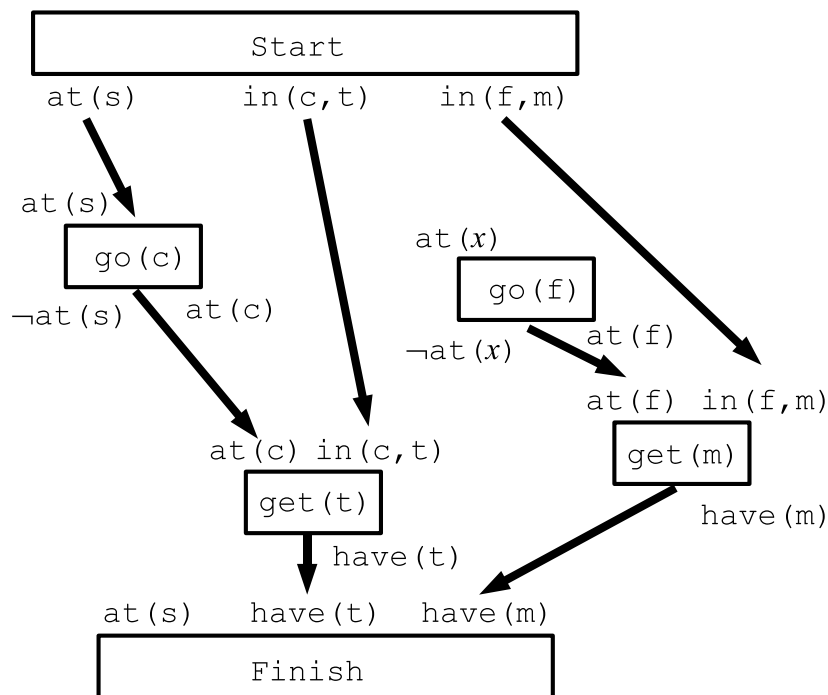


2008 Paper 4 Question 6

Artificial Intelligence I

A brilliant student has finished his exams and is making a well-deserved cup of tea. He is confused, however, and is trying to use the *partial order planning* algorithm to solve part of the problem. Using the abbreviations *f* for “fridge”, *c* for “cupboard”, *s* for “sink”, *m* for “milk” and *t* for “tea”, his start state is $\{\text{at}(s), \text{in}(c, t), \text{in}(f, m)\}$. Using x and y to denote variables, he has two actions. The first action is $\text{get}(y)$ having preconditions $\text{at}(x)$ and $\text{in}(x, y)$, and effect $\text{have}(y)$. The second action is $\text{go}(y)$ having precondition $\text{at}(x)$ and effects $\neg\text{at}(x)$ and $\text{at}(y)$. His goal is $\{\text{at}(s), \text{have}(t), \text{have}(m)\}$. So far he has made the following attempt at finding a plan:



In this diagram, arrows denote causal links.

- Can the $\text{at}(x)$ precondition on $\text{go}(f)$ be achieved by adding an ordering constraint and causal link from **Start** to $\text{go}(f)$, and perhaps one or more further ordering constraints, in such a way that the plan remains valid? Explain your answer. [4 marks]
- Describe a method, different from any suggested in part (a), by which the $\text{at}(x)$ precondition on $\text{go}(f)$ can be achieved in such a way that the plan remains valid. [8 marks]
- Describe a way in which the plan can be completed after making the addition you have described in part (b). [8 marks]