LUV Beginners Workshop
20 August 2016

Wen Lin's Talk: File Sharing in Linux

DEMO SESSION

How to Turn a Raspberry Pi into a Low-Power Network Attached Storage (NAS)?

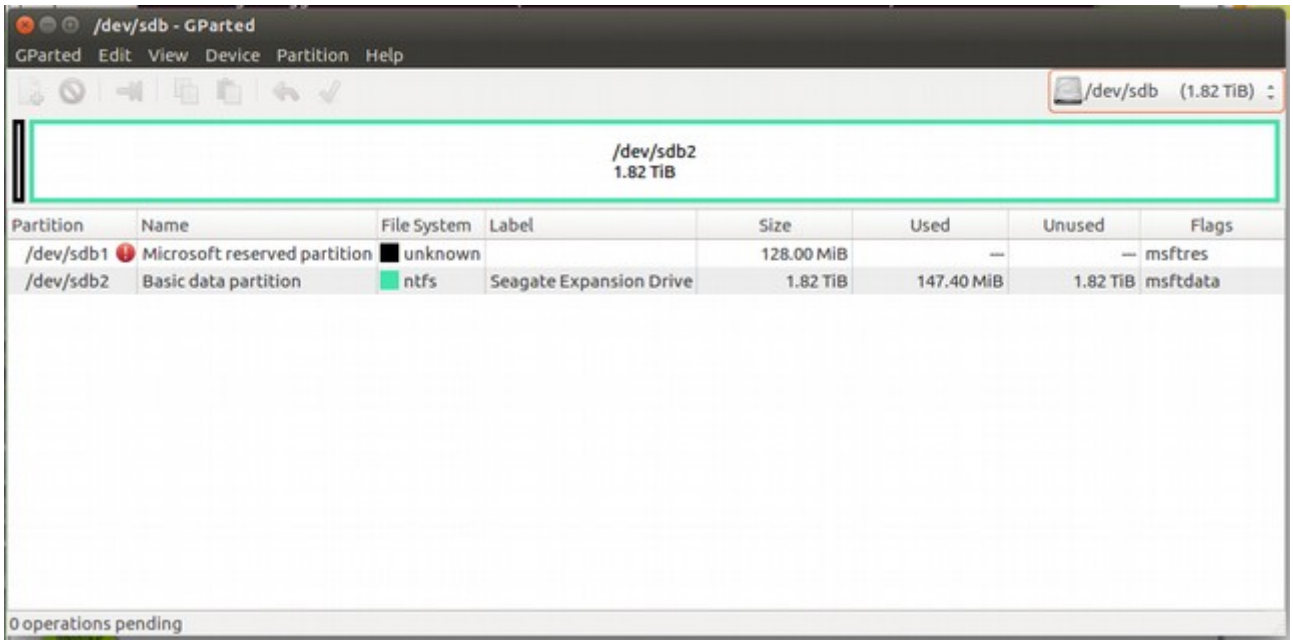
(1) **Components involved (Hardware / Software)**

- 1 x Raspberry Pi 2 Model B – as a head-less NAS host.
- 1 x USB Hard Drive (2TB) – as storage for the NAS.
- 1 x Laptop running Ubuntu 16.04 – as the monitor & keyboard for the head-less RasPi. Also as a Client PC to test the File Server.

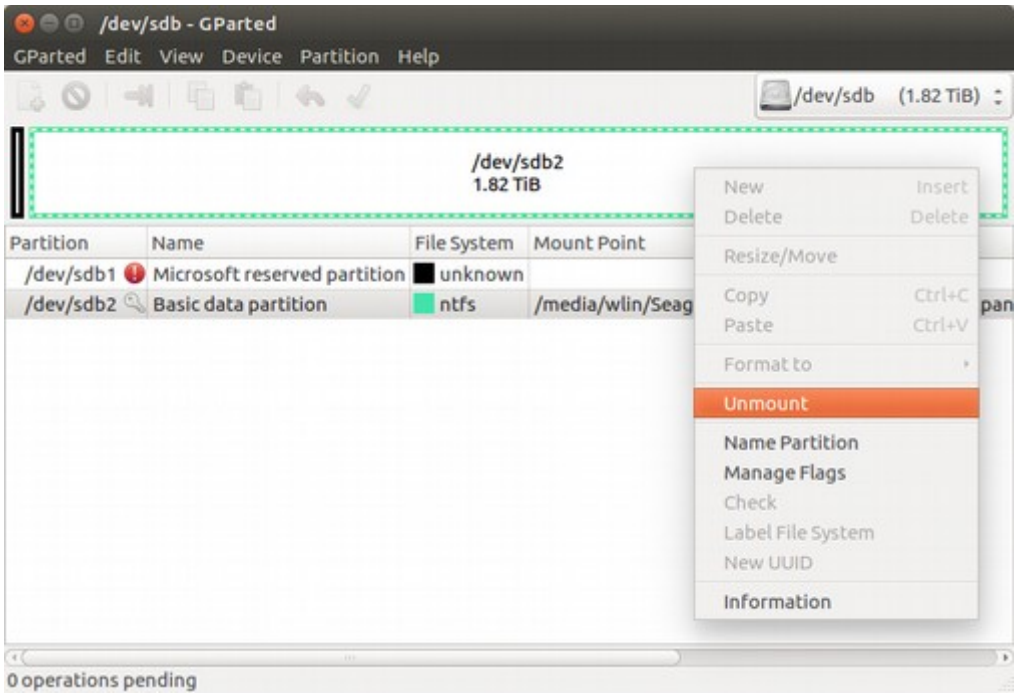
(2) **Preparation**

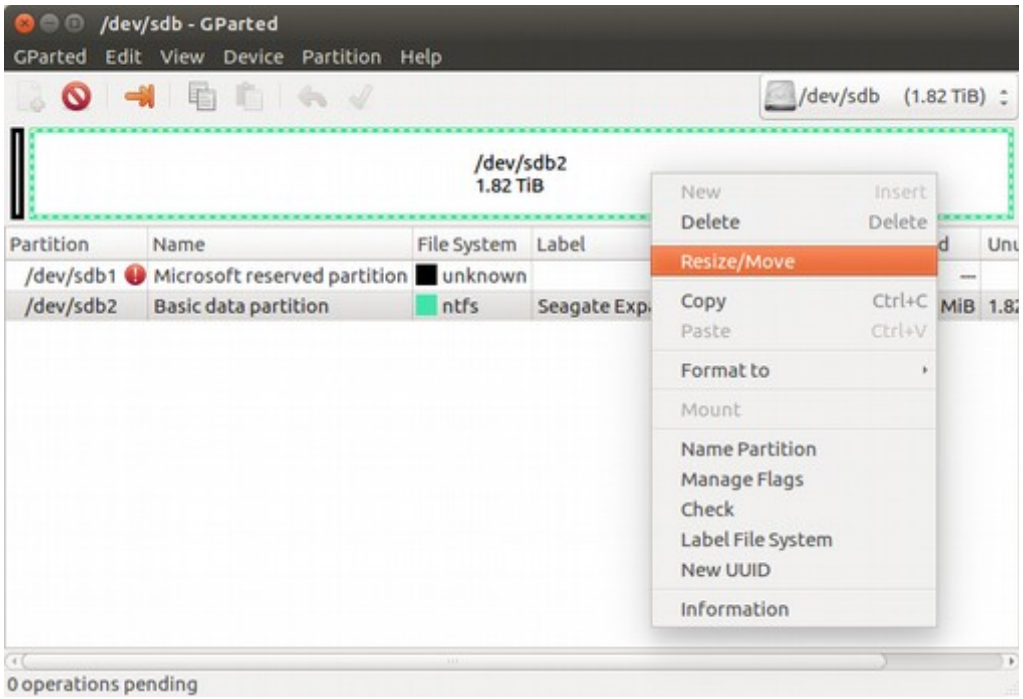
(a) Split the 2TB USB hard drive into 2 partitions – one NTFS, another ext4.

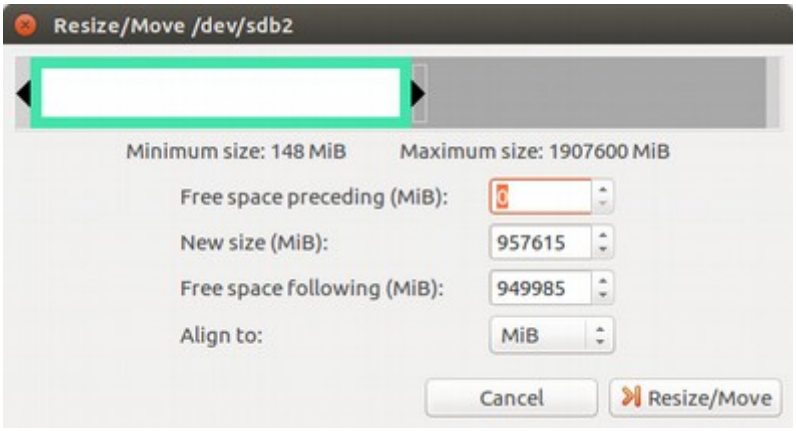
- Use Gparted to shrink the single 2TB NTFS partition to 1TB, then use the free-up space to create a new partition in ext4.
- Before we can resize the disk, we need to unmount it first – do this in Gparted as well.
- Below is the screen shot before the operation:

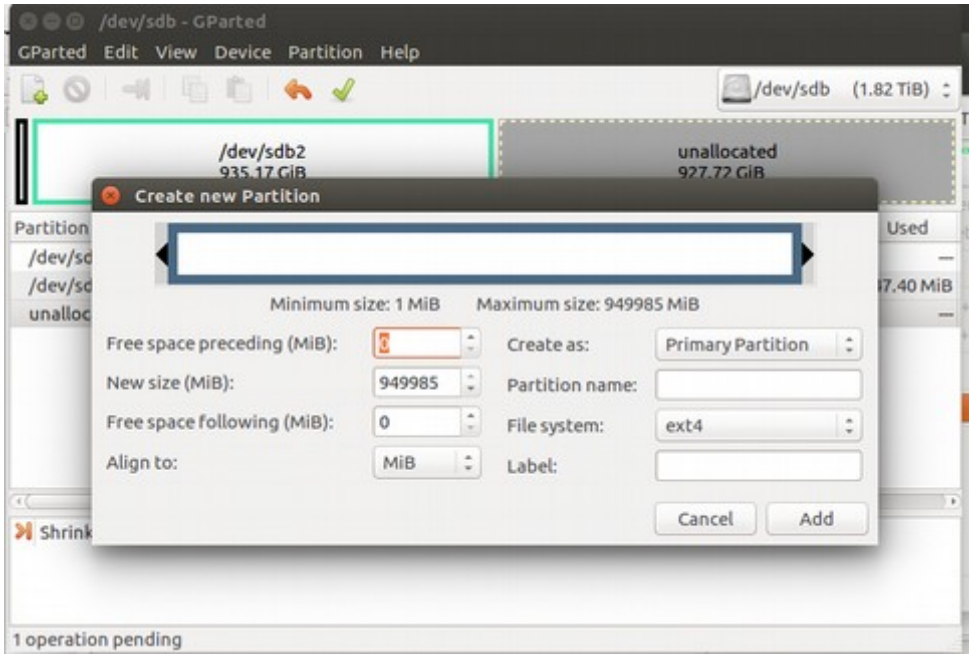


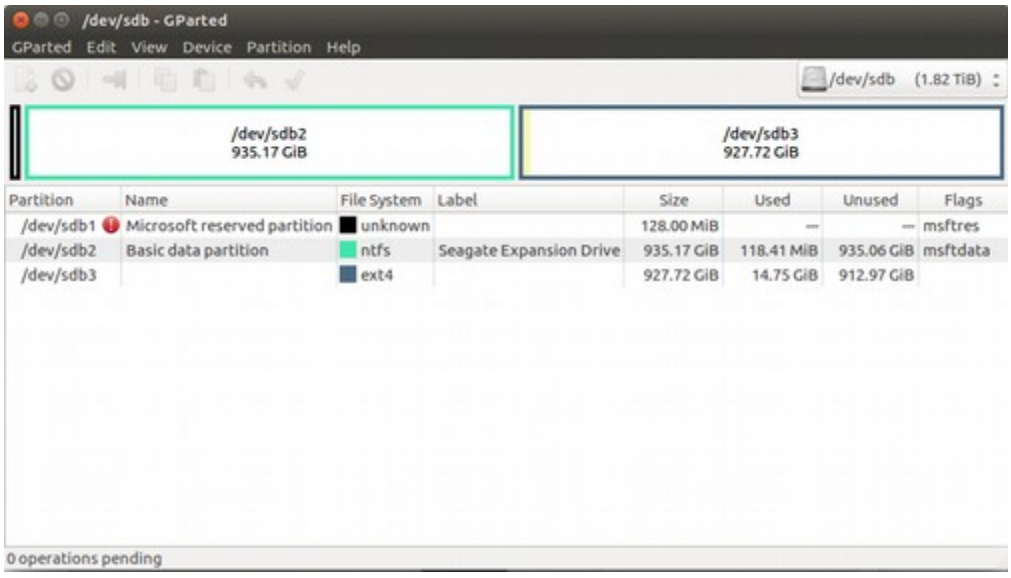
- The screen shots below illustrate the operations of creating a new ext4 partition as stated before.






Resize/Move /dev/sdb2
Minimum size: 148 MiB
Maximum size: 1907600 MiB
Free space preceding (MiB):
0
New size (MiB):
957615
Free space following (MiB):
949985
Align to:
MiB
Cancel
Resize/Move


/dev/sdb - GParted
GParted Edit View Device Partition Help
/dev/sdb (1.82 TiB)
/dev/sdb2
935.17 GiB
unallocated
927.72 GiB
Create new Partition
Minimum size: 1 MiB
Maximum size: 949985 MiB
Free space preceding (MiB):
0
New size (MiB):
949985
Free space following (MiB):
0
Align to:
MiB
Create as:
Primary Partition
Partition name:
File system:
ext4
Label:
Cancel
Add
Partition
Used
1 operation pending

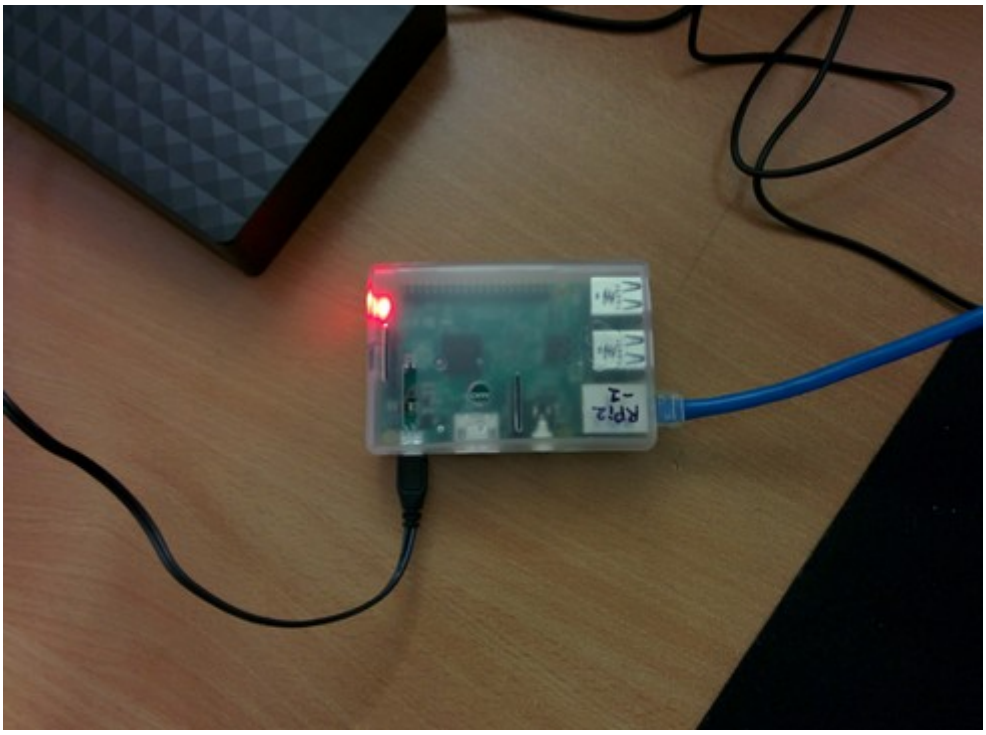

/dev/sdb - GParted
GParted Edit View Device Partition Help
/dev/sdb (1.82 TiB)
/dev/sdb2
935.17 GiB
/dev/sdb3
927.72 GiB
Partition
Name
File System
Label
Size
Used
Unused
Flags
/dev/sdb1
Microsoft reserved partition
unknown
128.00 MiB
msftres
/dev/sdb2
Basic data partition
ntfs
Seagate Expansion Drive
935.17 GiB
118.41 MiB
935.06 GiB
msftdata
/dev/sdb3
ext4
927.72 GiB
14.75 GiB
912.97 GiB
0 operations pending

- The split USB hard drive, as shown in shell:

```
wlin@wen-D630-book1:~$ df -h
Filesystem                   Size  Used Avail Use% Mounted on
udev                         976M     0  976M   0% /dev
tmpfs                        200M  6.5M  193M   4% /run
/dev/mapper/ubuntu--vg-root   72G   16G   53G  23% /
tmpfs                        996M  544K  995M   1% /dev/shm
tmpfs                        5.0M  4.0K  5.0M   1% /run/lock
tmpfs                        996M     0  996M   0% /sys/fs/cgroup
/dev/sda1                    236M  113M  111M  51% /boot
cgmfs                        100K     0  100K   0% /run/cgmanager/fs
tmpfs                        200M   84K  199M   1% /run/user/1000
/home/wlin/.Private           72G   16G   53G  23% /home/wlin
/dev/sdb3                    914G   72M  867G   1% /media/wlin/b1c65585-17ca-434d-8e5e-66db804b3dc5
/dev/sdb2                    936G  119M  936G   1% /media/wlin/Seagate Expansion Drive
```

(b) Accessing the head-less Raspberry Pi.

- Plug power & Ethernet cable to the raspi.



- Next, we need to find out the IP address allocated to this raspi by the network (via DHCP).

```
wlin@wen-D630-book1:~$ ifconfig
enp9s0    Link encap:Ethernet  HWaddr 00:1c:23:2f:4c:55
          inet addr:192.168.1.2  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::fc73:3019:e0b6:6cf9/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:194294 errors:174 dropped:0 overruns:0 frame:16
          TX packets:141596 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:207773702 (207.7 MB)  TX bytes:17310360 (17.3 MB)
          Interrupt:17
```

- Use a software called **nmap** to get a list of devices that are on the same network as my control laptop – from the services, found it: 192.168.1.4.

```
wlin@wen-D630-book1:~$ nmap 192.168.1.0/24

Starting Nmap 7.01 ( https://nmap.org ) at 2016-08-20 01:45 AEST
Nmap scan report for 192.168.1.1
Host is up (0.0037s latency).
All 1000 scanned ports on 192.168.1.1 are closed

Nmap scan report for 192.168.1.2
Host is up (0.00029s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE
22/tcp open  ssh

Nmap scan report for 192.168.1.3
Host is up (0.0033s latency).
All 1000 scanned ports on 192.168.1.3 are closed

Nmap scan report for 192.168.1.4
Host is up (0.00022s latency).
Not shown: 997 closed ports
PORT     STATE SERVICE
22/tcp   open  ssh
5900/tcp open  vnc
6000/tcp open  X11

Nmap scan report for 192.168.1.8
Host is up (0.00014s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE
22/tcp open  ssh

Nmap scan report for home.gateway (192.168.1.254)
Host is up (0.00078s latency).
Not shown: 993 closed ports
PORT     STATE SERVICE
21/tcp   open  ftp
23/tcp   open  telnet
53/tcp   open  domain
80/tcp   open  http
2800/tcp open  acc-raid
5060/tcp open  sip
8008/tcp open  http

Nmap done: 256 IP addresses (6 hosts up) scanned in 9.26 seconds
wlin@wen-D630-book1:~$
```

Tips

Sometimes the subnet you try to scan is so large (e.g. in an office or campus environment) that it would take too long to track down the IP address of my Raspi. To do it quicker, we can apply some parameters in the nmap command to narrow down the search.

- In the example below, we search for IP addresses with port 22 (ssh) opened.
  `sudo nmap -v -p22 10.51.20.0/23 |grep open`
- In the example below, we search for IP addresses with ports 5900 (vnc) and 6000 (X11) opened (This is because my Raspi happened to have such ports opened).
  `sudo nmap -v -p5900,6000 10.51.20.0/23 |grep open`

- Now try ssh to this IP (as user: pi).

```
wlin@wen-D630-book1:~/.ssh$ ssh pi@192.168.1.4
The authenticity of host '192.168.1.4 (192.168.1.4)' can't be established.
ECDSA key fingerprint is SHA256:o05fVc8U/ma80ojIjBNYJvbbuL+4ZjhaFak0Z3GXnhw.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.1.4' (ECDSA) to the list of known hosts.
pi@192.168.1.4's password:
Linux raspberrypi 4.1.19-v7+ #858 SMP Tue Mar 15 15:56:00 GMT 2016 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Fri Aug 19 03:58:25 2016 from wen-d630-book1.local
pi@raspberrypi ~ $
```

- We are now successfully login to our raspi.
- Now plug in the 2TB USB hard drive into 1 of the 4 USB ports of the raspi (preferably the hard drive should have its own power supply).
- We then issue a number of commands to get some info about this raspi.

```
pi@raspberrypi ~ $ cat /etc/*-release
PRETTY_NAME="Raspbian GNU/Linux 7 (wheezy)"
NAME="Raspbian GNU/Linux"
VERSION_ID="7"
VERSION="7 (wheezy)"
ID=raspbian
ID_LIKE=debian
ANSI_COLOR="1;31"
HOME_URL="http://www.raspbian.org/"
SUPPORT_URL="http://www.raspbian.org/RaspbianForums"
BUG_REPORT_URL="http://www.raspbian.org/RaspbianBugs"
pi@raspberrypi ~ $
pi@raspberrypi ~ $ uname -a
Linux raspberrypi 4.1.19-v7+ #858 SMP Tue Mar 15 15:56:00 GMT 2016 armv7l GNU/Linux
pi@raspberrypi ~ $

pi@raspberrypi ~ $ ifconfig
eth0      Link encap:Ethernet  HWaddr b8:27:eb:60:60:f6
          inet addr:192.168.1.4  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:2130 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1288 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:128270 (125.2 KiB)  TX bytes:97451 (95.1 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:8 errors:0 dropped:0 overruns:0 frame:0
          TX packets:8 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1104 (1.0 KiB)  TX bytes:1104 (1.0 KiB)

pi@raspberrypi ~ $

pi@raspberrypi ~ $ df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       3.7G  2.8G  729M  80% /
devtmpfs        427M     0  427M   0% /dev
tmpfs            87M  276K   86M   1% /run
tmpfs           5.0M     0  5.0M   0% /run/lock
```

```
tmpfs           173M     0  173M   0% /run/shm
/dev/mmcblk0p7   60M   20M   41M  33% /boot
/dev/mmcblk0p3   27M  1.2M   24M   5% /media/SETTINGS
/dev/mmcblk0p5   79M   24M   56M  30% /media/boot-rbp2
/dev/mmcblk0p6  2.5G  879M  1.5G  37% /media/root-rbp2
/dev/sda2       936G  119M  936G   1% /media/Seagate Expansion Drive
/dev/sda3       914G   72M  867G   1% /media/b1c65585-17ca-434d-8e5e-66db804b3dc5
pi@raspberrypi ~ $
```

(3) 1st File Share Setup - NFS

- First, use the dpkg command to find out whether the necessary software had already been installed or not.

```
pi@raspberrypi ~ $ dpkg -l | grep ssh
ii  libssh-4:armhf                      0.5.4-1+deb7u3                          armhf
tiny C SSH library
ii  libssh2-1:armhf                     1.4.2-1.1+deb7u2                        armhf
SSH2 client-side library
ii  openssh-blacklist                   0.4.1+nmu1                              all
list of default blacklisted OpenSSH RSA and DSA keys
ii  openssh-blacklist-extra             0.4.1+nmu1                              all
list of non-default blacklisted OpenSSH RSA and DSA keys
ii  openssh-client                      1:6.0p1-4+deb7u6                        armhf
secure shell (SSH) client, for secure access to remote machines
ii  openssh-server                      1:6.0p1-4+deb7u6                        armhf
secure shell (SSH) server, for secure access from remote machines
ii  ssh                                 1:6.0p1-4+deb7u6                        all
secure shell client and server (metapackage)
pi@raspberrypi ~ $

pi@raspberrypi ~ $ dpkg -l | grep nfs
ii  libnfsidmap2:armhf   0.25-4      armhf     NFS idmapping library
ii  nfs-common           1:1.2.6-4   armhf     NFS support files common to client and server
pi@raspberrypi ~ $


pi@raspberrypi ~ $ sudo apt-get install nfs-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
Note, selecting 'nfs-kernel-server' instead of 'nfs-server'
The following NEW packages will be installed:
  nfs-kernel-server
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 141 kB of archives.
After this operation, 472 kB of additional disk space will be used.
Get:1 http://mirrordirector.raspbian.org/raspbian/ wheezy/main nfs-kernel-server armhf
1:1.2.6-4 [141 kB]
Fetched 141 kB in 1s (103 kB/s)
Selecting previously unselected package nfs-kernel-server.
(Reading database ... 79321 files and directories currently installed.)
Unpacking nfs-kernel-server (from .../nfs-kernel-server_1%3a1.2.6-4_armhf.deb) ...
Processing triggers for man-db ...
Setting up nfs-kernel-server (1:1.2.6-4) ...

Creating config file /etc/exports with new version

Creating config file /etc/default/nfs-kernel-server with new version
[warn] Not starting NFS kernel daemon: no exports. ... (warning).
pi@raspberrypi ~ $


pi@raspberrypi /media/sharedrive $ pwd
/media/sharedrive
pi@raspberrypi /media/sharedrive $
pi@raspberrypi /media/sharedrive $ ls -lh
total 20K
drwx------ 2 pi pi  16K Aug 20 01:06 lost+found
drwxrwxrwx 3 pi pi 4.0K Aug 20 04:52 nfsshare
pi@raspberrypi /media/sharedrive $
```

```
pi@raspberrypi /etc $ sudo vi exports
pi@raspberrypi /etc $
```

- Contents of the NFS exports file.

```
pi@raspberrypi ~ $ cat /etc/exports
# /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_subtree_check)
#
# 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)
#
/media/sharedrive/nfsshare 192.168.1.0/24(rw)

pi@raspberrypi ~ $
```

- Restart the NFS server's service.

```
pi@raspberrypi /etc $ sudo /etc/init.d/nfs-kernel-server restart
[ ok ] Stopping NFS kernel daemon: mountd nfsd.
[ ok ] Unexporting directories for NFS kernel daemon....
[....] Exporting directories for NFS kernel daemon...exportfs: /etc/exports [1]:
Neither 'subtree_check' or 'no_subtree_check' specified for export
"192.168.1.0/24:/media/sharedrive/nfsshare".
  Assuming default behaviour ('no_subtree_check').
  NOTE: this default has changed since nfs-utils version 1.0.x

. ok
[....] Starting NFS kernel daemon: nfsdrpc.nfsd: address family inet6 not supported
by protocol TCP
 mountdrpc.mountd: svc_tli_create: could not open connection for udp6
rpc.mountd: svc_tli_create: could not open connection for tcp6
rpc.mountd: svc_tli_create: could not open connection for udp6
rpc.mountd: svc_tli_create: could not open connection for tcp6
rpc.mountd: svc_tli_create: could not open connection for udp6
rpc.mountd: svc_tli_create: could not open connection for tcp6
. ok
pi@raspberrypi /etc $
pi@raspberrypi /etc $
pi@raspberrypi /etc $
pi@raspberrypi /etc $
pi@raspberrypi /etc $ cd
pi@raspberrypi ~ $
pi@raspberrypi ~ $
```

- From a Client PC, mount a NFS share to the Raspi NAS.

```
$ sudo mount 192.168.1.2:/media/sharedrive/nfsshare /media/nfsshare
wlin@wen-D630-book1:/media$
```

- After that, we are ready to check out the new NFS share from the Ubuntu GUI File Manager.

(4) 2nd **File Share Setup - SSHFS**

- From my laptop, check to see if sshfs has already been installed. If not, install it:

```
wlin@wen-D630-book1:~$ dpkg -l | grep sshfs
wlin@wen-D630-book1:~$
wlin@wen-D630-book1:~$

wlin@wen-D630-book1:~$ sudo apt-get install sshfs
[sudo] password for wlin:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libabw-0.1-1v5 libcmis-0.5-5v5 libe-book-0.1-1 libeot0 libfreehand-0.1-1 libmspub-
0.1-1
  libmwaw-0.3-3 liborcus-0.10-0v5 libpagemaker-0.0-0 libwps-0.4-4
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  sshfs
0 to upgrade, 1 to newly install, 0 to remove and 0 not to upgrade.
Need to get 41.7 kB of archives.
After this operation, 138 kB of additional disk space will be used.
Get:1 http://au.archive.ubuntu.com/ubuntu xenial/universe amd64 sshfs amd64 2.5-
1ubuntu1 [41.7 kB]
Fetched 41.7 kB in 0s (72.9 kB/s)
Selecting previously unselected package sshfs.
(Reading database ... 268073 files and directories currently installed.)
Preparing to unpack .../sshfs_2.5-1ubuntu1_amd64.deb ...
Unpacking sshfs (2.5-1ubuntu1) ...
Processing triggers for man-db (2.7.5-1) ...
Setting up sshfs (2.5-1ubuntu1) ...
wlin@wen-D630-book1:~$
wlin@wen-D630-book1:~$
wlin@wen-D630-book1:~$ dpkg -l | grep sshfs
ii  sshfs                                          2.5-1ubuntu1
amd64        filesystem client based on SSH File Transfer Protocol
wlin@wen-D630-book1:~$


wlin@wen-D630-book1:~$ pwd
/home/wlin
wlin@wen-D630-book1:~$
wlin@wen-D630-book1:~$ ls
crash    Documents  examples.desktop  Pictures  Templates
Desktop  Downloads  Music             Public    Videos
wlin@wen-D630-book1:~$

wlin@wen-D630-book1:~$ mkdir pidrive
wlin@wen-D630-book1:~$
wlin@wen-D630-book1:~$
wlin@wen-D630-book1:~$ sshfs pi@192.168.1.2: pidrive
pi@192.168.1.2's password:
wlin@wen-D630-book1:~$

wlin@wen-D630-book1:~$ cd pidrive
wlin@wen-D630-book1:~/pidrive$ ls
Desktop  Documents  python_games  Scratch  vnc.sh
wlin@wen-D630-book1:~/pidrive$


wlin@wen-D630-book1:~$ sudo umount pidrive
wlin@wen-D630-book1:~$

wlin@wen-D630-book1:~$ sshfs pi@192.168.1.2:/media/sharedrive/nfsshare pidrive
pi@192.168.1.2's password:
wlin@wen-D630-book1:~$
```

(5) 3rd File Share Setup - SAMBA

- Same as previous 2 setups, check if samba is already installed. If not yet, do so.
- Also create 2 shared folders.

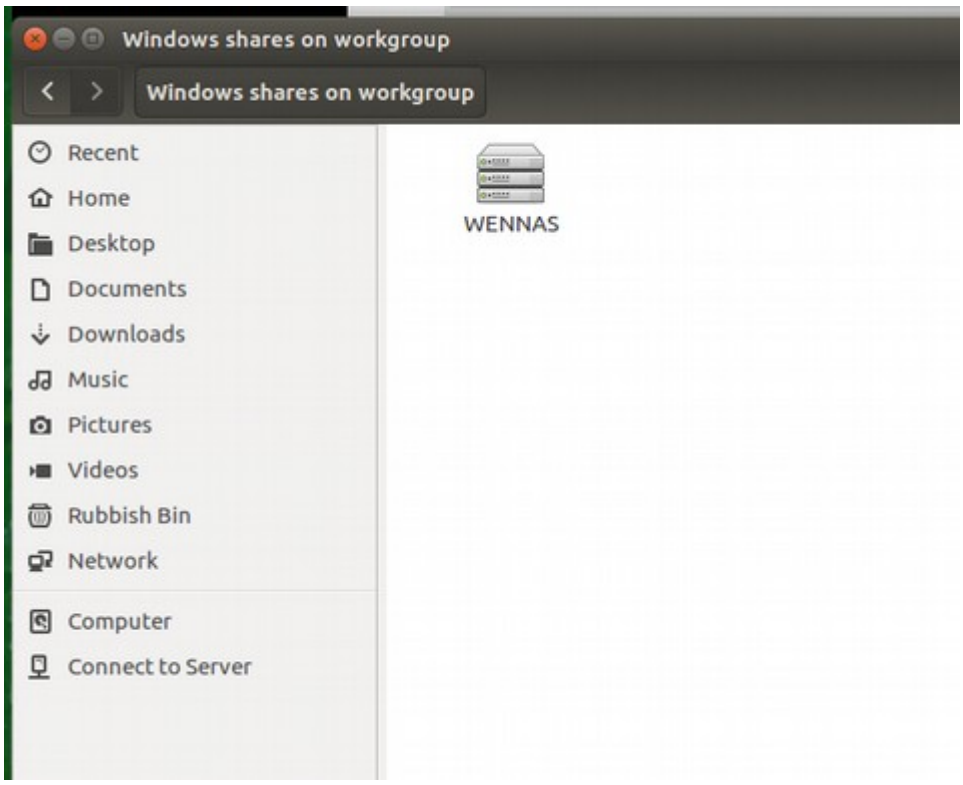
```
pi@raspberrypi / $ sudo mkdir -m 777 /media/sharedrive/pishare
pi@raspberrypi / $
pi@raspberrypi / $ sudo mkdir -m 777 /media/sharedrive/publicshare
pi@raspberrypi / $
pi@raspberrypi / $ cd media
pi@raspberrypi /media $ cd sharedrive
pi@raspberrypi /media/sharedrive $ ls -l
total 28
drwx------ 2 pi   pi   16384 Aug 20 01:06 lost+found
drwxrwxrwx 4 pi   pi    4096 Aug 20 08:29 nfsshare
drwxrwxrwx 2 root root  4096 Aug 20 08:42 pishare
drwxrwxrwx 2 root root  4096 Aug 20 08:42 publicshare
pi@raspberrypi /media/sharedrive $
pi@raspberrypi /media/sharedrive $
pi@raspberrypi /media/sharedrive $ cd
pi@raspberrypi ~ $
pi@raspberrypi ~ $
pi@raspberrypi ~ $ dpkg -l | grep samba
ii  samba-common                         2:3.6.6-6+deb7u10                       all
common files used by both the Samba server and client
pi@raspberrypi ~ $
pi@raspberrypi ~ $
pi@raspberrypi ~ $ sudo apt-get install samba samba-common-bin
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  tdb-tools
Suggested packages:
  openbsd-inetd inet-superserver smbldap-tools ldb-tools ctdb
The following NEW packages will be installed:
  samba samba-common-bin tdb-tools
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
Need to get 6,109 kB of archives.
After this operation, 36.4 MB of additional disk space will be used.
Do you want to continue [Y/n]? y
Get:1 http://mirrordirector.raspbian.org/raspbian/ wheezy/main samba armhf 2:3.6.6-
6+deb7u10 [3,328 kB]
Get:2 http://mirrordirector.raspbian.org/raspbian/ wheezy/main samba-common-bin armhf
2:3.6.6-6+deb7u10 [2,755 kB]
Get:3 http://mirrordirector.raspbian.org/raspbian/ wheezy/main tdb-tools armhf
1.2.10-2 [25.9 kB]
Fetched 6,109 kB in 10s (597 kB/s)
Preconfiguring packages ...
Selecting previously unselected package samba.
(Reading database ... 79350 files and directories currently installed.)
Unpacking samba (from .../samba_2%3a3.6.6-6+deb7u10_armhf.deb) ...
Selecting previously unselected package samba-common-bin.
Unpacking samba-common-bin (from .../samba-common-bin_2%3a3.6.6-
6+deb7u10_armhf.deb) ...
Selecting previously unselected package tdb-tools.
Unpacking tdb-tools (from .../tdb-tools_1.2.10-2_armhf.deb) ...
Processing triggers for man-db ...
Setting up samba (2:3.6.6-6+deb7u10) ...
Generating /etc/default/samba...
Adding group `sambashare' (GID 111) ...
Done.
update-alternatives: using /usr/bin/smbstatus.samba3 to provide /usr/bin/smbstatus
(smbstatus) in auto mode
[ ok ] Starting Samba daemons: nmbd smbd.
Setting up samba-common-bin (2:3.6.6-6+deb7u10) ...
```

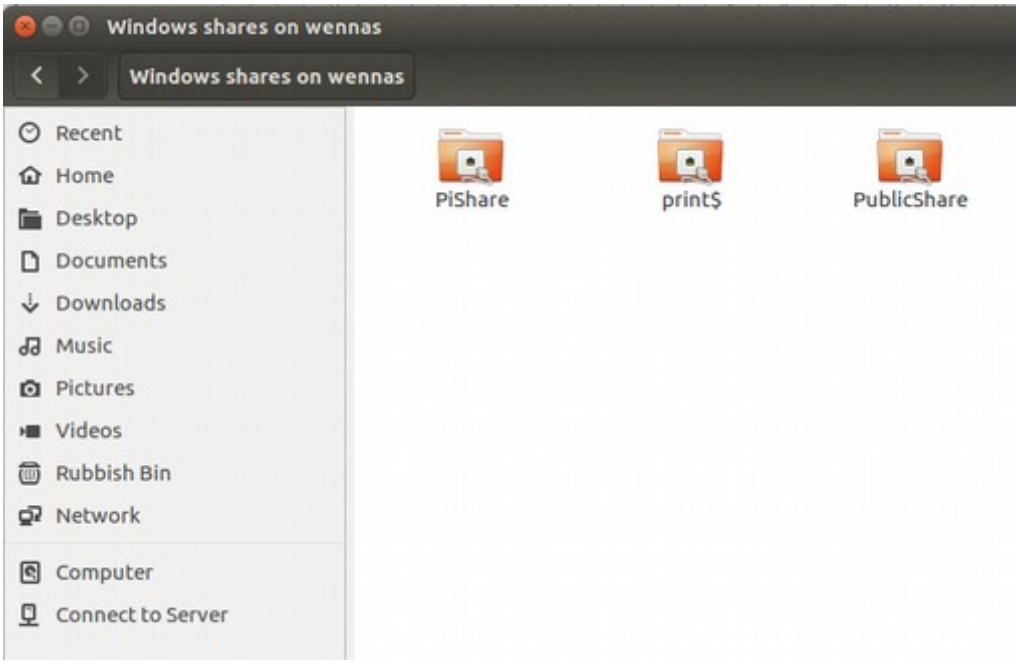
```
update-alternatives: using /usr/bin/nmblookup.samba3 to provide /usr/bin/nmblookup
(nmblookup) in auto mode
update-alternatives: using /usr/bin/net.samba3 to provide /usr/bin/net (net) in auto
mode
update-alternatives: using /usr/bin/testparm.samba3 to provide /usr/bin/testparm
(testparm) in auto mode
Setting up tdb-tools (1.2.10-2) ...
update-alternatives: using /usr/bin/tdbbackup.tdbtools to provide /usr/bin/tdbbackup
(tdbbackup) in auto mode
pi@raspberrypi ~ $


pi@raspberrypi ~ $ cd /etc/samba
pi@raspberrypi /etc/samba $ ls -l
total 16
-rw-r--r-- 1 root root     8 Feb 20  2015 gdbcommands
-rw-r--r-- 1 root root 12173 Aug 19 03:34 smb.conf
pi@raspberrypi /etc/samba $
pi@raspberrypi /etc/samba $ sudo cp smb.conf smb.conf.bak
pi@raspberrypi /etc/samba $ ls -l
total 28
-rw-r--r-- 1 root root     8 Feb 20  2015 gdbcommands
-rw-r--r-- 1 root root 12173 Aug 19 03:34 smb.conf
-rw-r--r-- 1 root root 12173 Aug 20 08:50 smb.conf.bak
pi@raspberrypi /etc/samba $
pi@raspberrypi /etc/samba $ sudo vi smb.conf
pi@raspberrypi /etc/samba $
```

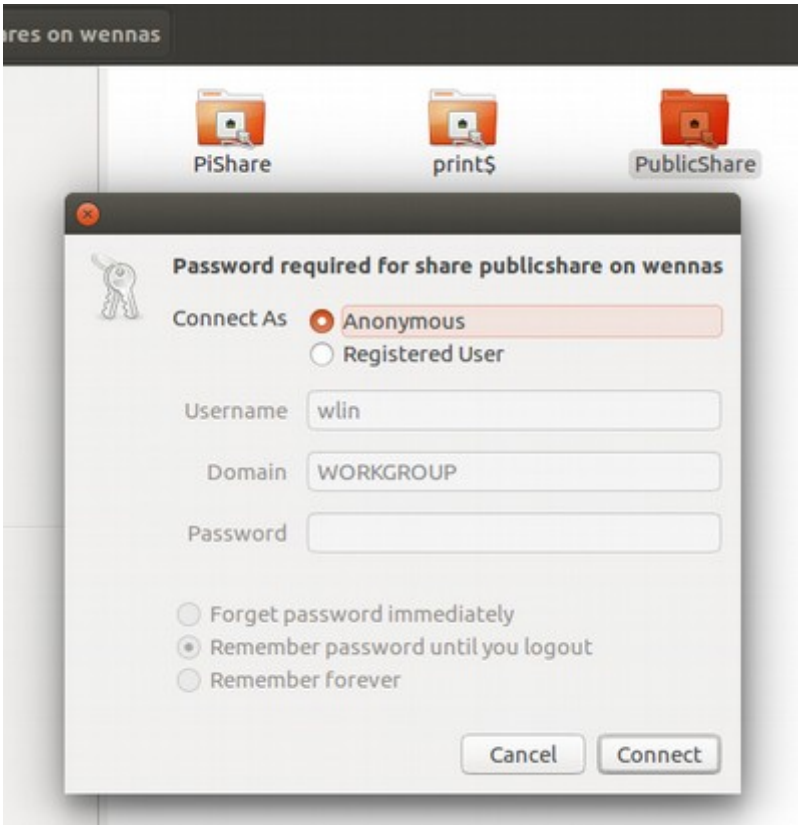
/etc/samba/smb.conf

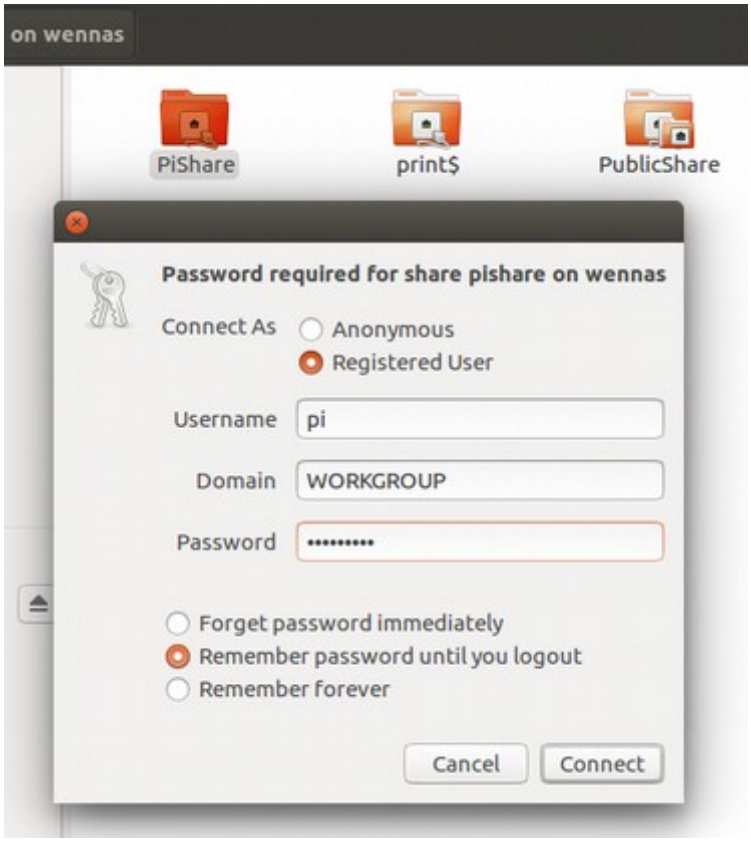
```
...

# Change this to the workgroup/NT-domain name your Samba server will part of
   workgroup = WORKGROUP
   netbios name = WENNAS

...

[PiShare]
path = /media/sharedrive/pishare
comment = Pi's Share Folder
valid users = pi
read only = No
create mask = 0777
directory mask = 0777

[PublicShare]
path = /media/sharedrive/publicshare
comment = Public Share Folder
guest ok = yes
read only = No
create mask = 0777
directory mask = 0777


pi@raspberrypi /etc/samba $ sudo service samba restart
[ ok ] Stopping Samba daemons: nmbd smbd.
[ ok ] Starting Samba daemons: nmbd smbd.
pi@raspberrypi /etc/samba $


pi@raspberrypi /etc/samba $ sudo smbpasswd -a pi
New SMB password:
Retype new SMB password:
Added user pi.
pi@raspberrypi /etc/samba $
```

- Configs done. We are now ready to try out this Samba file share.
- From a Windows PC, try: \\WENNAS
- From an Ubuntu PC, just browse the “Network”, then will see the WENNAS icon.


Windows shares on workgroup
Windows shares on workgroup
Recent
Home
Desktop
Documents
Downloads
Music
Pictures
Videos
Rubbish Bin
Network
Computer
Connect to Server
WENNAS


Windows shares on wennas
Windows shares on wennas
Recent
Home
Desktop
Documents
Downloads
Music
Pictures
Videos
Rubbish Bin
Network
Computer
Connect to Server
PiShare
print$
PublicShare


res on wennas
PiShare
print$
PublicShare
Password required for share publicshare on wennas
Connect As
Anonymous
Registered User
Username
wlin
Domain
WORKGROUP
Password
Forget password immediately
Remember password until you logout
Remember forever
Cancel
Connect


on wennas
PiShare
print$
PublicShare
Password required for share pishare on wennas
Connect As
Anonymous
Registered User
Username
pi
Domain
WORKGROUP
Password
Forget password immediately
Remember password until you logout
Remember forever
Cancel
Connect

Reference Resources for the 3 Demos above, and more

- http://www.howtogeek.com/139433/how-to-turn-a-raspberry-pi-into-a-low-power-network-storage-device/
- https://www.htpcguides.com/configure-nfs-server-and-nfs-client-raspberry-pi/
- http://www.instructables.com/id/Turn-Raspberry-Pi-into-a-Network-File-System-versi/
- https://www.raspberrypi.org/documentation/remote-access/ssh/sshfs.md
- http://projpi.com/diy-home-projects-with-a-raspberry-pi/raspberry-pi-samba-share-in-5-minutes/
- http://raspberrypi.stackexchange.com/questions/32975/ridicoulus-file-server-performance
- http://www.cio.com/article/2901051/create-a-home-server-with-raspberry-pi-2.html
- http://www.linuxtechi.com/access-google-drive-in-ubuntu-16-04/
- http://askubuntu.com/questions/18804/what-do-the-various-dpkg-flags-like-ii-rc-mean
- http://www.mikronauts.com/raspberry-pi/raspberry-pi-2-nas-experiment-howto/
- https://m.reddit.com/r/raspberry_pi/comments/4bpycu/raspberry_pi_file_server_performance/

Prepared by:
Wen Lin