

Hash Table

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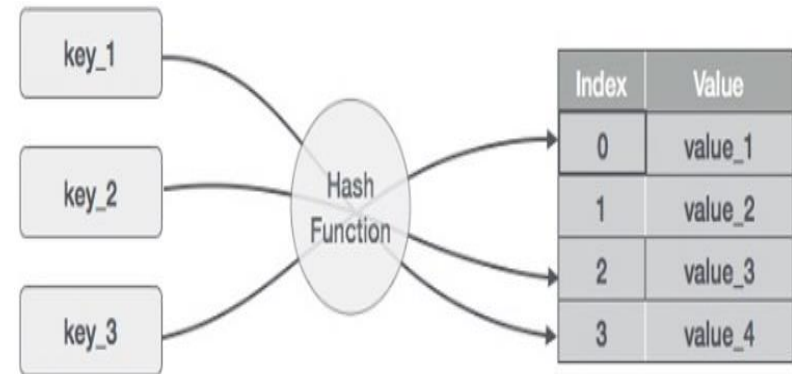
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Hashing (Hash Function)

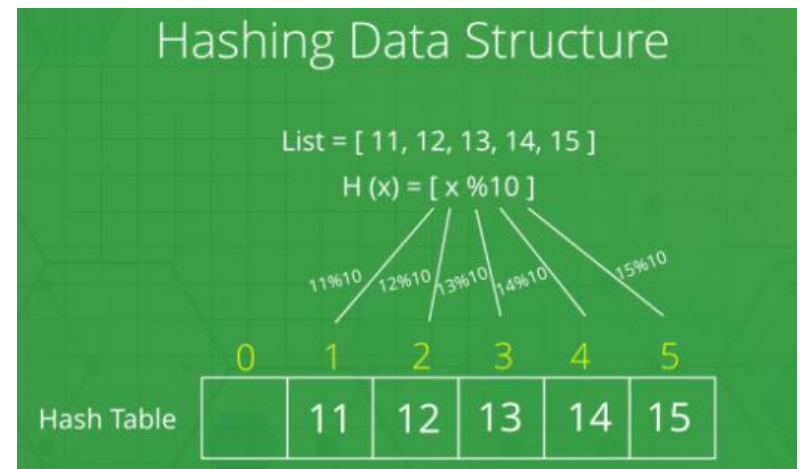
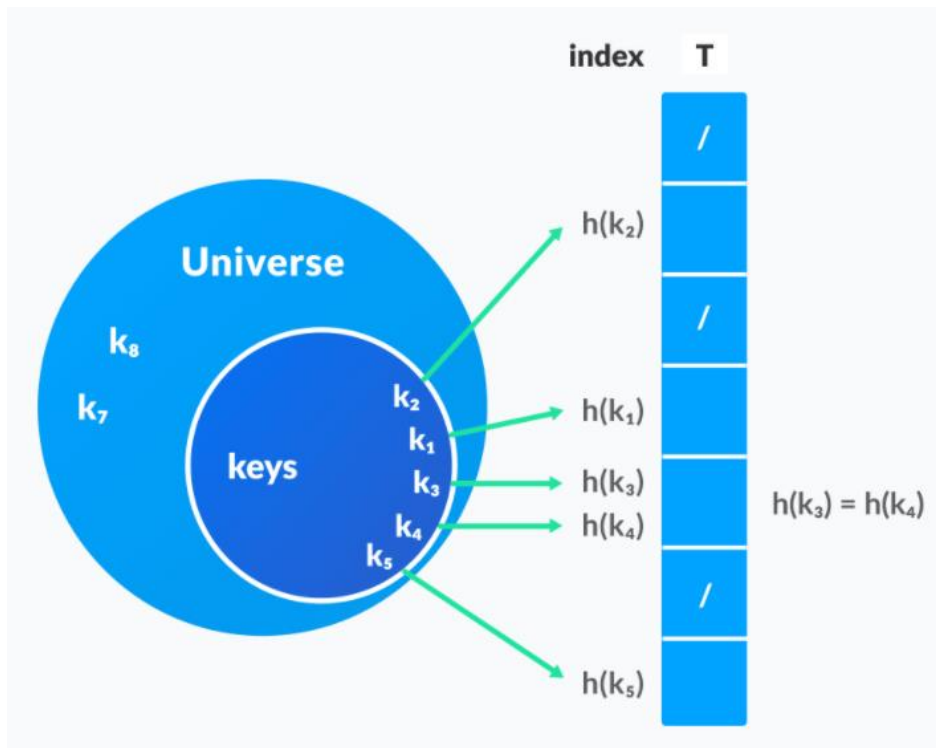
- Hashing is a technique to convert a range of key values into a range of indexes of an array.
 - $H(x) = x \% 20$

Key	Hash	Array Index
1	$1 \% 20 = 1$	1
2	$2 \% 20 = 2$	2
42	$42 \% 20 = 2$	2
4	$4 \% 20 = 4$	4
12	$12 \% 20 = 12$	12
14	$14 \% 20 = 14$	14
17	$17 \% 20 = 17$	17
13	$13 \% 20 = 13$	13
37	$37 \% 20 = 17$	17



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 its own unique index value.
- Designed to use a special function called the Hash function which is used to map a given value with a particular key for faster access of elements.



Hash Collision

- When the hash function generates the **same index for multiple keys**, there will be a conflict.
- This is called a hash collision.
- **Example**
 - Let $H(x) = x \% 10$.
 - $H(11) = 1$
 - $H(21) = 1$
 - $H(41) = 1$

Collision resolution by Chaining

- In chaining, if a hash function produces the **same index for multiple elements**, these elements are stored in the same index by using a **linked list**.
- If j is the slot for multiple elements, it contains a pointer to the head of the list of elements.

