**Solution**

[Id, Id]

**1-hop** Conditions:

* reference √

**2-hop** Conditions:

* if next hop is paper, then transform to **1-hop** question
* common author;
* common study field;
* common conference;
* common journal;

**3-hop** Conditions:

* if next hop is paper, then transform to **2-hop** [Id, Id] question
* if next hop is not paper, then second hop must be paper

[Id, AA.AuId]

**1-hop** Conditions:

* with author

**2-hop** Conditions:

* the next hop must be paper

**3-hop** Conditions:

* if the second hop is paper, then transform to **2-hop** [Id, Id] question
* if the second hop is author affiliation, the first hop must be an author node.

[AA.AuId, Id]

**1-hop** Conditions:

* with author

**2-hop** Conditions:

* the next hop must be paper

**3-hop** Conditions:

* if the next hop is paper, then transform to 2-hop [id, id] question
* if the next hop is author affiliation, the second hop must be an author node

[AA.AuId, AA.AuId]

**1-hop** Conditions: not exist

**2-hop** Conditions:

* the next hop is affiliation
* the next hop is paper

**3-hop** Condition:

* the next hop must be paper, then transform to **2-hop** [Id, AA.AuId] question