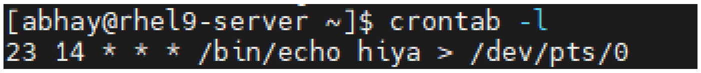
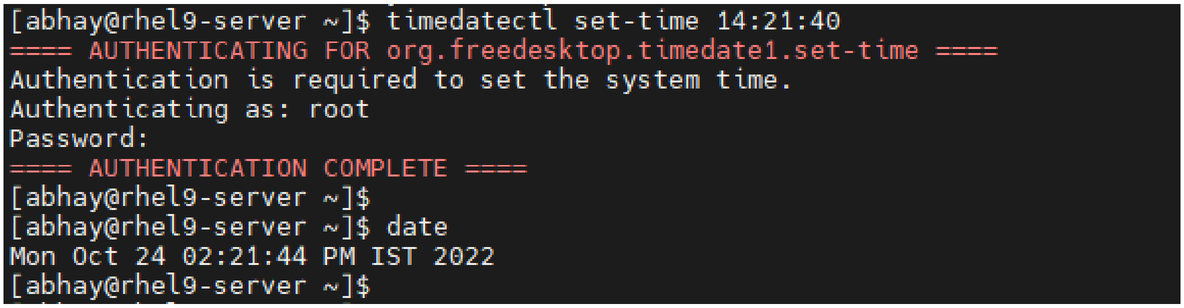
1.(a) Steps: -

Create a crontab using command crontab -e & write the job that runs daily at 14:23 local time and executes /bin/echo hiya. List this job using command as shown in image below-



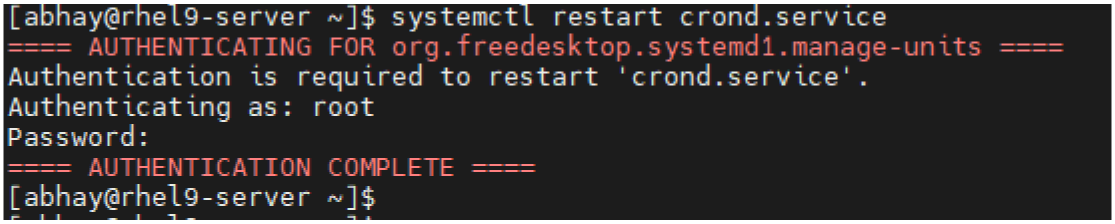
```
[abhay@rhel9-server ~]$ crontab -l
23 14 * * * /bin/echo hiya > /dev/pts/0
```

Now set system time which should be less than 14:23 in order to run the job. It is shown below as-



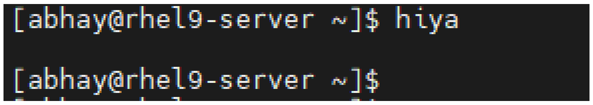
```
[abhay@rhel9-server ~]$ timedatectl set-time 14:21:40
==== AUTHENTICATING FOR org.freedesktop.timedate1.set-time ====
Authentication is required to set the system time.
Authenticating as: root
Password:
==== AUTHENTICATION COMPLETE ====
[abhay@rhel9-server ~]$
[abhay@rhel9-server ~]$ date
Mon Oct 24 02:21:44 PM IST 2022
[abhay@rhel9-server ~]$
```

Restart crond service as shown below-



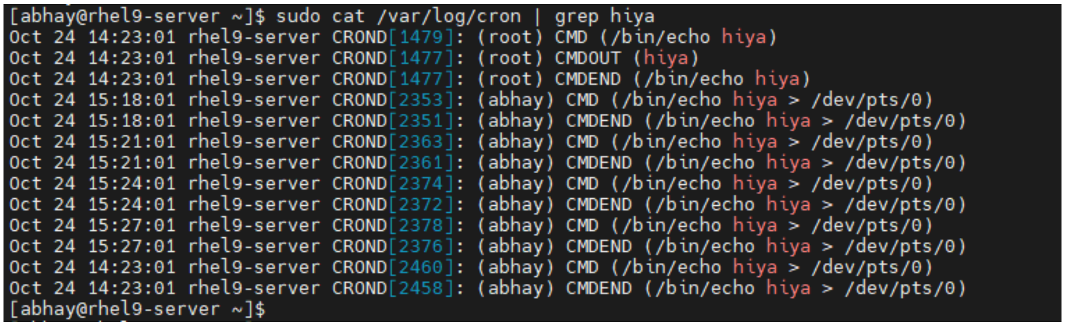
```
[abhay@rhel9-server ~]$ systemctl restart crond.service
==== AUTHENTICATING FOR org.freedesktop.systemd1.manage-units ====
Authentication is required to restart 'crond.service'.
Authenticating as: root
Password:
==== AUTHENTICATION COMPLETE ====
[abhay@rhel9-server ~]$
```

As soon as it is 14:23, job will get executed & print output which can be found in image below-



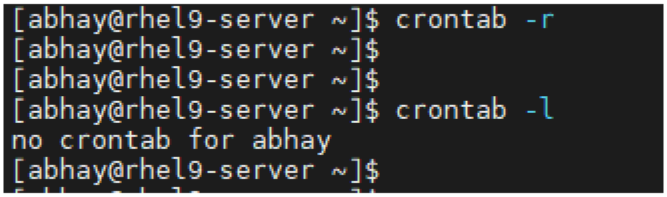
```
[abhay@rhel9-server ~]$ hiya

[abhay@rhel9-server ~]$
```

We can check logs generated in /var/log/cron file as shown below-



```
[abhay@rhel9-server ~]$ sudo cat /var/log/cron | grep hiya
Oct 24 14:23:01 rhel9-server CROND[1479]: (root) CMD (/bin/echo hiya)
Oct 24 14:23:01 rhel9-server CROND[1477]: (root) CMDOUT (hiya)
Oct 24 14:23:01 rhel9-server CROND[1477]: (root) CMDEND (/bin/echo hiya)
Oct 24 15:18:01 rhel9-server CROND[2353]: (abhay) CMD (/bin/echo hiya > /dev/pts/0)
Oct 24 15:18:01 rhel9-server CROND[2351]: (abhay) CMDEND (/bin/echo hiya > /dev/pts/0)
Oct 24 15:21:01 rhel9-server CROND[2363]: (abhay) CMD (/bin/echo hiya > /dev/pts/0)
Oct 24 15:21:01 rhel9-server CROND[2361]: (abhay) CMDEND (/bin/echo hiya > /dev/pts/0)
Oct 24 15:24:01 rhel9-server CROND[2374]: (abhay) CMD (/bin/echo hiya > /dev/pts/0)
Oct 24 15:24:01 rhel9-server CROND[2372]: (abhay) CMDEND (/bin/echo hiya > /dev/pts/0)
Oct 24 15:27:01 rhel9-server CROND[2378]: (abhay) CMD (/bin/echo hiya > /dev/pts/0)
Oct 24 15:27:01 rhel9-server CROND[2376]: (abhay) CMDEND (/bin/echo hiya > /dev/pts/0)
Oct 24 14:23:01 rhel9-server CROND[2460]: (abhay) CMD (/bin/echo hiya > /dev/pts/0)
Oct 24 14:23:01 rhel9-server CROND[2458]: (abhay) CMDEND (/bin/echo hiya > /dev/pts/0)
[abhay@rhel9-server ~]$
```

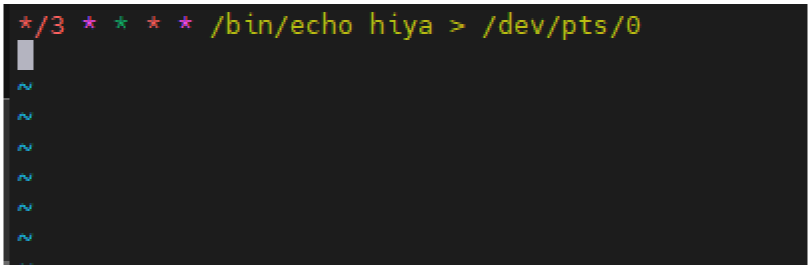
This job will run everyday at 14:23. If we want to remove this job, we need to use command crontab -r. It is shown in image below-



```
[abhay@rhel9-server ~]$ crontab -r
[abhay@rhel9-server ~]$
[abhay@rhel9-server ~]$
[abhay@rhel9-server ~]$ crontab -l
no crontab for abhay
[abhay@rhel9-server ~]$
```

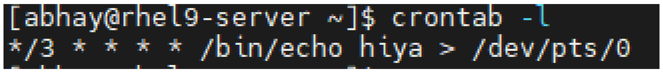
1. (b) Steps: -

Create a crontab using command crontab -e & write the job that runs daily at every 3-minute local time and executes /bin/echo hiya.



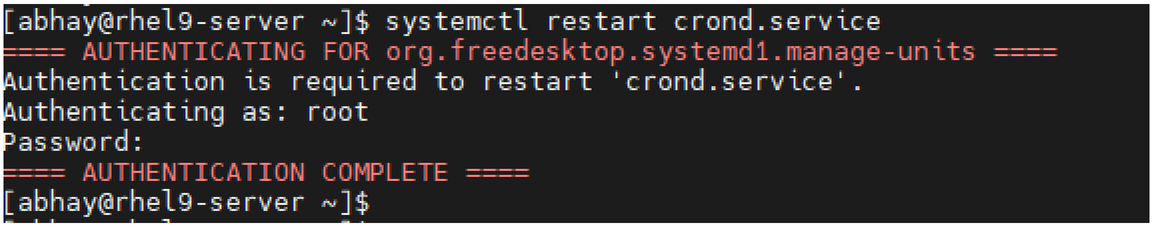
```
*/3 * * * * /bin/echo hiya > /dev/pts/0

~
~
~
~
~
~
```

List this job using command as shown in image below-



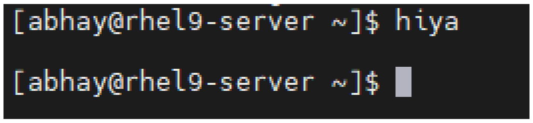
```
[abhay@rhel9-server ~]$ crontab -l
*/3 * * * * /bin/echo hiya > /dev/pts/0
```

Restart crond service as shown below-



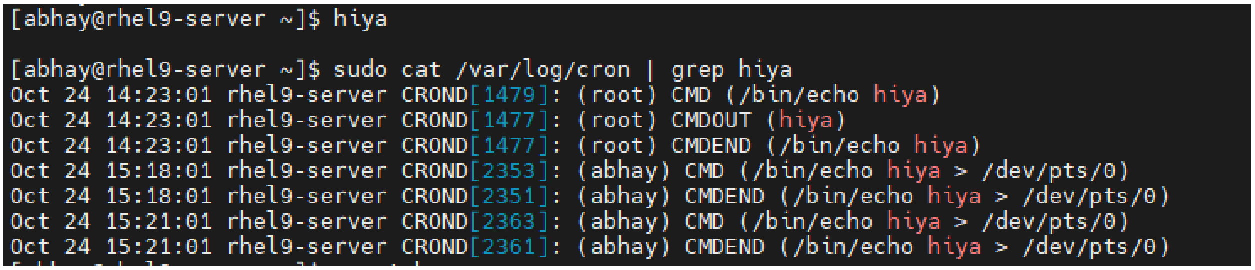
```
[abhay@rhel9-server ~]$ systemctl restart crond.service
==== AUTHENTICATING FOR org.freedesktop.systemd1.manage-units ====
Authentication is required to restart 'crond.service'.
Authenticating as: root
Password:
==== AUTHENTICATION COMPLETE ====
[abhay@rhel9-server ~]$
```

As soon as it is 3-minutes, job will get executed & print output which can be found in image below-



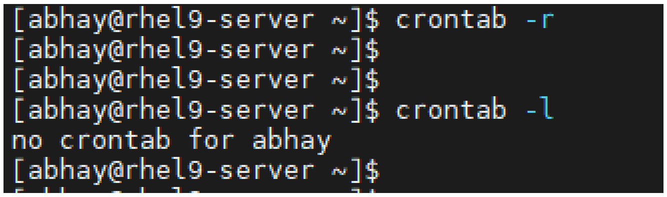
```
[abhay@rhel9-server ~]$ hiya

[abhay@rhel9-server ~]$
```

We can check logs generated in /var/log/cron file as shown below-



```
[abhay@rhel9-server ~]$ hiya

[abhay@rhel9-server ~]$ sudo cat /var/log/cron | grep hiya
Oct 24 14:23:01 rhel9-server CROND[1479]: (root) CMD (/bin/echo hiya)
Oct 24 14:23:01 rhel9-server CROND[1477]: (root) CMDOUT (hiya)
Oct 24 14:23:01 rhel9-server CROND[1477]: (root) CMDEND (/bin/echo hiya)
Oct 24 15:18:01 rhel9-server CROND[2353]: (abhay) CMD (/bin/echo hiya > /dev/pts/0)
Oct 24 15:18:01 rhel9-server CROND[2351]: (abhay) CMDEND (/bin/echo hiya > /dev/pts/0)
Oct 24 15:21:01 rhel9-server CROND[2363]: (abhay) CMD (/bin/echo hiya > /dev/pts/0)
Oct 24 15:21:01 rhel9-server CROND[2361]: (abhay) CMDEND (/bin/echo hiya > /dev/pts/0)
```

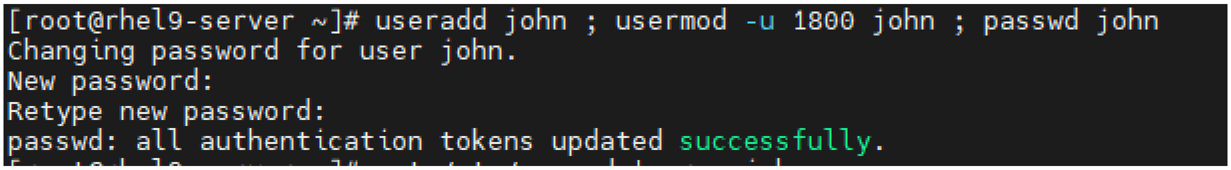
This job will run daily at every 3-minuts. If we want to remove this job, we need to use command crontab -r. It is shown in image below-



```
[abhay@rhel9-server ~]$ crontab -r
[abhay@rhel9-server ~]$
[abhay@rhel9-server ~]$
[abhay@rhel9-server ~]$ crontab -l
no crontab for abhay
[abhay@rhel9-server ~]$
```

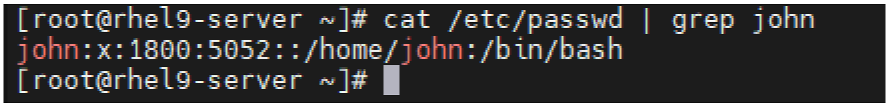
2. Steps: -

Create user john with uid 1800 & set password thuctive-



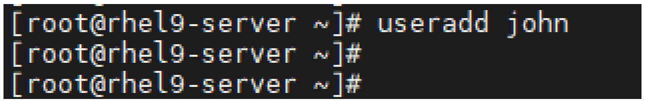
```
[root@rhel9-server ~]# useradd john ; usermod -u 1800 john ; passwd john
Changing password for user john.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
```

Verify it in /etc/passwd file as shown below-



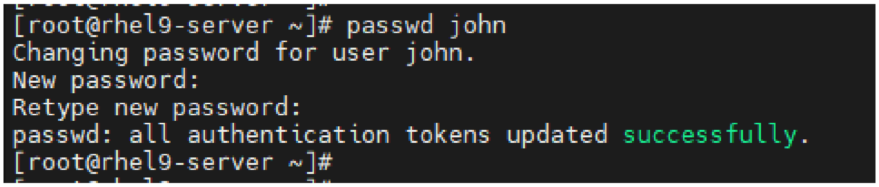
```
[root@rhel9-server ~]# cat /etc/passwd | grep john
john:x:1800:5052::/home/john:/bin/bash
[root@rhel9-server ~]#
```

Or, create user john as shown below-



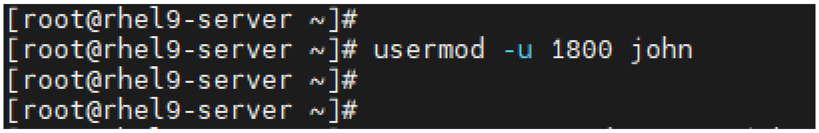
```
[root@rhel9-server ~]# useradd john
[root@rhel9-server ~]#
[root@rhel9-server ~]#
```

Set password thuctive-



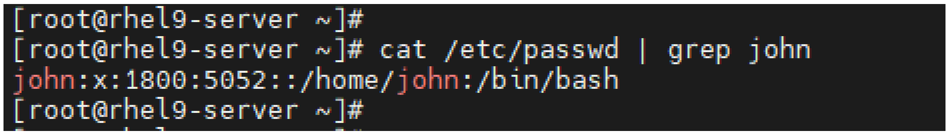
```
[root@rhel9-server ~]# passwd john
Changing password for user john.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
[root@rhel9-server ~]#
```

Set its uid 1800-



```
[root@rhel9-server ~]#
[root@rhel9-server ~]# usermod -u 1800 john
[root@rhel9-server ~]#
[root@rhel9-server ~]#
```

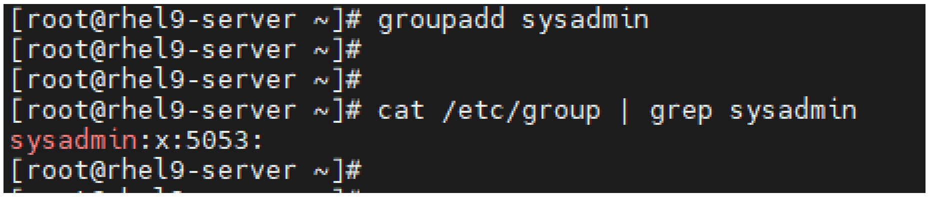
Verify it in /etc/passwd file as shown below-



```
[root@rhel9-server ~]#
[root@rhel9-server ~]# cat /etc/passwd | grep john
john:x:1800:5052::/home/john:/bin/bash
[root@rhel9-server ~]#
```

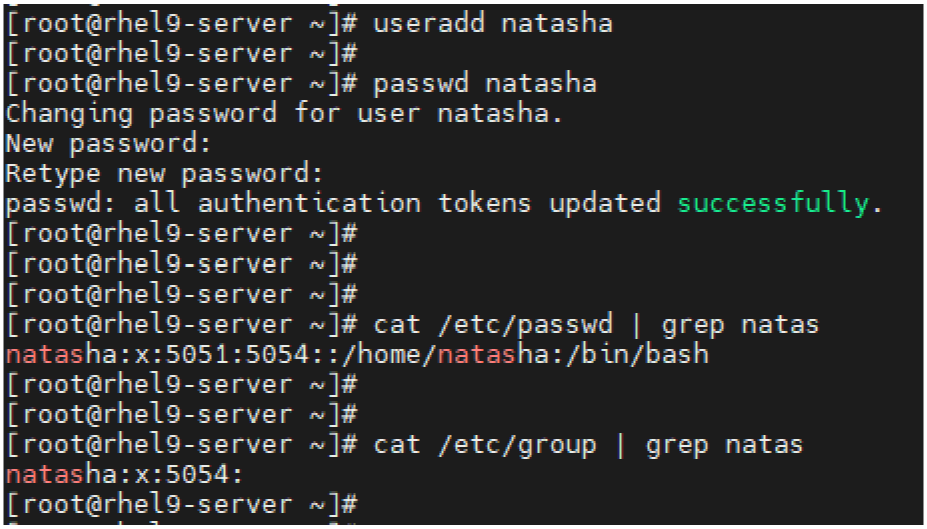
3. Steps: -

Create a group names sysadmin using groupadd command & verify it in /etc/group file-



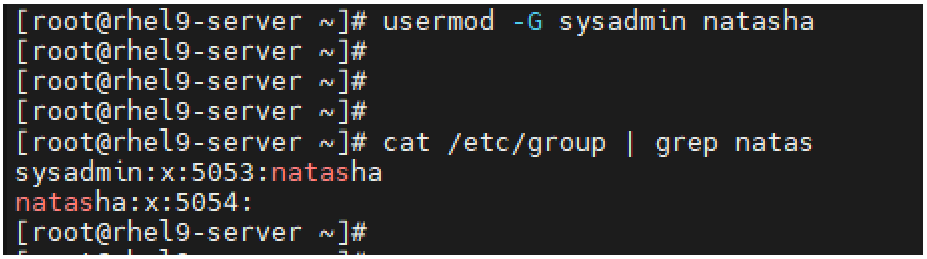
```
[root@rhel9-server ~]# groupadd sysadmin
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# cat /etc/group | grep sysadmin
sysadmin:x:5053:
[root@rhel9-server ~]#
```

Create a user natasha, set password thuctive, verify it in /etc/passwd & /etc/group file-



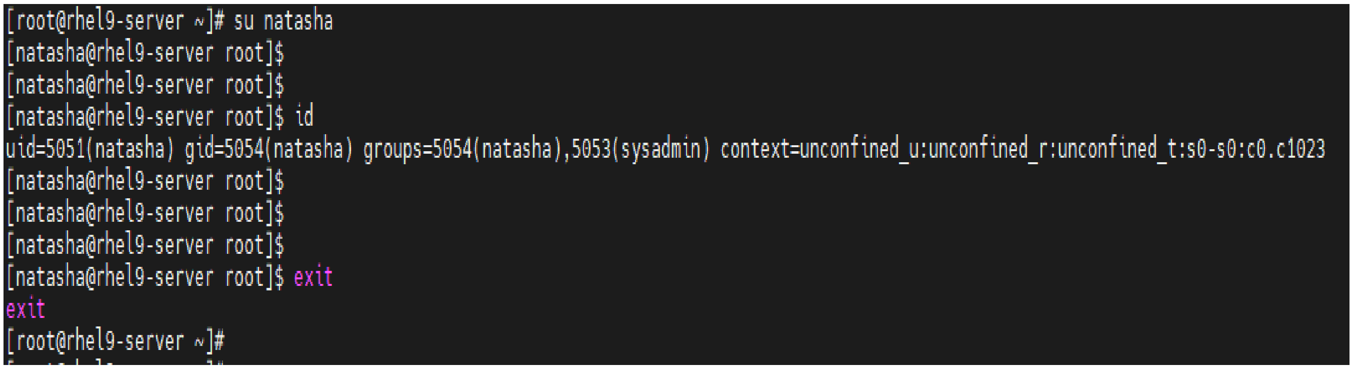
```
[root@rhel9-server ~]# useradd natasha
[root@rhel9-server ~]#
[root@rhel9-server ~]# passwd natasha
Changing password for user natasha.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# cat /etc/passwd | grep natas
natasha:x:5051:5054::/home/natasha:/bin/bash
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# cat /etc/group | grep natas
natasha:x:5054:
[root@rhel9-server ~]#
```

Add natasha in sysadmin group (secondary) & verify it in /etc/group file as shown below-



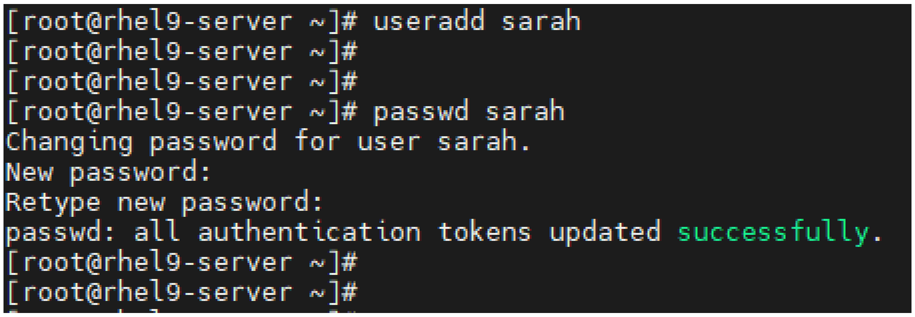
```
[root@rhel9-server ~]# usermod -G sysadmin natasha
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# cat /etc/group | grep natas
sysadmin:x:5053:natasha
natasha:x:5054:
[root@rhel9-server ~]#
```

Alternatively, we can login with natasha user & use id command to check primary & secondary group as shown below-



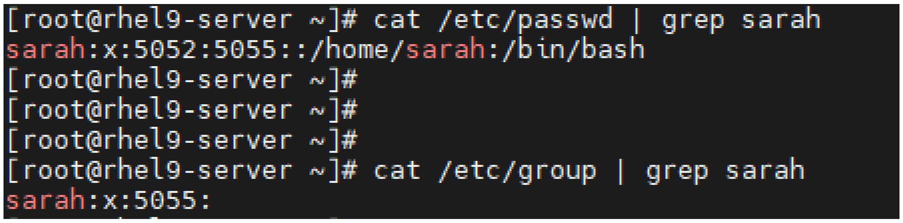
```
[root@rhel9-server ~]# su natasha
[natasha@rhel9-server root]$
[natasha@rhel9-server root]$
[natasha@rhel9-server root]$ id
uid=5051(natasha) gid=5054(natasha) groups=5054(natasha),5053(sysadmin) context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023
[natasha@rhel9-server root]$
[natasha@rhel9-server root]$
[natasha@rhel9-server root]$
[natasha@rhel9-server root]$ exit
exit
[root@rhel9-server ~]#
```

Now create another user sarah, set password thuctive as shown below-



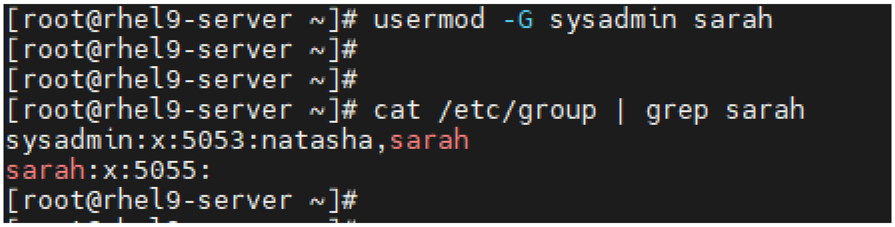
```
[root@rhel9-server ~]# useradd sarah
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# passwd sarah
Changing password for user sarah.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
[root@rhel9-server ~]#
[root@rhel9-server ~]#
```

Verify it in /etc/passwd & /etc/group file-



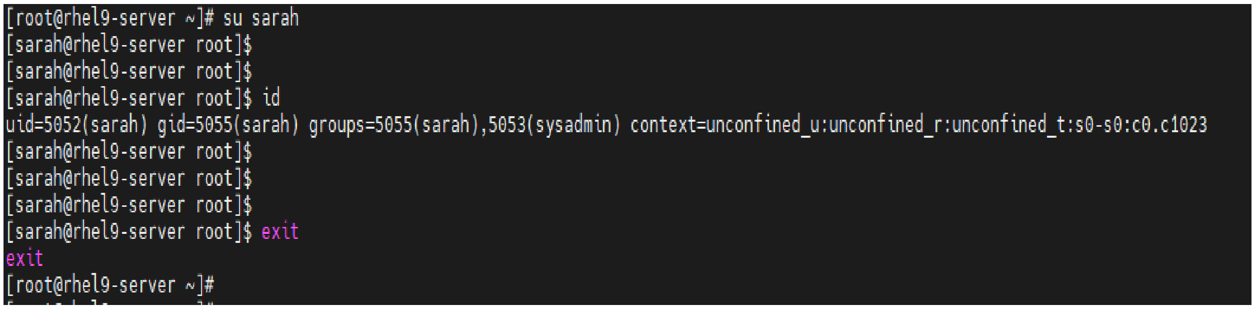
```
[root@rhel9-server ~]# cat /etc/passwd | grep sarah
sarah:x:5052:5055::/home/sarah:/bin/bash
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# cat /etc/group | grep sarah
sarah:x:5055:
```

Add sarah in sysadmin group (secondary) & verify it in /etc/group file as shown below-



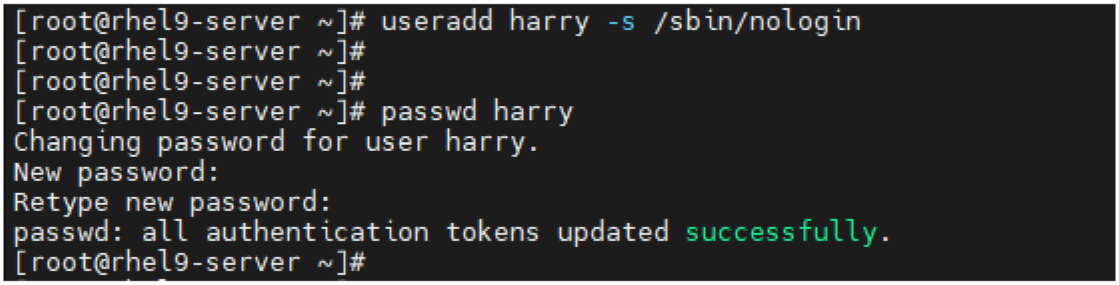
```
[root@rhel9-server ~]# usermod -G sysadmin sarah
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# cat /etc/group | grep sarah
sysadmin:x:5053:natasha,sarah
sarah:x:5055:
[root@rhel9-server ~]#
```

Alternatively, we can login with natasha user & use id command to check primary & secondary group as shown below-



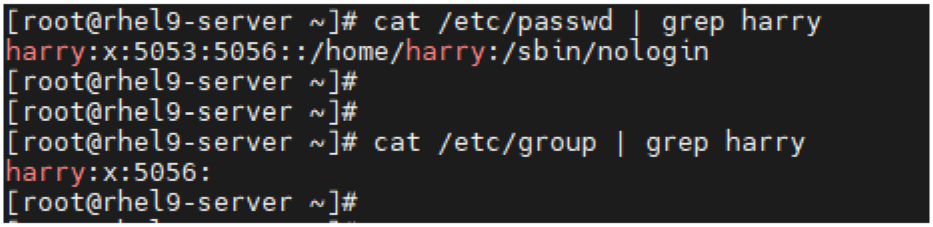
```
[root@rhel9-server ~]# su sarah
[sarah@rhel9-server root]$
[sarah@rhel9-server root]$
[sarah@rhel9-server root]$ id
uid=5052(sarah) gid=5055(sarah) groups=5055(sarah),5053(sysadmin) context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023
[sarah@rhel9-server root]$
[sarah@rhel9-server root]$
[sarah@rhel9-server root]$
[sarah@rhel9-server root]$ exit
exit
[root@rhel9-server ~]#
```

Now adding another user harry who will not have access to an interactive shell on the system & set the password thuctive-



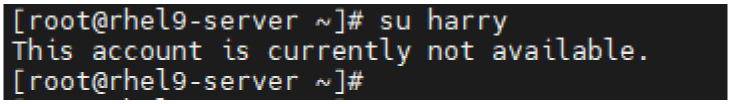
```
[root@rhel9-server ~]# useradd harry -s /sbin/nologin
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# passwd harry
Changing password for user harry.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
[root@rhel9-server ~]#
```

Verify it in /etc/passwd & /etc/group file-



```
[root@rhel9-server ~]# cat /etc/passwd | grep harry
harry:x:5053:5056::/home/harry:/sbin/nologin
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# cat /etc/group | grep harry
harry:x:5056:
[root@rhel9-server ~]#
```

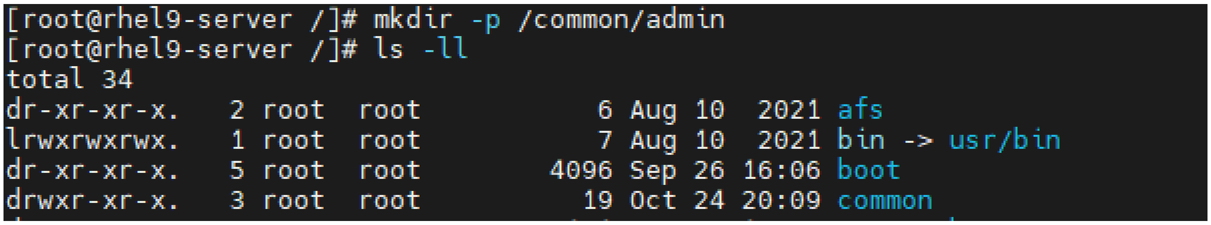
This harry user is not be able to access interactive shell as shown below-



```
[root@rhel9-server ~]# su harry
This account is currently not available.
[root@rhel9-server ~]#
```

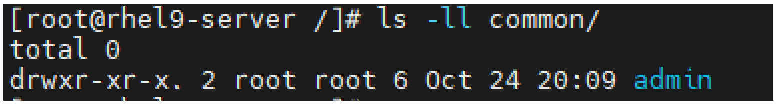
4. Steps: -

Create admin directory inside /common directory-



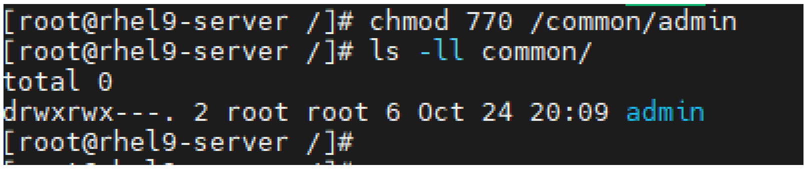
```
[root@rhel9-server /]# mkdir -p /common/admin
[root@rhel9-server /]# ls -ll
total 34
dr-xr-xr-x.   2 root  root           6 Aug 10  2021 afs
lrwxrwxrwx.   1 root  root           7 Aug 10  2021 bin -> usr/bin
dr-xr-xr-x.   5 root  root        4096 Sep 26 16:06 boot
drwxr-xr-x.   3 root  root          19 Oct 24 20:09 common
```

Check admin directory permission as shown below-



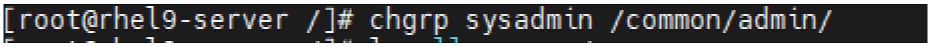
```
[root@rhel9-server /]# ls -ll common/
total 0
drwxr-xr-x. 2 root root 6 Oct 24 20:09 admin
```

Change admin directory permission to 770 as group owner should have read, write & execute permission-



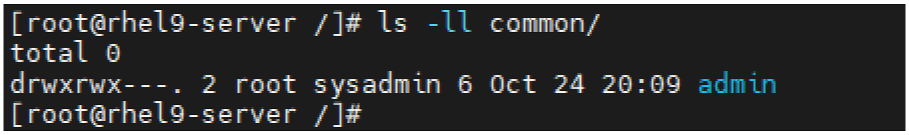
```
[root@rhel9-server /]# chmod 770 /common/admin
[root@rhel9-server /]# ls -ll common/
total 0
drwxrwx---. 2 root root 6 Oct 24 20:09 admin
[root@rhel9-server /]#
```

Provide group ownership of this directory to sysadmin group-



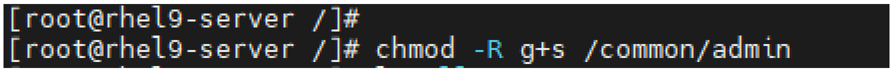
```
[root@rhel9-server /]# chgrp sysadmin /common/admin/
```

Now, verify it using ls -ll common command-



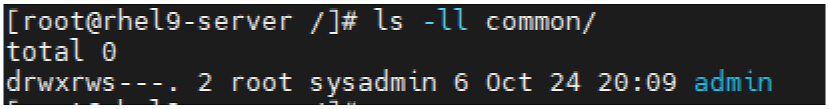
```
[root@rhel9-server /]# ls -ll common/
total 0
drwxrwx---. 2 root sysadmin 6 Oct 24 20:09 admin
[root@rhel9-server /]#
```

To have files/directory created inside admin directory with sysadmin group membership by default, we will use special permission sgid along with recursive functionality-



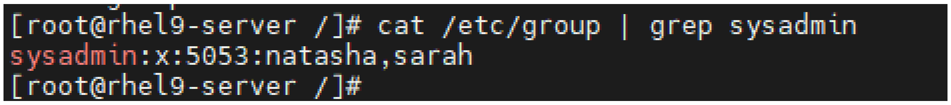
```
[root@rhel9-server /]#
[root@rhel9-server /]# chmod -R g+s /common/admin
```

Now verify it using ls -ll common command-



```
[root@rhel9-server /]# ls -ll common/
total 0
drwxrws---. 2 root sysadmin 6 Oct 24 20:09 admin
```

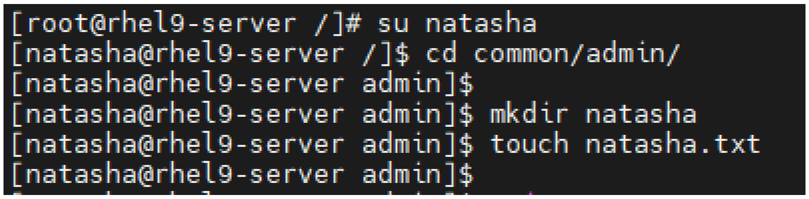
Check the members of this sysadmin group-



```
[root@rhel9-server /]# cat /etc/group | grep sysadmin
sysadmin:x:5053:natasha,sarah
[root@rhel9-server /]#
```

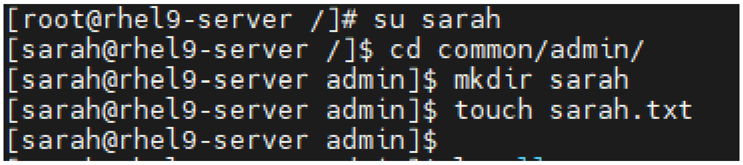
This shows natasha & sarah are members of this group.

Login with user natasha & create some file/directory-



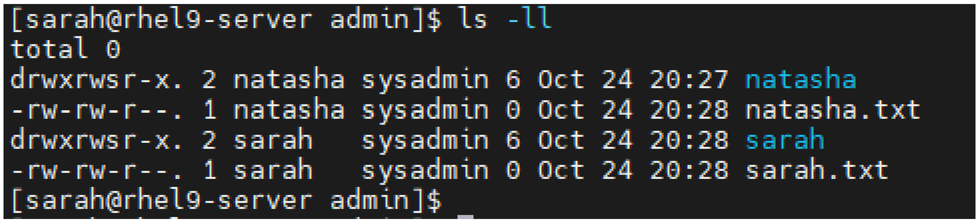
```
[root@rhel9-server /]# su natasha
[natasha@rhel9-server /]$ cd common/admin/
[natasha@rhel9-server admin]$
[natasha@rhel9-server admin]$ mkdir natasha
[natasha@rhel9-server admin]$ touch natasha.txt
[natasha@rhel9-server admin]$
```

Similarly, login with user sarah & create some file/directory-



```
[root@rhel9-server /]# su sarah
[sarah@rhel9-server /]$ cd common/admin/
[sarah@rhel9-server admin]$ mkdir sarah
[sarah@rhel9-server admin]$ touch sarah.txt
[sarah@rhel9-server admin]$
```

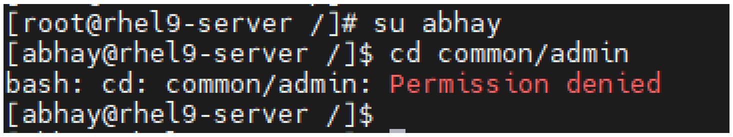
Now verify it using ls -ll command & check whether files/directories created have sysadmin as group owner or not-



```
[sarah@rhel9-server admin]$ ls -ll
total 0
drwxrwsr-x. 2 natasha sysadmin 6 Oct 24 20:27 natasha
-rw-rw-r--. 1 natasha sysadmin 0 Oct 24 20:28 natasha.txt
drwxrwsr-x. 2 sarah   sysadmin 6 Oct 24 20:28 sarah
-rw-rw-r--. 1 sarah   sysadmin 0 Oct 24 20:28 sarah.txt
[sarah@rhel9-server admin]$
```

All the files/directories inside /common/admin has sysadmin as group owner.

Now, login with other user & see if it can perform any operation (read, write or execute) on /common/admin directory or not-

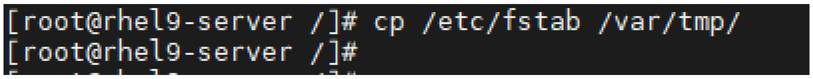


```
[root@rhel9-server /]# su abhay
[abhay@rhel9-server /]$ cd common/admin
bash: cd: common/admin: Permission denied
[abhay@rhel9-server /]$
```

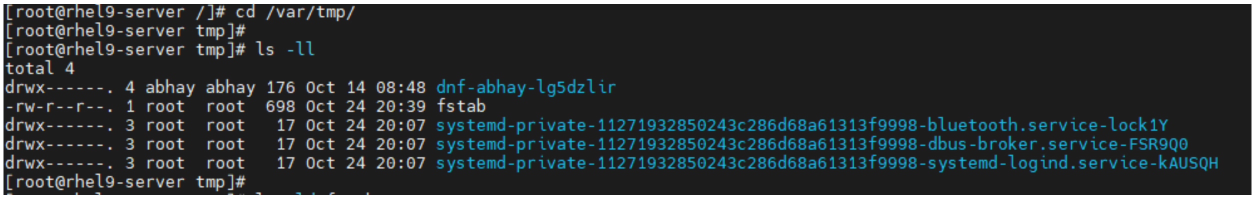
While using execute function with other user, it is showing “Permission denied”.

5. Steps: -

Copy the file /etc/fstab to /var/tmp-

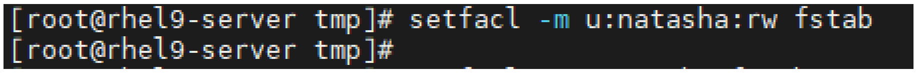


```
[root@rhel9-server /]# cp /etc/fstab /var/tmp/
[root@rhel9-server /]#
```



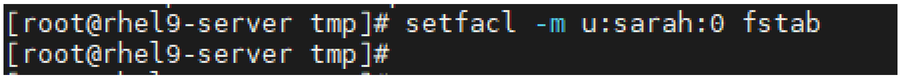
```
[root@rhel9-server /]# cd /var/tmp/
[root@rhel9-server tmp]#
[root@rhel9-server tmp]# ls -ll
total 4
drwx------. 4 abhay abhay 176 Oct 14 08:48 dnf-abhay-lg5dzlir
-rw-r--r--. 1 root  root  698 Oct 24 20:39 fstab
drwx------. 3 root  root   17 Oct 24 20:07 systemd-private-11271932850243c286d68a61313f9998-bluetooth.service-lock1Y
drwx------. 3 root  root   17 Oct 24 20:07 systemd-private-11271932850243c286d68a61313f9998-dbus-broker.service-FSR9Q0
drwx------. 3 root  root   17 Oct 24 20:07 systemd-private-11271932850243c286d68a61313f9998-systemd-logind.service-kAUSQH
[root@rhel9-server tmp]#
```

Set read, write permission for user natasha on this file-



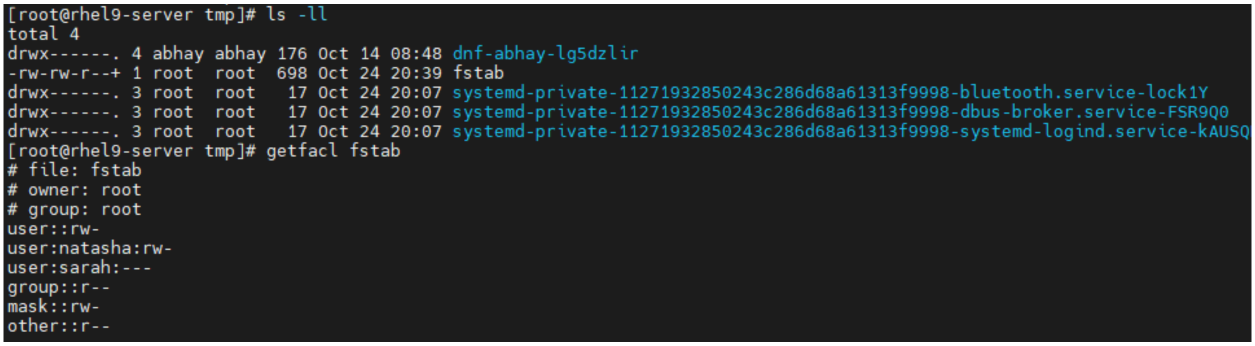
```
[root@rhel9-server tmp]# setfacl -m u:natasha:rw fstab
[root@rhel9-server tmp]#
```

Restrict read, write permission for user sarah-



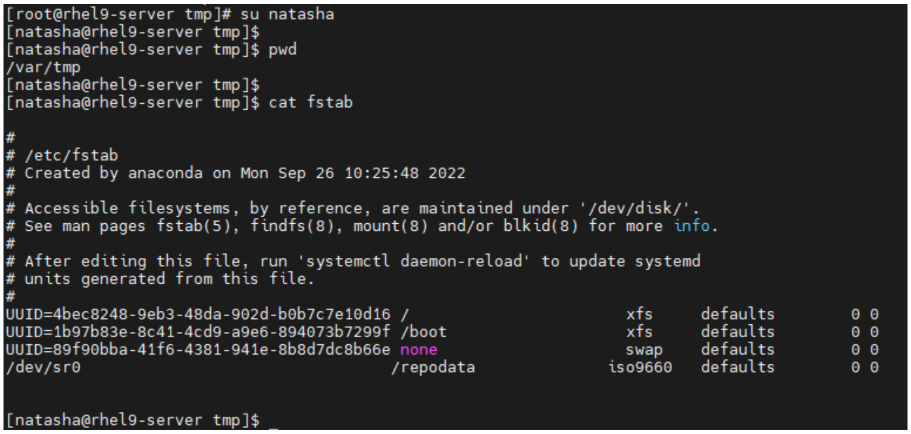
```
[root@rhel9-server tmp]# setfacl -m u:sarah:0 fstab
[root@rhel9-server tmp]#
```

Now check file permission-

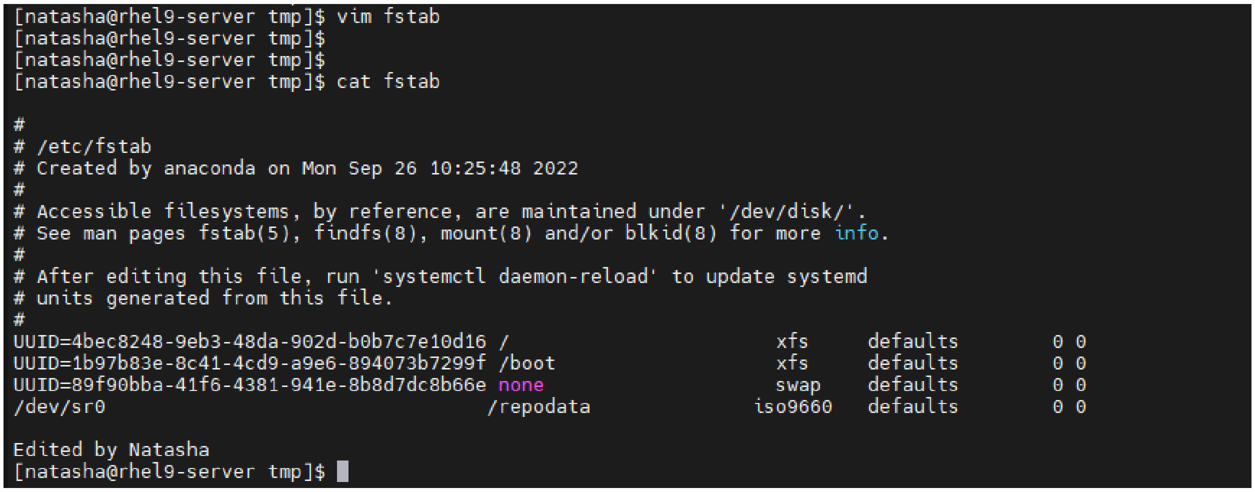


```
[root@rhel9-server tmp]# ls -ll
total 4
drwx------. 4 abhay abhay 176 Oct 14 08:48 dnf-abhay-lg5dzlir
-rw-rw-r--+ 1 root  root  698 Oct 24 20:39 fstab
drwx------. 3 root  root   17 Oct 24 20:07 systemd-private-11271932850243c286d68a61313f9998-bluetooth.service-lock1Y
drwx------. 3 root  root   17 Oct 24 20:07 systemd-private-11271932850243c286d68a61313f9998-dbus-broker.service-FSR9Q0
drwx------. 3 root  root   17 Oct 24 20:07 systemd-private-11271932850243c286d68a61313f9998-systemd-logind.service-kAUSQ
[root@rhel9-server tmp]# getfacl fstab
# file: fstab
# owner: root
# group: root
user::rw-
user:natasha:rw-
user:sarah:---
group::r--
mask::rw-
other::r--
```

User natasha is able to read & write as shown below-

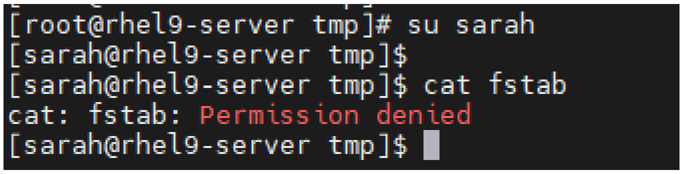


```
[root@rhel9-server tmp]# su natasha
[natasha@rhel9-server tmp]$
[natasha@rhel9-server tmp]$ pwd
/var/tmp
[natasha@rhel9-server tmp]$
[natasha@rhel9-server tmp]$ cat fstab

#
# /etc/fstab
# Created by anaconda on Mon Sep 26 10:25:48 2022
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
UUID=4bec8248-9eb3-48da-902d-b0b7c7e10d16 /                       xfs     defaults        0 0
UUID=1b97b83e-8c41-4cd9-a9e6-894073b7299f /boot                   xfs     defaults        0 0
UUID=89f90bba-41f6-4381-941e-8b8d7dc8b66e none                    swap    defaults        0 0
/dev/sr0                                 /repodata              iso9660   defaults        0 0


[natasha@rhel9-server tmp]$ _
```



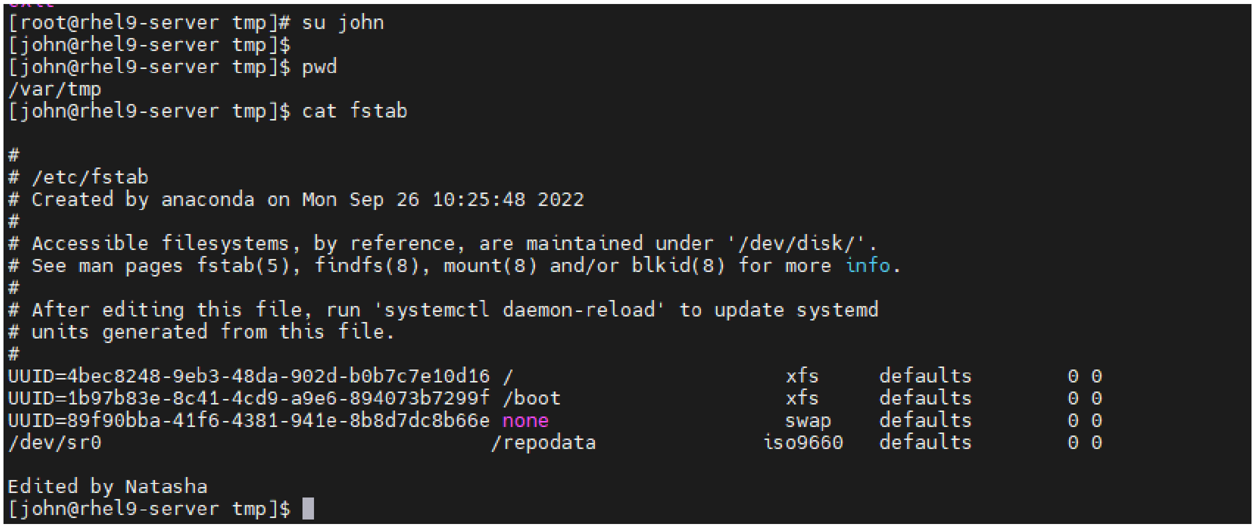
```
[natasha@rhel9-server tmp]$ vim fstab
[natasha@rhel9-server tmp]$
[natasha@rhel9-server tmp]$
[natasha@rhel9-server tmp]$ cat fstab

#
# /etc/fstab
# Created by anaconda on Mon Sep 26 10:25:48 2022
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
UUID=4bec8248-9eb3-48da-902d-b0b7c7e10d16 /                       xfs     defaults        0 0
UUID=1b97b83e-8c41-4cd9-a9e6-894073b7299f /boot                   xfs     defaults        0 0
UUID=89f90bba-41f6-4381-941e-8b8d7dc8b66e none                    swap    defaults        0 0
/dev/sr0                                 /repodata              iso9660   defaults        0 0

Edited by Natasha
[natasha@rhel9-server tmp]$
```

User sarah doesn’t have read, write access as shown below-

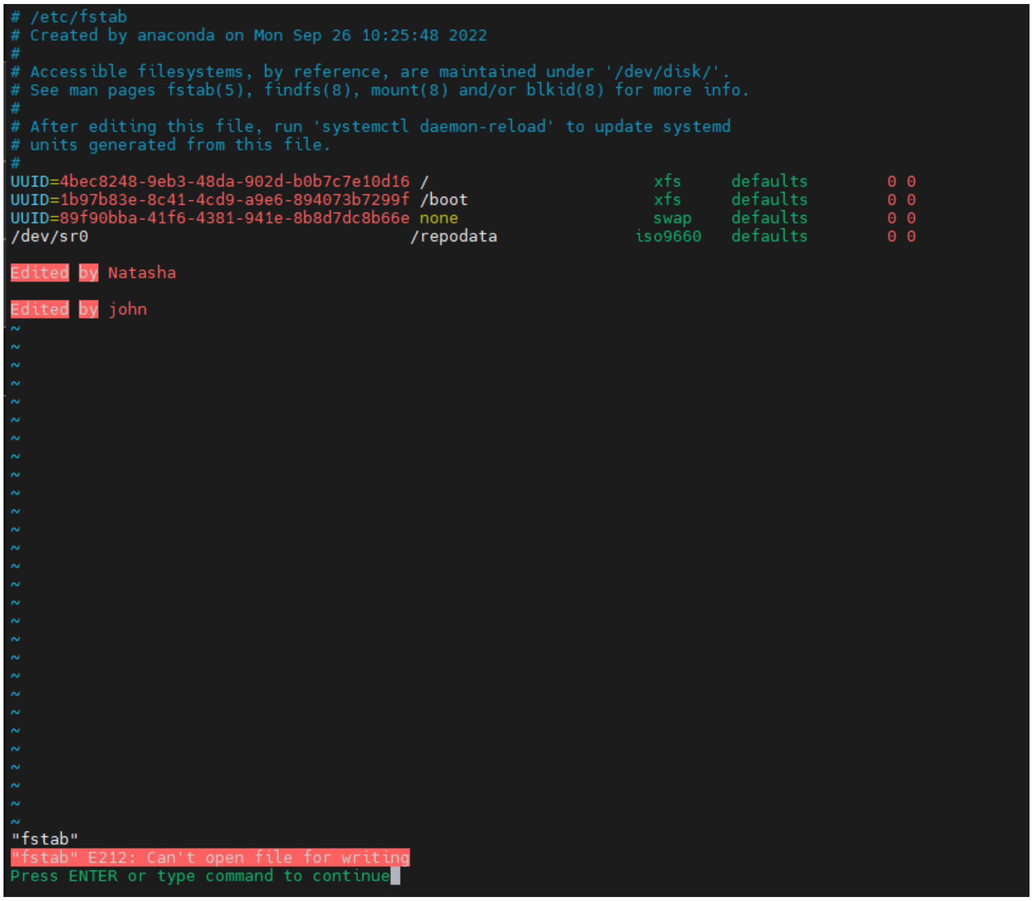


```
[root@rhel9-server tmp]# su sarah
[sarah@rhel9-server tmp]$
[sarah@rhel9-server tmp]$ cat fstab
cat: fstab: Permission denied
[sarah@rhel9-server tmp]$
```

Another user, john is able to read, but not write-



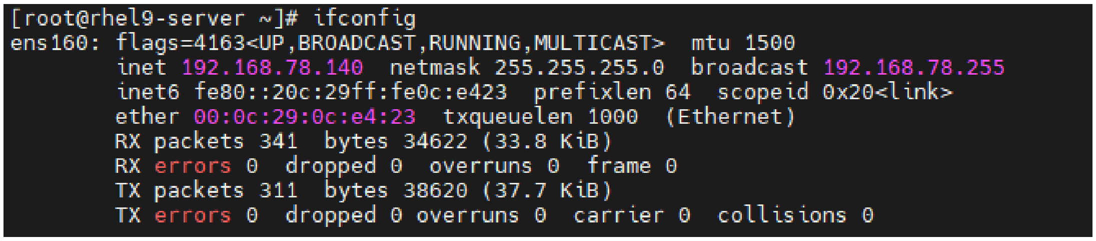
```
[root@rhel9-server tmp]# su john
[john@rhel9-server tmp]$
[john@rhel9-server tmp]$ pwd
/var/tmp
[john@rhel9-server tmp]$ cat fstab

#
# /etc/fstab
# Created by anaconda on Mon Sep 26 10:25:48 2022
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
UUID=4bec8248-9eb3-48da-902d-b0b7c7e10d16 /                       xfs     defaults        0 0
UUID=1b97b83e-8c41-4cd9-a9e6-894073b7299f /boot                   xfs     defaults        0 0
UUID=89f90bba-41f6-4381-941e-8b8d7dc8b66e none                    swap    defaults        0 0
/dev/sr0                                 /repodata              iso9660   defaults        0 0

Edited by Natasha
[john@rhel9-server tmp]$
```



```
# /etc/fstab
# Created by anaconda on Mon Sep 26 10:25:48 2022
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
UUID=4bec8248-9eb3-48da-902d-b0b7c7e10d16 /                       xfs     defaults        0 0
UUID=1b97b83e-8c41-4cd9-a9e6-894073b7299f /boot                   xfs     defaults        0 0
UUID=89f90bba-41f6-4381-941e-8b8d7dc8b66e none                    swap    defaults        0 0
/dev/sr0                                 /repodata              iso9660   defaults        0 0

Edited by Natasha

Edited by john
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
"fstab"
"fstab" E212: Can't open file for writing
Press ENTER or type command to continue
```

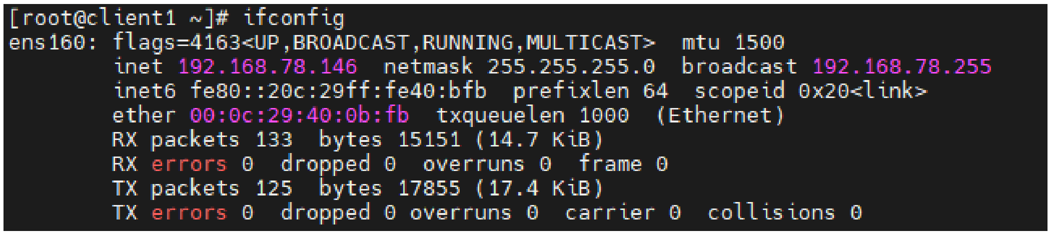
6. Steps: -

Check server IP-



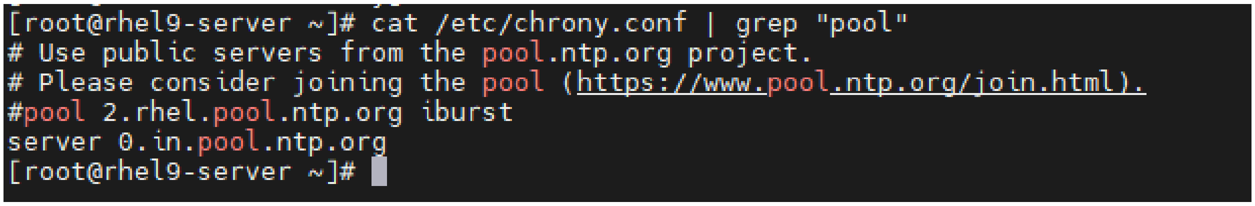
```
[root@rhel9-server ~]# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.78.140  netmask 255.255.255.0  broadcast 192.168.78.255
        inet6 fe80::20c:29ff:fe0c:e423  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:0c:e4:23  txqueuelen 1000  (Ethernet)
        RX packets 341  bytes 34622 (33.8 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 311  bytes 38620 (37.7 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Check client IP-



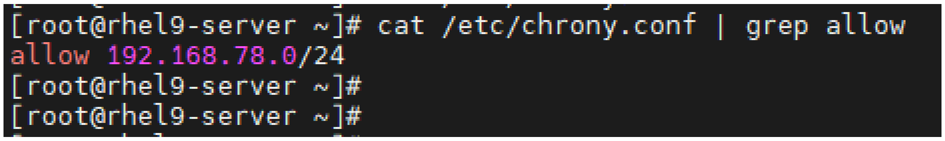
```
[root@client1 ~]# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.78.146  netmask 255.255.255.0  broadcast 192.168.78.255
        inet6 fe80::20c:29ff:fe40:bfb  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:40:0b:fb  txqueuelen 1000  (Ethernet)
        RX packets 133  bytes 15151 (14.7 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 125  bytes 17855 (17.4 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Using one of India NTP server url at server side in /etc/chrony.conf as shown below-



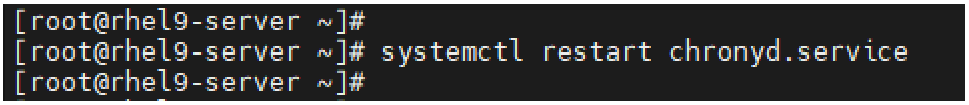
```
[root@rhel9-server ~]# cat /etc/chrony.conf | grep "pool"
# Use public servers from the pool.ntp.org project.
# Please consider joining the pool (https://www.pool.ntp.org/join.html).
#pool 2.rhel.pool.ntp.org iburst
server 0.in.pool.ntp.org
[root@rhel9-server ~]#
```

Have allowed 192.168.78.0/24 network for NTP configuration at server side-



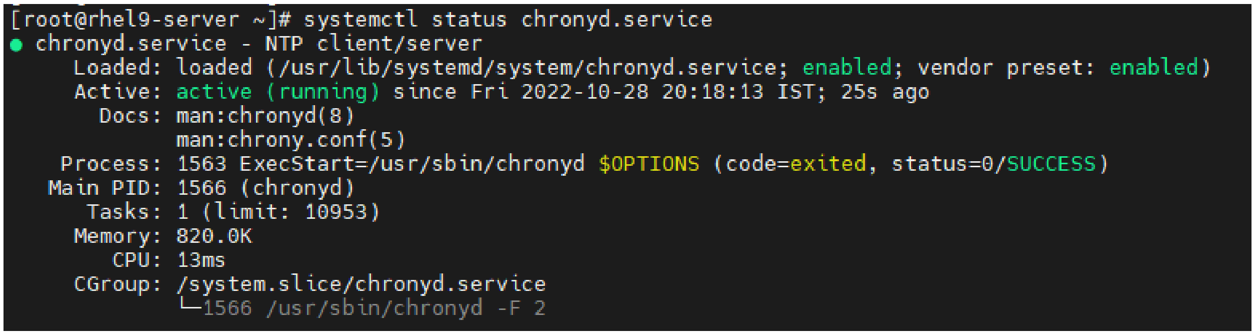
```
[root@rhel9-server ~]# cat /etc/chrony.conf | grep allow
allow 192.168.78.0/24
[root@rhel9-server ~]#
[root@rhel9-server ~]#
```

Now restart chronyd service at server side-



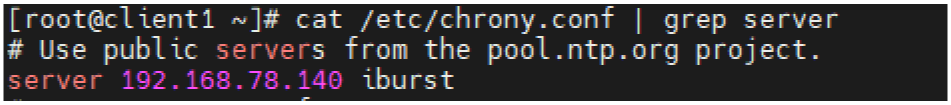
```
[root@rhel9-server ~]#
[root@rhel9-server ~]# systemctl restart chronyd.service
[root@rhel9-server ~]#
```

Check the chronyd service status as shown below-



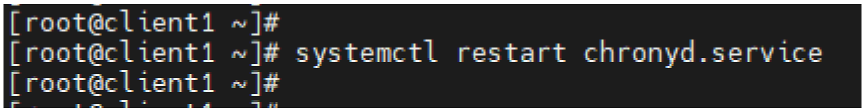
```
[root@rhel9-server ~]# systemctl status chronyd.service
● chronyd.service - NTP client/server
     Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enabled; vendor preset: enabled)
     Active: active (running) since Fri 2022-10-28 20:18:13 IST; 25s ago
       Docs: man:chronyd(8)
             man:chrony.conf(5)
    Process: 1563 ExecStart=/usr/sbin/chronyd $OPTIONS (code=exited, status=0/SUCCESS)
   Main PID: 1566 (chronyd)
      Tasks: 1 (limit: 10953)
     Memory: 820.0K
        CPU: 13ms
     CGroup: /system.slice/chronyd.service
             └─1566 /usr/sbin/chronyd -F 2
```

Now add 192.168.78.140 as NTP server in /etc/chrony.conf file at client side as shown below-



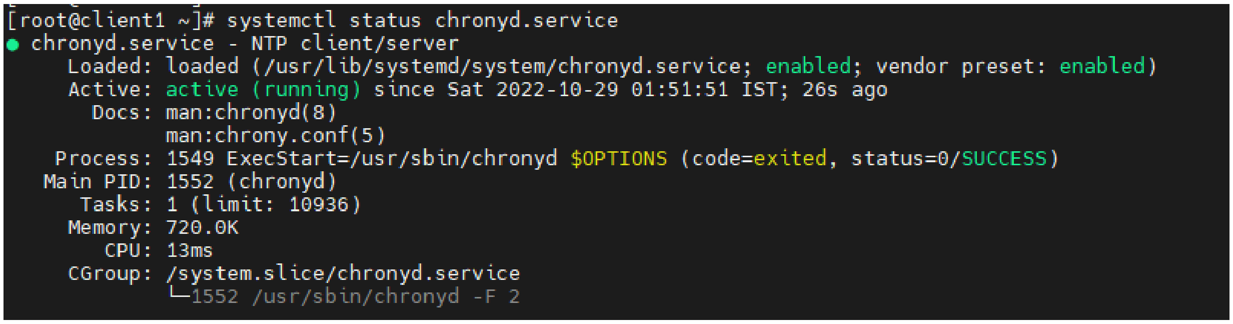
```
[root@client1 ~]# cat /etc/chrony.conf | grep server
# Use public servers from the pool.ntp.org project.
server 192.168.78.140 iburst
```

Restart chronyd service at client side-



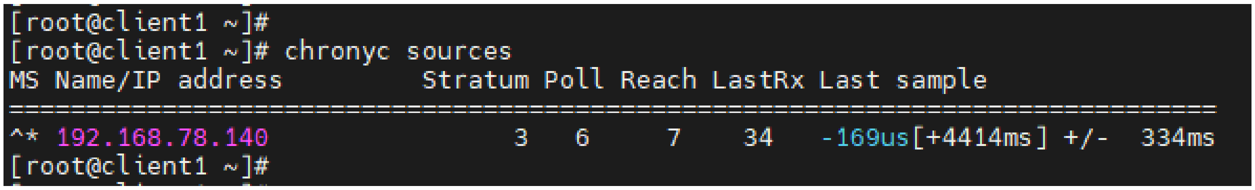
```
[root@client1 ~]#
[root@client1 ~]# systemctl restart chronyd.service
[root@client1 ~]#
```

Check the chronyd service status as shown below-



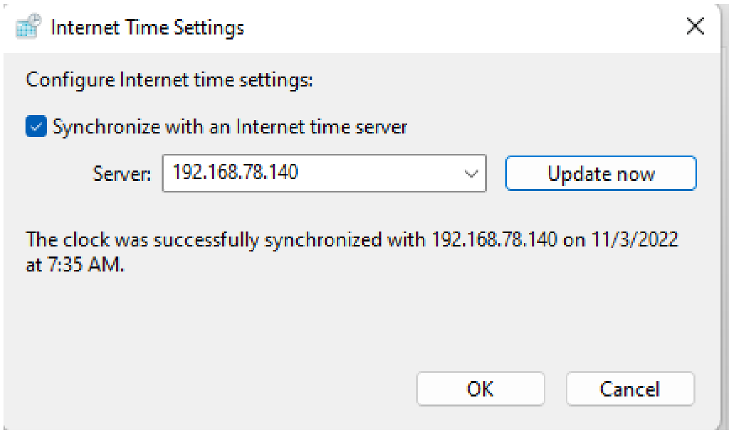
```
[root@client1 ~]# systemctl status chronyd.service
● chronyd.service - NTP client/server
     Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enabled; vendor preset: enabled)
     Active: active (running) since Sat 2022-10-29 01:51:51 IST; 26s ago
       Docs: man:chronyd(8)
             man:chrony.conf(5)
    Process: 1549 ExecStart=/usr/sbin/chronyd $OPTIONS (code=exited, status=0/SUCCESS)
   Main PID: 1552 (chronyd)
      Tasks: 1 (limit: 10936)
     Memory: 720.0K
        CPU: 13ms
     CGroup: /system.slice/chronyd.service
             └─1552 /usr/sbin/chronyd -F 2
```

Client will sync its clock with NTP server. We can verify NTP server source at client side as shown below-



```
[root@client1 ~]#
[root@client1 ~]# chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
===============================================================================
^* 192.168.78.140                3   6     7    34   -169us[+4414ms] +/-  334ms
[root@client1 ~]#
```

Similarly, for windows machine, we will try to sync it with the NTP server as shown below-



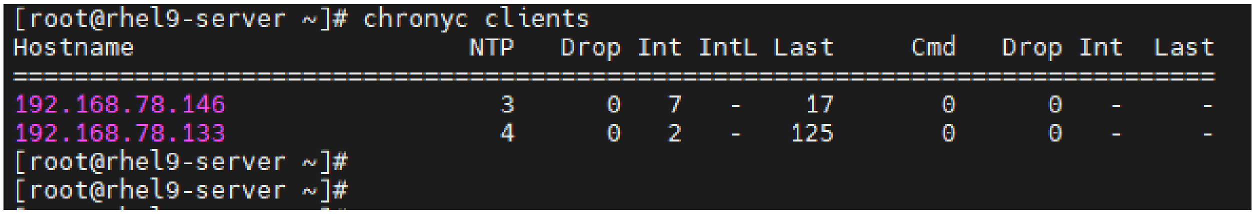
Configure Internet time settings:

☑ Synchronize with an Internet time server

Server: 192.168.78.140

The clock was successfully synchronized with 192.168.78.140 on 11/3/2022 at 7:35 AM.

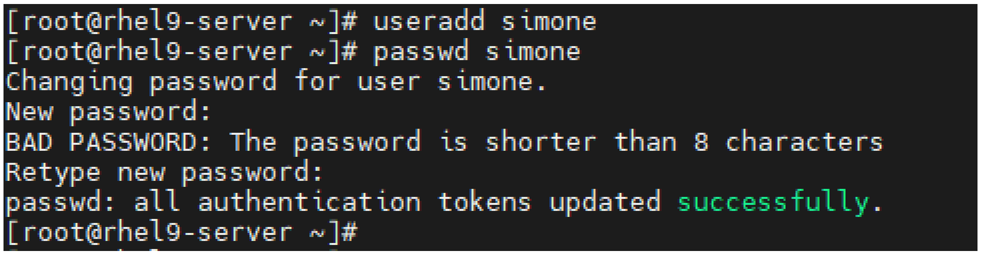
We can verify both the NTP clients at server side-



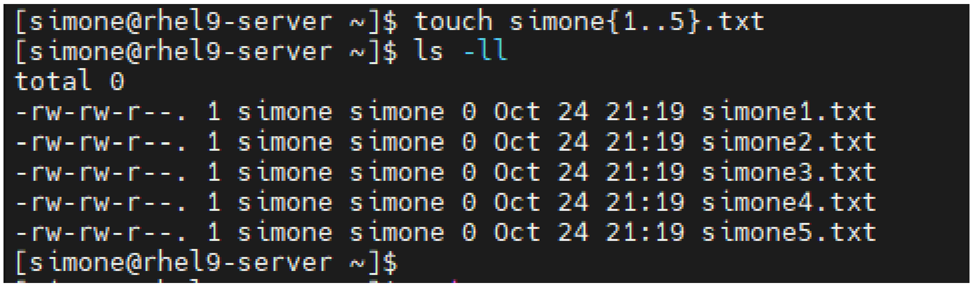
```
[root@rhel9-server ~]# chronyc clients
Hostname                      NTP   Drop Int IntL Last     Cmd   Drop Int  Last
===============================================================================
192.168.78.146                  3      0   7   -    17       0      0   -     -
192.168.78.133                  4      0   2   -   125       0      0   -     -
[root@rhel9-server ~]#
[root@rhel9-server ~]#
```

7. Steps: -

Creating user simone & some files inside its home directory-

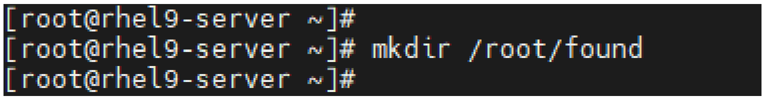


```
[root@rhel9-server ~]# useradd simone
[root@rhel9-server ~]# passwd simone
Changing password for user simone.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@rhel9-server ~]#
```



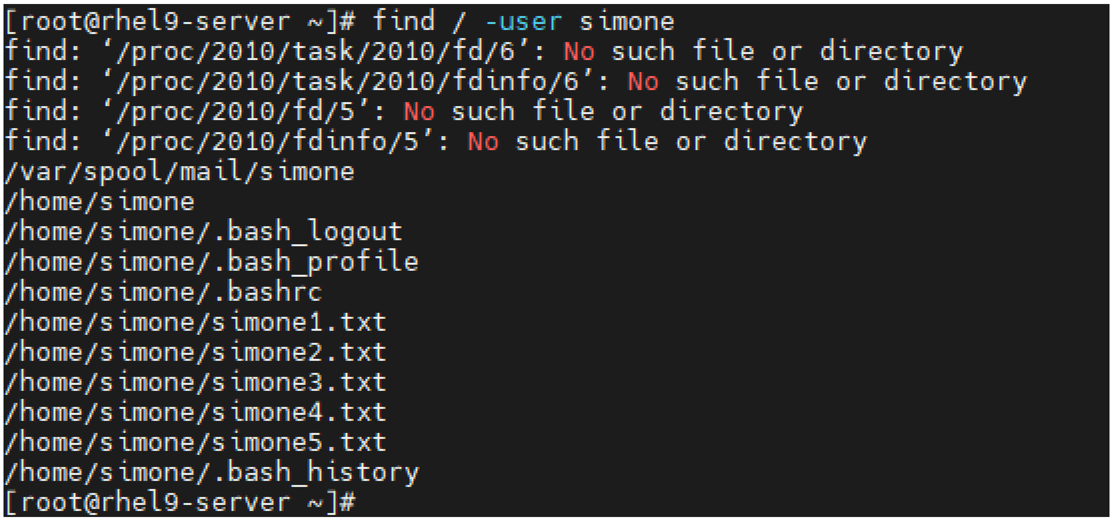
```
[simone@rhel9-server ~]$ touch simone{1..5}.txt
[simone@rhel9-server ~]$ ls -ll
total 0
-rw-rw-r--. 1 simone simone 0 Oct 24 21:19 simone1.txt
-rw-rw-r--. 1 simone simone 0 Oct 24 21:19 simone2.txt
-rw-rw-r--. 1 simone simone 0 Oct 24 21:19 simone3.txt
-rw-rw-r--. 1 simone simone 0 Oct 24 21:19 simone4.txt
-rw-rw-r--. 1 simone simone 0 Oct 24 21:19 simone5.txt
[simone@rhel9-server ~]$
```

Creating found directory inside /root-



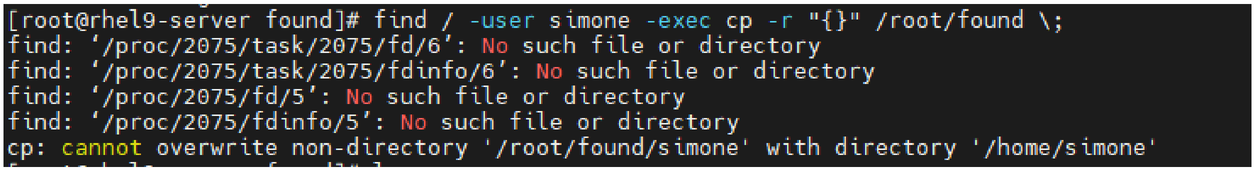
```
[root@rhel9-server ~]#
[root@rhel9-server ~]# mkdir /root/found
[root@rhel9-server ~]#
```

Find the files owned by user simone in this system-



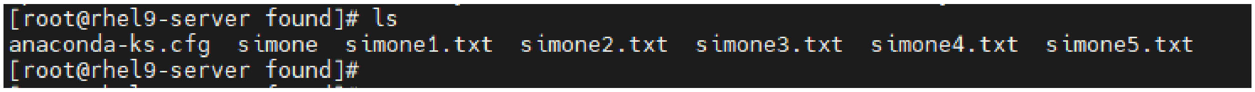
```
[root@rhel9-server ~]# find / -user simone
find: '/proc/2010/task/2010/fd/6': No such file or directory
find: '/proc/2010/task/2010/fdinfo/6': No such file or directory
find: '/proc/2010/fd/5': No such file or directory
find: '/proc/2010/fdinfo/5': No such file or directory
/var/spool/mail/simone
/home/simone
/home/simone/.bash_logout
/home/simone/.bash_profile
/home/simone/.bashrc
/home/simone/simone1.txt
/home/simone/simone2.txt
/home/simone/simone3.txt
/home/simone/simone4.txt
/home/simone/simone5.txt
/home/simone/.bash_history
[root@rhel9-server ~]#
```

Now copy these files in /root/found directory as below-



```
[root@rhel9-server found]# find / -user simone -exec cp -r "{}" /root/found \;
find: ‘/proc/2075/task/2075/fd/6’: No such file or directory
find: ‘/proc/2075/task/2075/fdinfo/6’: No such file or directory
find: ‘/proc/2075/fd/5’: No such file or directory
find: ‘/proc/2075/fdinfo/5’: No such file or directory
cp: cannot overwrite non-directory '/root/found/simone' with directory '/home/simone'
```

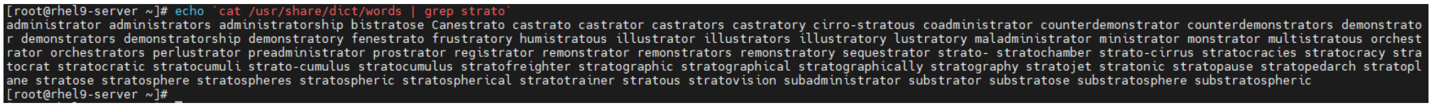
List those files-



```
[root@rhel9-server found]# ls
anaconda-ks.cfg  simone  simone1.txt  simone2.txt  simone3.txt  simone4.txt  simone5.txt
[root@rhel9-server found]#
```

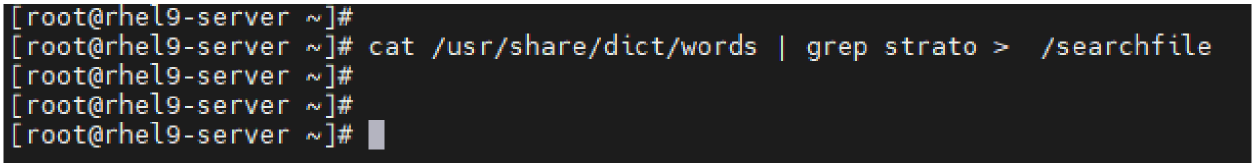
8. Steps: -

To find string “strato” inside /usr/share/dict/words-



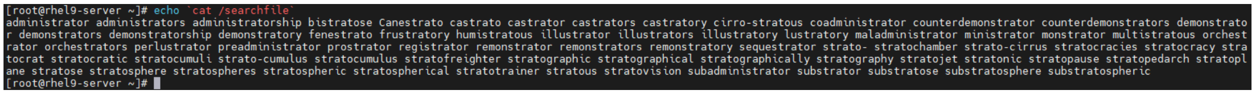
```
[root@rhel9-server ~]# echo `cat /usr/share/dict/words | grep strato`
administrator administrators administratorship bistratose Canestrato castrato castrator castrators castratory cirro-stratous coadministrator counterdemonstrator counterdemonstrators demonstrato
r demonstrators demonstratorship demonstratory fenestrato frustratory humistratous illustrator illustrators illustratory lustratory maladministrator ministrator monstrator multistratous orchest
rator orchestrators perlustrator preadministrator prostrator registrator remonstrator remonstrators remonstratory sequestrator strato- stratochamber strato-cirrus stratocracies stratocracy stra
tocrat stratocratic stratocumuli strato-cumulus stratocumulus stratofreighter stratographic stratographical stratographically stratography stratojet stratonic stratopause stratopedarch stratopl
ane stratose stratosphere stratospheres stratospheric stratospherical stratotrainer stratous stratovision subadministrator substrator substratose substratosphere substratospheric
[root@rhel9-server ~]#
```

Copy it in file named /searchfile-



```
[root@rhel9-server ~]#
[root@rhel9-server ~]# cat /usr/share/dict/words | grep strato >  /searchfile
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]#
```

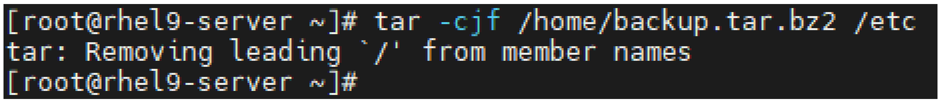
Now check the content in this /searchfile-



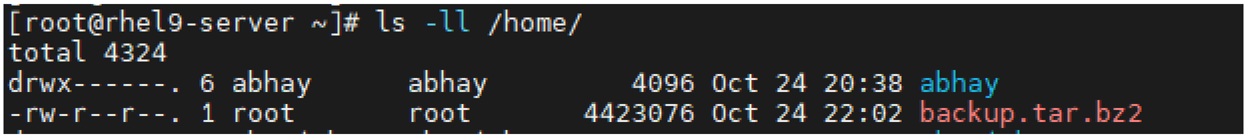
```
[root@rhel9-server ~]# echo `cat /searchfile`
administrator administrators administratorship bistratose Canestrato castrato castrator castrators castratory cirro-stratous coadministrator counterdemonstrator counterdemonstrators demonstrato
r demonstrators demonstratorship demonstratory fenestrato frustratory humistratous illustrator illustrators illustratory lustratory maladministrator ministrator monstrator multistratous orchest
rator orchestrators perlustrator preadministrator prostrator registrator remonstrator remonstrators remonstratory sequestrator strato- stratochamber strato-cirrus stratocracies stratocracy stra
tocrat stratocratic stratocumuli strato-cumulus stratocumulus stratofreighter stratographic stratographical stratographically stratography stratojet stratonic stratopause stratopedarch stratopl
ane stratose stratosphere stratospheres stratospheric stratospherical stratotrainer stratous stratovision subadministrator substrator substratose substratosphere substratospheric
[root@rhel9-server ~]#
```

12. Steps: -

Create a file backup.tar.bz2 of /etc directory in /home location & list it-

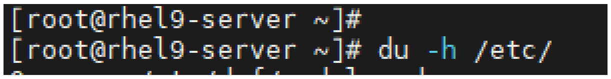


```
[root@rhel9-server ~]# tar -cjf /home/backup.tar.bz2 /etc
tar: Removing leading `/' from member names
[root@rhel9-server ~]#
```

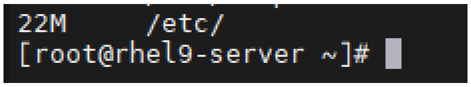


```
[root@rhel9-server ~]# ls -ll /home/
total 4324
drwx------. 6 abhay      abhay         4096 Oct 24 20:38 abhay
-rw-r--r--. 1 root       root       4423076 Oct 24 22:02 backup.tar.bz2
```

Check the total size of /etc directory as shown below-

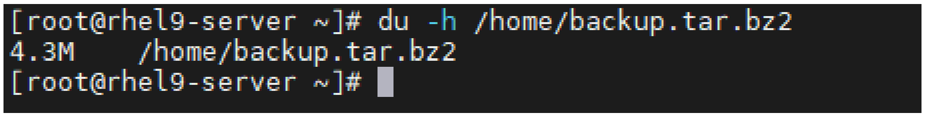


```
[root@rhel9-server ~]#
[root@rhel9-server ~]# du -h /etc/
```



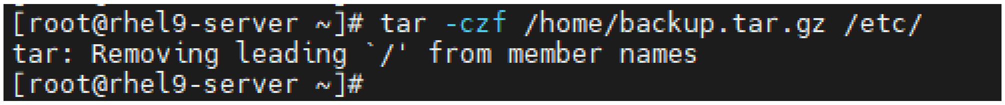
```
22M     /etc/
[root@rhel9-server ~]#
```

Check the total size of /etc after compressing & zipping it using bzip2-

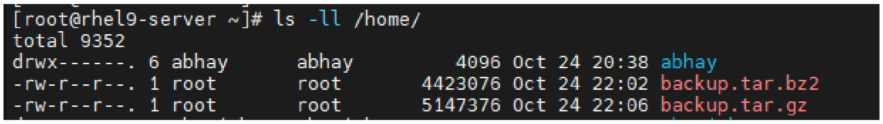


```
[root@rhel9-server ~]# du -h /home/backup.tar.bz2
4.3M    /home/backup.tar.bz2
[root@rhel9-server ~]#
```

Create a file backup.tar.gz of /etc directory in /home location & list it-

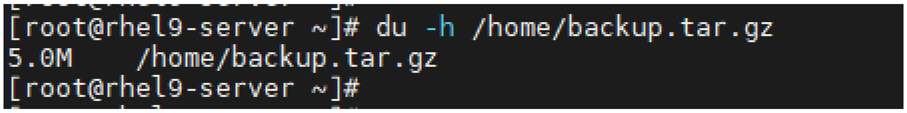


```
[root@rhel9-server ~]# tar -czf /home/backup.tar.gz /etc/
tar: Removing leading `/' from member names
[root@rhel9-server ~]#
```



```
[root@rhel9-server ~]# ls -ll /home/
total 9352
drwx------. 6 abhay      abhay         4096 Oct 24 20:38 abhay
-rw-r--r--. 1 root       root       4423076 Oct 24 22:02 backup.tar.bz2
-rw-r--r--. 1 root       root       5147376 Oct 24 22:06 backup.tar.gz
```

Check the total size of /etc after compressing & zipping it using gzip-



```
[root@rhel9-server ~]# du -h /home/backup.tar.gz
5.0M    /home/backup.tar.gz
[root@rhel9-server ~]#
```