Problem Set 3: Trees and Hashing

CS3330 Data Structures and Algorithms
Term 1 2016: August 15 – October 15
Dr. Jack Davault

Overview: This assignment will cover that material on trees and hashing. Provide the solutions for the problems in this assignment within a single Microsoft Word document. However, a Power Point file or scanned handwritten drawing for Problem 1(a) is fine. Remember to include your name and course number within all documents and files that you submit.

1. **[5 points] Trees.** Read the assigned chapter and notes for Week 5 located in the Learning Activities area in Blackboard. Then answer the following questions:

   (a) [3 points] Draw an Adelson-Velskii and Landis (AVL) tree for the following nodes: 64, 28, 51, 66, 15, 36, 74, 73, 12, 78, 82, 83, 86, 99, 21.

   > **Hint:** No coding is involved with this problem. You need to draw the actual tree for this problem. When you draw your tree, it must an AVL tree instead of just a regular binary tree or a binary search tree (BST). There are a few ways that you can arrange the layout for this tree; however, remember data within the tree must follow the rules of an AVL tree. I recommend that you first draw the tree with links and empty nodes. Then sort the items in the list and place them in the appropriate places within the tree so that it forms an AVL tree.

   (b) [2 points] Briefly explain the differences between a binary search tree and a regular binary tree. Which tree has a better advantage over the other? Briefly explain why.

2. **[5 points] Hashing.** Read the assigned chapter and notes for Week 6 located in the Learning Activities area in Blackboard. Then provide solutions to the following problems:

   (a) [2 points] Briefly explain the purpose of quadratic probing and provide an example of a mathematical function used to implement it based on the size of the hash table. Also, briefly explain the problem associated with quadratic probing in terms of the number of items within the hash table.

   (b) [3 points] Perform an Internet search and briefly discuss in a few paragraphs a computer related algorithm based on hashing. Provide an example with a diagram or table to help illustrate how the algorithm works. List your sources at the end of your paragraphs using APA format.

Other Notes: Submit your solutions using the Problem Set 3 link provided in the Assignments area. As usual, please do not hesitate to ask questions in the *Ask the Instructor* forum or via e-mail.