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Integrating Automated Provers in Proof Assistants

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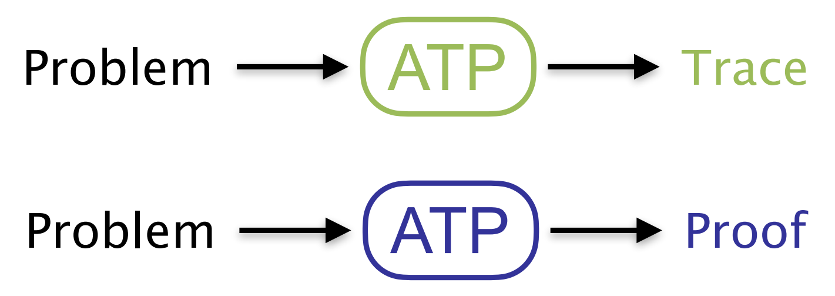
Introduction

The veracity of a theorem can be checked by generating complete proofs. However, tools that generate complete proofs are less efficient than tools that generate proof traces.

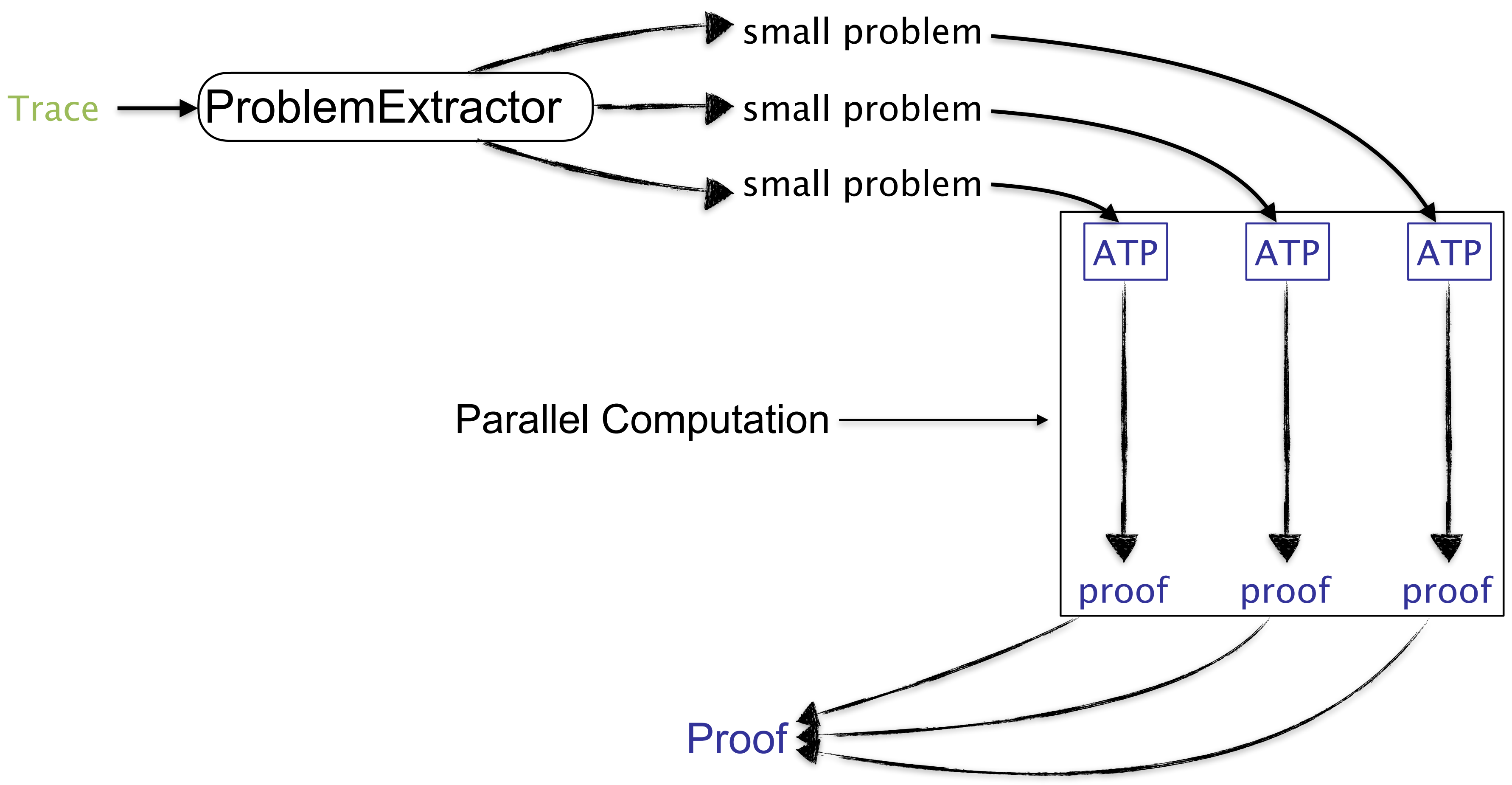
An ATP (Automated Theorem Prover) is a tool that produce whether a complete proof or a proof trace.



	Performance	Checkability
ATP	Good	Hard
ATP	Bad	Easy

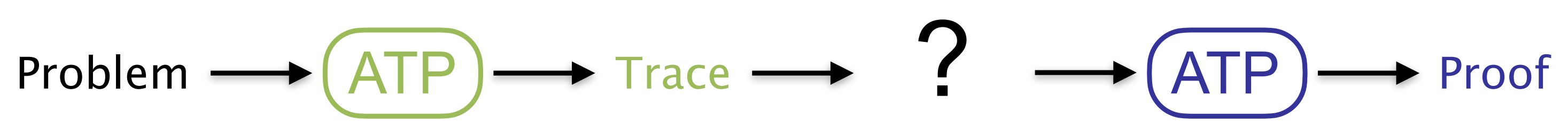
Method

By using the proof trace generated by an ATP, we can extract problems that are not proved and call an other ATP to solve them.



Goal

Generate complete proofs that are easy to check from proof traces



Gain

- Complete proofs
- Fast generating (thanks to parallel computation)
- Independant ATPs

Benchmarks

In this benchmark we've used E–prover and ZenonModulo as ATPs and Dedukti as a proof checker.
TPTP format for problems (7000 problems).
TSTP format for traces.

	E	ZenonModulo	E+ZenonModulo
TSTP / Dedukti	55%	15%	34%
Checkability	No	Yes	Yes
Time/Problem	5mn	5mn	5mn + 10s/problem

Informations and Links

- Git https://github.com/elhaddadyacine/
- ProblemExtractor https://github.com/elhaddadyacine/ProblemExtractor
- E-prover https://github.com/eprover/eprover
- Zenon Modulo https://github.com/elhaddadyacine/zenon_modulo
- Page web http://www.lsv.fr/~elhaddad/
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