Unix Quick Reference

This is just a location where I store various commands I found handy for Unix.

Systems Administration

Get list of all non-system Users

I needed a quick 'one liner' to get all non-system users on a Unix system. In this case, non-system was defined as having a UID >= 1000 (common practice) or a shell. The first line defines this.

This command can be copied and pasted into a terminal as a standard user, and will result in a tab separated list of the user, home directory, shell, and a comma separated list of group memberships

```
getent passwd | awk -F:
'($3>=1000)||($7~/(\/bash|\/sh|\/zsh|\/ksh|\/fish|\/tcsh)$/){print
$1":"$6":"$7}' \
| while IFS=: read user home shell; do groups=$(id -nG "$user" 2>/dev/null |
tr ' ' ','); printf "%-20s %-30s %-20s %s\n" "$user" "$home" "$shell"
"$groups"; done
```

Partitioning large drives

Drives greater than 2 Terabytes are not handled well by the standard *fdisk* application, so instead we use parted. Fun Fact!!! gparted is a nice little GUI interface to this. But, we're dealing with command line stuff here.

This assumes we have a drive, sdg, that we want to set up with gpt and create one partition on. That partition will set up on optimal sector boundries, and use all of the space available.

```
# remove all old file system information. Not necessary, but I do it just
because I can
wipefs -a /dev/sdg
# make this a gpt disk. Will wipe out any other partitioning scheme
parted /dev/sdg mklabel gpt
# make a new partition on optimal sector boundries. This is a primary
partition, and starts
# at the beginning of the disk (0%) and goes to the end of the disk (100%)
# I put that in quotes as, from what I've read, the percent symbol does not
work well
# within the bash command line
# note, we are not telling it what file system to use, so it defaults to
Linux
parted -a optimal /dev/sdg mkpart primary '0%' '100%'
# display the information on the disk
```

```
parted /dev/sdg print
# format as ext4, no reserved space, and a disk label marked 'backup'
mkfs.ext4 -m0 -Lbackup /dev/sdg
```

Rapidly wipe multiple hard drives

Nothing beats DBAN [https://dban.org/] in ease of use and a feeling of good security. However, I recently had an issue where I had a server with 7 slow hard disks containing data that really wasn't all that sensitive, so I simply wanted to put a bunch of zeros on it, so I booted off of my SystemRescueCD thumbdrive [https://www.system-rescue.org/] and ran the following bash script. Should work in any shell which has the *for* command, however.

wipedrives.sh

```
#! /usr/bin/env bash

# for truly not sensitive information, this command wipes all the OS
information
for drive in a b c d e f g
do
   wipefs -a /dev/sd$drive
done
# but, to really remove in a way that takes tons of effort to recover,
do this also
for drive in a b c
do
   echo Cleaning sd%drive
   dd if=/dev/zero | pv -petrs 580G | dd of=/dev/sd$drive
done
```

I had 7 drives to wipe, and this takes about 5 hours per drive, so a total of 35 hours. I realized I could probably run all 7 processes in parallel since, on my system, the drive controller is a lot faster than any individual drive So I decided to use the *screen* command and see if I could make that work.

wipedrives2.sh

```
#! /usr/bin/env bash

for drive in a b c d e f g h
do
   screen -dmS sd$drive bash -c "dd if=/dev/zero | pv -petrs 580G | dd
of=/dev/sd$drive"
done
```

Basically, we're using a bash for loop to grab all the drive names (I just used the last letter), running screen and immediately detaching the new process after telling it to run *bash -c* and the command after it in quotes (so it would not interpret the pipes in our current, non-screen shell). I'm running this

right now, and *pv* is predicting it will be done in 11.5 hours, or less than a third of the time. BUT, it is really heating up the office with 7 drives being continuously written to at the same time.

Warning: When SystemRescueCD boots, it tries to assemble any mdadm (software RAID) arrays, and since they are locked, *dd* and *wipefs* won't be able to write to them (maybe). In that case, do the following:

```
# find any mdadm volumes running on Linux
cat /proc/mdstat
# assuming it showed you md127 was running (normal)
mdadm --stop /dev/md127
# it should stop the MD array and make the individual drives accessible
```

Rename Server

I will occasionally mess up and name a server wrong, then I want to rename it. This is not as simple as it may seem. Most systems have multiple locations you must change, and you might also want to change the ssh host keys, lvm/mdadm/zfs names.

Debian

Following change hostname, mailname (if it exists), etc... Be sure to change *oldname* and *newname* on the sed command.

Note: this assumes the name is unique in the files. So something like 'a' should not be used; manually edit the file.

```
# change the host name, and the postfix name if that is installed
sed -i.old 's/oldname/newname/g' \
   /etc/hostname \
   /etc/hosts \
   /etc/mailname \
   /etc/postfix/main.cf \
   /etc/camp/sysinfo-client/sysinfo-client.yaml \
   /etc/msmtprc
/etc/init.d/hostname.sh start
# update the aliases, if they exist
newaliases
# regenerate the ssh keys
rm -v /etc/ssh/ssh_host_*
/usr/sbin/dpkg-reconfigure openssh-server
```

Reset Lost Password

The simplest solution is to boot from some kind of live system, then mount the drive and manually edit etc/shadow, which contains a hash of the passwords. In most cases, simply removing the hash sets the user in question to have no password.

We used the SystemRescueCD image (https://www.system-rescue.org/Download/) as a bootable USB thumbdrive for this and other purposes.

1. Boot the system from the CD or USB Drive
2. Determine which drive contains the etc/ directory

```
lsblk # Linux
```

3. Mount the drive someplace convenient

```
mount /dev/sda1 /mnt/backup
```

4. Open the shadow file and edit

```
joe /mnt/backup/etc/shadow
```

    1. Find the line which contains the user. This is a colon delimited file, with the first column being the username. A sample would look like

    ```
    dailydata:$6$FI3K:18368:0:99999:7:::
    ```

    2. On the line in question, remove everything between the first and second colon. In the sample (which was edited for brevity), it would be *6FI3K*. Be sure and DO NOT delete anything else, especially th colons
    3. Save the file
5. Reboot the system. The user in question should now be able to log in with no password.

Note: The username in the example is dailydata. The password hash is actually very long, in some cases around 100 characters.

If this does not work, you can use the same procedure above but, instead of editing the file directly, mount (as in the above example), then chroot into the mounted system and use the passwd command. So, after mounting in the above example, do the following:

```
chroot /mnt/backup
passwd root # Change root's password
exit # leave the chroot jail
reboot # or shutdown
```

Wipe Disk Signatures

There are several ways that signatures are included on block devices. You may have a signature saying a device contains an ext4 file system, for example, or is an LVM or RAID member. You can, of course, wipe them all by writing some value to all parts:

```
dd if=/dev/zero of=/dev/sda bs=16M
```

Which will read place the zeros on all blocks of device sda. NOTE: bs=16M determines how much data is written at one time, and larger numbers greatly increase the speed of the overwrite, up to a significant portion of available RAM.

One of the fastes ways to clean all signatures is the wipefs command. It is not as complete as using dd, but it is very, very fast, and usually works just fine.

```
# see what the signatures are
wipefs /dev/sda
# remove all of the signatures
sudo wipefs --all --force /dev/vdb
```

Grab Data via SSH

I needed to grab the output from dmidecode for a bunch of machines. This would have been a good place for something like puppet, but we don't have it fully deployed. However, I have ssh access to most of the machines, so I was trying to figure out how to do it. I wanted the resulting filename to be `hostname -f`.dmidecode, ie the full hostname of the server with .dmidecode at the end. In the following, HOSTNAME is something that ssh can get to.

```
ssh HOSTNAME 'hostname -f ; sudo -S dmidecode' >aaee && FNAM=$(head -1 aaee)
; sed '1d' aaee > $FNAM.dmidecode
```

Dave came up with most of this, then I modified it for my use. Basically, he is returning the hostname and the output of dmidecode to a local temp file named aaee. If that works, then grab the first line into variable FNAM. Then send everything but the first line to the filename $FNAM.dmidecode.

Note, since dmidecode requires root privileges, I had to use sudo to get it to work. sudo wants a terminal unless you pass the -S parameter, in which case it prints the prompt on STDERR and waits for input. That input is not blanked, so it is visible on your monitor.

Disk Management

Create Swap file

I generally prefer a swap *file* as opposed to a swap *partition*. While swap partitions can be more efficient, swap files are easier to manage (grow/shrink).

This came from https://www.cyberciti.biz/faq/create-a-freebsd-swap-file/

```
fallocate -l 4G /swapfile
# if no fallocate on your system, use the following
# dd if=/dev/zero of=/swapfile bs=1024 count=1048576
chmod 600 /swapfile
# use "force" to use the entire "device"
mkswap -f /swapfile
# save, then modify fstab
cp -a /etc/fstab /etc/fstab.save
echo '/swapfile swap swap defaults 0 0' >> /etc/fstab
# turn on swap for everything in fstab
swapon -a
```

```
# display the result
swapon --show
```

For BSD (FreeBSD specifically), you create the swapfile with dd, and you must use an md to mount it

```
# create an 8G swapfile
dd if=/dev/zero of=/swapfile bs=1G count=8
# set permissions very restrictive
chmod 600 /swapfile
# make a copy of fstab, in case we mess something up
cp -a /etc/fstab /etc/fstab.bak
# use mdconfig -lv to find an used md device. In this case, I'm using 42
echo 'md42   none  swap   sw,file=/swapfile  0 0' >> /etc/fstab
# turn on all defined swap devices
swapon -a
# now list them
swapinfo -g
```

If, as in the case I ran into one time, you have an active swap device you want to get rid of, use swapinfo to find it, then use **swapoff /path/to/device/to/remove** and remove it from fstab

Mount davfs file system

Many web services allow you to mount their contents via davfs. On Linux, it if fairly simple to do this using davfs2. **Note** expect this to be slower than what you experience on a LAN. The protocol is generalized, and remember you are doing your work over a connection measured in megabits/second instead of gigabits.

On a Devuan system, or any Debian derivative, the following will get davfs2 installed and running. Replace 'jane' below with your username:

```
#  Answer yes when asked if unprivileged users should be able to mount
sudo apt -y install davfs2
sudo usermod -aG davfs2 jane
mkdir -p ~/cloud/Tech
mkdir ~/.davfs2
sudo cp  /etc/davfs2/secrets ~/.davfs2/secrets
sudo chown jane:jane ~/.davfs2/secrets
chmod 600 ~/.davfs2/secrets
```

Now, you need to edit the secrets file you just copied. You can use an editor, or just append using echo. I'm using the latter below. Also, you need to add an entry in /etc/fstab.

For the secrets file, you are simply putting in the mount point on your system, a space, the username you will log into the remote machine with, a space, and the password on the remote server.

The fstab entry is a standard entry, but uses davfs as the type. I chose to have it auto mounted. This is example is for a NextCloud server. Most davfs servers have the correct parameters for mounting documented someplace.

```
# add credentials to .davfs/secrets
# mountpoint username password
echo '/home/jane/cloud/Tech jane your_password_here' >> ~/.davfs2/secrets
# add system mount to /etc/fstab
sudo cp /etc/fstab /etc/fstab.back
sudo echo 'https://cloud.example.com/remote.php/dav/files/jane/Tech
/home/jane/cloud/Tech davfs user,rw,auto 0 0' >> /etc/fstab
```

Adding a user to a group does not take place immediately; it requires a fresh login. However, you can simulate the login with the following command:

```
sudo su - jane
# Now, you can mount the drive
mount ~/cloud/Tech
# unmounting just uses the standard utilities
umount ~/cloud/Tech
```

Shell (mainly BASH)

Here Documents

Most unix users are familiar with echo'ing something to STDOUT so it can be used as STDIN for a following script (using the pipe). However, this is usually limited to a single line.

A **here document** is a way of having multiple lines processed at one time. In many cases, you can have similar functionality using quotes, but here documents are more robust.

For example, a simple test of a newly built mail system might include creating a file with all of the headers necessary, then passing that to *sendmail* for processing. However, you can skip a step and simply send the message directly using a here document.

```
sendmail user@example.com << EOF
To: user@example.com
from: root@example.org
Subject: test

This is a test
EOF
```

The entire block above is one command. Here is the breakdown.

1. *sendmail user@example.com* is a standard sendmail invocation which assumes the message itself is coming from STDIN.
2. « marks the beginning of a *here document*
3. *EOF* is the tag which will mark the end of the text for the here document
4. Everything up to the EOF is the actual string to be passed to sendmail
5. *EOF* at the end marks the end of the here document. **Note**: there must be no leading or trailing whitespace. The tag must be exactly as entered after the « (case sensitive), and must be the

only thing on the final line.

This only touches the surface of here documents. See https://tldp.org/LDP/abs/html/here-docs.html for a lot more information.

Find files within date range containing text

A client needed to find a lost e-mail. All he knew was that it arrived sometime on the 24th of Apr 2020, and who it was from. Not sure if the *-newerct* parameter is available on all versions of find, or if it is specific to GNU/Linux.

```
find Maildir -type f -newerct '26 Apr 2022 00:00:00' ! -newerct '27 Apr 2022 00:00:00' -exec grep -il 'from:.*user@example.org' \{\} \;
```

This is very fast, since the find command rapidly decreases the number of messages which must be scanned (he has almost 300k e-mails in various folders, and it took less than 2 seconds).

Find newest files in a directory tree

This will go through an entire directory tree under the current directory and locate the newest 5 files.

```
find . -type f -exec stat --format '%Y :%y %n' "{}" \; | sort -nr | cut -d: -f2- | head
```

- Change *find .* to *find /some/path* to change the starting directory
- Change *head* to *head -n 10* to grab the newest 10 files.
- You can add any kind of filter also, so entering *-iname* '*.jpg*' after the *-type f* would only find files ending in jpg.

Count all files in directory tree(s)

I was actually using this to count files in a maildir type directory. I needed to know how many total e-mails each user had, then I wanted to know how many they stored in their Inbox.

At a different domain, I needed to know only specific users. They all had account names of the form 'mca-something' so, since 'mca' is pretty uncommon, I just grep'd that (could have used egrep '^mca' even better, I guess).

Note: this is really not accurate as most IMAP servers store several configuration and control files in the directory, but since that is 2-5 per directory, and I had users storing tens of thousands of e-mails in the Inbox, I didn't break it down any further. You can always look a the Maildir and see some kind of pattern to send to egrep if you want more accuracy.

```
# count all files in all subdirectories
for dir in `ls`; do echo -n " $dir " ; find $dir -type f | wc -l ; done
# count all files in all specific subdirectories identified by a pattern (mca)
for dir in `ls | grep mca`; do echo -n " $dir " ; find $dir -type f | wc -l
```

```
; done
# find inn a subdirectory, ie the Inbox
for dir in `ls`; do echo -n " $dir " ; find $dir/Maildir/cur -type f | wc -l
; done
```

create multiple zero filled files

Sometimes, especially before doing a full disk backup using compression, it is good to write 0's to all unused disk space. This can be done quite easily with a simple dd command (assuming the current directory is on the partition you wish to do this to).

```
dd if=/dev/zero of=./deleteme
rm deleteme
```

This will create a single file, deleteme, which contains nothing but 0's in it (and thus is very compressible), then deletes the file.

However, I have found that I like to have several files which I can then leave on the disk in case I need to perform the copy in the future. I can leave myself plenty of disk space to do my work, and if I need more space, I simply delete some of the files I created. In this case, I'm assuming I have 49.5 gigabytes of free disk space, and I want to zero it all out, then free up 10G for running the system.

```
for i in {01..50} ; do echo Loop $i ; dd if=/dev/zero of=./deleteme.$i bs=1M
count=1024 ; done
for i in {41..50} ; do rm deleteme.$i ; done
```

This will create 50 1 gigabyte files in the current directory, each filled with zeros. Since I am trying to write 50 gigabytes but only have 49.5, the last write will fail since I have no more disk space to write to.

I then delete the last 10 files I created, which gives my system some space to run in.

break a file apart into pieces

In many cases, you have to take a large file and break it into smaller pieces. In this case, use the Unix command *split* to do so. In the following example, I'm taking the 23 Gigabyte file and breaking it into 23 1 Gigabyte files, with numeric suffixes beginning with 07, then 08, all the way to 30.

```
split --suffix-length=2 --bytes=1G --numeric-suffixes=07 --verbose deleteme
deleteme.
```

note that the original file (deleteme) is not modified, so you will need as much space as it occupies, plus a little for overhead.

ssh

Create new key, no passphrase

Create a new rsa key with no passphrase. Useful when you want two machines to talk to each other using automated processes, though it is very insecure if the primary storage is ever disabled.

- -C parameter allows you to define a comment (default is user@hostname)
- -t defines the type of key to create (rsa, dsa, etc...)
- -b is the number of bits to use in the key. Some keys (dsa) have a fixed size. Larger number of bits is harder to crack, but uses more resources.
- -f define the file to create for the private key. The public key will be the same, with .pub added

```
ssh-keygen -t rsa -b 4096 -f id_rsa -C 'new comment for key' -N ''
```

Create missing host keys

Create new host keys (run by root only). When a Unix system is initially set up, several ssh keys are created to identify the system. The following command allows you to change those. The one command will generate all key pairs which are not already created, with an empty passphrase for the private keys.

```
su
# enter root password to become root
ssh-keygen -A
exit # return to unprivileged user
```

Upgrade existing private key storage

Upgrade existing rsa private key to newer storage format. This only affects the encryption on the private key. It does not alter the key at all, so it still works as you are used to

```
ssh-keygen -p -o -f ~/.ssh/id_rsa
```

Change passphrase and/or comment on existing private key

- -p tells it to change the passphrase
- -c tells it to change the comment
- -f tells which file contains the information

```
ssh-keygen -p -c -f ~/.ssh/id_rsa
```

Using multiple key pairs

You can have multiple key pairs for a single user, by simply generating them with different file names, then passing the -i (identity) flag on the command line. WARNING: if you mess up the -f parameter, you can end up overwriting your default, which is stored as id_rsa (or something similar), so back up

your stuff first. The following example assumes rsa.

```
# make a copy in case we mess up
cp ~/.ssh/id_rsa ~/.ssh/id_rsa.original
cp ~/.ssh/id_rsa.pub ~/.ssh/id_rsa.pub.original
# generate two new keys for two separate applications
ssh-keygen -t rsa -b 4096 -f id_rsa.server1 -C 'key for server1' -N
'passphrase for this key'
ssh-keygen -t rsa -b 4096 -f id_rsa.server2 -C 'key for server2' -N
'passphrase for this key'
```

Copy id_rsa.server1.pub to server1:~/.ssh/authorized_keys, and id_rsa.server2.pub to server2:~/.ssh/authorized_keys

To go to a machine named server, which uses the default, simply execute

```
ssh server
```

however, to go to server1, using its separate key pair

```
ssh -i "~/.ssh/id_rsa.server1" server1
```

and do something similar for server2

See config file section for a way to make it easier

using the config file

There are two files which, by default, allow you to make life easier on yourself when using ssh. ~/.ssh/config is local, and /etc/ssh/ssh_config is global. The global file location may be different for other operating systems, but I haven't run into that yet.

We'll concentrate on the local config file. Basically, this is a standard text file, with restrictive permissions (0600). The file contains a stanza which begins with the keyword Host (case insensitive), followed by multiple line which set parameters for ssh when called. Each line is a keyword, as space, and a value.

config.example

```
Host myshortname
HostName realname.example.com

# use this for myother server
Host myother realname2.example.org
   HostName realname2.example.org
   IdentityFile ~/.ssh/realname2_rsa
   User remoteusername
   Port 43214
```

The example lists two entries. Note that whitespace is ignored, so indentation is done in the second

one to make it easier to read by humans.

The first stanza simply creates an alias (myshortname) for a connection. Issuing the command

```
ssh myshortname
```

uses the default identity file (~/.ssh/id_rsa), username (your current user name) and port (22) to connect to realname.example.com

The second does an override of several parameters. The following two commands are equivilent:

```
ssh myother
# is the same as
ssh -p 43214 -i "~/.ssh/realname2_rsa" remoteusername@realname2.example.org
```

There are pages and pages of options by running the *man sh_config* command, where you can include other files, set X11 forwarding, basically everything.

NOTE: I especially like this since I always get *ssh -p* and *scp -P* mixed up, and programs which use ssh (rsync, etc...) will use this file.

References

- https://stackoverflow.com/questions/2419566/best-way-to-use-multiple-ssh-private-keys-on-one-client#2419609
- https://linuxize.com/post/how-to-add-swap-space-on-debian-9/
- https://docs.nextcloud.com/server/18/user_manual/files/access_webdav.html
- https://www.cyberciti.biz/faq/create-a-freebsd-swap-file/
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