



Level Intended: Bachelor

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Collaborative Theme: Persistent data structures, visualization

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Interactive Visualization Of A Partially Persistent Red-Black Tree

Preamble

Ordinary data structures are ephemeral in the sense that an update on the structure destroys the old version, i.e. there is no mechanism to revert to previous states. Persistent data structures are data structures with archaeology. A structure is called partially persistent if all versions can be accessed, but only the newest version can be modified, and fully persistent if every version can be both accessed and modified. The obvious way to provide persistence is to make a copy of the data structure each time it is updated. But obviously this has major time and space drawbacks. Driscoll *et al.* [1] present simple, systematic and efficient techniques for making linked data structures partially as well as fully persistent.

Thesis Description

In this thesis, a visualization packet for a partial persistent red-black tree shall be implemented using the java library JEDAS [2]. The dictionary operations insert, delete and search (all interactive) shall first be implemented for a non-balanced partially persistent binary tree, providing visualization of the various versions. After the implementation of the above stands, a partially persistent red-black tree shall be implemented and visualized applying the node-copying method in [1]. Partial persistence for both trees shall be built on top of the ephemeral tree implementations which are provided in the chair's geom.-package.

References

1. J. Driscoll, N. Sarnak, D. Sleator and R. Tarjan. Making data structures persistent. STOC 86: Proceedings of the Eighteenth Annual ACM Symposium on Theory of Computing, 1986.
2. JEDAS homepage. <http://ad.informatik.uni-freiburg.de/jedas>