

# AI planning and search research review

## STRIPS

In artificial intelligence, STRIPS (Stanford Research Institute Problem Solver) is an automated planner developed by Richard Fikes and Nils Nilsson in 1971 at SRI International. The same name was later used to refer to the formal language of the inputs to this planner. This language is the base for most of the languages for expressing automated planning problem instances in use today.

The main interest of STRIPS is to solve the problem faced by a robot in re-arranging object and navigating. STRIPS overcome the disadvantage of Green's theorem-prover by separating entirely the processes of theorem proving from those of searching through a space of world models. This separation allows STRIPS to employ separate strategies for these two activities and thereby improve the overall performance of the system.

## PDDL

The Planning Domain Definition Language (PDDL) is an attempt to standardize Artificial Intelligence (AI) planning languages. It was first developed by Drew McDermott and his colleagues in 1998 (inspired by STRIPS and ADL among others) mainly to make the 1998/2000 International Planning Competition (IPC) possible, and then evolved with each competition.

PDDL was derived from the original STRIPS planning language (Fikes and Nilsson, 1971). Which is slightly more restricted than PDDL: STRIPS preconditions and goals cannot contain negative literals.

## MA-PDDL

Multi-agent PDDL is proposed with a corresponding multi-agent planning track for the International Planning Competition (IPC) due to there is no de-facto standard for the description of multi-agent planning problems similarly to the Planning Domain Definition Language (PDDL) in case of deterministic single-agent planning.

Multi-agent planning (de Weerd and Clement 2009) is about planning by N planning agents for M executing agents (or actors, actuators, bodies) situated in a multi-agent environment with a broad range of applications.

Multi-agent planning is fundamentally different from the single-agent case with a broad range of applications (e.g., multi-robot domains).

## Reference

de Weerd, M.; and Clement, B. 2009. Introduction to planning in multiagent systems. *Multiagent Grid Systems* 5(4):345-355.

Kovacs, D. L.; Dobrowiecki, T. P. (2013). Converting MA-PDDL to extensive-form games. *Acta Polytechnica Hungarica*. 10 (8). pp. 27–47.

McDermott, Drew; Ghallab, Malik; Howe, Adele; Knoblock, Craig; Ram, Ashwin; Veloso, Manuela; Weld, Daniel; Wilkins, David (1998). "PDDL---The Planning Domain Definition Language." Technical Report CVC TR98003/DCS TR1165. New Haven, CT: Yale Center for Computational Vision and Control. CiteSeerX 10.1.1.51.9941 Freely accessible.

Richard E. Fikes, Nils J. Nilsson (Winter 1971). "STRIPS: A New Approach to the Application of Theorem Proving to Problem Solving." *Artificial Intelligence*. 2 (3–4): 189–208. doi:10.1016/0004-3702(71)90010-5.