

$$d(a, b) = \text{dep}[a] + \text{dep}[b] - 2 \cdot \text{dep}[\text{LCA}(a, b)]$$

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$\text{LCA}(a, b)$:

if ($\text{dep}[a] \neq \text{dep}[b]$)

... (a b) ...

fix(a, b) // ?

if (a == b)
return a

for k = 20 k >= 0 --k

if (ancestor[a][k] != ancestor[b][k])

a = ancestor[a][k]

b = ancestor[b][k]

$O(\log n)$

return ancestor[a][0]

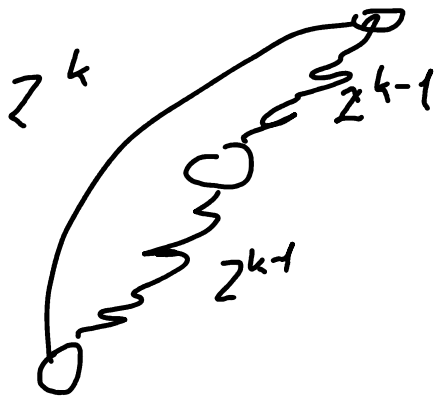
fix(a, b)
if (dep[a] > dep[b])
swap(a, b)

for (k = 20 k >= 0 k--)

if (dep[ancestor[b][k]] >= dep[a])
b = ancestor[b][k]

ancestor[u][k] - provides n o of 2^k

ancestor $[u][k]$ - powódzi n o odd 2^k
 $O(n \lg n)$



make Ancestors ()
 for $k=1$ to $k \leq 20$ $k++$

for $i=0$ to $i < n$ $i++$

$ancestor[i][k] = ancestor[ancestor[i][k-1]][k-1]$

$O(n \lg n)$

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1. dfs o la dep, $ancestor[v][0] - parent$
 2. makeAncestors()
 3. zapytanie $O(1 - \lg n)$