Warming up - due 13 March 2017

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7. märts 2017. a.
Typesetting

Please put your answers in a LaTeX document and submit both a pdf and the LaTeX source. You may find it helpful to use sharelatex or install a LaTeX distribution and editor, such as texworks. Some documentation on LaTeX can be found at https://en.wikibooks.org/wiki/LaTeX.

Study material

- SLURM documentation
  http://slurm.schedmd.com/documentation.html

- John the Ripper
  Website
  http://www.openwall.com/john/
  Informative reading

- Software Carpentry Linux
  https://software-carpentry.org/lessons/

- Command line crash course

- Linux BASH shell (eesti keeles)
  http://kuutorvaja.eenet.ee/wiki/Bashi_kasutamine

- Cornell Virtal workshop introduction to linux https://cvw.cac.cornell.edu/Linux/

- The linux command line http://linuxcommand.org/

Introduction

We will introduce some aspects of linux useful for working with remote infrastructures. Learn a little more about job schedulers. Finally, we will compare performance of several GPUs and filesystems.

Getting an account on the EENET Juur cluster

Get an account on the Juur cluster by following the instructions at http://grid.eenet.ee/main/english/accessing-the-cluster/

Logging in

**Homework question 1**

What CPU’s are on Juur cluster (Manufacturer, model and base clock speed)? You can get some information by logging in to the cluster

```
ssh hpc...@juur.grid.eenet.ee
```

and then typing:
cat /proc/cpuinfo

Once logged into Juur cluster. On some machines the login node CPU is different than the compute node CPU, in which case you can start an interactive job to get processor information (with SLURM, the command is `srun --pty bash`).

**Homework question 2**
Gathering information from SLURM. Log into the Rocket cluster:

```
ssh username@rocket.hpc.ut.ee
  then type:
sacct -a
```

What information do you get?

**ANSWER**

**COMMENT**

**GRADE**

**Homework question 3**
Gathering information from SLURM. Log into the Rocket cluster:

```
ssh username@rocket.hpc.ut.ee
  then type:
squeue
```

What information do you get?

**ANSWER**

**COMMENT**

**GRADE**

Software Carpentry

Using supercomputers and other remote resources typically requires some skills that are usually acquired through practice, rather than in formal courses. Thus far, you have logged in to a remote computer and transferred files to and from a remote computer. In this section, we will introduce some more linux commands.

**Homework question 4**
What is the bash shell, and how can a bash shell script aid you in (re-)producing a sequence of linux commands?

**ANSWER**

**COMMENT**

**GRADE**

**Homework question 5**
What do the following commands do when logged in to Rocket (for many of them typing `man` and then the command, for example `man ls`, should give helpful information)?
• wget
  ANSWER
  COMMENT

• module avail
  ANSWER
  COMMENT

• module load
  ANSWER
  COMMENT

• module purge
  ANSWER
  COMMENT

• more
  ANSWER
  COMMENT

• less
  ANSWER
  COMMENT

• vi
  ANSWER
  COMMENT

• emacs
  ANSWER
  COMMENT

• nano
  ANSWER
  COMMENT

• tar
  ANSWER
  COMMENT

• zip
  ANSWER
  COMMENT

• unzip
  ANSWER
  COMMENT
Testing password security on GPUs

In an ideal world one would use a different password on each differently administered system. It can be challenging to do this. One thing that can help are password managers such as:

- Keepass \url{http://keepass.info}
- KeepassX \url{https://keepassx.org}

Even with a password manager, weak passwords can be easily found. A tool that can be used to check for weak passwords is John the Ripper \url{http://openwall.com/john} and \url{https://github.com/magnumripper/JohnTheRipper}. You will compare the performance of this tool on GPUs as well as on CPUs. To prevent passwords from being easily found, often a hash of the password is stored on a remote system rather than the actual password. The program will take a hash of a password generated by a particular algorithm, and then try to find matching passwords.

**Homework question 6**

Log into Juur cluster. Then run the script to download and install John the Ripper on multicore CPU:

```
bash johnripperjuurcpuinstall.sh
```

Take a screenshot to demonstrate you have run the program. Report the runtime or passwords obtained per minute.

**Homework question 7**

Log into Juur cluster. Then run the scripts to download and install John the Ripper on Nvidia K20m GPU:

```
bash johnripperjuurgpuinstall.sh
```
Take a screenshot to demonstrate you have run the program. Report the runtime or passwords obtained per minute. Compare the runtimes for Juur multicore CPU and Juur Nvidia K20m GPU?

ANSWER

NOTE: The above exercises use an older version of John the ripper, and a different password list than used on Rocket. A possible project is to examine this in more detail, in particular using OpenCL as CUDA has been deprecated and removed from the latest releases of John the Ripper. One could also look at porting on of the algorithms not yet in OpenCL to OpenCL or writing tutorials on use of John the Ripper. More information is available on the wiki page at http://openwall.info/wiki/john

File system performance

Many remote computing resources typically have a choice of file systems. It is useful to choose the correct one for best performance of your computation. Filesystems themselves, also differ in performance.

Homework question 8

Review the information on the file systems at http://www.hpc.ut.ee/storage. Then examine the website https://www.vi4io.org/hpsl/start. What details would you add for Rocket to get it listed on the VI4IO website? (For bonus list Rocket or some other high performance computing system you have access to that is not yet listed on VI4IO and let me know about this).

ANSWER

GRADE

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Homework question 9


ANSWER

GRADE

Homework question 10

Run the script to download, install and run the IOR and MD-REAL-IO benchmarks in

a) Your home directory on Rocket
b) Your home directory on Vedur
c) The directory /gpfs/rocket on Rocket

Include files with your outputs in the submission. Compare and discuss the results.

ANSWER

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