CS 2550 – Principles of Database Systems (Spring 2017)
Dept. of Computer Science, University of Pittsburgh

Assignment #4: Query Processing & Optimization

Release: Mar. 13, 2017   Due: 11:59 PM, Mar. 28, 2017

Goal: The goal of this assignment is to better understand the query evaluation process.

Description Consider the query evaluation tree of the following SQL statement, which was produced in class.

```
Select  P.PNumber, P.DNum, E.Last, E.Address, E.DOB
From    Employee as E, Department as D, Project as P
Where   P.DNum = D.DNumber and D.MgrSSN = E.SSN and P.Location='PGH;
```

Further, consider four possible organizations of the `Employee-Department-Project` database.

1. Tables E, D and P are heap files & no access methods exist on any of them

2. Tables E and D are sorted files and P is a heap file & no access methods exist on any of them

3. Tables E, D and P are heap files & access methods (hashing) exist only on P

4. Table E is a sorted file and tables D and P are heap files & access methods exist on E and P, one of which is hash and the other is index

Questions [100 points]

For each database organizations above, identify subtrees that represent groups of operations which can be executed by a single algorithm. For each such subtree, there are potentially multiple methods that can be combined to implement it as a single algorithm. Please provide the following:

- The description of one such implementation (steps & data structures) out of all possible ones for each of the above cases.

- The cost of your implementation at each level.

You should state all the additional assumptions about the sorting keys, the access method (hash or index type and key), the size of the table, intermediate results and available cache memory (if one of the tables fits in the cache).

What & how to submit

1. You are required to submit a pdf file under your **pitt_user_name-hw4** (e.g, pitt01-hw4).

2. Submit your assignments through the class Web_base submission interface (at the class web page `http://db.cs.pitt.edu/courses/cs2550/17-2/`, click the Submit button). **It is your responsibility to make sure the assignment was properly submitted.**

3. Submit your assignment by the due date (**Mar. 28, 2017 at 11:59pm**).
There is **no late submission**.

Academic Honesty

The work in this assignment is to be done *independently* by each student. Discussions with other students on the assignment should be limited to understanding the statement of the problem. Cheating in any way, including giving your work to someone else will result in an F for the course and a report to the appropriate University authority.