Sources extraction.

Input:

- a set S := {$R_{i,j}$ | i, j∈[1,q] of dependence relations representing an SCC, where each $R_{i,j}$ denotes the union of all relations describing dependences between statements s_i and s_j, and q is the number of vertices in the SCC.

Output

- sets Sources(i), 1≤i≤q, composed of the (lexicographically minimal) sources of slices and being instances of statement s_i.

Method:

begin

1. **foreach** relation $R_{i,j}$ ∈ S **do**

extend the tuples of $R_{i,j}$ with additional objects representing identifiers of statements i and j, i.e., transform $R_{i,j}$:= {[e]→[e']} into $R_{i,j}$:={[e,i]→[e',j]}.

2. Form relation R as the union of all the relations in S, R := $\bigcup_{1\le i,j\le q \,\&\, R_{i,j}\in S} R_{i,j}$.

3. **foreach** statement s_i, 1≤i≤q, **do**

find set UDS(i) containing ultimate dependence sources being instances of statement s_i as the difference between the union of domains of all relations describing dependence sources being instances of s_i and the union of ranges of all relations representing destinations being also instances of s_i :

$$UDS(i) := \bigcup_{1\le k\le q \,\&\, R_{i,k}\in S} \mathrm{dom}\, R_{i,k} - \bigcup_{1\le k\le q \,\&\, R_{k,i}\in S} \mathrm{ran}\, R_{k,i} .$$

4. $UDS := \bigcup_{1\le i\le q} UDS(i)$.

5. **foreach** statement s_i, 1≤i≤q, **do**

5.1. Form relation R_UCS(i) representing all pairs of ultimate dependence sources that are connected (by an indirect path) in the dependence graph formed by R:

R_UCS(i):= {[e]→[e']| e∈UDS(i), e'∈UDS, e' ≻ e, (R*(e')) ∩ (R*(e)) ≠∅ }.

5.2. Sources(i):=UDS(i) – ran R_UCS(i).

end