Lab 2: MPI

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Save your file to "lab2_60xxxxxx.pdf" and upload it to MyCourses website.

Lab: 2. helloworld.c

Result from running with 2 processes:

```
[u6088232@cluster lab2]$ mpicc -o helloworld helloworld.c
[u6088232@cluster lab2]$ mpirun -np 2 -hostfile /etc/cluster-hosts.txt helloworld
 Hello! I'm 0 of 2 running on cluster.local
 Hello! I'm 1 of 2 running on compute-0-0.local
```

Result from running with 3 processes

```
[u6088232@cluster lab2]$ mpirun -np 3 -hostfile /etc/cluster-hosts.txt helloworld
Hello! I'm 0 of 3 running on cluster.local
Hello! I'm 2 of 3 running on compute-0-1.local
Hello! I'm 1 of 3 running on compute-0-0.local
```

Result from running with 4 processes:

```
[u6088232@cluster lab2]$ mpirun -np 4 -hostfile /etc/cluster-hosts.txt helloworld
 Hello! I'm 0 of 4 running on cluster.local
 Hello! I'm 1 of 4 running on compute-0-0.local
 Hello! I'm 2 of 4 running on compute-0-1.local
 Hello! I'm 3 of 4 running on compute-0-2.local
```

Result from running with 5 processes:

```
[u6088232@cluster lab2]$ mpirun -np 5 -hostfile /etc/cluster-hosts.txt helloworld
 Hello! I'm 0 of 5 running on cluster.local
 Hello! I'm 4 of 5 running on cluster.local
 Hello! I'm 1 of 5 running on compute-0-0.local
 Hello! I'm 2 of 5 running on compute-0-1.local
 Hello! I'm 3 of 5 running on compute-0-2.local
```

Result from running with 6 processes:

```
[u6088232@cluster lab2]$ mpirun -np 6 -hostfile /etc/cluster-hosts.txt helloworld
 Hello! I'm 0 of 6 running on cluster.local
 Hello! I'm 4 of 6 running on cluster.local
 Hello! I'm 1 of 6 running on compute-0-0.local
 Hello! I'm 5 of 6 running on compute-0-0.local
 Hello! I'm 2 of 6 running on compute-0-1.local
 Hello! I'm 3 of 6 running on compute-0-2.local
```

Lab: 3. integersum.c

Result:

```
[u6088232@cluster lab2]$ mpicc -o integersum integersum.c
[u6088232@cluster lab2]$ mpirun -np 2 intergersum
 Grand total = 500500
[u6088232@cluster lab2]$ mpirun -np 3 intergersum
 Grand total = 500500
 [u6088232@cluster lab2]$
```

Lab: 4. Modified integersum.c

Source Code:

```
#define LEFT 1
#define RIGHT 1000
#include <stdio.h>
#include <mpi.h>
int main(int argc, char *argv[])
{
int rank, size;
MPI_Status status;
int interval;
int number, start, end, sum, GrandTotal;
int proc;
MPI_Init( &argc, &argv );
MPI_Comm_rank( MPI_COMM_WORLD, &rank );
MPI_Comm_size( MPI_COMM_WORLD, &size );
if (rank == 0) {
GrandTotal = 0;
for (proc=1; proc<size; proc++) {
MPI_Recv(&sum,1,MPI_INT,proc,123,MPI_COMM_WORLD,&status);
GrandTotal=GrandTotal+sum;
}
printf("Grand total = %d \n", GrandTotal);
}
else {
interval=(RIGHT-LEFT+1)/(size-1);
start=(rank-1)*interval+LEFT;
end=start+interval-1;
if (rank == (size-1)) {
end = RIGHT;
}
sum=0;
for (number=start; number<=end; number++)
sum = sum+number;
```

```
MPI_Send(&sum,1,MPI_INT,0,123,MPI_COMM_WORLD);
printf("Rank %d: start %d, end %d, local sum
%d\n",rank,start,end,sum);
}
MPI_Finalize();
}
```

Result:

```
[u6088232@cluster lab2]$ mpirun -np 5  modifyintegersum
 Rank 4: start 751, end 1000, local sum 218875
 Rank 1: start 1, end 250, local sum 31375
 Rank 2: start 251, end 500, local sum 93875
 Rank 3: start 501, end 750, local sum 156375
 Grand total = 500500
 [u6088232@cluster lab2]$
```