

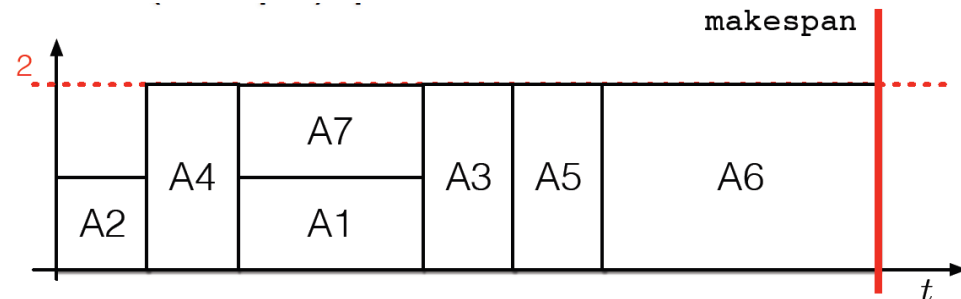
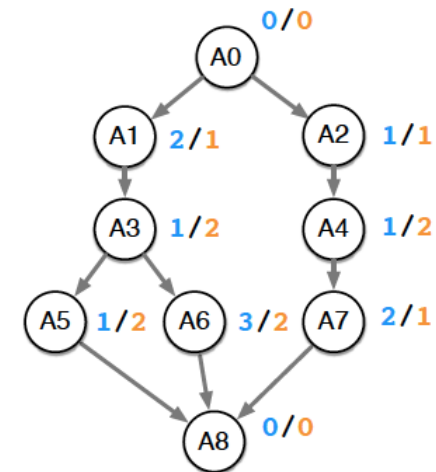
Resource Constrained Project Scheduling Problem (RCPSP)

- Given:
 - a set of cumulative resources,
 - a set of tasks with durations and resource requirements,
 - precedence constraints between some tasks,

RCPSP consists of deciding:

- when to execute each task so as to minimize the makespan, subject to precedence and cumulative resource constraints.

■ duration
■ req for r_0 ($c_0 = 2$)



RCPSP

- Variables and Domains
 - Start time S_i for each task with domain?
- Constraints
 - Precedence constraints for each $a_i \rightarrow a_j$
 - Cumulative constraints for each resource.
- Objective
 - Minimize the maximum $S_i + d_i$.

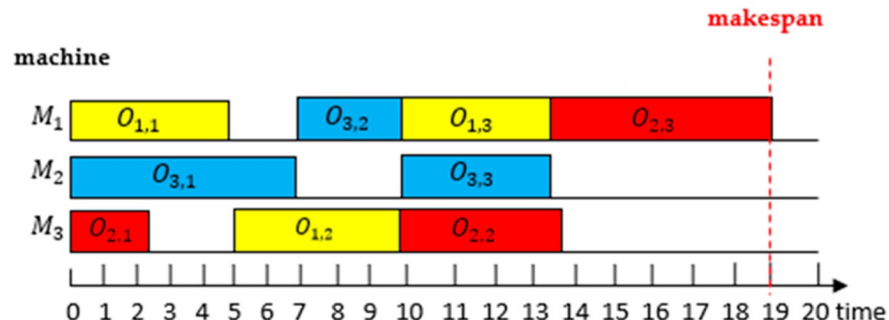
Job Shop Scheduling Problem (JSP)

- Given:

- a set of machines and a set of jobs, each composed of a sequence of tasks/orders, each requiring a different machine,
- machine requirements and machine-dependent durations of the job tasks,

JSP consists of deciding:

- when to execute the job tasks so to minimize the makespan, subject to task precedence and disjunctive resource constraints.



JSP

- **Note** # tasks = # machines (m)
- **Variables and Domains**
 - Start time S_{ji} for each job j and its task i with domain?
- **Constraints**
 - Precedence constraints on consecutive tasks of each job.
 - Disjunctive constraints for each machine on the job tasks requiring the machine.
- **Objective function**
 - Makespan as a dummy task with the lowest precedence in the schedule.
- **Objective**
 - minimize makespan.

To Do

- Implement both models.
- Search for the optimal solution to the given instances using Gecode, with a time limit of 5 mins (300 secs).
- Experiment with:
 - default search
 - search on the smallest (earliest) start times.
- Record the objective value and the time (msecs) in each experiment.
- What do you observe? Is searching on the smallest (earliest) start times is always a good idea? Justify your answer.