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## Computer Science 328 -01

### Lab Assignment 4

**Due Date: Sunday, February 18, 2024 (before midnight)**

#### Objectives:

1. Learning File Backup
2. Learning Network File System (NFS)
3. Learning LAMP server setup
4. Learning Cloud File Storage Systems: Owncloud, Nextcloud

#### Task 1: File Backup

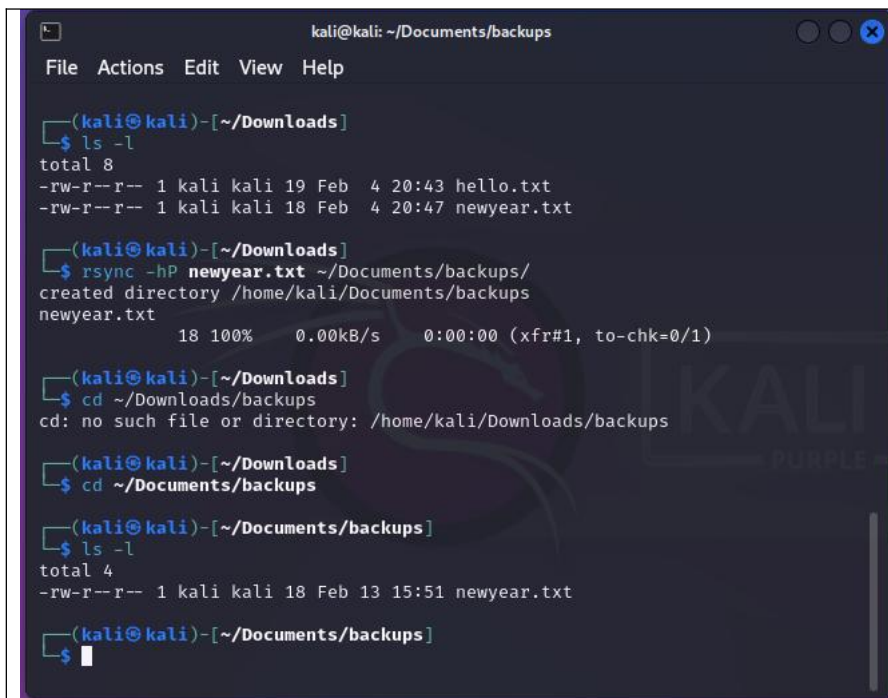
Please refer to the examples from the site below on how to use rsync command to do file/directory backup locally and remotely:

<https://www.tecmint.com/rsync-local-remote-file-synchronization-commands/>

#### Incremental backups with rsync command

Run both Ubuntu VM1 and Kali VM => open a terminal in Ubuntu => create a couple non-empty text files or download something like a couple images into the **Downloads** folder=> use rsync command to backup the whole **Downloads** folder locally into **Documents/backups** folder (note: **backups** subfolder will be created automatically by the rsync command) => take screen shot of the terminal showing the successful backup operation.

Insert your screen shot here:



```
kali@kali: ~/Documents/backups
File Actions Edit View Help

(kali@kali)-[~/Downloads]
$ ls -l
total 8
-rw-r--r-- 1 kali kali 19 Feb  4 20:43 hello.txt
-rw-r--r-- 1 kali kali 18 Feb  4 20:47 newyear.txt

(kali@kali)-[~/Downloads]
$ rsync -hP newyear.txt ~/Documents/backups/
created directory /home/kali/Documents/backups
newyear.txt
      18 100%   0.00kB/s   0:00:00 (xfr#1, to-chk=0/1)

(kali@kali)-[~/Downloads]
$ cd ~/Downloads/backups
cd: no such file or directory: /home/kali/Downloads/backups

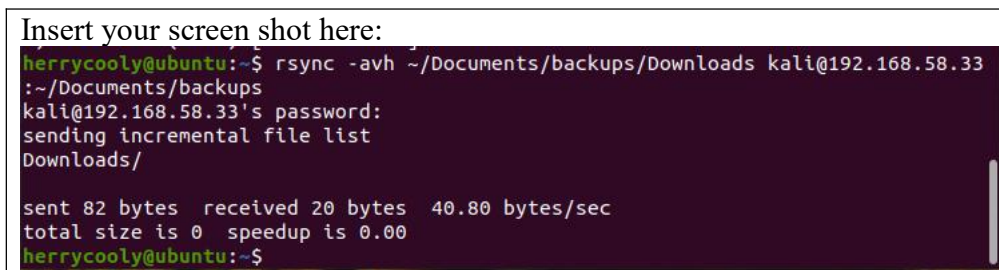
(kali@kali)-[~/Downloads]
$ cd ~/Documents/backups

(kali@kali)-[~/Documents/backups]
$ ls -l
total 4
-rw-r--r-- 1 kali kali 18 Feb 13 15:51 newyear.txt

(kali@kali)-[~/Documents/backups]
$
```

=> Next use rsync command to backup **/Documents/backups/Downloads** folder from Ubuntu VM into **/Documents/backups** folder of the remote Kali VM => take screen shot to show the successful backup operation

Insert your screen shot here:



```
herrycooly@ubuntu:~$ rsync -avh ~/Documents/backups/Downloads kali@192.168.58.33
~/Documents/backups
kali@192.168.58.33's password:
sending incremental file list
Downloads/

sent 82 bytes  received 20 bytes  40.80 bytes/sec
total size is 0  speedup is 0.00
herrycooly@ubuntu:~$
```

=> Next use rsync command to backup **/Documents/backups/Downloads** folder from remote Kali VM into **/tmp** folder of Ubuntu VM => take a screen shot to show the successful backup operation.

Insert your screen shot here:

```

(kali@kali)~/Documents/backups]
$ rsync -avh ~/Documents/backups/Downloads herrycooly@192.168.58.11:~/tmp
The authenticity of host '192.168.58.11 (192.168.58.11)' can't be established
ED25519 key fingerprint is SHA256:NAim4PSXtr9gjUdiYLX6rg1PNasUUoqJUXh7q6dI9qE
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.58.11' (ED25519) to the list of known hosts.
herrycooly@192.168.58.11's password:
sending incremental file list
Downloads/

sent 70 bytes  received 20 bytes  16.36 bytes/sec
total size is 0  speedup is 0.00

herrycooly@ubuntu:~/tmp$ ls -l
total 4
drwxrwxr-x 2 herrycooly herrycooly 4096 Feb 13 13:01 Downloads

```

## Task 2: Learning Network File System (NFS)

Please refer to “*How To Set Up an NFS Mount on Ubuntu.pdf*”:

- Use Ubuntu VM1 as host server, and both Ubuntu VM2 and Kali VM as client servers.
- Follow the instructions from the PDF file with the first client using Ubuntu VM2 (192.168.13.22).
- Next set up the second client (Kali VM) the same way by adding Kali VM's ip address (192.168.13.33) as the second client into /etc/exports file:

```

GNU nano 4.8 /etc/exports Modified
# /etc/exports: the access control list for filesystems which may be exported
# to NFS clients. See exports(5).
#
# Example for NFSv2 and NFSv3:
# /srv/homes hostname1(rw,sync,no_subtree_check) hostname2(ro,sync,no_s>
#
# Example for NFSv4:
# /srv/nfs4 gss/krb5i(rw,sync,fsid=0,crossmnt,no_subtree_check)
# /srv/nfs4/homes gss/krb5i(rw,sync,no_subtree_check)
#
/var/nfs/general 192.168.13.22(rw,sync,no_subtree_check)
/var/nfs/general 192.168.13.33(rw,sync,no_subtree_check)
/home 192.168.13.22(rw,sync,no_root_squash,no_subtree_check)
/home 192.168.13.33(rw,sync,no_root_squash,no_subtree_check)

```

and by creating two new files with different names like “kaligeneral.test” under the shared /general directory and “kalihome.test” under the shared /home directory.

- At the end, go to host server (Ubuntu VM1), use a command like “ls -l /var/nfs/general” to list the contents of the exported directory. Take a screen shot of the terminal to show the two new files created by both clients.

Insert your screen shot here:

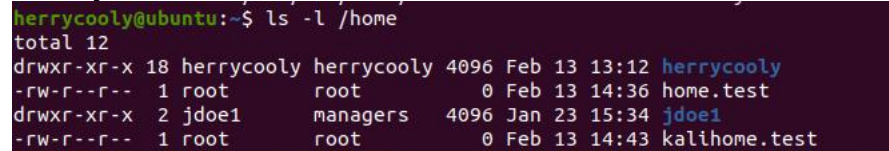
```

herrycooly@ubuntu:~$ ls -l /var/nfs/general
total 0
-rw-r--r-- 1 nobody nogroup 0 Feb 13 14:36 general.test
-rw-r--r-- 1 nobody nogroup 0 Feb 13 14:42 kaligeneral.test

```

- use the command “ls -l /home/nfs” to list the contents of the other exported directory. Take a screen of the terminal.

Insert your screen shot here:



```
herrycooly@ubuntu:~$ ls -l /home
total 12
drwxr-xr-x 18 herrycooly herrycooly 4096 Feb 13 13:12 herrycooly
-rw-r--r-- 1 root      root      0 Feb 13 14:36 home.test
drwxr-xr-x 2 jdoe1     managers  4096 Jan 23 15:34 jdoe1
-rw-r--r-- 1 root      root      0 Feb 13 14:43 kalihome.test
```

### Task 3: LAMP server setup

- Having a LAMP server setup is the prerequisite requirement for setting up Owncloud and Nextcloud servers in Task 4.
- Follow the steps from “Install LAMP server on Ubuntu 20.04.pdf” file to complete the LAMP server setup on both Ubuntu VM1 and Ubuntu VM2 respectively.
- Open a web browser in Kali VM to access the web server on Ubuntu VM1 by entering an URL: <http://ubuntu-vm1-ip/phpinfo.php>

Take a screen shot of your Kali VM’s web browser to show the result and insert the screenshot below:

PHP Version 7.4.3-4ubuntu2.19	
<b>System</b>	Linux ubuntu 5.15.0-91-generic #101~20.04.1-Ubuntu SMP Thu Nov 16 14:22:28 UTC 2023 x86_64
<b>Build Date</b>	Jun 27 2023 15:49:59
<b>Server API</b>	Apache 2.0 Handler
<b>Virtual Directory Support</b>	disabled
<b>Configuration File (php.ini) Path</b>	/etc/php/7.4/apache2
<b>Loaded Configuration File</b>	/etc/php/7.4/apache2/php.ini
<b>Scan this dir for additional .ini files</b>	/etc/php/7.4/apache2/conf.d
<b>Additional .ini files parsed</b>	/etc/php/7.4/apache2/conf.d/10-mysqld.ini, /etc/php/7.4/apache2/conf.d/10-opcache.ini, /etc/php/7.4/apache2/conf.d/10-pdo.ini, /etc/php/7.4/apache2/conf.d/20-calendar.ini, /etc/php/7.4/apache2/conf.d/20-ctype.ini, /etc/php/7.4/apache2/conf.d/20-exif.ini, /etc/php/7.4/apache2/conf.d/20-ffi.ini, /etc/php/7.4/apache2/conf.d/20-fileinfo.ini, /etc/php/7.4/apache2/conf.d/20-ftp.ini, /etc/php/7.4/apache2/conf.d/20-gettext.ini, /etc/php/7.4/apache2/conf.d/20-iconv.ini, /etc/php/7.4/apache2/conf.d/20-json.ini, /etc/php/7.4/apache2/conf.d/20-mysqli.ini, /etc/php/7.4/apache2/conf.d/20-pdo_mysqli.ini, /etc/php/7.4/apache2/conf.d/20-phar.ini, /etc/php/7.4/apache2/conf.d/20-posix.ini, /etc/php/7.4/apache2/conf.d/20-readline.ini, /etc/php/7.4/apache2/conf.d/20-shmop.ini, /etc/php/7.4/apache2/conf.d/20-sockets.ini, /etc/php/7.4/apache2/conf.d/20-sysvmsg.ini, /etc/php/7.4/apache2/conf.d/20-sysvsem.ini, /etc/php/7.4/apache2/conf.d/20-sysvshm.ini, /etc/php/7.4/apache2/conf.d/20-tokenizer.ini
<b>PHP API</b>	20190902
<b>PHP Extension</b>	20190902
<b>Zend Extension</b>	320190902
<b>Zend Extension Build</b>	API320190902.NTS
<b>PHP Extension Build</b>	API20190902.NTS
<b>Debug Build</b>	no
<b>Thread Safety</b>	disabled
<b>Zend Signal Handling</b>	enabled

- Use the same web browser in Kali VM to access the web server on Ubuntu VM2 by entering an URL: <http://ubuntu-vm2-ip/phpinfo.php>

Take a screen shot of your Kali VM's web browser again to show the result and insert the screenshot below:

PHP Version 7.4.3-4ubuntu2.19	
System	Linux ubuntu 5.15.0-91-generic #101~20.04.1-Ubuntu SMP Thu Nov 16 14:22:28 UTC 2023 x86_64
Build Date	Jun 27 2023 15:49:59
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.4/apache2
Loaded Configuration File	/etc/php/7.4/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.4/apache2/conf.d
Additional .ini files parsed	/etc/php/7.4/apache2/conf.d/10-mysqlnd.ini, /etc/php/7.4/apache2/conf.d/10-opcache.ini, /etc/php/7.4/apache2/conf.d/10-pdo.ini, /etc/php/7.4/apache2/conf.d/20-calendar.ini, /etc/php/7.4/apache2/conf.d/20-ctype.ini, /etc/php/7.4/apache2/conf.d/20-exif.ini, /etc/php/7.4/apache2/conf.d/20-ffi.ini, /etc/php/7.4/apache2/conf.d/20-fileinfo.ini, /etc/php/7.4/apache2/conf.d/20-ftp.ini, /etc/php/7.4/apache2/conf.d/20-gettext.ini, /etc/php/7.4/apache2/conf.d/20-iconv.ini, /etc/php/7.4/apache2/conf.d/20-json.ini, /etc/php/7.4/apache2/conf.d/20-mysqli.ini, /etc/php/7.4/apache2/conf.d/20-pdo_mysql.ini, /etc/php/7.4/apache2/conf.d/20-phar.ini, /etc/php/7.4/apache2/conf.d/20-posix.ini, /etc/php/7.4/apache2/conf.d/20-readline.ini, /etc/php/7.4/apache2/conf.d/20-shmop.ini, /etc/php/7.4/apache2/conf.d/20-sockets.ini, /etc/php/7.4/apache2/conf.d/20-sysvmsg.ini, /etc/php/7.4/apache2/conf.d/20-sysvsem.ini, /etc/php/7.4/apache2/conf.d/20-sysvshm.ini, /etc/php/7.4/apache2/conf.d/20-tokenizer.ini
PHP API	20190902
PHP Extension	20190902
Zend Extension	320190902
Zend Extension Build	API320190902.NTS
PHP Extension Build	API20190902.NTS
Debug Build	no
Thread Safety	disabled
Zend Signal Handling	enabled

要将输入定向到该虚拟机，请将鼠标指针移入其中或按 Ctrl+G.

## Task 4: Cloud File Storage Systems: Owncloud, Nextcloud

- Install and configure owncloud server software on Ubuntu VM1

- Follow the instructions from the link below:  
[How to Install and Configure ownCloud on Ubuntu 20.04 | Linode](#)

Please note that LAMP stack should have already installed. So you should start from the step: “create your ownCloud database” with the following changes during the installation:

\* Step 3 during the database creation: the single “grant” statement should be replaced by two statements like these:

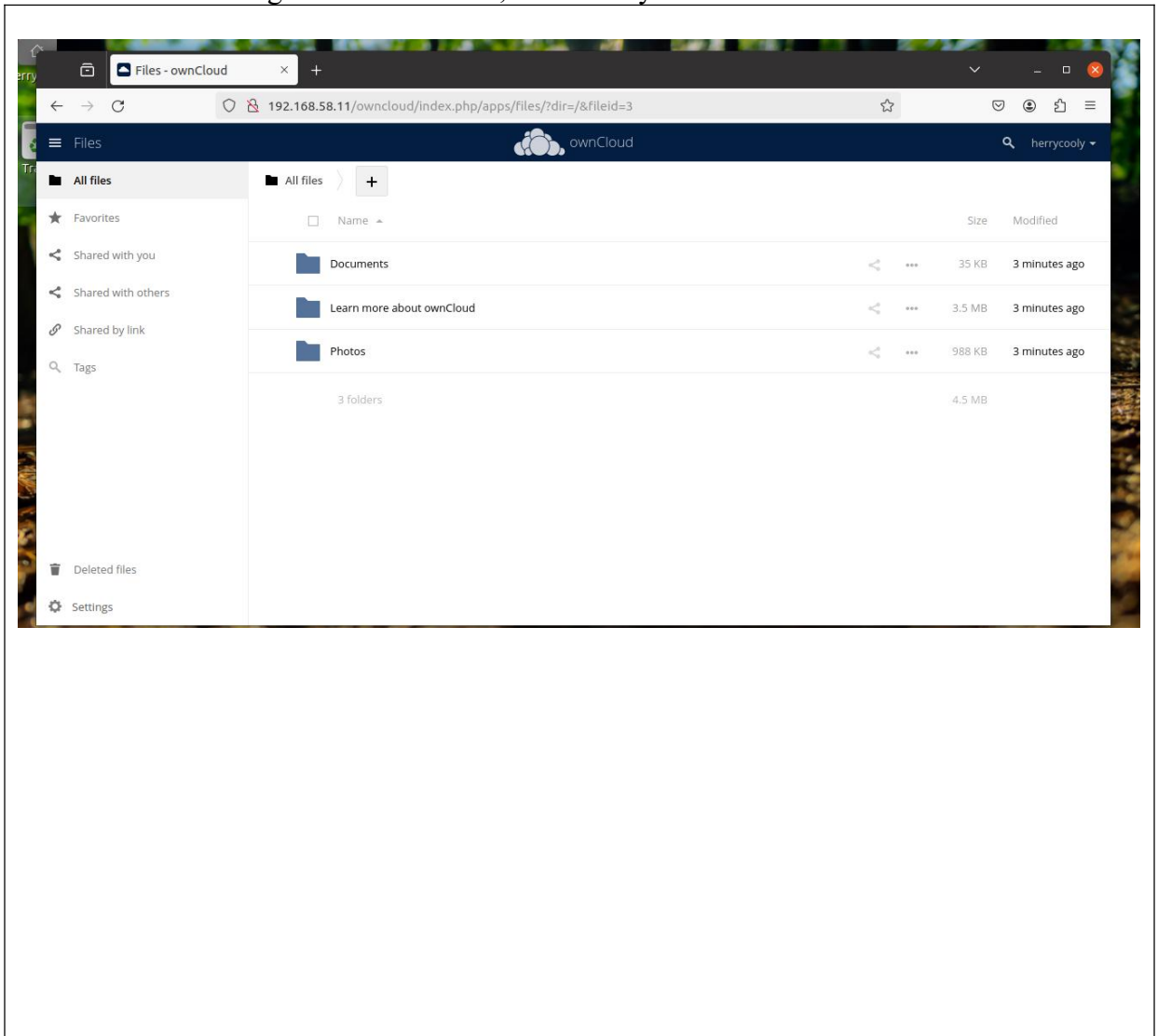
```
>CREATE USER 'ownclouduser'@'localhost' IDENTIFIED BY 'letmein';
>GRANT ALL ON ownclouddb.* TO 'ownclouduser'@'localhost';
```

\*The first line inside the **owncloud.conf** file has a typo:

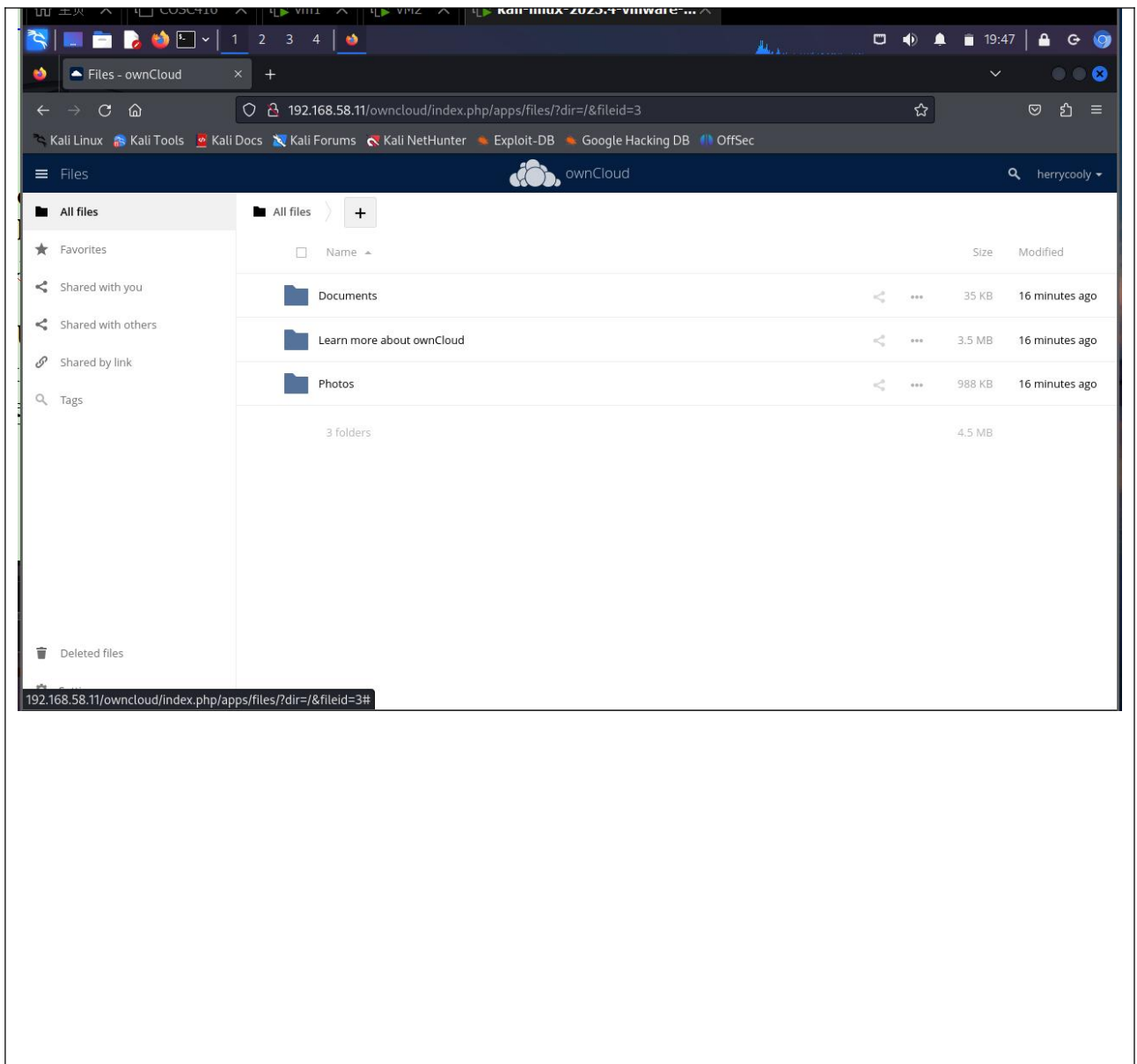
<VirtualHost \*:80> should read <VirtualHost \*:80> instead without the \ character.



- When you finish the installation and configuration of owncloud server, using the host name (owncloud.cosc328.edu) to access your owncloud service with a browser. Take a screen shot of your web browser showing owncloud service, and insert your screen shot below:



- Log into Kali VM. Open a browser and use an URL like <http://ubuntu-vm1-ip/owncloud/> to access the **owncloud** server from Ubuntu VM1. Take a screen shot of the browser showing owncloud service, and insert your screen shot below:

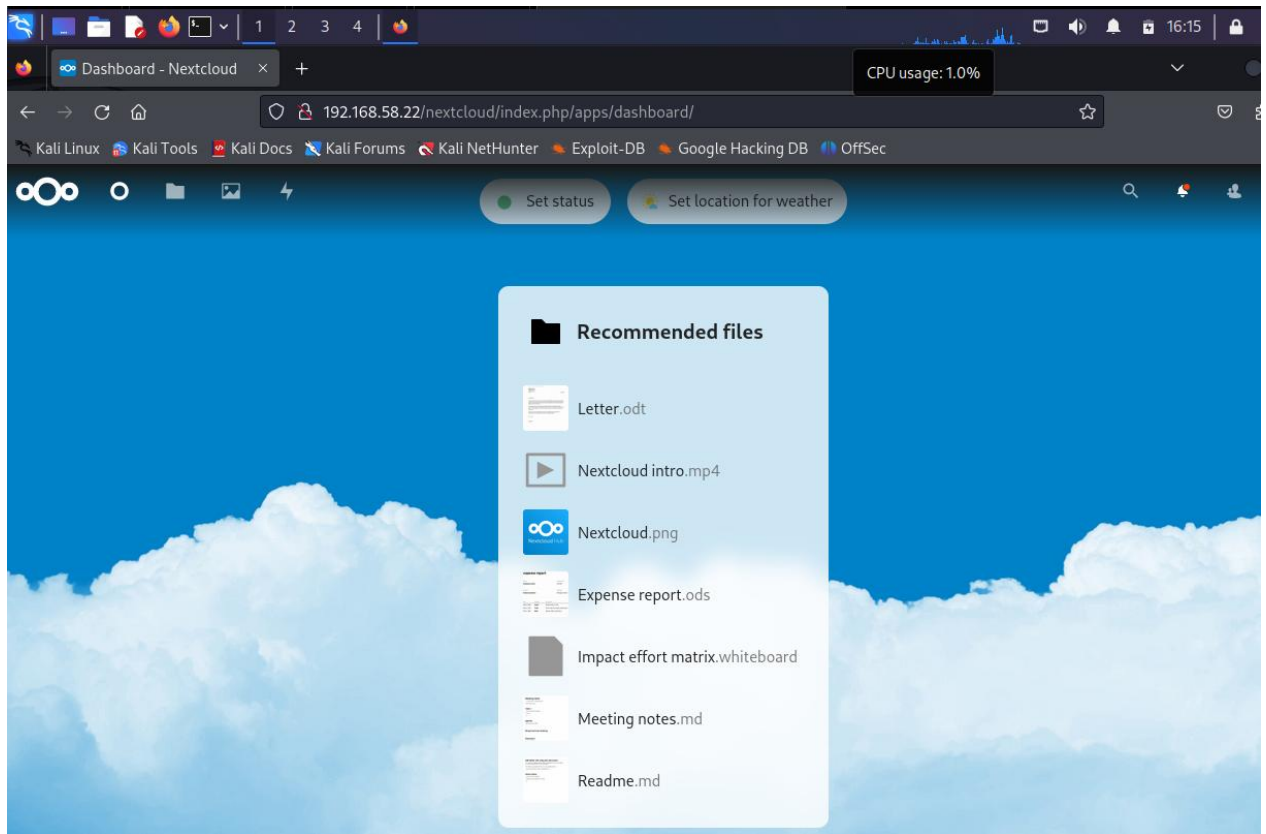


- Next install and configure **nextcloud** server software on Ubuntu VM2.
- Follow the same steps for installing and configuring owncloud server software with the following changes:
  - Download nextcloud using this url:  
\$ wget <https://download.nextcloud.com/server/releases/nextcloud-21.0.1.zip>
  - Naming changes: owncloud => nextcloud

When you finish the installation and configuration of nextcloud server, you can do a quick testing of your nextcloud service on the same VM with a web browser by entering an URL like <http://localhost/nextcloud/> to access the nextcloud service. Make sure that it works!



- Next go into Kali VM. Open a browser and use an URL like <http://ubuntu-vm2-ip/nextcloud/> to access the nextcloud server from Ubuntu VM2. Take a screen shot of the browser in Kali VM showing the nextcloud service, and insert your screen shot below:



## Submitting your work:

Please export this Word document file with all your answers and embedded screen shots as a PDF file. Submit the PDF file via Lab 4 assignment tab on our Moodle course page by *Sunday, February 18, 2024 (by midnight)*.