An Algorithm for Building Reachability Trees

Step 1. Label the initial marking \( M_0 \) as the root & tag it "new";

Step 2. While "new" markings exist, do the following:

1. Select a new marking \( M \);

2. If \( M \) is identical to a marking on the path from the root to \( M \), then tag \( M \) "old", and go to another new marking;

3. If no transitions are enabled at \( M \), tag \( M \) "dead-end";

4. While there exist enabled transitions at \( M \), do the following for each enabled transition \( t \) at \( M \):

   4.1. Obtain the marking \( M' \) that results from firing \( t \) at \( M \);

   4.2. On the path from the root to \( M \) if there exists a marking \( M'' \) such that \( M'(p) \geq M''(p) \) for each place \( p \) and \( M' \neq M'' \), then replace \( M'(p) \) by \( \omega \) for each place such that \( M'(p) > M''(p) \);

   4.3. Introduce \( M' \) as a node, draw an arc with label \( t \) from \( M \) to \( M' \), and tag \( M' \) "new".