

MODULE *Digraph*

A *digraph* is a pair consisting of a set of vertices and a set of edges

$Vertices(digraph) \triangleq digraph[1]$

$Edges(digraph) \triangleq digraph[2]$

$IsDigraph(digraph) \triangleq$

$\wedge digraph = \langle Vertices(digraph), Edges(digraph) \rangle$

$\wedge \forall e \in Edges(digraph) :$

$\wedge e = \langle e[1], e[2] \rangle$

$\wedge \{e[1], e[2]\} \subseteq Vertices(digraph)$

$Children(v, digraph) \triangleq$

$\{c \in Vertices(digraph) : \langle v, c \rangle \in Edges(digraph)\}$

RECURSIVE $Descendants(_, _)$ union of reachable

$Descendants(vs, dag) \triangleq$ IF $vs = \{\}$ THEN $\{\}$ ELSE

LET $children \triangleq \{c \in Vertices(dag) : \exists v \in vs : \langle v, c \rangle \in Edges(dag)\}$ IN
 $children \cup Descendants(children, dag)$