

Prepare your answers to this assignment using a word processor or text formatting system. Acceptable formats are MS Word, Open Office, and PDF. Turn in this assignment electronically using the digital dropbox on Blackboard.

Name your file as indicated below. Points will be deducted for improperly formatted filenames.

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### **The Assignment**

#### **Problem 1 (adapted from Ramakrishnan)**

Consider a distributed database that has the following two relations:

Employees (eid: integer, did: integer, ename: varchar, salary: real)  
Departments (did: integer, mgrid: integer, location: varchar)

The Employees relation is stored in New York and the Departments relation is stored in Los Angeles. The Employees table is 1000 pages and the Departments table is 50 pages.

For each query below, describe the evaluation plan and give its cost in terms of D (the cost to read a page) and S (the cost to ship a page).

- a) Find the ename of the employee with the highest salary. Assume the query is run at Los Angeles and the “ship to one site” approach is used. Note that no join is needed for this query.
- b) Generate a list of all the managers, their department id number, and a list of all the employees that work for that department (i.e. join Employees and Departments). Assume the query is run at Los Angeles and the “fetch as needed” approach is used with a nested loop join.
- c) Generate a list of all the managers, their department id number, and a list of all the employees that work for that department (i.e. join Employees and Departments). Assume the query is run at Los Angeles and the “ship to one site” approach is used with a nested loop join.

#### **Problem 2 (from Ramakrishnan)**

Suppose that the two-phase commit protocol with presumed abort is used. Explain how the system recovers from failure and deals with a particular transaction T in each of the following cases.

- a) A subordinate site for T fails before receiving a prepare message.
- b) A subordinate site for T fails after receiving a prepare message and force-writing an abort log record, but before responding to the prepare message.
- c) A subordinate site for T fails after receiving a prepare message and force-writing an abort log record, and sending a no vote.