LAB 1: Introduction to MPI

Insatllation

Linux:

sudo apt install mpich

sample code example: hello_world.c

```c
#include <mpi.h>
#include <stdio.h>
int main(int argc, char** argv) {
    // Initialize the MPI environment
    MPI_Init(NULL, NULL);

    // Get the number of processes
    int world_size;
    MPI_Comm_size(MPI_COMM_WORLD, &world_size);

    // Get the rank of the process
    int world_rank;
    MPI_Comm_rank(MPI_COMM_WORLD, &world_rank);

    // Get the name of the processor
    char processor_name[MPI_MAX_PROCESSOR_NAME];
    int name_len;
    MPI_Get_processor_name(processor_name, &name_len);

    // Print off a hello world message
    printf("Hello world from processor %s, rank %d out of %d
processors\n",processor_name, world_rank, world_size);
    // Finalize the MPI environment.
    MPI_Finalize();
}
```

Terminal: mpicc mpi_hello_world.c -o hello-world
mpirun -np 5 ./hello-world

Windows Installation Guide:

The MPI installetion processes are--

1. You need to **install a compiler according to your computer Bit architecture.** As example, If you have 64 bit windows pc, then you could download mingw-w64 compiler.To download 64 bit mingw, go to this link and download this like the image.

2. after extracting the compiler and setting environment variable. Run a simple hellow world program in c.
3. Then download msmpi software from this link and install.
4. you need to install first *.exe* file then *.msi* **in a folder which all name must not contain any space. As Example-** Folder name **Parallel Processing** is not permissible. you need to write **Parallel_processing**

```
D:\MSMPI\MPI
├───Benchmarks
├───Bin
├───License
├───Redist
└───SDK
    ├───Include
    │   ├───x64
    │   └───x86
    ├───Lib
    │   ├───x64
    │   └───x86
    └───License
PS D:\MSMPI>
```

5. If the installation has no error, check the following path of installation from cmd by execution setmsmpi

```
Microsoft Windows [Version 10.0.26100.2894]
(c) Microsoft Corporation. All rights reserved.

C:\Users\saifn>set msmpi
MSMPI_BENCHMARKS=D:\MSMPI\MPI\Benchmarks\
MSMPI_BIN=D:\MSMPI\MPI\Bin\
MSMPI_INC=D:\MSMPI\MPI\SDK\Include\
MSMPI_LIB32=D:\MSMPI\MPI\SDK\Lib\x86\
MSMPI_LIB64=D:\MSMPI\MPI\SDK\Lib\x64\
```

6. **Setting up VSCODE:**Then download a sample mpi code, If you get cannot open source file "mpi.h"C/C++(1696). Then go to Quick fix option and click edit "includepath" settings. then edit like this image.
7. then you need to open task.json file located in .vscode folder. you could press F1, search task and go to task: Configure task. then click c/c++ option.
8. after opening task.json, you need to write

```
            "-I",
            "${MSMPI_INC}",
            "-L",
            "${MSMPI_LIB64}",
            "-lmsmpi",
```

like this Image.

8. Now you could build your mpi program, go to terminal and click Run build task. It will show build successfully and make a .exe file.
9. Now you could run .exe file with mpiexec -n <no_of_Threads> <exe file name> command.

TASK:

Complete the task from MPI Tutorials

Sending and receiving with MPI Send and MPI Recv

Dynamic receiving with MPI_Probe and MPI_Status

Point-to-point communication application - Random walking

Referenecs:

MPI Tutorials: