CSE 5400 Interdisciplinary CS

Assignment 4:Scheduling process

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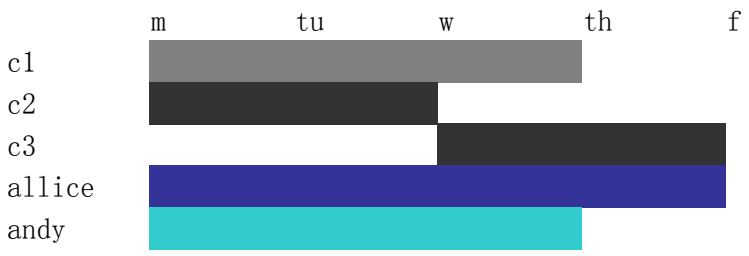
In this topic, we discussed how to schedule the avaliable time to several cases.It's called the scheduling problem.We use the back track algorithm to guarantee finding a complete schedule.While finding the schedule,we are not just randomly choose the cases or attorneys,we will use some algorithm to order the attorneys and cases to make the back track in a efficient way.In other words,make the result coming earlier.

While we also discussed the situation that what if the complete schedule can not be found?Offering a partial schedule which has the longest cases occupied is an ideal solution.

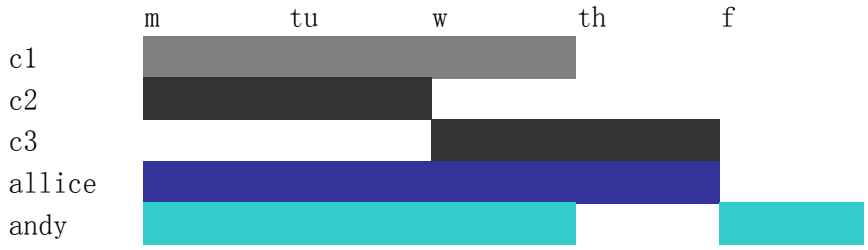
A. For each input file:

（i）Draw tables for the case schedule and attorney availability

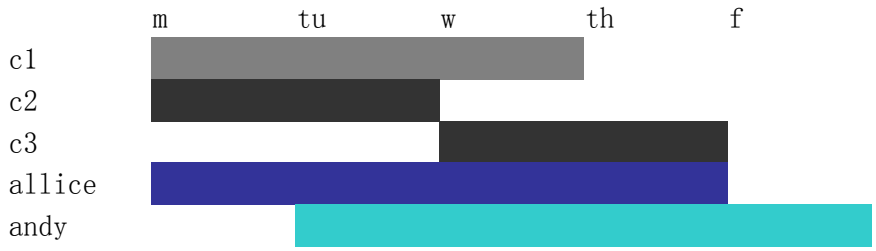
1.



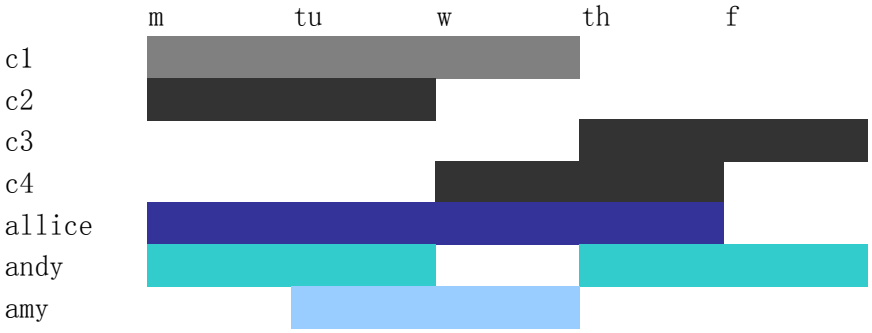
2.



3.

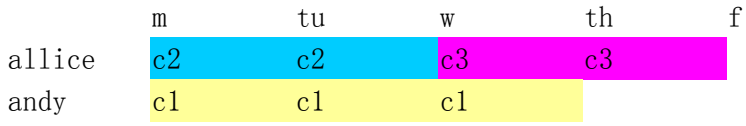


4.

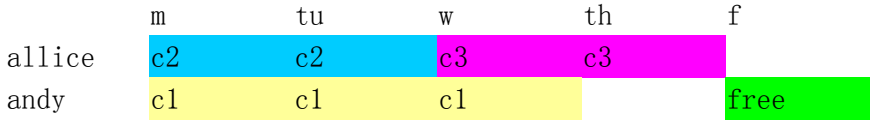


ii Draw a table for the attorney schedule if a complete schedule exists; otherwise, discuss why a complete schedule does not exist and draw a table with a partial schedule.

File one:

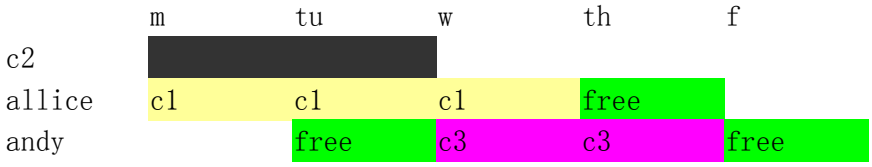


File two:



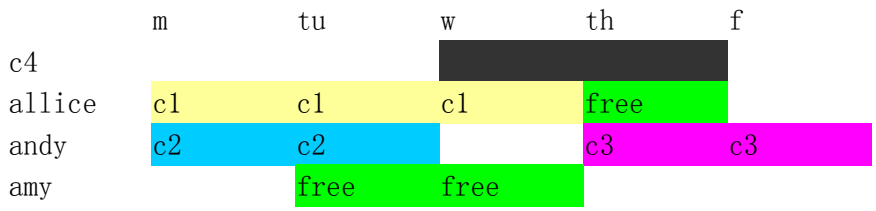
File three:

Can not find a complete schedule,but partial schedule.Because for case 1 and case 2 they need attorney Allice,but Allice can just be assigned to one of them,so there is no solution.But has a partial schedule.



File four:

Can not find a complete schedule,but partial schedule. Because for case 1 and case 4,only attorney Allice can fit them.But he can not be assigned for both of them,just one of them,so there is no complete solution.



B. Discuss the strength of Least Constraining and Least Workload in attorney/branch ordering. Discuss how you might combine the strength of both ordering methods.

For Least Constraining algorithm,the advantage is that,using the branch ordering will make an complete solution quickly.Even through there is no guarantee that we can find the solution earlier,but we can improve the performance.

As for Least Workload algorithm,this is for making the attorneys have an kindly equal workload.Which means,we will assign a case to the attorney who has a less work load.So we will consider the workload firstly.The advantage is that, we will get a result which is a balance workload.But the disadvantage is that,we may find a solution later since we consider the workload firstly.Because the workload is not a necessary factor to influence an complete result.We may cost more time to find a suitable attorney for some particular cases.

Moreover,if ties of attorneys have the same workload,we will use the Least Constraining algorithm again to evaluate which attorney is the best one to fit the current case.

C.Compare the two algorithms:

i Output quality.

For Least Constraining algorithm,once there is an complete

schedule,we cost less time to find a final result.The tree nodes is less than the Least Workload algorithm.

For the Least Workload algorithm,if there is an complete schedule,we will get a solution in which most of the attorneys have a balance workload.Even through the time is a little bit longer than algorithm 1,the Standard deviation of schedule days for attorneys is much less than algorithm 1.

ii Time/speed

For Least Constraining algorithm,assume that there are M attorneys and N cases.Because we use the back track method,so in the worst situation,we will find the result in the right side of the structure tree.So we will compare M + M^2 +M^3 +... + M^N.So the total times will be M*(1-M^N)/(1-M),and the time complexity is O(M^N)

For Least Workload algorithm,assume that there are M attorneys and N cases.If there is a solution,also in the worst situation,we will compare M + M^2 +M^3 +... + M^N times.So the time complexity is O(M^N).

iii Space/memory

For Least Constraining algorithm,assume that there are M attorneys and N cases.In each level,we will use N space to store the cases,and M space to store the attorneys.And this number is decreasing level by level.So the total space is M+N

+(M+N-2)+(M+N-4)+...+(M+N-2N).So the total space is (M+N+M-N)*N/2,and the space complexity is O(MN).

For Least Workload algorithm,assume that there are M attorneys and N cases.We use the same data structure as Least Constraining algorithm,so the space complexity is O(MN);