CPSC 471

Homework 3

October 2021

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Tutorial: 06

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8.16

e)

RESULT (empty)

Fname	Lname

Explanation:

PNUMBER_EMPLOYEE (Pno, Essn) <- π Pno,Essn(WORKS_ON)

PROJECT_NUMBER <- π Pnumber (Project)

EMPLOYEE_ALL_PROJECTS <- PNUMBER_EMPLOYEE ÷ PROJECT_NUMBER

RESULT <- π Fname, Lname (EMPLOYEE $\bowtie$ Ssn = Essn EMPLOYEE_ALL_PROJECTS)

g)

Explanation:

AVERAGE_SALARY(Dno, Average_sal) <- ρ(Dno, Average_sal)(Dno $\Im$, AVERAGE Salary (EMPLOYEE))

Dno	Average Salary
5	33250
4	31000
1	55000

RESULT <- π Dname, Average_sal (Average_Salary $\bowtie$ Dno = Dname Department)

Dname	Average Salary
Research	33250
Administration	31000
Headquarters	55000

i)

HOUSTON_PROJECT(Ssn) <- π Essn (WORKS_ON $\bowtie$ Pno = Pnumber (σ Plocation = ‘Houston’ (PROJECT)))

NO_HOUSTON_DEPS <- π Dnumber (DEPARTMENT) – π Dnumber (σ Dlocation = ‘Houston’ (DEPT_LOCATIONS))

NO_HOUSTON_SSN <- π Ssn (EMPLOYEE $\bowtie$ Dno = Dnumber NO_HOUSTON_DEPS)

RESULT <- π Fname, Lname, Address (EMPLOYEE * (HOUSTON_PROJECT - NO_HOUSTON_SSN))

Fname	Lname	Address
Jennifer	Wallace	291 Berry, Bellaire, TX

j)

DEPT_MANAGERS <- π Mgr_ssn (DEPARTMENT)

DEPENDENTS_SSN <- π Essn (DEPENDENT)

DEPT_MANAGERS_NO_DEPENDENTS <- DEPT_MANAGERS – DEPENDENTS_SSN

RESULT <- π Lname (EMPLOYEE * DEPT_MANAGERS_NO_DEPENDENTS)

Lname
Borg

Question 8.18

a)

BRANCH <- σ Branch_name = 'Sharpstown' (LIBRARY_BRANCH)

BOOK_NAME <- σ Title = 'The Lost Tribe' (BOOK)

BOOK_COPIES_IN_SHARPSTOWN <- π no_of_copies (BOOK_NAME $\bowtie$ BOOK_COPIES $\bowtie$ BRANCH)

c)

BORROWER_ID <- π Card_no (BORROWER)

BOOK_LOANS_ID <- π Card_no (BOOK_LOANS)

NOT_BORROWED_BOOKS <- BORROWER_ID – BOOK_LOANS_ID

NAMES_NO_BOOKS <- π Name (NOT_BORROWED_BOOKS*BORROWER)

d)

BRANCH <- σ Branch_name 'Sharpstown' (LIBRARY_BRANCH)

BRANCHES_ID <- π Branch_id (BRANCH)

DUE_BOOKS <- π Book_id, Card_no ((σ Due_date = 'today' (BOOK_LOANS))* BRANCHES_ID)

DUE_INFORMATION <- π title, Name, Address (DUE_BOOKS* BOOK *BORROWER)

f)

BORROWERS(Card_no,num_books) <- ρ(Card_no, num_books)(Card_no $\mathfrak{I}$ COUNT Book_id (BOOK_LOANS)

BORROWER_5PLUS <- σ num_books >5 (BORROWERS)

BORROWERS_INFO <- π Name, Address, num_books (BORROWER_5PLUS * BORROWER)

g)

BRANCH <- σ Branch_name 'Central' (LIBRARY_BRANCH)

BOOKS_ID_BY_KING <- π Book_id (σ Author_name = 'Stephen King' (BOOK_AUTHORS))

BOOKS_BY_KING <- π Book_id, Title (BOOKS_ID_BY_KING * BOOK)

BOOKS_BY_KING_AT_CENTRAL <- π Title, No_of_copies (BOOKS_BY_KING * BRANCH * BOOK_COPIES)

8.23

c)

Left outer Join means adding data from the left table to the right. It joins based on attribute that is present in both relations. In this case, Salesperson_id is the attribute that is present in both. In the case of Left outer Join, every row on the left will be kept and will bring in any matching rows from the right table. If a salesperson does not make a sale, it will be assigned a NULL value. The example below describes the Left Outer Join operation using SALESPERSON and SALE.

For example

SALESPERSON

Salesperson_id	Name	Phone
1000	John	403-000-0001
1001	Jack	403-000-0002
1002	Josh	403-000-0003
1003	James	403-000-0004

SALE

Salesperson_id	Serial_no	Date	Sale_price
1000	100000	2021-10-30	20000
1001	100001	2021-01-01	30000
1002	100002	2021-02-01	40000

After Left Outer Join

Salesperson_id	Name	Phone	Serial_no	Date	Sale_price
1000	John	403-000-0001	100000	2021-10-30	20000
1001	Jack	403-000-0002	100001	2021-01-01	30000
1002	Josh	403-000-0003	100002	2021-02-01	40000
1003	James	403-000-0004	Null	Null	Null

Part ii)

a)

FARMER1 <- ρ (SIN) π p1_sin (σ p1_sin != NULL (Kids))

FARMER2 <- ρ (SIN) π p2_sin (σ p2_sin != NULL (Kids))

FARMER_SIN <- FARMER1 U FARMER2

FARMER_WITH_KIDS_AT_SCHOOL <- π SIN (FARMER_SIN*Farmer) b)

SCHOOL_VILLAGE <- ρ(s_name, vname) π sname, vname(School)

FARMER_PARENTS <- ρ(F_sin, name) π SIN, name (Farmer)

KIDS_AT_SCHOOL <- SIN, s_name, name (σ s_name != NULL ((Kids $\bowtie$ p1_sin = F_SIN FARMER_PARENTS) U (Kids $\bowtie$ p2_sin = F_SIN FARMER_PARENTS)))

KIDS_NOT_SAME_VILLAGE <- π s_name (σ s_name != vname(SCHOOL_VILLAGE * KIDS_AT_SCHOOL))

SCHOOL_SAME_VILLAGE <- π s_name (School – KIDS_NOT_SAME_VILLAGE)

c)

MAX_POPULATION <- ρ(population)(ℑ MAX population (VILLAGE))

VILLAGE_NAME_MAX <- π name (Village * MAX_POPULATION)

d)

FARMER_SIN <- ρ (F_sin) π SIN (Farmer)

KIDS_AT_SCHOOL <- π F_sin, SIN, s_name (σ s_name != NULL ((Kids $\bowtie$ p1_sin = SIN FARMER_SIN) U (Kids $\bowtie$ p2_sin = SIN FARMER_SIN)))

ALL_SCHOOLS <- <- ρ (s_name) π sname (School)

KIDS_AT_ALL_SCHOOLS <- ρ (SIN) π F_sin KIDS_AT_SCHOOL ÷ ALL_SCHOOLS

FARMER_WITH_KIDS_AT_SCHOOL <- KIDS_AT_ALL_SCHOOLS*Farmer

e)

ALL_VILLAGES <- ρ (v_name) π name (Villages)

ALL_SCHOOLS <- ρ (v_name) π vname (School)

VILLAGES_NO_SCHOOL <- ρ (name) ALL_VILLAGES – ALL_SCHOOLS

VILLAGES_NO_SCHOOL_NAMES <- π name (VILLAGES_NO_SCHOOL*Villages)