

Lab1 Solution

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Using sed utility

1. Display the lines that contain the word "lp" in /etc/passwd file.

```
ahmed@ahmed-usb:~$ sed -n "/lp/p" /etc/passwd
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
cups-pk-helper:x:115:122:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin
_flatpak:x:131:139:Flatpak system-wide installation helper,,,:/nonexistent:/usr/sbin/nologin
ahmed@ahmed-usb:~$
```

2. Display /etc/passwd file except the third line.

```
ahmed@ahmed-usb: ~  
ahmed@ahmed-usb:~$ sed "3d" /etc/passwd  
root:x:0:0:root:/root:/bin/bash  
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin  
sys:x:3:3:sys:/dev:/usr/sbin/nologin  
sync:x:4:65534:sync:/bin:/bin/sync  
games:x:5:60:games:/usr/games:/usr/sbin/nologin  
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin  
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin  
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin  
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin  
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin  
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin  
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin  
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin  
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin  
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin  
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin  
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin  
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin  
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin  
messagebus:x:102:105:/:/nonexistent:/usr/sbin/nologin  
systemd-timesync:x:103:106:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin  
syslog:x:104:111:/:/home/syslog:/usr/sbin/nologin  
_apt:x:105:65534:/:/nonexistent:/usr/sbin/nologin  
tss:x:106:113:TPM software stack,,,:/var/lib/tpm:/bin/false  
uuidd:x:107:116:/:/run/uuidd:/usr/sbin/nologin  
systemd-oom:x:108:117:systemd Userspace OOM Killer,,,:/run/systemd:/usr/sbin/nologin  
tcpdump:x:109:118:/:/nonexistent:/usr/sbin/nologin  
avahi-autoipd:x:110:119:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin  
usbmux:x:111:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin  
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin  
kernoops:x:113:65534:Kernel Oops Tracking Daemon,,,:/usr/sbin/nologin  
avahi:x:114:121:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin  
cups-pk-helper:x:115:122:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin  
rtkit:x:116:123:RealtimeKit,,,:/proc:/usr/sbin/nologin  
whoopsie:x:117:124:/:/nonexistent:/bin/false  
sssd:x:118:125:SSSD system user,,,:/var/lib/sss:/usr/sbin/nologin  
speech-dispatcher:x:119:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false  
fwupd-refresh:x:120:126:fwupd-refresh user,,,:/run/systemd:/usr/sbin/nologin  
nm-openvpn:x:121:127:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin  
saned:x:122:129:/:/var/lib/saned:/usr/sbin/nologin  
colord:x:123:130:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin  
geoclue:x:124:131:/:/var/lib/geoclue:/usr/sbin/nologin  
pulse:x:125:132:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin  
gnome-initial-setup:x:126:65534:/:/run/gnome-initial-setup:/bin/false  
hplip:x:127:7:HPLIP system user,,,:/run/hplip:/bin/false  
gdm:x:128:134:Gnome Display Manager:/var/lib/gdm3:/bin/false  
ahmed:x:1000:1000:ahmed,,,:/home/ahmed:/bin/bash  
postgres:x:129:137:PostgreSQL administrator,,,:/var/lib/postgresql:/bin/bash  
mysql:x:130:138:MySQL Server,,,:/nonexistent:/bin/false  
_flatpak:x:131:139:Flatpak system-wide installation helper,,,:/nonexistent:/usr/sbin/nologin  
netdata:x:132:141:/:/var/lib/netdata:/usr/sbin/nologin  
ahmed@ahmed-usb:~$
```

3. Display /etc/passwd file except the last line.

```
ahmed@ahmed-usb: ~  
ahmed@ahmed-usb:~$ sed '$d' /etc/passwd  
root:x:0:0:root:/root:/bin/bash  
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin  
bin:x:2:2:bin:/bin:/usr/sbin/nologin  
sys:x:3:3:sys:/dev:/usr/sbin/nologin  
sync:x:4:65534:sync:/bin:/bin/sync  
games:x:5:60:games:/usr/games:/usr/sbin/nologin  
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin  
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin  
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin  
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin  
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin  
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin  
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin  
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin  
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin  
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin  
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin  
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin  
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin  
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin  
messagebus:x:102:105:/:nonexistent:/usr/sbin/nologin  
systemd-timesync:x:103:106:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin  
syslog:x:104:111:/:home/syslog:/usr/sbin/nologin  
_apt:x:105:65534:/:nonexistent:/usr/sbin/nologin  
tss:x:106:113:TPM software stack,,,:/var/lib/tpm:/bin/false  
uidd:x:107:116:/:run/uidd:/usr/sbin/nologin  
systemd-oom:x:108:117:systemd Userspace OOM Killer,,,:/run/systemd:/usr/sbin/nologin  
tcpdump:x:109:118:/:nonexistent:/usr/sbin/nologin  
avahi-autoipd:x:110:119:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin  
usbmux:x:111:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin  
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin  
kernoops:x:113:65534:Kernel Oops Tracking Daemon,,,:/usr/sbin/nologin  
avahi:x:114:121:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin  
cups-pk-helper:x:115:122:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin  
rtkit:x:116:123:RealtimeKit,,,:/proc:/usr/sbin/nologin  
whoopsie:x:117:124:/:nonexistent:/bin/false  
sssd:x:118:125:SSSD system user,,,:/var/lib/sss:/usr/sbin/nologin  
speech-dispatcher:x:119:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false  
fwupd-refresh:x:120:126:fwupd-refresh user,,,:/run/systemd:/usr/sbin/nologin  
nm-openvpn:x:121:127:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin  
saned:x:122:129:/:var/lib/saned:/usr/sbin/nologin  
colord:x:123:130:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin  
geoclue:x:124:131:/:var/lib/geoclue:/usr/sbin/nologin  
pulse:x:125:132:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin  
gnome-initial-setup:x:126:65534:/:run/gnome-initial-setup:/bin/false  
hplip:x:127:7:HPLIP system user,,,:/run/hplip:/bin/false  
gdm:x:128:134:Gnome Display Manager:/var/lib/gdm3:/bin/false  
ahmed:x:1000:1000:ahmed,,,:/home/ahmed:/bin/bash  
postgres:x:129:137:PostgreSQL administrator,,,:/var/lib/postgresql:/bin/bash  
mysql:x:130:138:MySQL Server,,,:/nonexistent:/bin/false  
_flatpak:x:131:139:Flatpak system-wide installation helper,,,:/nonexistent:/usr/sbin/nologin  
ahmed@ahmed-usb:~$
```

4. Display /etc/passwd file except the lines that contain the word "lp".

```
ahmed@ahmed-usb: ~  
ahmed@ahmed-usb:~$ sed '/lp/d' /etc/passwd  
root:x:0:0:root:/root:/bin/bash  
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin  
bin:x:2:2:bin:/bin:/usr/sbin/nologin  
sys:x:3:3:sys:/dev:/usr/sbin/nologin  
sync:x:4:65534:sync:/bin:/bin/sync  
games:x:5:60:games:/usr/games:/usr/sbin/nologin  
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin  
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin  
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin  
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin  
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin  
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin  
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin  
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin  
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin  
gnats:x:41:41:Gnats Bug-Reporting System (admin)/var/lib/gnats:/usr/sbin/nologin  
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin  
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin  
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin  
messagebus:x:102:105:/:nonexistent:/usr/sbin/nologin  
systemd-timesync:x:103:106:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin  
syslog:x:104:111:/:home/syslog:/usr/sbin/nologin  
_apt:x:105:65534:/:nonexistent:/usr/sbin/nologin  
tss:x:106:113:TPM software stack,,,:/var/lib/tpm:/bin/false  
uuidd:x:107:116:/:run/uuidd:/usr/sbin/nologin  
systemd-oom:x:108:117:systemd Userspace OOM Killer,,,:/run/systemd:/usr/sbin/nologin  
tcpdump:x:109:118:/:nonexistent:/usr/sbin/nologin  
avahi-autoipd:x:110:119:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin  
usbmux:x:111:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin  
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin  
kernoops:x:113:65534:Kernel Oops Tracking Daemon,,,:/usr/sbin/nologin  
avahi:x:114:121:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin  
rtkit:x:116:123:RealtimeKit,,,:/proc:/usr/sbin/nologin  
whoopsie:x:117:124:/:nonexistent:/bin/false  
sssd:x:118:125:SSSD system user,,,:/var/lib/sss:/usr/sbin/nologin  
speech-dispatcher:x:119:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false  
fwupd-refresh:x:120:126:fwupd-refresh user,,,:/run/systemd:/usr/sbin/nologin  
nm-openvpn:x:121:127:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin  
saned:x:122:129:/:var/lib/saned:/usr/sbin/nologin  
colord:x:123:130:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin  
geoclue:x:124:131:/:var/lib/geoclue:/usr/sbin/nologin  
pulse:x:125:132:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin  
gnome-initial-setup:x:126:65534:/:run/gnome-initial-setup:/bin/false  
hplip:x:127:7:HPLIP system user,,,:/run/hplip:/bin/false  
gdm:x:128:134:Gnome Display Manager:/var/lib/gdm3:/bin/false  
ahmed:x:1000:1000:ahmed,,,:/home/ahmed:/bin/bash  
postgres:x:129:137:PostgreSQL administrator,,,:/var/lib/postgresql:/bin/bash  
mysql:x:130:138:MySQL Server,,,:nonexistent:/bin/false  
netdata:x:132:141:/:var/lib/netdata:/usr/sbin/nologin  
ahmed@ahmed-usb:~$
```


5. Substitute all the words that contain “lp” with “mylp” in /etc/passwd file.

```
ahmed@ahmed-usb: ~  
ahmed@ahmed-usb:~$ sed 's/lp/mylp/' /etc/passwd  
root:x:0:0:root:/root:/bin/bash  
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin  
bin:x:2:2:bin:/bin:/usr/sbin/nologin  
sys:x:3:3:sys:/dev:/usr/sbin/nologin  
sync:x:4:65534:sync:/bin:/bin/sync  
games:x:5:60:games:/usr/games:/usr/sbin/nologin  
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin  
mylp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin  
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin  
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin  
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin  
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin  
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin  
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin  
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin  
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin  
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin  
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin  
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin  
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin  
messagebus:x:102:105:/:nonexistent:/usr/sbin/nologin  
systemd-timesync:x:103:106:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin  
syslog:x:104:111:/:home/syslog:/usr/sbin/nologin  
_apt:x:105:65534:/:nonexistent:/usr/sbin/nologin  
tss:x:106:113:TPM software stack,,,:/var/lib/tpm:/bin/false  
uidd:x:107:116:/:run/uidd:/usr/sbin/nologin  
systemd-oom:x:108:117:systemd Userspace OOM Killer,,,:/run/systemd:/usr/sbin/nologin  
tcpdump:x:109:118:/:nonexistent:/usr/sbin/nologin  
avahi-autoipd:x:110:119:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin  
usbmux:x:111:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin  
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin  
kernoops:x:113:65534:Kernel Oops Tracking Daemon,,,:/usr/sbin/nologin  
avahi:x:114:121:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin  
cups-pk-hemlyper:x:115:122:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin  
rtkit:x:116:123:RealtimeKit,,,:/proc:/usr/sbin/nologin  
whoopsie:x:117:124:/:nonexistent:/bin/false  
sssd:x:118:125:SSSD system user,,,:/var/lib/sss:/usr/sbin/nologin  
speech-dispatcher:x:119:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false  
fwupd-refresh:x:120:126:fwupd-refresh user,,,:/run/systemd:/usr/sbin/nologin  
nm-openvpn:x:121:127:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin  
saned:x:122:129:/:/var/lib/saned:/usr/sbin/nologin  
colord:x:123:130:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin  
geoclue:x:124:131:/:/var/lib/geoclue:/usr/sbin/nologin  
pulse:x:125:132:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin  
gnome-initial-setup:x:126:65534:/:run/gnome-initial-setup:/bin/false  
hplip:x:127:7:HPLIP system user,,,:/run/hplip:/bin/false  
gdm:x:128:134:Gnome Display Manager:/var/lib/gdm3:/bin/false  
ahmed:x:1000:1000:ahmed,,,:/home/ahmed:/bin/bash  
postgres:x:129:137:PostgreSQL administrator,,,:/var/lib/postgresql:/bin/bash  
mysql:x:130:138:MySQL Server,,,:/nonexistent:/bin/false  
_flatpak:x:131:139:Flatpak system-wide installation hemlyper,,,:/nonexistent:/usr/sbin/nologin  
netdata:x:132:141:/:/var/lib/netdata:/usr/sbin/nologin  
ahmed@ahmed-usb:~$
```

Using awk utility

1. Print full name (comment) of all users in the system.

```
awk -F ':' '{  
{  
    print $5}' /etc/passwd
```

2. Print login, full name (comment) and home directory of all users.(Print each line preceded by a line number)

```
awk -F ':' '
{
    print NR " " $1 " " $5 " " $6}' /etc/passwd
```

3. Print login, uid and full name (comment) of those uid is greater than 500

```
awk -F ':' '
{
    if ($3 > 500) {    print $1 " " $5  }}' /etc/passwd
```

4. Print login, uid and full name (comment) of those uid is exactly 500

```
awk -F ':' '
{
    if ($3 == 500) {    print $1 " " $5  }}' /etc/passwd
```

5. Print line from 5 to 15 from /etc/passwd

```
awk '
{
    if (NR <= 15 && NR >= 5) {    print $0  }}' /etc/passwd
```

6. Change lp to mylp

```
awk -F ':' '{
    for (i = 1; i <= NF; i++) {    if ($i == "lp") {        $i = "mylp"    } }    print
    $0}' /etc/passwd
```

7. Print all information about greatest uid.

```
awk -F ':' 'BEGIN {
    max = -1;    maxLine = ""}
{
    if ($3 > max) {    max = $3    maxLine = $0  }}
END {
    print maxLine}' /etc/passwd
```

8. Get the sum of all accounts id's.

```
awk -F ':' 'BEGIN {
    sum = 0;}
{
```

```
    sum += $3}
END {
    print sum}' /etc/passwd
```

Bonus

1. Get the sum of accounts id's that has the same group.

```
awk -F ':' '{
    if (g_arr[$4] == null){        g_arr[$4] = $3    }   else {        g_arr[$4]+=$3    }} END {
for( g in g_arr )
print g " sum: " g_arr[g]
}' /etc/passwd
```

2. Make the following report.

```
awk -F ':' '{
    if (g_arr[$4] == null){        g_arr[$4] = $1    }   else {        g_arr[$4]+=$1 + "\n"
    }} END {
for( g in g_arr )
print g " users: \n" g_arr[g]
}' /etc/passwd
```