## **CS 310 Algorithms**

Assignment -1

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Q5. [5 marks]

You are given the following two  $n \times n$ -dimensional matrices. The first matrix called "Intern Preference Matrix" stores information about n interns that want to apply for jobs at n different companies. Each row corresponds to one intern and indicates his/her order of preference for the employers. For example: Intern-1's first preference is Employer-3, second preference is for Employer-1, third preference is Employer-5 and so-on.

How would you restructure/re-store the above information so that we can answer such queries in O(1) time? You are only allowed to use arrays. You cannot use other data structures such as hash tables, etc. **Clearly** explain your answer and the **space** required by your solution.

## Sol:

We will make two 2D arrays each of size n\*n where n is number of Employees/Interns.

In Interns Array, we will rewrite their preferences for Employees such that:

- Every Row corresponds to that Intern Preferences i.e. Row 0 shows Intern 1 preferences
- Every Columns represents corresponding Employee i.e. Column 0 shows Employee 1.
- In this way, we will store their Employees J preference number by Intern I at Array[I][J].

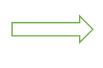
Now, we can answer each query in O (1).

The overall space required is  $2*(N*N) = O(N^2)$ 

For Example, consider the conversion of following intern array:

## Intern Preference Matrix

I <sub>1</sub>	E3	E2	E1
l <sub>2</sub>	E1	E3	E2
<b>I</b> 3	E1	E2	E3



	E1	E2	E3
I <sub>1</sub>	3	2	1
l <sub>2</sub>	1	3	2
<b>I</b> 3	1	2	3

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