PDDL Planning VS Planning in the Situation Calculus

Task specification

Domain 1 : @Home lab
Task : Bring me a fork
General scenario : A robot is given a task by a person sitting on the sofa in the @home lab to bring him/her a fork from the kitchen. The robot should be able to generate a plan that enables it to move from its starting position to the kitchen, pick up a fork from a kitchen drawer and bring it back to the same person in the same position. Figure 1 shows a simplified map of @home lab that is used in this experiment.

Complexity variation:

- Level 1: The fork is placed on top of the table T1. The robot only needs to pick it up and return to the same person in the same position. At this point, the model will, only, include the person, the table, and the starting point.
- Level 2: The fork is located on the kitchen bar right above the drawer D1. The robot has to pick it up and return to the same person at the same position. At this point, the model will, only, include the person, the drawer D1 and the starting point.
- Level 2: The fork is located in a drawer in the kitchen. The robot needs to include pulling-out the drawer and pushing it back as part of the plan. At this point, all the objects on the map will be included in the model.

Note that at the first two levels, only the relevant nodes are added to the model.

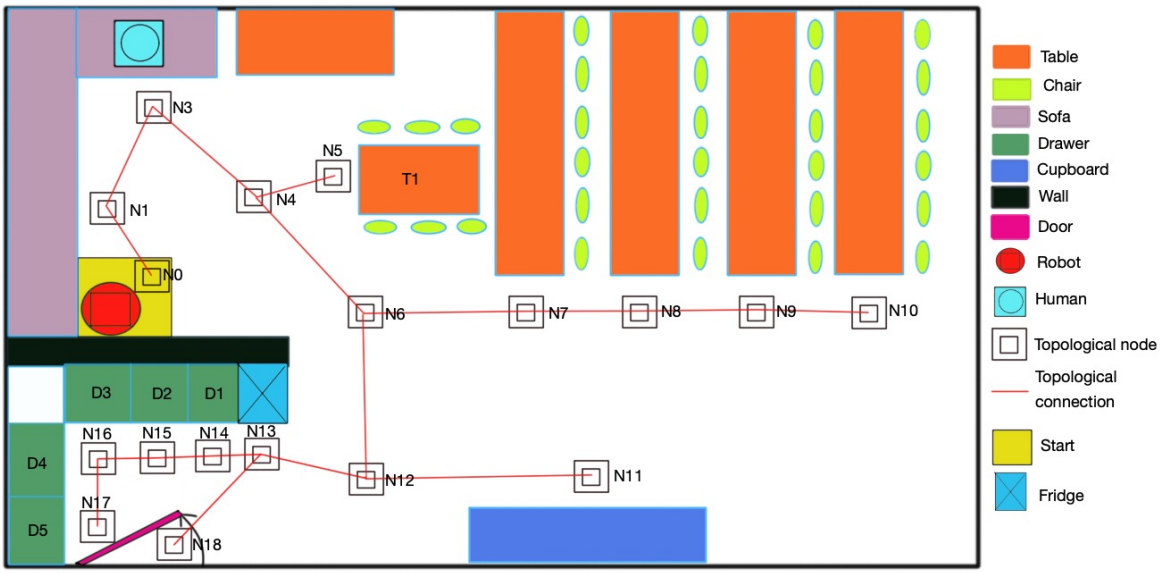

Figure 1: @Home lab simplified map

Domain 2 : @Work lab

Task : Pick up and place an object

General scenario : A robot is given a task to pick up a cube from station S6 and place it in a rectangular hole in station S3. The robot should be able to generate a plan that enables it to move from its starting position to station S6, pick up the cube, move to station S3, and place the cube inside the hole. Figure 2 shows a map of the @work lab used in this experiment. The map does not represent the actual @work lab in HBRS however, it follows some of the map characteristics of the arena of the 2019 RoboCup, Germany.

Complexity variation:

- Level 1: The robot has to pick up the cube C1 from station S6 and place it on station S5. The model will only include the two stations and the starting point.
- Level 2: The robot has to pick up the cube C1 from station S6 and place it into the hole in station S3. The model will only include the two stations and the starting point.
- Level 3: The robot has to generate a multi-goal plan. First, the robot has to pick up the cube C1 and place it on station S1. After that, it should pick up the cube C2 and place it into the hole in station S3. The model will include all the stations on the map

Note that at the first two levels, only the relevant nodes are added to the model.

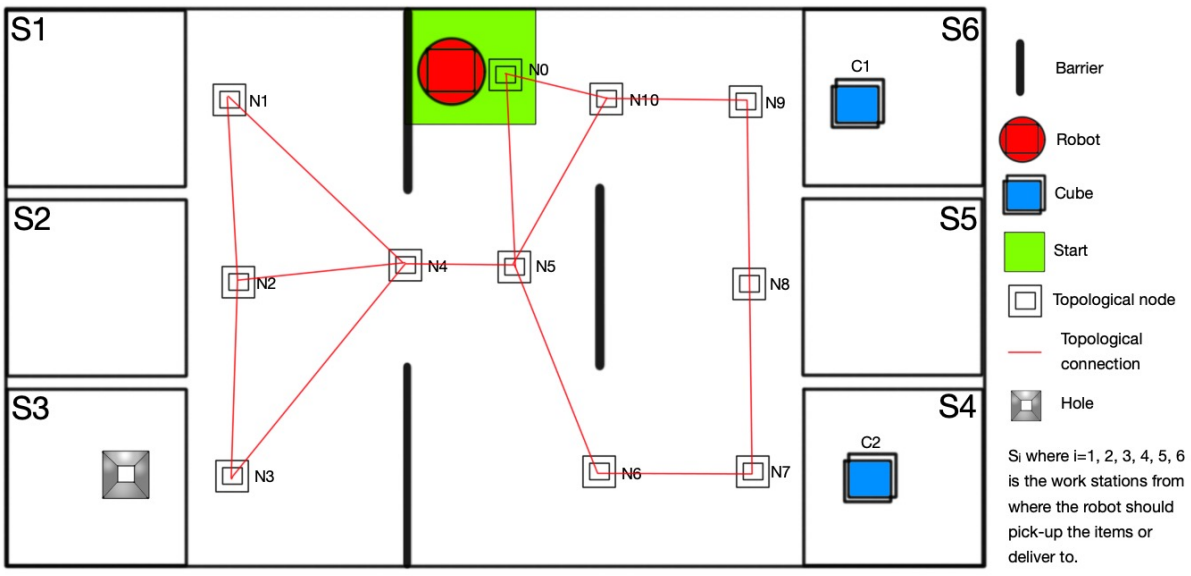

Figure 2: @Work lab simplified map