King Saud University
College of Computer and Information Sciences
Computer Science Department

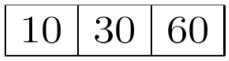
CSC 212 **Second Semester 1439-1440**

Tutorial #11

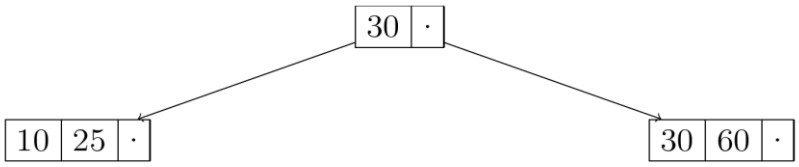
Problem 1: Insert into an empty B+ Tree of order 3 the following keys: 30, 10, 60, 25, 1, 20, 55.

Solution:

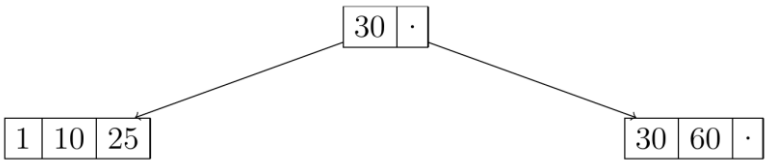
Inserting (30, 10, 60)



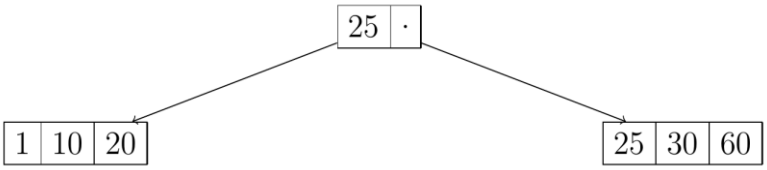
Inserting (25): split root as leaf; new root



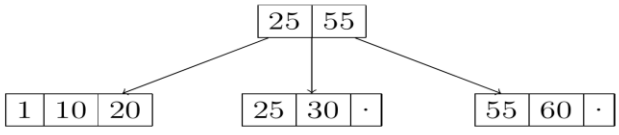
Inserting (1)



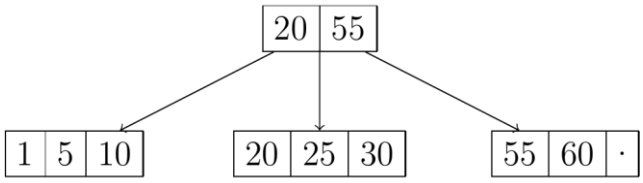
Inserting (20): transfer datum to next sibling



Inserting (55): split leaf

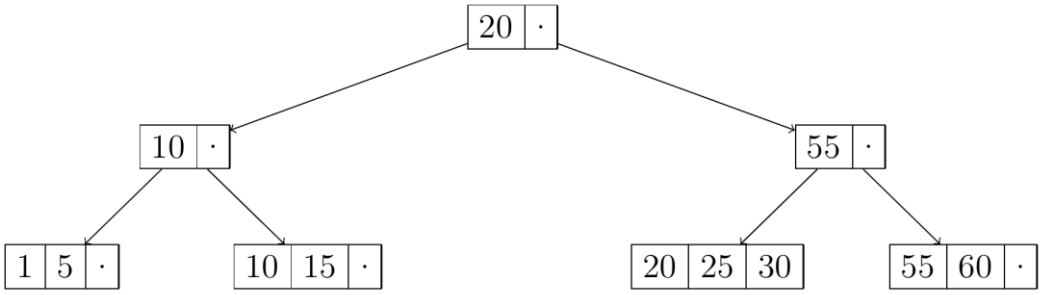


Problem 2: Insert key 15 into the following B+ Tree:

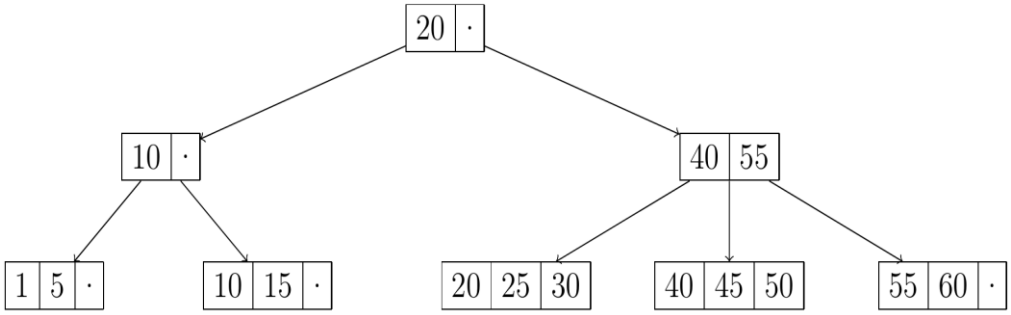


Solution:

Inserting (15): split leaf; split parent; new root

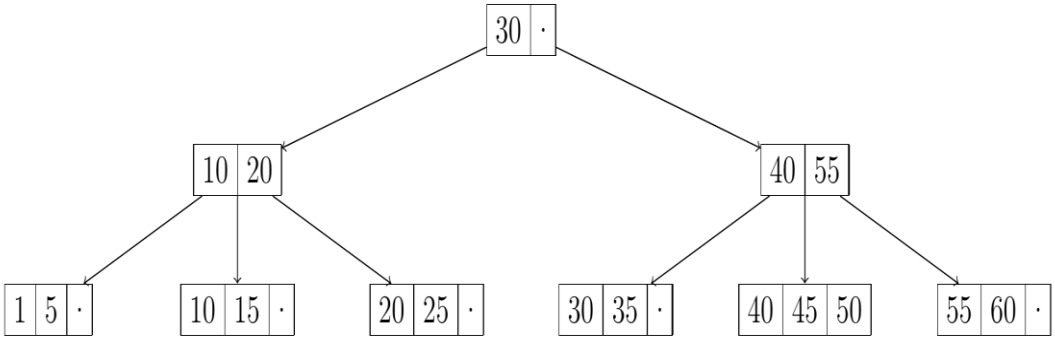


Problem 3: Insert key 35 into the following B+ Tree:

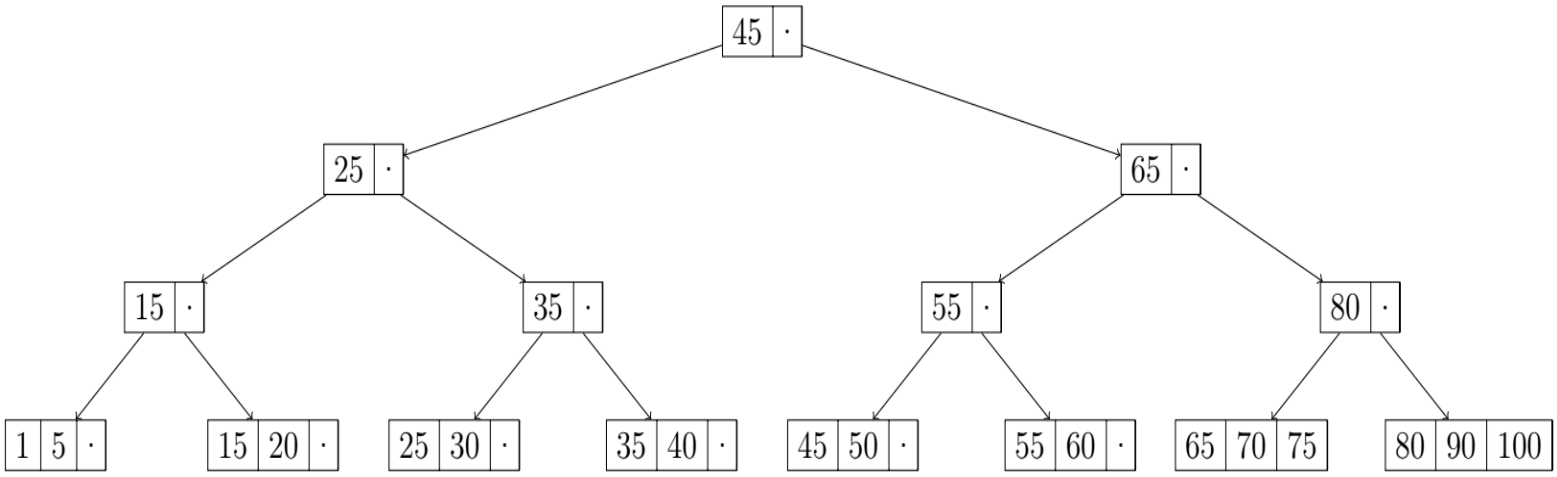


Solution:

Inserting (35); split leaf; transfer leaf to next sibling

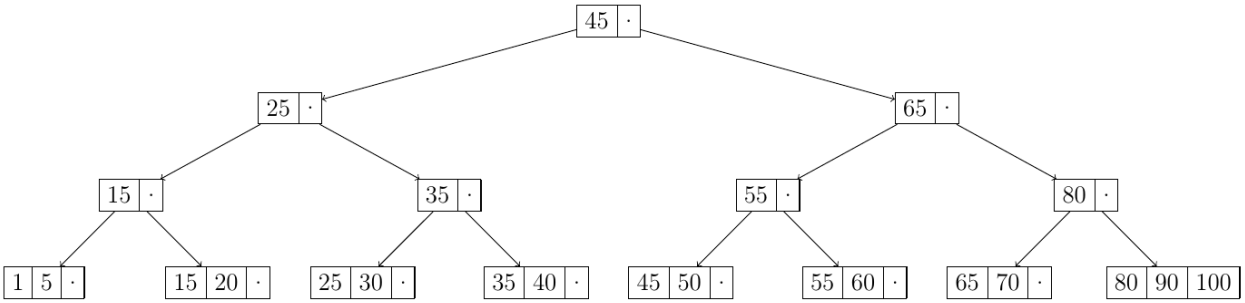


Problem 4: Delete keys 75, 70, 80, 30 from the following B+ Tree:

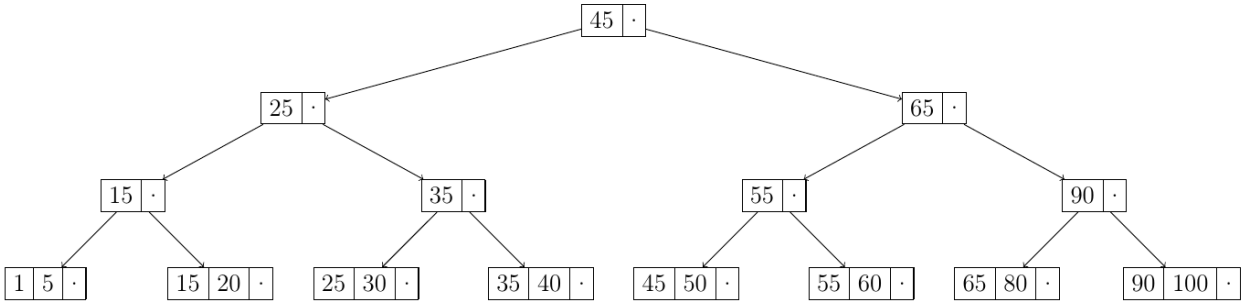


Solution:

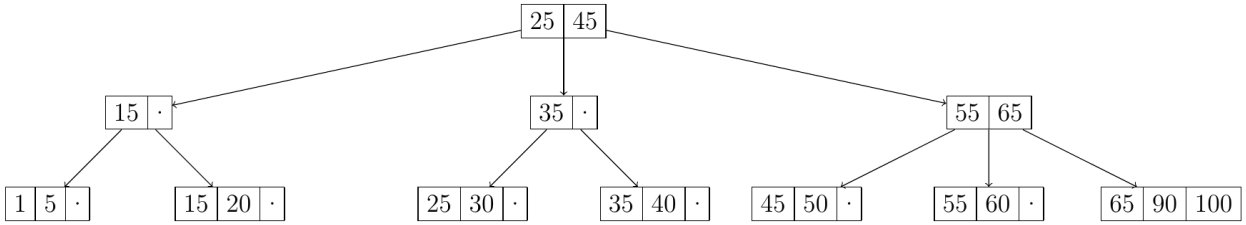
Deleting (75)



Deleting (70): borrow datum from next sibling



Deleting (80): merge leaf with next sibling; merge parent with sibling; merge parent with sibling; delete root



Deleting (30): merge leaf with next sibling; borrow leaf from next sibling