Marked ancestor upper bound

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- ART decomposition
- recurse in top tree
- $\Rightarrow O\left(\frac{\lg n}{\lg \lg n}\right)$ levels of recursion

- bottom tree:
  - store predecessor structure on each nonbranching path
    - $O(\lg \lg n)$ since $u = O(n)$
  - represent compressed tree with 1 word of $O(\lg n)$ bits
    - bits represent which paths have marked nodes
    - ordered by depth
  - node stores bitmask of ancestors in compressed tree
- query: $O\left(\frac{\lg n}{\lg \lg n}\right)$
  - in bottom tree:
    - find lowest ancestral path with marked node via mask, shift, LSB
    - if there is one, query predecessor structure
    - else recurse in top tree with root of bottom tree
- update: $O(\lg \lg n)$
  - each node stores recursion depth at which it is in bottom tree
  - update predecessor structure for path & 1 word for compressed tree.