| Graph Pattern | Hop Type | Expressions in $\mu - RA$ |
|---|---|---|
| `(a)-[FriendOf]->(b),`<br>`(b)-[Knows]->(c)` | `One Hop And Branch` | $\widetilde{\pi}_m \left( \rho^m_{f_{id}} (F) \bowtie \rho^m_{p_{id}} (K) \right)$ |
| `(a)-[FriendOf]->(b)-[FriendOf]->(c),`<br>`(b)-[Knows]->(d)` | `Two Hops And Branch` | $\widetilde{\pi}_m \left( \rho^m_{f_{id}} (F) \bowtie \rho^m_{p_{id}} (F) \bowtie \rho^m_{p_{id}} (K) \right)$ |
| `(a)-[FriendOf]->(b)-[FriendOf]->(c),`<br>`(c)-[FriendOf]->(d), (c)-[Knows]->(d)` | `Three Hops And Branch` | $\widetilde{\pi}_m \left( \rho^m_{f_{id}} \left( \widetilde{\pi}_m (\rho^m_{f_{id}} (F) \bowtie \rho^m_{p_{id}} (F) \right) \bowtie \rho^m_{p_{id}} (F) \bowtie \rho^m_{p_{id}} (K) \right)$ |
| `(a)-[FriendOf]->(b)-[FriendOf]->(c),`<br>`(c)-[FriendOf]->(d), (b)-[Knows]->(d)` | `Three Hops And Branch` | $\widetilde{\pi}_{m,n} \left( \rho^n_{f_{id}} \left( \rho^m_{f_{id}} (F) \bowtie \rho^m_{p_{id}} (F) \right) \bowtie \rho^n_{f_{id}} (F) \bowtie \rho^m_{p_{id}} (K) \right)$ |
| `(a)-[FriendOf]->(b)-[FriendOf]->(c),`<br>`(c)-[FriendOf]->(d), (b)-[Knows]->(d)` | `Three Hops And Branch` | $\widetilde{\pi}_{m,n} \left( \rho^m_{f_{id}} (F) \bowtie \rho^{m,n}_{p_{id},f_{id}} (F) \bowtie \rho^n_{p_{id}} (F) \bowtie \rho^m_{p_{id}} (K) \right)$ |
| `(a)-[FriendOf]->(b)-[FriendOf]->(c),`<br>`(c)-[FriendOf]->(d), (b)-[Knows]->(e)`<br>`(c)-[Knows]->(f)` | `Four Hops And Branches` | $\widetilde{\pi}_{m,n} \left( \rho^m_{f_{id}} (F) \bowtie \rho^m_{p_{id}} \left( \rho^n_{f_{id}} (F) \right) \bowtie \rho^m_{p_{id}} \left( \rho^k_{k_{id}} (K) \right) \bowtie \rho^n_{p_{id}} (F) \bowtie \rho^n_{p_{id}} (K) \right)$ |