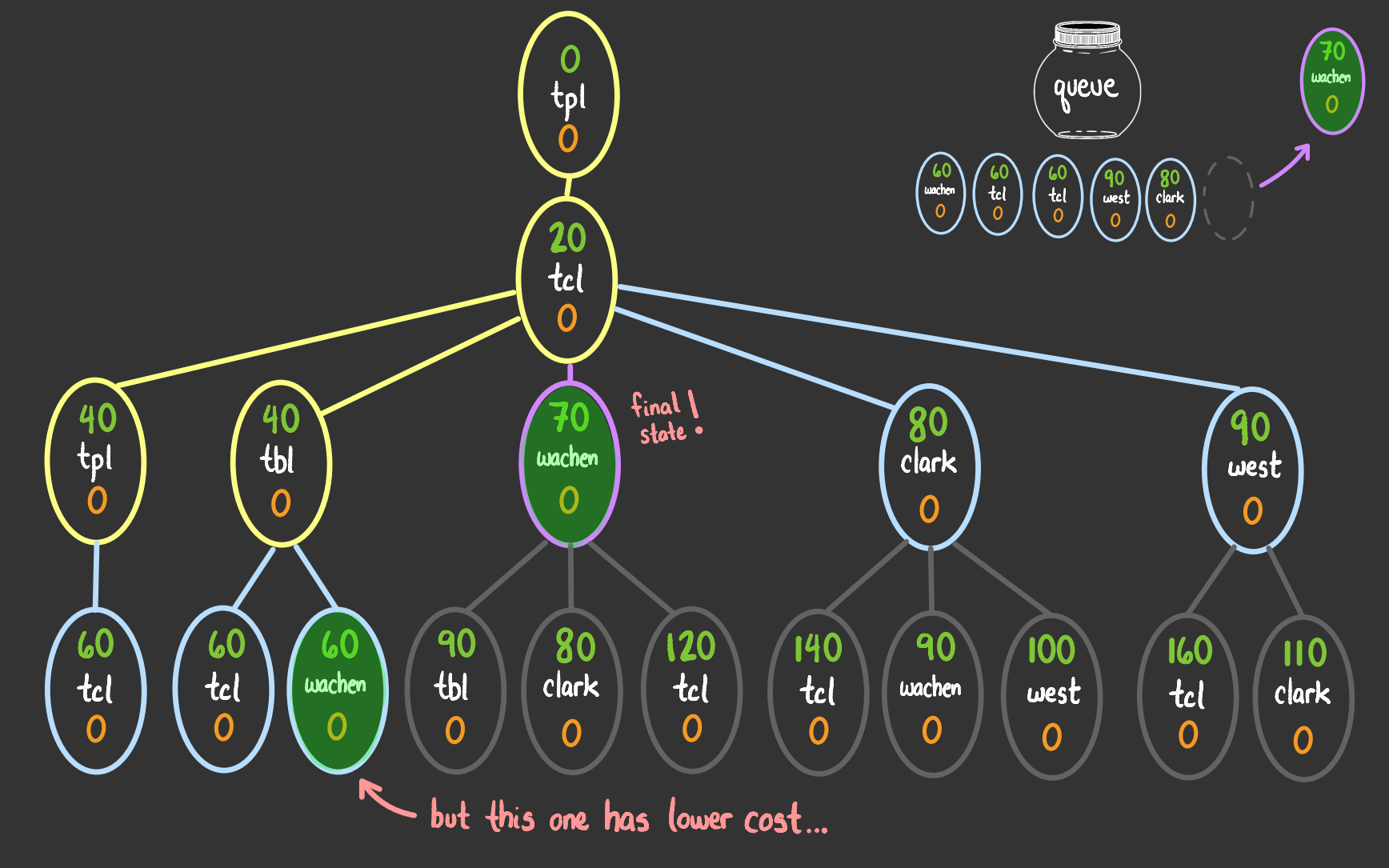
uniform cost search

16 sept 2022

CSCI 373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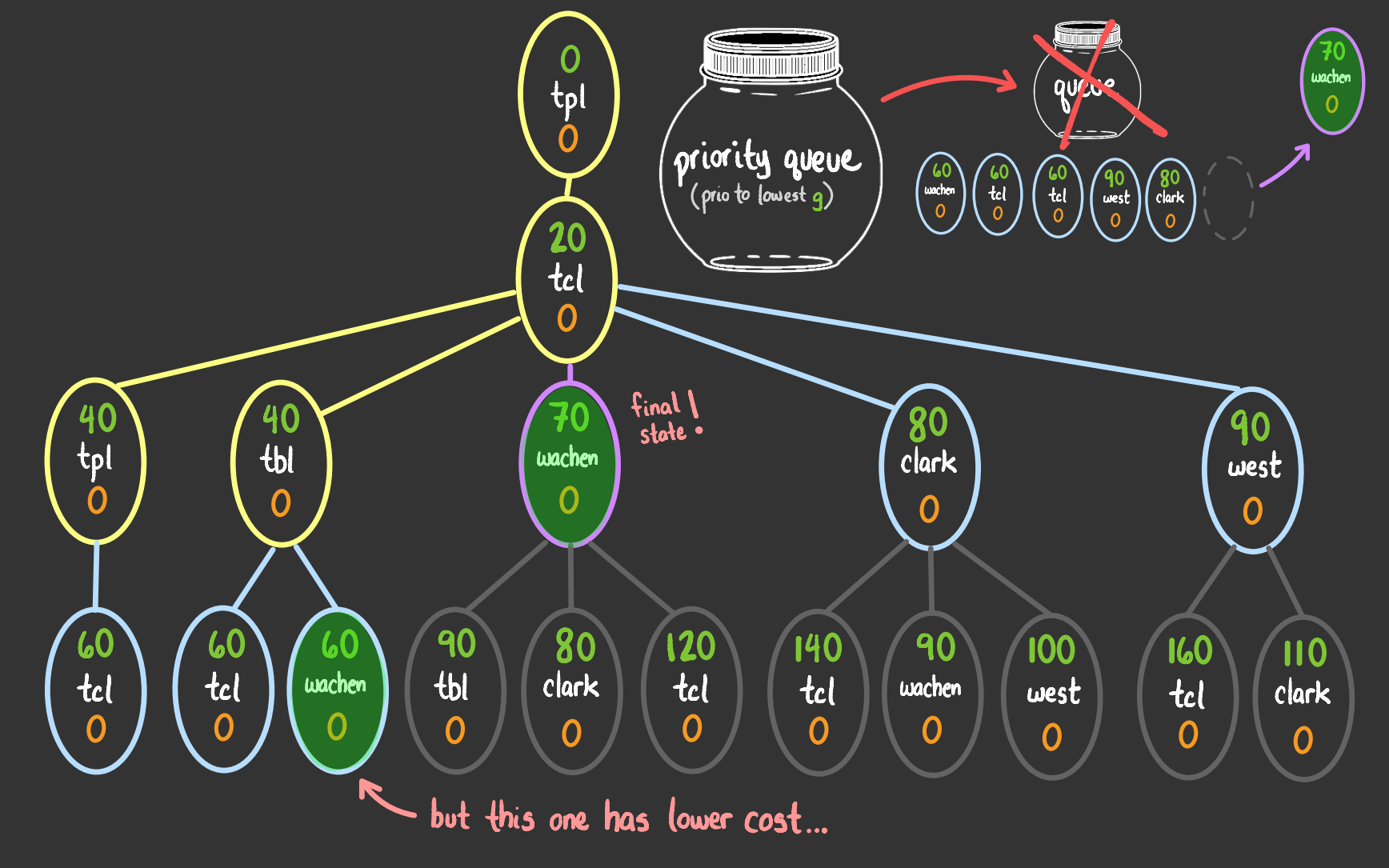
but this one has lower cost...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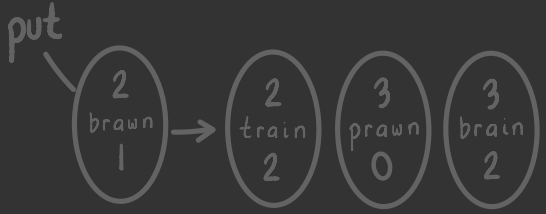
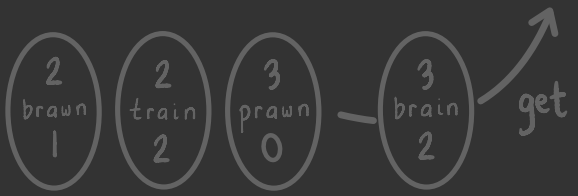
but this one has lower cost...

example containers

queue





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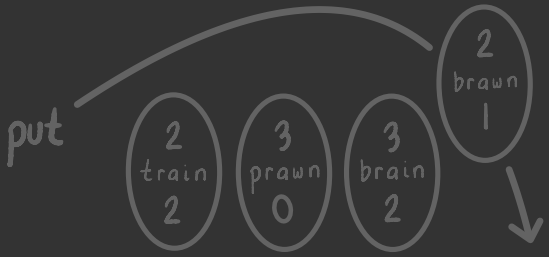
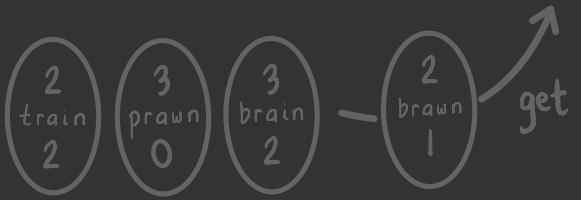
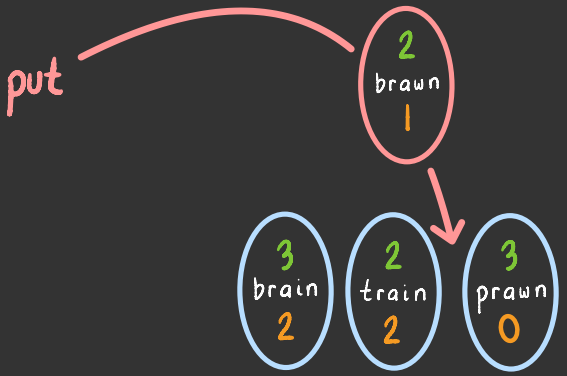
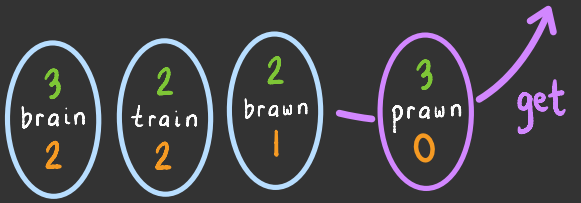




priority queue



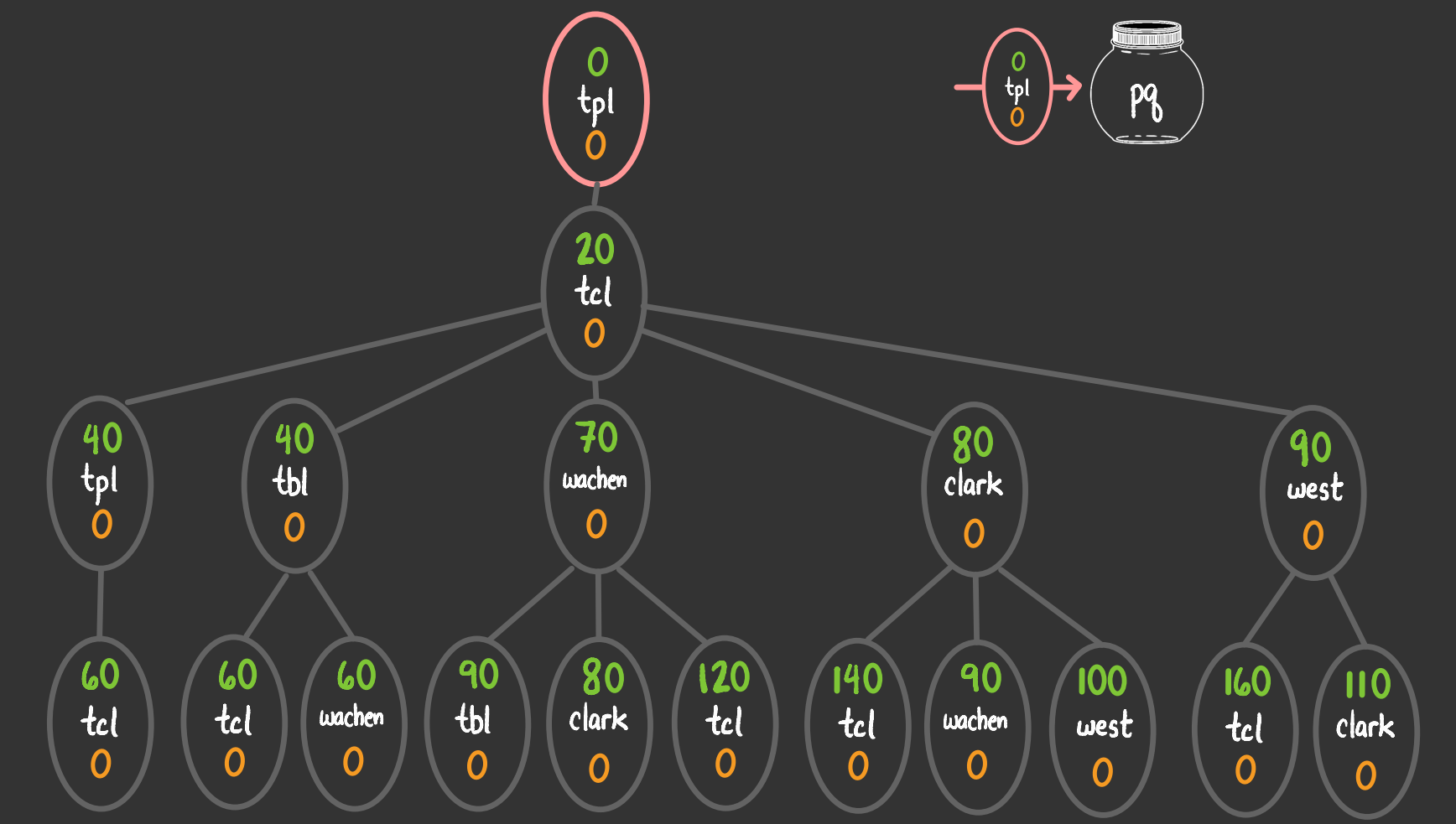


SEARCH$(M = (Q, \Sigma, \Delta, q_0, F, w), H)$:

- container = new Container()
- container.put($\langle q_0, 0, H(q_0) \rangle$)
- repeat:
  - if container.empty() then return ∞
  - n = container.get()
  - if $q(n) \in F$ then return $g(n)$
  - let $\text{successors}_{M,H}(n) = \{ \langle q', g(n) + w(q(n), \sigma, q'), H(q') \rangle \mid (q(n), \sigma, q') \in \Delta \}$
  - for $n' \in \text{successors}_{M,H}(n)$:
    container.put(n')

"visit" a node

feel free to play along...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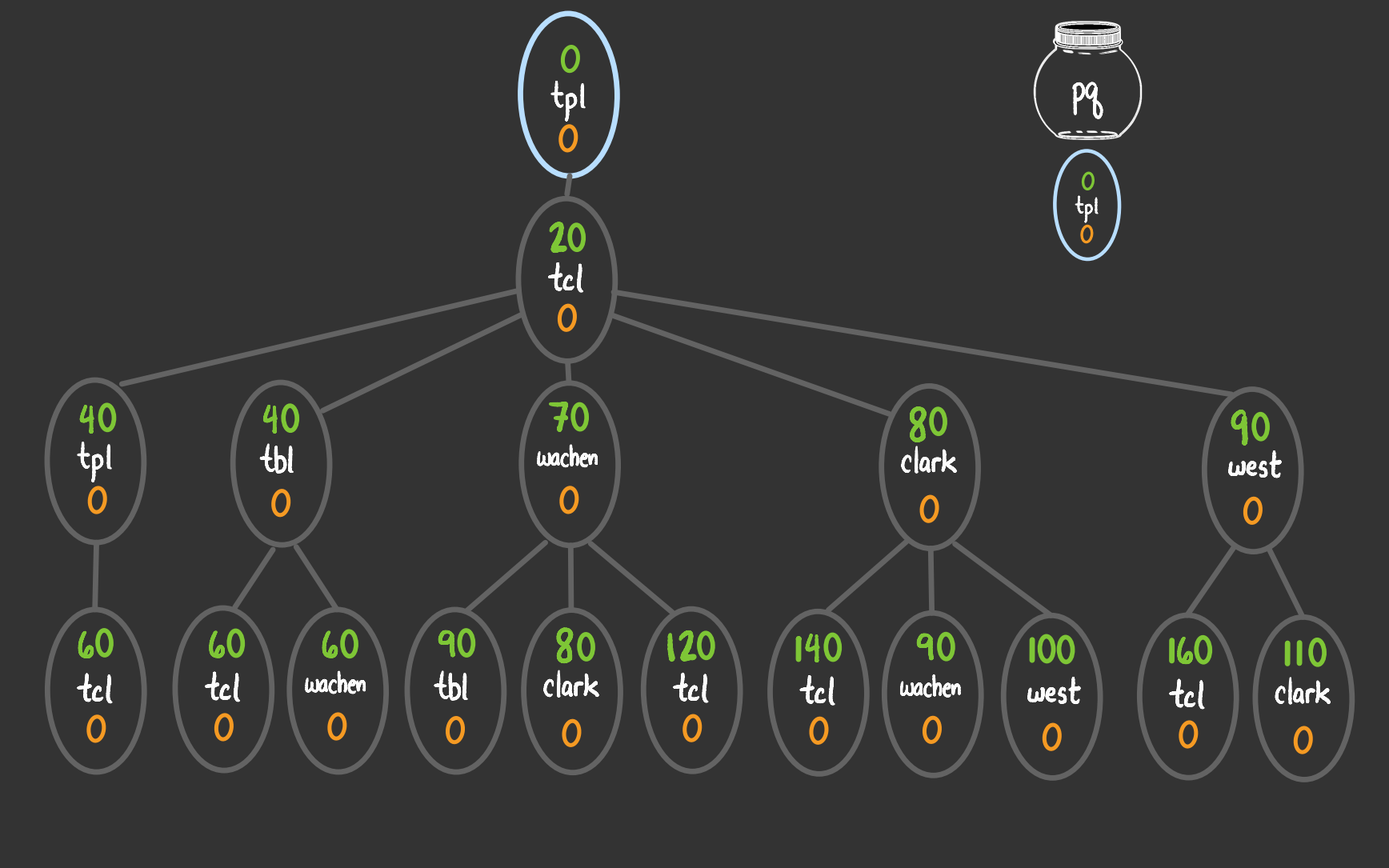
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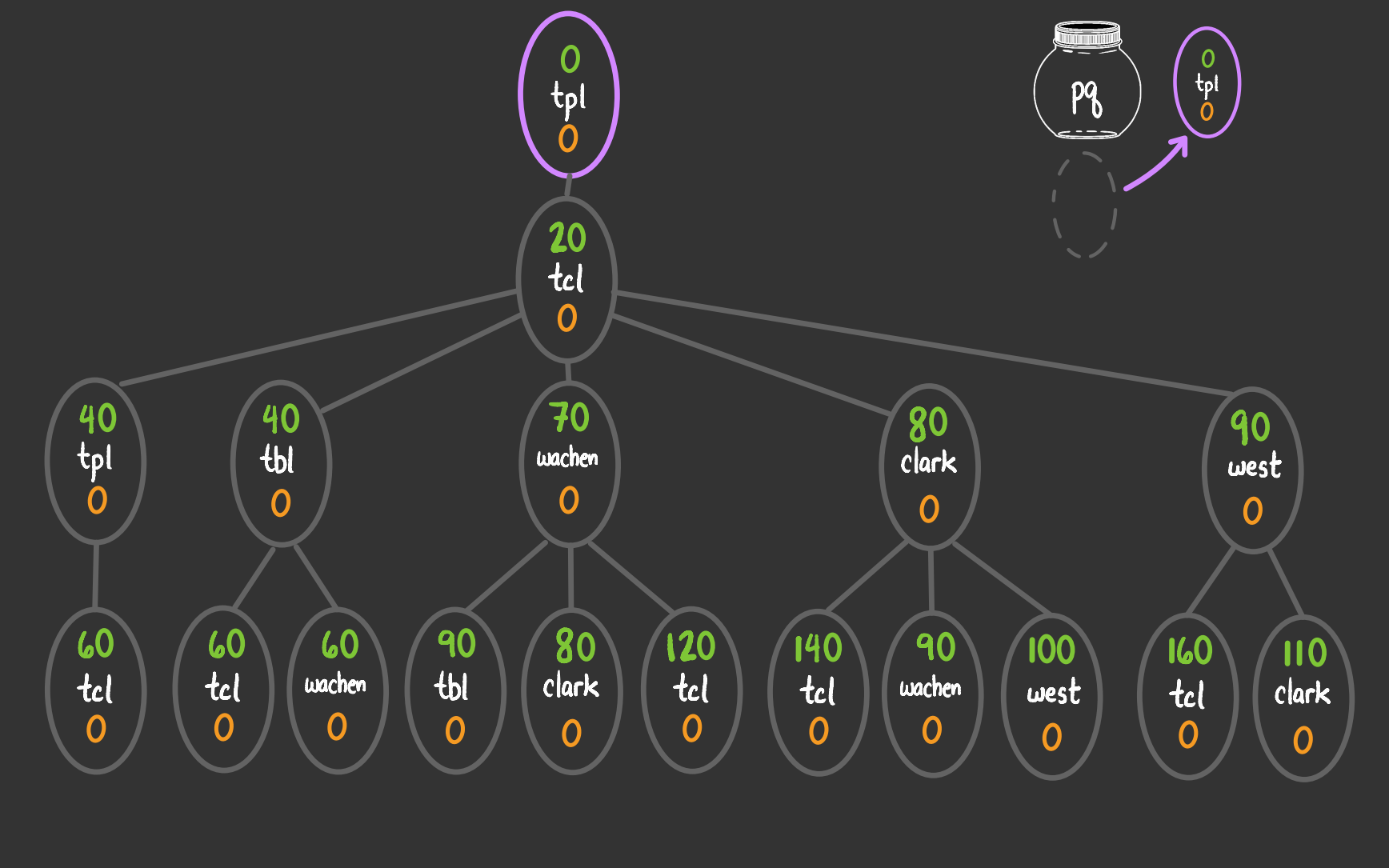
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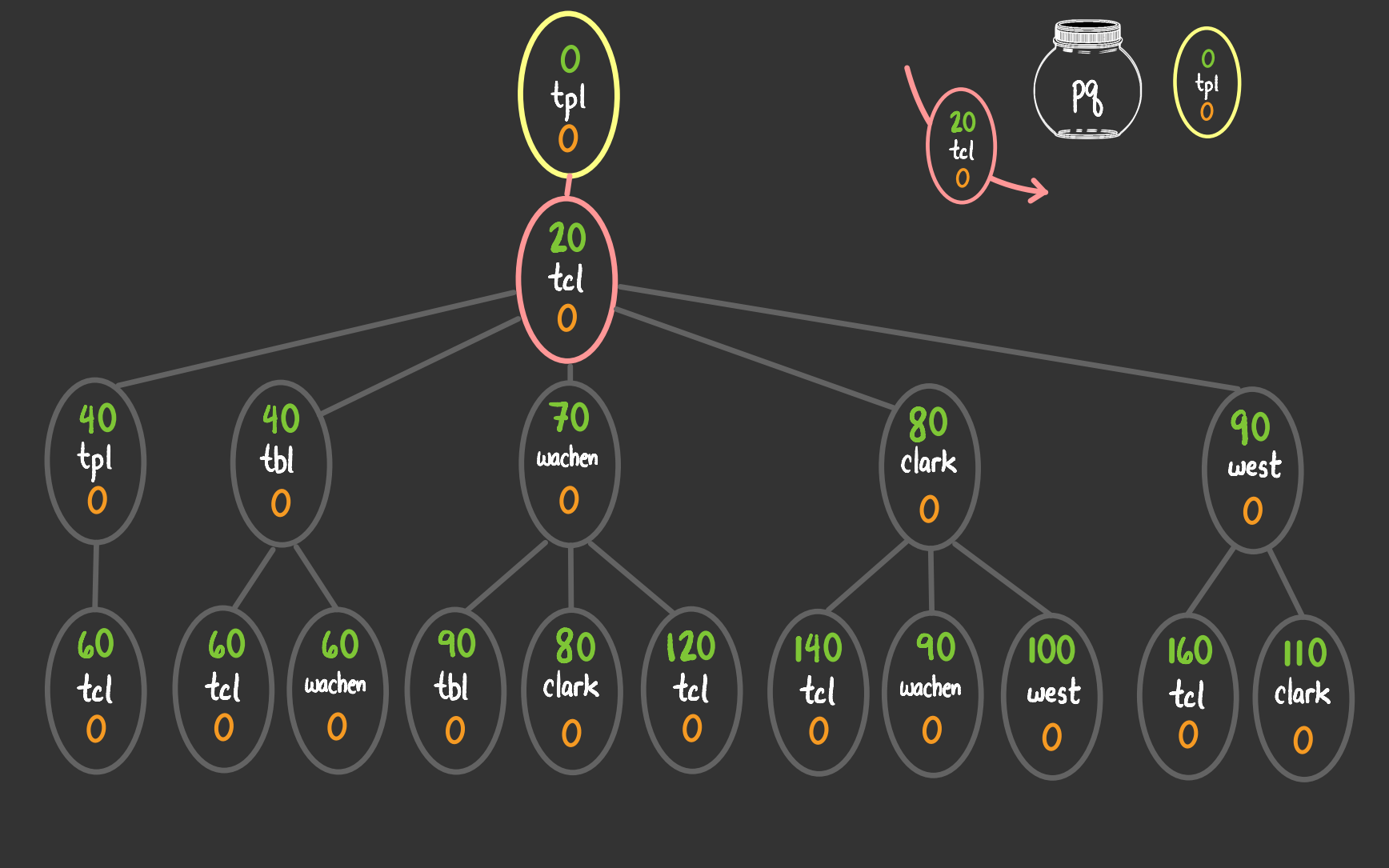
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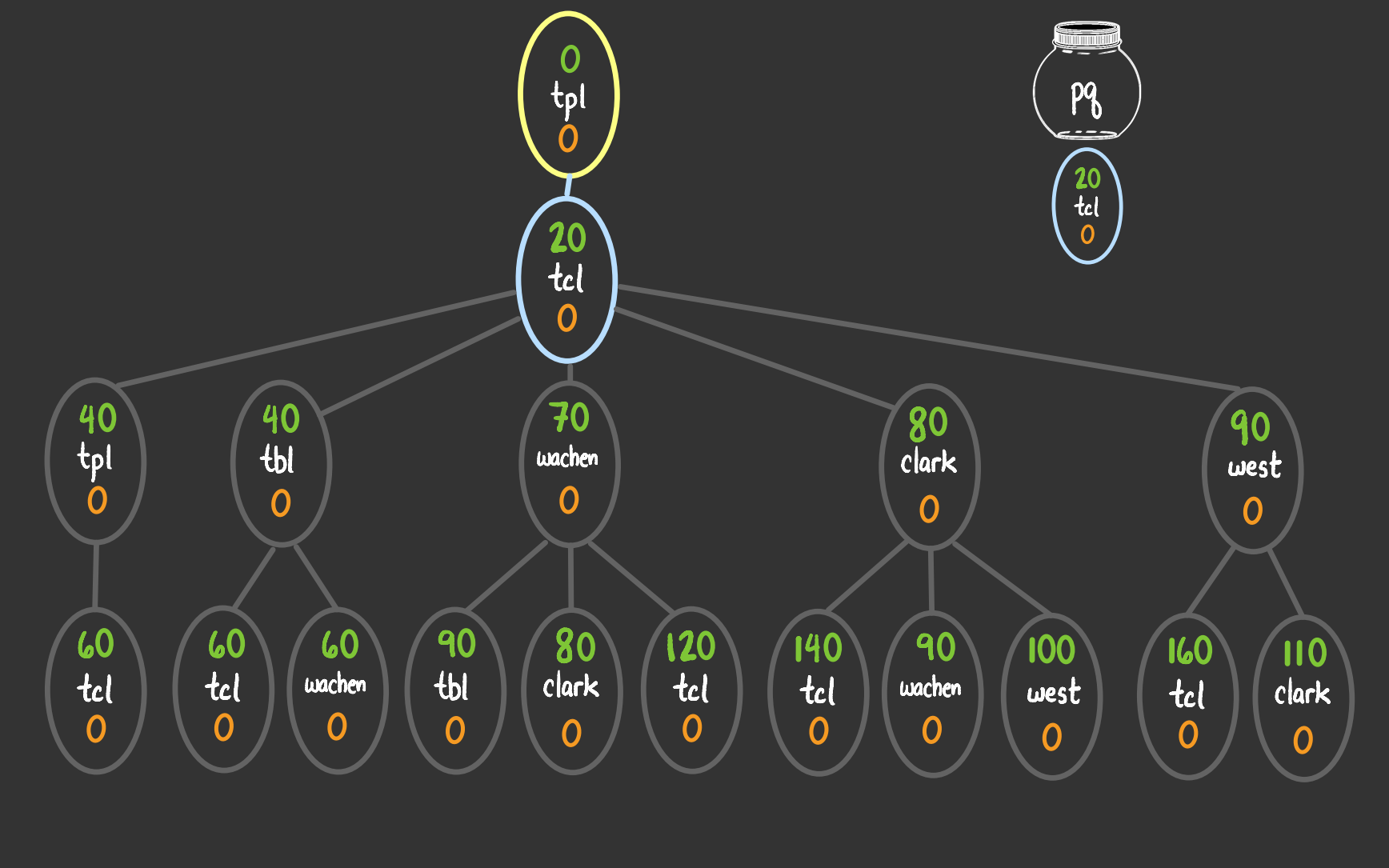
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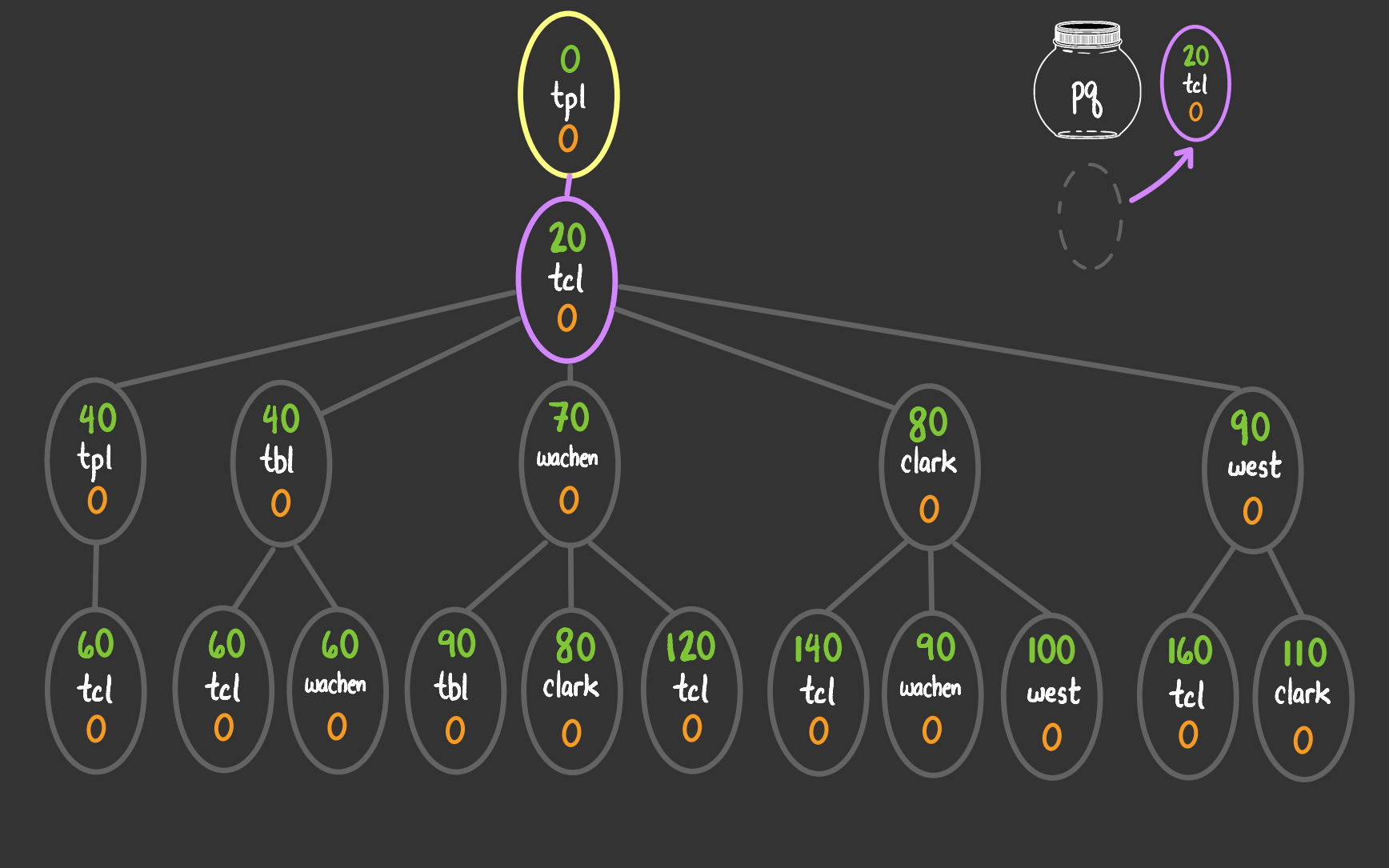
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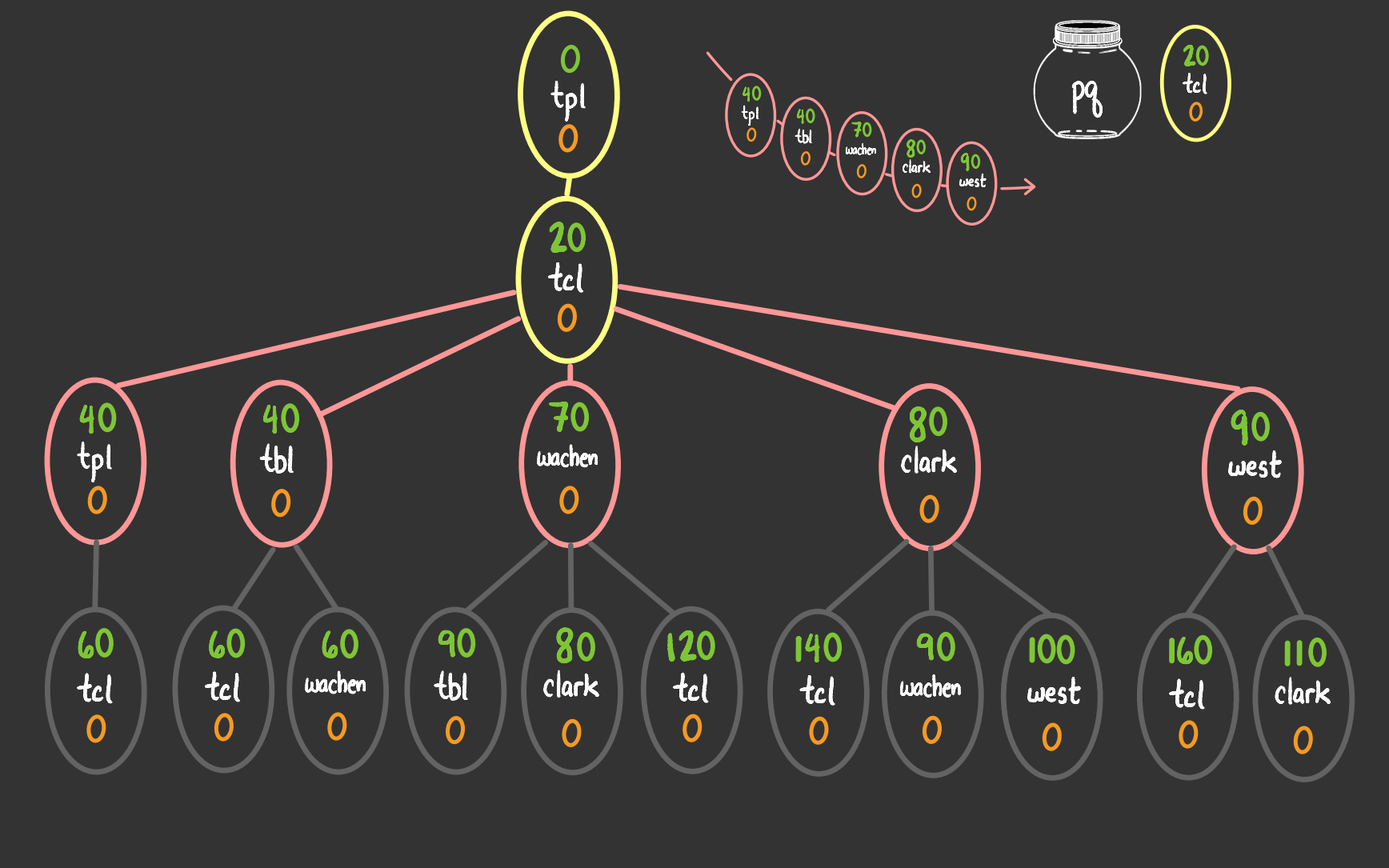
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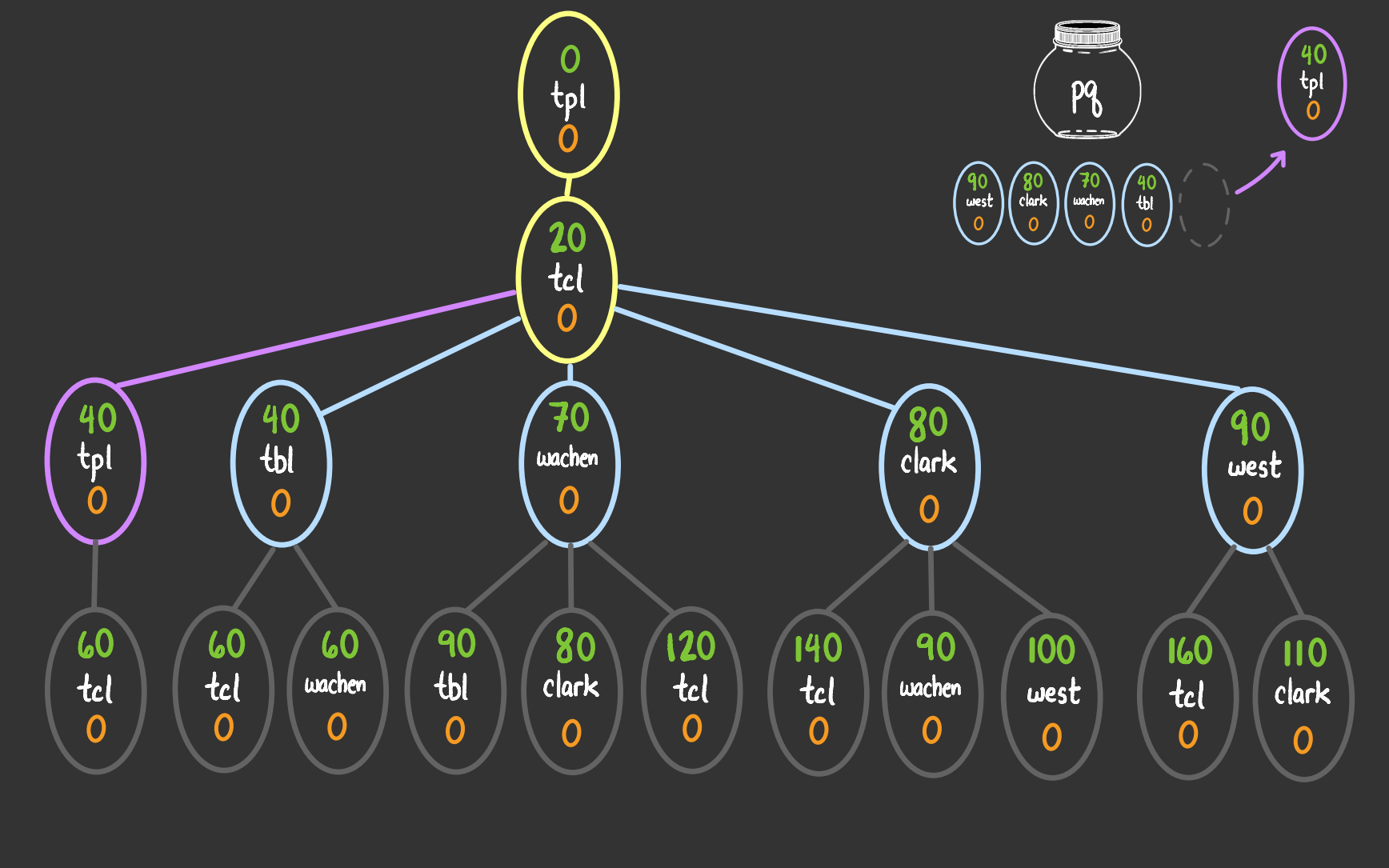
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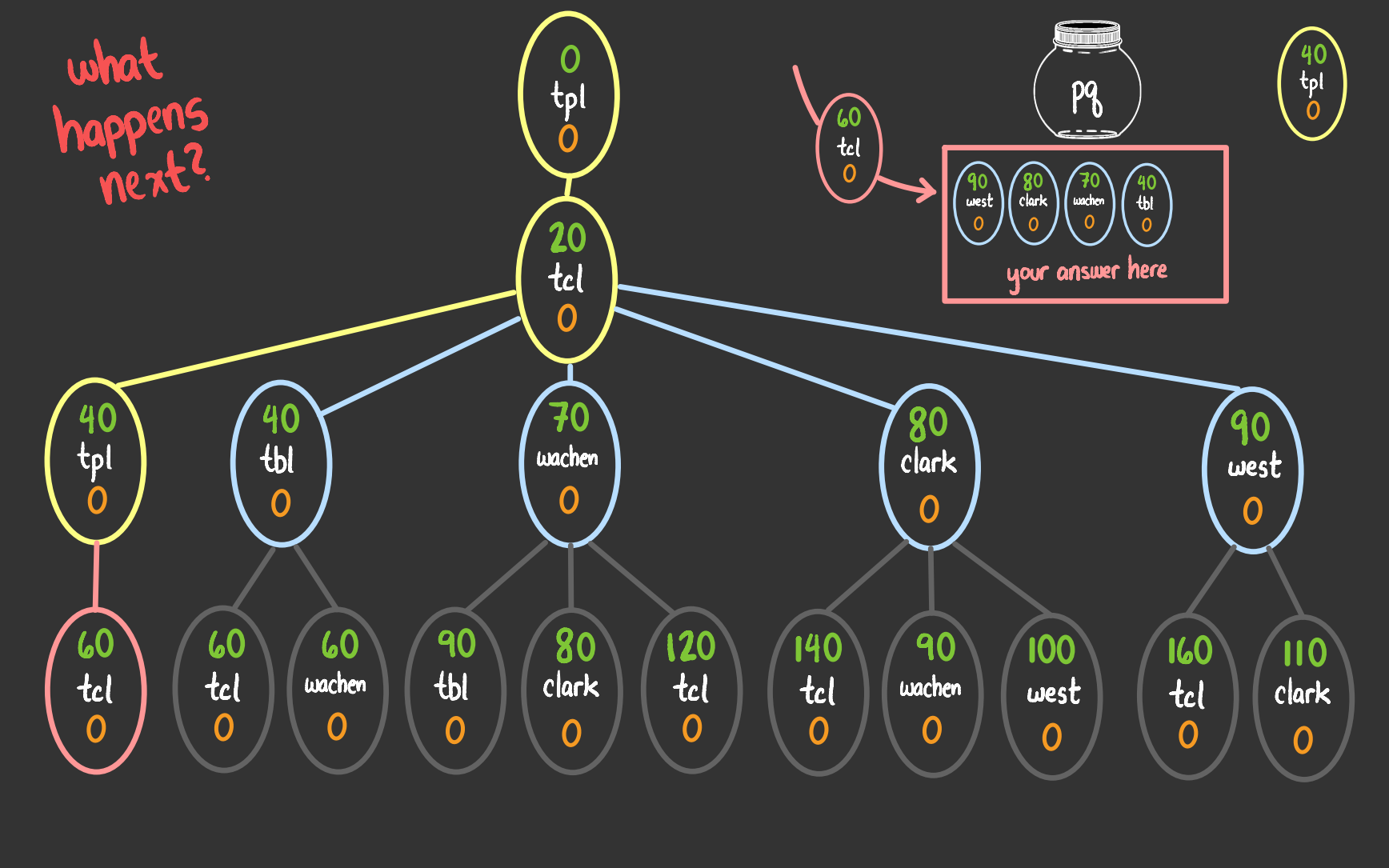
what happens next?
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your answer here
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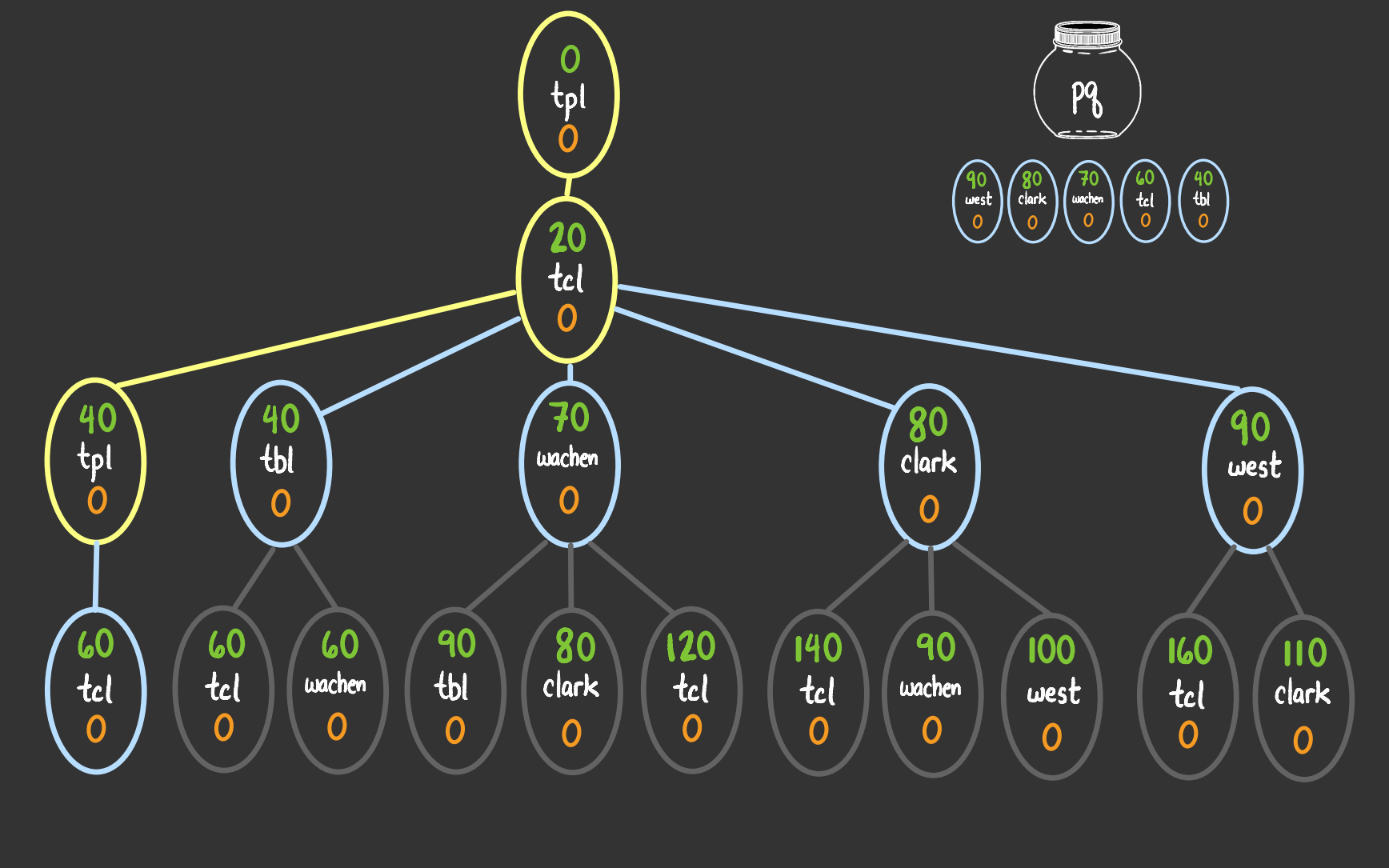
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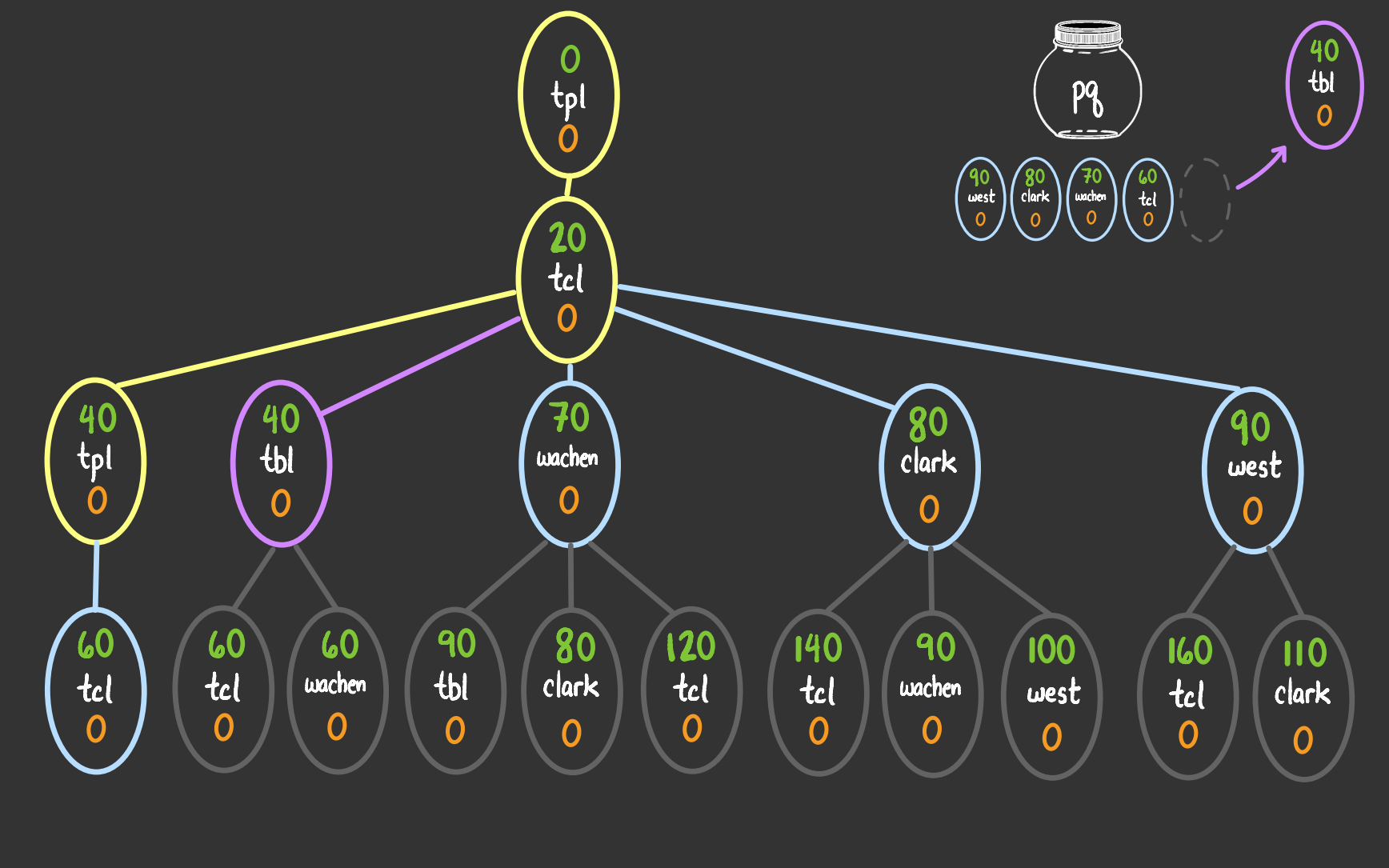
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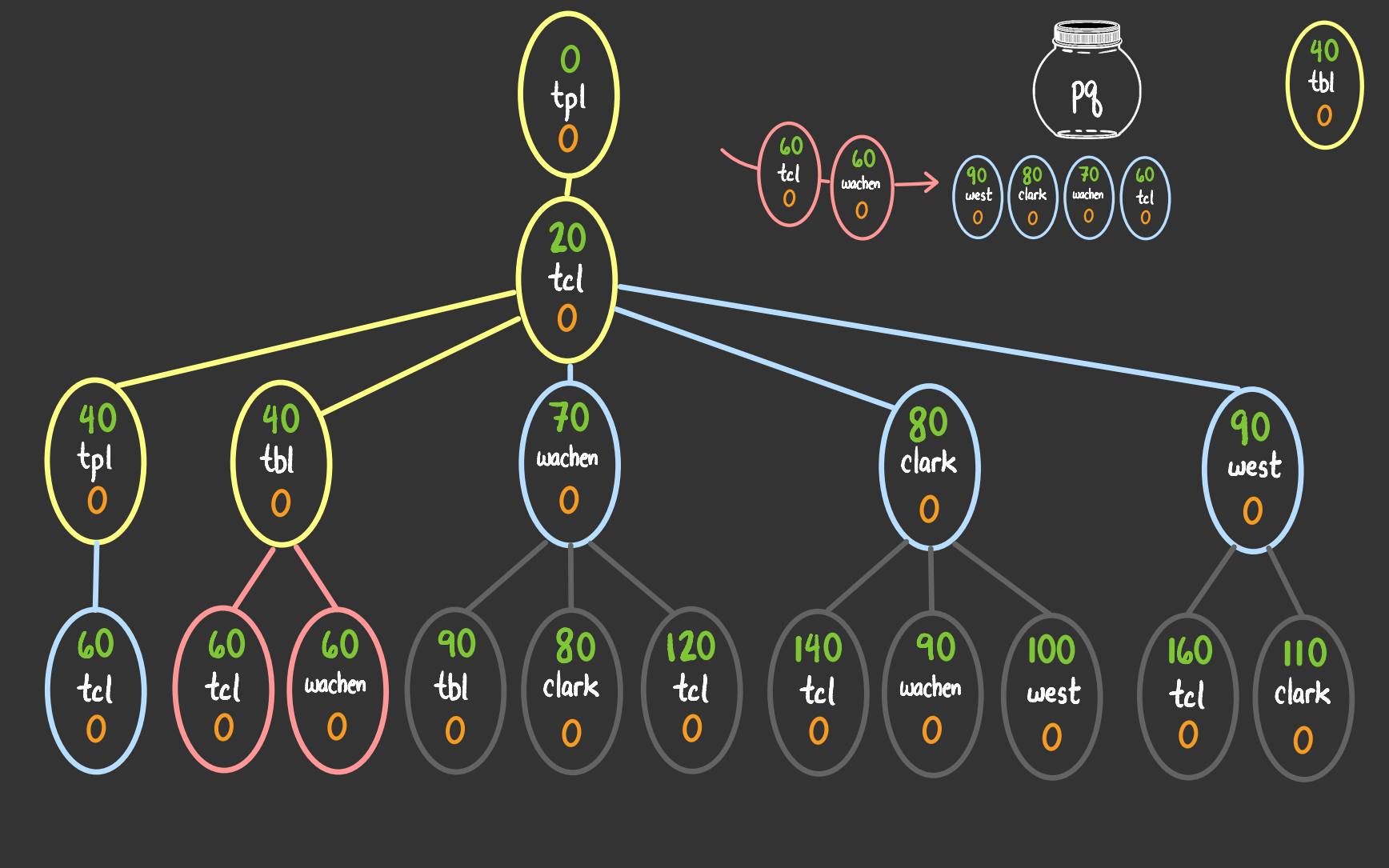
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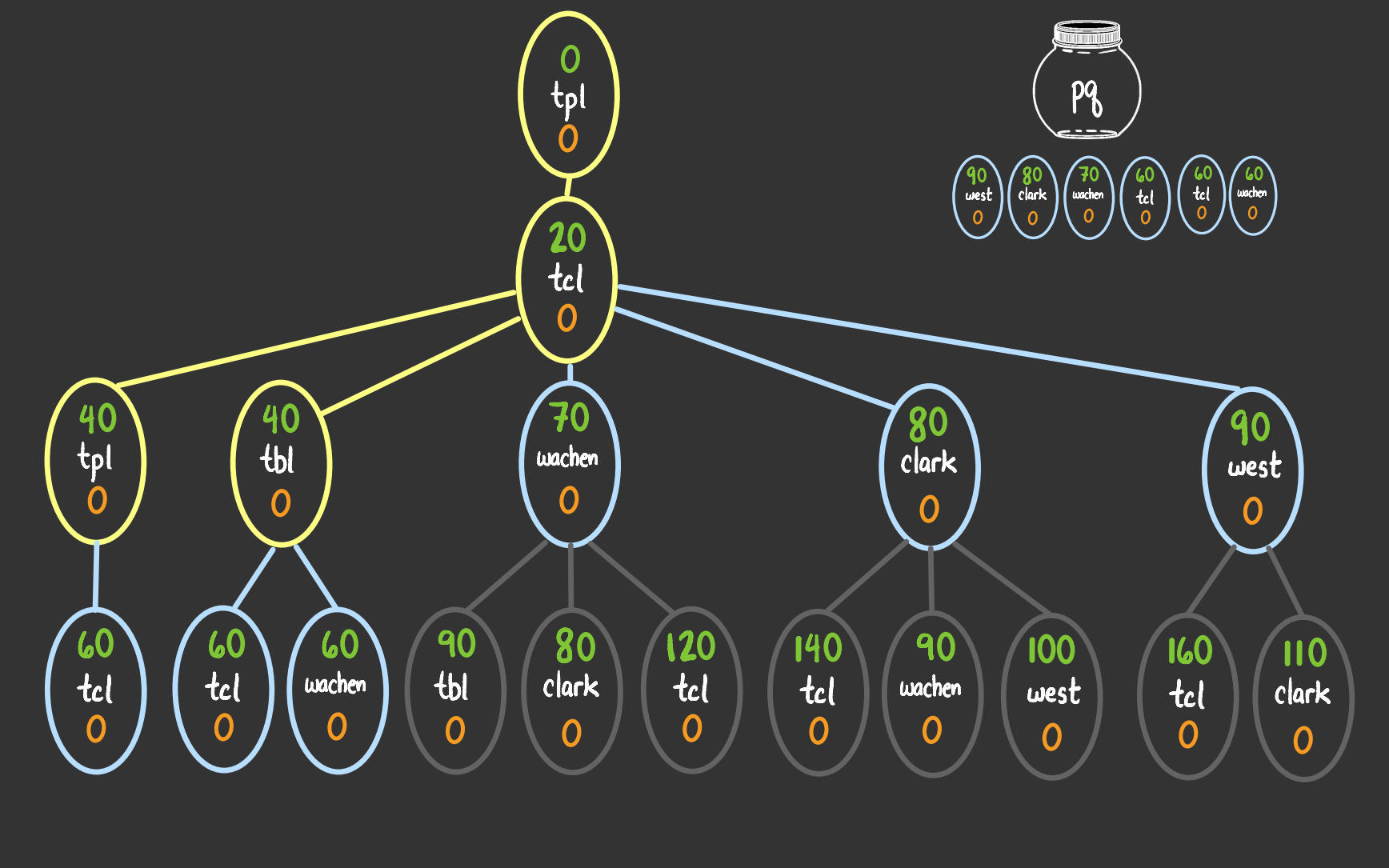
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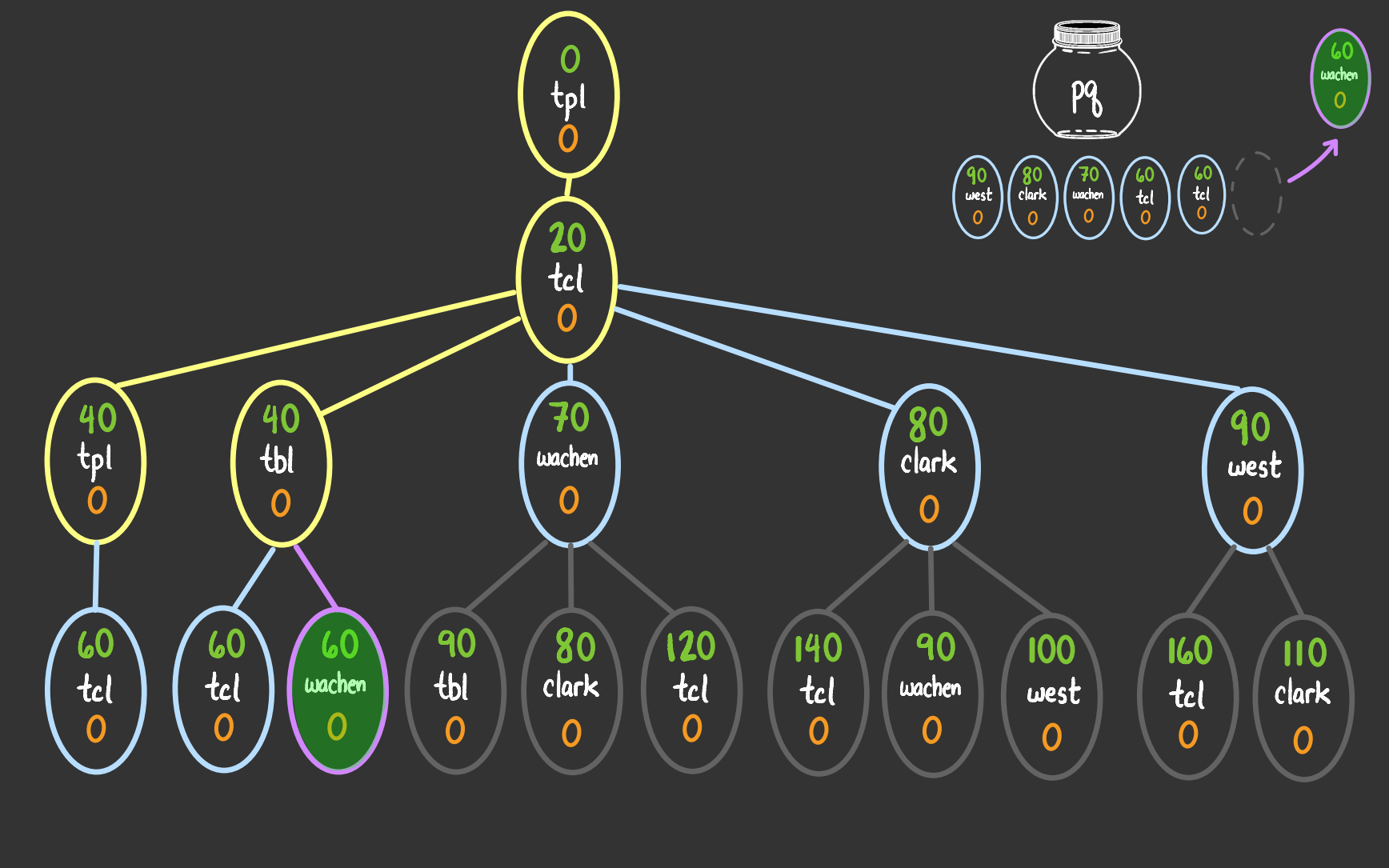
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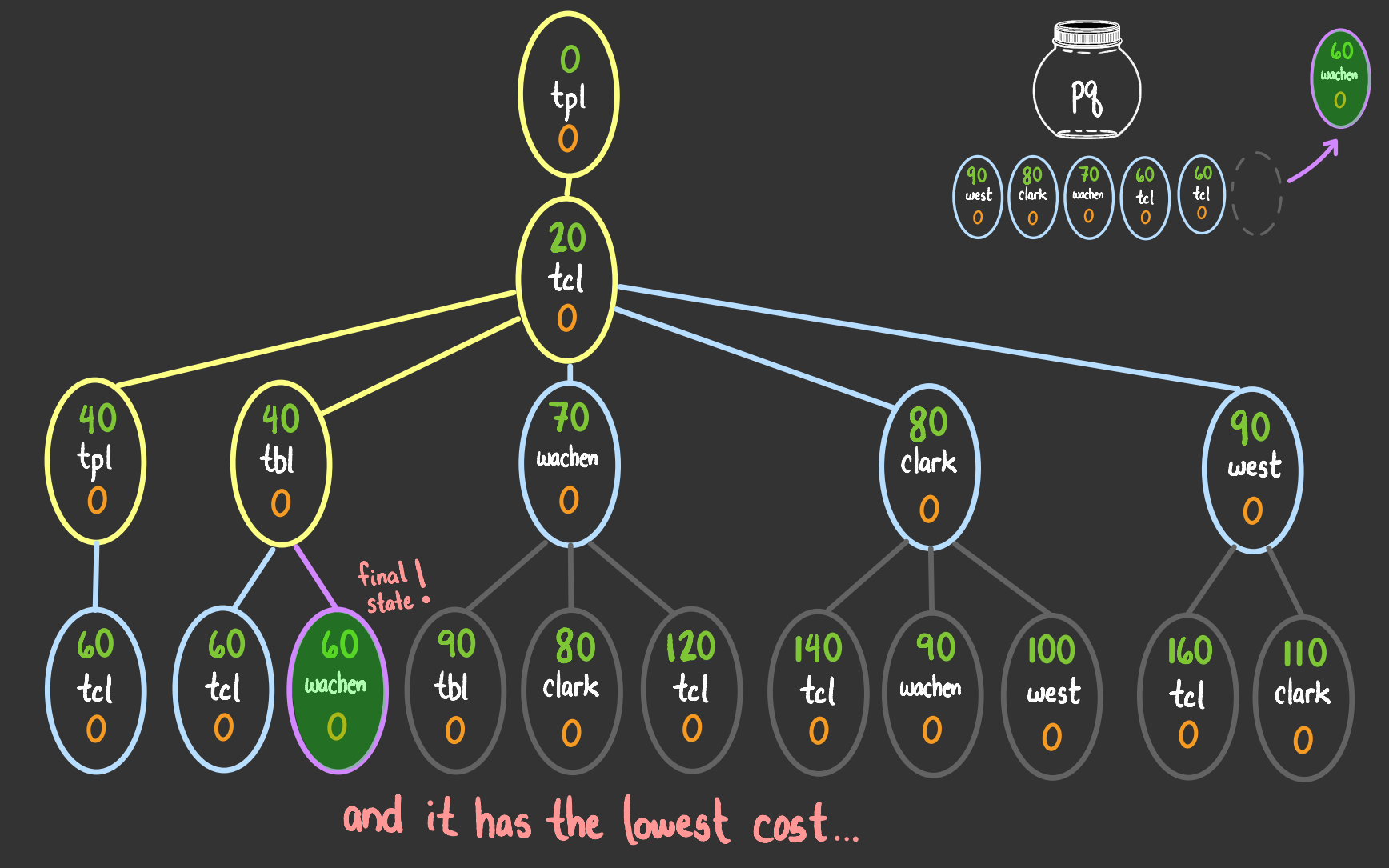
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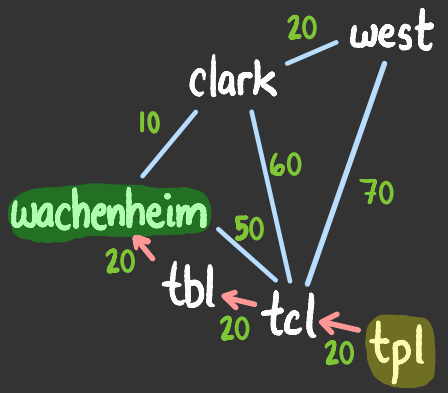
and it has the lowest cost...



uniform cost search is guaranteed to find the optimal solution

why? if search node n_1 is visited before search node n_2, then $g(n_1) \leq g(n_2)$

(can be proven by contradiction)