Chessica Nation

CS-215-ON

Data Structures

29 Sept 2022

Assignment 5.1

Part 1

    a. Explain how a hash function is used.

A hash function is used by taking a search key and returning the index of the element in the hash table where the value associated with the search key is stored. Some system is put in place to convert the search key into an integer, i, and then the value is stored in array[i], thereby mapping, or hashing, the search key to the index.

    b. How might a string hash function be written?

A string hash function might be written by using the Unicode value of each character as the hash code. To better prevent collisions, we can continue further and multiply the Unicode value of each character by a factor based on its position in the string and then sum the values of each character.

    c. Explain why we might choose to use a hash function rather than search for a key.

We might choose to use a hash function rather than search for a key because using a hash function is often faster and more efficient. Rather than having to search through an array for a key, which is at best O(log n), we can use hash functions to locate a particular value in O(1). In emergency situations, such as a 911 operator finding your address, this savings in time can be life changing.

d. What hash function does the Java Util HashMap use for hashing strings?

The Java Util HashMap class uses the following hash function:

u0gn-1 + u1gn-2 + … + un-2g + un-1

where u = the uth character in a string, g = the constant 31, and n = the length of the string.