Programming Assignment: 3

Deadline: 05 October, 2023 11:59 PM **[Maximum Marks: 20]**

Submission Policy and Requirements :

- Programming languages: C
- Do cite references (if using any)
- Submissions should include a working code for the questions asked, a report to show the analysis of results in each part
- Submission of the report is mandatory.

Assessment criterion:

The assessment will be done on the basis of the following components:

- Working codes
- Analysis and clarity of results & clarity of the report
- Understanding the theoretical concepts

Guidelines for Submission:

- A single report**(pdf)** for all questions (which data structure use and why)
- No need to add code snippet screenshot
- Mention all the relevant results and comparisons as asked or wherever required for a better understanding of the results
- A single zip file containing the report, codes
- Name the file with the roll number, for example, Roll_Number_PA1.zip
- **The report must be in PDF format; other formats lead to zero.**
- **You need to solve programming assignment 3 on HackerRank (link provided below) and create an account using an IITJ ID. You must mention your roll number with your name.**

Question 1: **Marks: 10**

Bikash is working on a crucial aspect of compiler optimization: register allocation. In the world of compiler optimization, register allocation involves efficiently assigning a multitude of program variables to a limited number of CPU registers.

Bikash needs your help to determine the minimum number of registers required to allocate these program variables, taking into account their dependencies and conflicts.

Write a function or programme that takes the following inputs:

An integer N (1 <= N <= 1000), representing the number of program variables.

An integer E (1 <= E <= 5000), representing the number of dependencies or conflicts between these variables.

U -> A list of source program variables.

V -> A list of destination program variables.

N lines follow, each containing the program variables that have dependencies or conflicts with the corresponding variable.

Your program should find and return the minimum number of registers needed for an optimized allocation of these program variables, considering their dependencies and conflicts.

Example:

Input:

N = 5

E = 8

U = 1 1 2 2 3 3 4 5

V = 2 3 1 4 1 5 2 3

Output:

2

Question 2: Without table data structure **Marks: 10**

Implement the above question with other than table data structure (Highlight what's the difference in terms of time or space in the report.)

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www.hackerrank.com/adsa-pa-3