PROBLEM SET: 3

Due: Monday, March 26th

Behavior Trees

BEHAVIOR TREES (100 Points + 30 Points Bonus)

Roomba's roaming

This new type of Roomba has very simple reflex rules. It will always check the battery level first. If the level is below 30%, it will plan a path to its charging base ("home"), go there, and start the docking procedure. If the battery is at a sufficient level, it will start the function it was commanded to perform. The available commands are:

1. Spot cleaning: it will perform a 20s intensive cleaning in a specific area
2. General cleaning: go around the room and vacuum dust until the battery falls under 30%
3. Do nothing

During general cleaning, if the dust sensor detects a particularly dirty spot, the Roomba will perform a 35s spot cleaning.

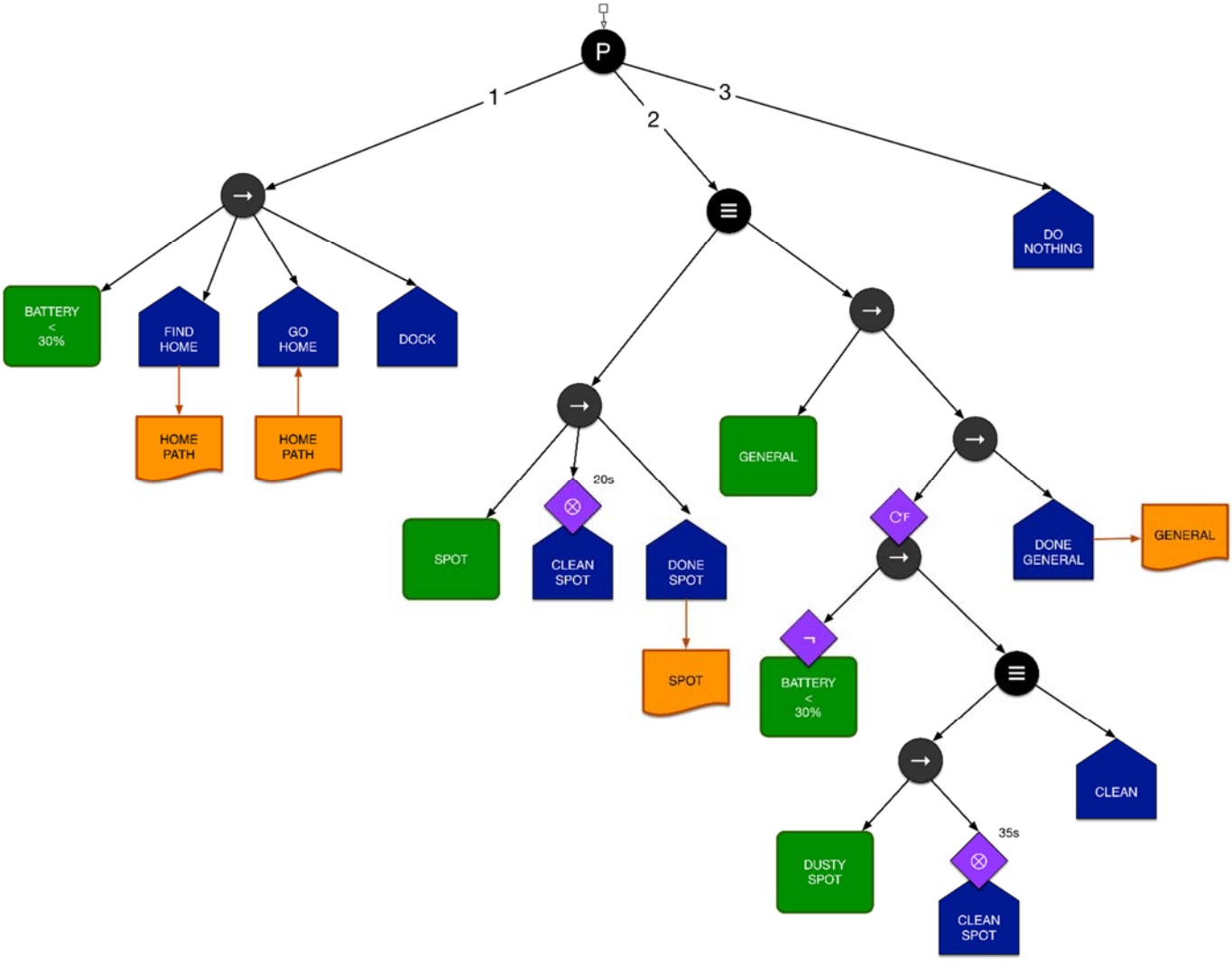
The goal of this problem set is to implement the provided behavior tree. As we talked about in class, trees can be represented with concatenated IF-THEN-ELSE rules. Trees can also be implemented through a standard recursive node definition (additional 30 Points).

Your implementation should accept a blackboard object as input (a regular hash map or dictionary). The blackboard contains the following elements:

1. **BATTERY_LEVEL**: an integer number between 0 and 100
2. **SPOT**: a Boolean value – **TRUE** if the command was requested, **FALSE** otherwise
3. **GENERAL**: a Boolean value – **TRUE** if the command was requested, **FALSE** otherwise
4. **DUSTY_SPOT**: a Boolean value – **TRUE** if the sensor detected a dusty spot during the cycle, **FALSE** otherwise
5. **HOME_PATH**: The path to the docking station

SPOT and **GENERAL** should not change until the command has been completed. The tree evaluation is called several times, each time simulates a 1s interval. Certain tasks should return **RUNNING** if they have not completed the job yet, and last for the specified number of cycles (20 cycles, or 35 cycles).

Except for **DONE GENERAL** and **DONE SPOT**, none of the other tasks will need to be implemented as printing a string with the name of the task and the state (SUCCEEDED, FAILED, RUNNING) will be sufficient. **DONE GENERAL** and **DONE SPOT** will set to **FALSE** the corresponding values in the blackboard.



SUBMISSION

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