

PRACTICE PROBLEM SET #8

CSC 261/461 (Database Systems), Spring 2018,
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Sections to study

Note: There is no better alternative than studying the textbook! Reading the following sections would reinforce your understanding of the material.

Chapter 18

- 18.4.1 (J3 and J4)
- 18.4.4
- Section 19.1

Chapter 19

- Very Important: 19.1.2. We have gone through the material but you must study this section for better understanding.
If must understand **each and every** step in Figure 19.2 is performed. Study the last paragraph: Summary of Heuristics for Algebraic Optimization.
- 19.3.2
- 19.3.3
- 19.4 (S1 to S6)
- 19.5 (J1-J4) (Important. We cover the exact same topic using easier representation.)

Chapter 20

- Studying only the slides is sufficient.

Problem 1

Assume an Employee table Employee(EmployeeID, Salary) is provided. The total number of records in Employee table is 60,000. The size of each record is 20 bytes. Assume, the size of each block is 200 bytes.

Assume an **equi-height** (practice with equi-weight too) histogram is provided, where the buckets are:

10k-15k, 15k-20k, 20k-30k, 30k-50k, 50k-80k.

Each bucket (x-y) stores the count of employees where **salary \geq x and salary $<$ y**. Also assume, x and y are multiples of 1000. Assume, each EmployeeID is unique.

Answer the following questions.

(Note: Each question is independent. Any assumptions made are local to that question.)

1. What is the average cost to find the employee with EmployeeID = "123456"?
2. What is the cost to find the employees whose salary is 40k using binary search? Assume, the entries are sorted based on salary.

3. Assume, we have primary index on EmployeeID. Number of levels for this index is 3. What is the cost to find an employee with EmployeeID = "123456"?
4. Assume, we have an ordering index on Salary. What is the cost to find all the employees whose salary is greater than 40k? Assume, number of level for this index is 3.
5. Assume, we have a secondary B+ index on Salary with 3 level. What is the cost to find all the employees whose salary is 40k?

Problem 2 (Fig: 19.2)

Consider the following query.

```
SELECT Lname
FROM EMPLOYEE, WORKS_ON, PROJECT
WHERE Pname='Aquarius' AND Pnumber=Pno AND Essn=Ssn
AND Bdate > '1957-12-31';
```

1. Draw the initial (canonical) query tree for SQL query
2. Move SELECT operations down the query tree.
3. Apply the more restrictive SELECT operation first.
4. Replace CARTESIAN PRODUCT and SELECT with JOIN operations
5. Move PROJECT operations down the query tree