19.6

Interval Scheduling
19.6.1
Problem statement, and a few greedy algorithms that do not work
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!
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!
Greedy Template

\[ R \] is the set of all requests
\[ X \leftarrow \emptyset \quad (\ast \quad X \quad \text{will store all the jobs that will be scheduled} \quad \ast) \]
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 \( R \)
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 \( R \)
Earliest Start Time

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

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

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

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

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

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

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

Figure: Counter example for earliest start time
Earliest Start Time

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

Figure: Counter example for earliest start time
Earliest Start Time

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.

___  ___  ___  ___  ___  ___
____________________________________________________________________
Smallest Processing Time

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

——— ——— ——— ———

----------------------------------
Smallest Processing Time

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

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

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

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

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.

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.

Figure: Counter example for smallest processing time
Fewest Conflicts

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

_____  _____  _____  _____

_____  _____

__________________________
Fewest Conflicts

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

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

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

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

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

Figure: Counter example for fewest conflicts
Fewest Conflicts

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

Figure: Counter example for fewest conflicts
Fewest Conflicts

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

Figure: Counter example for fewest conflicts
Fewest Conflicts

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

____________________

Figure: Counter example for fewest conflicts
THE END

...(for now)