Vrije Universiteit Amsterdam

Bachelor Thesis

Logical Verification of AVL Trees in Lean

Author: Sofia Konovalova   (2635220)

1st supervisor: Jasmin Blanchette
daily supervisor: Jannis Limperg

*A thesis submitted in fulfillment of the requirements for
the VU Bachelor of Science degree in Computer Science*

April 17, 2021

Contents

1   AVL Trees

1.1   Binary Search Trees

While Lean does have a definition of a binary search tree, it is limited to the inductive definition `bin_tree`, in which a node only contains its left and right subtree. For a search tree, it is important that at the very least a tree node has a key and maybe some value.

1.2   Rotation

Appendices