

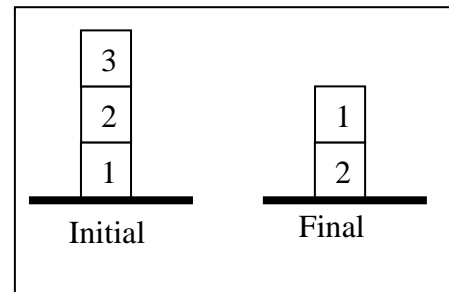
COMP 786 Multiagent Systems Spring 2008 Assignment 3

1 (This is the corrected version of problem 4 in Assignment 2.). The following Concurrent MetateM system has three agents. One, `hammerm`, makes hammers from the heads supplied by `headsup` and handles supplied by `handlesup`. Describe the agents in English and tabulate the first few steps in an example run using Figure 3.6 on page 60 of the text as an example. Proposition `make` is true when `hammerm` makes a hammer, `supply_head` is true when `headsup` supplies a head (to `hammerm`), and `supply_handle` is true when `handlesup` supplies a handle (to `hammerm`).

```
hammerm(supply_head, supply_handle)[make]
  ( ¬ make S supply_head ) ∧ ( ¬ make S supply_handle ) ⇒
    ◇( make ∧ O( ¬ make U ( ◇supply_head ∧ ◇supply_handle ) )
headsup(make)[supply_head]
  ●make ⇒ ◇supply_head.
handlesup(make)[supply_handle]
  ●make ⇒ ◇supply_handle.
```

2 (This is problem 2 on p. 87 of Wooldridge.). Recall the vacuum world example discussed in the preceding chapter [Chapter 3]. Formulate the operations available to the agent using the STRIPS notation.

3. Refer to the discussion of the PRS and Jam systems in section 4.5 of Wooldridge (and slides 52-60 of MyLecture04.ppt). Using Figure 4.6 (slide 58-59) as an example, give a fragment of a Jam system operating on a blocks world that describes the initial state as shown in the first figure at right and has as its top-level goal the state shown in the second figure at right. In these figures, “I” is an abbreviation for “BlockI” (e.g., “2” means “Block2”). The only things you have to change in Figure 4.6 (and the only things you have to show) are the FACTS segment and the definition of the plane named “Top-level plan”. Also, follow the execution of the plan step by step, indicating what actions are executed or goals are pushed or popped. (You could do this with narrative or with a table.)



4 (This is problem 1 on p. 104 of Wooldridge.) Develop a solution to the vacuum-world example described in Chapter 3 using Brooks’ subsumption architecture. How does it compare with the logic-based example? [Do not use the language of the example on slide 15 of MyLecture05.ppt or the schematic of slide 16, and do not visually connect modules as in slide 17. Rather, state each behavior as a (c,a) pair, where c is a set of percepts (conditions) and a is an action, and give the inhibition relations among your behaviors.]

5. Refer to the topic of indexical-functional representation on slides 30-33 of MyLecture05.ppt. List and explain some indexical-functional entities and indexical-functional aspects that could be used for the robot in the vacuum-world example of Chapter 3. Try to be reasonably complete. Using these entities and aspects, give two rules that would be useful. (The syntax is up to you.)
6. Give a brief justification of the Principle of Spatial Monotonicity for situated automata (slide 47 of MyLecture05.ppt). Briefly describe an example involving two or more delay elements.
7. Refer to the figure of the InteRRaP architecture on slide 79 of MyLecture05.ppt. Suppose the domain is unmanned cars that move around a town making deliveries from one business to another. Briefly discuss what would be required of each of the seven components shown in the figure and how they would interact. This should not take more than half a single-spaced page.