CS 2005 Database Systems

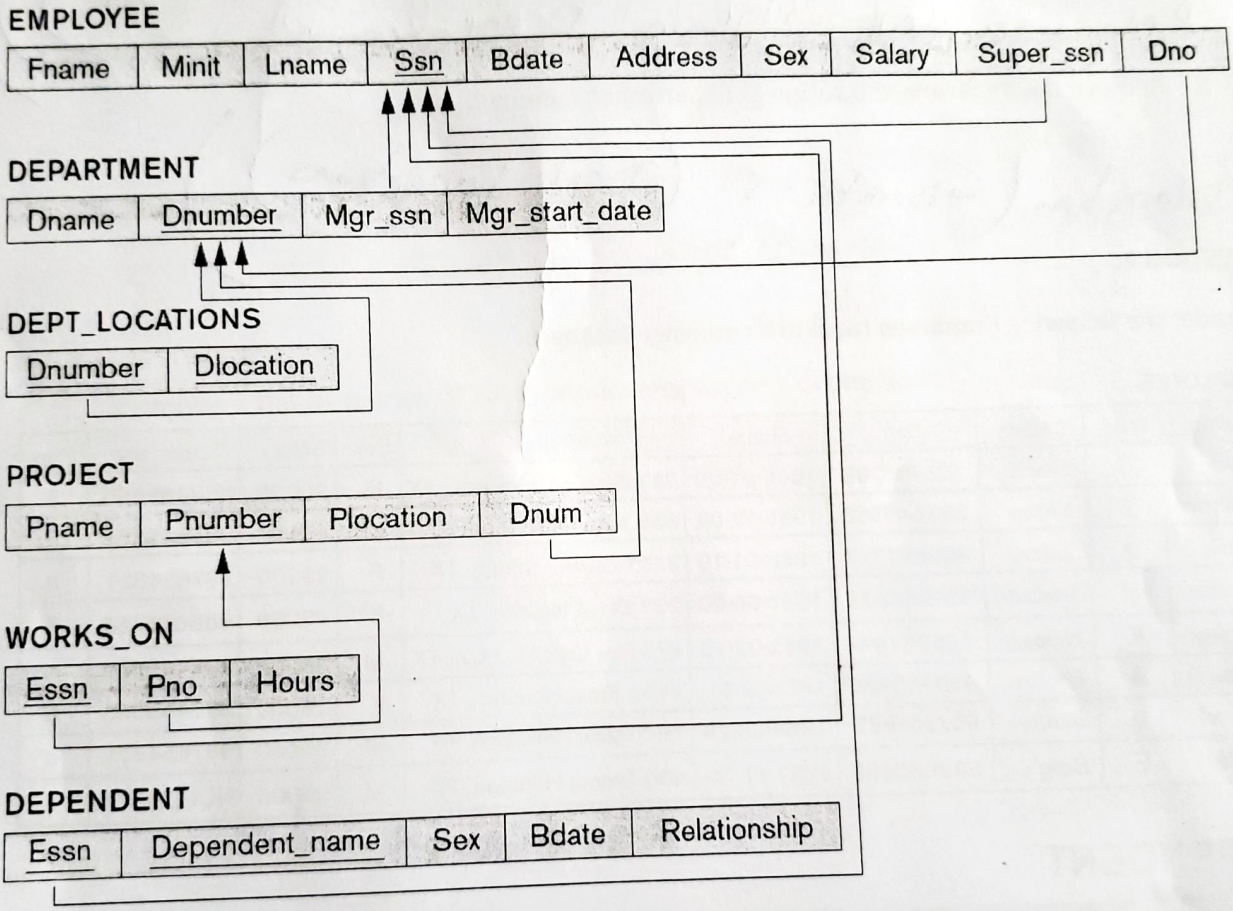
Date: 04/05/2023

QUIZ 4

NAME: _____ ROLL NO:_____ POINTS: /20

NOTE: MAKE SURE YOU USE CORRECT ATTRIBUTE NAME CORRESPONDING TO THE TABLE YOU ARE REFERENCING IN YOUR RELATIONAL ALGEBRA QUERY

QUESTION 1: Consider the following relations, write the following relational algebra queries [10 points].



1. Retrieve the salaries of all employees who work for department number 5

$\pi_{Salary}(\sigma_{Dno=5}(Employee))$

2. Retrieve the number of hours for an employee with ssn=1235678 working on a project number 1

$\pi_{Hours}(\sigma_{Essn=1235678 \text{ and } Pno=1}(works\_on))$

3. Retrieve all the dependent names for an employee with ssn=1235678

$\pi_{Dependent\_name}(\sigma_{ESSN=1235678}(Dependent))$

4. Retrieve the Manager SSn of "Research" department (department name=Research) and rename it as "Manager_SSN"

$\rho_{Manager\_SSN}(\pi_{Mgr\_ssn}(\sigma_{Dname="Research"}(Department)))$

5. Retrieve the department location of department number 5

$\pi_{Dlocation}(\sigma_{Dnumber=5}(Dept\_locations))$

QUESTION 2:

Consider the following **Employee** table in a company Database.

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

DEPENDENT

Essn	Dependent_name	Sex	Bdate	Relationship

Write the following Relational Algebra Queries [10 points]

1. Retrieve all employees who either work in department 4 and make over $25,000 per year, or work in department 5 and make over $30,000.

$\sigma_{(Dno=4 \text{ and } salary>25000) \text{ or } (Dno=5 \text{ and } Salary>30000)}(Employee)$

2. Retrieve the first name, last name, and salary of all employees who work in department number 5 and are female.

$\pi_{Fname, Lname, salary}(\sigma_{Dno=5 \text{ and } Sex=F}(Employee))$

3. Retrieve the Fname of all the employees supervised by employee having SSN (Super_ssn) 33344555 and rename the column name as "FirstName".

$$\rho_{FirstName}\left(\pi_{Fname}\left(\sigma_{Super\_ssn=33344555}(Employee)\right)\right)$$

4. Retrieve the Social Security numbers of all employees who either work in department 5 or directly supervise an employee who works in department 5

$$Dep5\_Emps \leftarrow \sigma_{Dno=5}(Employee)$$

$$Result1 \leftarrow \pi_{ssn}(Dep5\_Emps)$$

$$Result2 \leftarrow \pi_{Super\_ssn}(Dep5\_Emps)$$

$$Result \leftarrow Result1 \cup Result2$$

5. Retrieve a list of names of each female employee's dependents

One Solution:

$$Female\_Emps \leftarrow \sigma_{Sex='F'}(Employee)$$

$$EmpNames \leftarrow \pi_{Fname,Lname,Ssn}(Female\_Emps)$$

$$Emp\_Dependent \leftarrow EmpNames \times Dependent$$

$$Actual\_Dependents \leftarrow \sigma_{Ssn=Essn}(Emp\_Dependent$$

$$Result \leftarrow \pi_{Fname,Lname,Dependent\_name}(Actual\_Dependents)$$

Another solution:

$$Female\_Emps \leftarrow \pi_{Fname,Lname,Ssn}(\sigma_{Sex='F'}(Employee))$$

$$Result \leftarrow \pi_{Fname,Lname,Dependent\_name}\left(Female\_Emps \underset{Ssn=Essn}{\bowtie} Dependent\right)$$