

Home Work 4

Any coding platform and programming language is allowed

0: All of the homeworks will be checked at your **own computer**. So do not try to cheat

0: Homeworks are scheduled to be evaluated at 07 May 2018 in the next lesson, 07.05.2018

Main method

- 1: Compose a class that will hold a string and an integer value
- 2: Compose a list/array that will hold the composed class objects
- 3: In a for loop 0 to 100, compose a class object, assign its string value as A100 (the next one will be A101, A102 . . A200) and assign its integer value = a randomly generated integer **rand()**
- 4: So the generated list will have 100 class objects that each one has a randomly generated integer and a string value that is A100, A101, A102 (based on the loop number)
- 5: Generate a number randomly between 2-10. This will be our number of job processor
- 6: Now imagine each integer number on list as a job queue (like takes 5 minutes to complete)
- 7: Use greedy algorithm to assign those jobs to the job processors to finish all jobs in minimum time
- 8: Code another algorithm such as brute force and compare that whether greedy algorithm produced best scheduling or there are even better solutions
- 9: An example is presented about Job scheduling problem below
- 10: Calculate both greedy and other algorithm running times
- 11: Now increase the list size and the number of job processors to some higher value and evaluate running times again



A scheduling problem

- You have to run nine jobs, with running times of 3, 5, 6, 10, 11, 14, 15, 18, and 20 minutes
- You have three processors on which you can run these jobs
- You decide to do the longest-running jobs first, on whatever processor is available

P1	20	10	3
P2	18	11	6
P3	15	14	5

- Time to completion: $18 + 11 + 6 = 35$ minutes
- This solution isn't bad, but we might be able to do better



Another approach

- What would be the result if you ran the *shortest* job first?
- Again, the running times are 3, 5, 6, 10, 11, 14, 15, 18, and 20 minutes

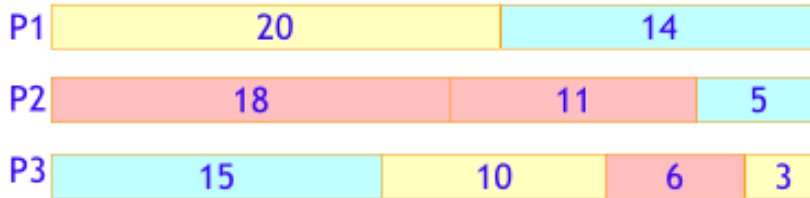
P1	3	10	15
P2	5	11	18
P3	6	14	20

- That wasn't such a good idea; time to completion is now $6 + 14 + 20 = 40$ minutes
- Note, however, that the greedy algorithm itself is fast
 - All we had to do at each stage was pick the minimum or maximum



An optimum solution

- Better solutions do exist:



- This solution is clearly optimal (why?)
- Clearly, there are other optimal solutions (why?)
- How do we find such a solution?
 - One way: Try all possible assignments of jobs to processors
 - Unfortunately, this approach can take exponential time

Additional Note

In addition, you need to RAR (e.g. Winrar) or ZIP (e.g. Winzip) your homework

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code and email to me. My email is . Make sure that you have included your Name, Student number and the number of the HomeWork such as HomeWork 4 to the email.

For any questions, come and ask me without any hesitation. My room is A015