



CS202: FUNDAMENTALS OF COMPUTER SCIENCE II

HOMEWORK - 1

Balanced Search Trees and Hashing

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CS202 - 02

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Inserting into an AVL Tree

Step - 1: Insert 7

7

Step - 2: Insert 91

7
 \
 91

Step - 3: Insert 3

7
/ \
3 91

Step - 4: Insert 24

7
/ \
3 91
 /
 24

Step - 5: Insert 12

7
/ \
3 24
 / \
 12 91

Step - 6: Insert 33

24
 / \
 7 91
 / \< /
3 12 33

Step - 7: Insert 45

24
 / \
 7 45
 / \< / \
3 12 33 91

Step - 8: Insert 61

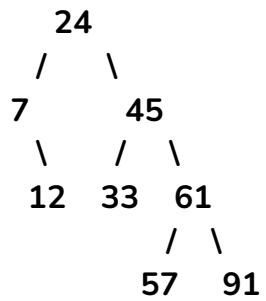
24
 / \
 7 45
 / \< / \
3 12 33 91
 /
 61

Step - 9: Insert 57

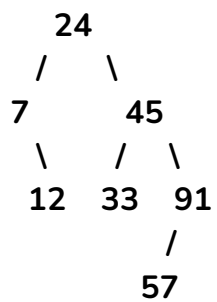
24
 / \
 7 45
 / \< / \
3 12 33 61
 / \
 57 91

Deleting from an AVL Tree

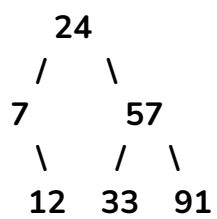
Step - 1: Delete 3



Step - 2: Delete 61



Step - 3: Delete 45



Inserting into a 2-3 Tree

Step - 1: Insert 7

7

Step - 2: Insert 91

7 91

Step - 3: Insert 3

7
/
3 91

Step - 4: Insert 24

7
/
3 24 91

Step - 5: Insert 12

7 24
/
3 12 91

Step - 6: Insert 33

7 24
/
3 12 33 91

Step - 7: Insert 45

24
/
7 45
/
3 12 33 91

Step - 8: Insert 61

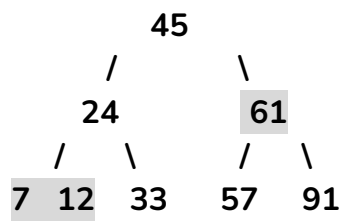
24
/
7 45
/
3 12 33 61 91

Step - 9: Insert 57

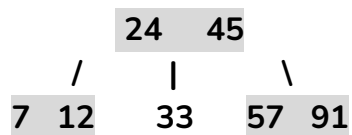
24
/
7 45 61
/
3 12 33 57 91

Deleting from a 2-3 Tree

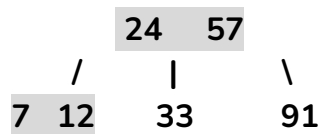
Step - 1: Delete 3



Step - 2: Delete 61



Step - 3: Delete 45



Inserting into a 2-3-4 Tree

Step - 1: Insert 7

7

Step - 2: Insert 91

7 91

Step - 3: Insert 3

3 7 91

Step - 4: Insert 24

7
/ \
3 24 91

Step - 5: Insert 12

7
/ \
3 12 24 91

Step - 6: Insert 33

7 24
/ | \
3 12 33 91

Step - 7: Insert 45

7 24
/ | \
3 12 33 45 91

Step - 8: Insert 61

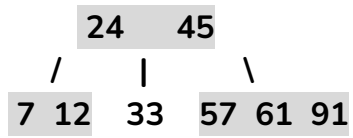
7 24 45
/ \ / \
3 12 33 61 91

Step - 9: Insert 57

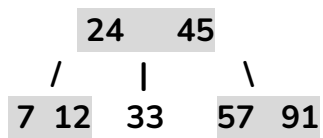
24
/ \
7 45
/ \ / \
3 12 33 57 61 91

Deleting from a 2-3-4 Tree

Step - 1: Delete 3



Step - 2: Delete 61



Step - 3: Delete 45

