Experiment 07

* Title: Write a program to implement planning programming

* Objectives:
1. To understand the basics of planning programming
2. To implement the goal stack planning programming

* Theory:

Goal stack planning is one of the earliest methods in AI in which we work backwards from goal state to initial state.

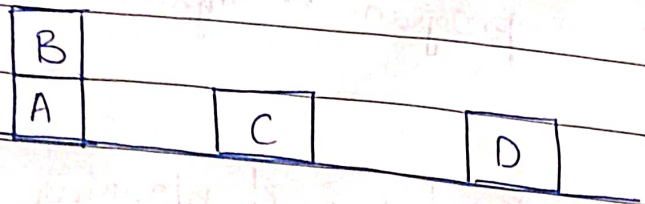
We start from goal state & we try fulfilling the pre-conditions required to achieve the initial state. These pre-conditions in turn have their own set of preconditions, which are required to be satisfied first. We keep solving these "goals" & "sub-goals" until we finally arrive at the initial state. We make use of a stack to hold these goals that need to be fulfilled as well the actions that we need to perform for the same.

Predicates can be thought of as a statement in which helps us convey the information about a configuration in Blocks world. Given below are the list of predicate as well as their intended meaning

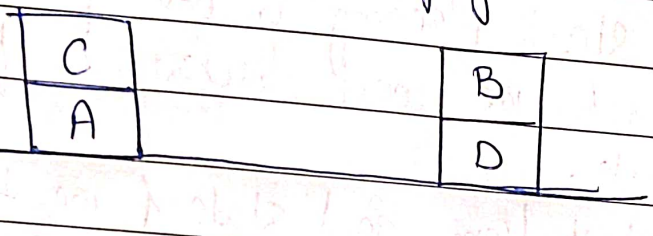
1. On (A, B): Block A is on B
2. ontable (A): Block A is on table
3. clear (A): Nothing is on top of A
4. Holding (A): Arm is holding A
5. ArmEmpty: Arm is holding nothing

Using these predicates, we can represent initial & goal state

Initial state : On(B, A) ^ OnTable(A) ^ OnTable(C) ^ OnTable(D) ^ Clear(B) ^ Clear(C) ^ Clear(D) ^ ArmEmpty



Goal state : On(C, A) ^ On(B, D) ^ OnTable(A) ^ OnTable(D) ^ Clear(C) ^ Clear(B) ^ ArmEmpty



Operations can be performed by robot arm such as

1. Stack(X, Y) : Move block X on Y
2. unstack(X, Y) : Move block X which is on top of Y
3. Pickup(X) : Pick up X which is on top of table
4. Putdown(X) : Put Block X on table

The effect of these operations is represented using two lists ADD & DELETE. DELETE list contains the predicates which will cease to be true once performed. ADD list on the other hand contains the predicates which will become true once performed. The Pre-condition, Add & Delete list for each operation is rather intuitive. It contains a combination of various predicates

Conclusion : Thus we have studied & implemented goal stack planning programming method

Table (C) ^ On Table(d)

Empty

— table

(A) ^ On Table (D) ^