Homework Project 2

Given 03/20/2018, Due 04/09/2018

Take the height-balanced tree code, and replace the `key` field by a field `int leaves`. That field should contain the number of leaves below the node, so `n->leaves` = 1 if `n` is a leaf, and `n->leaves =n->left->leaves + n->right->leaves` else. The `leaves` field must be updated after an insertion or deletion for all nodes on the path from the root to the changed leaf, and after a rotation for the changed nodes.

Then you

(1) replace the `find` function by

```
object_t *find_by_number(tree_node_t *tree, int k);
```

which returns the object stored in the `k`-th leaf from left (start counting with the leftmost leaf as 1);

(2) replace the `insert` function by

```
void insert_by_number(tree_node_t *tree, int k, object_t *new_obj);
```

which inserts `new_obj` in a new `k`-th leaf, moving all leaves above it one step to the right (without renumbering), and

(3) replace the `delete` function by

```
object_t * delete_by_number(tree_node_t *tree, int k);
```

which deletes (and returns) the object stored in the `k`-th leaf, moving all leaves above it one step to the left (without renumbering).

The programming language is C or C++; test your code before submission using the `gcc` or `g++` compiler. Do not change the given interface. Do not submit code that you did not test. Please remove all dead code; try to program as clearly as possible, since I try to read it. Do not copy code from another student or from the web; this must be all your own work.

Submit your source code by e-mail to `phjmbrass@gmail.com`; include the course (220) and homework number in the subject line, and your name as a comment in the homework file.