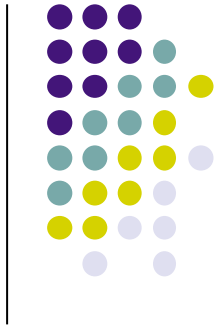
Efficiency



- How efficient is the Lookup function?
  - If there are *n* words in the tree, and each node's subtrees are approximately equal in size (we say the tree is balanced), then the average lookup time is proportional to log *n*
  - Tree lookup is much more efficient than list lookup: if for 1000 words the average time is 10, then for 1000000 words this will increase to 20 (instead of being multiplied by 1000!)
- If the tree is not balanced, say all the right subtrees are very small, then the time will be much larger
  - In the worst case, the tree will look like a list
- How can we arrange for the tree to be balanced?
  - There exist algorithms for balancing an unbalanced tree, but if we insert words randomly, then we can show that the tree will be approximately balanced, good enough to achieve logarithmic time