



Analysis of task tree

Solutions, statement: Dimitar Shapatov; Solutions, analysis: Kiril Zashev

This task is a classic encode-decode task. The key to the solution is hidden in the fundamental property of trees: every vertex has exactly one parent, with the exception of the root.

Then the solution of the task becomes trivial – we pick a root of the tree and with a DFS we find the parents of every vertex. Since the constraint requires encoding only through the bits 0 and 1, we convert the parent of every vertex into the binary numeral system. In order to optimize the length of the string, we can encode only $\lfloor \log_2 N \rfloor + 1$ bits for every vertex. The decoding requires easy work with bitwise operations.