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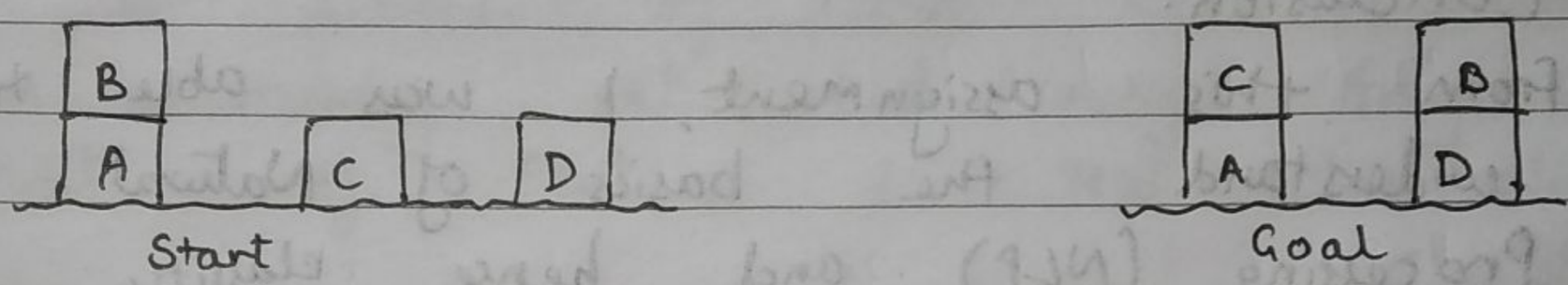
LP1 - A1R3

* Title: Goal Stack Planning

* Problem Statement:
Implement Goal Stack planning for the following configurations from the blocks world:



* Objective:
To learn and implement goal stack planning.

* S/W and H/W requirements:
i) 64 bit processor
ii) RAM
iii) Linux OS
iv) Python3

* Theory:
Blocks World Problem:
i) There are N blocks, a table and a robotic arm. Blocks are identified as 1, 2, ..., N
ii) Each block can sit on top of another block, or on the table.
iii) There can be a stack of blocks of arbitary length / height.
iv) However, Only 1 block can be directly on another block. No two blocks can be sitting directly on the same block.

v) The bottom most block of a stack must be on the table. The table can hold any number of blocks.

vi) If there is no block on top of a block, then the block is clear.

vii) The robotic arm can hold only 1 block.

viii) If the robotic arm does not hold any block, it is "Empty".

* Goal Stack Planner:

i) Goal stack planning integrates the advantages of both forward and backward planning.

ii) An action is added to the plan only if it's pre-conditions are satisfied.

iii) If any precondition is not satisfied, then we add a relevant action for that pre-condition and push the pre-conditions on stack and repeat the same process.

* Algorithm:

① Push the goal state on stack.

② Repeat until the stack is empty:

a) If stack top is a compound goal,

i) Push its subgoals on stack.

b) If stack top is a single unsatisfied goal,

i) Replace it by an action that makes it satisfied.

ii) Push the action's precondition on stack

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c) if stack top is an action,
   i) Check for unsatisfied pre-requisites.
   ii) if all prerequisites are satisfied,
      I) Pop action from stack.
      II) Execute it
      III) Change the knowledge base by action's effect.
      else
      I) Push unsatisfied preconditions on stack.

d) If stack top is a satisfied goal.
   i) Pop it from stack.

Conclusion:
From this assignment, I was able to understand the goal stack planning and hence implement this assignment.