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.

```python
# `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 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 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 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
}
```