JAVA HashMap and Hash Set

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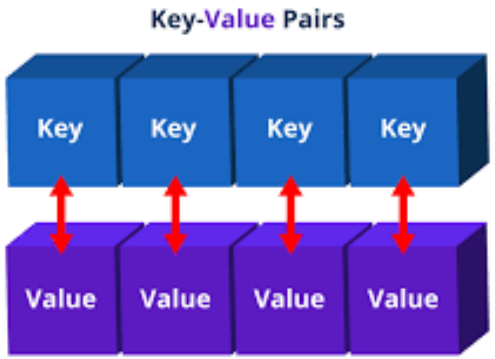
Java HashMap

In ArrayList, Arrays store items as an ordered collection, and we had to access them with an index number (int type).

A HashMap, store items in "**key**/**value**" pairs, and we can access them by an index of another type (e.g. a String).



One object is used as a key (index) to another object (value).

It can store different types: String keys and Integer values, or the same type, like: String keys and String values:

Example

Create a HashMap object called **capitalCities** that will store String **keys** and String **values**:

```
import java.util.HashMap; // import the HashMap class
HashMap<String, String> capitalCities = new HashMap<String, String>();
```

Adding Items to HashMap

The HashMap class has many useful methods.
For example, to add items to it, use the put() method:

Example

```
// Import the HashMap class
import java.util.HashMap;
public class Main
{
        public static void main(String[] args)
        {
                // Create a HashMap object called capitalCities
                HashMap<String, String> capitalCities = new HashMap<String, String>();
                // Add keys and values (Country, City)
                capitalCities.put("England", "London");
                capitalCities.put("Germany", "Berlin");
                capitalCities.put("Norway", "Oslo");
                capitalCities.put("USA", "Washington DC");

                System.out.println(capitalCities);
        }
}
```

```
{USA=Washington DC, Norway=Oslo, England=London, Germany=Berlin}
```

Access an Item

To access a value in the HashMap, use the get() method and refer to its key:

Example

```
capitalCities.get("England");
```

```
import java.util.HashMap;

public class Main {
  public static void main(String[] args) {
    HashMap<String, String> capitalCities = new HashMap<String, String>();
    capitalCities.put("England", "London");
    capitalCities.put("Germany", "Berlin");
    capitalCities.put("Norway", "Oslo");
    capitalCities.put("USA", "Washington DC");

    System.out.println(capitalCities.get("England"));

  }
}
```

```
London
```

Remove an Item

To remove an item, use the remove() method and refer to the key:

Example

```
capitalCities.remove("England");
```

```
import java.util.HashMap;

public class Main {
  public static void main(String[] args) {
    HashMap<String, String> capitalCities = new HashMap<String, String>();
    capitalCities.put("England", "London");
    capitalCities.put("Germany", "Berlin");
    capitalCities.put("Norway", "Oslo");
    capitalCities.put("USA", "Washington DC");

    capitalCities.remove("England");

    System.out.println(capitalCities);
  }
}
```

```
{USA=Washington DC, Norway=Oslo, Germany=Berlin}
```

Remove all items

To remove all items, use the clear() method:

Example
capitalCities.clear();

```
import java.util.HashMap;

public class Main {
  public static void main(String[] args) {
    HashMap<String, String> capitalCities = new HashMap<String, String>();
    capitalCities.put("England", "London");
    capitalCities.put("Germany", "Berlin");
    capitalCities.put("Norway", "Oslo");
    capitalCities.put("USA", "Washington DC");

    capitalCities.clear();

    System.out.println(capitalCities);
  }
}
```

```
{}
```

HashMap Size

To find out how many items there are, use the size() method:

Example

```
capitalCities.size();
```

```
import java.util.HashMap;

public class Main {
  public static void main(String[] args) {
    HashMap<String, String> capitalCities = new HashMap<String, String>();
    capitalCities.put("England", "London");
    capitalCities.put("Germany", "Berlin");
    capitalCities.put("Norway", "Oslo");
    capitalCities.put("USA", "Washington DC");

    System.out.println(capitalCities.size());

  }
}
```

```
4
```

Loop Through a HashMap

Loop through the items of a HashMap with a **for-each** loop.
Note: Use the keySet() method if **you only want the keys**, and use the **values() method if you only want the values**:

Example

```
// Print keys for (String i : capitalCities.keySet()) { System.out.println(i); }
```

```
import java.util.HashMap;

public class Main {
  public static void main(String[] args) {
    HashMap<String, String> capitalCities = new HashMap<String, String>();
    capitalCities.put("England", "London");
    capitalCities.put("Germany", "Berlin");
    capitalCities.put("Norway", "Oslo");
    capitalCities.put("USA", "Washington DC");

    for (String i : capitalCities.keySet()) {System.out.println(i);    }
  }
}
```

```
USA
Norway
England
Germany
```

Example

```
// Print values for (String i : capitalCities.values()) { System.out.println(i); }
```

```
import java.util.HashMap;

public class Main {
  public static void main(String[] args) {
    HashMap<String, String> capitalCities = new HashMap<String, String>();
    capitalCities.put("England", "London");
    capitalCities.put("Germany", "Berlin");
    capitalCities.put("Norway", "Oslo");
    capitalCities.put("USA", "Washington DC");

    for (String i : capitalCities.values()) {System.out.println(i);    }
  }
}
```

```
Washington DC
Oslo
London
Berlin
```

```
// Print keys and values
for (String i : capitalCities.keySet()) {
                System.out.println("key: " + i + " value: " + capitalCities.get(i)); }
```

```
import java.util.HashMap;

public class Main {
  public static void main(String[] args) {
    HashMap<String, String> capitalCities = new HashMap<String, String>();
    capitalCities.put("England", "London");
    capitalCities.put("Germany", "Berlin");
    capitalCities.put("Norway", "Oslo");
    capitalCities.put("USA", "Washington DC");

    for (String i : capitalCities.keySet()) {
      System.out.println("key: " + i + " value: " + capitalCities.get(i));
    }
  }
}
```

```
key: USA value: Washington DC
key: Norway value: Oslo
key: England value: London
key: Germany value: Berlin
```

Keys and values in a HashMap are actually objects.
Previously, we used objects of type "String".
Remember that a **String in Java is an object (not a primitive type).**
To use other types, such as int, we must specify an equivalent wrapper class: Integer.
For other primitive types, we use: Boolean for boolean, Character for char, Double for double, etc:

Example

Create a HashMap object called **people** that will store String **keys** and Integer **values**:

```
// Import the HashMap class
import java.util.HashMap;
public class Main
{
        public static void main(String[] args)
        {
                // Create a HashMap object called people
                HashMap<String, Integer> people = new HashMap<String, Integer>();
                // Add keys and values (Name, Age)
                people.put("John", 32);
                people.put("Steve", 30);
                people.put("Angie", 33);

                for (String i : people.keySet())
                {
                        System.out.println("key: " + i + " value: " + people.get(i));
                }
        }
}
```

```
Name: Angie Age: 33
Name: Steve Age: 30
Name: John Age: 32
```

Java HashSet

A HashSet is a collection of items **where every item is unique**, and it is found in the java.util package:

Create a HashSet object called **cars** that will store strings:

```
import java.util.HashSet;
// Import the HashSet class
HashSet<String> cars = new HashSet<String>();
```

Adding items to the HashSet using add() Method

```
// Import the HashSet class
import java.util.HashSet;
public class Main {
        public static void main(String[] args) {
                HashSet<String> cars = new HashSet<String>();
                cars.add("Volvo");
                cars.add("BMW");
                cars.add("Ford");
                cars.add("BMW");
                cars.add("Mazda");

                System.out.println(cars);
        }
}
```

```
[Volvo, Mazda, Ford, BMW]
```

NOTE: Though BMW is added twice it only appears once in the set because every item in a set has to be unique.

To check if an Item Exists

To check whether an item exists in a HashSet, we use the contains() method:

Example

```
cars.contains("Mazda");
```

```
// Import the HashSet class
import java.util.HashSet;

public class Main {
  public static void main(String[] args) {
    HashSet<String> cars = new HashSet<String>();
    cars.add("Volvo");
    cars.add("BMW");
    cars.add("Ford");
    cars.add("BMW");
    cars.add("Mazda");

    System.out.println(cars.contains("Mazda"));
  }
}
```

```
true
```

To remove an item

To remove an item, use the remove() method:

Example

```
cars.remove("Volvo");
```

```
// Import the HashSet class
import java.util.HashSet;

public class Main {
  public static void main(String[] args) {
    HashSet<String> cars = new HashSet<String>();
    cars.add("Volvo");
    cars.add("BMW");
    cars.add("Ford");
    cars.add("BMW");
    cars.add("Mazda");

    cars.remove("Volvo");

    System.out.println(cars);
  }
}
```

```
[Mazda, Ford, BMW]
```

To remove all items

To remove all items, use the clear() method:

Example
cars.clear();

```
// Import the HashSet class
import java.util.HashSet;
public class Main {
  public static void main(String[] args) {
    HashSet<String> cars = new HashSet<String>();
    cars.add("Volvo");
    cars.add("BMW");
    cars.add("Ford");
    cars.add("BMW");
    cars.add("Mazda");
    cars.clear();
    System.out.println(cars);  }}
```

```
[]
```

To find the HashSet size

To find out how many items there are, we use the size method:

Example
cars.size();

```
// Import the HashSet class
import java.util.HashSet;


public class Main {
  public static void main(String[] args) {
    HashSet<String> cars = new HashSet<String>();
    cars.add("Volvo");
    cars.add("BMW");
    cars.add("Ford");
    cars.add("BMW");
    cars.add("Mazda");
    System.out.println(cars.size());  }}
```

To loop through a HashSet

Loop through the items of an HashSet with a **for-each** loop:

Example

```
for (String i : cars) { System.out.println(i); }
```

```
// Import the HashSet class
import java.util.HashSet;

public class Main {
  public static void main(String[] args) {
    HashSet<String> cars = new HashSet<String>();
    cars.add("Volvo");
    cars.add("BMW");
    cars.add("Ford");
    cars.add("BMW");
    cars.add("Mazda");
    for (String i : cars) { System.out.println(i);}
}
}
```

```
Volvo
Mazda
Ford
BMW
```

Items in an HashSet are actually objects.
Previously, we created items (objects) of type "String“, which in Java is an object (not a primitive type).
To use other types, such as int, we must specify an equivalent wrapper class: Integer.
For other primitive types, we use: Boolean for boolean, Character for char, Double for double, etc:

Example
A HashSet that stores Integer objects and shows which numbers between 1 and 10 are in the set:

```
import java.util.HashSet;
public class Main {
        public static void main(String[] args) {
                // Create a HashSet object called numbers
                HashSet<Integer> numbers = new HashSet<Integer>();
                // Add values to the set
                numbers.add(4);
                numbers.add(7);
                numbers.add(9);
                // Show which numbers between 1 and 10 are in the set
                for(int i = 1; i <= 10; i++)
                {
                        if(numbers.contains(i))
                        {
                                System.out.println(i + " was found in the set.");
                        }
                        else
                        {
                                System.out.println(i + " was not found in the set.");
                        }
                }
        }
}
```

```
1 was not found in the set.
2 was not found in the set.
3 was not found in the set.
4 was found in the set.
5 was not found in the set.
6 was not found in the set.
7 was found in the set.
8 was not found in the set.
9 was found in the set.
10 was not found in the set.
```

Thank You