G53KRR 2018 Answer to the informal exercise on planning

The answer given is not the only possible one. If you came up with a different answer, and would like me to check it, please come to the office hour on Friday at 11, or email it to me.

The domain consists of:

- a table, a set of cubic blocks and a robot arm;
- each block is either on the table or stacked on top of another block
- the arm can pick up a block and move it to another position either on the table or on top of another block;
- the arm can only pick up one block at time, so it cannot pick up a block which has another block on top.

1. Give PDDL description for this domain: list the fluents and action schemas.

   Answer. Fluents:

   - $Block(x)$: x is a block
   - $On(x, y)$: x is on y, where y is either another block or table
   - $Clear(x)$: there is nothing on top of block x

   Action schemas:

   ACTION: $move(b, x, y)$:
   PRECONDITION: $Block(b), Block(y), On(b, x), Clear(b), Clear(y), x \neq y$
   EFFECT: $On(b, y), Clear(x), \neg On(b, x), \neg Clear(y)$

   ACTION: $moveToTable(b, x)$:
   PRECONDITION: $Block(b)$, $Block(x)$, $On(b, x)$, $Clear(b)$
   EFFECT: $On(b, Table), Clear(x), \neg On(b, x)$

2. Suppose in the initial state blocks A, B and C are as follows: block C is on top of B, B is on the table, and A is on the table. The goal is to build a tower where C is on the table, B on top of C, and A on top of B.

   State the planning problem: specify the objects involved, give the description of the initial state, and give the goal description.

   Answer.

   - Objects: A, B, C, $Table$
   - Initial state: $Block(A)$, $Block(B)$, $Block(C)$, $Clear(C)$, $Clear(A)$, $On(C, B)$, $On(A, Table)$, $On(B, Table)$
   - Goal: $On(A, B)$, $On(B, C)$, $On(C, Table)$