

# Hash Maps

## Hash Maps

Hash maps are a common data structure used to store key-value pairs for efficient retrieval. A value stored in a hash map is retrieved using the key under which it was stored.

# `states` is a Hash Map with state abbreviation keys and state name values.

```
states = {  
  'TN': "Tennessee",  
  'CA': "California",  
  'NY': "New York",  
  'FL': "Florida"  
}
```

```
west_coast_state = states['CA']
```

## Hash map underlying data structure

Hash maps are built on top of an underlying array data structure using an indexing system.

Each index in the array can store one key-value pair. If the hash map is implemented using chaining for collision resolution, each index can store another data structure such as a linked list, which stores all values for multiple keys that hash to the same index.

## Hash function

Hash map data structures use a hash function, which turns a key into an index within an underlying array. The hash function can be used to access an index when inserting a value or retrieving a value from a hash map.

## hash map only one value

Each Hash Map key can be paired with only one value.  
However, different keys can be paired with the same value.

#This is a valid Hash Map where 2 keys share the same value

```
correct_hash_map = {  
  "a" : 1,  
  "b" : 3,  
  "c" : 1  
}
```

#This Hash Map is INVALID since a key cannot have more than 1 value

```
incorrect_hash_map = {  
  "a" : 1,  
  "a" : 3,  
  "b" : 2  
}
```