

# Finding Parallel Regions with Temporal Planning

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## Abstract

Abstract.

Introduction.

Helmert, M. 2006. The fast downward planning system.  
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## Bibliography

### Temporal Plannign

According to (Haslum et al. 2019), actions in temporal planning have a duration. Therefore, the planner will try to find a schedule in which some actions can be executed in parallel.

There are different approaches that can be used to formalize temporal actions with PDDL. In this paper, I used `:durative-actions`. This action is represented in four sections, as listed below.

- `:parameters`: parameters needed to execute the action;
- `:duration`: time the action takes to run;
- `:condition`: conditions that need to be respected to apply the effects;
- `:effect`: effects that will be applied to the state;

The sections `:condition` and `:effect` are separated in three categories: `at start`, `over all` and `at end`. As described by (Haslum et al. 2019), these categories represent the conditions and effects used at each stage of the action. The `at start` statements are used when starting the action. The `over all` statements are used during the time the action is being executed. The `at end` statements are used at the end of the action.

### Fast Downward

I used the Fast Downward planner to find best temporal plan. Originaly, the paper form (Helmert 2006) does not state that Fast Downward planner support temporal planning.

## References

Haslum, P.; Lipovetzky, N.; Magazzeni, D.; and Muise, C. 2019. *An Introduction to the Planning Domain Definition Language*. Synthesis Lectures on Artificial Intelligence and Machine Learning. Morgan & Claypool Publishers.

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