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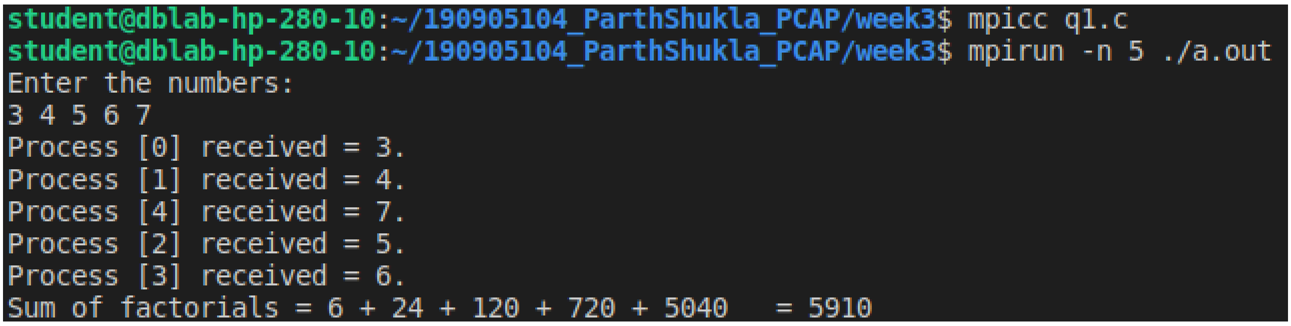
190905104

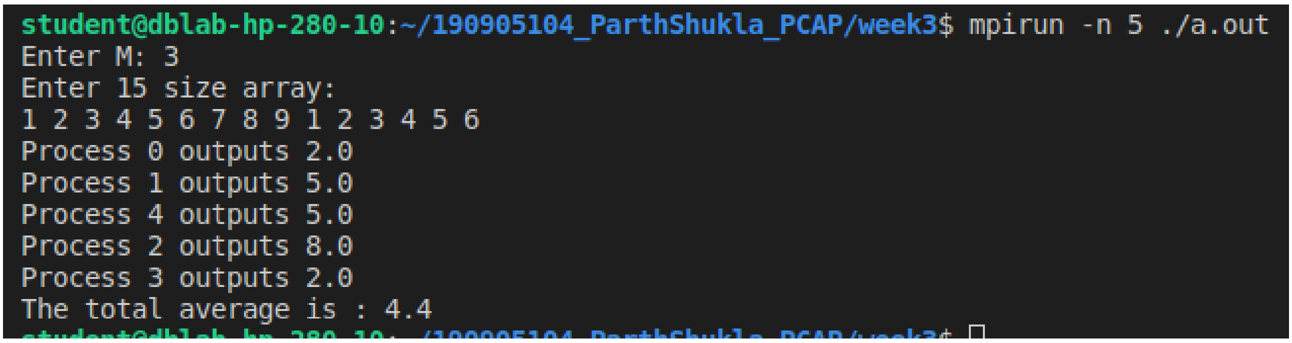
```
#include <mpi.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

void main(int argc, char *argv[])
{
    int rank, size;
    MPI_Init(&argc, &argv);
    MPI_Comm_rank(MPI_COMM_WORLD, &rank);
    MPI_Comm_size(MPI_COMM_WORLD, &size);
    long fact;
    long i, n;
    long rec;
    long arr[100], facts[100];
    if (rank == 0)
    {
        n = size;
        printf("Enter the numbers: \n");
        for (i = 0; i < n; ++i)
        {
            scanf("%ld", &arr[i]);
        }
    }
    MPI_Scatter(arr, 1, MPI_LONG, &rec, 1, MPI_LONG, 0,
                MPI_COMM_WORLD);
    printf("Process [%d] received = %ld.\n", rank, rec);
    fact = 1;
    for (i = 2; i <= rec; ++i)
    {
        fact *= i;
    }
    MPI_Gather(&fact, 1, MPI_LONG, facts, 1, MPI_LONG, 0,
               MPI_COMM_WORLD);
    if (rank == 0)
    {
        printf("Sum of factorials = ");
        long sum = 0;
        for (i = 0; i < n; ++i)
        {
            sum += facts[i];
            printf("%ld %s", facts[i], (i != n - 1) ? "+ " : " ");
        }
        printf(" = %ld\n", sum);
    }
    MPI_Finalize();
}
```



```
student@dblab-hp-280-10:~/190905104_ParthShukla_PCAP/week3$ mpicc q1.c
student@dblab-hp-280-10:~/190905104_ParthShukla_PCAP/week3$ mpirun -n 5 ./a.out
Enter the numbers:
3 4 5 6 7
Process [0] received = 3.
Process [1] received = 4.
Process [4] received = 7.
Process [2] received = 5.
Process [3] received = 6.
Sum of factorials = 6 + 24 + 120 + 720 + 5040   = 5910
```

2)

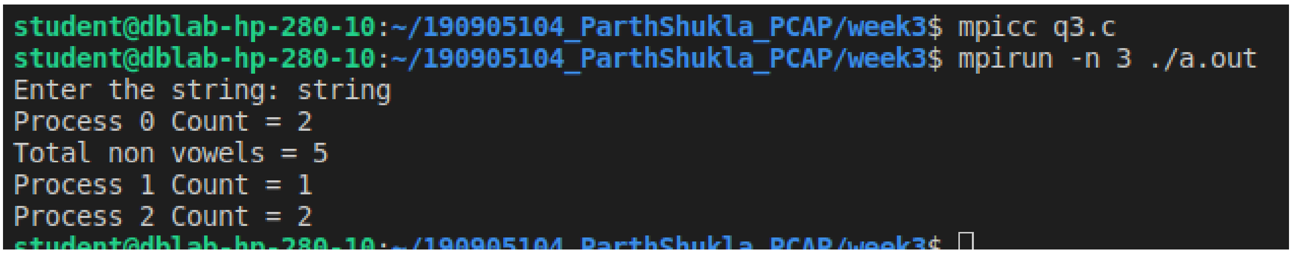
```
#include <mpi.h>
#include <stdio.h>
#include <math.h>
int main(int argc, char **argv)
{
    MPI_Init(NULL, NULL);
    int size;
    MPI_Comm_size(MPI_COMM_WORLD, &size);
    int rank;
    MPI_Comm_rank(MPI_COMM_WORLD, &rank);
    int A[100], m = 3;
    float B[100];
    if (rank == 0)
    {
        printf("Enter M: ");
        scanf(" %d" , &m);
        printf("Enter %d size array: \n", size * m);
        for (int i = 0; i < size * m; i++)
        {
            scanf(" %d", &A[i]);
        }
    }
    int c[m];
    float avg = 0;
    MPI_Scatter(A , m ,MPI_INT, &c , m, MPI_INT, 0 , MPI_COMM_WORLD);

    for(int i = 0; i < m; i++){
        avg+=c[i];
    }
    avg/=m;
    printf("Process %d outputs %.1f\n" , rank , avg);
    MPI_Gather(&avg , 1 ,MPI_FLOAT, B , 1, MPI_FLOAT, 0 ,
    MPI_COMM_WORLD);
    if(rank==0){
        float tavg = 0;
        for(int i = 0; i < size; i++){
            tavg += B[i];
        }
        tavg /= size;
        printf("The total average is : %.1f\n" , tavg);
    }
    MPI_Finalize();
}
```



```
student@dblab-hp-280-10:~/190905104_ParthShukla_PCAP/week3$ mpirun -n 5 ./a.out
Enter M: 3
Enter 15 size array:
1 2 3 4 5 6 7 8 9 1 2 3 4 5 6
Process 0 outputs 2.0
Process 1 outputs 5.0
Process 4 outputs 5.0
Process 2 outputs 8.0
Process 3 outputs 2.0
The total average is : 4.4
student@dblab-hp-280-10:~/190905104_ParthShukla_PCAP/week3$
```

3)

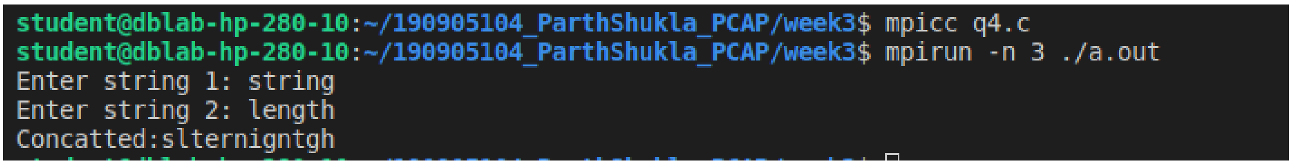
```
#include <mpi.h>
#include <stdio.h>
#include <string.h>
int main(int argc, char *argv[])
{
    int rank, size;
    int count = 0;
    int b[100] = {0};
    int i, n, l;
    char str[100], c[100];
    MPI_Init(&argc, &argv);
    MPI_Comm_rank(MPI_COMM_WORLD, &rank);
    MPI_Comm_size(MPI_COMM_WORLD, &size);
    if (rank == 0)
    {
        n = size;
        printf("Enter the string: ");
        scanf("%s", str);
        l = strlen(str) / n;
    }
    MPI_Bcast(&l, 1, MPI_INT, 0, MPI_COMM_WORLD);
    MPI_Scatter(str, l, MPI_CHAR, c, l, MPI_CHAR, 0, MPI_COMM_WORLD);
    count = 0;
    for (i = 0; i < l; ++i)
    {
        if (c[i] == 'a' || c[i] == 'e' || c[i] == 'i' || c[i] == 'o' || c[i] == 'u')
            continue;
        count += 1;
    }
    printf("Process %d Count = %d\n", rank, count);
    fflush(stdout);
    MPI_Gather(&count, 1, MPI_INT, b, 1, MPI_INT, 0, MPI_COMM_WORLD);
    if (rank == 0)
    {
        int tcount = 0;
        for (i = 0; i < n; i++)
            tcount += b[i];
        printf("Total non vowels = %d\n", tcount);
        fflush(stdout);
    }
    MPI_Finalize();
}
```



```
student@dblab-hp-280-10:~/190905104_ParthShukla_PCAP/week3$ mpicc q3.c
student@dblab-hp-280-10:~/190905104_ParthShukla_PCAP/week3$ mpirun -n 3 ./a.out
Enter the string: string
Process 0 Count = 2
Total non vowels = 5
Process 1 Count = 1
Process 2 Count = 2
student@dblab-hp-280-10:~/190905104_ParthShukla_PCAP/week3$ 
```

4)

```
#include <mpi.h>
#include <stdio.h>
#include <string.h>
int main(int argc, char *argv[])
{
    int rank, size;
    float avg = 0;
    char b[100], str1[100], str2[100], c1[100], c2[100], concatted[100];
    int i, j, m;
    MPI_Init(&argc, &argv);
    MPI_Comm_rank(MPI_COMM_WORLD, &rank);
    MPI_Comm_size(MPI_COMM_WORLD, &size);
    if (rank == 0)
    {
        printf("Enter string 1: ");
        scanf("%s", str1);
        printf("Enter string 2: ");
        scanf("%s", str2);
        m = strlen(str1) / size;
    }
    MPI_Bcast(&m, 1, MPI_INT, 0, MPI_COMM_WORLD);
    MPI_Scatter(str1, m, MPI_CHAR, c1, m, MPI_CHAR, 0,
                MPI_COMM_WORLD);
    MPI_Scatter(str2, m, MPI_CHAR, c2, m, MPI_CHAR, 0,
                MPI_COMM_WORLD);
    int t = 0;
    for (t = 0; t <= 2 * m; t += 2)
    {
        concatted[t] = c1[t / 2];
        concatted[t + 1] = c2[t / 2];
    }
    concatted[2 * m] = '\0';
    MPI_Gather(concatted, 2 * m, MPI_CHAR, b, 2 * m, MPI_CHAR, 0,
               MPI_COMM_WORLD);
    if (rank == 0)
    {
        b[m * size * 2] = '\0';
        printf("Concatted:%s\n", b);
    }
    MPI_Finalize();
}
```



```
student@dblab-hp-280-10:~/190905104_ParthShukla_PCAP/week3$ mpicc q4.c
student@dblab-hp-280-10:~/190905104_ParthShukla_PCAP/week3$ mpirun -n 3 ./a.out
Enter string 1: string
Enter string 2: length
Concatted:slternigntgh
```