanf("%s", &cname);
68                      printf("Age (integer):\n");
69                      scanf("%d", &age);
70                      printf("City:\n");
71                      scanf("%s", &ccity);
72                      strcpy(sqlstmt, "insert into Customer values (:v1, :v2, :v3,
                         ↪  v4)");
73                      exec sql prepare s from : sqlstmt;
74                      exec sql execute s using : cnum, : cname, : age, : ccity;
75                      printf("quit or continue?('q' to quit Customer table else, '2'
                         ↪  to continue.)\n");
76                      scanf("%s", &pick);
77                  }
78              }
79              if (strcmp(pick, "3") == 0) {
80                  while (strcmp(pick, "q") != 0) {
81                      printf("C#:\n");
82                      scanf("%s", &cnum);
83                      printf("B#:\n");
84                      scanf("%s", &bnum);
```

```
85                  printf("Balance (integer):\n");
86                  scanf("%d", &balance);
87                  strcpy(sqlstmt, "insert into Account values (:v1, :v2, :v3)");
88                  exec sql prepare s from : sqlstmt;
89                  exec sql execute s using : bnum, : cnum, : balance;
90                  printf("quit or continue?('q' to quit Account table else, '3'
                     ↪  to continue.)\n");
91                  scanf("%s", &pick);
92              }
93          }
94          printf("There are 3 tables in db: \n");
95          printf("1. Bank \n");
96          printf("2. Customer \n");
97          printf("3. Account \n");
98          printf("\n\n");
99          printf("Please enter a number 1, 2 or 3 to select a table or q to
             ↪  quit.\n");
100         scanf("%s", &pick);
101         exec sql execute immediate "commit";
102     }
103   exit(1);
104 }
```


fedora@OracleVM:~
[fedora@OracleVM ~]$ ./a6part2
Connected to ORACLE
Creating tables:
There are 3 tables in this db:
1. Bank
2. Customer
3. Account
Please enter number 1, 2 or 3 to select a table or enter q to quit.
1
B#:
B1
Name:
England
City:
London
quit or continue?('q' to quit Bank table else, '1' to continue.)
q
There are 3 tables in db:
1. Bank
2. Customer
3. Account
Please enter a number 1, 2 or 3 to select a table or q to quit.
2
C#:
C1
Name:
Adams
Age (integer):
20
City:
London
quit or continue?('q' to quit Customer table else, '2' to continue.)
q


fedora@OracleVM:~
There are 3 tables in db:
1. Bank
2. Customer
3. Account
Please enter a number 1, 2 or 3 to select a table or q to quit.
3
C#:
C1
B#:
B1
Balance (integer):
1000
quit or continue?('q' to quit Account table else, '3' to continue.)
q
There are 3 tables in db:
1. Bank
2. Customer
3. Account
Please enter a number 1, 2 or 3 to select a table or q to quit.
q
[fedora@OracleVM ~]$ sqlplus
SQL*Plus: Release 11.2.0.2.0 Production on Thu Nov 30 01:22:53 2017
Copyright (c) 1982, 2011, Oracle. All rights reserved.
Enter user-name: fedora
Enter password:
Connected to:
Oracle Database 11g Express Edition Release 11.2.0.2.0 - 64bit Production
SQL> select table_name from user_tables;



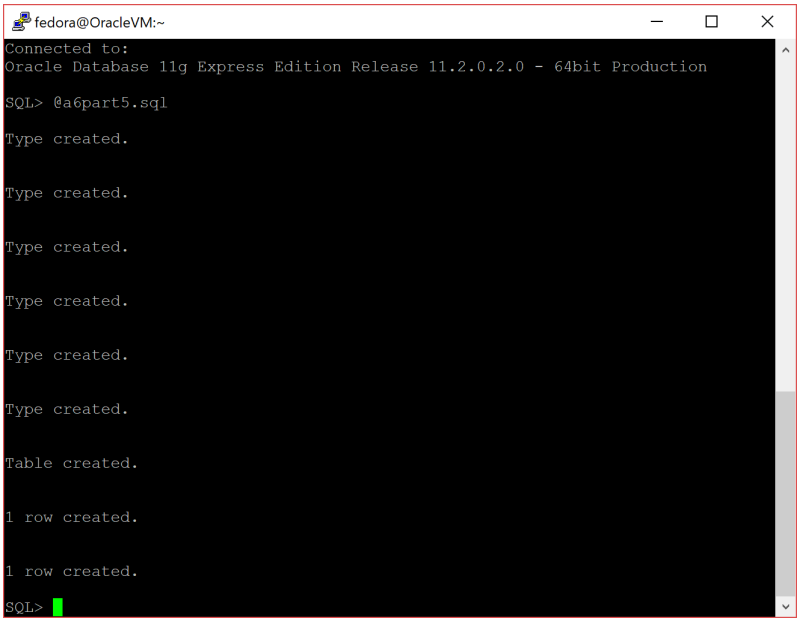
Part 3

a6part3.pc

```c
#include <stdio.h>

exec sql include sqlca;
exec sql begin declare section;
char sqlstmt1[1024];
char sqlstmt2[1024];
char bnum[3];
char bname[10];
int age;
char bcity[10];
char cnum[3];
char cname[10];
char ccity[10];
int balance;
char *MYID = "fedora/thisvmsucks";
```

```
16 exec sql end declare section;
17 int main() {
18   exec sql connect : MYID;
19   if (sqlca.sqlcode == 0)
20     printf("Connected to ORACLE\n");
21   else
22     printf("Connect Failed\n");
23     exec sql whenever sqlerror goto error;
24     exec sql whenever not found goto done;
25
26     strcpy(sqlstmt1, "select * from Customer order by C#");
27         printf("%s", sqlstmt1);
28     exec sql declare c_cur cursor for :sqlstmt1;
29
30         strcpy(sqlstmt2, "select * from Bank where exists (select * from Account
           ↪  where Account.C#=:cnum and Account.B#=Bank.B#) order by Bank.B#");
31         printf("%s", sqlstmt2);
32         exec sql prepare b from :sqlstmt2;
33         exec sql declare b_cur cursor for b;
34
35
36   printf("         C#                Name                    Age
      ↪  City        \n");
37
38   while(1) {
39         exec sql fetch c_cur into :cnum, :cname, :age, :ccity;
40         printf(" %s   %s   %d   %s \n", cnum, cname, age, ccity);
41
42         exec sql open b_cur using :cnum;
43         printf("  C#          Name     Balance        \n");
44         while(1){
45                 exec sql fetch b_cur into :bnum, :bname, :bcity;
46                 printf("  %s  %s  %s \n", bnum, bname, bcity);
47
48         }
49
50   done:
51     exec sql close c_cur;
52         exec sql close b_cur;
53     exec sql commit release;
54     printf("Work is done successfully!\n");
```

```
55      exit(0);
56
57          error:
58          printf("Error found in SQL. \n");
59          EXEC SQL WHENEVER SQLERROR CONTINUE;
60          fprintf (stderr, "DBMS Error: %.*s\n", sqlca.sqlerrm.sqlerrml,
             ↪  sqlca.sqlerrm.sqlerrmc);
61      exec sql rollback release;
62          exec sql rollback release;
63          exit(1);
64  }
```

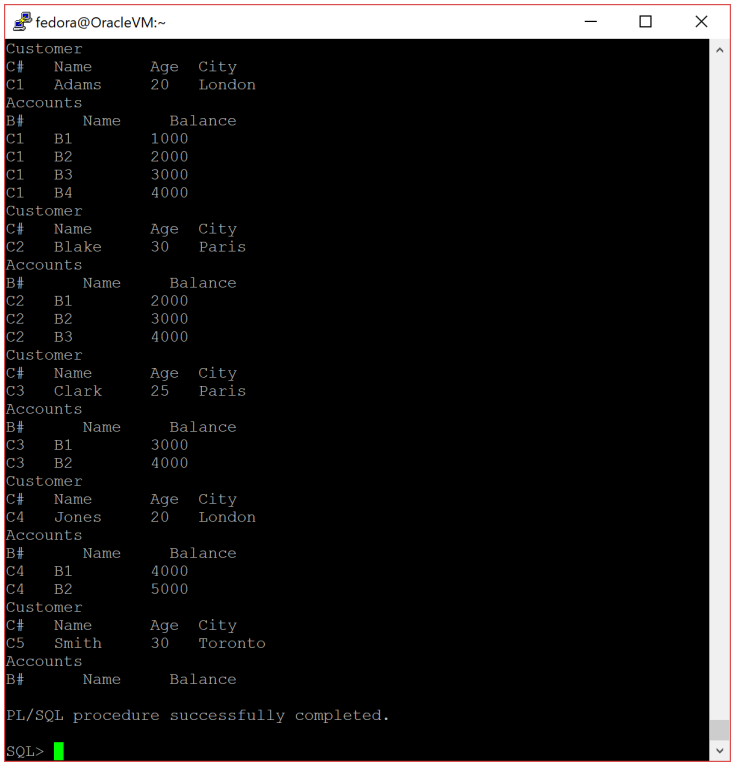


Part 4

a6part4.sql

```
1   DECLARE
2     c_tuple Customer%rowtype;
3     b_tuple Bank%rowtype;
4
5     CURSOR c_cursor IS select * from Customer ORDER BY C# ASC;
```

```
6    CURSOR b_cursor(cnum Customer.C#%type)
7    IS  select A.*
8        FROM Bank B, Account A
9        WHERE B.B# = A.B#
10       AND   A.C# = cnum
11       ORDER BY B.B# ASC;
12 BEGIN
13   dbms_output.put_line('  Customer');
14   dbms_output.put_line('C#   Name      Age  City      ');
15
16   OPEN c_cursor;
17   LOOP
18     fetch c_cursor into c_tuple;
19     exit when c_cursor%NOTFOUND;
20
21     dbms_output.put_line('  Customer');
22         dbms_output.put_line('C#   Name      Age  City');
23         dbms_output.put_line(rpad(to_char(c_tuple.C#),5)
24         || rpad(c_tuple.Name,10)
25         || rpad(c_tuple.Age,5)
26         || rpad(c_tuple.City,10));
27
28     dbms_output.put_line('    Accounts');
29     dbms_output.put_line('  B#      Name     Balance');
30
31     OPEN b_cursor(c_tuple.C#);
32     LOOP
33       FETCH b_cursor into b_tuple;
34       exit when b_cursor%NOTFOUND;
35
36       dbms_output.put_line(rpad(to_char(b_tuple.B#),5) ||
37         rpad(b_tuple.Name,10) || rpad(b_tuple.City,10));
38
39     END LOOP;
40     CLOSE b_cursor;
41
42   END LOOP;
43   CLOSE c_cursor;
44 END;
```

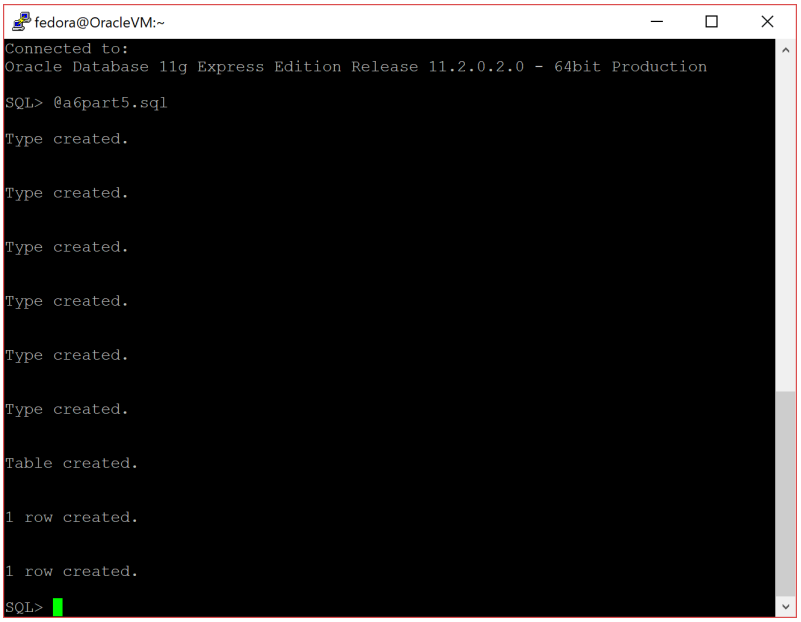


Part 5

a6part5.sql

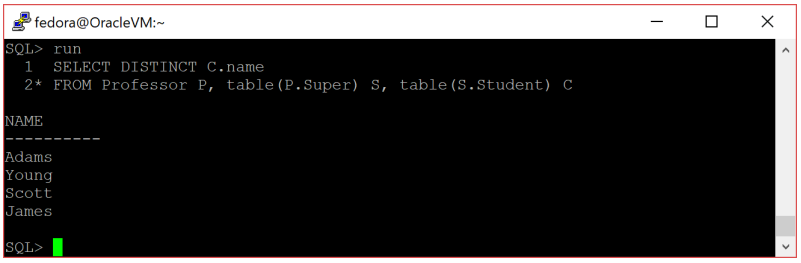
```sql
-- types declared
create type name_v as varray(5) of varchar(10);
/
create type hobby_v as varray(3) of varchar(10);
/
create type student_t
  as object(
            name varchar(10),
            hobby hobby_v);
/
create type student_v
  as varray(5)
  of student_t;
```

```
/
create type super_t
  as object(
            kind varchar(10),
            student student_v);
/
create type super_v as varray(5) of super_t;
/

-- table declared
create table professor(
  name varchar(10) primary key,
  hobby hobby_v,
  super super_v);

-- insert rows
insert into professor values(
  'Henry',
  hobby_v('Chess','Skiing'),
  super_v(super_t('Ph.d',
          student_v(student_t('Young',hobby_v('Skiing','Soccer')))),
  super_t('M.sc',student_v(student_t('James',hobby_v('Boxing')),
          student_t('Adams',hobby_v('Chess','Skiing'))))));
insert into professor values(
  'David',
  hobby_v('Hiking','Travel'),
  super_v(super_t('M.sc',
  student_v(student_t('Scott',hobby_v('Hiking','Travel'))))));
```



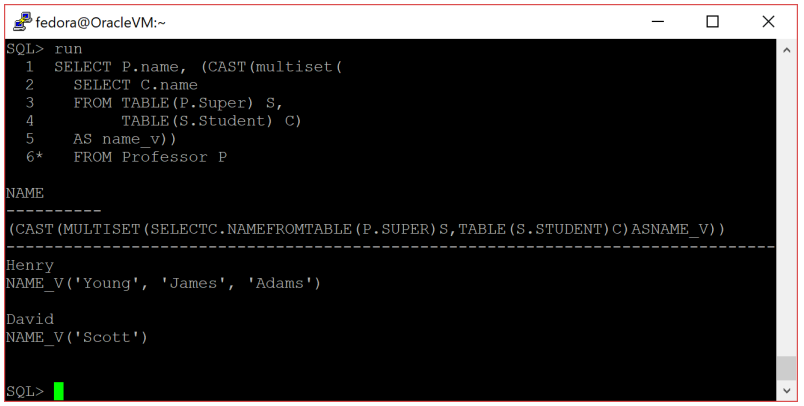
a6part6-1.sql

```sql
-- List all students (both master and PhD) as a single set of names.
SELECT DISTINCT C.name
FROM Professor P, table(P.Super) S, table(S.Student) C;
```



a6part6-2.sql

```sql
-- List all students (both master and PhD) as a single set of names.
SELECT DISTINCT C.name
FROM Professor P, table(P.Super) S, table(S.Student) C;
```


fedora@OracleVM:~
SQL> run
1 SELECT P.name, (CAST(multiset(
2 SELECT C.name
3 FROM TABLE(P.Super) S,
4 TABLE(S.Student) C)
5 AS name_v))
6* FROM Professor P
NAME
(CAST(MULTISET(SELECTC.NAMEFROMTABLE(P.SUPER)S,TABLE(S.STUDENT)C)ASNAME_V))
Henry
NAME_V('Young', 'James', 'Adams')
David
NAME_V('Scott')
SQL>