JASMIN Workshop: Exercise 01: Accessing and using the jasmin “scientific analysis” servers

Scenario

I am a new JASMIN user and I have been granted a jasmin-login role which controls access to the JASMIN shared resources, e.g. login, transfer and scientific analysis servers and LOTUS. I would like to access the JASMIN resources available for interactive computing.
Note: If needed refer to the cheat sheet for exercise 01 at the end of this document for specific commands (example of a command output is in blue text color)

Objectives

- How to login to JASMIN
- How to access the scientific analysis servers
- How to enable X11 forwarding
- How to access the data transfer server
- To familiarize with command line interface versus graphical user interface on JASMIN

JASMIN resources

- JASMIN login, transfer and scientific analysis servers
- Home directory quota 100 GB (SSD)
- GWS workshop (PFS)`/group_workspaces/jasmin2/workshop/users/$USER/ex01`

Local resources

- SSH client and SSH keys
- Jasmin-login account

Instructions

1. Launch a terminal on your local host
2. Start the ssh-agent and load your JASMIN SSH private key:
    a. Linux/MacOS:
        i. eval $(ssh-agent -s)
        ii. ssh-add ~/.ssh/<your-private-key-file>
    b. Windows
        i. Set up MobaAgent to store your private key file (https://help.jasmin.ac.uk/article/4832-mobaxterm-new#mobagent)
3. Check that your key is loaded. In a terminal window:
    a. `ssh-add -l` [lowercase L]. You should see the “fingerprint” information for your key
4. SSH login to JASMIN login node `ssh -A <username>@jasmin-login1.ceda.ac.uk`
5. Discover the scientific analysis servers displayed in the login message
6. Check the load and choose a scientific server
7. SSH login to a chosen scientific server, e.g. `jasmin-sci<number>.ceda.ac.uk`
8. Check your current working directory using the Linux command `pwd` and the size of this directory using the Linux command `du` (Use `man <command>` to check for command line options)
9. Check which Linux user group you belong to, e.g. `groups`

10. Create a directory for your output files using `mkdir`. Add the `-p` flag to create all the directories in the path. e.g. `mkdir -p /group_workspaces/jasmin2/workshop/users/$USER/ex01`
11. Then change into this directory, e.g. `cd <Above directory path>`
12. Launch Gnuplot to plot a graph using the command `gnuplot` and create a plot of the function `sin(x)` using the following commands:

```
gnuplot> plot sin(x)
gnuplot> set term post eps
gnuplot> set output "my_first_plot.eps"
gnuplot> replot
gnuplot> quit
```

13. Try to view the output file using the command `gv <filename>`. **Plot will not display** because the application is running on a remote server and the graphic is not forwarded to your local desktop. Continue to the next instruction to enable the X11 forwarding.
14. See **Note1** then launch another SSH login session with the option `-X` or `-Y` to enable X11 forwarding. **Note 1:** The X server should be running on your local desktop (also known as X11) (For Windows check the setting in MobaXterm. For macOS, start XQuartz. In Linux, the SSH terminal has X11 server running by default)
15. Can you display the output file using the command `gv`?
16. Check what is running on the chosen scientific server using `top`
17. Logout from JASMIN scientific server, then logout from `jasmin-login1.ceda.ac.uk`
18. SSH login to `jasmin-xfer1.ceda.ac.uk`
19. Can you launch `gnuplot`?
20. Logout

Review

By completing this exercise you will be able to login to the interactive computing resources to run your processing or to develop and test your code. You will be able to access the different user working areas: home and GWS. You will be able to run X11-windows applications.

Alternative approaches and best practice

- How to troubleshoot SSH login issues?
    1. You do not have a jasmin-login account
    2. Jasmin-login was revoked because you did not respond to the email confirmation request
    3. Your SSH private key file permissions were accidentally modified.
    4. You exceeded the quota limit 100GB on your home directory
    5. Your changed access permission of your home directory **`/home/users/<username>`**
    6. **/tmp** is full on the JASMIN server.
    7. You are not in a whitelisted network domain.
- The login node **`jasmin-login1`** is a gateway server to access the scientific analysis servers. No processing on the JASMIN login node is allowed. https://help.jasmin.ac.uk/article/191-login-servers
- Root privilege `sudo` is not allowed on all JASMIN servers.
- The user home directory is 100 GB quota and it is backed up, e.g. `/home/users/$USER`. Users can access snapshots to recover files/directories that have been accidentally deleted https://help.jasmin.ac.uk/article/176-storage
- The bash shell is supported on JASMIN. We do not support any shells other than bash

- Do not use JASMIN data transfer server **`jasmin-xfer1`** as a gateway to login to scientific analysis servers
- Running `X11` application can be slow (another alternative is to use `x2go`)

  https://help.jasmin.ac.uk/article/189-get-started-with-jasmin
  https://help.jasmin.ac.uk/article/187-login
  https://help.jasmin.ac.uk/article/4475-graphical-linux-desktop-access-using-x2go

Cheat sheet for Exercise 01: Accessing and using the jasmin “scientific analysis” servers

1. Launch a terminal on your local host. On Mac search “Applications/Utilities/Terminal” in finder or search by keyword “terminal” by pressing the command and the space bar. On Windows, launch MobaXterm

2. Start the ssh-agent and load your SSH private key file. Check the key is loaded

```
eval $(ssh-agent -s)
ssh-add ~/.ssh/<your-private-key-file>
ssh-add -l
```

3. SSH login to JASMIN login node

```
ssh -A <username>@jasmin-login1.ceda.ac.uk
```

4. Discover the scientific analysis servers displayed in the login message

```
        ****************************************************************
        ** JASMIN Shared VM status at 2019-06-20 13:05:01.240568     **
```

5. Check the load e.g. number or users logged in, the free memory and the CPU used, and choose a scientific analysis server

```
Average load on each VM over the last hour:
================================================================================
Host                                       Users  Free memory  CPU
--------------------------------------------------------------------------------
jasmin-sci5.ceda.ac.uk                        11     16.1G    6.0%
```

6. SSH login to a chosen scientific analysis server e.g. sci-server number 5

```
ssh jasmin-sci5.ceda.ac.uk
Last login: Mon Jun 24 13:17:56 2019 from jasmin-login1.ceda.ac.uk
    RAL High Performance Computing Services Group
    Configured by PXE/Kickstart: 2014-04-02 08:58
    Admin contact:               Peter Chiu <peter.chiu@stfc.ac.uk>

Additional information about JASMIN can be found at: http://jasmin.ac.uk

For support please contact CEDA Helpdesk: support@ceda.ac.uk
[fchami@jasmin-sci5 ~]$
```

7. Which filesystem is your current working directory and what is the size of this area?

```
pwd
/home/users/<username>
pdu -sh .
9.7G   .
```

8. Check which Linux user groups you belong to

```
groups
users open gws_workshop
```

9. Create a directory for your output file (GWS workshop is a parallel file system PFS)

```
mkdir -p /group_workspaces/jasmin2/workshop/users/$USER/ex01
cd /group_workspaces/jasmin2/workshop/users/$USER/ex01
```

10. Plot a function sin(x) using `gnuplot`

```
gnuplot
gnuplot> plot sin(x)
gnuplot> set term post eps
gnuplot> set output "my_first_plot.eps"
gnuplot> replot
gnuplot> quit
```

11. Viewing the plot using 'gv' is expected to fail as X11 forwarding is not enabled

```
gv my_first_plot.eps
gv: Unable to open the display.
```

12. Launch another SSH login session with the option `-X` or `-Y` to enable `X11` forwarding and then SSH into your previously chosen scientific analysis server

```
ssh -AX <username>@jasmin-login1.ceda.ac.uk
ssh -X <username>@jasmin-sci<number>.ceda.ac.uk
```

13. Can you view the plot?

```
gv /group_workspaces/jasmin2/workshop/users/$USER/ex01/my_first_plot.eps
```

14. Check what is running on the chosen scientific analysis server use `top` or `ps`

```
top
top -u <username>
top - 13:27:21 up  2:12,  4 users,  load average: 0.10, 0.10, 0.15
Tasks: 310 total,   1 running, 309 sleeping,   0 stopped,   0 zombie
Cpu(s):  1.0%us,  0.3%sy,  0.0%ni, 98.7%id,  0.0%wa,  0.0%hi,  0.0%si,  0.0%st
Mem:  32863020k total, 26084472k used,  6778548k free,    14672k buffers
Swap:  4194300k total,        0k used,  4194300k free, 24243732k cached

   PID USER      PR  NI  VIRT  RES  SHR S %CPU %MEM    TIME+  COMMAND
 41056 fchami    20   0 13444 1360  900 R  0.7  0.0   0:00.28 top
 39697 fchami    20   0  112m 2000  904 S  0.0  0.0   0:00.00 sshd
 39710 fchami    20   0  104m 1824 1380 S  0.0  0.0   0:00.06 bash
 40922 fchami    20   0  112m 2504  948 S  0.0  0.0   0:00.13 sshd
 40939 fchami    20   0  104m 1828 1384 S  0.0  0.0   0:00.06 bash
 41005 fchami    20   0  136m 3108 2208 S  0.0  0.0   0:00.10 gv
q (to exit top)
```

15. Exit Ghostscript viewer `gv`. Logout from the scientific analysis server and from the login server

```
logout
Connection to jasmin-sci5.ceda.ac.uk closed.
logout
Connection to jasmin-login1.ceda.ac.uk closed.
```

16. SSH login to the JASMIN data transfer server

```
ssh -A <username>@jasmin-xfer1.ceda.ac.uk
```

17. Which filesystem is your current working directory?

```
pwd
/home/users/<username>
```

18. Can you launch `gnuplot`?

```
gnuplot
-bash: gnuplot: command not found
```

19. Logout from JASMIN transfer server

```
logout
Connection to jasmin-xfer1.ceda.ac.uk closed.
```