Introduction to the cluster

1 Basic concepts

1.1 Connecting to the cluster

Linux and Mac

To connect to one of the front-ends of the RWTH cluster, you will use the `ssh` command. The basic usage is

```
ssh TIM-ID@NODE-NAME.rz.rwth-aachen.de
```

where `TIM-ID` is your TIM ID (e.g., `ab123456`), and `NODE-NAME` is, for instance, `cluster-linux`. The system will then ask for your password. Type it in and you will be connected to the cluster.

If you need to copy some files to the cluster, for instance some of the example source code we use in class, you can use the `scp` command. The basic usage is

```
scp FILES TIM-ID@NODE-NAME.rz.rwth-aachen.de:
```

where `FILES` is a list of files to copy. If you want to copy a directory, you have to use the option `-r`. Notice the `:` at the end of the command.

Since typing the entire command every time you want to connect to the cluster is tedious, you can also configure your `ssh` to use aliases. For instance, if you add the following lines to your file `~/.ssh/config`

```
Host cluster
    HostName cluster-linux.rz.rwth-aachen.de
    User TIM-ID
```

you can now connect using the command `ssh cluster`.

Windows

Unfortunately, I cannot be of much help for Windows. Some suggestions of programs that I got from you guys is listed below. I am pretty sure you can find basic manuals on how to use them.

- `putty`
- `fastx`
- `mobaxterm`

VPN

The commands described above will only work if you are connected from within the university network. In case you want to connect from home, you can connect to the university network via `vpn`. You can find information on how to do it at the IT Center's webpage:

`https://doc.itc.rwth-aachen.de/display/VPN/Allgemeine+Einstellungen+zur+Nutzung+von+VPN`

or simply type "vpn rwth" in google. In that webpage you can find info regarding the installation and configuration of the required programs for multiple operating systems.

1.2 The cluster

When working on the cluster, we will distinguish between the front-end and back-end nodes. After connecting to the cluster we will be working on one of the front-ends. In the front-ends we will be sharing the resources with many other users also connected to this node. This means that we have to take two things into account. First, we should not run heavy computations here, to avoid overloading these nodes. Second, we do not want to run in the front-ends experiments where we need precise and reproducible timings. In the front-ends we will only compile our code and run small tests to check the correctness of our code.

When we need exclusive access to a node or want to run large experiments, we have to submit our "jobs" to the batch system. For this, we will prepare job scripts with the needs of the simulation (number of cores, memory, ...). These jobs will then be scheduled and run on the back-end nodes. I will show you how to do this when needed.

2 Try yourself and test your environment

Now you will try out yourself to see whether you understood the above. You have to download the file `TestEnvironment.tgz` from the `l2p`, and copy it to your account in the cluster. Then, you should connect to the cluster, extract the contents of the file (`tar -xzvf TestEnvironment.tgz`) and run the file `run.sh` (`./run.sh`). If you encounter any problem, please let me know.