

ASSIGNMENT NO-3

```
#include <stdio.h>

#include <mpi.h>

int main(int argc, char* argv[]) {
    int rank, size;
    int num[20]; // N=20, n=4

    MPI_Init(&argc, &argv);
    MPI_Comm_rank(MPI_COMM_WORLD, &rank);
    MPI_Comm_size(MPI_COMM_WORLD, &size);

    for (int i = 0; i < 20; i++)
        num[i] = i + 1;

    if (rank == 0) {
        int s[4];
        printf("Distribution at rank %d \n", rank);

        for (int i = 1; i < 4; i++)
            MPI_Send(&num[i * 5], 5, MPI_INT, i, 1, MPI_COMM_WORLD); // N/n i.e. 20/4=5

        int sum = 0, local_sum = 0;
        for (int i = 0; i < 5; i++) {
            local_sum = local_sum + num[i];
        }
        for (int i = 1; i < 4; i++) {
            MPI_Recv(&s[i], 1, MPI_INT, i, 1, MPI_COMM_WORLD, MPI_STATUS_IGNORE);
        }
        printf("local sum at rank %d is %d\n", rank, local_sum);
    }
}
```

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sum = local_sum;

for (int i = 1; i < 4; i++)

    sum = sum + s[i];

printf("final sum = %d\n\n", sum);
} else {

    int k[5];

    MPI_Recv(k, 5, MPI_INT, 0, 1, MPI_COMM_WORLD, MPI_STATUS_IGNORE);

    int local_sum = 0;

    for (int i = 0; i < 5; i++) {

        local_sum = local_sum + k[i];

    }

    printf("local sum at rank %d is %d\n", rank, local_sum);

    MPI_Send(&local_sum, 1, MPI_INT, 0, 1, MPI_COMM_WORLD);

}

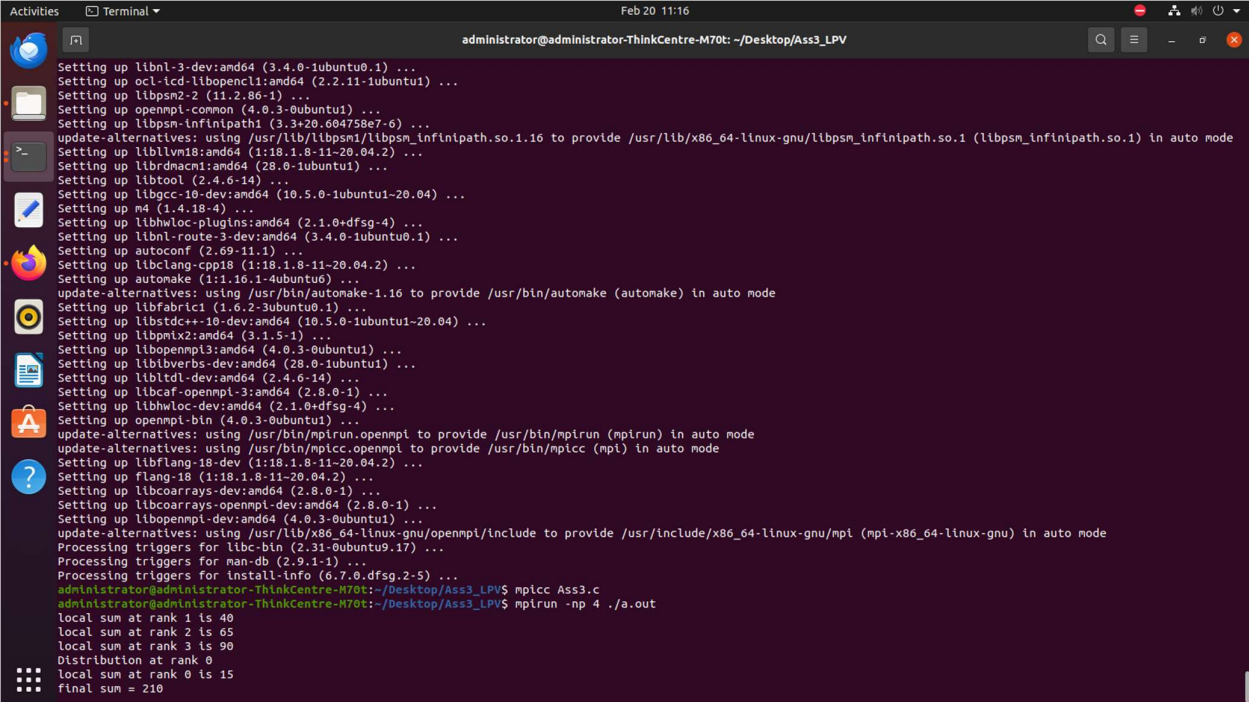
MPI_Finalize();

return 0;

}

```

Output



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Setting up libnl-3-dev:amd64 (3.4.0-1ubuntu0.1) ...
Setting up ocl-icd-libopencl1:amd64 (2.2.11-1ubuntu1) ...
Setting up libpsm2-2 (11.2.86-1) ...
Setting up openmpi-common (4.0.3-0ubuntu1) ...
Setting up libpsm-infinipath1 (3.3+20.604758e7-6) ...
update-alternatives: using /usr/lib/libpsm1/libpsm_infinipath.so.1.16 to provide /usr/lib/x86_64-linux-gnu/libpsm_infinipath.so.1 (libpsm_infinipath.so.1) in auto mode
Setting up liblvm18:amd64 (1:18.1.8-11-20.04.2) ...
Setting up librdmacm1:amd64 (28.0-1ubuntu1) ...
Setting up libtool (2.4.6-14) ...
Setting up libgcc-10-dev:amd64 (10.5.0-1ubuntu1~20.04) ...
Setting up m4 (1.4.18-4) ...
Setting up libhwloc-plugins:amd64 (2.1.0+dfsg-4) ...
Setting up libnl-route-3-dev:amd64 (3.4.0-1ubuntu0.1) ...
Setting up autoconf (2.69-11.1) ...
Setting up libclang-cpp18 (1:18.1.8-11-20.04.2) ...
Setting up automake (1:1.16.1-4ubuntu6) ...
update-alternatives: using /usr/bin/automake-1.16 to provide /usr/bin/automake (automake) in auto mode
Setting up libfabric1 (1.6.2-3ubuntu0.1) ...
Setting up libstdc++-10-dev:amd64 (10.5.0-1ubuntu1~20.04) ...
Setting up libpmix2:amd64 (3.1.5-1) ...
Setting up libopenmpi3:amd64 (4.0.3-0ubuntu1) ...
Setting up libibverbs-dev:amd64 (28.0-1ubuntu1) ...
Setting up libltdl-dev:amd64 (2.4.6-14) ...
Setting up libcaf-openmpi-3:amd64 (2.8.0-1) ...
Setting up libhwloc-dev:amd64 (2.1.0+dfsg-4) ...
Setting up openmpi-bin (4.0.3-0ubuntu1) ...
update-alternatives: using /usr/bin/mpirun.openmpi to provide /usr/bin/mpirun (mpirun) in auto mode
update-alternatives: using /usr/bin/mpicc.openmpi to provide /usr/bin/mpicc (mpi) in auto mode
Setting up libflang-18-dev (1:18.1.8-11-20.04.2) ...
Setting up flang-18 (1:18.1.8-11-20.04.2) ...
Setting up libcoarrays-dev:amd64 (2.8.0-1) ...
Setting up libcoarrays-openmpi-dev:amd64 (2.8.0-1) ...
Setting up libopenmpi-dev:amd64 (4.0.3-0ubuntu1) ...
update-alternatives: using /usr/lib/x86_64-linux-gnu/openmpi/include to provide /usr/include/x86_64-linux-gnu/mpi (mpi-x86_64-linux-gnu) in auto mode
Processing triggers for libc-bin (2.31-0ubuntu9.17) ...
Processing triggers for nan-db (2.9.1-1) ...
Processing triggers for install-info (6.7.0.dfsg.2-5) ...
administrator@administrator-ThinkCentre-M70t: ~/Desktop/Ass3_LPV$ mpicc Ass3.c
administrator@administrator-ThinkCentre-M70t: ~/Desktop/Ass3_LPV$ mpirun -np 4 ./a.out
local sum at rank 1 is 40
local sum at rank 2 is 65
local sum at rank 3 is 90
Distribution at rank 0
local sum at rank 0 is 15
final sum = 210

```