**Homework 10 for CS542 - Fall 2023**

**Assigned:** Wednesday Nov 9th, 2023

**Due:** Wednesday, November 15th, 2023 10 am ET

**Maximum Points:** 100

**Problem 1: [36 points, 6 each]**



**Problem 2**

You are given the following information about the Executives relationship in a database:

Executives has attributes *ename, title, dname,* and *address*; all are string fields of the same

length. The *ename* attribute is a candidate key. The relation contains 10,000 pages. There are 10 buffer pages in memory available for querying.

**Problem 2.1: [30 points, 10 each]**

Consider the following query:

*SELECT E.title, E.ename FROM Executives E WHERE E.title='CFO'*

**Assume that only 10% of Executives tuples meet the selection condition.**

For each index described below, describe the best query plan and show you calculations for the cost (in I/Os) of it. The best query plan for any given sub-problem *might* not use the index, but it cannot use any other indexes of other sub-problems. Assume that the B+ tree has three levels, with the first level (the root) already in memory, not counting towards the 10 pages that are available for querying.

1. Clustered B+ tree index on E.title
2. Unclustered B+ tree index E.title
3. Clustered B+ tree index on (E.ename, E.title)

**Problem 2.2: [34 points, 17 each]**

Consider the following query:

*SELECT E.ename FROM Executives E WHERE E.title='CFO' AND E.dname='Toy';*

**Assume that only 10% of Executives tuples meet the condition E.title = CFO, only 10% meet E.dname =Toy, and that only 5% meet both conditions.**

For each index described below, describe the best query plan and show you calculations for the cost (in I/Os) of it. The best query plan for any given sub-problem *might* not use the index, but it cannot use any other indexes of other sub-problems. Assume that the B+ tree has three levels, with the first level (the root) already in memory, not counting towards the 10 pages that are available for querying.

1. Clustered B+ tree index on (E.title, E.ename)
2. Clustered B+ tree index on (E.ename, E.title, E.dname)