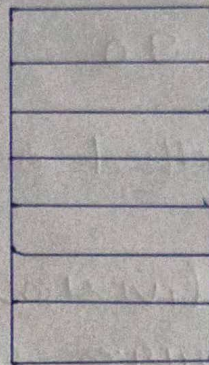


# Hashing

Hashing is the process of generating a value from a text or a list of numbers using a mathematical function known as hash function.

Hash function — It is the process in which we try to insert or fetch the data from a hash table.



## Hash table

There are mainly four hash function

- ① Division method
- ② Mid square method
- ③ Folding method
- ④ Multiplication method

Division method — This is the most simple and easiest method to generate a hash value. The hash function divides the value  $K$  by  $M$  and then uses the remainder obtained.



Formula  $h(k) = k \bmod M$

Here,

$K$  is the key value, and

$M$  is the size of the hash table

e.g  $K = 12345$

$M = 95$

$$h(12345) = 12345 \bmod 95 \\ = 90$$

- Pros:
1. This method is quite good for any value of  $M$ .
  2. The division method is very fast since it requires only a single division operation.

## 2. Mid Square method

It involves two steps to compute the hash value.

1. Square the value of the key  $K$   
i.e.  $K^2$

2. Extract the middle  $\delta$  digits as the hash value.

formula:  $h(k) = h(k \times k)$

Here,  $K$  is the value.

The value of  $\delta$  can be decided based on the size of the table.



Example

Suppose the hash table has 100 memory locations.

So  $r = 2$  because two digits are required to map the key to the memory location.

$$K = 60$$

$$K \times K = 3600$$

$$h(60) = 60$$

Note — Take Reference through GFG site.