LAB II

RaspberryPi LABS
SPARK@UoM

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Contents

Introduction

This lab aims to introduce the student with an interesting use case of a RaspberryPi, using the RaspberryPi as a Network Attached Storage device. At industrial or coporate sectors the NAS devices are very common since it provide means for transferring data fast and easily among different computers. Any user with the access to the network can use the data stored from any of their devices. However, cloud storage services and increasing speeds of the internet may cause a user to rethink about using a NAS device.

The microSD card storage or any attached USB storage device to the RaspberryPi can be converted to an NAS device this way. This document focuses on using the free space of the MicroSD card, if you plan to use a separate USB storage device such as an external hard drive, make sure you use a proper power supply for the RaspberryPi, which can supply sufficient amount of current for both devices.

We use SAMBA to setup the NAS in this lab. According to samba.org, SAMBA is,

> *Samba is the standard Windows interoperability suite of programs for Linux and Unix.*
> *Since 1992, Samba has provided secure, stable and fast file and print services for all clients using the SMB/CIFS protocol, such as all versions of DOS and Windows, OS/2, Linux and many others.*

This lab utilizes the `Local Area Network` created by the routers which many households use to access the internet. The RPi can be connected to the network via WiFi or Ethernet interfaces. Once setup you can leave the samba server running on background, the RaspberryPi can be used for your other applications. You will be able to use the NAS as any of the storage devices attached to your computer or the smart phone.

Outcomes

- Explore and practice different linux shell commands used for setting up packages, editing files etc.
- Exposure to one of the many extremely useful applications of RaspberryPi.

What you will need

- RaspberryPi
- Consumer grade router(A typical router provided by ISPs)

Implementation

This lab utilizes the pre-set hostname ***raspberrpi*** *of the RaspberryPi 3b+ of the Raspian OS. If you have setup a different operating system, you may need to find the assigned IP address for the RPi by your router, or assign a hostname. It is left as an exercise. In case you are unable to access using the* ***raspberrypi*** *hostname you will have to use the IP address of your RPi.*

Installing `SAMBA`

To install SAMBA package run the following commands.

```
sudo apt-get update
sudo apt-get upgrade
sudo apt-get install samba samba-common-bin
```

- Why did we use the `sudo` at the beginning of each command?
- Read more about the `apt` Advanced Package Tool.

Create a directory to be shared

In this step we strongly recommend you to use the terminal or the SSH terminal commands `cd, mkdir`. Make a note of the path of the folder you created. For example

/home/pi/shared

Creating a user account

In this lab you will implement an authenticated access NAS device.
For authenticated access, a user account needs to be created. This is essential because in the next step the user account needs to be allocated to a `group`. The default root user pi should not be used.

```
useradd -s /sbin/nologin netuser
```

Now to enable the account run,

```
passwd netuser
```

You can use username and password combination of your choice.

Now the user needs to be added to the `samba` database.

```
smbpasswd -a netuser
```

Create a Local Group

The user we just created needs to be added to a group in order to work with the samba server. It is highly recommended to use a separate group.

```
groupadd samba
```

Next we add our user `netuser` to the group `samba`.

```
usermod -aG samba netuser
```

Configuring permissions for the shared folder

The separate user and the group must be given the permission to access the folder we plan to use as the NAS.

```
chgrp -R samba /home/pi/shared/
chmod 2770 /home/pi/shared/
```

Configure smb.conf file

SAMBA uses the smb.conf located in `/etc/samba`.
Use `nano` editor to edit the file. This is a text editor implemented on the command line interface itself.

Hint

You may need to explicitly use Super User access.

Under `[global]` section make sure these lines are inserted.

```
[global]
        log file = /var/log/samba/%m
        log level = 1
        server role = standalone server
        workgroup = WORKGROUP
        map to guest = bad user
```

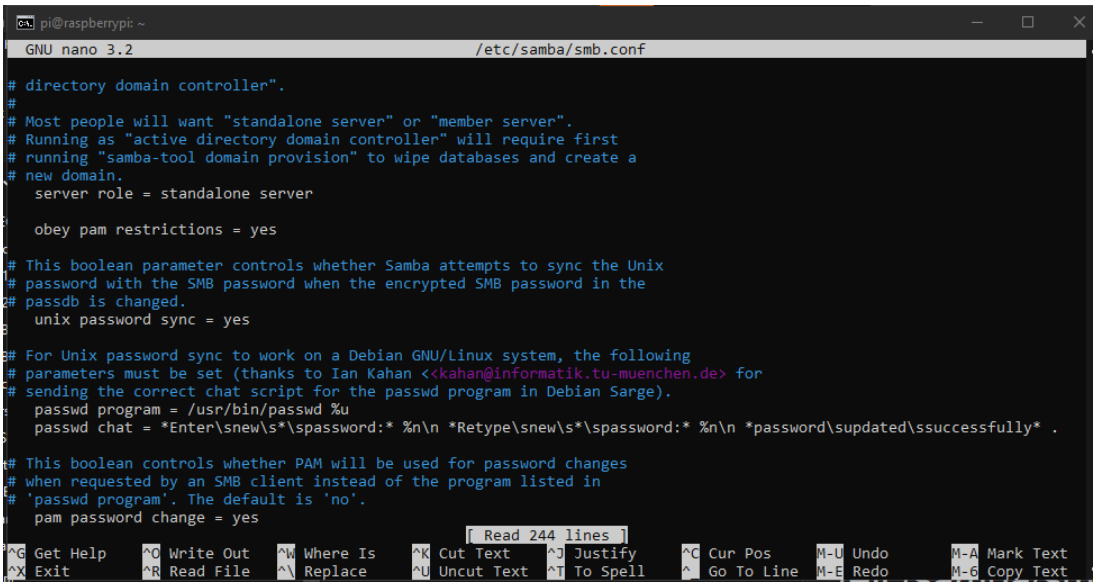
Scroll down to the end of the file, insert the following.

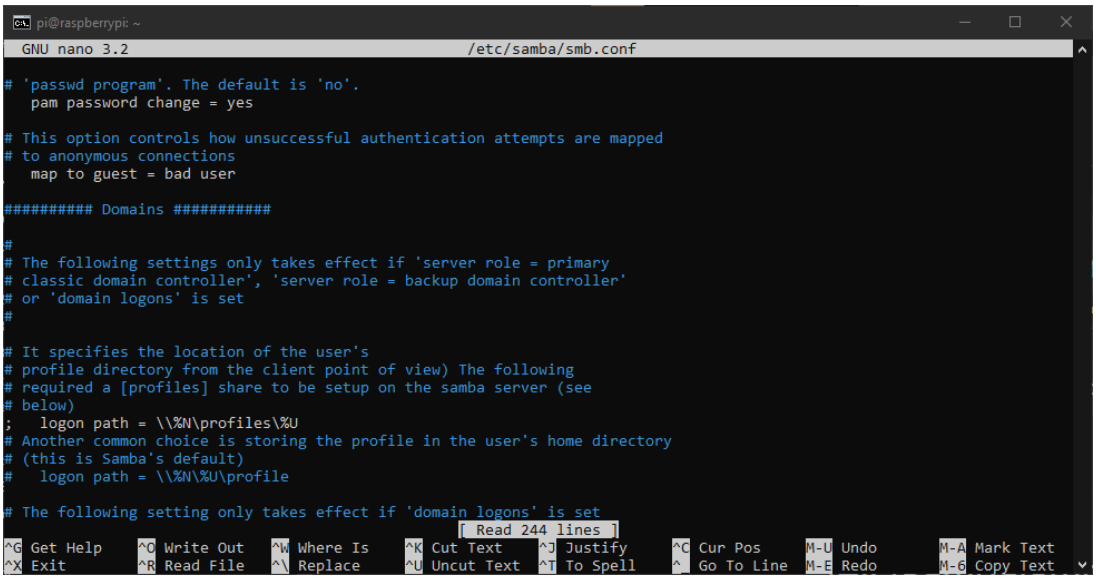
```
[NETWORK_SHARE]
        # This share requires authentication to access
        path = /home/pi/shared/
        read only = no
        valid users = @samba
        inherit permissions = yes
```

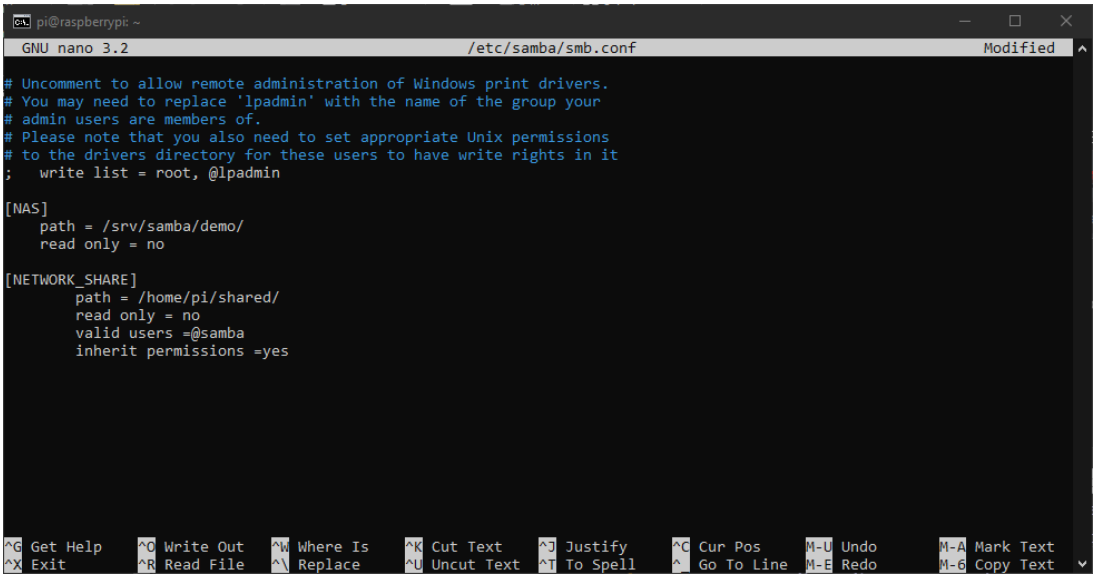
The `[NETWORK_SHARE]` determines the display name of the shared folder on network. You can use any preferred name.

Under `valid users` you need to specify the group you created in previous steps.

The `workgroup` must be same as your Windows workgroup. The default is WORKGROUP, unless you have changed it in windows settings.







Accessing the NAS from Windows 10

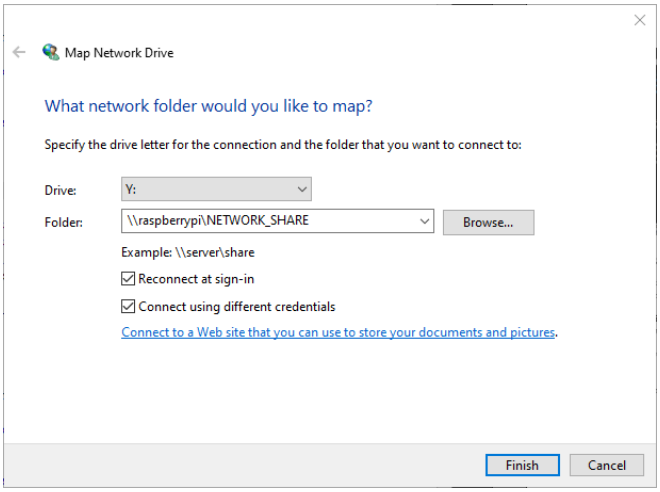
You will be mapping a new network drive to your computer.

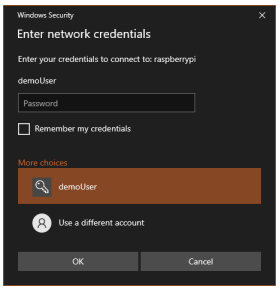
Right click on `This PC` on Windows explorer and select `Map network drive`. A wizard will pop up.

Enter \\`raspberrypi`\`NETWORK_SHARE`. (Use the IP address in case you've changed the operating system).

Make sure to check `Connect using different credentials` checkbox.

In the next dialog box if there is a username already filled in click on more options and select `Use a different account`

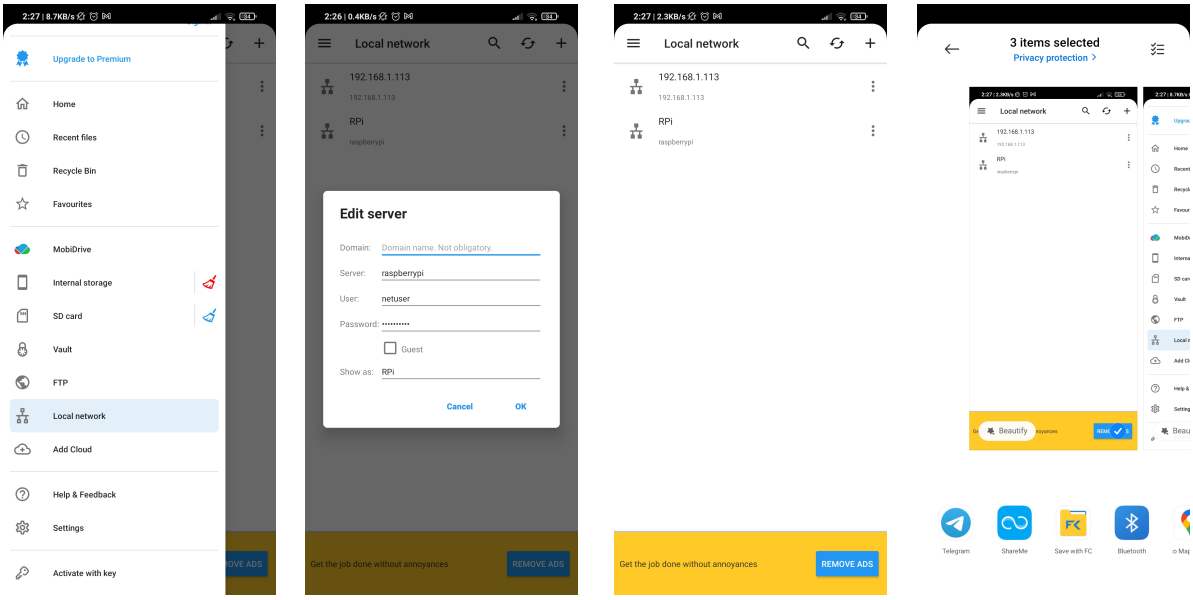




Accessing the NAS from Android

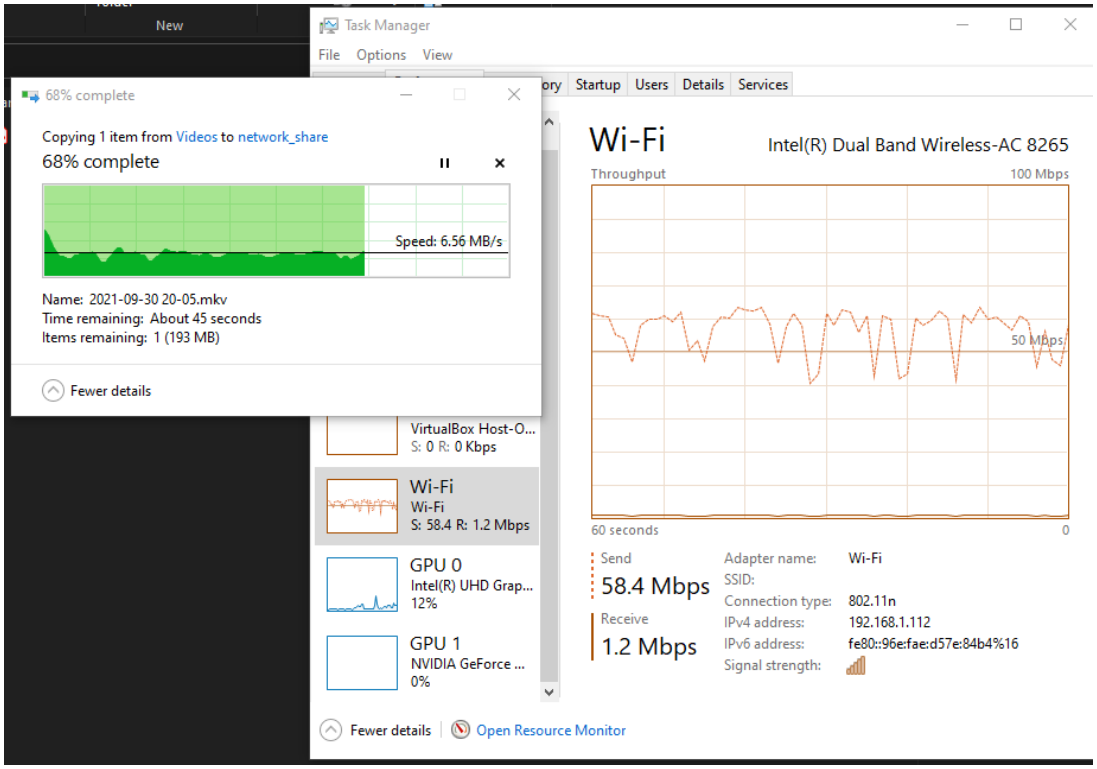
Many File Explorer apps support `samba`. The following steps are for the **File Commander** application. It has an *Ad supported* free version.
Other applications will follow a very similar procedure.

Once setup you can use *Save with FC* option under android share options to use the NAS just as a normal storage on your device.



Speed considerations

- The RaspberryPi 3B+ shares its USB controller with the Ethernet interface. In which scenarios will it affect the speed of the NAS?
- Use an application such as LAN speed test
- Are you using a free WiFi channel? You can use an Android app such as WiFi Analyzer
- If you have the free spectrum using 40MHz bandwidth channels will increase the maximum theoretical speed of your WiFi connection.


New
Task Manager
File Options View
Startup Users Details Services
68% complete
Copying 1 item from Videos to network_share
68% complete
Speed: 6.56 MB/s
Name: 2021-09-30 20-05.mkv
Time remaining: About 45 seconds
Items remaining: 1 (193 MB)
Fewer details
VirtualBox Host-O...
S: 0 R: 0 Kbps
Wi-Fi
Wi-Fi
S: 58.4 R: 1.2 Mbps
GPU 0
Intel(R) UHD Grap...
12%
GPU 1
NVIDIA GeForce ...
0%
Wi-Fi
Intel(R) Dual Band Wireless-AC 8265
Throughput
100 Mbps
50 Mbps
60 seconds
0
Send
58.4 Mbps
Receive
1.2 Mbps
Adapter name: Wi-Fi
SSID:
Connection type: 802.11n
IPv4 address: 192.168.1.112
IPv6 address: fe80::96e:fae:d57e:84b4%16
Signal strength:
Fewer details
Open Resource Monitor