Assignment 5.1 Hash Maps

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CS 215

Part 1

1. Explain how a hash function is used.

A hash function is used to index and search data in efficient and appropriate ways for a given situation. The hash function involves a key that is used to find the data value that is associated with the key. When a key and value are added to a hash function, the key is converted into a numeric value representing an index location, and that is where the data value is stored. To retrieve the data value, the hash function is applied to the key again, and that produces the index where the data value can be located/retrieved.

b.     How might a string hash function be written?

A string hash function can be written to convert text or string values into numerical values that can then be stored and retrieved. For example, one approach is to iterate through each character in a string and convert it to its corresponding ASCII value by casting the character to an integer, and then multiplying the current hash for that string by 31, and then adding that ASCII value. This would result in a integer hash value for the string input.

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 a hash function is likely to be more efficient because it involves O(1) constant time complexity, since the hash function zeroes in on the exact location of the data being sought, rather than having to iterate through the entire data set or large portions of it, which would involve O(n) time complexity. Especially if working with a very large data set, searching for a specific key could involve vastly increased time and resources compared to using a hash function.

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

The Java Util HashMap uses the hashCode() hash function for hashing strings.