

Logic Specification Programming - Sheet #2

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Exercise 13

```
friends(ted, alice).
friends(ted, bob).
friends(bob, peggy).
friends(peggy, oscar).
friends(oscar, ted).
friends(oscar, walter).
friends(eve, walter).
```

```
social_net(X, Y) :- friends(X, Y).
social_net(X, Y) :- friends(X, Z), social_net(Z, Y).
```

```
?- social_net(ted, oscar).
```

a) - Magic Set Transformation

rule 0) - Fixed call modes.

$social_net_{bb}(X, Y) : \neg friends(X, Y).$

$social_net_{bb}(X, Y) : \neg friends(X, Y), social_net_{fb}(Z, Y).$

rule 2)

$magic_social_net_{bb}(V1, V2)$

rule 3)

$magic_social_net_{bb}(Z, Y) : magic_social_net_{fb}(X, Y), friends(X, Z).$

rule 4)

$social_net(X, Y) : \neg magic_social_net_{bb}(X, Y), friends(X, Y).$

$social_net(X, Y) : \neg magic_social_net_{bb}(X, Y), friends(X, Z), social_net_{fb}(Z, Y).$

rule 5)

$magic_social_net_{bb}(ted, oscar).$

b)

$M = \pi_{4,2}(M \bowtie_{1=1} F) \cup \{(ted, oscar)\}$

$S = \pi_{1,2}(M \bowtie_{1=1,2=2} F) \cup \pi_{1,2}((M \bowtie_{1=1} F) \bowtie_{2=2,4=1} S)$

c)

$friends(ted, alice).$

$friends(ted, bob).$

$friends(bob, peggy).$

$friends(peggy, oscar).$

$friends(oscar, ted).$

$friends(oscar, walter).$

$friends(eve, walter).$

$M_0 = \{(ted, oscar)\}$

$S_0 = \emptyset$

$M_1 = \{(ted, oscar), (alice, oscar), (bob, oscar)\}$

$S_1 = \pi_{1,2}(\emptyset) \cup \pi_{1,2}(\emptyset) = \emptyset$

$M_2 = \{(ted, oscar), (alice, oscar), (bob, oscar), (peggy, oscar)\}$

$S_2 = \pi_{1,2}(\emptyset) \cup \pi_{1,2}(\emptyset) = \emptyset$

$M_3 = \{(ted, oscar), (alice, oscar), (bob, oscar), (peggy, oscar), (oscar, oscar)\}$

$S_3 = \pi_{1,2}(\{(peggy, oscar)\}) \cup \pi_{1,2}(\emptyset) = \{(peggy, oscar)\}$

$M_4 = \{(ted, oscar), (alice, oscar), (bob, oscar), (peggy, oscar), (oscar, oscar), (walter, oscar)\}$

$S_4 = \pi_{1,2}(\emptyset) \cup \pi_{1,2}((M_3 \bowtie_{1=1} F) \bowtie_{2=2,4=1} \{(peggy, oscar)\})$

$$= \{(peggy, oscar), (bob, oscar), (oscar, oscar)\})$$

Further steps cannot derive further information \rightarrow fixed point reached