CSCI321 – Fall 2012
Homework Set 2
Solutions

Problem 6.16

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

$PROJ\_HOURS(PNO, TOT\_HRS) \leftarrow {}_{PNO}\mathcal{G}_{\mathbf{sum}(HOURS)}\, WORKS\_ON$

$RESULT \leftarrow \Pi_{PNAME, TOT\_HRS}((PROJ\_HOURS) \bowtie_{PNO=PNUMBER} (PROJECT))$

Result:

PNAME	*TOT_HRS*
ProductX	52.5
ProductY	37.5
ProductZ	50.0
Computerization	55.0
Reorganization	25.0
Newbenefits	55.0

(g) For each department, retrieve the department name, and the average salary of employees working in that department.

$DEPT\_AVG\_SALS(DNUMBER, AVG\_SAL) \leftarrow {}_{DNO}\mathcal{G}_{\mathbf{avg}(SALARY)}(EMPLOYEE)$

$RESULT \leftarrow \Pi_{DNAME, AVG\_SAL}(DEPT\_AVG\_SALS \bowtie DEPARTMENT)$

Result:

DNAME	*AVG_SAL*
Research	33250
Administration	31000
Headquarters	55000

(h) Retrieve the average salary of all female employees.

$RESULT(AVG\_F\_SAL) \leftarrow \mathcal{G}_{\mathbf{avg}(SALARY)}(\sigma_{SEX='F'}(EMPLOYEE))$

Result:

AVG_F_SAL
31000

Problem 6.18

(a) How many copies of the book titled The Lost Tribe are owned by the library branch whose name is "Sharpstown"?

$A \leftarrow BOOKCOPIES \bowtie LIBRARY\_BRANCH \bowtie BOOK$

$RESULT \leftarrow \Pi_{No\_Of\_Copies}(\sigma_{BranchName='Sharpstown' and Title='TheLostTribe'}(A))$

(b) How many copies of the book titled The Lost Tribe are owned by each library branch?

$RESULT \leftarrow \Pi_{BranchID, No\_Of\_Copies}((\sigma_{Title='TheLostTribe'}(BOOK)) \bowtie BOOKCOPIES)$

(c) Retrieve the names of all borrowers who do not have any books checked out.

$NO\_CHECKOUT\_B \leftarrow \Pi_{CardNo}(BORROWER) - \Pi_{CardNo}(BOOK\_LOANS)$

$RESULT \leftarrow \Pi_{Name}(BORROWER \bowtie NO\_CHECKOUT\_B)$

(d) For each book that is loaned out from the "Sharpstown" branch and whose DueDate is today, retrieve the book title, the borrower's name, and the borrower's address.

$S \leftarrow \Pi_{BranchId}(\sigma_{BranchName='Sharpstown'}(LIBRARY\_BRANCH))$

$B\_FROM\_S \leftarrow \Pi_{BookId, CardNo}((\sigma_{DueDate='today'}(BOOKLOANS)) \bowtie S)$

$RESULT \leftarrow \Pi_{Title, Name, Address}(BOOK \bowtie BORROWER \bowtie B\_FROM\_S)$

(e) For each library branch, retrieve the branch name and the total number of books loaned out from that branch.

$R(BranchId, Total) \leftarrow {}_{BranchId}\mathcal{G}_{\mathbf{count}(BookId, CardNo)}(BOOK\_LOANS)$

$RESULT \leftarrow \Pi_{BranchName, Total}(R \bowtie LIBRARY\_BRANCH)$

(f) Retrieve the names, addresses, and number of books checked out for all borrowers who have more than five books checked out.

$B(CardNo, TotalCheckout) \leftarrow {}_{CardNo}\mathcal{G}_{\mathbf{count}(BookId)}(BOOK\_LOANS)$

$B5 \leftarrow \sigma_{TotalCheckout>5}(B)$

$RESULT \leftarrow \Pi_{Name, Address, TotalCheckout}(B5 \bowtie BORROWER)$

(g) For each book authored (or co-authored) by "Stephen King", retrieve the title and the number of copies owned by the library branch whose name is "Central".

$SK(BookId, Title) \leftarrow (\sigma_{AuthorName='StephenKing'}(BOOK\_AUTHORS)) \bowtie BOOK$

$CENTRAL(BranchId) \leftarrow \sigma_{BranchName='Central'}(LIBRARY\_BRANCH)$

$RESULT \leftarrow \Pi_{Title, NoOfCopies}(SK \bowtie BOOKCOPIES \bowtie CENTRAL)$