

# INF5390 – Artificial Intelligence (spring 2012)

## Exercise 2

Please prepare your response to the two assignments below and send by e-mail to the lecturer Roar Fjellheim, [roarfj@ifi.uio.no](mailto:roarfj@ifi.uio.no), not later than **May 14, 2012**. You may use Norwegian or English and submit the response in either .doc(x) or .pdf format.

The response must be received on time and approved for you to be allowed to enter the exam in June.

### 1) Agents That Plan (INF5390-08)

The figure shows the robot Shakey in a world consisting of 4 rooms along a corridor, where each room has a door and a light switch. Shakey can move from location to location, push boxes, climb up and down boxes, and switch lights on and off. He can only reach switches by standing on a box.

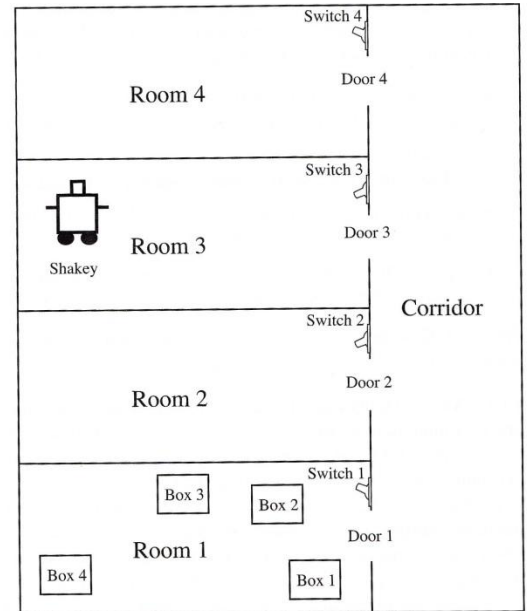
The rooms, doors, corridor and switches mentioned are given location constants. You will also need to define constants for initial locations of Shakey and the boxes, as well as a predicate *In* to define that a position is in a room.

Shakey's 6 actions are:

- $Go(x,y,r)$  which requires that Shakey be *At*  $x$  and that  $x$  and  $y$  are locations in the same room  $r$ . By convention a door joining two rooms is in both of them.
- $Push(b,x,y,r)$ : Push a box  $b$  from location  $x$  to location  $y$  in the same room  $r$ .
- $ClimbUp(b)$ ,  $ClimbDown(b)$ : Climb up and down a box  $b$ .
- $TurnOn(l)$ ,  $TurnOff(l)$ : Turn on and turn off light switch  $l$  (by convention, we use the switch constants both for the locations of the switches and for the objects that can be switched on/off).

Your tasks are the following:

- 1.1 Write down PDDL sentences for Shakey's 6 actions and the initial state shown in the figure.
- 1.2 Show a plan for Shakey to switch on light *Switch 2* using *Box 2* to stand on.



### 2) Agents That Reason Under Uncertainty (INF5390-10)

Show from first principles including the definition of conditional probability that:

$$P(A|B \wedge A) = 1$$