On the Simplicity of Synthesizing Linked Data Structure Operations

Darya Kurilova, Carnegie Mellon University and Derek Radeside, University of Waterloo

AVL Trees

An AVL tree is a self-balancing binary search tree with the property that the difference between height of the left subtree and of the right subtree is at most 1.

Conclusions

- Using "divide-and-conquer" principle and the common pattern for code generation brings the search space down to what is manageable by current SAT-solvers.
- Hence, generating data structures that involve heap manipulations might be not as difficult as previously imagined.

Methods to Be Generated

Basic Data Structures Definitions

Invariants

Methods to Be Generated

Prior Work on Synthesizing Code Using a SAT Solver

Our Approach

* Common Pattern

```
public boolean contains(int x) {
    // generated code goes here
    return false;
} // delete operation
```

* "Divide-and-Conquer"

Conclusions:
- Two groups of invariants
- Two main properties
- Two helper methods

Invariant Analysis

Basic Data Structures Definitions

Invariants

Methods to Be Generated

Executable Code

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