IMPLEMENTATION *OF ARRAYLIST AND HASHMAP*

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1) ArrayList Implementation

For this I have a created a separate class named MyArrayList and implemented some methods of original ArrayList and there is also some variation in some of the methods, example in method set: an index and a value is passed but ArrayList will show error if index is out of range and MyArrayList will round the index to index by index=index% size and will not show error and proceed and I have used Array to implement MyArrayList.

Code of class MyArrayList:

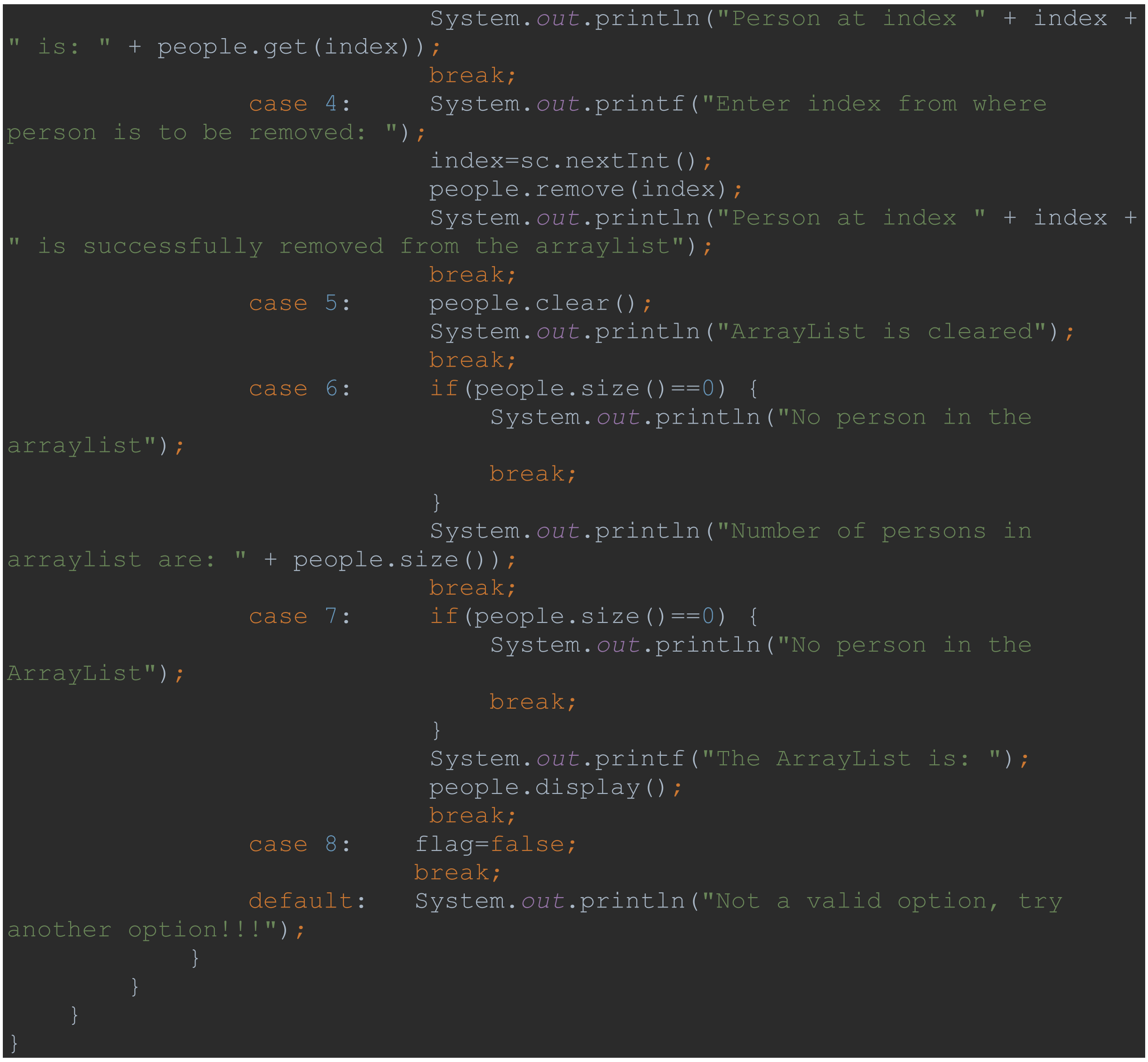
```
package  mypac;

public class MyArrayList<V> {

    //Since we are implementing arraylist using array so its fix_size has
to be defined
    private static final int fix_size=10;

    //recordArray is a array of Object type
    private Object recordArray[];

    //index is the original size of arraylist and size is the max size of
recordArray
    private int index,size;

    //Default Constructor
    public MyArrayList(){
        recordArray=new Object[fix_size];
        this.size=fix_size;
    }

    //Method to add an element in the recordArray which will also check
size bound of array
    public void add(V v){
        if(this.index==this.size-1){
            //we need to increase the size of recordArray[]
            increaseSize();
        }
        recordArray[this.index]=v;
        this.index++;

    }
    //Private method to handle size bound of the array
    private void increaseSize() {
        this.size=this.size+fix_size;
        Object newrecordArray[]=new Object[this.size];
        for(int i=0; i<recordArray.length;i++){
            newrecordArray[i]=recordArray[i];
        }
        this.recordArray=newrecordArray;
    }

    //Method to get the element of recordArray at ith index
    //Note: Different from original ArrayList since it will also work for
indexes out of range
    public V get(int i){
        i=i%index;
        final V v = (V)recordArray[i];
        return v;

    }

    //Method to remove an element of recordArray from ith index\
    //Note: Different from original ArrayList since it will also work for
indexes out of range
    public void remove(int i){
        i=i%index;
        for(int x=i; x<this.recordArray.length-1;x++){
            recordArray[x]=recordArray[x+1];
        }
        this.index--;
    }

    //Method to set the value of element at given index
    //Note: Different from original ArrayList since it will also work for
indexes out of range
    public void set(Integer i,V v){
        i=i%index;
        recordArray[i]=v;
    }

    //Method to clear all the elements in the array
    public void clear(){
        index=0;
        size=fix_size;
    }

    //Method to return the size of ArrayList
    public int size(){
        return index;
    }

    //Method to display all the elements in the ArrayList
    public void display(){
        for(int i=0;i<this.index;i++){
            System.out.print(recordArray[i]);
            if(i!=this.index-1)
                System.out.print(",  ");
        }
        System.out.println();
    }
}
```

After this I have made a test class in the same package to test the working of all the methods, so I have used a switch to switch between the methods and through it we can test every method as many numbers of times.

Object is people and we are implementing MyArrayList on their name.

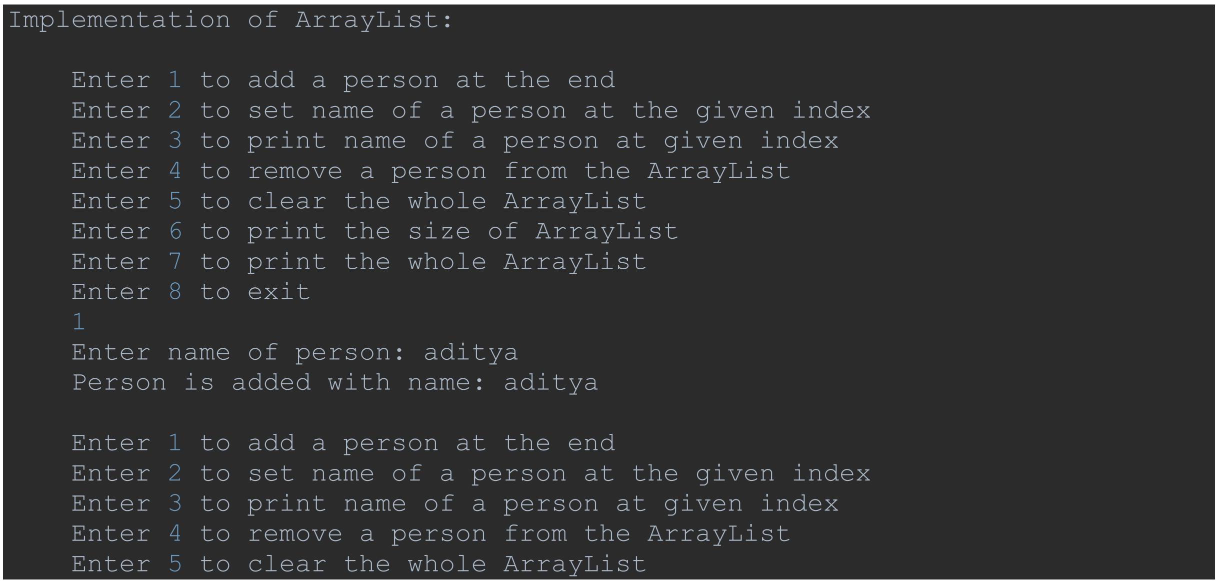
Code of class TestClass:

```
package mypac;
import mypac.MyArrayList;

import java.util.Scanner;

public class TestClass{
    public static void main(String[] args) {
        System.out.println("Implementation of ArrayList:");
        //Let us take an ArrayList of people with their name as the value.
        MyArrayList<String> people = new MyArrayList<String>();
        boolean flag=true;
        while(flag){
            System.out.println();
            System.out.println("Enter 1 to add a person at the end");
            System.out.println("Enter 2 to set name of a person at the 
given index");
            System.out.println("Enter 3 to print name of a person at given 
index");
            System.out.println("Enter 4 to remove a person from the 
ArrayList");
            System.out.println("Enter 5 to clear the whole ArrayList");
            System.out.println("Enter 6 to print the size of ArrayList");
            System.out.println("Enter 7 to print the whole ArrayList");
            System.out.println("Enter 8 to exit");
            Scanner sc=new Scanner(System.in);
            int x=sc.nextInt();
            String name;
            Integer index;
            switch(x){
                case 1:     System.out.printf("Enter name of person: ");
                            name=sc.next();
                            people.add(name);
                            System.out.println("Person is added with name: 
" + name);
                            break;
                case 2:     System.out.printf("Enter name of person: ");
                            name=sc.next();
                            System.out.printf("Enter index where this 
person is to be added: ");

                            index=sc.nextInt();
                            people.set(index, name);
                            System.out.printf("Person at index " + index + 
" is: " + people.get(index));
                            break;
                case 3:     System.out.printf("Enter index from where 
person name is to be displayed: ");
                            index=sc.nextInt();
```

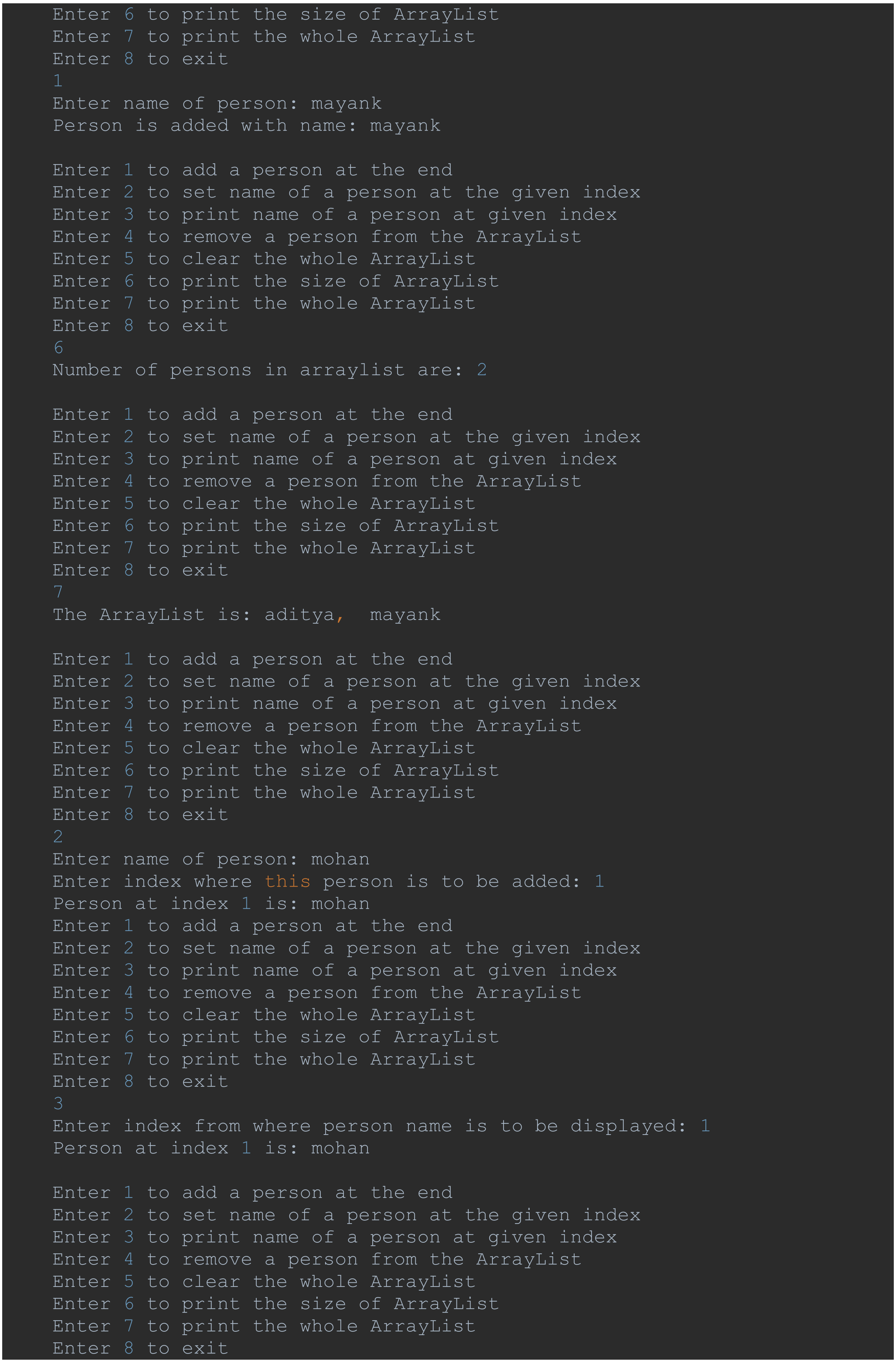


```
                            System.out.println("Person at index " + index +
" is: " + people.get(index));
                            break;
                case 4:     System.out.printf("Enter index from where
person is to be removed: ");
                            index=sc.nextInt();
                            people.remove(index);
                            System.out.println("Person at index " + index +
" is successfully removed from the arraylist");
                            break;
                case 5:     people.clear();
                            System.out.println("ArrayList is cleared");
                            break;
                case 6:     if(people.size()==0) {
                                System.out.println("No person in the
arraylist");
                                break;
                            }
                            System.out.println("Number of persons in
arraylist are: " + people.size());
                            break;
                case 7:     if(people.size()==0) {
                                System.out.println("No person in the
ArrayList");
                                break;
                            }
                            System.out.printf("The ArrayList is: ");
                            people.display();
                            break;
                case 8:    flag=false;
                           break;
                default:   System.out.println("Not a valid option, try
another option!!!");
            }
        }
    }
}
```

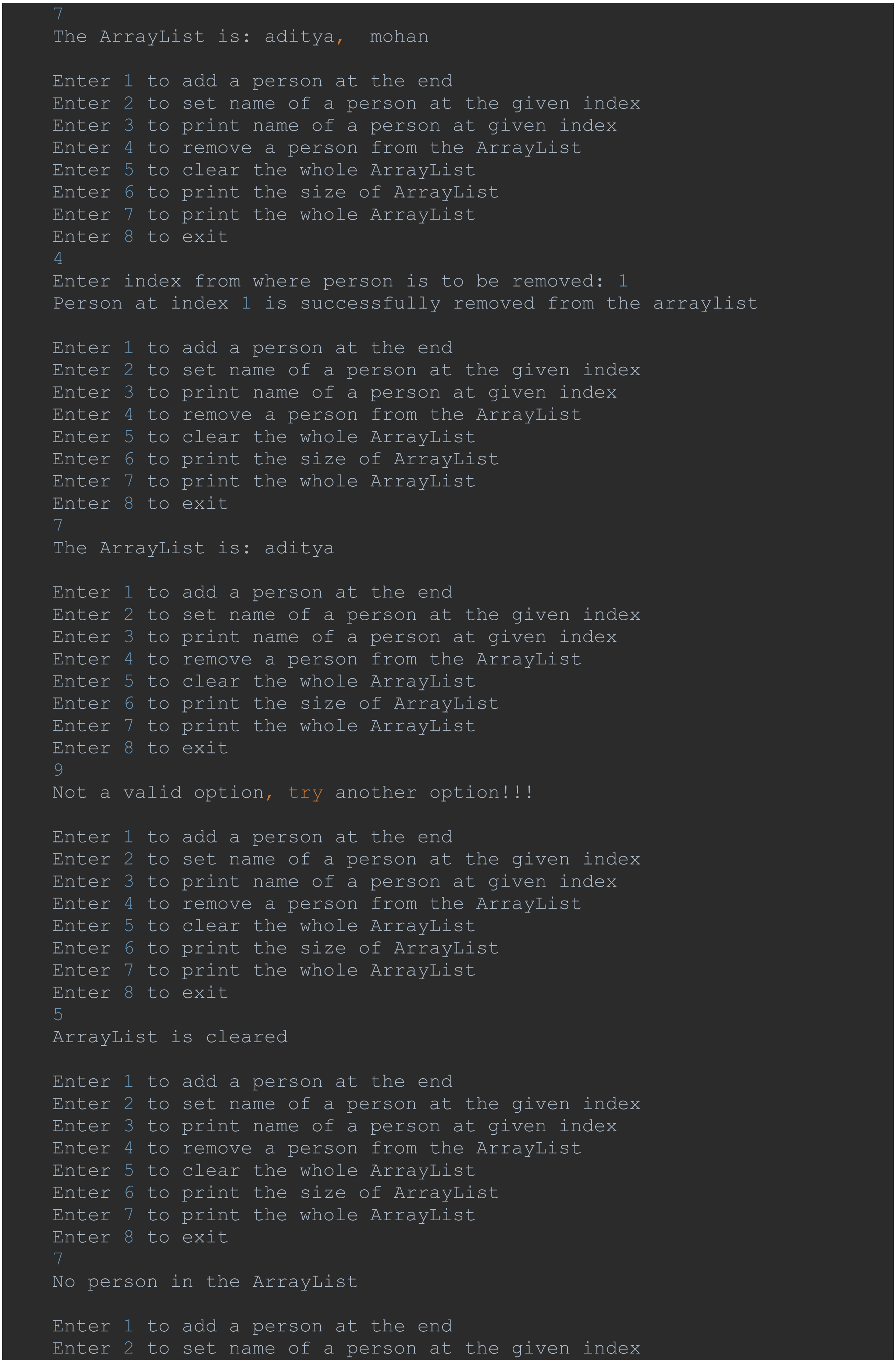
Sample Output:



```
Implementation of ArrayList:

    Enter 1 to add a person at the end
    Enter 2 to set name of a person at the given index
    Enter 3 to print name of a person at given index
    Enter 4 to remove a person from the ArrayList
    Enter 5 to clear the whole ArrayList
    Enter 6 to print the size of ArrayList
    Enter 7 to print the whole ArrayList
    Enter 8 to exit
    1
    Enter name of person: aditya
    Person is added with name: aditya

    Enter 1 to add a person at the end
    Enter 2 to set name of a person at the given index
    Enter 3 to print name of a person at given index
    Enter 4 to remove a person from the ArrayList
    Enter 5 to clear the whole ArrayList
```



```
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
1
Enter name of person: mayank
Person is added with name: mayank

Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
Enter 3 to print name of a person at given index
Enter 4 to remove a person from the ArrayList
Enter 5 to clear the whole ArrayList
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
6
Number of persons in arraylist are: 2

Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
Enter 3 to print name of a person at given index
Enter 4 to remove a person from the ArrayList
Enter 5 to clear the whole ArrayList
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
7
The ArrayList is: aditya,  mayank

Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
Enter 3 to print name of a person at given index
Enter 4 to remove a person from the ArrayList
Enter 5 to clear the whole ArrayList
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
2
Enter name of person: mohan
Enter index where this person is to be added: 1
Person at index 1 is: mohan
Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
Enter 3 to print name of a person at given index
Enter 4 to remove a person from the ArrayList
Enter 5 to clear the whole ArrayList
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
3
Enter index from where person name is to be displayed: 1
Person at index 1 is: mohan

Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
Enter 3 to print name of a person at given index
Enter 4 to remove a person from the ArrayList
Enter 5 to clear the whole ArrayList
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
```



```
7
The ArrayList is: aditya,  mohan

Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
Enter 3 to print name of a person at given index
Enter 4 to remove a person from the ArrayList
Enter 5 to clear the whole ArrayList
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
4
Enter index from where person is to be removed: 1
Person at index 1 is successfully removed from the arraylist

Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
Enter 3 to print name of a person at given index
Enter 4 to remove a person from the ArrayList
Enter 5 to clear the whole ArrayList
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
7
The ArrayList is: aditya

Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
Enter 3 to print name of a person at given index
Enter 4 to remove a person from the ArrayList
Enter 5 to clear the whole ArrayList
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
9
Not a valid option, try another option!!!

Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
Enter 3 to print name of a person at given index
Enter 4 to remove a person from the ArrayList
Enter 5 to clear the whole ArrayList
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
5
ArrayList is cleared

Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
Enter 3 to print name of a person at given index
Enter 4 to remove a person from the ArrayList
Enter 5 to clear the whole ArrayList
Enter 6 to print the size of ArrayList
Enter 7 to print the whole ArrayList
Enter 8 to exit
7
No person in the ArrayList

Enter 1 to add a person at the end
Enter 2 to set name of a person at the given index
```

```
    Enter 3 to print name of a person at given index
    Enter 4 to remove a person from the ArrayList
    Enter 5 to clear the whole ArrayList
    Enter 6 to print the size of ArrayList
    Enter 7 to print the whole ArrayList
    Enter 8 to exit
    6
    No person in the arraylist

    Enter 1 to add a person at the end
    Enter 2 to set name of a person at the given index
    Enter 3 to print name of a person at given index
    Enter 4 to remove a person from the ArrayList
    Enter 5 to clear the whole ArrayList
    Enter 6 to print the size of ArrayList
    Enter 7 to print the whole ArrayList
    Enter 8 to exit
    8

    Process finished with exit code 0
```

2) HashMap Implementation

For this I have a created a separate class named MyHashMap and implemented some methods of original HashMap and there is also some variation in some of the methods like in MyArrayList, I have used ArrayList to implement MyHashMap.

<K,V> is used so that user can take any data type of his/her choice.

Code of class MyHashMap:

```
package mypack;

import java.util.ArrayList;
import java.util.List;
public class MyHashMap<K,V>{

   //This class will contain key and value pair for every element.
   class  Container{
      K key;
      V value;
      public void insert(K k, V v){
         this.key=k;
         this.value=v;
      }
   }

   private Container c;
   //recordList is a list of type Container, for ith index it will give
value of key and pair.
```

```
   private List<Container> recordList;

   //Default Constructor to define the recordList.
   public MyHashMap(){

      this.recordList=new ArrayList<Container>();
   }

   //put method will add a key and its value in recordList and will also
check for duplicate keys.
   public void put(K k, V v){
      this.c=new Container();
      c.insert(k, v);
      int i;
      //It will check for the same key before adding
      for(i=0; i<recordList.size(); i++){
         Container c1=recordList.get(i);
         if(c1.key.equals(k)){
            //This will remove the existing key, value pair
            recordList.remove(i);
            break;
         }
      }
      //To add the new key, value at index i
      recordList.add(i,c);
   }

   //This method will return the value for the given key.
   public V get(K k)  {
      for (int i = 0; i < this.recordList.size(); i++)  {
         Container con = recordList.get(i);
         if(con.key.equals(k)){
            return con.value;
         }

      }
      return null;
   }

   //This method will delete key, value pair if given key exists and
returns true else it will return false
   public boolean remove(K k){
      for (int i = 0; i < this.recordList.size(); i++)  {
         Container con = recordList.get(i);
         if(con.key.equals(k)){
            //remove the existing String
            recordList.remove(i);
            return true;
         }

      }
      return false;
   }

   //This method will empty the hashMap array
   public void clear(){
      for (int i = this.recordList.size() - 1; i >= 0; i--)  {
         Container con = recordList.get(i);
         recordList.remove(i);
      }
   }
```

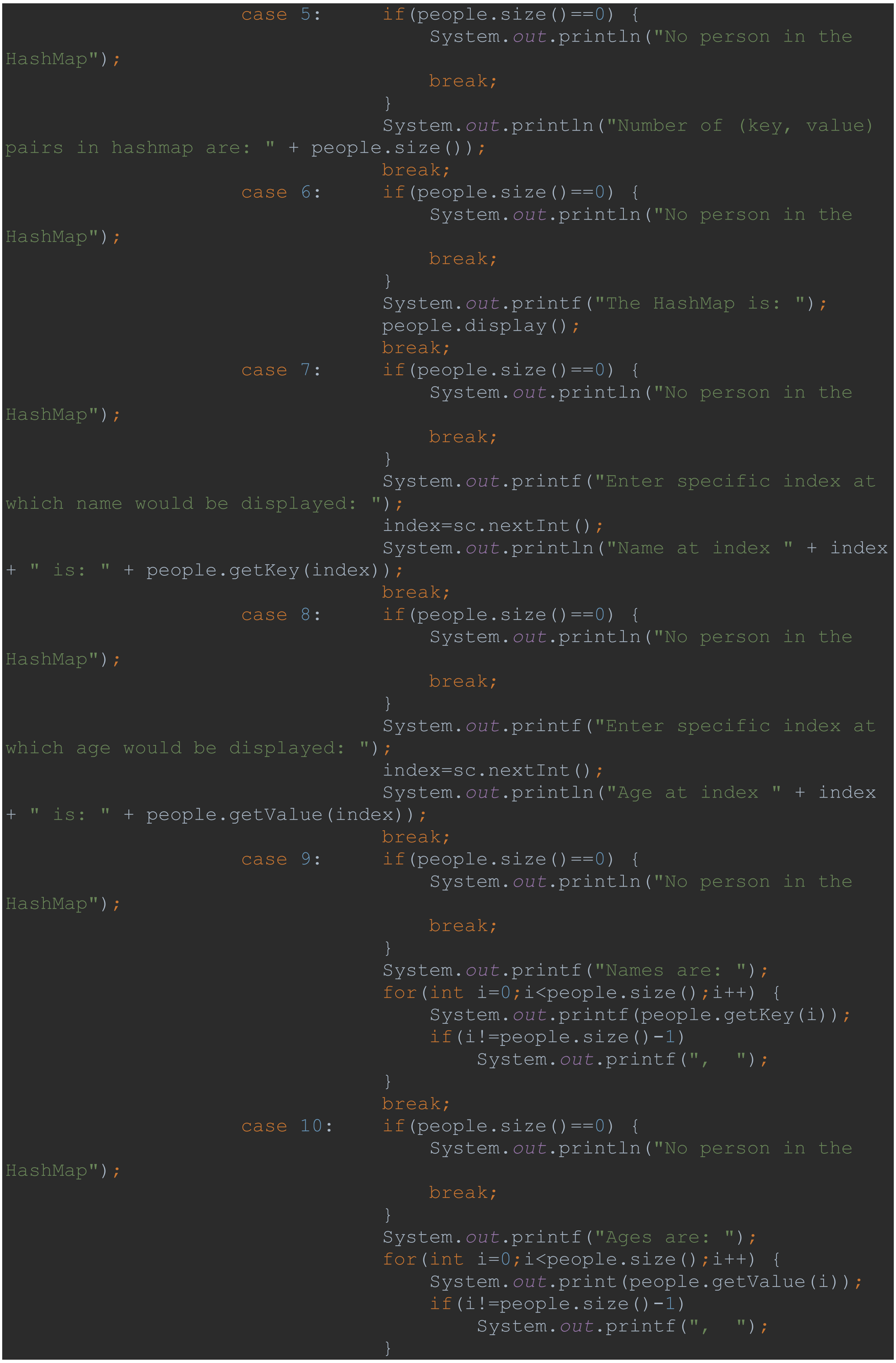
```
    //This method will return the number of different keys in the recordList
    public int size(){
        return recordList.size();
    }

    //This method displays all the keys and their respective values.
    public void display(){
        for(int i=0;i<this.recordList.size();i++){
            Container con = recordList.get(i);
            System.out.print(con.key + " -> " + con.value);
            if(i!=this.recordList.size()-1)
                System.out.print(",  ");
        }
        System.out.println();
    }

    //This method return Key at the given index.
    //If index is out of range then it will also handle that case.
    public K getKey(int index){
        if(recordList.size()==0)
            return null;
        index=index%(this.recordList.size());
        Container con = recordList.get(index);
        return con.key;
    }

    //This method return Value at the given index.
    //If index is out of range then it will also handle that case.
    public V getValue(int index){
        if(recordList.size()==0)
            return null;
        index=index%(this.recordList.size());
        Container con = recordList.get(index);
        return con.value;
    }
}
```

After this I have made a test class in the same package to test the working of all the methods, so I have used a switch to switch between the methods and through it we can test every method as many numbers of times.

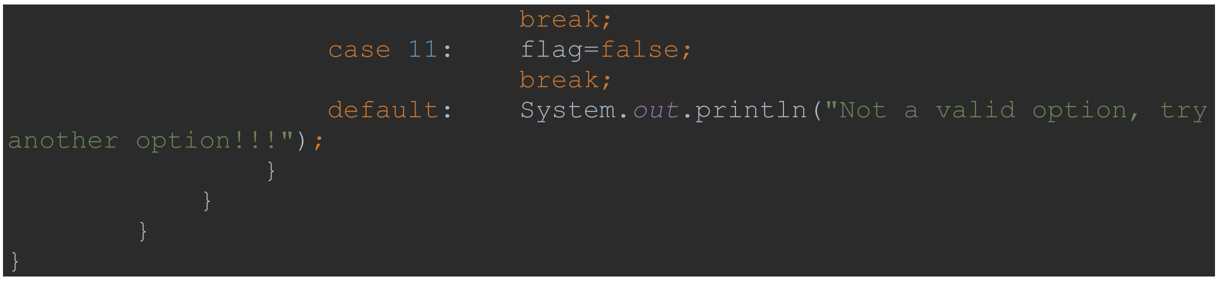
Object is people and we are implementing MyHashMap on their name as key and age as value.

Code of class TestClass:

```
package mypack;
import mypack.MyHashMap;

import java.util.Scanner;

public class TestClass{
        public static void main(String[] args) {
            System.out.println("Implementation of HashMap:");
            //Let us take an HashMap of people with their name as Key and
age as Value.
            MyHashMap<String, Integer> people = new MyHashMap<String,
Integer>();
            boolean flag=true;
            while(flag){
                System.out.println();
                System.out.println("Enter 1 to add a person");
                System.out.println("Enter 2 to print age of a person");
                System.out.println("Enter 3 to remove a person from the
hashmap");
                System.out.println("Enter 4 to clear the whole hashmap");
                System.out.println("Enter 5 to print the size of hashmap");
                System.out.println("Enter 6 to print the whole hashmap");
                System.out.println("Enter 7 to print key at a specific
index");
                System.out.println("Enter 8 to print value at a specific
index");
                System.out.println("Enter 9 to print all keys using a
loop");
                System.out.println("Enter 10 to print all values using a
loop");
                System.out.println("Enter 11 to exit");
                Scanner sc=new Scanner(System.in);
                int x=sc.nextInt();
                String name;
                Integer age,index;
                switch(x){
                    case 1:     System.out.printf("Enter name of person:
");
                                name=sc.next();
                                System.out.printf("Enter age of person: ");
                                age=sc.nextInt();
                                people.put(name,age);
                                System.out.println("Person is added with
name: " + name + " and age: " + age);
                                break;
                    case 2:     System.out.printf("Enter name of person
whose age is to be displayed: ");
                                name=sc.next();
                                if(people.get(name)==null)
                                    System.out.println("No such person in
hashmap");
                                else
                                    System.out.println("Age of " + name + "
is " + people.get(name));
                                break;
                    case 3:     System.out.printf("Enter name of person to
be removed: ");
                                name=sc.next();
                                boolean var=people.remove(name);
                                if(!var)
                                    System.out.println("No such person in
hashmap");
                                else
                                    System.out.println(name + " is
successfully removed from the hashmap");
                                break;
                    case 4:     people.clear();
                                System.out.println("HashMap is cleared");
                                break;
```

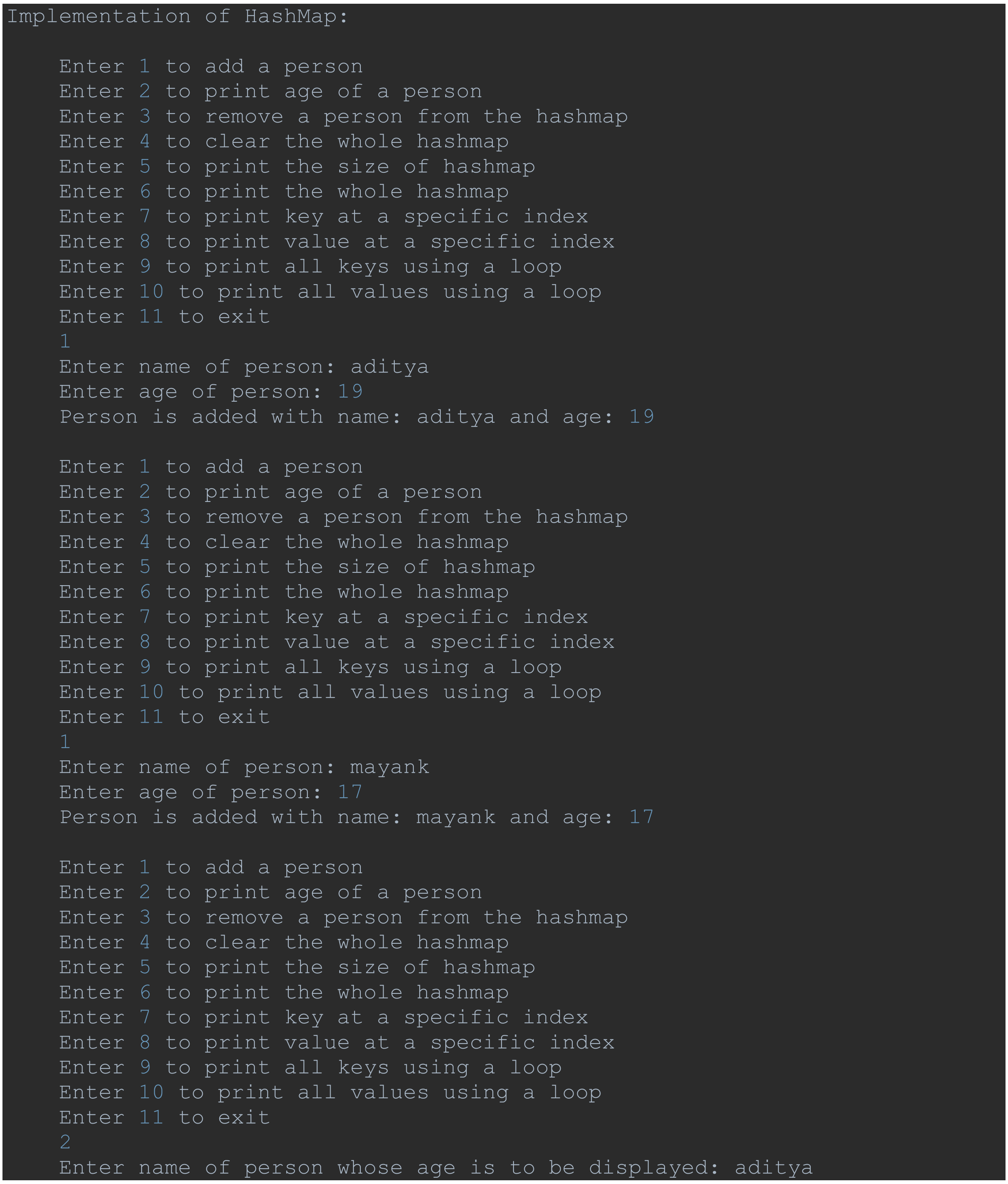


```
                    case 5:     if(people.size()==0) {
                                    System.out.println("No person in the
HashMap");
                                    break;
                                }
                                System.out.println("Number of (key, value)
pairs in hashmap are: " + people.size());
                                break;
                    case 6:     if(people.size()==0) {
                                    System.out.println("No person in the
HashMap");
                                    break;
                                }
                                System.out.printf("The HashMap is: ");
                                people.display();
                                break;
                    case 7:     if(people.size()==0) {
                                    System.out.println("No person in the
HashMap");
                                    break;
                                }
                                System.out.printf("Enter specific index at
which name would be displayed: ");
                                index=sc.nextInt();
                                System.out.println("Name at index " + index
+ " is: " + people.getKey(index));
                                break;
                    case 8:     if(people.size()==0) {
                                    System.out.println("No person in the
HashMap");
                                    break;
                                }
                                System.out.printf("Enter specific index at
which age would be displayed: ");
                                index=sc.nextInt();
                                System.out.println("Age at index " + index
+ " is: " + people.getValue(index));
                                break;
                    case 9:     if(people.size()==0) {
                                    System.out.println("No person in the
HashMap");
                                    break;
                                }
                                System.out.printf("Names are: ");
                                for(int i=0;i<people.size();i++) {
                                    System.out.printf(people.getKey(i));
                                    if(i!=people.size()-1)
                                        System.out.printf(",  ");
                                }
                                break;
                    case 10:    if(people.size()==0) {
                                    System.out.println("No person in the
HashMap");
                                    break;
                                }
                                System.out.printf("Ages are: ");
                                for(int i=0;i<people.size();i++) {
                                    System.out.print(people.getValue(i));
                                    if(i!=people.size()-1)
                                        System.out.printf(",  ");
                                }
```

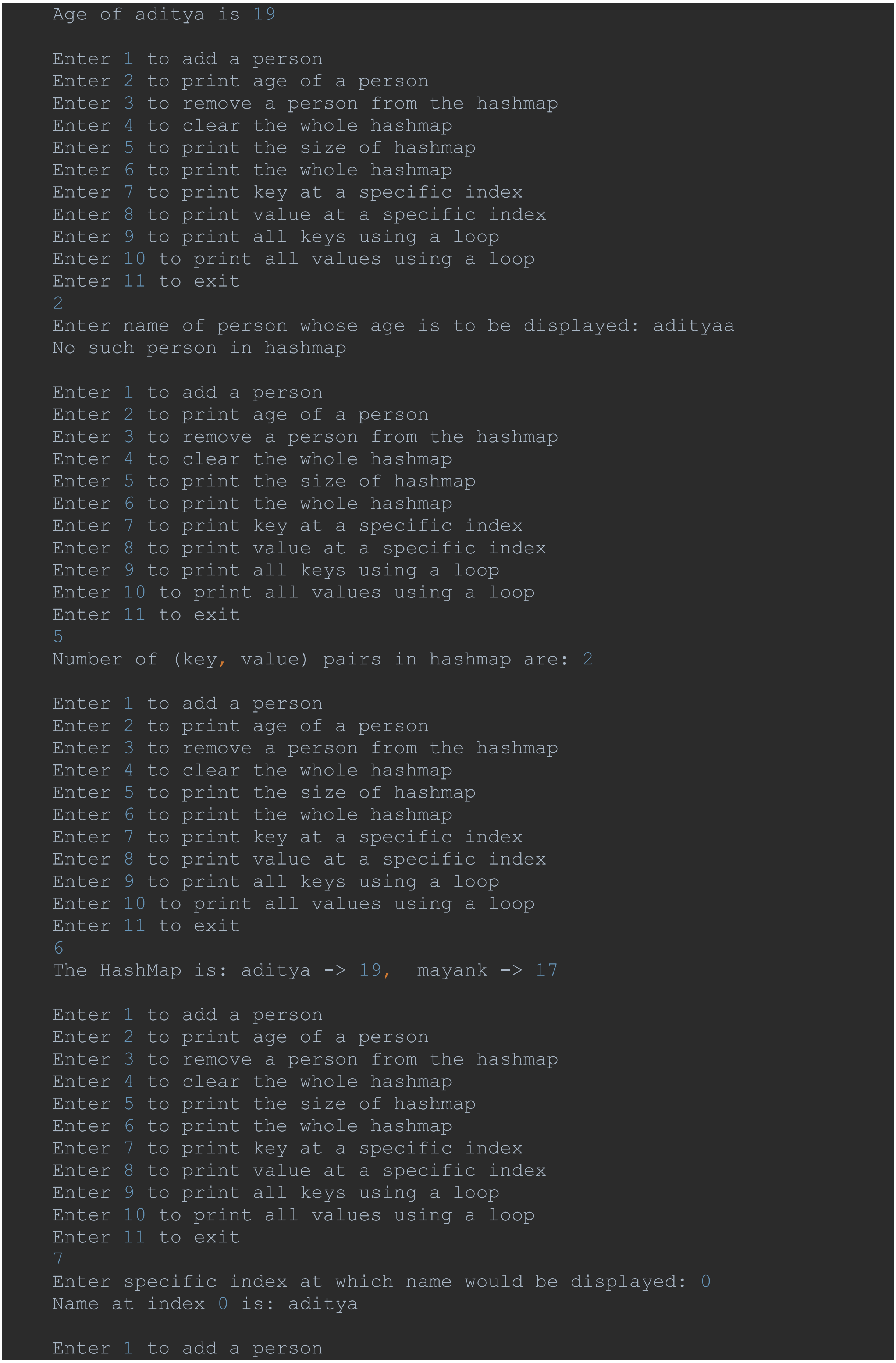


```
                                break;
                    case 11:    flag=false;
                                break;
                    default:    System.out.println("Not a valid option, try
another option!!!");
                }
            }
        }
}
```

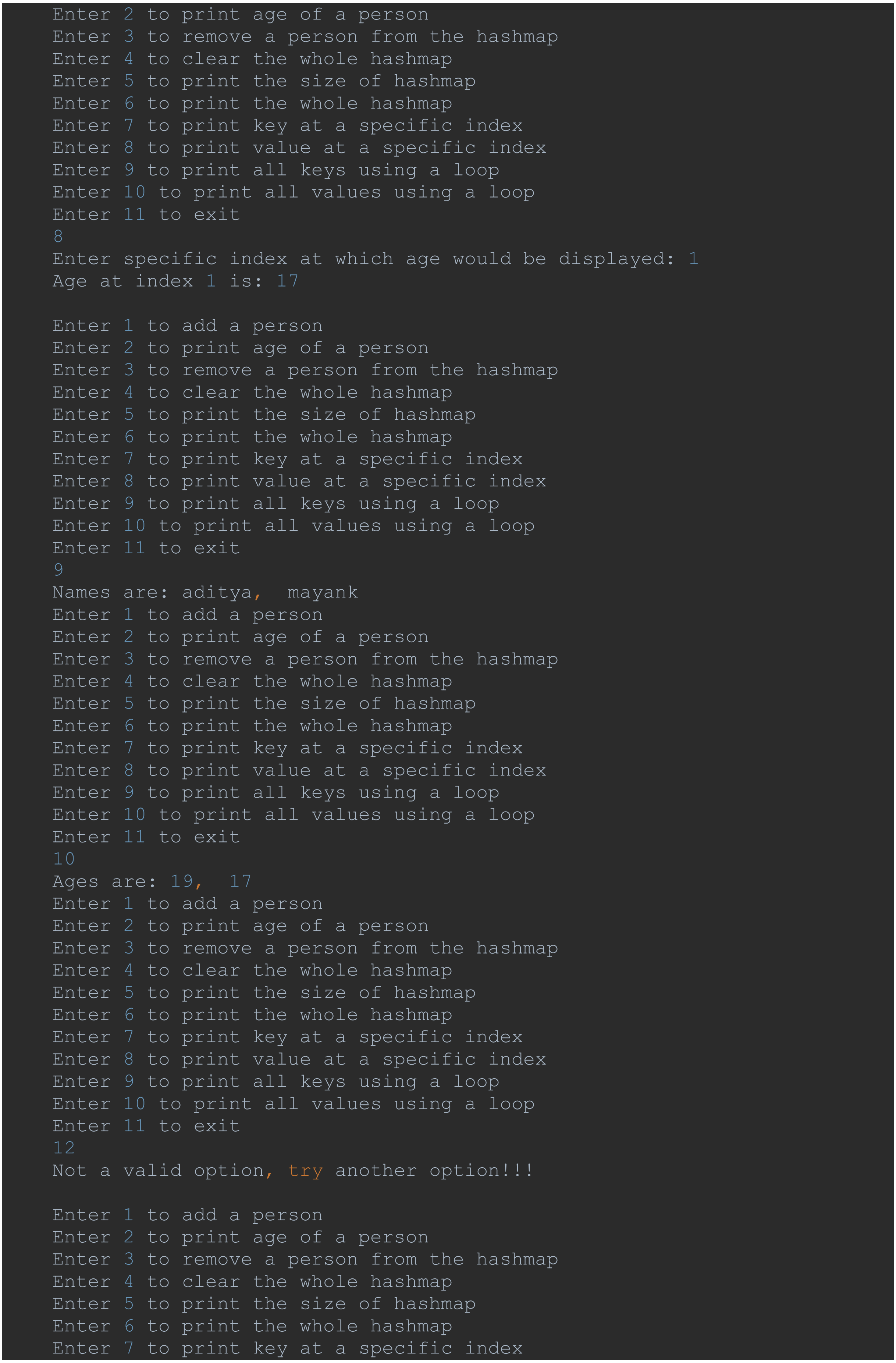
Sample Output:



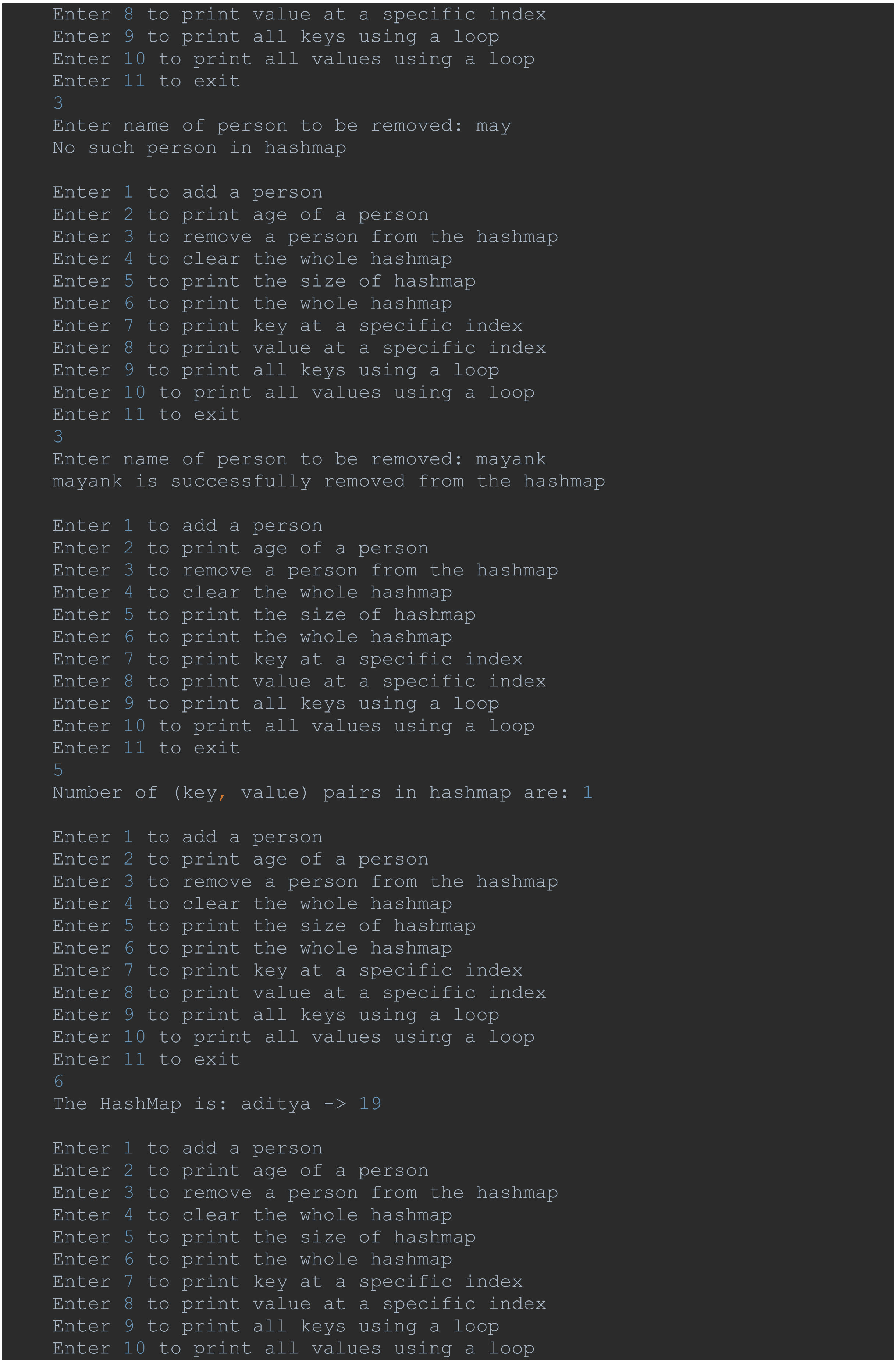
```
Implementation of HashMap:

    Enter 1 to add a person
    Enter 2 to print age of a person
    Enter 3 to remove a person from the hashmap
    Enter 4 to clear the whole hashmap
    Enter 5 to print the size of hashmap
    Enter 6 to print the whole hashmap
    Enter 7 to print key at a specific index
    Enter 8 to print value at a specific index
    Enter 9 to print all keys using a loop
    Enter 10 to print all values using a loop
    Enter 11 to exit
    1
    Enter name of person: aditya
    Enter age of person: 19
    Person is added with name: aditya and age: 19

    Enter 1 to add a person
    Enter 2 to print age of a person
    Enter 3 to remove a person from the hashmap
    Enter 4 to clear the whole hashmap
    Enter 5 to print the size of hashmap
    Enter 6 to print the whole hashmap
    Enter 7 to print key at a specific index
    Enter 8 to print value at a specific index
    Enter 9 to print all keys using a loop
    Enter 10 to print all values using a loop
    Enter 11 to exit
    1
    Enter name of person: mayank
    Enter age of person: 17
    Person is added with name: mayank and age: 17

    Enter 1 to add a person
    Enter 2 to print age of a person
    Enter 3 to remove a person from the hashmap
    Enter 4 to clear the whole hashmap
    Enter 5 to print the size of hashmap
    Enter 6 to print the whole hashmap
    Enter 7 to print key at a specific index
    Enter 8 to print value at a specific index
    Enter 9 to print all keys using a loop
    Enter 10 to print all values using a loop
    Enter 11 to exit
    2
    Enter name of person whose age is to be displayed: aditya
```



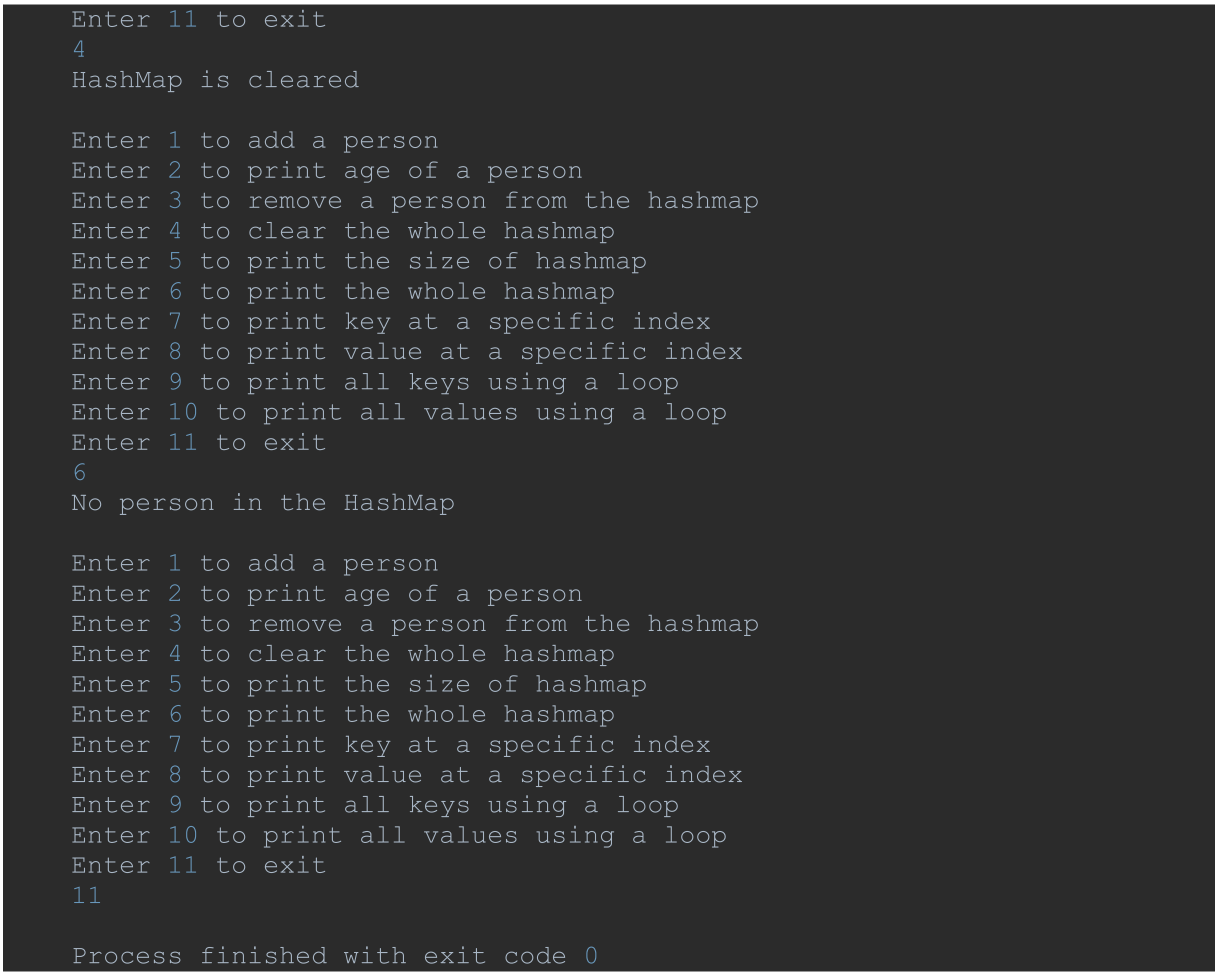
```
Age of aditya is 19

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
2
Enter name of person whose age is to be displayed: adityaa
No such person in hashmap

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
5
Number of (key, value) pairs in hashmap are: 2

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
6
The HashMap is: aditya -> 19,  mayank -> 17

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
7
Enter specific index at which name would be displayed: 0
Name at index 0 is: aditya

Enter 1 to add a person
```



```
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
8
Enter specific index at which age would be displayed: 1
Age at index 1 is: 17

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
9
Names are: aditya,  mayank
Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
10
Ages are: 19,  17
Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
12
Not a valid option, try another option!!!

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
```



```
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
3
Enter name of person to be removed: may
No such person in hashmap

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
3
Enter name of person to be removed: mayank
mayank is successfully removed from the hashmap

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
5
Number of (key, value) pairs in hashmap are: 1

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
6
The HashMap is: aditya -> 19

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
```



```
Enter 11 to exit
4
HashMap is cleared

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
6
No person in the HashMap

Enter 1 to add a person
Enter 2 to print age of a person
Enter 3 to remove a person from the hashmap
Enter 4 to clear the whole hashmap
Enter 5 to print the size of hashmap
Enter 6 to print the whole hashmap
Enter 7 to print key at a specific index
Enter 8 to print value at a specific index
Enter 9 to print all keys using a loop
Enter 10 to print all values using a loop
Enter 11 to exit
11

Process finished with exit code 0
```