

**BANGLADESH UNIVERSITY OF PROFESSIONALS**

Department of Information and Communication Technology

Faculty of Science and Technology (FST)

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**1. Introduction**

The given problem says, there are 2 rooms with 1 large-table each, 6 blocks, and 1 robot gripper. The robot can pick up (or put down) one block at a time, and can move from one room to another holding at-most 1 block.

The aforementioned problem can be solver by PDDL to transfer the blocks from initial state to goal state.

Two PDDL files have been taken; one consisting of the problem definition and the other containing the domain description. Then the planning has been conducted according to the initial state definition and goal state to be obtained.

**2. Problem File Description**

In the problem PDDL file, the problem has been defined. The problem states the objects that are present in our problem. There are a few objects in our problem; the left room and right room; there are 6 blocks A, B, C, D, E, F; there is a robot gripper; there are one table in each room.

The initial state of the left room shows, the robot gripper lies here being empty. The block C lies on the table and block B lies on table and block A lies on block B.

The initial state of the right room shows, the block D lies on table. Block E lies on table and block F lies on E.

The goal state of left room should be, block F lies on table and block E lies on Block F; again, block D lies on block E.

The goal state of right room should be, block C lies on table and block B lies on Block C; again, block A lies on block B.

**3. Domain File Description**

In the domain file, the domain definition and the plan procedure is performed.

The requirements for planning has been defined here. Typing for declaring parameter and object types has been used. The syntax is the same for declaring types of objects in the problem definition. Equality for preconditions has been used. Conditional effects to consider conditions have also been used. The types has been defined for room and the blocks.

The predicates defined are: handempty – where the gripper is empty, clear – where the blocks are clear or no block lies above it, on – where one block lies on the other, at – where a block lies on a room, holding – where the gripper is holding a block.

There has been 3 actions defined: pick –up, put –down, move.

The pick –up action consists what the object’s initial state is and what will be the goal. The precondition in this case is that an object may lie on table or on another object but no other object should lie above the object to be moved. The robot gripper should be empty. The object should be lying in any of the rooms. The location of the gripper is to be considered.

The effect of this will be, the robot gripper will hold the object and the object that was lying below the moved object will become clear. The moved object will not be lying on any other object.

The put –down action consists, the robot gripper will hold the object and the object that was lying below the moved object will become clear. The moved object will not be lying on any other object.

The effect of this will be, the robot gripper will not hold that object and the object will be lying on another object when the table is not clear otherwise the object will lie on the table.

The move action consists, moving one object from one room to another room with the help of the gripper. When the gripper is holding any object, it will move to the other room.

**4. Obtained Plan**

The obtained plan says,

At first, pick-up a lying on b of room\_left, then move a from room\_left to room\_right. The object a is put-down on d of room\_right. Then f is pick-up from e of room\_right. F is move from room\_right to room\_left. It is put-down to table of room\_left. Then c is pick-up from table of room\_left. Then c is moved from room\_left to room\_right. Then c is put-down to table of room\_right. Then e is pick-up from table of room\_right. Then e moved from room\_right to room\_left and put-down on f of room\_left. The b is pick-up from table of room\_left. The b is move from room\_left room\_ to right. B is put-down on c of room\_right. Then a pick-up from d on room\_right. Put-down a on b of room\_right. Pick-up d on table of room\_right. Then d is moved from room\_right to room\_left. Then put-down on e room\_left.