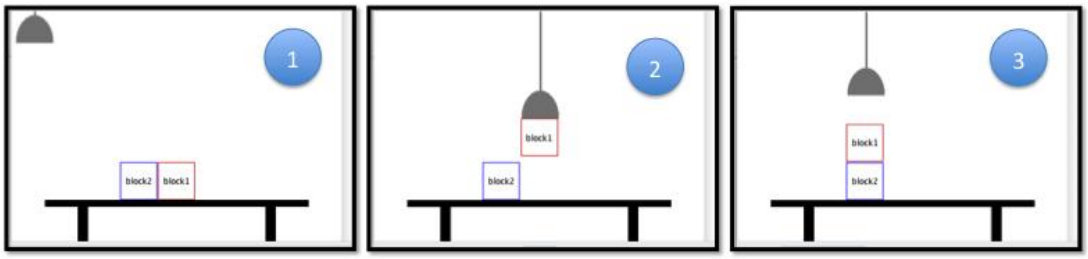
GWV – Grundlagen der Wissensverarbeitung

Tutorial 12 : Planning

Class Exercise 1.1 : (Planning)

The following assignment is about *planning* in the *Blocksworld*. This simple domain consists of a table with a various number of equally sized cubes on top. The cubes are numbered and can be stacked on top of each other. A single robot arm can manipulate the cubes in a way that it can pick up cubes and place them anywhere on the table or on top of another cube. The arm can only pick up and hold a single cube at a time.

1. Define a set of predicates that can be used to describe the state of the domain.
2. Define a set of actions that can be executed with the robot's arm. Specify the pre- and postconditions of these actions. Use the following suggestions for naming the predicates:
   - pickuptable(block-1)
   - putdowntable(block-1)
   - pickup(block-1, block-2)
   - putdown(block-1, block-2)



3. Model the following scenarios and goals according to your definitions of predicates:
   - Initial state: block-1 and block-2 are placed next to each other on the table.
     Goal: Stack block-1 on top of block-2.
   - Initial state: block-1 is on top of the table, while block-2 is on top of block 1. block-3 is on top of the table, block-4 is on top of block-3 and block-5 is on top of block-4.
     Goal: block-3 should be on top of block-4 and block-5 should be on top of block-1.
   - Initial state: block-1 and block-2 are on top of the table. block-3 is on top of block-1.
     Goal: block-1 should be on top of block-2 and block-2 on top of block-3.
4. Use *forward planning* and *regression planning* to solve the planning tasks. What is special about the third planning task?

5. If you view planning as a search problem: Which search methods would you use and why?

6. For the third scenario, what would happen if you had additional blocks (block-4 to block-n) on top of the table?

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Achievable score on this sheet: 0