

On the Computational Complexity of Plan Verification, (Bounded) Plan-Optimality Verification, and Bounded Plan Existence

Songtuan Lin¹ Conny Olz² Malte Helmert³ Pascal Bercher¹

¹School of Computing, The Australian National University, Australia

²Institute of Artificial Intelligence, Ulm University, Germany

³Department of Mathematics and Computer Science, University of Basel, Switzerland

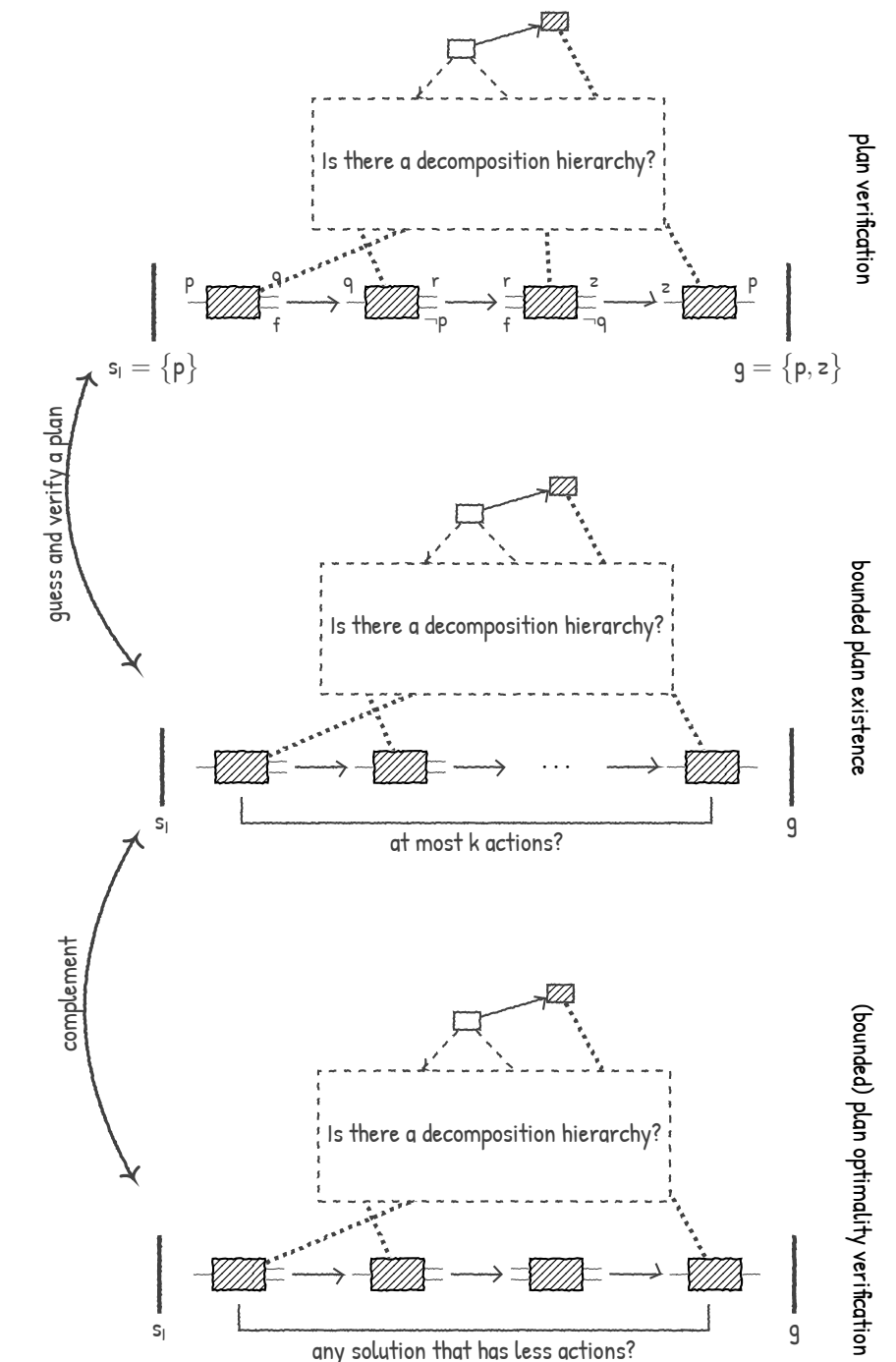
¹{songtuan.lin, pascal.bercher}@anu.edu.au ²conny.olz@uni-ulm.de ³malte.helmert@unibas.ch

Objective

We studied the computational complexity of several problems centered at the bounded plan existence problem.

1. The plan verification problem.
2. The bounded plan existence problem.
3. The (bounded) plan optimality verification problem.

Problems and their relations



Results

		Plan Verification	k -length Plan Existence		Plan Optimality Verification	Bounded Plan Optimality Verification	
			k in binary	k in unary		plan given	only plan length given
Classical	ground	In P	PSPACE-complete	NP-complete	coNP-complete	coNP-complete	PSPACE-complete
	lifted	In P	NEXPTIME-complete	NP-complete	coNP-complete	coNP-complete	coNEXPTIME-complete
Hierarchical	ground	NP-complete	NEXPTIME-complete	NP-complete	coNP-complete	coNP-complete	coNEXPTIME-complete
	lifted	PSPACE-hard In NEXPTIME	NEXPTIME-complete	PSPACE-hard In NEXPTIME	PSPACE-hard In coNEXPTIME	PSPACE-hard In coNEXPTIME	coNEXPTIME-complete

How a decomposition hierarchy simulates state transitions:

