Algorithm Analysis: HW6

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Please scan or take clear pictures of your solutions to Problems 2 and 3. Place all materials (code, screenshot, and pictures) in a .zip file called YourNameHW6.zip and submit it to Blackboard by 5:00pm on Friday, October 28.

Problem 1 (5 points).

On the "Scheduling Problem Worksheet" from a previous class, you were asked to implement a greedy algorithm that solves the Scheduling Problem in either Java or C++. Download either ScheduleGreedy.java or scheduleGreedy.cpp from the Topics Covered page, and write the rest of the code that is needed for the scheduleIt function.

The function scheduleIt takes an array of service times and produces an array representing the optimal schedule (i.e., the schedule that minimizes the time in the system). For example, if the jobs array contains the services times [5, 10, 4], then we are trying to schedule three jobs: job 1 with a service time of 5, job 2 with a service time of 10, and job 3 with a service time of 4. When we call scheduleIt on jobs, it should return the array [3, 1, 2] that represents the optimal schedule.

For this problem submit 2 things:

1. The ScheduleGreedy.java or scheduleGreedy.cpp file that contains the completed code for scheduleIt.
2. A screen shot of what your program outputs when the jobs array is [5, 10, 4].

Problem 2 (2.5 points).

Consider the following jobs, deadlines, and profits.

Job	Deadline	Profit
1	3	7
2	2	2
3	3	9
4	1	8

Use the Scheduling with Deadlines algorithm (Algorithm 4.4 on page 179-180 in our textbook) to determine the schedule that maximizes the total profit. When using this algorithm, be sure to write down what J and K look like after each iteration of the for-loop. Please use Example 4.6 (on page 180) as a guide for solving this problem.

First we sort our jobs in terms of profit.

Job	Deadline	Profit
3	3	9
4	1	8
1	3	7
2	2	2

1. Set S to be $\emptyset$
2. S is set to { 3 } because [3] is reasonable.
3. S is set to {3,4 } because [4,3] is reasonable.
4. S is set to {3,4,1} because [4, 3, 1] is reasonable.
5. {3,4,1,2} is rejected because it is not a reasonable set.

The final Value is {3,4,1} and [4, 3, 1] is the optimal schedule because it is a reasonable set these values. The total maximized profit is 9 + 8 + 7 = 24.

Problem 3 (2.5 points).

Consider the following jobs, deadlines, and profits.

Job	Deadline	Profit
1	2	40
2	4	15
3	3	60
4	2	20
5	3	10
6	1	45
7	1	55

Use the the Scheduling with Deadlines algorithm to determine the schedule that maximizes the total profit. As in Problem 2, update what J and K look like after each iteration of the for-loop.

First we sort our jobs in terms of profit.

Job	Deadline	Profit
3	3	60
7	1	55
6	1	45
1	2	40
4	2	20
2	4	15
5	3	10

1. Set S to be $\emptyset$
2. S is set to { 3 } because [3] is reasonable.
3. S is set to { 3,7 } because [7,3] is reasonable.
4. { 3,7,6 } is rejected because it is not a reasonable set.
5. S is set to { 3,7,1 } because [7,1,3] is reasonable.
6. { 3,7,1,4 } is rejected because it is not a reasonable set.
7. S is set to { 3,7,1,2 } because [7,1,3,2] is reasonable.
8. { 3,7,1,2,5 } is rejected because it is not a reasonable set.

The final Value is { 3,7,1,2,5 } and [7,1,3,2] is the optimal schedule because it is a reasonable set of these values. The total maximized profit 55 + 40 + 60 + 15 = 170.