

19.6

Interval Scheduling

19.6.1

Problem statement, and a few greedy algorithms that do not work

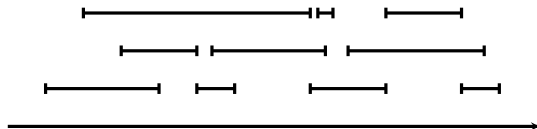
Interval Scheduling

Problem 19.1 (Interval Scheduling).

Input: A set of jobs with start and finish times to be scheduled on a resource (example: classes and class rooms).

Goal: Schedule as many jobs as possible

ⓘ Two jobs with overlapping intervals cannot both be scheduled!



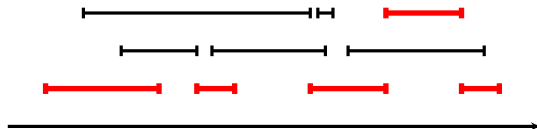
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Greedy Template

```
 $R$  is the set of all requests  
 $X \leftarrow \emptyset$  (*  $X$  will store all the jobs that will be scheduled *)  
while  $R$  is not empty do  
    choose  $i \in R$   
    add  $i$  to  $X$   
    remove from  $R$  all requests that overlap with  $i$   
return the set  $X$ 
```

Main task: Decide the order in which to process requests in R

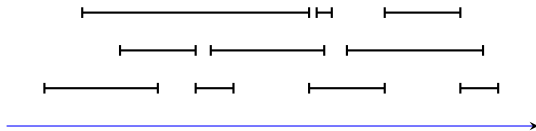
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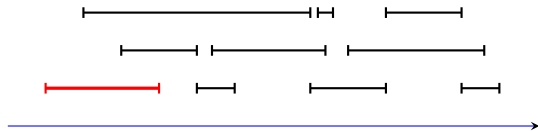
Earliest Start Time

Process jobs in the order of their starting times, beginning with those that start earliest.



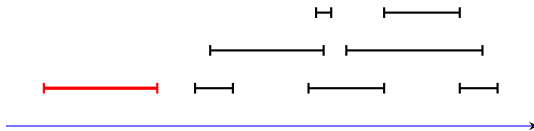
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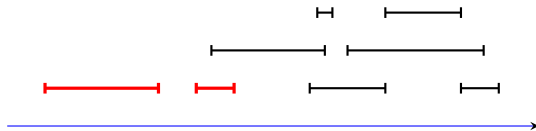
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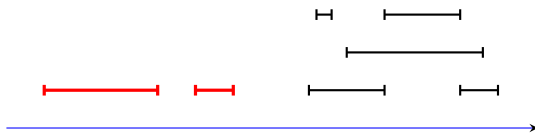
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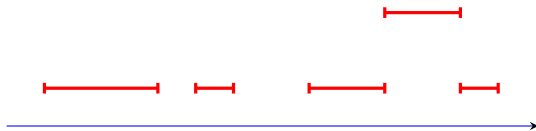
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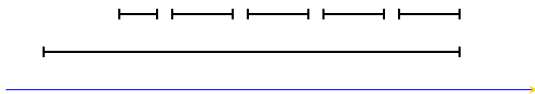


Figure: Counter example for earliest start time

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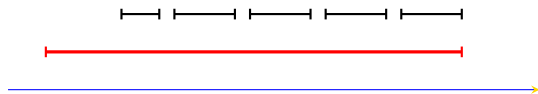


Figure: Counter example for earliest start time

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Process jobs in the order of their starting times, beginning with those that start earliest.



Figure: Counter example for earliest start time

Smallest Processing Time

Process jobs in the order of processing time, starting with jobs that require the shortest processing.



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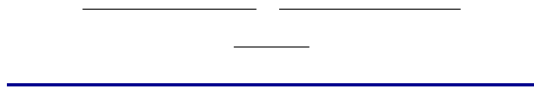


Figure: Counter example for smallest processing time

Smallest Processing Time

Process jobs in the order of processing time, starting with jobs that require the shortest processing.

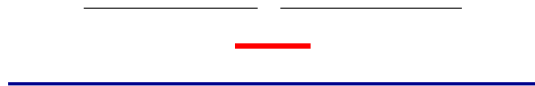


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Figure: Counter example for smallest processing time

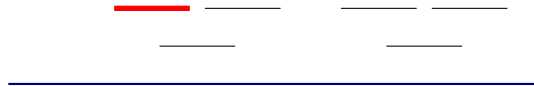
Fewest Conflicts

Process jobs in that have the fewest “conflicts” first.



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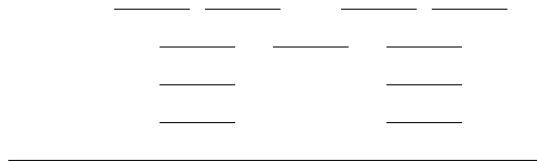


Figure: Counter example for fewest conflicts

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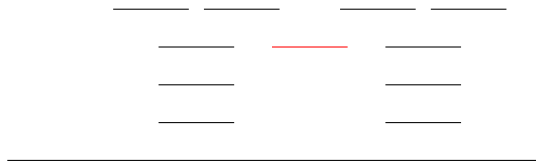


Figure: Counter example for fewest conflicts

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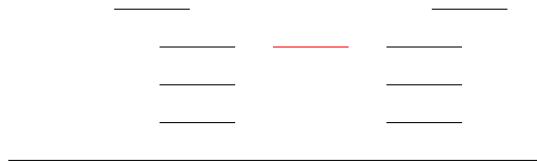


Figure: Counter example for fewest conflicts

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Figure: Counter example for fewest conflicts

THE END

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(for now)