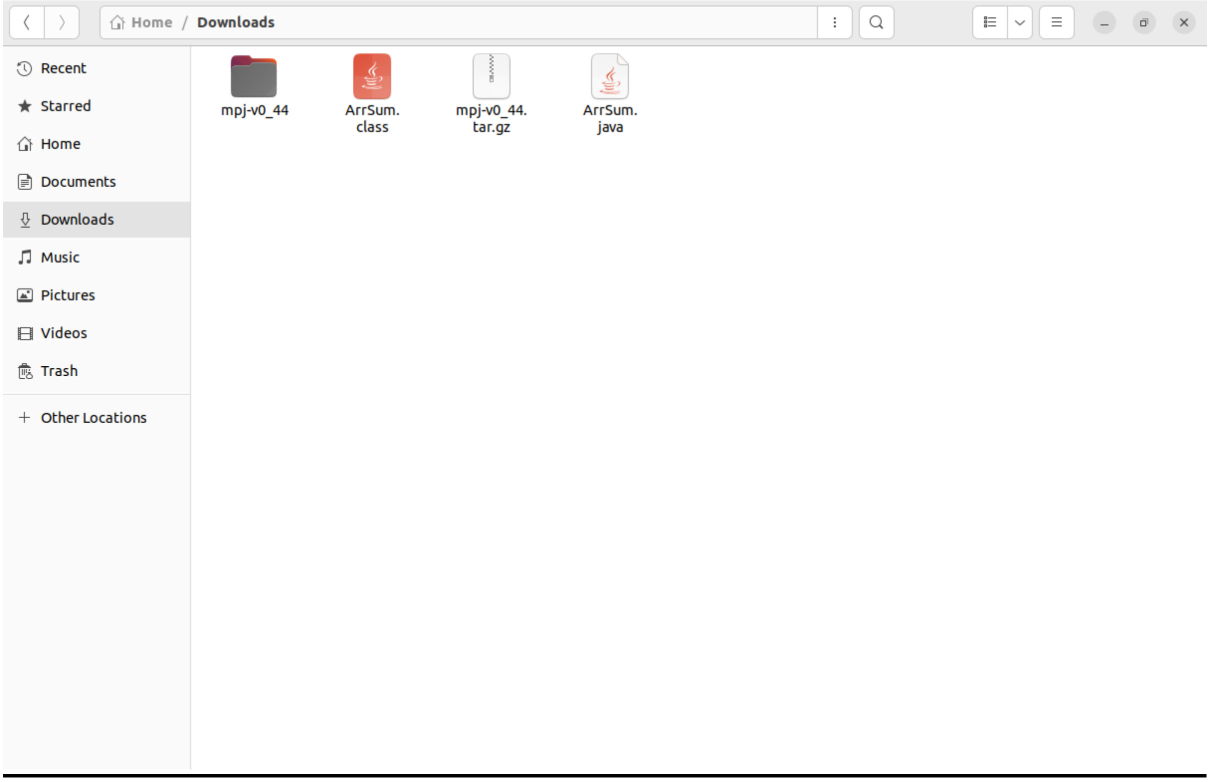
# CODE:

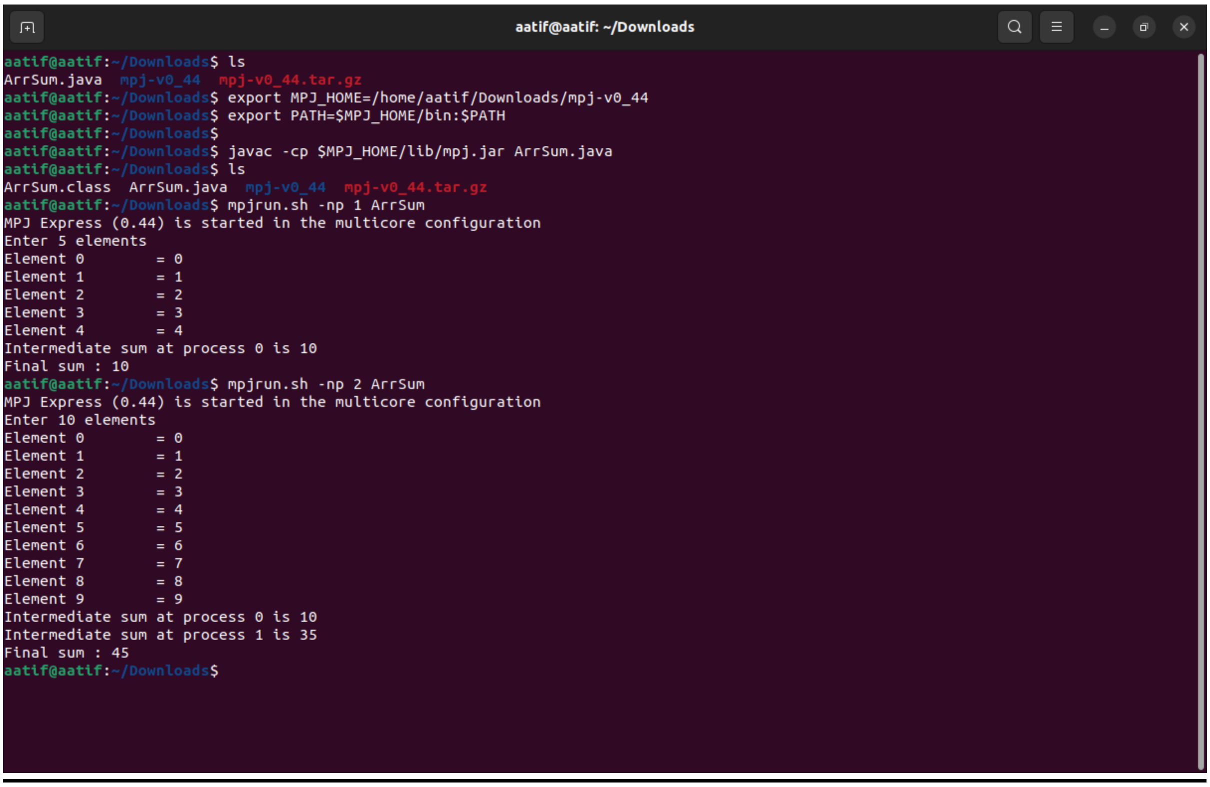
## ArrSum.java :

```
import mpi.MPI;
import java.util.Scanner;
import mpi.*;

public class ArrSum {
   public static void main(String[] args) throws Exception{
       MPI.Init(args);

       int rank = MPI.COMM_WORLD.Rank();
       int size = MPI.COMM_WORLD.Size();

       int unitsize = 5;
       int root = 0;
       int send_buffer[] = null;

       // 1 process is expected to handle 4 elements
       send_buffer = new int [unitsize * size];
       int recieve_buffer[] = new int [unitsize];
       int new_recieve_buffer[] = new int [size];

       // Set data for distribution
       if(rank == root) {
          int total_elements = unitsize * size;
          System.out.println("Enter " + total_elements + " elements");
          for(int i = 0; i < total_elements; i++) {
             System.out.println("Element " + i + "\t = " + i);
             send_buffer[i] = i;
          }
       }
```

```
// Scatter data to processes
MPI.COMM_WORLD.Scatter(
    send_buffer,
    0,
    unitsize,
    MPI.INT,
    recieve_buffer,
    0,
    unitsize,
    MPI.INT,
    root
);

// Calculate sum at non root processes
// Store result in first index of array
for(int i = 1; i < unitsize; i++) {
    recieve_buffer[0] += recieve_buffer[i];
}
System.out.println(
    "Intermediate sum at process " + rank + " is " + recieve_buffer[0]
);

// Gather data from processes
MPI.COMM_WORLD.Gather(
    recieve_buffer,
    0,
    1,
    MPI.INT,
    new_recieve_buffer,
    0,
    1,
    MPI.INT,
            root
        );

        // Aggregate output from all non root processes
        if(rank == root) {
            int total_sum = 0;
            for(int i = 0; i < size; i++) {
                total_sum += new_recieve_buffer[i];
            }
            System.out.println("Final sum : " + total_sum);
        }

        MPI.Finalize();
    }
}
```

# OUTPUT:





```
aatif@aatif:~/Downloads$ ls
ArrSum.java  mpj-v0_44  mpj-v0_44.tar.gz
aatif@aatif:~/Downloads$ export MPJ_HOME=/home/aatif/Downloads/mpj-v0_44
aatif@aatif:~/Downloads$ export PATH=$MPJ_HOME/bin:$PATH
aatif@aatif:~/Downloads$
aatif@aatif:~/Downloads$ javac -cp $MPJ_HOME/lib/mpj.jar ArrSum.java
aatif@aatif:~/Downloads$ ls
ArrSum.class  ArrSum.java  mpj-v0_44  mpj-v0_44.tar.gz
aatif@aatif:~/Downloads$ mpjrun.sh -np 1 ArrSum
MPJ Express (0.44) is started in the multicore configuration
Enter 5 elements
Element 0        = 0
Element 1        = 1
Element 2        = 2
Element 3        = 3
Element 4        = 4
Intermediate sum at process 0 is 10
Final sum : 10
aatif@aatif:~/Downloads$ mpjrun.sh -np 2 ArrSum
MPJ Express (0.44) is started in the multicore configuration
Enter 10 elements
Element 0        = 0
Element 1        = 1
Element 2        = 2
Element 3        = 3
Element 4        = 4
Element 5        = 5
Element 6        = 6
Element 7        = 7
Element 8        = 8
Element 9        = 9
Intermediate sum at process 0 is 10
Intermediate sum at process 1 is 35
Final sum : 45
aatif@aatif:~/Downloads$
```