

Embedding a Scheduler in Execution for a Planetary Rover

Wayne Chi, Steve Chien, Jagriti Agrawal, Gregg Rabideau, Edward Benowitz,
Daniel Gaines, Elyse Fosse, Stephen Kuhn, James Biehl

Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, CA 91109
{firstname.lastname}@jpl.nasa.gov

Abstract

Scheduling often takes place in the context of execution. This reality drives several key design decisions: (1) when to invoke (re) scheduling, (2) what to do when the scheduler is running, and (3) how to use the schedule to execute scheduled activities. We define these design decisions *theoretically* in the context of the embedded scheduler and *practically* in the context of the design of an embedded scheduler for a planetary rover. We use the concept of a *commit window* to enable execution to use the previously generated schedule while (re) scheduling. We define the concepts of *fixed cadence*, *event driven*, and *hybrid* scheduling to control invocation of (re) scheduling. We define the concept of *flexible execution* to enable execution of the generated schedule to be adaptive within the response cycle of the scheduler. We present empirical results from both synthetic and planetary rover scheduling and execution model data that documents the effectiveness of these techniques at enabling the scheduler to take advantage of execution opportunities to complete activities earlier.

1. Appearance

The full paper appears in The 28th International Conference on Automated Planning and Scheduling (ICAPS 2018) 24-29 June 2018 [1].

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References

- [1] Wayne Chi, Steve Chien, Jagriti Agrawal, Gregg Rabideau, Edward Benowitz, Daniel Gaines, Elyse Fosse, Stephen Kuhn, and James Biehl. Embedding a scheduler in execution for a planetary rover. In *ICAPS*, 2018. https://ai.jpl.nasa.gov/public/papers/chi_icaps2018_embedding.pdf.