CMSC 401 – Fall 2019

Assignment 3
(due Thu, 11/21 – 11:59pm)

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CMSC 401- Algorithm Analysis with Advanced Data Structures

VCU College of Engineering

Lecture Hall Assignment

- You are the course coordinator in a university and you need to assign the courses to the lecture halls.
- You did your homework and based on the number of enrollments in each course and some other features (e.g., distance, A/V support) you know which course can be taught in which lecture hall(s).
- Given these potential assignments, you want to find the maximum number of courses that could be taught at the same time.

Assignment 3

- Write a program cmsc401.java that reads the database of potential assignments between courses and lecture halls in the format below:
  - The number of courses, N, in the first line. N>=3, N<=100
  - The number of lecture halls, M, in the second line. M>=3, M<=100
  - Each of the next N lines shows the possible assignments of each course to the existing lecture halls
    - You can assume that there will be at most **min(20, M)** possible lecture halls for each course

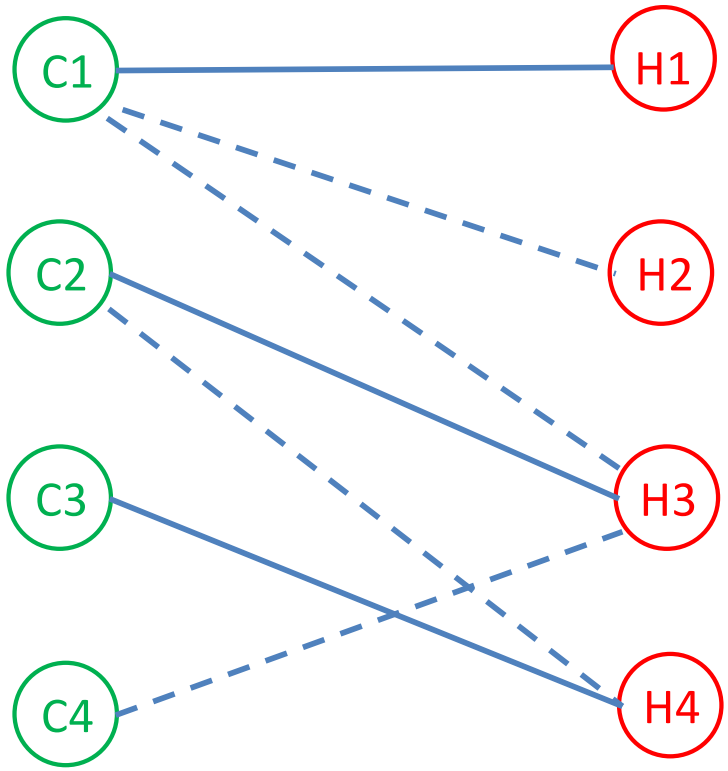
- And returns as output
  - **a single number**: the maximum number of courses that could be run at the same time
  - just one number, no comments, prompts etc.

Example

Input:

```
4
4
C1: H1 H2 H3
C2: H3 H4
C3: H4
C4: H3
```

Output:
3



Solid lines show one example assignment with maximum course count

Remarks

- The courses are named from C1 to CN
- The lecture halls are named from H1 to HM
- Each course has at least one potential lecture hall to be taught

- **Hint:** Consider Max-Flow problem and how it could be used here (see last slides of Lecture 18)

- No other text, comments, questions on output

Constraints

- Any Java libraries, classes, functions related to graphs, vertices, edges are NOT allowed
  - Create your own…
- Using Java queue or priority queue (and other simple data structures such as lists, hash maps) is allowed

Submission

- **Date due:** Thursday, Nov 21st, 11:59 pm
- Upload through Blackboard
  - Your submission should be a zip archive 3_FamilyName_FirstName.zip containing
    - Java source code in a single file cmsc401.java **(all lower case letters!)**
    - The file should have *your name* in a comment in the first line
    - Remember: in Java, class name should match the file name, and is case sensitive
- Please do NOT create your own packages
- Do NOT place the file into a folder – just zip the file
- Use standard I/O to read input (System.in, System.out) and output
- Make sure **the** program compiles and WORKS!
- Late submissions are accepted up to 2 days!