

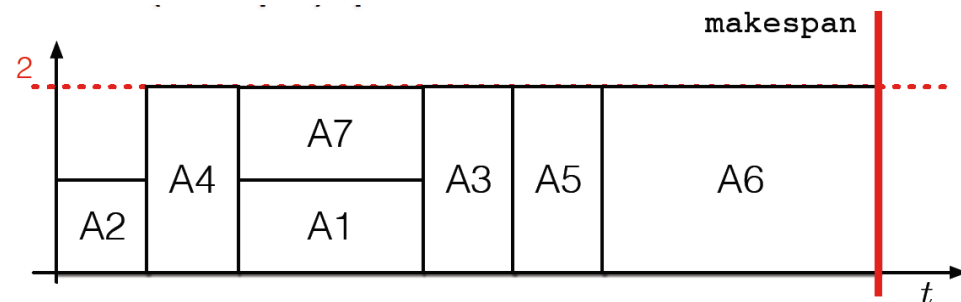
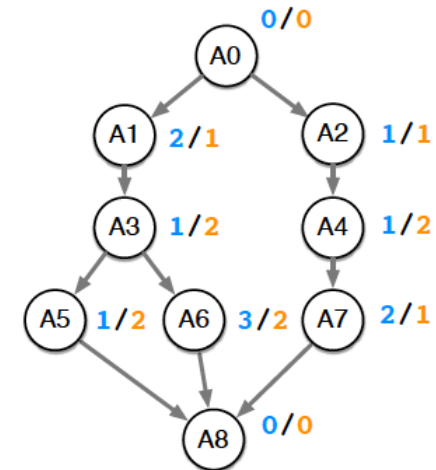
Attention

- Use a separate folder for each problem.
- Create a project (.mzp) for each problem.
 - Add the model files (*.mzn) and the data files (*.dzn)
- Configure the solver to obtain the solution statistics and to set a time limit (300 seconds).
- Use commas when reporting big numbers. E.g.,
 - 976474 instead of 976,474
- Submit one single zip file.

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 $S_i + d_i$.

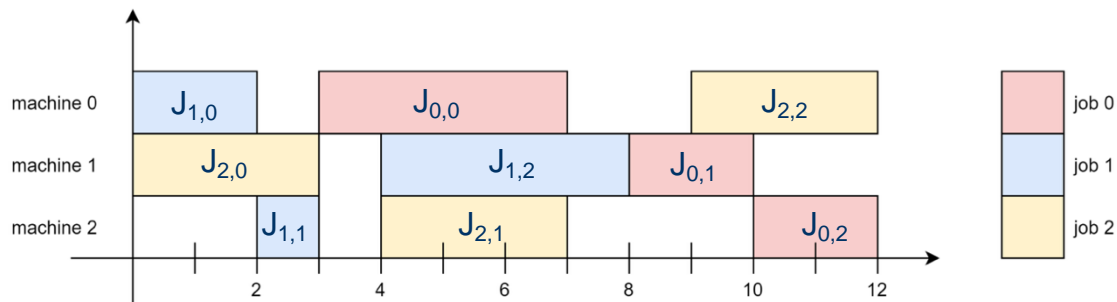
Job Shop Scheduling Problem (JSP)

- 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.

RCPSP & JSP

- 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 Earliest Start Times (ESTs) using “smallest”.
- Record the objective value obtained within the time limit in each experiment.
- Record also the time to find an initial solution by EST.
- Observe the results.

Comments

- Present briefly your observations. Pay attention to the following points.
 - Is searching on EST a good strategy to find an initial solution?
 - Is searching on EST a good strategy to find an optimal solution? Justify your answer.