FEDERAL STATE AUTONOMOUS EDUCATIONAL INSTITUTION
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Parallel algorithms for the analysis and synthesis of data on the assignments No.18, 19

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Assignment 18

To complete the task, you need to create and compile two programs: Master (master.o) and Slave (slave.o).

The Master should start the worker, so be careful with the names of the executable files.

Launch the master via the mpiexec command for one process.

Startup example: mpiexec -n 1 ./master.o

Understand the new functions in Assignment18_master.c and Assignment18_slave.c and explain programs execution.

Add a third process, which will transfer from the slave processes to the master the number of running processes, the master should receive and display.

Listing of the program

Master program code

Slave program code

Description

Master program creates 3 processes of slave program (using function MPI_Comm_spawn). In current implementation first 2 slave procs are sending their ranks to master program and the third one sending number of slave processes. Master program outputs all received information. To communicate with parent process, child processes usefunction MPI_Comm_get_parent to get the parent's communicator.

Example of launch parameters and output

```
[pes@vandosik HW_MPI]$ mpic++ Assignment18_master.c -o task_18_master
[pes@vandosik HW_MPI]$ mpic++ Assignment18_slave.c -o task_18_slave
[pes@vandosik HW_MPI]$
[pes@vandosik HW_MPI]$ mpiexec -n 1 ./task_18_master --mca opal_warn_on_missing_libcuda 0
Slaves #0 and #1 are working
Slave #2 send message: number_working = 3
[pes@vandosik HW_MPI]$
```

Assignment 19

ITo complete the task, you need to create and compile two programs: server and client. In one window of the SSH client, a server is launched for one process, which gives out the port name.

An example of a command to start the server: mpiexec -n 1 ./serv.o

Then the client is launched in another window, specifying the port name separated by a space in single quotes (example command: mpiexec -n 1 ./client.o ‘port name’).

Understand the new functions in Assignment19_serv.c and Assignment19_client.c and explain programs execution.

Check the work by running the server and the client. Add the program and send an arbitrary message to each other.

The server should display the following messages:

Port name

Waiting for the client ...

Client connected

Server sent value: 25

Server got value: 42

The client should display the following messages:

Attempt to connect

Server connection

Client sent value: 42

Client got value: 25

Listing of the program

Server code file

Client code file

Makefile

Description

Server establishes an connection by MPI_Open_port function. Client connects to the port, passed as argument, using MPI_Comm_connect function. Then communication between two points goes like in usual communicator. In this particular program client sends array of chars containing message “Hello Server”.Server after receiving message, outputs it and replies with “Hello Client”.

For this task mpich utilt were used. Source code for them was borrowed from official repo (https://github.com/pmodels/mpich) and manually compiled… (I failed to install on my ArchLinux by “sudo pacman -S mpich” command)

Example of launch parameters and output

Server window:

```
[pes@vandosik HW_MPI]$ make -f Assignment19.mk
~/mpich-install/bin/mpicc Assignment19_client.c -o task_19_client
[pes@vandosik HW_MPI]$
[pes@vandosik HW_MPI]$ ~/mpich-install/bin/mpiexec -n 1 ./task_19_serv
Portname: tag#0$connentry#0200957FC0A80145000000000000000$
Wait for client...
Client Connected
Received from client: Hello Server
Send to client: Hello Client
```

Client window:

```
[pes@vandosik HW_MPI]$ ~/mpich-install/bin/mpiexec -n 1 ./task_19_client 'tag#0$connentry#0200957FC0A80145000000000000000$'
Attempt to connect
Connected to server
Send to server: Hello Server
Received from server: Hello Client
[pes@vandosik HW_MPI]$
```