

Setting up an Icafe with Raspberry Pi's

This document is about using 15 – 20 Raspberry Pis to implement an Internet Café or Learning Center. An internet café allows people to rent computers to access the internet. A learning center will be slightly different to set up, it will allow classroom learning to be augmented by the computer.

Café Models & Pieces Needed

1a. Just a cyber café.

Able to have internet access & make money for a pastor.

Just a cyber café. Only needs NXFilter and CafePilot.

1b. A cyber café that doubles as a classroom. Data stored off a PI or a NAS

For NAS (QNAP or Synology NAS is best)

On PI. Can use USB drive or thumb-drive, mounted on /home. Unix format is preferred. (ext2, ext3, ext4, xfs, etc.)

Needs LDAP, NXFilter, CafePilot, pam_mkhome, libpam_ldap, NFS

2. A cyber café that doubles as a classroom with a server. (thin clients)

Linux server should be running Ubuntu. Would be best to use PINet or one of those distros. We do not have this model tested and working.

3. PI as thin client, Windows server.

This requires too many Windows licenses, and was deemed too expensive. Would boot up into Raspbian and then have terminal services to the Windows server.

Raspberry Pi home page <https://www.raspberrypi.org/>

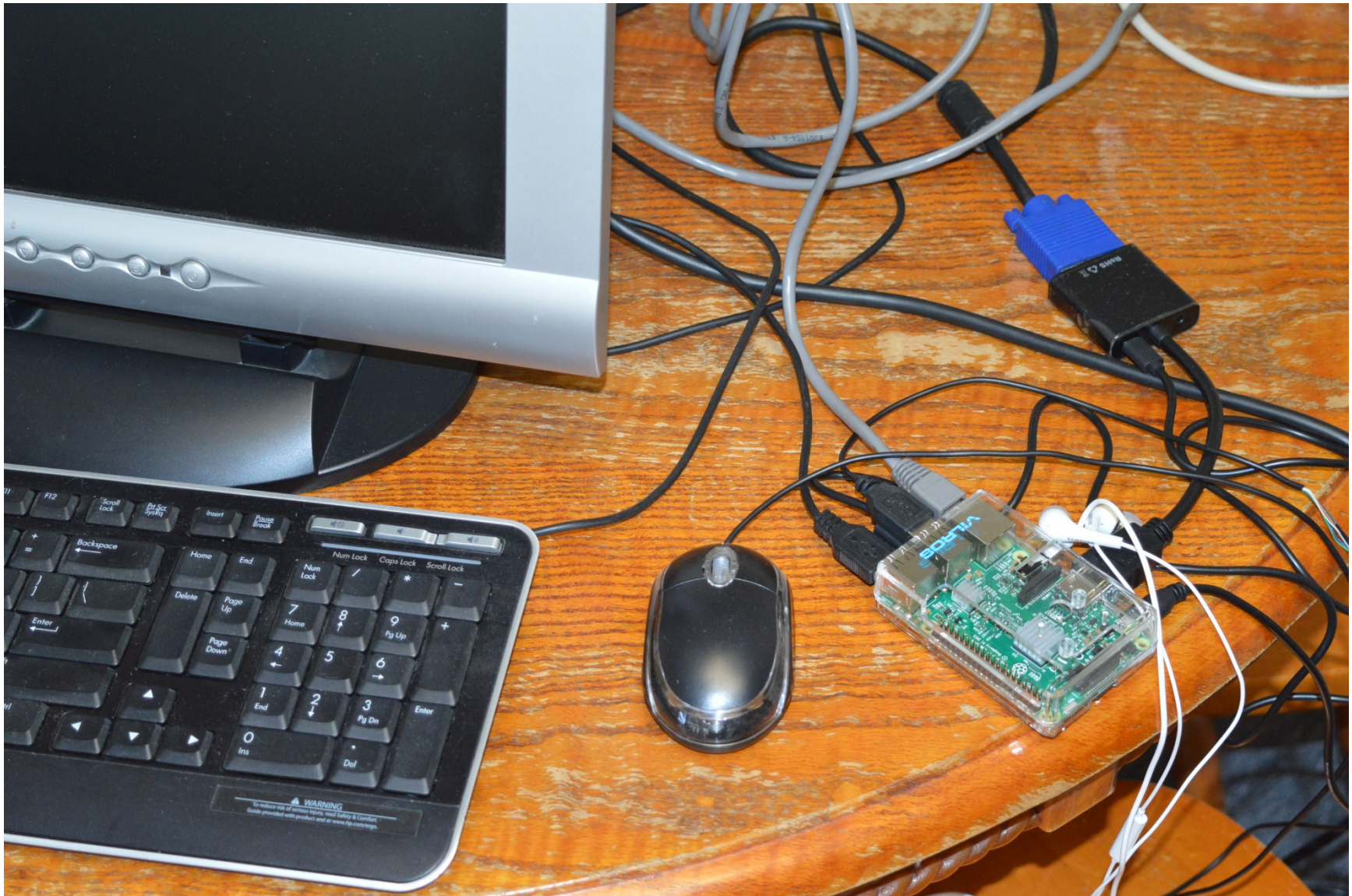
Introduction to the Raspberry Pi 3 video (20 min): <https://www.youtube.com/watch?v=-6OGuhLtkbU>

The Raspberry Pi is a very small computer, about the size of a deck of cards. It uses an ARM processor like many smart phones, and so is incompatible with most PC software. You can run various versions of Linux on it, the most popular is Raspbian, a Linux based on Debian. The standard implementation includes office and productivity software, math software, and some other educational programs.

The Raspberry Pi is a bare computer, you also need a monitor, a keyboard and mouse, and a power supply to turn it into a desktop computer system.



Raspberry Pi 3 Model B



Raspberry Pi with case, mouse, keyboard, and monitor

Monitors

Raspberry Pis have an HDMI video output. You could use HDMI compatible monitors:

HDMI Monitor: SCEPTRE E205W-1600 20" \$79.99 from Newegg, \$69.99 from Walmart

If you have old VGA monitors you need a HDMI to VGA adaptor with a power input, raspberry pi's HDMI port do not provide enough power to run the adaptor, but you can hook up to the USB port for power. (HDMI 50 mA, USB 500 mA, raspberry pi USB 1.2 A total (all usb ports) if you put `max_usb_current=1` in `/boot/config.txt`) We had some strange side effects from pulling too much current from the R-pi usb ports, we could get to some web sites in the browser, but not others. We added a multiport USB charger to run the converters.

For example: VicTsing Gold-Plated 1080P HDMI to VGA Adapter Video Converter with Micro USB & 3.5mm Audio, VS1-VC34B-VD, \$9.99 on Amazon

HDMI to VGA, Rankie® Gold-Plated Active HDMI HDTV to VGA Adapter Converter Male to Female with Micro USB Charging Cable, R-1150-ADAPTER-HDMI-VGA-BK, \$9.99 on Amazon

If your monitors have DVI input, that's better:

HDMI(F) to DVI(M) adaptor \$5 at local electronics store, \$6 at Walmart

Antitheft

In an internet café, you will need to tie everything down, perhaps not in a learning center.

The following Raspberry Pi cases allow you to mount them on the back of the monitors:

Raspberry Pi VESA Mount Case by HungryPi.com \$9.00, may be out of stock

Adafruit VESA Mount Plus for Raspberry Pi 2 / B+ / A+ PRODUCT ID: 2534 \$9.95

You can secure the monitors, keyboards and mice with the following cables:

Cable Lock for Computer accessories by Kensington 1 new from \$3.00 Amazon. Secures mouse and keyboard by their cables.

HDE Laptop Notebook Anti-Theft Braided Steel Security Cable Lock with 2 Keys \$1.50 + \$2.99 shipping, amazon, for monitors

or SODIAL(R) Laptop Key Lock Security Cable Lock \$4.29 & Free Shipping, 1 month lead time, amazon

Power

Power conditioning will depend a lot on your local power quality, if it exists at all.

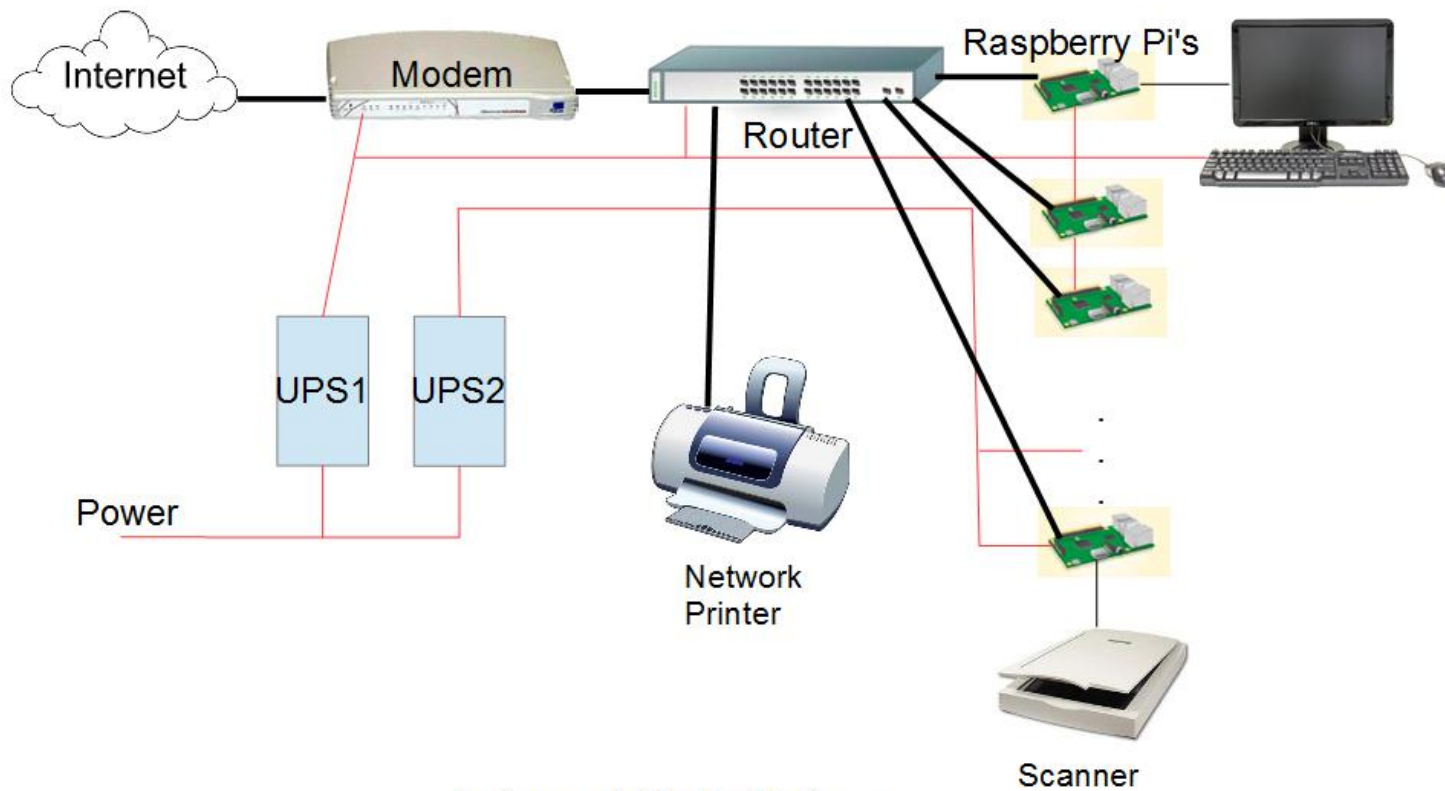
If you have long power outages you may want a generator/inverter.

You will need a UPS in most areas. For 15-20 raspberry pis you may need 2 1000W UPS'es. UPS'es are speced in VA and Watts, the VA (or Volt-Amp) number being higher, the actual Watts available is 60-70% of the VA rating. The best approach is to find a local distributor, which will have UPS'es compatible with the local power. In most areas you want a line-interactive transformer, which adjusts to brownouts and surges without going on battery. It may be a good idea in areas with noisy power to plug the UPS into an external surge protector. Note, UPS batteries need to be exercised once in a while to extend their lives, and surge protectors with MOVs need to be replaced after several voltage spikes. You may want to look into Transient Voltage Suppression (TVS) diodes in areas with a lot of voltage spikes, but you may have to install them yourself, as cheap surge suppressors don't use them, they use MOVs.

Be careful, most inverters and cheaper UPS'es put out a stepped (square) wave, which may work with R-Pi's and monitors, but not with most printers. Printers also demand high current when operating. You may want to leave the printer off the backup power loop. Recent computers with active power factor correction (APFC) will also not work on stepped wave outputs.

The following chart assumes you are in an area with 220 V AC power.

Description	mfg	part no	cost	units	ext cost \$	power (W)	ext power	UPS power
HDMI Monitor, 20"	SCEPTRE	E205W-1600	80	15	1200	77	1155	1155
Raspberry Pi kit	Vilros		70	15	1050	3	45	45
USB Keyboard	Insignia	NS-PNK5001	10	15	150	0.5	7.5	7.5
USB Mouse	Logitech	B100	8	15	120	0.5	7.5	7.5
Cable Lock for mouse and keyboard	Kensington		3	15	45		0	0
Cable Lock for monitor	HDE		4.50	15	67.50		0	0
VESA mount case for R-Pi	Adafruit	2534	10	15	150		0	0
generator, 220 Volt 4000 W	All Power	apgg4000	637	1	637		0	0
lights			10	6	60	60	360	180
color printer	Canon	ca-lbp5050n	400	1	400	253	253	
color scanner	Epson	Perfection V39	80	1	80	2.5	2.5	2.5
UPS, 1000W	Simran	VUPS-1000	130.44	2	260.88	50	100	
Generator Transfer Switch Kit 220 VOLTS	Reliance	31406CRK	400	1	400		0	0
router, 24 port	Netgear	JGS524NA	160	1	160	16	16	16
Gigabit modem router	TP-LINK	Archer D2 AC750	130	1	130	16	16	16
Totals					4910.38		1962.5	1429.5



Internet Cafe Setup

Setting up a Raspberry Pi

See video for basic set-up. <https://www.youtube.com/watch?v=-6OGuhLtKbU>

setting time zone on raspberry pi:

```
sudo dpkg-reconfigure tzdata
```

or

```
sudo raspi-config
```

How to change the host name of the raspberry pi:

Edit `/etc/hosts` and `/etc/hostname`,

```
sudo nano /etc/hosts
```

the last line has the host name `raspberrypi`, change this to whatever you want the machine name to be.

```
sudo nano /etc/hostname
```

This file only has one line, change it to what you used in `/etc/hosts`.

```
reboot
```

If you copy your SD cards (use Win 32 Disk Imager) to set up multiple r-pis, you will have to change the host name on each one.

Icafe software

CafePilot, written in Java; the client can run on a raspberry pi, the server on another raspberry pi or Windows or whatever. Java is included in the Raspbian distribution.

<https://sourceforge.net/projects/cafepilot/?source=directory#screenshots>

Not included in the documents is how to launch the CafePilot Client at startup. Here's how:

Put CafePilot_Client.jar and lib directory in /usr/local/bin

Create directory /home/pi/.config/autostart if it doesn't exist.

Put the following file in this directory, with a .desktop extension (for example CafePilot.desktop):

```
[Desktop Entry]
Name=CafePilot
Comment=CafePilot Client
Exec=java -jar "usr/local/bin/CafePilot_Client.jar" &>/dev/null &
Type=Application
Encoding=UTF-8
GenericName=CafePilot Client
```

Enable the executable bit, either from the windows manager (right click on the file and select properties) or by executing

```
chmod +x CafePilot.desktop
```

Use as Clients

You can't run raspberry pis as clients on a Windows server without licenses.

Only by acquiring additional licenses (in addition to that of Windows) can a computer running Windows Server service multiple remote users at one time and achieve virtual desktop infrastructure. - Wikipedia

Setting up printing from a raspberry pi

First install CUPS (Common Unix Printing System), from command prompt:

```
sudo apt-get update
```

```
sudo apt-get install cups
```

Add user pi to printer group:

```
sudo usermod -a -G lpadmin pi
```

In a browser, go to <http://localhost:631>

Under administration tab select Add Printer, put in user pi and password

select printer

pick driver of closest model

accept default options

print test page

This website has pictures, but some steps are unnecessary if you do it from the pi

<http://www.howtogeek.com/169679/how-to-add-a-printer-to-your-raspberry-pi-or-other-linux-computer/>

Setting up a scanner

```
sudo apt-get install simple-scan
```

This program will detect a scanner on the USB port.

Getting Youtube to work

Audio: plug headphone or earbuds into audio jack

turn on audio jack, from command prompt:

```
amixer cset numid = 3 1
```

You can also get audio from a USB headset.

Video: works for short videos, but to prevent freezes change the memory split to increase graphics memory:

```
sudo raspi-config
```

select 9 Advanced Options

select A3 Memory Split

I used 128MB for graphics, Raspberry Pi 3 has 1 GB total.

Internet Filtering Software

There are three major types of Internet Filtering Software:

1. DNS filter, blocks URLs

This blocks URL's by intercepting the Domain Name lookup. This option does not require any software on the client side.

2. URL filter proxy, blocks URLs

This blocks URLs by passing all requests through a proxy server. You would have to set up self-signed certificates to access secure sites (https).

3. Content filter proxy, uses rules to examine pages and block unwanted content.

You may also have keyword filtering available on your router.

None of them are easy to install. Any URL blocking filter also requires a list of URL's to block. These can be obtained from several blacklists on the web, some of which are paid. Content blocking filters need a set of rules instead.

NxFILTER

NxFILTER combines a light-weight DNS filter and a local web proxy filtering.

This also caches domain names, speeding up name lookup of frequently used sites.

You can run NxFILTER on one Raspberry Pi, and set all the others to use it as the DNS server. This computer should probably belong to the administrator, and not be available to ordinary users.

Follow the tutorial to install and run NxFILTER (<http://www.nxfilter.org/tutorial.html>). Then from the browser, setup your blacklist. We used shallalist for the blacklist. Turn on authentication, and create a policy to block sites of your choosing. Then change the DNS entry on your router, so all computers on the LAN use the DNS set up with NxFILTER. Also make the server have a static IP address. You will want to set a cron job to update your blacklist regularly, see download policy for frequency.

NxFILTER supports the following blacklists.

1. Jahaslist

Jahaslist is the default blacklist option for NxFILTER.

\$50 for 50 users per year. They offer non-profit organization discount.

2. Shallalist

Free for non-commercial use only. It is maintained on www.shallalist.de.

The lists may be used free of charge but companies, institutions and government agencies have to register by signing a usage contract.

3. Komodia

It has more than 30 million domains classified and does dynamic classification. NxFILTER uses its cloud option so it doesn't require import or update.

The pricing is 3 USD per-user, per-year, by 50 user block. Before you buy it you can have a 14 days trial. There are non-profit organization discount and volume discount.

Other Blacklists

urlblacklist.com \$70 per year for once per month update

Virus Protection

There is virus protection available for the Raspberry Pi, but it bogs down the computer, and probably isn't necessary. There are very few viruses written for Linux, fewer for the ARM architecture. But you might want to use these programs to stop the spread of Windows viruses.

ClamAV (cpu hog)

clamscan (memory hog)

Using Microsoft Online

Office Online (previously Office Web Apps) is an online office suite offered by Microsoft, which allows users to create and edit files using lightweight, web browser-based versions of Microsoft Office applications: Word, Excel, PowerPoint and OneNote. The offering also includes Outlook.com, People, Calendar and OneDrive, all of which are accessible from a unified app switcher. - Wikipedia

Microsoft Office Home

<https://www.office.com/>

Microsoft Online doesn't work with the original Raspberry Pi browser, Firefox and Chromium are available.

Chromium is now the default web browser.

Installing Firefox

<https://www.raspberrypi.org/forums/viewtopic.php?f=63&t=150438>

Using this document

We used the IP address of a server as 192.168.0.50. If you have a different IP address block for your server, change the 192.168.0.50 IP address in all the lines below to whatever your server IP address is.

Server

---- Setting up a static IP ----

The server should have a static IP address so all the clients know how to access the server.

If you cannot do this at the router, here is a discussion on how to do this: <http://raspberrypi.stackexchange.com/questions/37920/how-do-i-set-up-networking-wifi-static-ip>

But, since we are using the `/etc/dhcpd.conf` file later on, we will specify this here. You will need to know your own router and DNS settings for your network and insert those values below. If local DNS does not work, you may want to use 8.8.8.8 instead of the 192.168.0.1.

From the PI, if you have been able to successfully plug it into the network and ping the Internet, you can find the numbers you will need by typing:

```
$ route -ne
```

The `route -ne` command should give your “gateway” on the line that starts with 0.0.0.0. The next number after that should be something like 192.168.0.1.

To find your DNS server do

```
$ cat /etc/resolv.conf
```

And find the “nameserver” If there are more of them, you can specify them one after the other, separated by a space on the `domain_name_servers` entry in `/etc/dhcpd.conf`

In the `/etc/dhcpd.conf`

```
interface eth0
  static ip_address=192.168.0.50/24
  static routers=192.168.0.1
  static domain_name_servers=192.168.0.1
```

----- Set up an LDAP server for serving usernames to the clients-----

From <http://workshop.botter.ventures/2012/07/27/how-to-setup-an-ldap-server-on-raspberry-pi/>

```
$ sudo apt-get install slapd ldap-utils
```

It will ask for a username and password. Remember those. Then, reconfigure slapd with the following:

```
$sudo dpkg-reconfigure slapd
```

```
domain = icafe
```

OrgName = icafe

Admin pass = admin

MDB backend

V2 disabled

Now, we install and configure the webserver

```
$ sudo apt-get install php5-fpm php5-cli php5-ldap php-apc phpldapadmin nginx
```

The above command will initially fail. We needed to change port 80 to 81 in `/etc/nginx/sites-available/default`. (edit `/etc/nginx/sites-available/default` and change all 80s to 81) Otherwise it conflicts with nxfiler.

Once the 80s have been changed to 81s, then reconfigure nginx

```
$ sudo dpkg reconfigure nginx-full
```

```
$ sudo apt-get -f install
```

Change `/etc/phpldapadmin/config.php`

set server name (to whatever)

set `dc=icafe`

In `/etc/nginx/sites-available/default`

```
server {
```

```
    root /usr/share/phpldapadmin/htdocs;
```

```
    index index.php index.html;
```



```
server_name localhost;

location ~ /\.php$ {

    include snippets/fastcgi-php.conf

    fastcgi_pass unix:/var/run/php5-fpm.sock;

#    fastcgi_index index.php;

    include fastcgi_params;

}

}
```

Now, from the server, we can go to <http://127.0.0.1:81> and log in as admin.

Make a “posix group” first. All the users for the whole café will use this group. If you do not have a group set up, you cannot add any users.

Start making users.

The home directory can be `/home/users/[username]`

Do not use UID 1000. That is the PI user on every device. You can create a PI user with user ID 1000. The local user of the PI is used first, and then it checks LDAP for all other users.

----- NFS Server (on server)-----

```
$ sudo apt-get install nfs-common nfs-kernel-server rpcbind
```

edit `/etc/exports`, add:

```
/home 192.168.0.0/24(rw,no_root_squash, sync)
```

Then, we run:

```
$ sudo exportfs -va
```

```
$ sudo systemctl enable rpcbind
```

```
$ sudo systemctl restart nfs-kernel-server
```

-----Disable autologin-----

```
sudo raspi-config
```

Select 3: boot options -> B1 Desktop/CLI -> B3 desktop with user login

```
reboot
```

---- Protect the server----

After the server is mostly setup, we do want to try to protect it as much as we can. I (Tim Young) see the greatest threat is the person logged in at the server (who adds people to the CafePilot). They are most likely going to be browsing the Internet, checking email, etc. Such a user is likely to get malware or adware installed on that machine. It would be a good idea to ensure that NXFilter also filters that machine, and has the malware and advertisements blocked. It would be best if we could get the server to browse using NXFilter, but that is complex to do. So, instead, we will simply add a browser extension to the browser on the server. The one I like is "Adblock Plus" (it does malware and other things too)

Server maintainence

Backup /home – User data files (Desktop, Documents, etc. Ignore temporary internet files if you can)

Backup /var/lib/ldap – Just the database of usernames and passwords

Have recovery instructions also

Client

For client:

<https://www.theurbanpenguin.com/authenticating-your-raspberry-pi-suers-to-openldap/>

```
$ sudo apt-get install libpam-ldapd libnss-ldapd
```

When it is installing, it asks for some information:

put IP address of ldap server: **192.168.0.50**

search base: **dc=icafe**

configure libnss: put check-marks next to "**group**" and "**passwd**" – use the space-bar to mark something with a check-mark.

During this time, you will see a few minor warnings, which can be ignored.

Once you have completed this step, you should be able to log in with any ldap username/passwords which you have set up on the server. But, they will fail to open a desktop until we have the NFS installed. (It will continue to fail after NFS is installed until we have the auto creation of users home-directories, so long as the user does not already have a home directory)

----- NFS Client (on client) ---

```
$ sudo apt-get install nfs-common
```

--- Client to mount home directory (on client)---

```
$ sudo apt-get install autofs
```

add to end of /etc/auto.master:

```
+auto.master
```

```
/mnt/nfs /etc/auto.home --timeout=300
```

In /etc/auto.home (This will be a new file)

```
home -rw,timeo=5,intr 192.168.0.50:/home
```

run:

```
$ sudo mkdir -p /mnt/nfs/
```

```
$ sudo systemctl restart autofs
```

```
$ sudo systemctl enable autofs
```

```
$ sudo ln -s /mnt/nfs/home /home/users
```

Once you have completed these step, you should be able to log in with any ldap username/passwords which you have set up on the server. If the user you have tried to log in as has a home directory, they will be able to successfully log in. Though you most likely do not have a home directory yet. So, to test this out, do:

```
$ mount
```

```
$ ls /home/users
```

```
$ mount
```

Should auto-mount the nfs share. The first “mount” command should show you that there is no “192.168.0.5:/home” mounted. The ls should trigger the automount, and the last “mount” should show you a 192.168.0.50:/home being mounted. You may not have much in the way of files in that directory yet.

----- pam_mkhome (client to automatically create home directories)-----

(From <https://www.theurbanpenguin.com/authenticating-your-raspberry-pi-users-to-openldap/>)

Add this line to the file: /etc/pam.d/common-session

Edit the file as root. Add this after the last "session required" line in the file.

```
session required pam_mkhomedir.so umask=027 skel=/etc/skel
```

When you have completed this, you should be able to create a new "Generic: User Account" on the server in ldap (on the server, go to <http://127.0.0.1:81>), and then log into the client PI with that new account. It should pull up a generic desktop for your new user.

-----Disable autologin-----

Sudo raspi-config

Select 3: boot options -> B1 Desktop/CLI -> B3 desktop with user login

Select 3: boot options -> B2 Wait for network at boot

Reboot

---- Setting up filtering on the PI ----

In the file `/etc/dhcpd.conf`

Add the lines at the bottom of the file:

```
interface eth0

static domain_name_servers=192.168.0.50

interface wlan0

static domain_name_servers=192.168.0.50
```


----- Notes if you use a NAS for file-service -----

Notes: If you buy a NAS for this setup, the NAS should be capable of `no_root_squash` for the NFS mounts. Not all NAS's have this option. (If it has any "squash" options, it will probably do this. Both QNAP and Synology NAS's have this.)

If you use a QNAP, you have the option of serving LDAP from the NAS. That can save some on the server setup, as well as the network traffic (logins, file-saves, etc) should be a lot faster.

Day to Day Operations

Adding ldap users

Adding CafePilot users

Backing up the server (Not defined yet)

Further things to be done

Figure out a backup (`/var/lib/ldap`, and `/home` on the server)

Improve `nxfilter` and `CafePilot` install instructions

Add an instruction page for adding users

Get various methods of distribution together.

- 1) Thumb-drive with server and client images, & instructions
- 2) `Dpkg` file with dependencies so they are all installed & config instructions

Install instructions would look somewhat like:

```
Wget http://cybermissions.org/cafe.deb
```

Dpkg install café.deb

Apt-get -f install

[Then, do various configuration options]

3) This document so they can install from scratch.

Give them to someone to test if they can do a complete install

Appendix 1. Detailed Raspberry Pi 3 installation

1. Purchase Raspberry Pi 3 Kit from Amazon (\$49.99)
2. Purchase SanDisk Ultra 32 GB microSDHC from Amazon (\$11.49)
3. Format SD Card
 - a. Install SDFormatter
 - b. Format SD Card
4. Install NOOBS on SD Card
5. Install SD Card in Pi board
6. Start Pi board
 - a. Select English (US)
 - b. Install raspbian from NOOBS
7. Start raspbian
 - a. Setup Country & Time
 - b. Setup WiFi
8. Update Software
 - a. sudo aptitude update
 - b. sudo aptitude full-upgrade
 - c. reboot
9. Install locate (finds files)
 - a. sudo apt-get install locate
 - b. sudo updatedb
 - c. locate <file name>
10. Install Webmin
 - a. wget http://prdownloads.sourceforge.net/webadmin/webmin_1.810_all.deb
 - i. or from USB Drive
 - b. sudo dpkg --install /home/pi/Downloads/webmin_1.810_all.deb
 - c. reboot
11. Start Webmin – <https://localhost:10000>
12. Install sysstats in webmin
 - a. sudo apt-get install librrdtool-oo-perl
 - b. Install libdbi1 from Internet or USB Drive

- c. Install librrd4 from Internet or USB Drive
 - d. Install rrdtool from Internet or USB Drive
 - e. Install sysstats from internet or USB Drive
13. Update all software
- a. sudo aptitude update
 - b. sudo aptitude full-upgrade
 - c. reboot
14. Install Chromium-browser
- a. sudo apt-get update
 - b. sudo apt-get install chromium-browser -y
15. Install CUPS (printer)
- a. sudo apt-get update
 - b. sudo apt-get install cups
 - c. sudo usermod -a -G lpadmin pi
 - d. In browser go to <http://localhost:631>
 - i. Under administration tab select Add Printer, put in user pi and password
 - ii. select printer
 - iii. pick driver of closest model
 - iv. accept default options
 - v. print test page
16. Install apache2 (optional)
- a. sudo apt-get install apache2
17. Update all software
- a. sudo aptitude update
 - b. sudo aptitude full-upgrade
 - c. reboot
18. Create Firewall Filtering rules
- a. Using Webmin
 - i. Networking
 - 1. Linux Firewall