LAB-10

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19BCE1113

1. CODE

lab-10_1.c

```c
#include <mpi.h>
#include <stdio.h>
int main(int argc, char **argv)
{
int rank;
int a,b,send_data;
const int root = 0;
MPI_Init(&argc, &argv);
MPI_Comm_rank(MPI_COMM_WORLD, &rank);
int world_size;
MPI_Comm_size(MPI_COMM_WORLD, &world_size);
if (rank != root)
{
b=2;
MPI_Recv(&a, 1, MPI_INT, rank-1, 0, MPI_COMM_WORLD,MPI_STATUS_IGNORE);
printf("Process [P%d]: received data %d\n", rank, a);
send_data=b;
}
else{
a=1;
send_data=a;
}
printf("Process p[%d]: sent data %d\n",rank,send_data);
MPI_Send(&send_data, 1, MPI_INT, (rank+1)%world_size, 0, MPI_COMM_WORLD);
if(rank==root){
MPI_Recv(&b, 1, MPI_INT, 1, 0, MPI_COMM_WORLD,MPI_STATUS_IGNORE);
printf("Process [P%d]: received data %d\n", rank, b);
}
MPI_Finalize();
return 0;
}

```

OUTPUT

2. 192.168.56.102 (aayush)

```
aayush@aayush-VirtualBox:~$ mpicc -o lab-10_1 lab-10_1.c
aayush@aayush-VirtualBox:~$ mpirun -np 2 ./lab-10_1
Process p[0]: sent data 1
Process [P1]: received data 1
Process p[1]: sent data 2
Process [P0]: received data 2
aayush@aayush-VirtualBox:~$
```

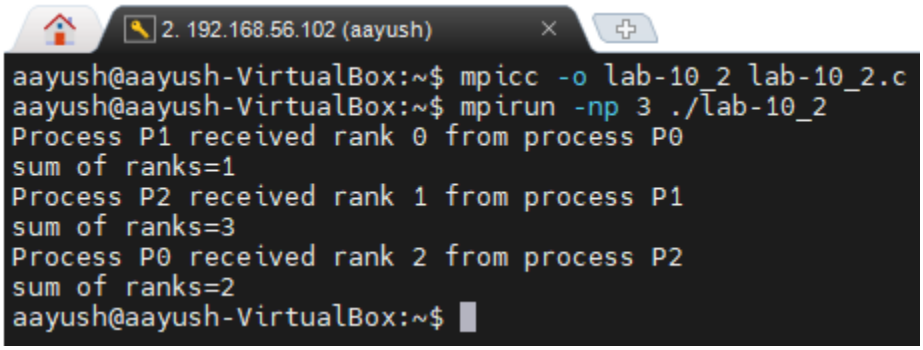
2. CODE

lab-10_2.c

```c
#include <mpi.h>
#include <stdio.h>
int main(int argc, char **argv)
{
int rank,world_rank,rank1;
MPI_Init(&argc, &argv);
MPI_Comm_rank(MPI_COMM_WORLD, &world_rank);
int world_size;
MPI_Comm_size(MPI_COMM_WORLD, &world_size);
if (world_rank != 0) {
MPI_Recv(&rank1, 1, MPI_INT, world_rank - 1, 0,MPI_COMM_WORLD,
MPI_STATUS_IGNORE);
rank=world_rank;
printf("Process P%d received rank %d from process P%d\n", world_rank,rank1, world_rank - 1);
printf("sum of ranks=%d\n",(world_rank+rank1));
} rank=world_rank;
MPI_Send(&rank, 1, MPI_INT, (world_rank + 1) % world_size,0, MPI_COMM_WORLD);
if (world_rank == 0) {
rank=world_rank;
MPI_Recv(&rank1, 1, MPI_INT, world_size - 1, 0,MPI_COMM_WORLD,
MPI_STATUS_IGNORE);
printf("Process P%d received rank %d from process P%d\n", world_rank,rank1, world_size - 1);
printf("sum of ranks=%d\n",(world_rank+rank1));
}
MPI_Finalize();
}

```

OUTPUT



3. CODE

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lab-10_3.c

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

int main(int argc, char **argv)
{
int rank,sum,overall_sum=0,i;
int avg;
int a[]={1,2,3},b[]={1,2,3,4},c[]={1,2,3,4,5},d[]={1,2,3,4,5,6};
MPI_Init(&argc, &argv);
MPI_Comm_rank(MPI_COMM_WORLD, &rank);
int world_size;
MPI_Comm_size(MPI_COMM_WORLD, &world_size);
int* sub_avgs=NULL;
if(rank==0)
{
sum=0;
sub_avgs = malloc(sizeof(int) * world_size);
for(i=0;i<3;i++)
{
  sum=sum+a[i];
}
avg=sum/3;
MPI_Gather(&avg,1 , MPI_INT, sub_avgs, 1, MPI_INT, 0,MPI_COMM_WORLD);
for(i=0;i<world_size;i++)
{
printf("Average from Process P[%d]:%d\n",i,sub_avgs[i]);
overall_sum=overall_sum+sub_avgs[i];
}
printf("\nProcess P[%d]: Overall Average=%d\n",rank,(overall_sum/world_size));
}
else
{
sum=0;
```

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lab-10_3.c

```
33 {
34 sum=0;
35 if(rank==1)
36 {
37 for(i=0;i<4;i++)
38 {
39 sum=sum+b[i];
40 }
41 avg=sum/4;
42 MPI_Gather(&avg,1 , MPI_INT, sub_avgs, 1, MPI_INT, 0,MPI_COMM_WORLD);
43 }
44 if(rank==2)
45 {
46 for(i=0;i<5;i++)
47 {
48 sum=sum+c[i];
49 }
50 avg=sum/5;
51 MPI_Gather(&avg,1 ,MPI_INT, sub_avgs, 1, MPI_INT, 0,MPI_COMM_WORLD);
52 }
53 if(rank==3)
54 {
55 for(i=0;i<6;i++)
56 {
57 sum=sum+c[i];
58 }
59 avg=sum/6;
60 MPI_Gather(&avg,1 , MPI_INT, sub_avgs, 1, MPI_INT, 0,MPI_COMM_WORLD);
61 }
62 }
63 MPI_Finalize();
64 }
65
```

OUTPUT