Summary of Observations :

The Option1 rewrite graphs require fewer rules and promise to be far more compact than graphs produced via the Option2 rewrite approach. However, the Option2 rewrite approach provides more detailed explanations for data appearances/absences at particular rules requiring negation. To illustrate, in Example 1, while Option1 merely implies the absence of ***(10,10)*** in subgoal ***p*** results from the absence of ***(10)*** in ***q***, Option2 provides a more insightful explanation in the revelation of the absence of ***(10)*** in BOTH ***q*** and ***r*** as the true reason underlying the absence of ***(10,10)*** at ***p***. Similarly, in Example 2, Option1 justifies the absence of ***(10,10)*** at subgoal ***p*** with the absence of ***(10)*** in ***r***. However, Option2 discloses a more detailed explanation by revealing the data absence actually results from ONLY absence in ***r***, not in ***q***. Finally, in Example 3, Option1 argues the absence of ***(10,10)*** in subgoal ***p*** results from the absence of ***(10)*** in ***q***, while Option2 provides a more complete explanation by isolating the true stimulus for the data absence in ***p*** as the direct consequence of the absence of ***(10)*** ONLY in ***q*** and NOT in ***r***.

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Core Program:

a(X,Y) :- b(X,Y), ~p(X,Y)
p(X,Y) :- q(X), r(Y)

Option 1 Rewrite : a OR b

not_p(X,Y) :- ~q(X), dom_a_att1(X), dom_a_att2(Y)
not_p(X,Y) :- ~r(Y), dom_a_att1(X), dom_a_att2(Y)

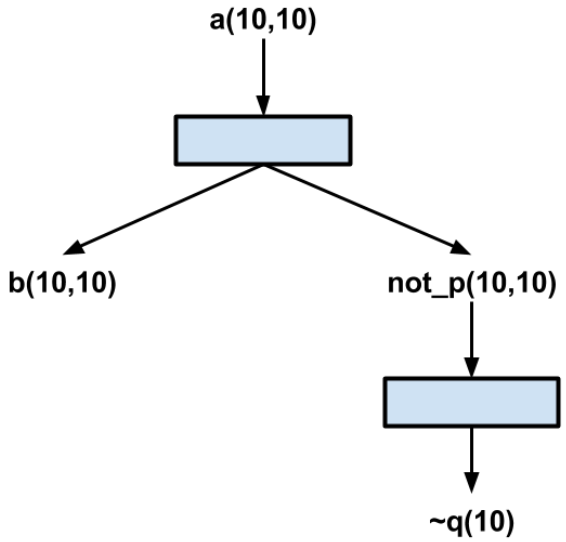
Option 2 Rewrite : (a AND NOT b) OR (NOT a AND b) OR (a AND b)

not_p(X,Y) :- q(X),~r(Y), dom_a_att1(X), dom_a_att2(Y)
not_p(X,Y) :- ~q(X),r(Y), dom_a_att1(X), dom_a_att2(Y)
not_p(X,Y) :- ~q(X),~r(Y), dom_a_att1(X), dom_a_att2(Y)

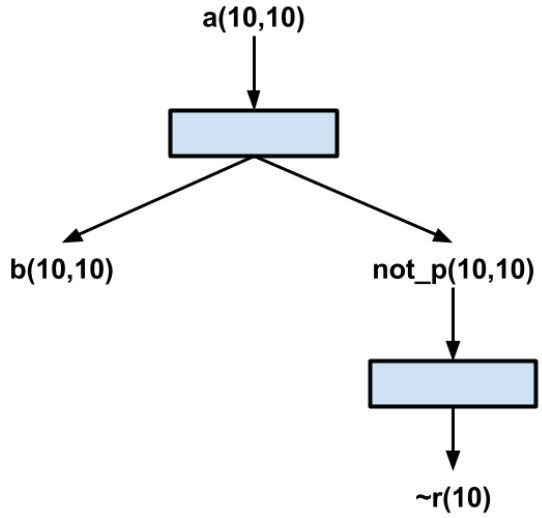
Example 1:

q(1) ;
r(2) ;
p(1, 2) ;

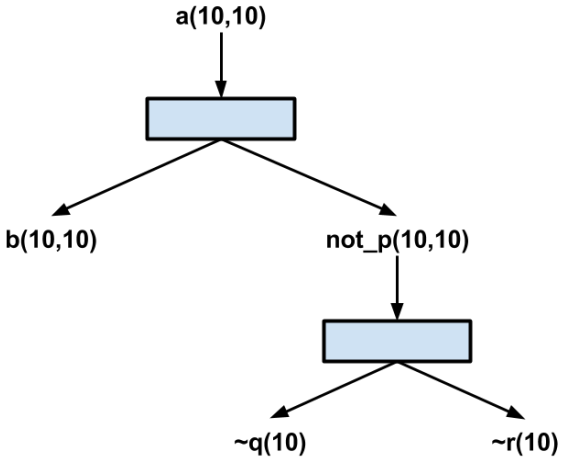
Option 1 Provenance :



Option 1 Provenance (Equivalent) :



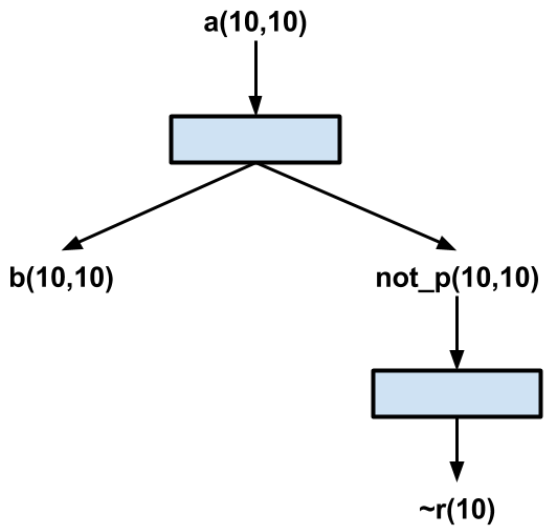
Option 2 Provenance :



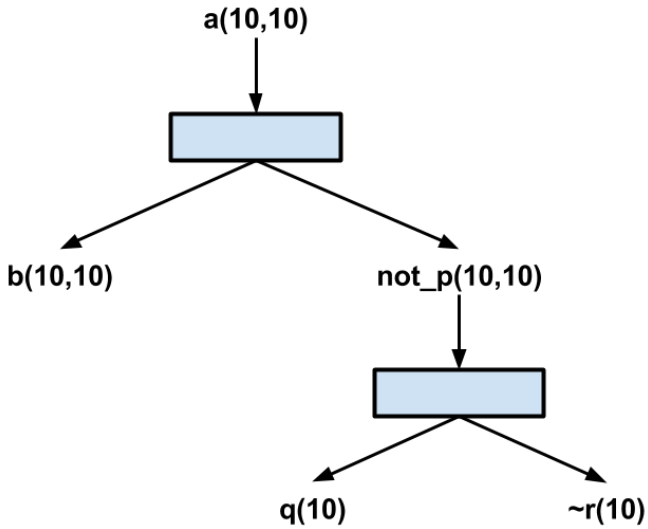
Example 2:

q(10) ;
r(2) ;
p(10, 2) ;

Option 1 Provenance :



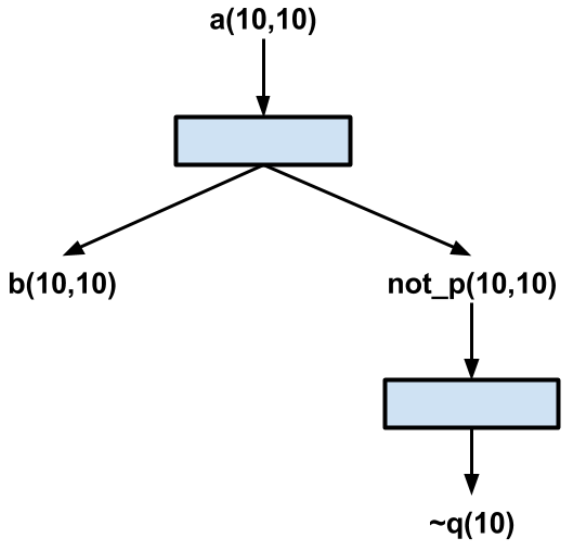
Option 2 Provenance :



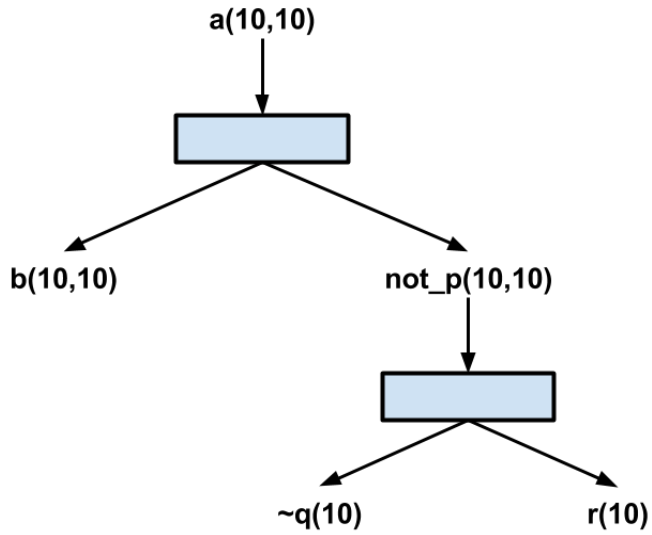
Example 3:

q(1) ;
r(10) ;
p(1, 10) ;

Option 1 Provenance :



Option 2 Provenance :



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