Coordinating Temporally Constrained Planning Agents

Basic Problem
We consider a set of tasks with precedence constraints that need to be completed by a set of agents that want to plan autonomously.

Due to interdependencies between tasks, deadlocks might occur.

We prevent these deadlocks by adding a minimal set of constraints, such that autonomous planning is enabled.

Moderately coupled
• precedence constraints

before
overlaps
during

Tightly coupled
• precedence constraints
• synchronisation constraints

meets
starts
finishes
equals

Interval Algebra
Tasks have durations, and can thus be represented as intervals. Analysis has turned out that the relations between these intervals result in different types of problems to be solved.

Time Windows
Many real-life problems have known earliest starting times and latest finishing times. By rewriting these time windows, previously developed techniques for precedence constraints can be used to describe these problems, too.

Problem with time windows
Problem without time windows

Future Work
Although intervals can now be used, we cannot yet represent the temporal distance between two events.

References