

UL HPC School 2017 PS1: Getting Started on the UL HPC platform

UL High Performance Computing (HPC) Team

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Latest versions available on Github:



UL HPC tutorials:

UL HPC School:

PS1 tutorial sources:

https://github.com/ULHPC/tutorials

http://hpc.uni.lu/hpc-school/

https://github.com/ULHPC/tutorials/tree/devel/basic/getting_started





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Introduction

Summary



2 SSH Secure Shell

3 Hands-On: Getting Started on ULHPC



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Introduction



Main Objectives of this Session

- Understand SSH
- Connect to the UL HPC Platform
 - $\, \hookrightarrow \, \, {\sf SSH} \, \, {\sf configuration} \,$
 - \hookrightarrow Generate your SSH key pair
 - \hookrightarrow overcome port filtering
- Discovering, visualizing and reserving UL HPC resources
 - \hookrightarrow Working environment
 - $\, \hookrightarrow \ {\sf Web \ monitoring \ interfaces} \,$
 - \hookrightarrow OAR vs. SLURM Batch Scheduler
 - \hookrightarrow Job management
 - $\, \hookrightarrow \, \, \mathsf{Software} \, / \, \mathsf{Environement} \, \, \mathsf{Modules}$





Summary





3 Hands-On: Getting Started on ULHPC



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SSH: Secure Shell

- Ensure secure connection to remote (UL) server
 - \hookrightarrow establish encrypted tunnel using asymmetric keys
 - ✓ Public id_rsa.pub vs. Private id_rsa (without .pub)
 - ✓ typically on a non-standard port (Ex: 8022)

limits kiddie script

- ✓ Basic rule: 1 machine = 1 key pair
- \hookrightarrow the private key is **SECRET**: **never** send it to anybody
 - \checkmark Can be protected with a passphrase





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- SSH is used as a secure backbone channel for many tools
 - \hookrightarrow Remote shell i.e remote command line
 - \hookrightarrow File transfer: rsync, scp, sftp
 - \hookrightarrow versionning synchronization (svn, git), github, gitlab etc.





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 - \hookrightarrow File transfer: rsync, scp, sftp
 - \hookrightarrow versionning synchronization (svn, git), github, gitlab etc.
- Authentication:
 - \hookrightarrow password

 \hookrightarrow (better) public key authentication

(disable if possible)







SSH Secure Shell



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SSH Secure Shell





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SSH Secure Shell





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SSH Secure Shell







SSH: Public Key Authentication



• Restrict to public key authentication: /etc/ssh/sshd_config:





SSH Setup on Linux / Mac OS

- OpenSSH natively supported; configuration directory : ~/.ssh/
 - \hookrightarrow package openssh-client (Debian-like) or ssh (Redhat-like)
- SSH Key Pairs (public vs private) generation:
 - \hookrightarrow specify a **strong** passphrase

- $\checkmark~$ protect your **private** key from being stolen i.e. impersonation
- $\checkmark~$ drawback: passphrase must be typed to use your key



ssh-keygen



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DSA and RSA 1024 bit are deprecated now!



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~/.ssh/id_{rsa,ed25519}

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ssh-keygen



SSH Setup on Windows

- Putty Suite, includes: http://www.chiark.greenend.org.uk/~sgtatham/putty/
 - \hookrightarrow PuTTY, the free SSH client

- \hookrightarrow Pageant, an SSH authentication agent for PuTTY tools
- \hookrightarrow PLink, th PuTTy CLI
- $\,\hookrightarrow\,$ PuTTYgen, an RSA and DSA key generation utility





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$\mathbf{PuTTY} \neq \mathbf{OpenSSH}$

- Putty keys are **NOT** supported by OpenSSH (yet can be exported)
- Binding Pageant with OpenSSH agent is NOT natively supported
 - $\,\hookrightarrow\,$ Third-party tools like ssh-pageant are made for that
 - \hookrightarrow Combine nicely with Git bash

https://git-for-windows.github.io/

- with PLink, hostnames eventually refer to **PuTTY Sessions**
 - $\,\hookrightarrow\,$ NEVER to SSH entries in ~/.ssh/config
 - $\,\hookrightarrow\,$ This usage might be hidden. . . Ex: \$GIT_SSH etc.







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SSH Basic Usage





SSH Advanced Usage: SOCKS Proxy



SSH Secure Shell



SSH Advanced Usage: SOCKS Proxy





SSH Advanced Usage: SOCKS Proxy





SSH Advanced Usage: SOCKS Proxy



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SSH Advanced Usage: SOCKS Proxy



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SSH Advanced Usage: SOCKS Proxy



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SSH Advanced Usage: SOCKS Proxy



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SSH Advanced Usage: SOCKS Proxy



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SSH Secure Shell



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SSH Advanced Usage: ProxyCommand











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Example: ssh -p 8022 svarrette@access-chaos.uni.lu



- ~/.ssh/config:
 - \hookrightarrow Simpler commands
 - $\, \hookrightarrow \, \, \mathsf{Bash} \, \, \mathsf{completion} \,$
 - \$> ssh cha<TAB>





SSH in Practice

~/.ssh/config

\$> ssh [-X] [-p <port>] <login>@<hostname>

Example: ssh -p 8022 svarrette@access-chaos.uni.lu

```
Host *.ext ul
    ProxyCommand ssh -q chaos-cluster \
                 "nc -q 0 %h %p"
# UL HPC Platform -- http://hpc.uni.lu
Host chaos-cluster
    Hostname
                 access-chaos.uni.lu
Host gaia-cluster
    Hostname
                 access-gaia.uni.lu
Host iris-cluster
    Hostname access-iris.uni.lu
Host *-cluster
               login #ADAPT accordingly
   User
    Port
                8022
    ForwardAgent no
```

Host <shortname> Port <port> User <login> Hostname <hostname>

- ~/.ssh/config:
 - $\, \hookrightarrow \, \, \mathsf{Simpler} \, \, \mathsf{commands} \,$
 - $\, \hookrightarrow \, \, \mathsf{Bash} \, \, \mathsf{completion} \,$
 - \$> ssh cha<TAB>





SSH in Practice

~/.ssh/config

\$> ssh [-X] [-p <port>] <login>@<hostname>

Example: ssh -p 8022 svarrette@access-chaos.uni.lu

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    Hostname
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Host *-cluster
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                 login #ADAPT accordingly
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```

Host <shortname> Port <port> User <login> Hostname <hostname>

- ~/.ssh/config:
 - $\, \hookrightarrow \, \, \mathsf{Simpler} \, \, \mathsf{commands} \,$
 - $\, \hookrightarrow \, \mathsf{Bash} \, \, \mathsf{completion} \,$
 - \$> ssh cha<TAB>
- \$> ssh chaos-cluster
- \$> ssh work
- \$> ssh work.ext_ul





SSH in Practice: Main CLI commands





DSH – Distributed / Dancer's Shell

http://www.netfort.gr.jp/~dancer/software/dsh.html.en

• SSH wrapper that allows to run commands over multiple machines. \hookrightarrow Linux / Mac OS only

\$> { apt-get | yum | brew } install dsh

Installation

• Configuration: in ~/.dsh/

SSH Secure Shell

- $\,\hookrightarrow\,$ ~/.dsh/dsh.conf: main configuration file
- $\,\hookrightarrow\,$ ~/.dsh/machines.list: list of **all** nodes
- \hookrightarrow ~/.dsh/group/: holds group definition
- <name> Group definition: ~/.dsh/group/<name>:

 \hookrightarrow simply list **SSH** shortnames (one name by line)

• Bash completion file for DSH:

https://gist.github.com/920433.git



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DSH configuration ~/.dsh/dsh.conf

```
# ~/.dsh/dsh.conf
# Configuration file for dsh (Distributed / Dancer's Shell).
# 'man dsh.conf' for details
verbose = 0
remoteshell
             = ssh
showmachinenames = 1
# Specify 1 to make the shell wait for each individual invocation.
   See -c and -w option for dsh(1)
waitshell
             = 0 # whether to wait for execution
# Number of parallel connection to create at the same time.
#forklimit=8
remoteshellopt
            = -q
                                                      LUXEMBOURG
```



DSH Basic Usage

 $\$ dsh [-c | -w] { -a | -g <group> | -m <hostname> } <command>

Option	Description
-c -w -a -g <group> -m <hostname></hostname></group>	<pre>run the commands in parallel (default) run the commands in sequential run the command on all nodes listed in machines.list restrict the commands to the hosts group <group> run the command only on hostname</group></pre>

FAQ: sudo: sorry, you must have a tty to run sudo
 → requires to change the default configuration of sudo
 → Ex to not requiring a tty to launch a sudo command
 Defaults:<login> !requiretty





Summary









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Hands-On 1: SSH Setup

http://ulhpc-tutorials.readthedocs.io/en/latest/basic/getting_started/

Your Turn!

- Generating you SSH Key pair
- Connect to UL HPC (Linux / Mac OS / Unix / Windows)
 - $\,\hookrightarrow\,$ Connect from your laptop/workstation to UL HPC access
 - \hookrightarrow Connect from one cluster to the other
- Transferring files



Hand-on 2: First steps on UL HPC



- ✓ Not available on frontends, *Only* on compute nodes
- $\,\hookrightarrow\,$ (advanced) discovering GNU screen

Directory	Max size	Max #files	Backup
\$HOME (gaia, chaos)	100 GB	1.000.000	YES
\$HOME (iris)	500 GB	1.000.000	YES
<pre>\$WORK (except iris)</pre>	3 TB		NO
<pre>\$SCRATCH (except iris)</pre>	10 TB		NO



http://hpc.uni.lu/status/overview.html





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http://hpc.uni.lu/{iris,gaia,chaos,g5k}/monika

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http://hpc.uni.lu/{iris,gaia,chaos,g5k}/drawgantt



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http://hpc.uni.lu/{iris,gaia,chaos,g5k}/ganglia







Thank you for your attention...

Questions?

http://hpc.uni.lu

The UL High Performance Computing (HPC) Team

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2 SSH Secure Shell



Hands-On: Getting Started on ULHPC



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