NON LINEAR PLANNING EXAMPLE

Given the following initial state **ontable(a,p1), ontable(d,p3), on(c,d), ontable (b,p2), clear(a), clear(c), clear(b), handempty**
and the goal **ontable(a,p2)**

Actions are described as follows

pickup(X,Pos)
PRECOND: ontable(X,Pos), clear(X), handempty
DELETE: ontable(X,Pos), clear(X), handempty
ADD: holding(X), empty(Pos)

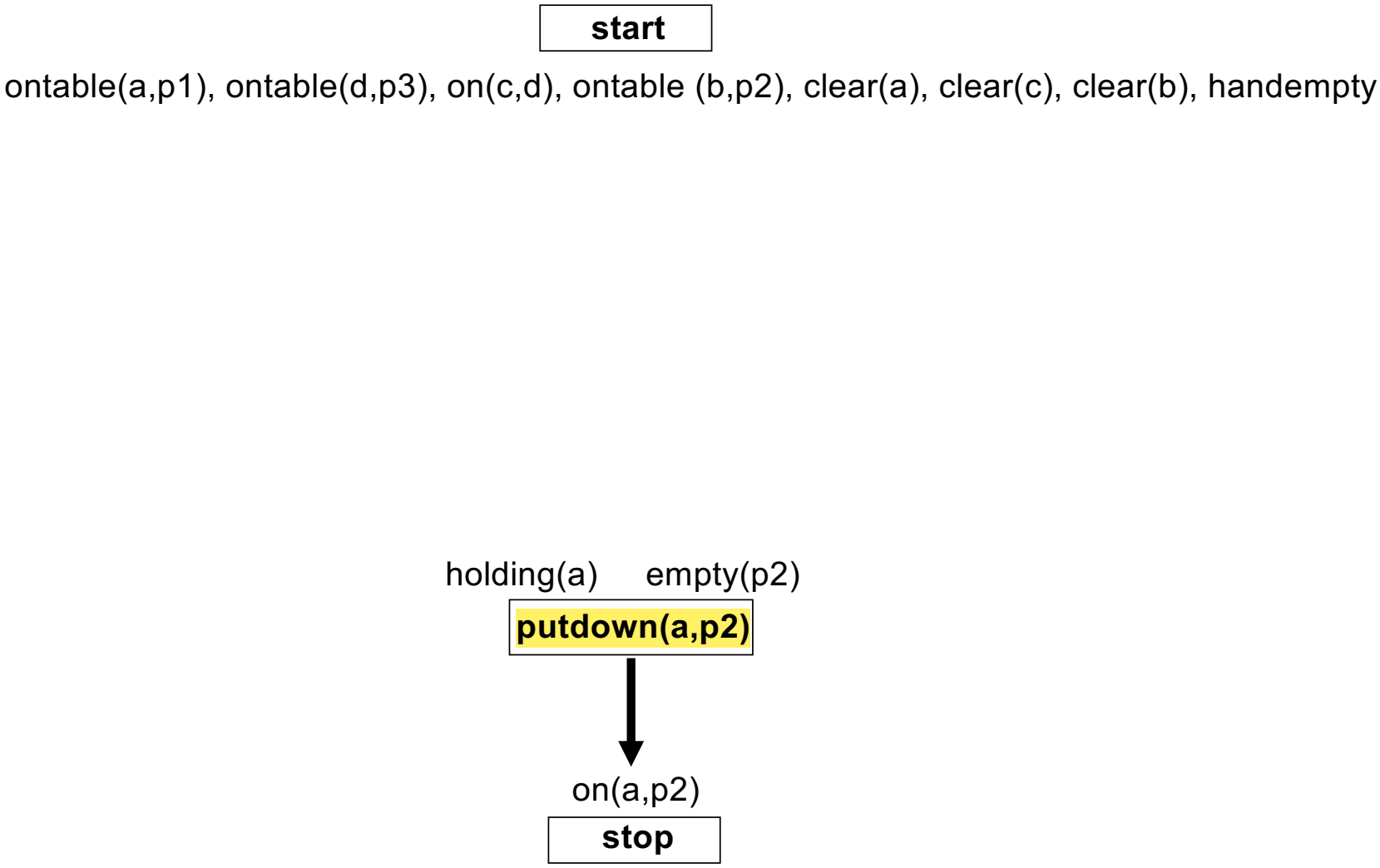
putdown(X,Pos)
PRECOND: holding(X), empty(Pos)
DELETE: holding(X), empty(Pos)
ADD: ontable(X,Pos), clear(X), handempty

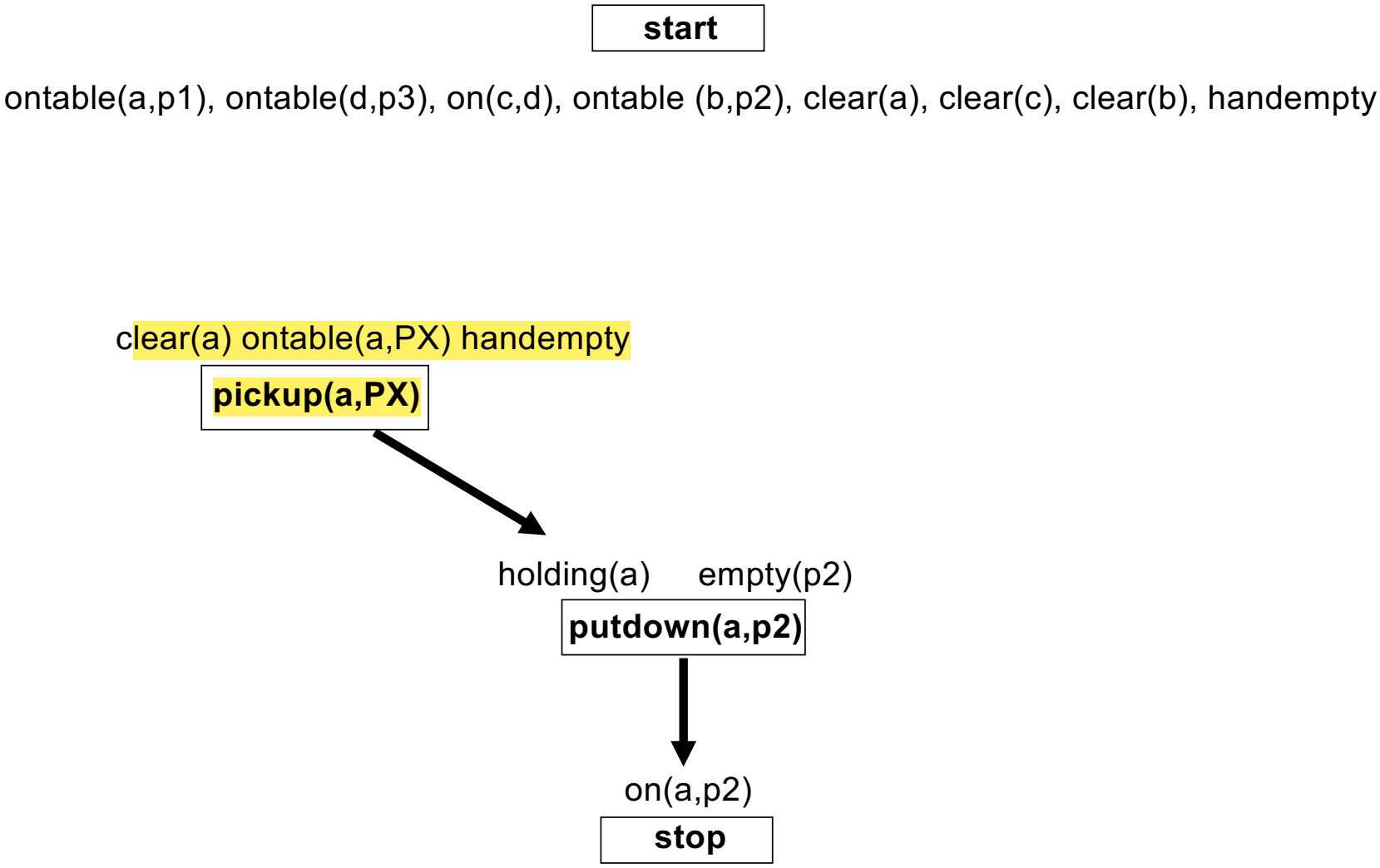
stack(X,Y)
PRECOND: holding(X), clear(Y)
DELETE: holding(X), clear(Y)
ADD: handempty, on(X,Y), clear(X)

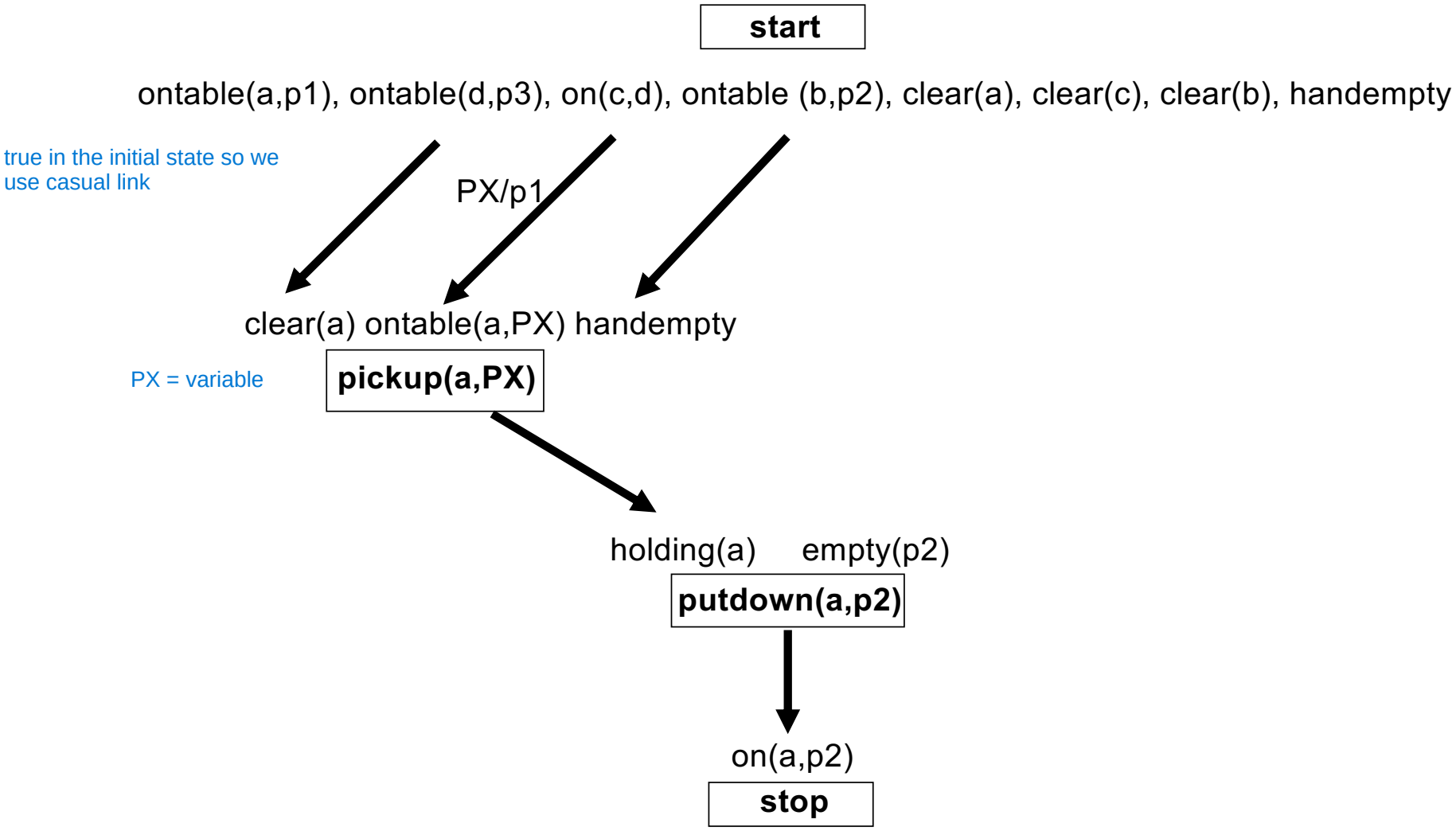
unstack(X,Y)
PRECOND: handempty, on(X,Y), clear(X)
DELETE: handempty, on(X,Y), clear(X)
ADD: holding(X), clear(Y)

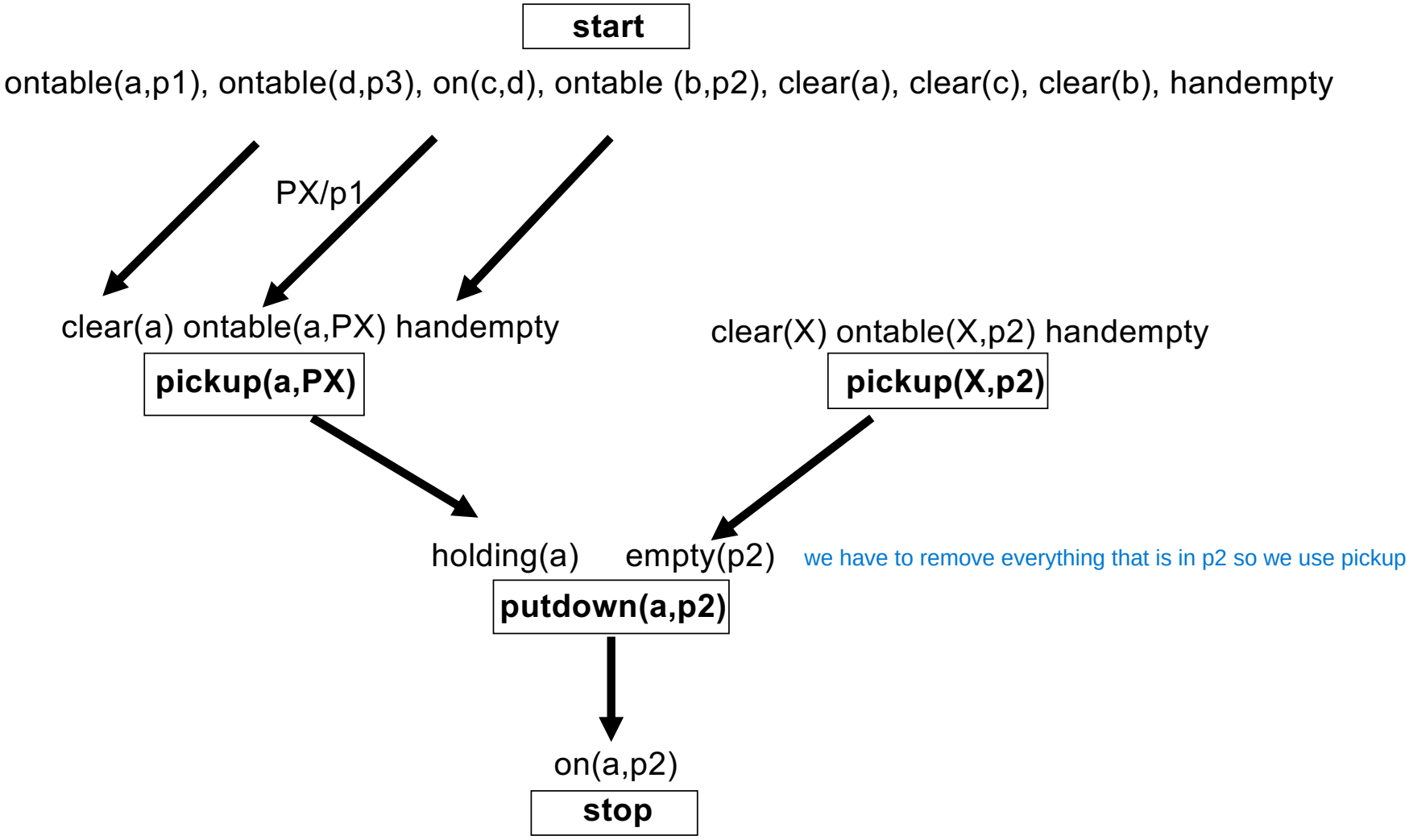
ontable(a,p1), ontable(d,p3), on(c,d), ontable (b,p2), clear(a), clear(c), clear(b), handempty

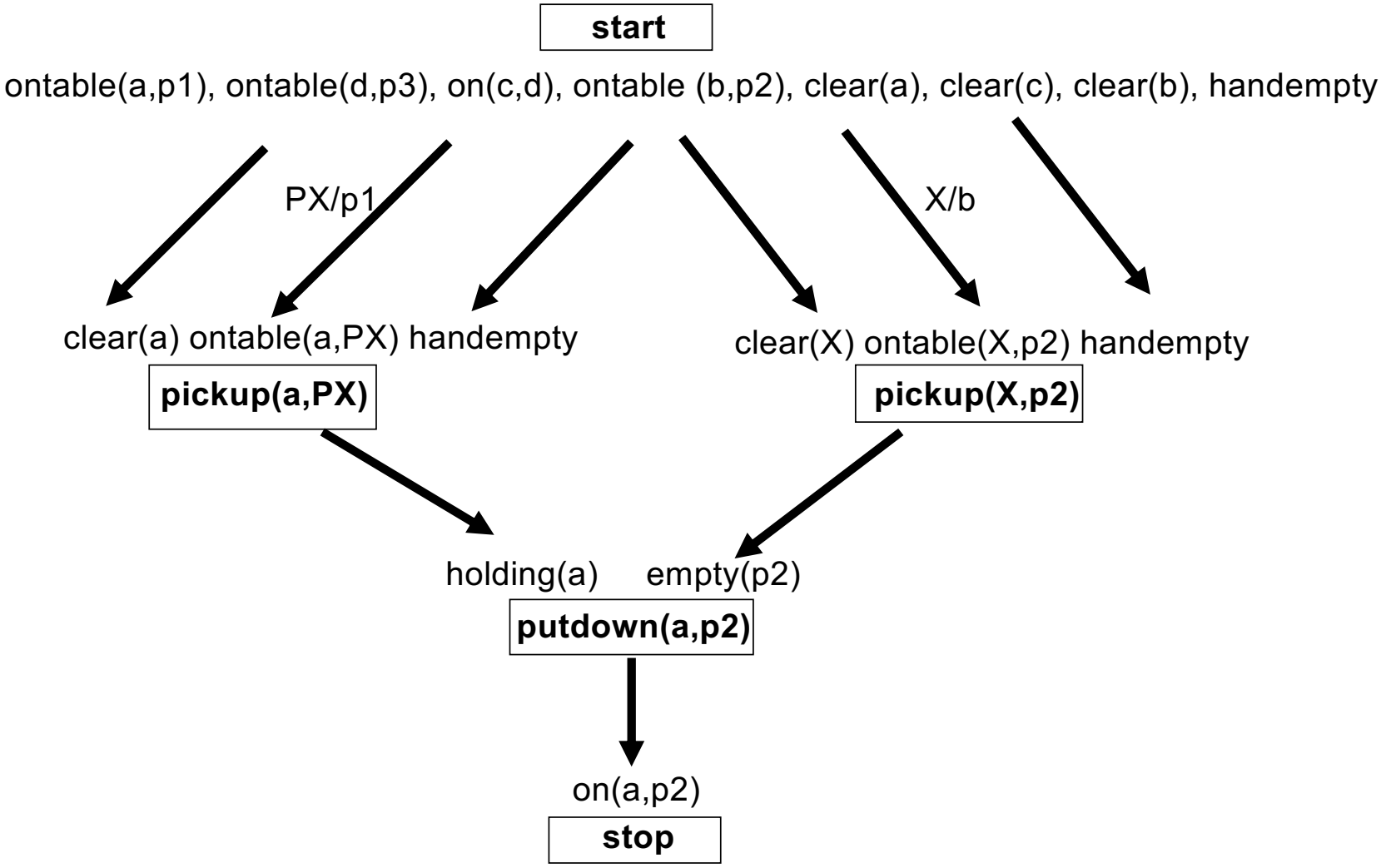
on(a,p2)

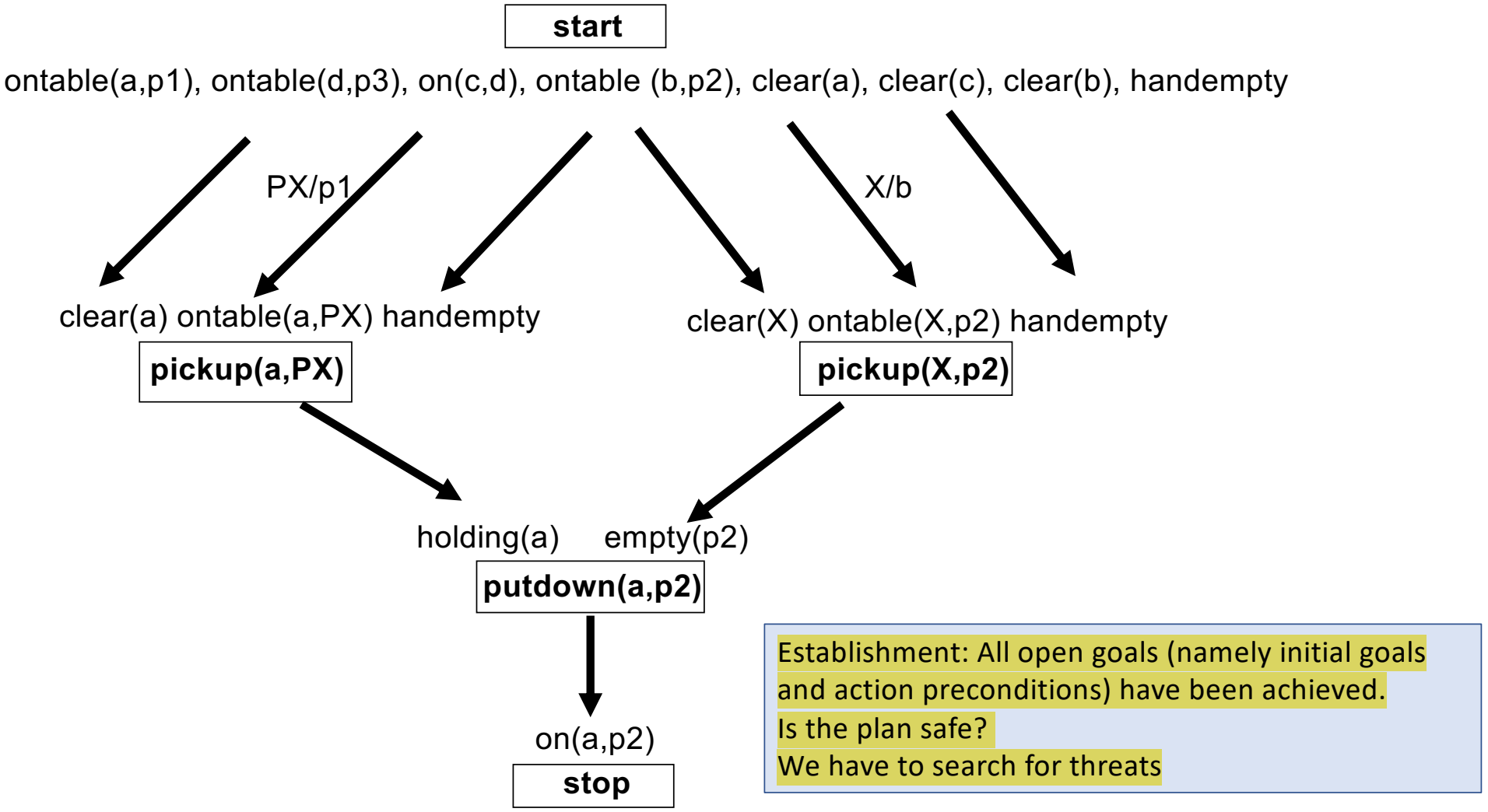

start
ontable(a,p1), ontable(d,p3), on(c,d), ontable (b,p2), clear(a), clear(c), clear(b), handempty
holding(a) empty(p2)
putdown(a,p2)
on(a,p2)
stop

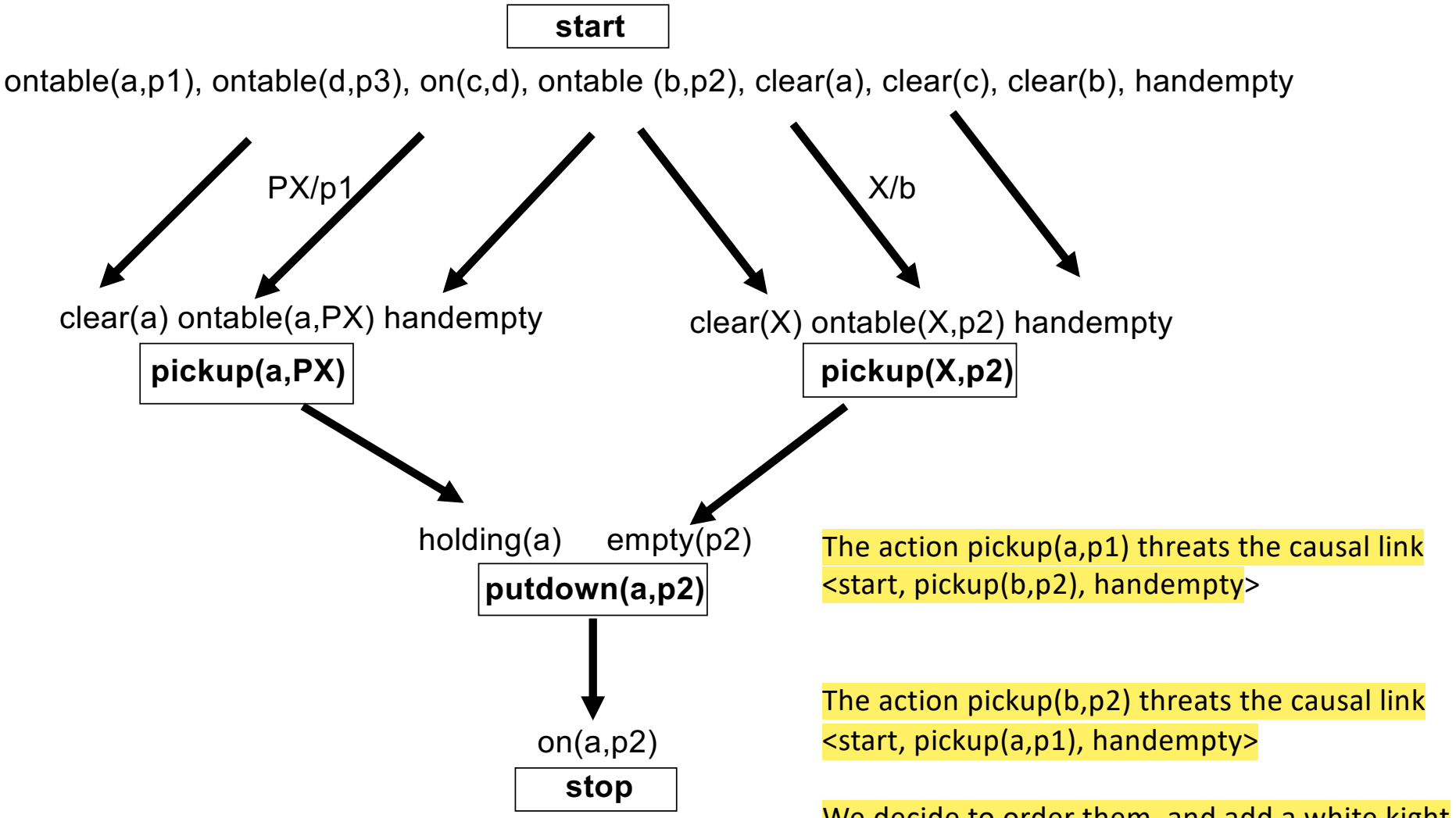

start
ontable(a,p1), ontable(d,p3), on(c,d), ontable (b,p2), clear(a), clear(c), clear(b), handempty
clear(a) ontable(a,PX) handempty
pickup(a,PX)
holding(a)
empty(p2)
putdown(a,p2)
on(a,p2)
stop


start
ontable(a,p1), ontable(d,p3), on(c,d), ontable (b,p2), clear(a), clear(c), clear(b), handempty
true in the initial state so we use casual link
PX/p1
clear(a) ontable(a,PX) handempty
PX = variable
pickup(a,PX)
holding(a) empty(p2)
putdown(a,p2)
on(a,p2)
stop


start
ontable(a,p1), ontable(d,p3), on(c,d), ontable (b,p2), clear(a), clear(c), clear(b), handempty
PX/p1
clear(a) ontable(a,PX) handempty
pickup(a,PX)
clear(X) ontable(X,p2) handempty
pickup(X,p2)
holding(a)
empty(p2)
we have to remove everything that is in p2 so we use pickup
putdown(a,p2)
on(a,p2)
stop


start
ontable(a,p1), ontable(d,p3), on(c,d), ontable (b,p2), clear(a), clear(c), clear(b), handempty
PX/p1
X/b
clear(a) ontable(a,PX) handempty
pickup(a,PX)
clear(X) ontable(X,p2) handempty
pickup(X,p2)
holding(a) empty(p2)
putdown(a,p2)
on(a,p2)
stop

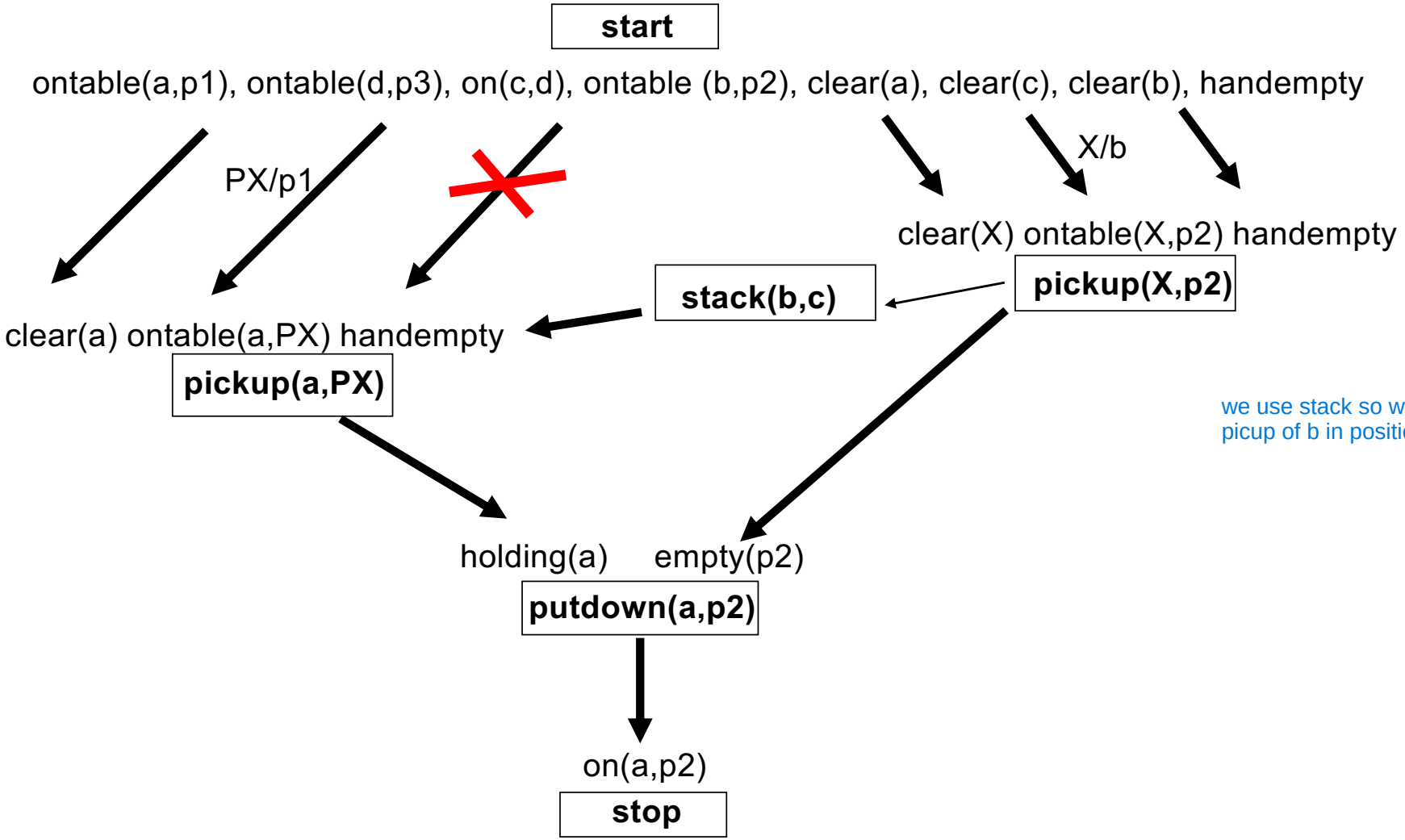

start
ontable(a,p1), ontable(d,p3), on(c,d), ontable (b,p2), clear(a), clear(c), clear(b), handempty
PX/p1
X/b
clear(a) ontable(a,PX) handempty
pickup(a,PX)
clear(X) ontable(X,p2) handempty
pickup(X,p2)
holding(a) empty(p2)
putdown(a,p2)
on(a,p2)
stop
Establishment: All open goals (namely initial goals and action preconditions) have been achieved.
Is the plan safe?
We have to search for threats



The action pickup(a,p1) threats the causal link <start, pickup(b,p2), handempty>

The action pickup(b,p2) threats the causal link <start, pickup(a,p1), handempty>

We decide to order them, and add a white kight



we use stack so we eestibilize handempty after the picup of b in position p2