LAB 01 - LINUX BACKUP

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Task 1 : Local Sync

1. The output of

   ```
   du -sh /home
   210M    /home
   ```

   The command used to create a full uncompressed backup is :

   ```
    sudo tar cf /mnt/backup2/uncompressed.tar /home/
   ```

2. In order to create the backup directory, we used the following command :

   ```
   sudo mkdir /mnt/backup2/jeremy_backup
   ```

   Also, we changed the rights using this command :

   ```
   sudo chown jeremy /mnt/backup2/jeremy_backup/
   ```

3. After typing the command :

   ```
   rsync -av /home/ 2017-09-25-093533
   ```

   - **What do these options do?**

     Those options ensure that :

     - `-v` : The console output is verbose. It explains all the operations the command is doing
     - `-a` : Turns in the *archive mode*.
   - **Specifically, which options are implied by the `-a` option and what do they do?**

     All options are implied with `-a` with the exception of *hard links* being preserved. As this kind of operation is expensive, you want to ensure the `-H` option is specified to preserved those links.
   - **How can you use the `date` command to avoid typing the timestamp of the current time? How do you make `date` produce UTC time?**
     Using the `date` command, you can produce the UTC time using the `-u` option.
   - **How much disk space is used by the backup directory?**

     Using the `du -sh 2017-09-25-093533/` command, we find out the total space is 44MB large.

4. The command used is :

```
rsync -av /home/ 2017-09-25-093533 --delete --link-dest=2017-09-25-093533/
```

- `--delete` : Deletes files in the destination directory if they don't exist in the source directory.
- `--link-dest=DIR` : hard link to files in *DIR* when unchanged.
- **How much disk space is used by the backup directory according to the `du` command?**

  44MB are used according to the `du` command.
- **How much by the individual snapshot directories?**

  According to the individual snapshot directory, 946.4 kB are used.
- **How do you explain what `du` displays (if you had to write the `du` command, how would you count hard links)?**

  We could explain that `du` reads the links and therefore, it reads the size of those links.

5. In the `jeremy` folder, we created a file called `a` using this :

```
touch a
```

We ran the `stat` command on a screenshot done some time prior to the backup

```
stat /home/jeremy/Pictures/Screenshot\ from\ 2019-09-25\ 22-01-01.png
  File: /home/jeremy/Pictures/Screenshot from 2019-09-25 22-01-01.png
  Size: 445774      Blocks: 872        IO Block: 4096   regular file
Device: 801h/2049d  Inode: 131311      Links: 1
Access: (0664/-rw-rw-r--)  Uid: ( 1000/  jeremy)   Gid: ( 1000/  jeremy)
Access: 2019-10-13 13:36:16.777078803 +0200
Modify: 2019-09-25 22:01:01.653816263 +0200
Change: 2019-09-25 22:01:01.653816263 +0200
 Birth: -
```

Then we ran it on the file created :

```
stat /home/jeremy/a
  File: /home/jeremy/a
  Size: 0           Blocks: 0          IO Block: 4096   regular empty file
Device: 801h/2049d  Inode: 131490      Links: 1
Access: (0644/-rw-r--r--)  Uid: ( 1000/  jeremy)   Gid: ( 1000/  jeremy)
Access: 2019-10-13 15:26:39.567370013 +0200
Modify: 2019-10-13 15:26:39.567370013 +0200
Change: 2019-10-13 15:26:39.567370013 +0200
 Birth: -
```

Then we rerun the command used before.

The `stat` command shows us for the screenshot :

```
stat /home/jeremy/Pictures/Screenshot\ from\ 2019-09-25\ 22-01-01.png
  File: /home/jeremy/Pictures/Screenshot from 2019-09-25 22-01-01.png
  Size: 445774      Blocks: 872        IO Block: 4096   regular file
Device: 801h/2049d  Inode: 131311      Links: 1
Access: (0664/-rw-rw-r--)  Uid: ( 1000/  jeremy)   Gid: ( 1000/  jeremy)
Access: 2019-10-13 13:36:16.777078803 +0200
Modify: 2019-09-25 22:01:01.653816263 +0200
Change: 2019-09-25 22:01:01.653816263 +0200
 Birth: -
```

And for the file :

```
stat /home/jeremy/a
  File: /home/jeremy/a
  Size: 0           Blocks: 0          IO Block: 4096   regular empty file
Device: 801h/2049d  Inode: 131490      Links: 1
Access: (0644/-rw-r--r--)  Uid: ( 1000/  jeremy)   Gid: ( 1000/  jeremy)
Access: 2019-10-13 15:30:22.943370013 +0200
Modify: 2019-10-13 15:26:39.567370013 +0200
Change: 2019-10-13 15:26:39.567370013 +0200
 Birth: -
```

We can see that the date accessed on the new file has changed, as for the old file, access has not changed.

6. **What happens to the files in the incremental backup that were hardlinked to the files of the full backup?**

Task 2 : Set up SSH for remote login

1. **In your personal `.ssh` directory download the `key.sec` file below this document. Be sure to remove all permissions for `group` and `others` from this file.**

   All permissions were removed using the `chmod` command.

2. **Test logging into your account on the remote machine using SSH. Log out again.**

   ```
   ssh ait.lan.iict.ch -l jeremy_zerbib -i .ssh/key.sec
   ```

   In order to log out, we used `exit` in the terminal.

3. **On your local machine configure an SSH shortcut to the account on the remote machine. Create the file `~/.ssh/config` if does not yet exist and add the following lines to it:**

   ```
   # Cloud virtual machine for AIT lab
   Host cloudvm
       Hostname ait.lan.iict.ch
       IdentityFile ~/.ssh/key.sec
       User jeremy_zerbib
   ```

   In order to do this part, we copied the config above using :

   ```
   gedit .ssh/config
   ```

Replace the username after `User` by your account name.

Test this shortcut by typing `ssh cloudvm`. You should see the command line prompt of the remote machine.

```
ssh cloudvm
Welcome to Ubuntu 16.04.6 LTS (GNU/Linux 4.4.0-165-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

5 packages can be updated.
0 updates are security updates.

New release '18.04.2 LTS' available.
Run 'do-release-upgrade' to upgrade to it.


Last login: Sun Oct 13 15:50:07 2019 from 10.192.18.127
```

Task 3 : Remote Sync

1. **Create a backup directory on the remote machine as described in Task 1 so that your user can read/write.**

   After login into the *ssh* session, we created a folder

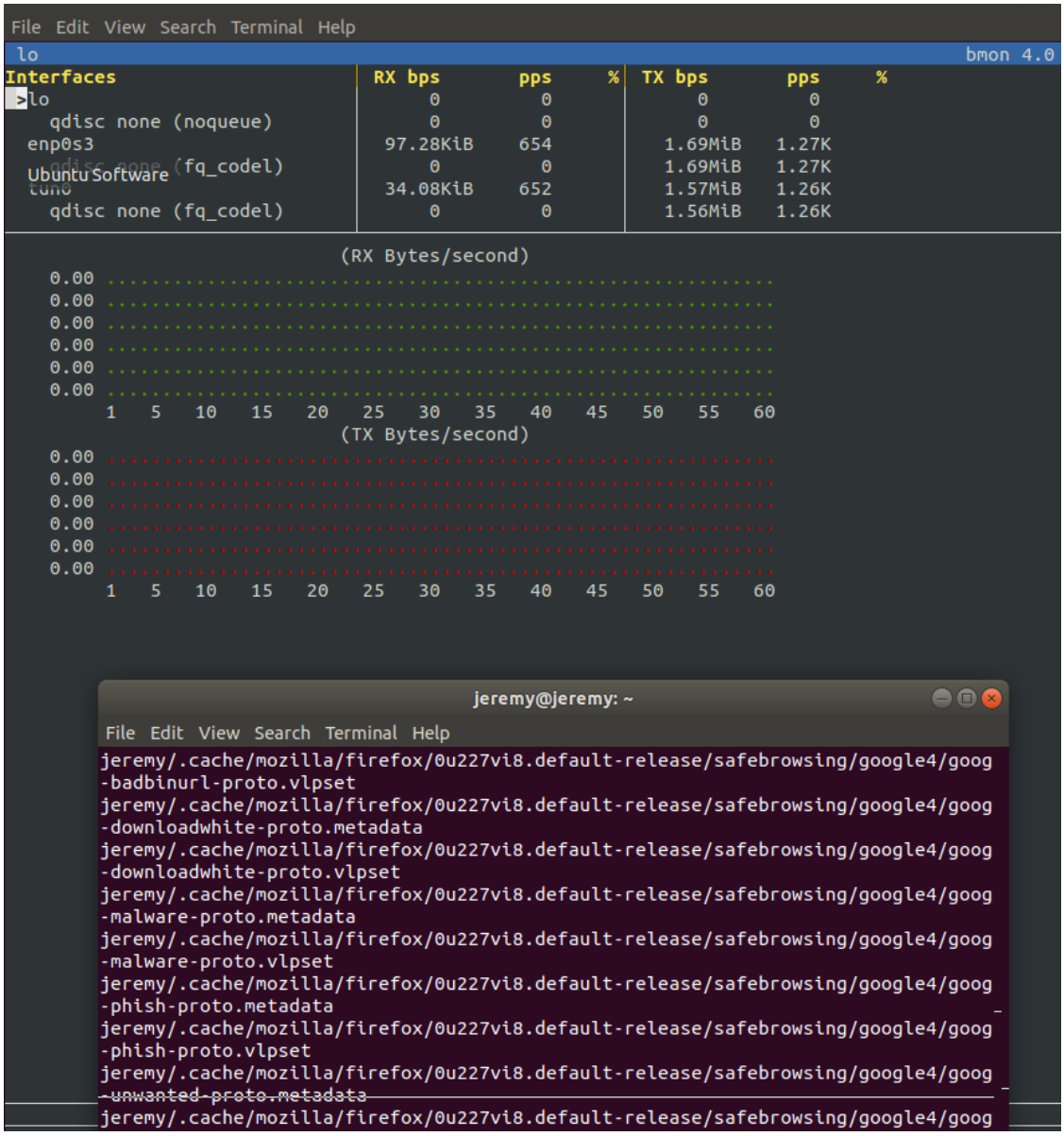
   ```
   mkdir /jeremy_backup
   ```

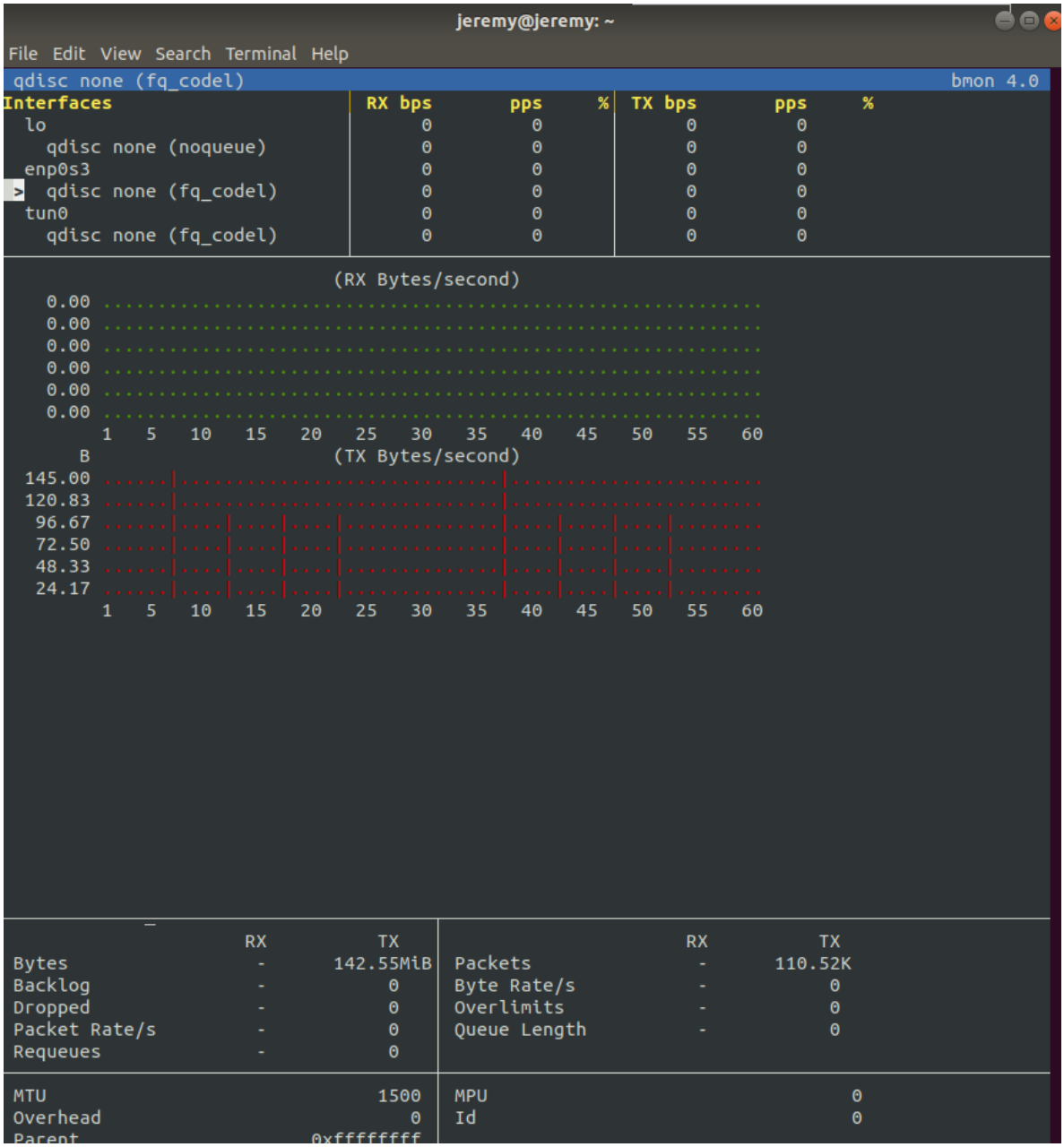
2. **Repeat the full backup and the incremental backup of task 1, but with the backup going to the remote machine over SSH. In the `rsync` command you need to prefix the destination parameter with `cloudvm:` to tell `rsync` to use SSH to transfer the data to the remote machine.**

   ```
   rsync -av /home/ cloudvm:jeremy_backup/2017-09-25-093533 --delete --link-dest=2017-09-25-093533/
   ```

3. **Optional: Using a network monitoring tool on your local Linux machine like `bmon` observe how much network traffic `rsync` is causing.**

   The bandwith used by *ssh* is monitored by `bmon`.


File Edit View Search Terminal Help
lo
bmon 4.0
Interfaces
RX bps
pps
%
TX bps
pps
%
>lo
0
0
0
0
qdisc none (noqueue)
0
0
0
0
enp0s3
97.28KiB
654
1.69MiB
1.27K
qdisc none (fq_codel)
0
0
1.69MiB
1.27K
tun0
34.08KiB
652
1.57MiB
1.26K
qdisc none (fq_codel)
0
0
1.56MiB
1.26K
Ubuntu Software
(RX Bytes/second)
0.00
1 5 10 15 20 25 30 35 40 45 50 55 60
(TX Bytes/second)
0.00
1 5 10 15 20 25 30 35 40 45 50 55 60
jeremy@jeremy: ~
File Edit View Search Terminal Help
jeremy/.cache/mozilla/firefox/0u227vi8.default-release/safebrowsing/google4/goog-badbinurl-proto.vlpset
jeremy/.cache/mozilla/firefox/0u227vi8.default-release/safebrowsing/google4/goog-downloadwhite-proto.metadata
jeremy/.cache/mozilla/firefox/0u227vi8.default-release/safebrowsing/google4/goog-downloadwhite-proto.vlpset
jeremy/.cache/mozilla/firefox/0u227vi8.default-release/safebrowsing/google4/goog-malware-proto.metadata
jeremy/.cache/mozilla/firefox/0u227vi8.default-release/safebrowsing/google4/goog-malware-proto.vlpset
jeremy/.cache/mozilla/firefox/0u227vi8.default-release/safebrowsing/google4/goog-phish-proto.metadata
jeremy/.cache/mozilla/firefox/0u227vi8.default-release/safebrowsing/google4/goog-phish-proto.vlpset
jeremy/.cache/mozilla/firefox/0u227vi8.default-release/safebrowsing/google4/goog-unwanted-proto.metadata
jeremy/.cache/mozilla/firefox/0u227vi8.default-release/safebrowsing/google4/goog


jeremy@jeremy: ~
File Edit View Search Terminal Help
qdisc none (fq_codel)
bmon 4.0
Interfaces
RX bps
pps
%
TX bps
pps
%
lo
0
0
0
0
qdisc none (noqueue)
0
0
0
0
enp0s3
0
0
0
0
> qdisc none (fq_codel)
0
0
0
0
tun0
0
0
0
0
qdisc none (fq_codel)
0
0
0
0
(RX Bytes/second)
0.00
0.00
0.00
0.00
0.00
0.00
1 5 10 15 20 25 30 35 40 45 50 55 60
B
(TX Bytes/second)
145.00
120.83
96.67
72.50
48.33
24.17
1 5 10 15 20 25 30 35 40 45 50 55 60
RX
TX
Bytes
-
142.55MiB
Backlog
-
0
Dropped
-
0
Packet Rate/s
-
0
Requeues
-
0
RX
TX
Packets
-
110.52K
Byte Rate/s
-
0
Overlimits
-
0
Queue Length
-
0
MTU
1500
Overhead
0
Parent
0xffffffff
MPU
0
Id
0