

Course Project

Given information about flights that an airline needs to provide, generate a profitable schedule.

The input is a detailed information about legs of flight that the airline needs to serve. We denote this set of flights by $\mathcal{F}$. We would like to find the minimum number of airplanes needed to carry out this schedule.

For an example of possible input, consider the following set of flights:

1. Boston (depart 6 A.M.) - Washington D.C. (arrive 7 A.M.).
2. Washington (depart 8 A.M.) - Los Angeles (arrive 11 A.M.)
3. Las Vegas (depart 5 P.M.) - Seattle (arrive 6 P.M.)

This schedule can be served by a single airplane by adding the leg Los-Angeles (depart 12 noon)- Las Vegas (1 P.M.) to this schedule.

More formally, we say that the airline has $p = |\mathcal{F}|$ flight legs that it wishes to service by the fewest possible plans. The starting time for flight i is a_i , and the finishing time is b_i . The plane requires r_{ij} hours to retrain from point of destination of flight i to the point of origin of flight j .

Tasks to be carried out

1. (30 points) Formulate the problem as either using one of the solution techniques we covered in the course. Solve the problem by hand for the following legs

i	From	To	a_i	b_i	r_{ij}					
					1	2	3	4	5	6
1	Boston	Washington D.C.	6	7	1	0	5	6	4	1
2	Washington D.C.	Los Angeles	8	11	4	4	2	3	0	4
3	Las Vegas	Seattle	17	18	5	6	4	0	3	5
4	Seattle	Boston	19	23	0	1	4	4	5	0
5	Los Angeles	Boston	12	16	0	1	4	4	5	0
6	Boston	Las Vegas	18	22	5	5	0	2	1	5

2. (40 points) Generalize the problem for any number of legs and show how outline how you will build the network and find the optimal solution
3. (30 points) Implement the generalized scheme in Java. Clearly show the approaches the have taken to make your code efficient.

4. Bonus

(50 points) Generalize for the case in which their are costs associated each leg and implement the generalization in Java.

The points above are precentage points of your total project's grade. You will be judged on 1.Soundness of your code 2.Clarity of your report 3.Additional Code extensions and innovative enhancements