

Stable Matching Report

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1 Results

Briefly comment the results, did the script say all your solutions were correct? Approximately how long time does it take for the program to run on the largest input? What takes the majority of the time?

The script says all solutions are correct. The longest time is the matching, because we need to check all the students again of the companies that already have matches, which is what can take $O(n^2)$.

2 Implementation details

How did you implement the solution? Which data structures were used? Which modifications to these data structures were used? What is the overall running time? Why?

We used the Gale-Shapley algorithm for our solution. First we read the in file and convert the data into an inverted list, so that the value of each index in the array represents what priority the student/company of that index has. We use two 2-dimensional arrays; one for the company and one for the students, where the row represents the student/company number and the columns of the rows are the preferences as an inverted list. The matrix that we generate go from 0 to $n+1$ in both rows and columns to make it not necessary to change any numbers. The first column are also later used to keep track of which number of priority the company has that we are looking for.

To keep track of what students that have not yet had a match, we use an array where each student is represented of their "student-number" to keep track of the matched- and unmatched students. In order to find better matches, we check if the new student has a higher preference for the company and in that case switching the student for the old match. The matches are also kept in an array where each position number in the array is the company and the number in that position is the student-match. When all students have matched with a company the program prints the student-number in the company-number order.

The overall running time is:

real 1m2.527s user 0m59.713s sys 0m3.633s