SF2568: Instructions for Lab 1

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Overview

The aim of this lab work is twofold,

- to become comfortable with the PDC environment and ferlin and to run and modify a simple MPI program;
- to start with homework 1, problem 6.

Finding information

One of your most important skills is to be able to find information in order to learn and understand new things. For this lab your main sources of information are:

- `man`, `--help`, `-h`, `apropos`, ...
- Lecture notes

  `http://www.math.kth.se/na/SF2568/`

  `parpro-14/Introduction to PDC course 140121.pdf`
- The PDC cheat-sheet, to be found at

  `http://www.pdc.kth.se/education/tutorials/summer-school/`

  `introduction-to-pdcs-environment/cheatSheet.pdf`
- `http://www.pdc.kth.se/`
- Internet

If you get stuck, have any problems with your account or in any other way want to check that you have grasped something in this lab correctly — please ask the course assistants for help! What you learn today is the basis for the following weeks of lab exercises.

Exercise

- Copy the files `hello.c` from `/afs/nada.kth.se/info/parpro1-11` into your work directory.
- Compile and run the program `hello.c` using 4 processes. What are the results?
- Modify the program `hello.c` such that, instead of printing the acknowledgement, sends a message back to the master containing the worker's rank. Also modify the program so the master receives the messages and prints out the corresponding ranks to stdout.

How to work on ferlin

1. On a computer with a Kerberos software installed (your laptop, or for this lab a CSC workstation), make sure that you have forwardable Kerberos tickets:

   `klist -Tf`

2. If you don't have forwardable Kerberos tickets, create them on your LOCAL COMPUTER using:

   `kinit --forwardable` *`your-user-name-at-pdc`*`@NADA.KTH.SE`

   (The capitalized domain is important!)

   Note: Never type your password on any remote connection — only on your local computer!

3. Log in to PDC's Dell Harpertown Foundation Level System cluster ferlin by issuing the command

   `ssh -Y` *`your-user-name-at-pdc`*`@ferlin.pdc.kth.se`

   Check your Kerberos ticket and AFS tokens on the login node. Are they forwarded and forwardable?

4. Get the proper environment for doing the lab using the command

   `module add heimdal easy i-compilers mpi`

5. For the purposes of this lab, 4 interactive nodes are available. Run the command

   `spattach -i -p <#virtual_nodes>`

   to attach yourself to a number of virtual nodes placed on the interactive nodes. Every node features 8 cores, but since interactive nodes are always

shared among all users, you only get a virtual node and things might be extremely slow.

Note: Never, never, never run jobs on the login node!!

Note: If you need only one interactive node, you can login on and run directly on that interactive node. Cf. Lecture notes, slide 21.

Note: Interactive nodes should only be used for development and debugging purposes. For serious runs and for benchmarking use batch nodes!

6. Change to your work directory.

7. Compile your program by running `mpicc`.

8. Run your program using the command `mpirun.`

   Note: You will probably observe an error message: `A high-performance Open MPI point-to-point messaging module was unable to find any relevant network interfaces`. You can safely ignore this message.

   Note: On interactive nodes, you can usually run your code directly without a startup script (`mympirun`) using `mpirun`. This does not hold if you use dedicated nodes like in HW 3 later in this course.

9. When your code is successfully running on interactive nodes, try submitting a run on dedicated nodes on Ferlin. On the login node do:

   ```
   module add easy
   ```

   ```
   esubmit -n 1 -t 5 mympirun -np 4 <path to your executable>
   ```

   The script `mpirun` can be downloaded from `/afs/nada.kth.se/info/parpro1-11`. It should be located in your working directory. Please have a look at it using an editor of your choice to see how to use it and how it works!

10. Note: A hanging program can be interrupted using `Control-C`.

11. The AFS file system is shared between the computers at CSC and PDC. So the program can be edited on your local Linux workstation using your favorite editor. The compilation (and execution, of course) must be done on ferlin.