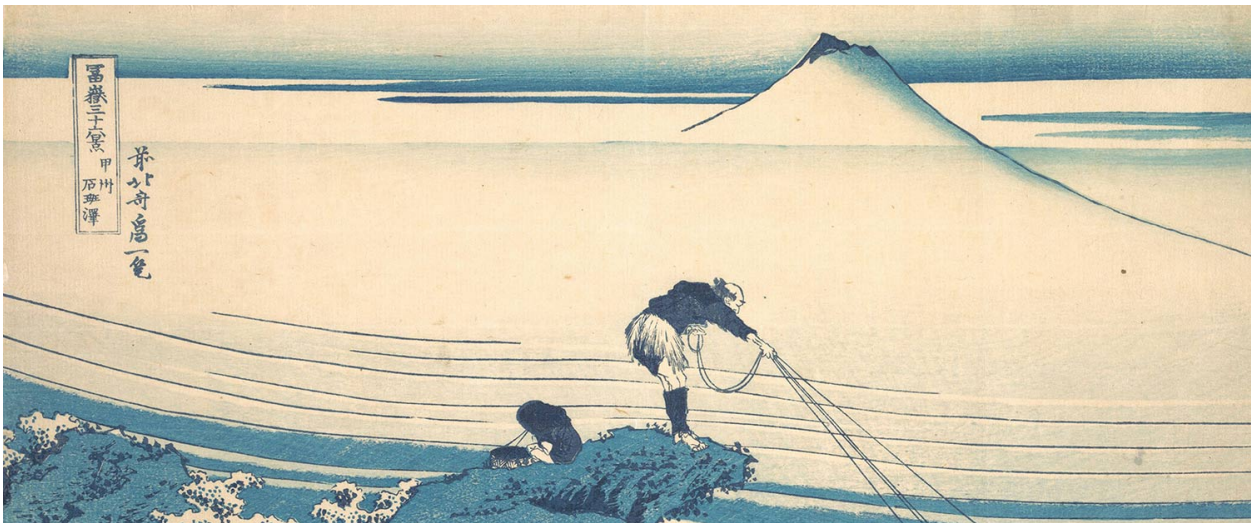


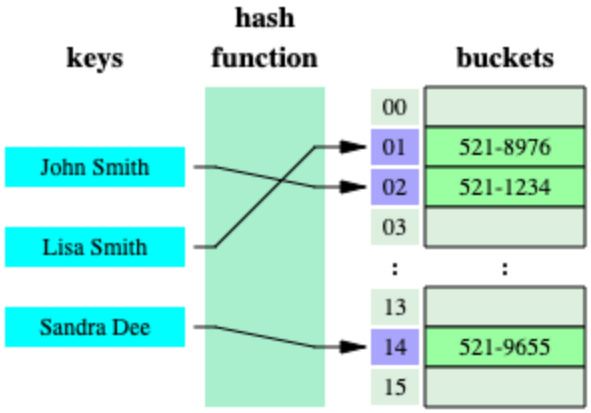
Hash Table

💡 The Hash table data structure stores elements in key-value pairs where

→ **Key :** unique integer that is used for indexing the values

→ **Value** : data that are associated with keys.

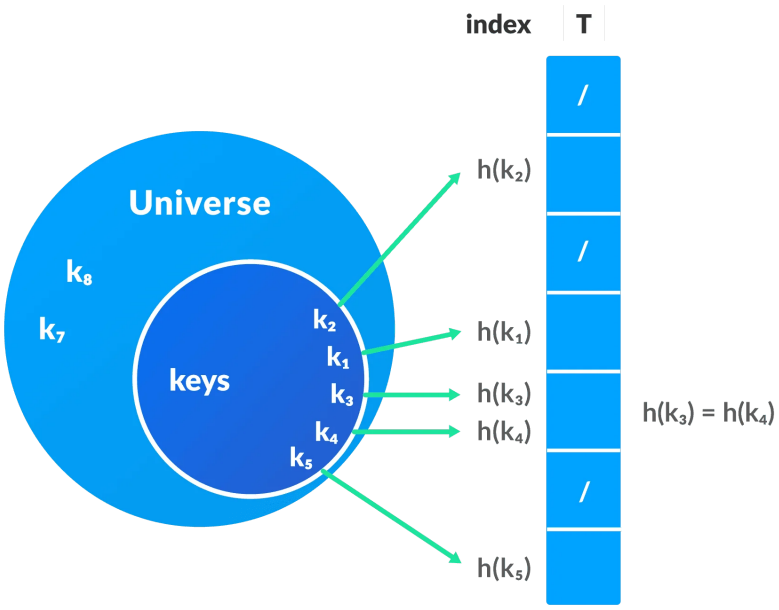
In a hash table, index is processed using the keys. And, the element corresponding to that key is stored in the index. This process is called **hashing**.



Hashing (Hash Function)

Hashing is a technique to convert a range of key values into a range of indexes of an array.

Let k be a key and h(x) be a hash function, h(k) will give us a new index to store the element linked with k.



Hash Collision

When the hash function generates the same index for multiple keys, there will be a conflict (what value to be stored in that index). This is called a **hash collision.**

📌 **SUMMARY:**

We can resolve the hash collision using one of the following techniques.

`/Collision Resolution By Chaining`

`/Open Addressing : Linear/Quadratic Probing and Double Hashing`

Good Hash Functions

A good hash function may not prevent the collisions completely however it can reduce the number of collisions. Some of the methods to achieve good hashing functions are;

→ Division Method, Multiplication Method, Universal Hashing

Advantages and Usages of Hash Tables

→ **Fast Access:** Hash tables provide constant-time average-case access time for inserting, deleting, and retrieving values.

→ **Data Caching:** Hash tables are used in caching mechanisms to quickly store and retrieve recently accessed data.

→ **Dictionaries:** Hash tables are used to implement dictionaries, where words are mapped to their definitions or translations.

→ **Indexing:** Hash tables are used to index and search data efficiently, reducing the need for linear searches.

Applications of Hash Table

→ Hash tables are frequently used for indexing and searching massive volumes of data. A search engine might use a hash table to store the web pages that it has indexed.

→ Data is usually cached in memory via hash tables, enabling rapid access to frequently used information.

→ Hash functions are frequently used in cryptography to create digital signatures, validate data, and guarantee data integrity.

→ Hash tables can be used for implementing database indexes, enabling fast access to data based on key values.

📚 References

GeeksforGeeks | A computer science portal for geeks

A Computer Science portal for geeks. It contains well written, well thought and well explained computer science and programming articles, quizzes and practice/competitive programming/company

https://www.geeksforgeeks.org/

Programiz: Learn to Code for Free

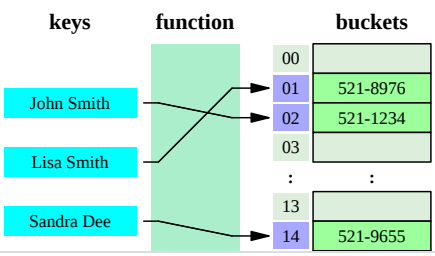
Learn to code in Python, C/C++, Java, and other popular programming languages with our easy to follow tutorials, examples, online compiler and references.

https://www.programiz.com

Hash Tables - Data Structures Handbook

A hash table is a data structure where data is stored in an associative manner. The data is mapped to array positions by a hash function. Read more here!

https://www.thedshandbook.com/hash-tables/



Data Structure and Algorithms—Hash Table

A hash table is a data structure that allows you to store and retrieve values efficiently using a key-value pair mapping. It is also known…

https://medium.com/@ahsan.majeed086/data-structure-and-algorithms-hash-table-1a8ef93f58a0

Data Structure and Algorithms - Hash Table

Data Structure and Algorithms Hash Table - Hash Table is a data structure which stores data in an associative manner. In a hash table, data is stored in an array format, where each data value has

https://www.tutorialspoint.com/data_structures_algorithms/hash_data_structure.htm

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SerhatKumas - Overview

Computer engineering student who loves coding in different fields instead of focusing on a one spesific area. - SerhatKumas

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