SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

Week 10&11 Exercises

Planning

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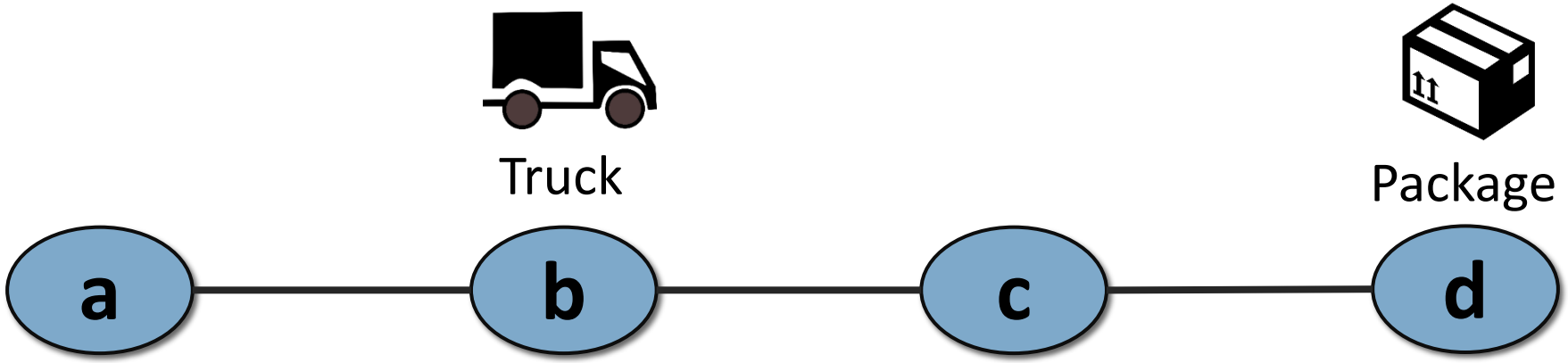
50.021 Artificial Intelligence

The following notes are compiled from various sources such as textbooks, lecture materials, Web resources and are shared for academic purposes only, intended for use by students registered for a specific course. In the interest of brevity, every source is not cited. The compiler of these notes gratefully acknowledges all such sources.

Planning Formulation

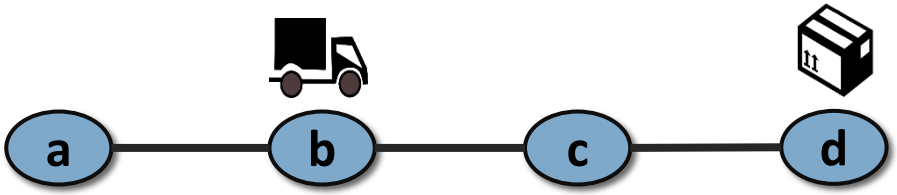
- Consider the below planning problem. There are three locations a, b, c and d, with a truck at b and package at d. The truck is able perform the following actions: (i) move(x,y): move from location x to y; (ii) load(x): load a package at location x; and (iii) unload(x): unload the package at location x.



Planning Formulation

Given the start state in the above diagram, your goal is to get the package to location a. Formulate this planning problem using the STRIPS representation and answer the following:

- List down the propositional variables (facts).
- Specify the operators (actions), including the pre-conditions and post-conditions.
- Specify the initial state and the goal state/specification.



Make this a delete-relaxed problem

Planning Heuristics

- Given this problem definition:
  - Variables: x_1, x_2, x_3, x_4, x_5
  - Initial State: x_1
  - Goal: x_2, x_5
  - Actions:

o_1 :	precond: x_1,	postcond: x_2
o_2 :	precond: x_2,	postcond: $\neg x_2, x_3$
o_3 :	precond: x_2, x_3,	postcond: $\neg x_2, x_4$
o_4 :	precond: x_4,	postcond: x_5

x1 -o1-> x2 -o2-> x3 -o3-> x4 -o4-> x5

F0 A0 F1 A1 F2 A2 F3 A3 F4

  - ***Task: Compute the value of h_{add}. Show your workings.***
  - ***Task: Compute the value of h_{max}. Show your workings.***

h add = 1+4 = 5

h max = 4