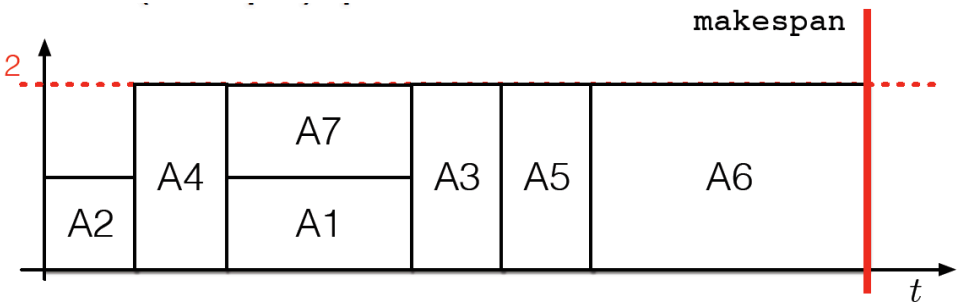
Modelling and Solving Exercises in MiniZinc - 2

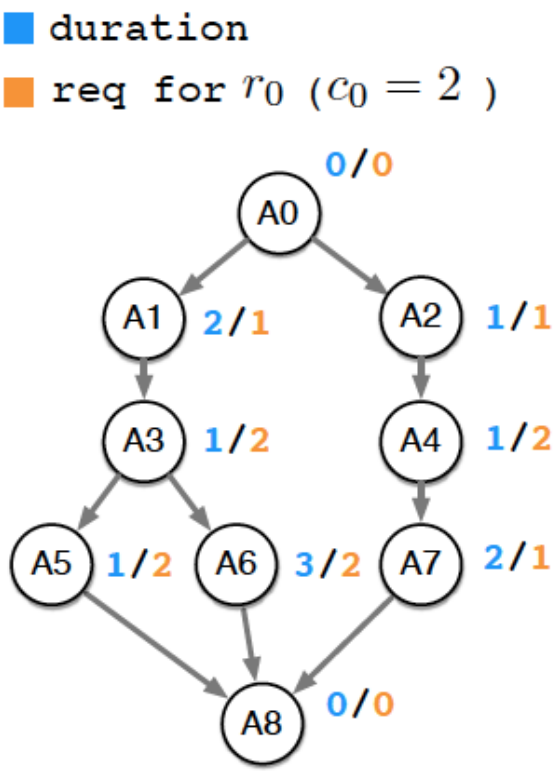
A Scheduling Problem

- Given:
  - n tasks with durations (d_i) and resource requirements (req_{ij}),
  - m cumulative resources with fixed capacities (l_j),
  - a set of temporal relations between the tasks,
  - and a performance metric,
- decide:
  - when to execute each task so as to minimize the makespan, subject to temporal and resource constraints.

A Scheduling Problem

- Temporal constraints
  - Precedence constraints.
- Resource constraints
  - Tasks can overlap up without exceeding the resource capacity.
- Makespan
  - Completion time of the last task.





A Scheduling Problem

- Variables and Domains
  - Start time S_i for each task with domain?
- Constraints
  - $S_i + d_i \leq S_j$ for each $i \rightarrow j$
  - Cumulative constraints for each resource r.
- Objective function
  - Makespan as the maximum $S_i + d_i$.
- Objective
  - Minimize makespan.

To Do

- Implement the model.
- Search for the optimal solution using Gecode, with a time limit of 5 mins (300 secs).
- Experiment with the default search and search on the earliest start times.
- For the difficult instances (instance 3 and 4), experiment with Chuffed using its default search.
- Record the objective value and the time (msecs) in each experiment.