AI Planning were first developed in 1971 with the introduction of STRIPS domain. Some of the restriction posed by STRIPS were overcome through Action Description Language (ADL) in 1986 to realise more realistic problem [2]. In 1998, Problem Domain Description Language (PDDL) was introduced that was computer parsable and standardized syntax for representing planning problems and has since been used with few modifications. [2]

Early planners worked on the principle of computing subgoals and then stringing the subplans to form some order. This did not allow interleaving of actions which was required for complete planner and was overcome with the introduction of goal regression planning with the development of WARPLAN .

Goal Stack planning starts from the goal state by stacking up each subgoals with the compound goal at the bottom of the stack and is often used to solve STRIPS[3]. At each step the top of the goal is perused. If a sequence of actions is found that satisfies this goal, it is removed and the next goal is attempted. This process is repeated until the goal state is empty[4]. If the conditions on top of the stack are satisfied, that state is popped out, if it isn't then it is replaced with actions and its preconditions.If stack top is an action, it is popped and executed along with appropriate change to the knowledge base using action's effects.. This process is repeated till a sequence of actions satisfies goal.

Partial order planning consists of detection of conflicts and protection of achieved conditions from interferences and dominated a significant period of research [2]. A **Plan space** planner searches through the space of partial plans as opposed to state space approach which searches through graph of nodes representing world states. A partial plan is a set of tuple $\pi = (A,\prec,B,L)$ where $A = \{a1,\ldots,ak\}$ is a set of partially instantiated planning operators;$\prec$ is a set of ordering constraints on A of the form ($ai \prec aj$);B is a set of binding constraints on the variables of actions in A of the form $x=y$, $x\neq y$, or $x\in Dx$; L is a set of causal links of the form $\langle ai -[p] \text{->} aj \rangle$. It tries to come up with a plan that will take it from initial state to goal state. A **plan** is a set of actions organized into some structure and consists of precondition, postcondition, set of actions and a set of ordering on steps . A **refinement operator** takes as in input partial plan and and makes it more specific.Initial search space is an empty plan represented as $\pi0 = (\{init, goal\},\{(init\prec goal)\},\{\},\{\})$: where init consists of only effect and no precondition while goal consists of only precondition and not effect.[1]

A resurgence in state space planning was pioneered with the introduction of UNPOP program in 1996 and suggestion of ignore delete heuristic ,Heuristic Search Planner (HSP) and **FF planning algorithm (FF)**[2]. **FF** relies on forward space search using a heuristic that estimates goal distances by ignoring delete list but does not assume facts to be independent. It combines hill-climbing with systematic search to derive powerful heuristics and prune the search space. It leads to improvement in runtime performance in comparison to HSP [5].

[1]: http://www.inf.ed.ac.uk/teaching/courses/plan/slides/Plan-Space-Search-Slides.pdf

[2] Artificial Intelligence: A Modern Approach Textbook by Peter Norvig and Stuart J. Russell

[3] http://aimaterials.blogspot.com/p/planning-goal-state-algorithm.html

[4] http://users.cs.cf.ac.uk/Dave.Marshall/AI2/node121.html

[5]Jorg Homann, Bernhard Nebel: The FF Planning System: Fast Plan Generation Through Heuristic Search