Tu Lam

CS 340 / Dr. Julianne Schutfort

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Homework #5

(Due Date: Nov 1st, 2020)

1. Retrieve the ***first*** and ***last names*** of employees that work in ***department 1*** or ***department 5***.

Answer: $\mathbf{DEP1} \leftarrow \sigma_{Dno\,=\,1}(\text{EMPLOYEE})$
$\mathbf{DEP5} \leftarrow \sigma_{Dno\,=\,5}(\text{EMPLOYEE})$
$\mathbf{RESULT1} \leftarrow \pi_{\text{Fname, Lname}}(\mathbf{DEP1})$
$\mathbf{RESULT2} \leftarrow \pi_{\text{Fname, Lname}}(\mathbf{DEP5})$
$\mathbf{RESULT} \leftarrow \mathbf{RESULT1} \cup \mathbf{RESULT2}$

Query Result:

Fname	Lname
John	Smith
Franklin	Wong
Ramesh	Narayan
Joyce	English
James	Borg

2. Retrieve the ***names*** of all departments with a location in ***'Houston'***.

Answer: $\mathbf{LOC} \leftarrow \sigma_{\text{Dlocation = "Houston"}}(\text{DEPT\_LOCATIONS})$
$\mathbf{RESULT} \leftarrow \pi_{\text{Dname}}(\text{DEPARTMENT} * \mathbf{LOC})$

Query Result:

Dname
Research
Headquarters

3. Retrieve the ***SSNs*** of all employees that work ***more than 10 hours*** per week on project ***number1***.

Answer: **PROJ** $\leftarrow \sigma_{Pno\ =\ 1}$(WORKS_ON)
WO $\leftarrow \sigma_{\text{Hours} > 10}$(**PROJ**)
RESULT $\leftarrow \pi_{\text{Essn}}$(**WO**)

Query Result:

Essn
123456789
453453453

4. Retrieve the ***first*** and ***last names*** of employees in ***department 5*** who work ***more than 10 hours*** per week on the '***ProductX***' project.

Answer: **PRNAME** $\leftarrow \sigma_{\text{Pname = "ProductX"}}$(PROJECT)
PRNUM $\leftarrow$ WORKS_ON $\bowtie_{\text{Pno = Pnumber}}$ **PRNAME**
TIME $\leftarrow \sigma_{\text{Hours} > 10}$(**PRNUM**)
ID $\leftarrow$ EMPLOYEE $\bowtie_{\text{Ssn = Essn}}$ **TIME**
RESULT $\leftarrow \pi_{\text{Fname, Lname}}(\sigma_{\text{Dno = 5}}(\textbf{ID}))$

Query Result:

Fname	Lname
John	Smith
Joyce	English

5. Retrieve the ***first*** and ***last names*** of employees that are directly supervised by ***'Franklin Wong'***.

Answer: $\mathbf{WONG} \leftarrow \sigma_{\text{Fname = "Franklin" AND Lname = "Wong"}}(\text{EMPLOYEE})$

$\mathbf{WONG\_NO} \leftarrow \pi_{\text{Ssn}}(\mathbf{WONG})$

$\mathbf{TOTAL} \leftarrow \text{EMPLOYEE} \bowtie_{\text{Super\_ssn= Ssn}} \mathbf{WONG\_NO}$

$\mathbf{RESULT} \leftarrow \pi_{\text{Fname, Lname}}(\mathbf{TOTAL})$

Query Result:

Fname	Lname
John	Smith
Ramesh	Narayan
Joyce	English

6. For ***each project***, list the ***project name*** and the ***total hours per week*** (by ***all employees***) spent on that project.

Answer: $\mathbf{PROJ\_H} \leftarrow_{\text{Pno}} \Im_{\text{SUM Hours}}(\text{WORKS\_ON})$

$\mathbf{TOTAL} \leftarrow \mathbf{PROJ\_H} \bowtie_{\text{Pno=Pnumber}} \text{PROJECT}$

$\mathbf{RESULT} \leftarrow \pi_{\text{Pname, Hours}}(\mathbf{TOTAL})$

Query Result:

Pname	Hours
ProductX	52.5
ProductY	37.5
ProductZ	50.0
Computerization	55.0
Reorganization	25.0
Newbenefits	55.0

7. Retrieve the ***SSNs*** of employees who work on ***every project***.

Answer: $\mathbf{SSN\_PROJ} \leftarrow \pi_{\text{Essn, Pno}}(\text{WORKS\_ON})$
$\mathbf{PRO}(\text{Pno}) \leftarrow \pi_{\text{Pnumber}}(\text{PROJECT})$
$\mathbf{TOTAL}(\text{Ssn}) \leftarrow \mathbf{SSN\_PROJ} / \mathbf{PRO}$
$\mathbf{RESULT} \leftarrow \pi_{\text{Ssn}}(\mathbf{TOTAL} * \text{EMPLOYEE})$

Query Result:

Ssn
None

8. For each department, retrieve the ***department name***, and the ***average salary*** of employees working in that ***department***.

Answer: $\mathbf{AVG\_SAL} \leftarrow_{\text{Dno}} \Im_{\text{AVG Salary}}(\text{EMPLOYEE})$
$\mathbf{TOTAL} \leftarrow \text{DEPARTMENT} \bowtie_{\text{Dnumber = Dno}} \mathbf{AVG\_SAL}$
$\mathbf{RESULT} \leftarrow \pi_{\text{Dname, Salary}}(\mathbf{TOTAL})$

Query Result:

Dname	Salary
Research	33,250
Administrator	31,000
Headquarter	55,000