I. Totally Ordered Planning

Planners in the early 1970s generally considered **totally ordered** action sequences. Problem decomposition was achieved by computing a subplan for each subgoal and then stringing the subplans together in some order. This approach, called **linear planning** by Sacerdoti (1975), was soon discovered to be incomplete.

The shortage of linear panning reminds people that a complete planner must allow for **interleaving** of actions from different subplans within a single sequence. The notion of serializable subgoals (Korf, 1987) corresponds exactly to the set of problems for which noninterleaved planners are complete.

II. STRIPS

Mathematically, a STRIPS instance is a quadruple <P, O, I, G>, in which each component has the following meaning:

1. P is a set of *conditions* (i.e., propositional variables);
2. O is a set of *operators* (i.e., actions); each operator is itself a quadruple , each element being a set of conditions. These four sets specify, in order, which conditions must be true for the action to be executable, which ones must be false, which ones are made true by the action and which ones are made false;
3. I is the initial state, given as the set of conditions that are initially true (all others are assumed false);
4. G is the specification of the goal state; this is given as a pair , which specify which conditions are true and false, respectively, in order for a state to be considered a goal state.

Classical planning is close to STRIPS. The representation language of STRIPS is meaningful. It enable planner to describe a planning problem better.

III. Partial-order Planning

Partial-order planning is an approach to automated planning that leaves decisions about the ordering of actions as open as possible. It contrasts with **total-order planning**, which produces an exact ordering of actions. Given a problem in which some sequence of actions is required in order to achieve a goal, a **partial-order plan** specifies all actions that need to be taken, but specifies an ordering of the actions only where necessary. TWEAK (Chapman, 1987), SNLP (Soderland and Weld, 1991) and UCPOP (Penberthy and Weld, 1992) are the examples of partial-order planning.

Partial order planning doesn't sequence actions until it is absolutely necessary; however, these actions are conceived of much before they are sequenced. Partial-order planning exhibits the Principle of Least Commitment, which contributes to the efficiency of this planning system as a whole.

[1] McAllester D. ， Rosenblitt D..Systematic Nonlinear Planning.AAAI-1991 ftp.ai.mit.edu:/pub/dam/aaai91c.ps

[2] Soderland S. ， Weld D..Evaluating nonlinear planning.Technical Report TR 91-02-03.University of Wasington CSE.1991

[3] https://en.wikipedia.org/wiki/STRIPS

[4] https://en.wikipedia.org/wiki/Partial-order_planning