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CS-215-ON

Assignment 5.1

1. **Explain how a hash function is used.**

A hash function takes in a value (String, integer, etc.) and using the chosen approach, converts it to a number to use as its key/index. That number or index is then compressed to fit within the range of possible indexes in the given hash table. Typically, this is done by dividing the key by the table length with the mod operator and using the resulting remainder as the index/key where the value will be stored.

1. **How might a string hash function be written?**

It could be done by converting each character of the string to its Unicode value, multiplying that number by a particular factor given the characters position in the string, and summing the resulting values from each character. That sum could then be compressed, i.e. key = sum % table.length(), to get the index where the value will be stored.

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

Accessing values via their hashed keys is an O(1) operation, or constant time, assuming no collisions or clusters being searched. Searching for a key, each item at a time, is iterative or linear (O(n)), which defeats the purpose of hashing. A hash function provides increased efficiency for retrieving an object/value.

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

It uses the hashCode() function, which converts strings using:  
  
s[0]\*31^(n-1) + s[1]\*31^(n-2) + ... + s[n-1]