B-Trees

Task 1: Non-Redundant B-Tree

- Suppose a *non-redundant B-tree* of degree $m \in \langle 3,5 \rangle$

  - Determine the *minimum number of children* and the *minimum number of keys* at each node except the root of the tree

  - *Insert only the first 10 assigned values* into the tree in the given order

  - Finally, *delete the first 4 inserted* values from the tree (in an arbitrary order)

- *Illustrate* the state of the tree *each time a node is split or merged* and also the *final result*

  - I.e., if you are only trivially inserting or deleting a key, just describe what happened

- Or, you may *implement* the B-tree *and log* all events (i.e., submit the source code and, e.g., makefile)

  - The permitted languages are Java, Python, C, C++, and Swift

- **Points:** 2

Task 2: B+-Tree

- Suppose a *B+-tree* of degree $m \in \langle 3,6 \rangle$

  - Determine the *minimum number of children* and the *minimum number of keys* at each node except the root of the tree

  - *Insert all 15 assigned values* into the tree in the given order

  - Finally, *delete the first 4 inserted* values from the tree (in an arbitrary order)

- *Illustrate* the state of the tree *each time a node is split or merged* and also the *final result*

  - I.e., if you are only trivially inserting or deleting a key, just describe what happened

- Or, you may *implement* the B+-tree *and log* all events (i.e., submit the source code and, e.g., makefile)

  - The permitted languages are Java, Python, C, C++, and Swift

- **Points:** 1.5

Task 3: B*-Tree

- Suppose a *B*-tree* of degree $m \in \langle 4,6 \rangle$

  - Determine the *minimum number of children* and the *minimum number of keys* at each node except the root of the tree

  - *Insert all 15 assigned values* into the tree in the given order

  - Finally, *delete the first 4 inserted* values from the tree (in an arbitrary order)

- *Illustrate* the state of the tree *each time a node is split or merged* and also the *final result*

  - I.e., if you are only trivially inserting or deleting a key, just describe what happened

- Or, you may *implement* the B*-tree *and log* all events (i.e., submit the source code and, e.g., makefile)

  - The permitted languages are Java, Python, C, C++, and Swift

- **Points:** 1.5

Bonus Task 4: Redundant B–Tree

❖ Solve the Task 1 for redundant B-tree

❖ In addition, *illustrate an example* in which case you will use a *redundant B-tree* and an another example illustrating a suitable utilization of *non-redundant B-tree*

❖ **Points:** 1