

Kurt Rose
Steven Brink

① convert $A \wedge ((B \wedge C) \vee G) \wedge \neg A$
into CNF;

$$(B \wedge C) \vee G \equiv (B \vee G) \wedge (C \vee G)$$
$$A \wedge ((B \wedge C) \vee G) \wedge \neg A \equiv A \wedge (B \vee G) \wedge (C \vee G) \wedge \neg A$$

② $A \wedge (B \vee G) \wedge (C \vee G) \wedge \neg A$



$$\{A\}, \{B, G\}, \{C, G\}, \{\neg A\}$$



3) ① Negate the goal $\{B\}$

② Choose 1st rule with B in head
 $\frac{\{B, \bar{A}, \bar{C}\}, \{B\}}{\{\bar{A}, \bar{C}\}}$

③ Choose 1st rule with A in head
 $\frac{\{A\}, \{\bar{A}, \bar{C}\}}{\{\bar{C}\}}$

④ Choose 1st rule with C in head
 $\frac{\{C, \bar{E}\}, \{\bar{C}\}}{\{\bar{E}\}}$

⑤ Choose 1st rule with E in head
 $\frac{\{E, \bar{A}\}, \{\bar{E}\}}{\{\bar{A}\}}$

⑥ Choose 1st rule with A in head
 $\frac{\{A\}, \{\bar{A}\}}{\{-\}}$

Done.

④ Forward chaining would start w/ an empty agenda then add facts together $\{A, \bar{C}\}$. It would then see w/c consequences were derivable from these facts in one step using $B: -A, C$ and $E: -A$ we could derive

$\{A, C, B, \bar{E}\}$. This contains B so done

⑤ $\forall x \exists y (\text{Minute}(x) \Rightarrow \text{Born When}(y, x) \wedge \text{Sucher}(y, x))$

6 Want to compute

$$\text{Unify}(t(s(h(x), 0), z), t(d, g(s(h, m))))(l)$$

↳ compound? ok of unify satisfied
so compute

$$\text{Unify}(s(h(x), 0), z), (d, g(s(h, m))))$$

$$\text{Unify}(t(\text{slot1}, \text{slot2}), t(\text{slot1}, \text{slot2}))(l)$$

since 1st two parameters same
this returns third parameter. i.e., (l)

So want to compute

$$\text{unify}(s(h(x), 0), z), (d, g(s(h, m))))(l)$$

↳ List? ok holds so compute

$$\text{unify}(z, (g(s(h, m))), \text{Unify}(s(h(x), 0), d, l))$$

d is a variable

so compute
 $\text{Unify-Var}(d, s(h(x), 0), l)$

now get substitution list

$$(d/s(h(x), 0))$$

so need to compute

$$\text{Unify}(z, (g(s(h, m))), (d/s(h(x), 0)))$$

↳ List? ok holds so compute

$$\text{Unify}((), (), \text{Unify}(z, g(s(h, m)), (d/s(h(x), 0)))$$

after compute Unify-Var
set $(z/g(s(h, m)), (d/s(h(x), 0)))$

↳ as $() = ()$
this last unify returns $\theta =$
 $(z/g(s(h, m)), d/s(h(x), 0))$
so mgu would be
 $t(s(h(x), 0), g(s(h, m)))$

7. $S \rightarrow []$.
 $S \rightarrow "(, S,)" S$.

Corresponds to

$S(\text{Input}, \text{Input})$.

$S(\text{Input}, \text{After Paren})$: — $\text{Input} = [40, \text{After}1]$
 $S(\text{After}1, \text{After}2)$
 $\text{After}2 = [41, \text{After}3]$
 $S(\text{After}3, \text{After}4)$

Thomas
Twain.

~~⑧ Effect Axiom: changes that result from taking actions.~~

~~possibility Axiom: when it's possible to execute the action~~

~~Frame problem: Representing the things that stays the same~~

⑧

Effect Axiom: An axiom in the situation calculus that specifies the results of some action.

possibility ax: An axiom in the situation calculus of the form: if certain preconditions are met then some action is possible.

Frame prob: Representing the things that stays the same after you have done an action in the situation calculus.

9 Document1

4/22/2004

S': On(A,B) & On(B,C) This is goal.

1. Move(A, Table, B)

-Remove On(A,B), Clear(Table) from S'. Add precondition literals.

S2: On(B,C) & On(A,Table) & Clear(A) & Clear(B) & Block(A)

2. Move(B, Table,C)

-Remove On(B,C), Clear(Table) from S2. Add precondition literals.

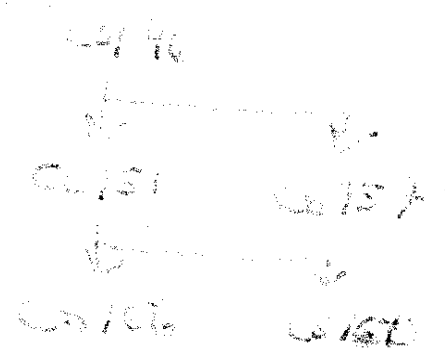
S1: On(A,Table) & On(B,Table) & Clear(A) & Clear(B) & Clear(C) & Block(A)
& Block(B)

This contains only things which are true in our initial goal state so planner would

terminate with the plan: Move(B, Table,C), Move(A, Table, B)

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(10)



Op(Action Start / End)
 Op(Action: [Action], from: [Value])
 Op(Action: [Action], from: [Value], to: [Value])
 Op(Action: [Action], from: [Value], to: [Value])

Op(Action: [Action], from: [Value], to: [Value])
 Op(Action: [Action], from: [Value], to: [Value])
 Op(Action: [Action], from: [Value], to: [Value])