Reading Note for *Distributed Garbage Collection for General Graphs*

Assumptions:

- Asynchronous network model with a reliable reordering channel.
- Unique identifier for each node.

Contributions:

- Propose a scalable, cycle-collecting, ***decentralized***, reference counting garbage collector with partial tracing.
- Memory: O(logn) bits per node, where n is the number of nodes in the graph.
- It collects garbage in O(Ea) time, where Ea is the number of edges in the induced subgraph.
- Algorithm is stable against concurrent mutation.

Definitions:

- All nodes in G are either live or dead.
- Live if reachable.
- Edge is either strong, weak, or phantom.
- Strong edge is defined as A->B, Weight(A) < Weight(B)
- No cycle of strong edges will be formed by weight-based edge classification
- A path is an ordered set of edges such that
- the destination of each edge is the origin of the next
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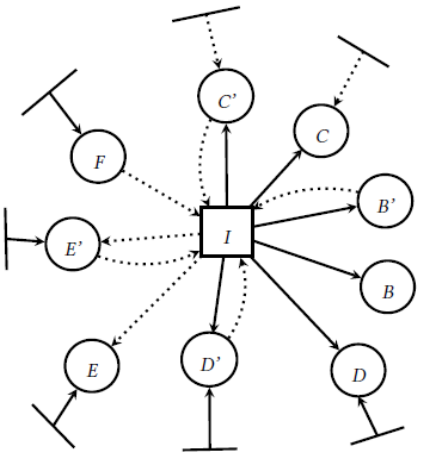
- A path is called strong if it consists exclusively of strong edges.
- If it contains any weak edges, it is called non-strong.
- a node I ∈ G is dead if and only if its supporting set is empty.

- A dependent set is a set of node thats depends on a strong edge from I
- Purely dependent only has an edge from I.
- Supporting set has an edge from them to I.
- Independent set is nodes with a strong edge from other nodes.
- Build is intersection of independent and supporting
- Recovery set is independent intersection supporting
- Affected set is all nodes pointed from I.



Set Name	Nodes in Set	Comment
Purely Dependent	*B B'*	if *I* is garbage, so this set
Dependent	*B B' C C'*	Will phantomize
Supporting	*C' D' E' F*	If this set isn't empty, *I* is not garbage
Independent	*D D' E E' F*	Will not phantomize
Build	*D' E' F*	If this set is not empty, recover is not necessary
Recovery	*C'*	The intersection of the dependent and supporting sets
Affected	*B B' C C' D D' E E'*	

Phases

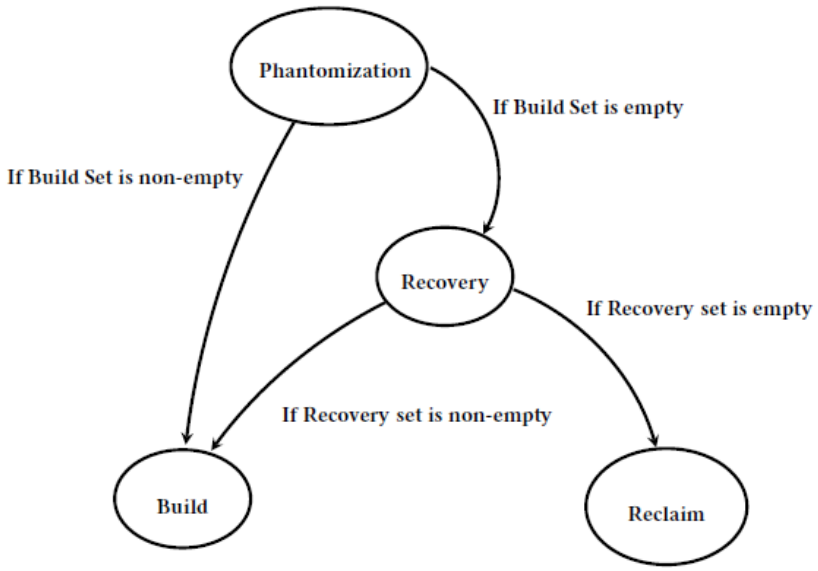


Figure 3. An illustration of the phase transitions performed by an initiator in the algorithm.