

Exercises Lecture 12

Efficient AI Programming (IAIP)

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Exercise 1 (adapted from RN03 11.2)

Given the STRIPS problem defined in Figure 11.2 on page 380 in RN03,

- For a progression search, what are all the applicable concrete instances of $Fly(p, from, to)$ in the state $At(P1, JFK) \wedge At(P2, SFO) \wedge Plane(P1) \wedge Plane(P2) \wedge Airport(JFK) \wedge Airport(SFO)$?
- What is the next state achieved by applying each of these actions?

Exercise 2

Consider the 4-puzzle domain shown below

1	3
2	■

As for the 8-puzzle, tiles can be moved up, down, left, and right, but it is only possible to move a tile into an empty space. Thus, for the state shown above, tile 3 can move down and tile 2 can move right.

- Define the 4-puzzle as a STRIPS planning domain.
- Assume that the above state is the initial state. How would it be represented for your domain description?

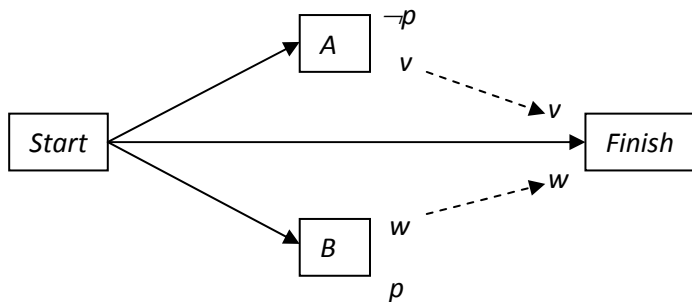
Assume the goal is to place tile 2 in the top right corner

■	2
■	■

- How would this goal be represented for your domain description?
- What are the applicable actions of the goal for a regression search?
- What is the new goal for each action?

Exercise 3

Consider the plan-state shown below



As depicted, action A and B can happen in independent of each other, but A sets p false and B sets p true. Does this mean that the plan-state is inconsistent? (why / why not)

Exercise 4

Consider the STRIPS planning problem

Init = v

Goal = $v \wedge w$

Action A

PRE: v

EFF: w

Action B

PRE:

EFF: $\neg v$

- Write a propositional formula that is satisfiable if and only if a plan exists in one time step.
- Show a variable assignment that makes the formula true.