We discuss 3 major breakthroughs STRIPS, Partial order planner and GRAPHPLAN in automated planning in chronological order.

STRIPS (**Stanford Research Institute Problem Solver**) was first major planning system as the component for the Shakey robot project at SRI by Fikes and Nilsson. A STRIPS system describes the effect of an action by a first order logic rule which defines how the current world model should be changed when the action (satisfying logical preconditions) is performed. Later advanced variants of STRIPS were ADL (Advanced Description Language) and PDDL (Problem Domain Definition Language), which has become the standard language for the planning competitions at the AIPS conference.

Early planners worked only with totally ordered action sequences. Solving each subgoals separately could introduce problems like Sussman anomaly for interleaved goals.
NOAH (Net of Action Hierarchies) was pioneer **partial order planner** where partially ordered plans could be created to include the detection of conflicts and protection of acheived conditions from interference. A partial order planner comprises actions (steps) with constraints (for ordering and causality) on them.

With above planners, it was difficult to solve NP hard like problems with high complexity. GRAPHPLAN was next breakthrough in planning which could handle high complexity problems due to its high performance.
GRAPHPLAN is a general-purpose planner for STRIPS-style domains, based on ideas used in graph algorithms. Given a problem statement, rather than immediately embarking upon a search as in standard planning method, **Graphplan** explicitly constructs and annotates a compact structure called a Planning Graph, in which a plan is a kind of "flow" of truth-values through the graph. This graph has the property that useful information for constraining search can quickly be propagated through the graph as it is being built. Graphplan then exploits this information in the search for a plan. Furthermore, Planning Graphs can be constructed quickly as they have polynomial size and can be built in polynomial time.

REFERENCES

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