

Lab: Windows HPC Workshop 03/2012

Christian Terboven

Center for Computing and Communication, RWTH Aachen University

Seffenter Weg 23, 52074 Aachen, Germany

terboven@rz.rwth-aachen.de

Abstract

This document guides you through the prepared examples and exercises.

If you need help or have any question please do not hesitate to ask!

1. Preparation and Login

You can find this document in PDF version as well as a ZIP archive containing all files required to work on the following tasks at the event website: www.rz.rwth-aachen.de/ppces, navigate to *Course Material*. Please download the archive and extract the content to your Home directory (network drive H:).

Login to the desktop in the CIP room

If you want to use your own laptop you brought with you, you are invited to do so. Please connect to the *eduroam* wireless network, or ask for a guest account in the *mops* wireless network. If you already have a "PC-POOL" account, you can use it to login to our laptops. If you are a member or guest of RWTH Aachen University, you can create such a service account using the RWTH Identity Management system at www.rwth-aachen.de/by.

Login to our Compute Cluster

If you already have a "Hochleistungsrechnen RWTH Aachen" account, you can use it to login to our systems. If you are a member or guest of RWTH Aachen University, you can create such a service account using the RWTH Identity Management system at www.rwth-aachen.de/by. For the scope of this lab session we created a set of temporary accounts for the case that you do not have one yourself. The accounts are named "hpc_lecture??" (replace ?? with the number we assign to you) and the password is "ppCES!2012".

Use the Remote Desktop Connection (Windows) or the *rdesktop* (Linux) program as described in the lecture.

2. Batch System

This exercise is intended to make you familiar with using our Batch Systems.

- Login to `cluster-win.rz.rwth-aachen.de`.
- Start the Compute *HPC Job Manager* via *Start* → *All Programs* → *Microsoft HPC Pack* → *HPC Job Manager*.
- **Task 2.1:** For a selected job find out on which compute node it is running!
- **Task 2.2:** Submit `mpi_HelloWorld_vs2005.exe` as a batch job running on two sockets. Examine the output file to get the hostname of the machines the job has been executed on. Use the `RZ_HPCLAB` job template to avoid long waiting times for available resources.
- **Task 2.3:** Examine the `submit_hpc2008.cmd` script to learn how to submit jobs from the command line. Correct the path settings and submit a job using the script.

3. Visual Studio

This exercise is intended to make you familiar with using Visual Studio on our Cluster.

- Start Visual Studio 2010.

Visual Studio with Microsoft C/C++

- **Task 3.a.1:** Create a new (C++, Win32 Console Application, no pre-compiled headers, empty) project. Add the existing source files to the project; compile both the Debug and the Release configurations.
- **Task 3.a.2:** Measure the runtime of both Executables.
- **Task 3.a.3:** Enable more compiler optimizations in the Release Configuration. Measure the runtime of the new executable.

Visual Studio with Intel C/C++

- **Task 3.b.1:** Create a new (C++, Win32 Console Application, no pre-compiled headers, empty) project. Add the existing source files to the project; compile both the Debug and the Release configurations. Convert the Solution to use the Intel C/C++ compiler.
- **Task 3.b.2:** Measure the runtime of both Executables.
- **Task 3.b.3:** Enable more compiler optimizations in the Release Configuration. Measure the runtime of the new executable.

Visual Studio with Intel FORTRAN

- **Task 3.c.1:** Create a new (Intel(R) Fortran, Console Application, empty) project. Add the existing source files to the project; compile both the Debug and the Release configurations.
- **Task 3.c.2:** Measure the runtime of both Executables.
- **Task 3.c.3:** Enable more compiler optimizations in the Release Configuration. Measure the runtime of the new executable.

4. Visual Studio: Parallel Programming in OpenMP

This exercise is intended to make you familiar with using OpenMP within Visual Studio on our Cluster. It assumes basic knowledge of OpenMP.

- Start Visual Studio 2010, create a project, and add the existing source files to the project.
- **Task 4.1:** Examine the comments in `pi.c` and add OpenMP pragmas accordingly. Enable OpenMP in the project configurations. Perform some experiments to measure the speedup.

5. Visual Studio: Parallel Programming in MPI

This exercise is intended to make you familiar with using MPI within Visual Studio on our Cluster. It assumes basic knowledge of OpenMP.

- Start Visual Studio 2010, create a project, and add the existing source files to the project.
- **Task 5.1:** Examine the comments in `pi.c` and add MPI routine calls accordingly. Enable MPI support in the project configurations. Perform some experiments to measure the speedup.