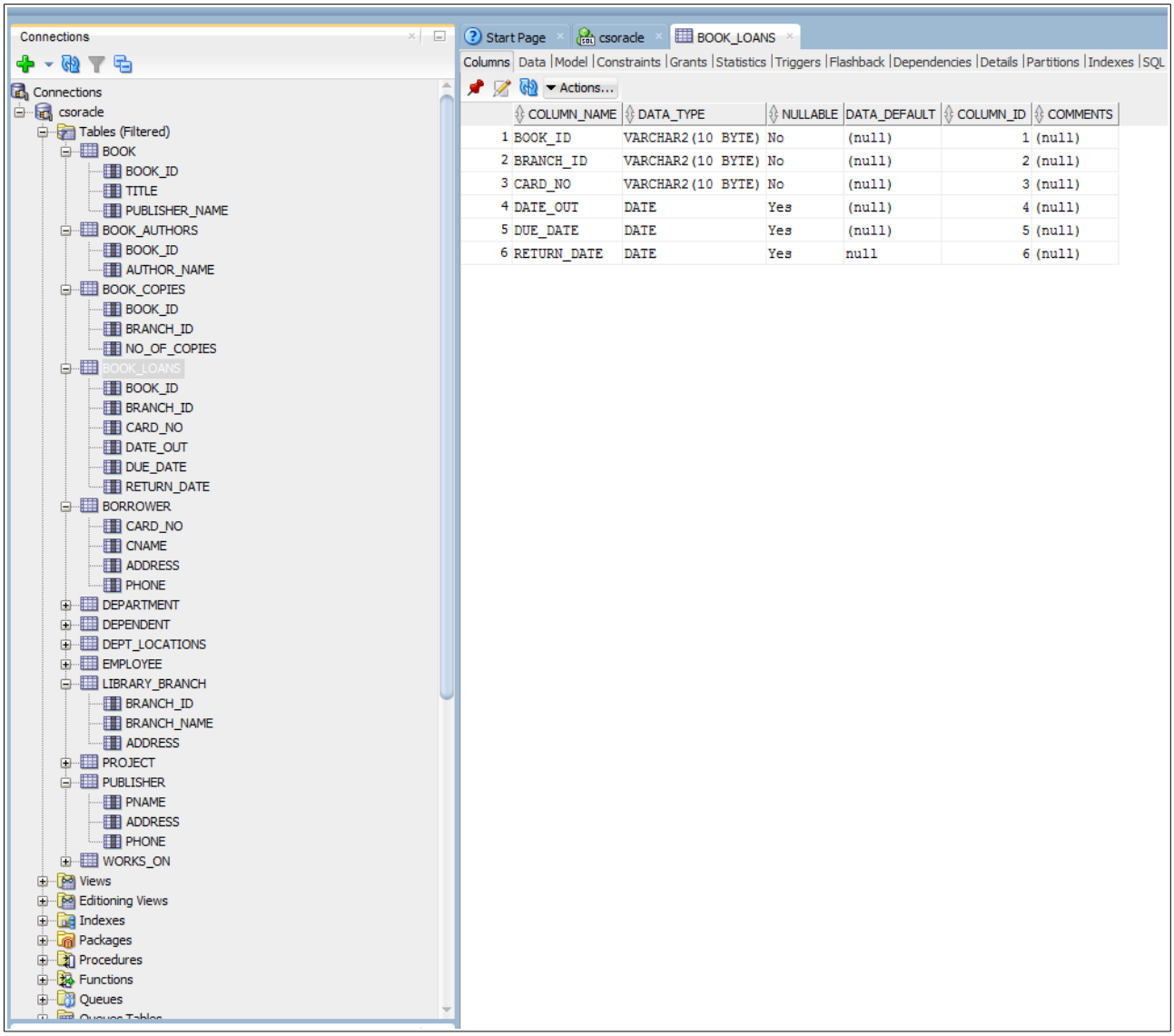
The University of Texas at Dallas
Database Design – Prof. Nurcan, Yuruk

Assignment 02

Part1 - 1. Creating Library Database:

a. creating the tables:

```
--DROP TABLE if exists BOOKS;
CREATE TABLE BOOKS (
        book_id             varchar(10),
        title               varchar(20),
        publ_name           varchar(20),
        primary key(book_id));

CREATE TABLE BOOK_AUTHORS (
        book_id             varchar(10),
        author_name         varchar(20),
        primary key(book_id, author_name));

CREATE TABLE PUBLISHER (
        pname               varchar(20),
        address             varchar(50),
        phone               varchar(20),
        primary key(pname));

CREATE TABLE BOOK_COPIES (
        book_id             varchar(10),
        branch_id           varchar(10),
        no_of_copies        integer,
        primary key(book_id, branch_id));

CREATE TABLE BOOK_LOANS (
        book_id             varchar(10),
        branch_id           varchar(10),
        card_no             varchar(10),
        date_out            date,
        due_date            date,
        return_date         date default null,
        primary key(book_id, branch_id, card_no));

CREATE TABLE LIBRARY_BRANCH (
        branch_id           varchar(10),
        branch_name         varchar(20),
        address             varchar(50),
        primary key(branch_id));

CREATE TABLE BORROWER (
        card_no             varchar(10),
        cname               varchar(20),
        address             varchar(50),
        phone               varchar(20),
        primary key(card_no));
```



*** The default value for RETURN_DATE is set to be NULL.*

b. triggered actions that will be attached to each foreign key constraint:

ALTER TABLE BOOK ADD CONSTRAINT fk1 FOREIGN KEY(publisher_name) REFERENCES publisher(pname) ON DELETE CASCADE;

ALTER TABLE BOOK_AUTHORS ADD CONSTRAINT fk2 FOREIGN KEY(book_id) REFERENCES BOOK(book_id) ON DELETE CASCADE;

ALTER TABLE BOOK_COPIES ADD CONSTRAINT fk3 FOREIGN KEY(book_id) REFERENCES BOOK(book_id) ON DELETE CASCADE;

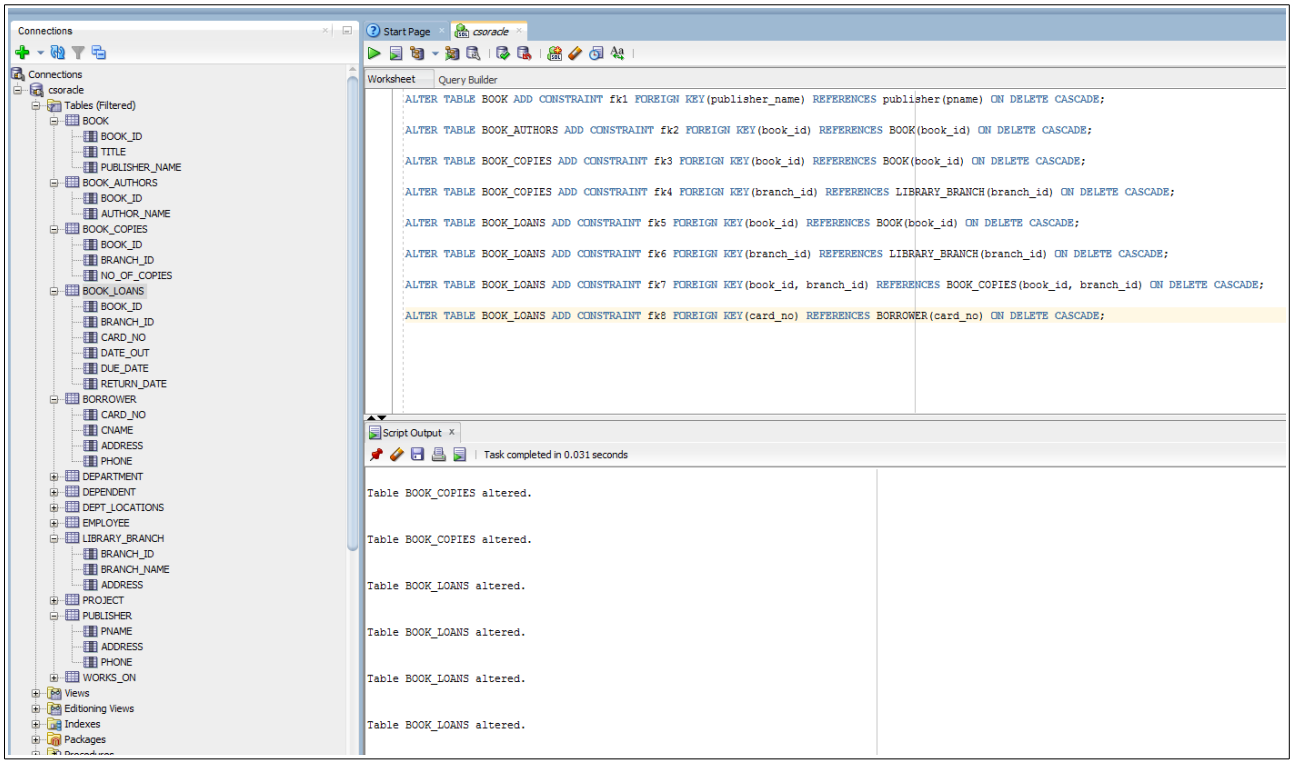
ALTER TABLE BOOK_COPIES ADD CONSTRAINT fk4 FOREIGN KEY(branch_id) REFERENCES LIBRARY_BRANCH(branch_id) ON DELETE CASCADE;

ALTER TABLE BOOK_LOANS ADD CONSTRAINT fk5 FOREIGN KEY(book_id) REFERENCES BOOK(book_id) ON DELETE CASCADE;

ALTER TABLE BOOK_LOANS ADD CONSTRAINT fk6 FOREIGN KEY(branch_id) REFERENCES LIBRARY_BRANCH(branch_id) ON DELETE CASCADE;

ALTER TABLE BOOK_LOANS ADD CONSTRAINT fk7 FOREIGN KEY(book_id, branch_id) REFERENCES BOOK_COPIES(book_id, branch_id) ON DELETE CASCADE;

We dont need to refer BOOK_LOANS(book_id, branch_id) from BOOK_COPIES(book_id, branch_id)



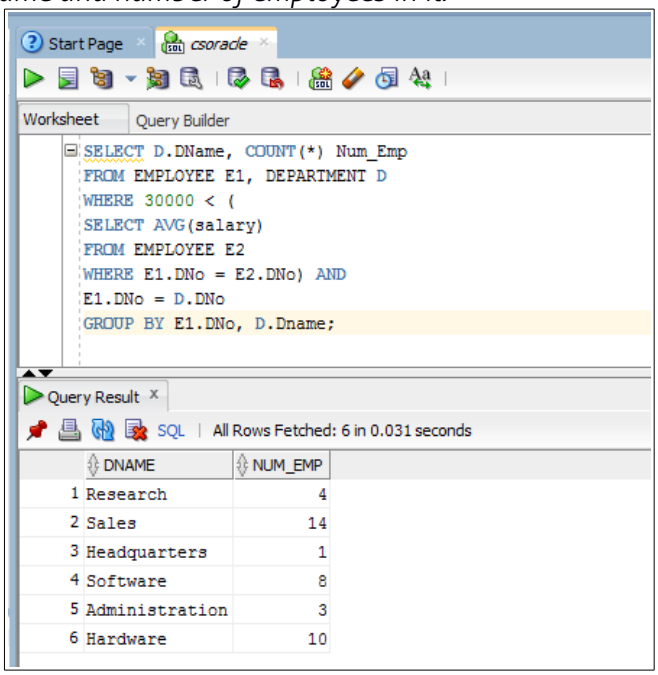
Part 2

1. Queries on COMPANY database.

a. *for each dept with AVG_EMP_SALARY > 30000, deptName and number of employees in it.*

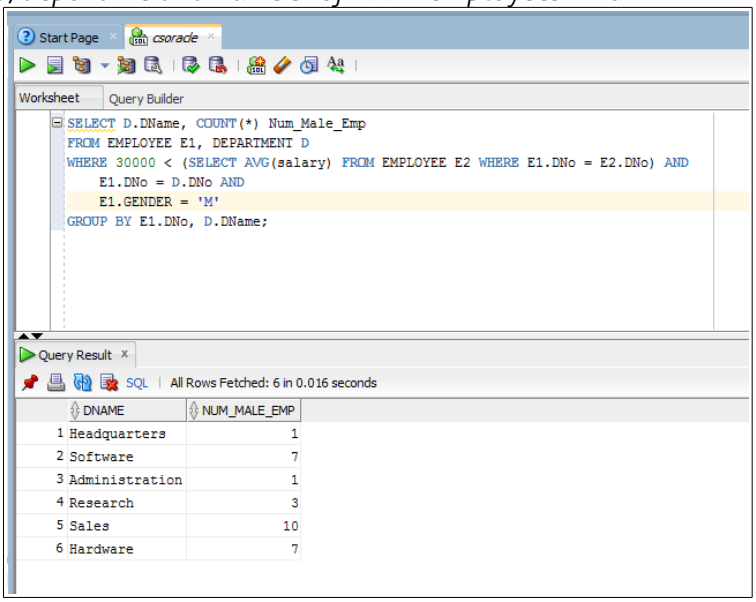
```
SELECT D.DName, COUNT(*) Num_Emp
FROM EMPLOYEE E1, DEPARTMENT D
WHERE 30000 < (
        SELECT AVG(salary)
        FROM EMPLOYEE E2
        WHERE E1.DNo = E2.DNo) AND
E1.DNo = D.DNo
GROUP BY E1.DNo, D.Dname;
```

***** There can be differences in query outputs, because of different databases data values. So, I have outputs based on the employee database that I have.***



b. *for each dept with AVG_EMP_SALARY > 30000, deptName and number of MALE employees in it.*

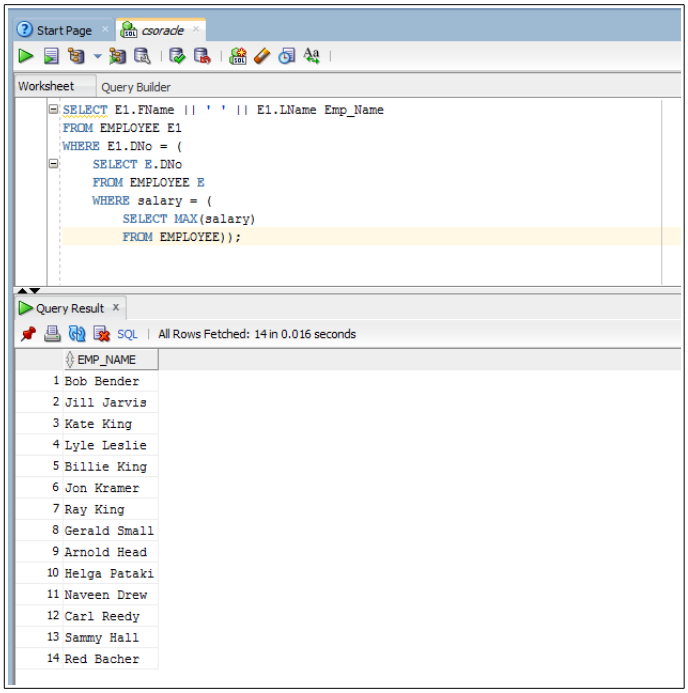
```
SELECT D.DName,
COUNT(*) Num_Male_Emp
FROM EMPLOYEE E1, DEPARTMENT D
WHERE 30000 < (
        SELECT AVG(salary)
        FROM EMPLOYEE E2
        WHERE E1.DNo = E2.DNo) AND
E1.DNo = D.DNo AND
E1.GENDER = 'M'
GROUP BY E1.DNo, D.DName;
```



c. *for the department with highest emp salary, giving names of employees in it.*

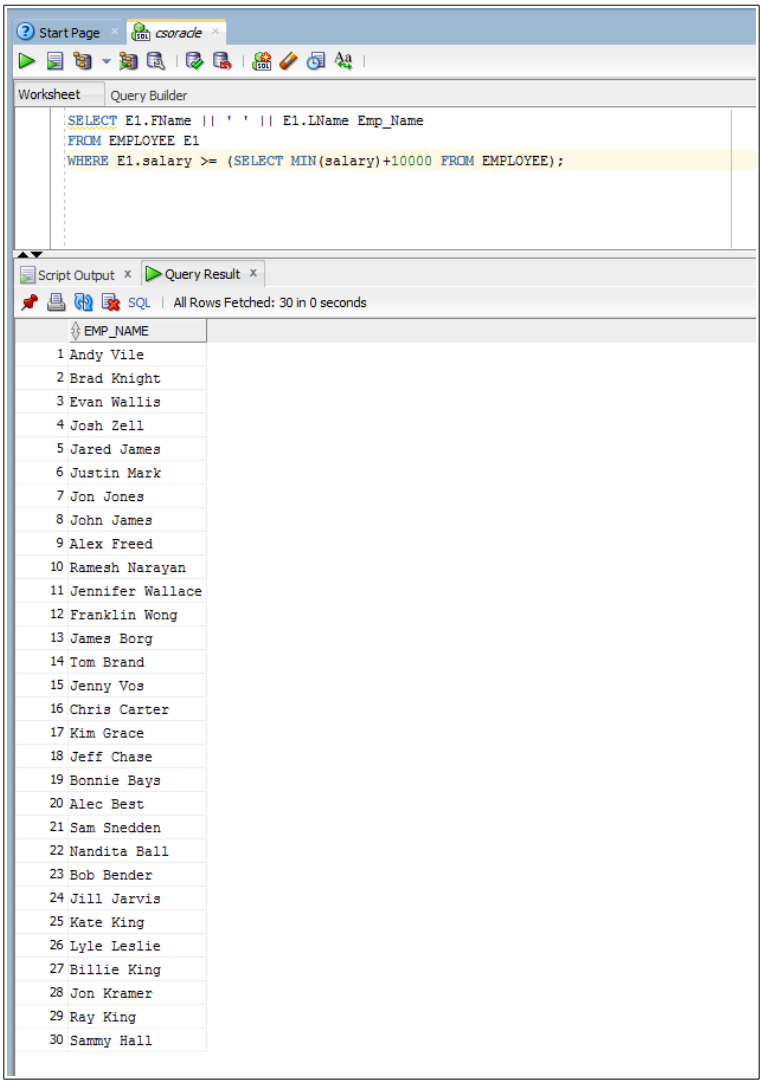
```
SELECT E1.FName || ' ' || E1.LName Emp_Name
FROM EMPLOYEE E1
WHERE E1.DNo = (
        SELECT E.DNo
        FROM EMPLOYEE E
        WHERE salary = ( SELECT MAX(salary)
                FROM EMPLOYEE));
```

***** There can be different total no of tuples from other's databases.***
For e.g., I have 14 employees in Dno=8, others may have 15, or so.
Kindly take a note of this.



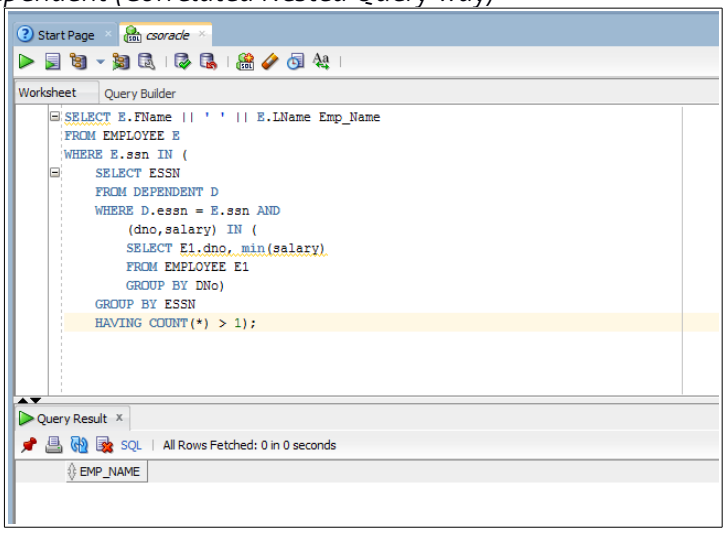
d. *employees making atleast 10000 more than the least salaried employee in the company.*

```
SELECT E1.FName || ' ' || E1.LName
Emp_Name
FROM EMPLOYEE E1
WHERE E1.salary >= (
SELECT MIN(salary)+10000
FROM EMPLOYEE);
```



e. *employees making least in their dept, with >1 dependent (Correlated Nested Query way)*

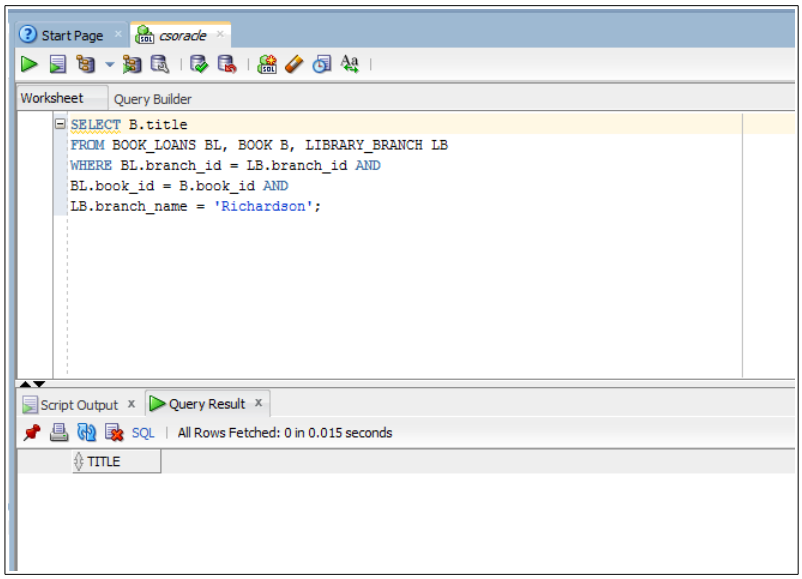
```
SELECT E.FName || ' ' || E.LName Emp_Name
FROM EMPLOYEE E
WHERE E.ssn IN (
        SELECT D.essn
        FROM DEPENDENT D
        WHERE D.essn = E.ssn AND
                (dno,salary) IN (
                SELECT E1.dno, min(salary)
                FROM EMPLOYEE E1
                GROUP BY DNo)
        GROUP BY essn
        HAVING COUNT(*) > 1);
```



2. Queries on LIBRARY database.

a. *books borrowed form 'Richardson' library*

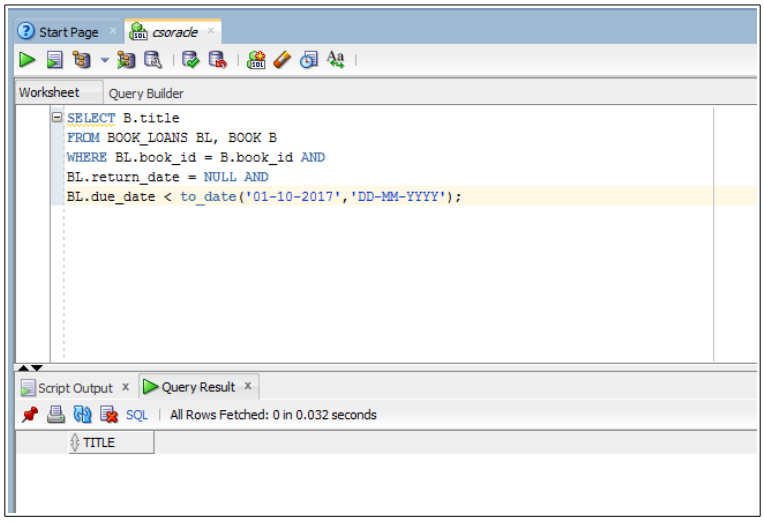
```
SELECT B.title
FROM
BOOK_LOANS BL, BOOK B,
LIBRARY_BRANCH LB
WHERE
BL.branch_id = LB.branch_id AND
BL.book_id = B.book_id AND
LB.branch_name = 'Richardson';
```



b. *books that are overdue*

```
SELECT B.title
FROM BOOK_LOANS BL, BOOK B
WHERE BL.book_id = B.book_id AND
BL.return_date = NULL AND
BL.due_date < to_date(
'01-10-2017','DD-MM-YYYY');
```

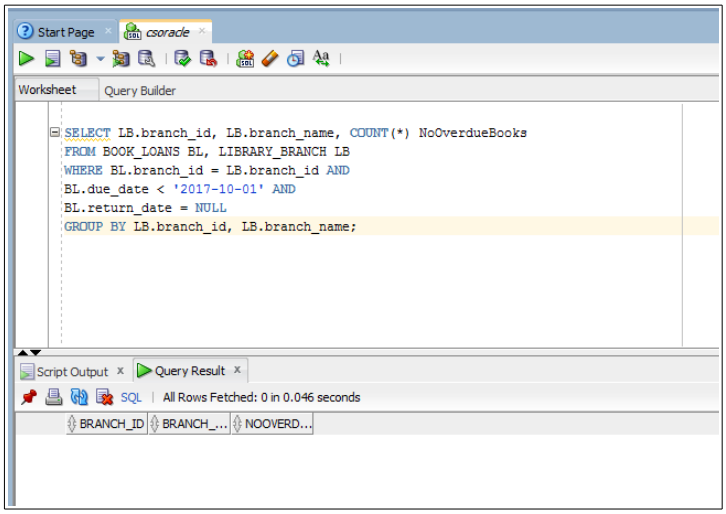
***OR BL.due_date < current_date;**



c. *for each library branch, no of overdue books*

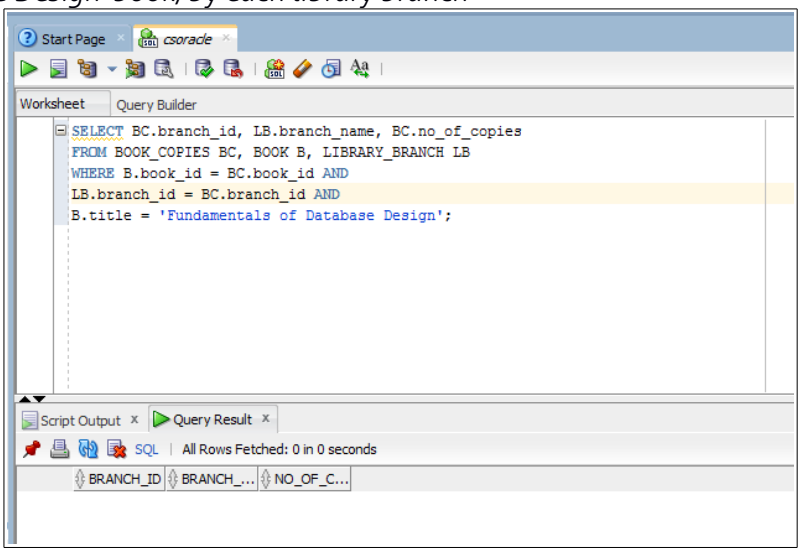
```
SELECT LB.branch_id, LB.branch_name,
COUNT(*) NoOverdueBooks
FROM
BOOK_LOANS BL, LIBRARY_BRANCH LB
WHERE
BL.branch_id = LB.branch_id AND
BL.due_date < '2017-10-01' AND
BL.return_date = NULL
GROUP BY LB.branch_id, LB.branch_name;
```

***OR BL.due_date < current_date;**



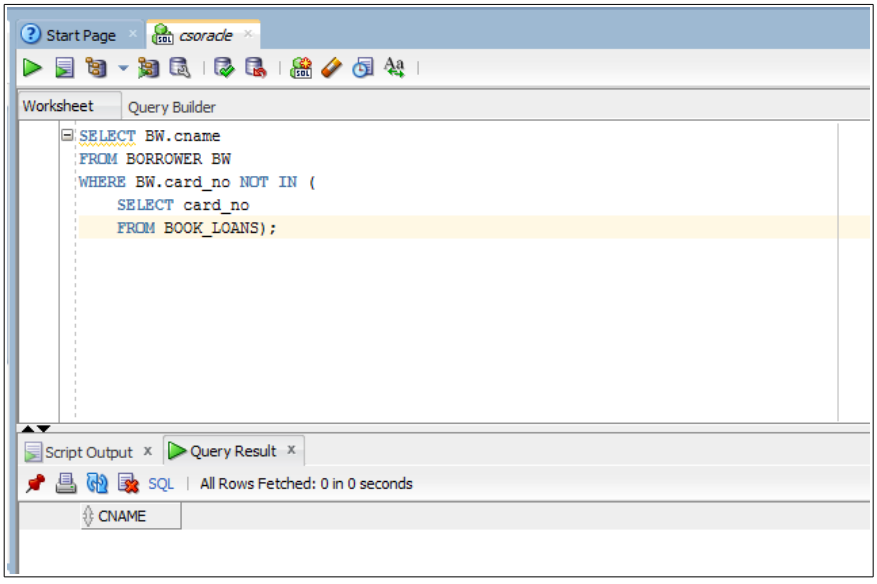
d. *no of copies of 'Fundamentals of Database Design' book, by each library branch*

```
SELECT BC.branch_id,
LB.branch_name, BC.no_of_copies
FROM BOOK_COPIES BC, BOOK B,
LIBRARY_BRANCH LB
WHERE B.book_id = BC.book_id AND
LB.branch_id = BC.branch_id AND
B.title = 'Fundamentals of
Database Design';
```



e. *names of borrowers who hasn't checked out a book*

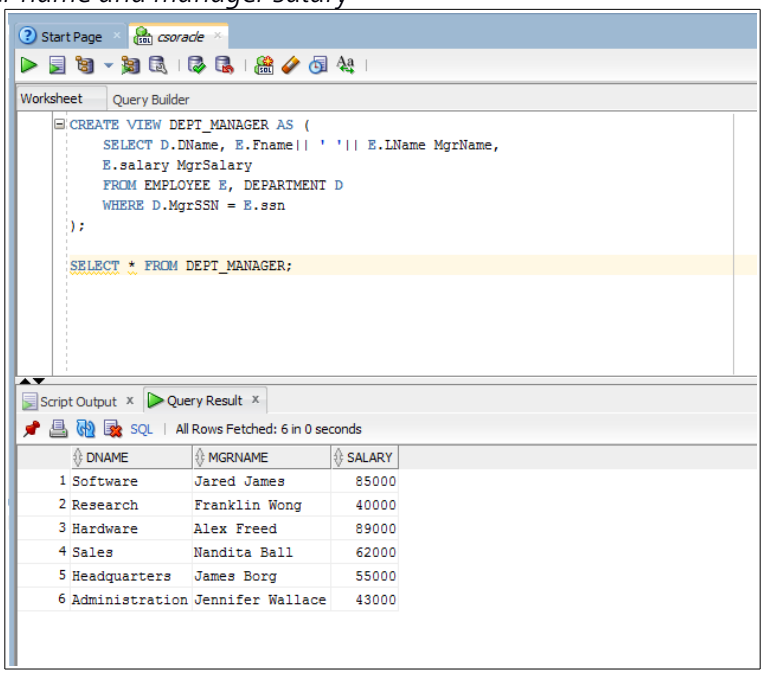
```
SELECT BW.cname
FROM BORROWER BW
WHERE BW.card_no NOT IN (
        SELECT card_no
        FROM BOOK_LOANS);
```



3. Specifying VIEWS on COMPANY database using Correlated Nested Queries (except a.)

a. *VIEW for each department, it's name, manager name and manager salary*

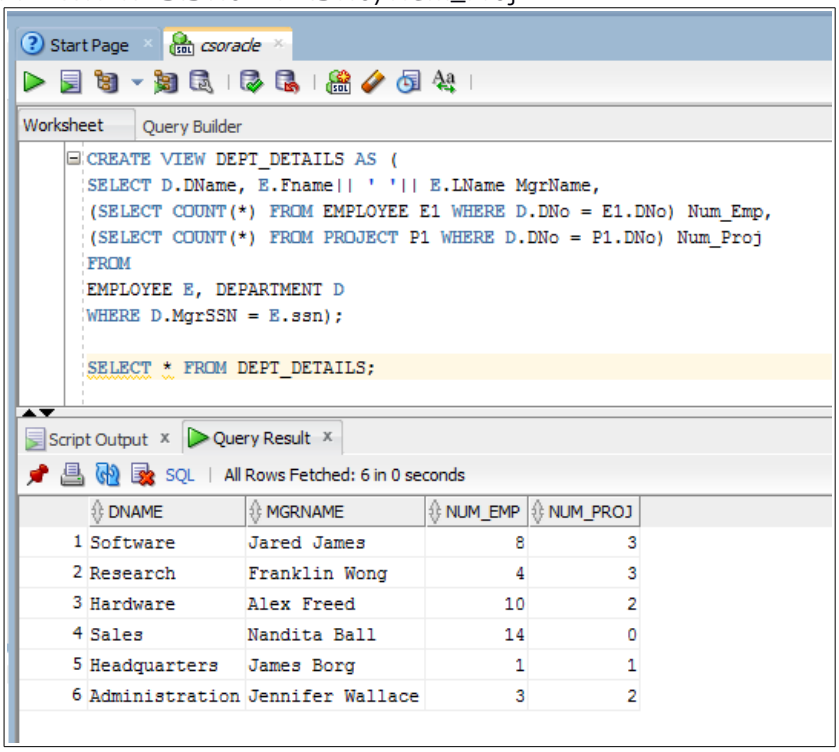
```
CREATE VIEW DEPT_MANAGER AS (
        SELECT D.DName,
        E.Fname|| ' '|| E.LName MgrName,
        E.salary MgrSalary
        FROM
        EMPLOYEE E, DEPARTMENT D
        WHERE D.MgrSSN = E.ssn
);

SELECT * FROM DEPT_MANAGER;
```



	DNAME	MGRNAME	SALARY
1	Software	Jared James	85000
2	Research	Franklin Wong	40000
3	Hardware	Alex Freed	89000
4	Sales	Nandita Ball	62000
5	Headquarters	James Borg	55000
6	Administration	Jennifer Wallace	43000

b. *VIEW for each dept, it's name, mngr name, no of empl, no of projects*

```
CREATE VIEW DEPT_DETAILS AS (
        SELECT D.DName, E.Fname|| ' '|| E.LName MgrName,
        (SELECT COUNT(*) FROM EMPLOYEE E1 WHERE D.DNo = E1.DNo) Num_Emp,
        (SELECT COUNT(*) FROM PROJECT P1 WHERE D.DNo = P1.DNo) Num_Proj

        FROM
        EMPLOYEE E, DEPARTMENT D
        WHERE D.MgrSSN = E.ssn);

SELECT * FROM DEPT_DETAILS;
```

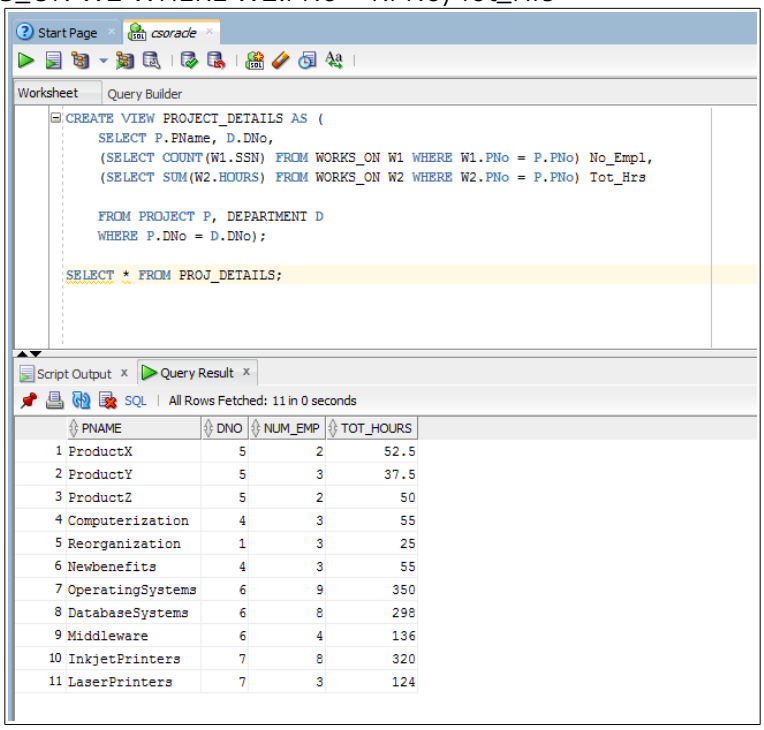


	DNAME	MGRNAME	NUM_EMP	NUM_PROJ
1	Software	Jared James	8	3
2	Research	Franklin Wong	4	3
3	Hardware	Alex Freed	10	2
4	Sales	Nandita Ball	14	0
5	Headquarters	James Borg	1	1
6	Administration	Jennifer Wallace	3	2

c. *VIEW for each project, its name, deptname, no of empl, total hrs per week*

```
CREATE VIEW PROJECT_DETAILS AS (
        SELECT P.PName, D.DNo, D.Dname,
        (SELECT COUNT(W1.SSN) FROM WORKS_ON W1 WHERE W1.PNo = P.PNo) No_Empl,
        (SELECT SUM(W2.HOURS) FROM WORKS_ON W2 WHERE W2.PNo = P.PNo) Tot_Hrs

        FROM PROJECT P, DEPARTMENT D
        WHERE P.DNo = D.DNo);

SELECT * FROM PROJ_DETAILS;
```

***Instead for DeptName, I've here Dno.*
:) Rest of the query is working fine, I guess.

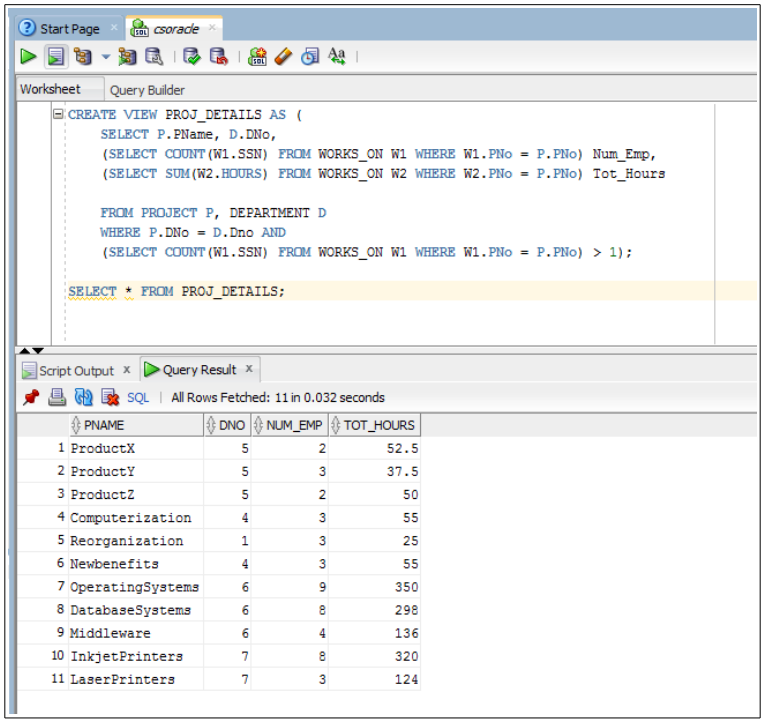


	PNAME	DNO	NUM_EMP	TOT_HOURS
1	ProductX	5	2	52.5
2	ProductY	5	3	37.5
3	ProductZ	5	2	50
4	Computerization	4	3	55
5	Reorganization	1	3	25
6	Newbenefits	4	3	55
7	OperatingSystems	6	9	350
8	DatabaseSystems	6	8	298
9	Middleware	6	4	136
10	InkjetPrinters	7	8	320
11	LaserPrinters	7	3	124

d. *VIEW for each project, its name, deptname, no of empl, total hrs per week, with > 1 empl*

```
CREATE VIEW PROJ_DETAILS AS (
        SELECT P.PName, D.DNo, D.Dname,
        (SELECT COUNT(W1.SSN) FROM WORKS_ON W1 WHERE W1.PNo = P.PNo) Num_Emp,
        (SELECT SUM(W2.HOURS) FROM WORKS_ON W2 WHERE W2.PNo = P.PNo) Tot_Hours

        FROM PROJECT P, DEPARTMENT D
        WHERE P.DNo = D.Dno AND
        (SELECT COUNT(W1.SSN) FROM WORKS_ON W1 WHERE W1.PNo = P.PNo) > 1);

SELECT * FROM PROJ_DETAILS;
```

***Instead for DeptName, I've here Dno.*
:) Rest of the query is working fine, I guess.



e. *VIEW for each employee, it's name, salary, dept, dept mngr, mngr salary and avg dept salary*

```
CREATE VIEW EMP_DETAILS AS (
        SELECT E.Fname||' '||E.Lname EmpName, E.salary, D.Dname,
        (SELECT E2.Fname||' '||E2.Lname FROM EMPLOYEE E2 WHERE D.MgrSSN = E2.SSN) MgrName,
        (SELECT E2.salary FROM EMPLOYEE E2 WHERE E2.SSN = D.MgrSSN) MgrSalary,
        ROUND((SELECT AVG(salary) FROM EMPLOYEE E2 WHERE E2.Dno = E.Dno),2) AvgDeptSalary

        FROM
        EMPLOYEE E,
        DEPARTMENT D
        WHERE E.DNo = D.DNo);

SELECT * FROM EMP_DETAILS;
```