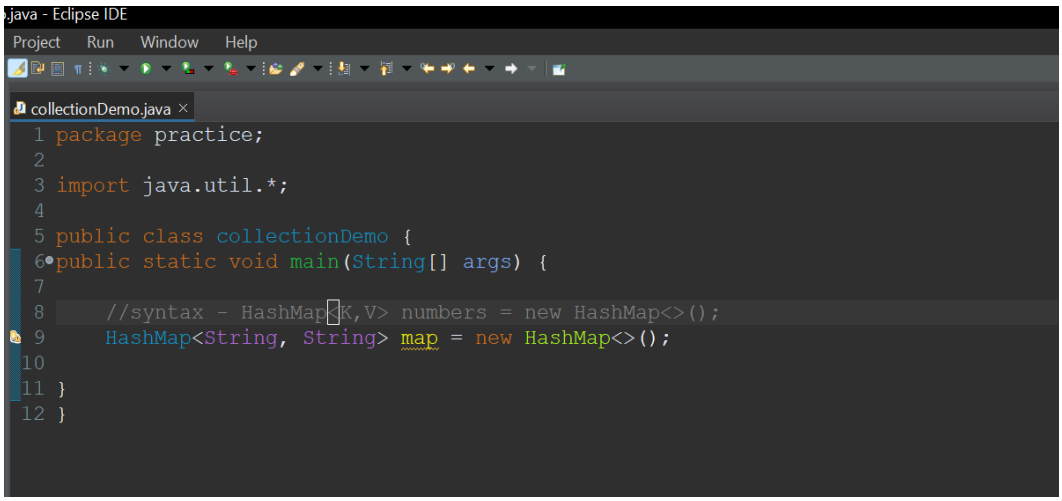
HashMap

1) What is a HashMap in Java and give syntax to create it in Java?

HashMap is a data structure that stores key-value pairs, where each key is unique, and each key has a corresponding value with it. provides constant-time performance for the basic operations of adding, removing, and finding values.

Creating a simple HashMap: -
Here K represents the Key and V represents the values



2) How do you add and remove elements in HashMap?

To add an element to a HashMap, you can use the put () method, which takes two arguments: the key and the value.

To remove we can use we can use Remove () method which takes one argument: the key

3) How do you iterate over the key-value pairs in a HashMap?

Using the keyset () method to get a set of all the keys, and then iterating over the set and using the get() method to retrieve the corresponding value for each key.

Using the for Each () method to iterate over the key-value pairs, which is available in Java 8 and later.

```
    //adding the elements
    map.put(1,10);
    map.put(2,20);

    Set<Integer> keys = map.keySet();
    for (int i: keys) {
        System.out.println(i);
    }



    map.forEach((key,value)->{
        System.out.println(key+" "+value);
    });
```

4) Why is there a need for HashMap and how is it different from Array List?

HashMap and Array List are both data structures in Java, but they are designed for different purposes and have different performance characteristics.

Array List is an ordered collection of elements, where each element can be accessed by its index in the list. On the other hand, HashMap is a data structure that stores key-value pairs and uses a hash function to map keys to indices in an array.

HashMap uses a hash function to determine the index of a key, it can perform lookups and insertions in constant time on average, O(1), whereas Array List performs these operations in linear time, O(n).

*collectionDemo.java

```
public static void main(String[] args) {
    HashMap<Integer,Integer> map = new HashMap<>();
    map.put(1,10);
    map.put(2,20);
    map.get(2);
    map.put(3, 80);   //O(1)


    ArrayList<String> list = new ArrayList<>();
    list.add("One");
    list.add("Two");
    list.add("Three");
    String element = list.get(1);
    list.add("Four");     // O(n)

}
```

5) what is collision in HashMap in java?

Collision in a HashMap in Java occurs when two or more keys have the same hash code and are mapped to the same index in the array (bucket). When a key-value pair is added to the HashMap, the hash function is used to determine the index in the array where the pair should be stored. If another key-value pair is added with the same hash code and the index is already occupied, a collision occurs.