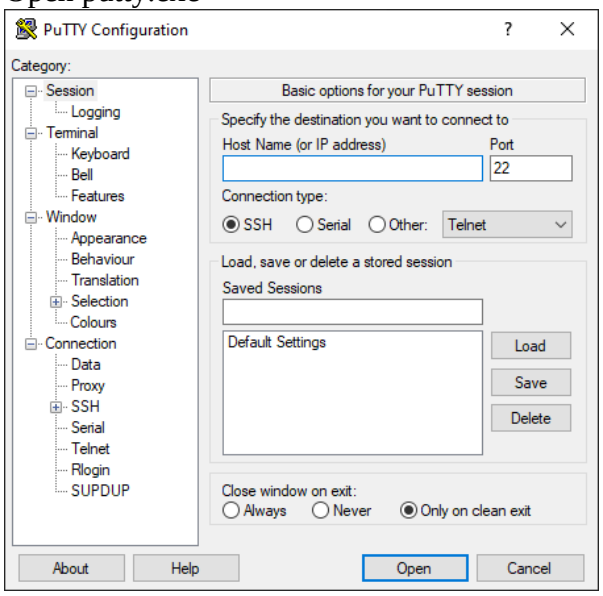
Date: 11.06.2025

# Shell Scripting for given use cases

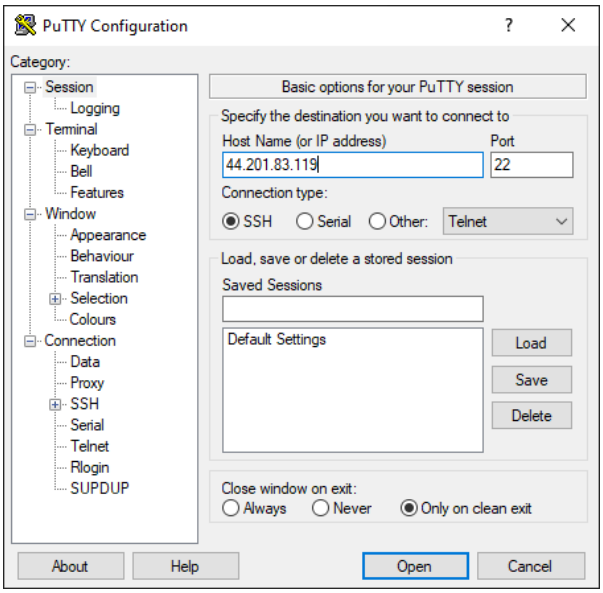
## Contents

# 1. Using PuTTY to connect to AWS EC2 Instance

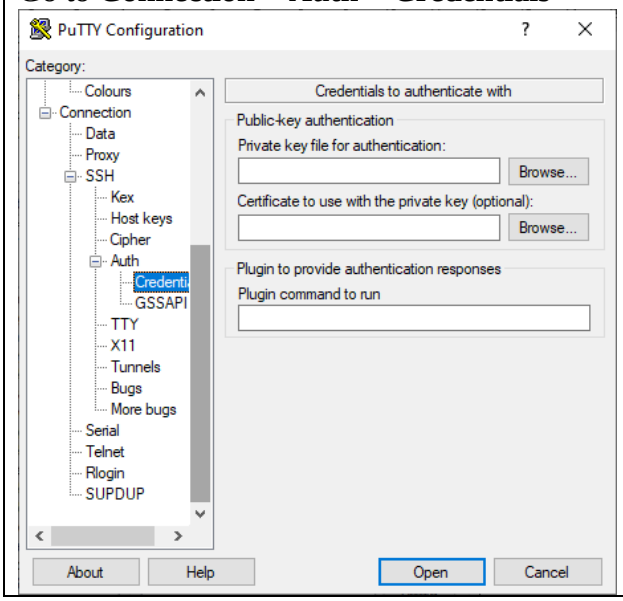
**Step 1:**
Open putty.exe



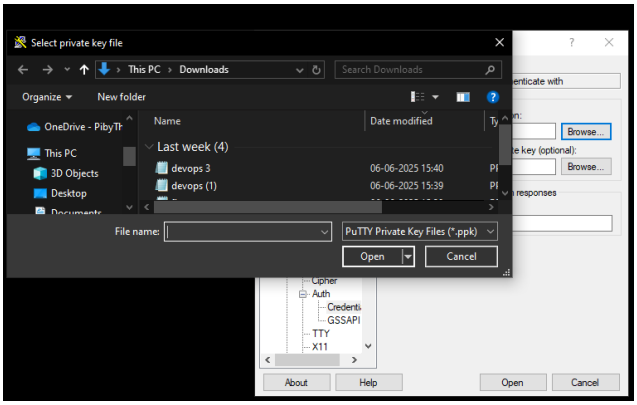

**Step 2:**
Add IP address of EC2 Instance



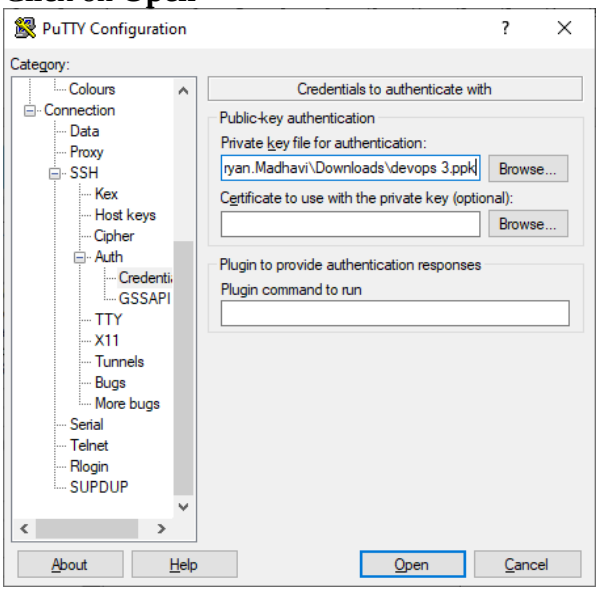

**Step 3:**
Go to **Connection** > **Auth** > **Credentials**



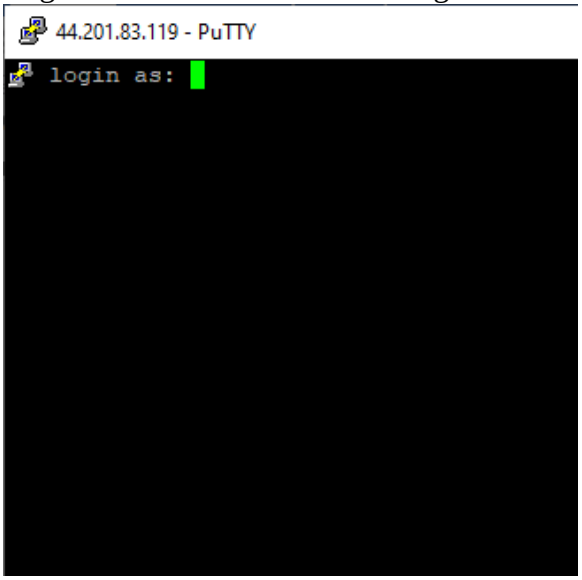

**Step 4:**
Click on **Browse** > Select a private key file



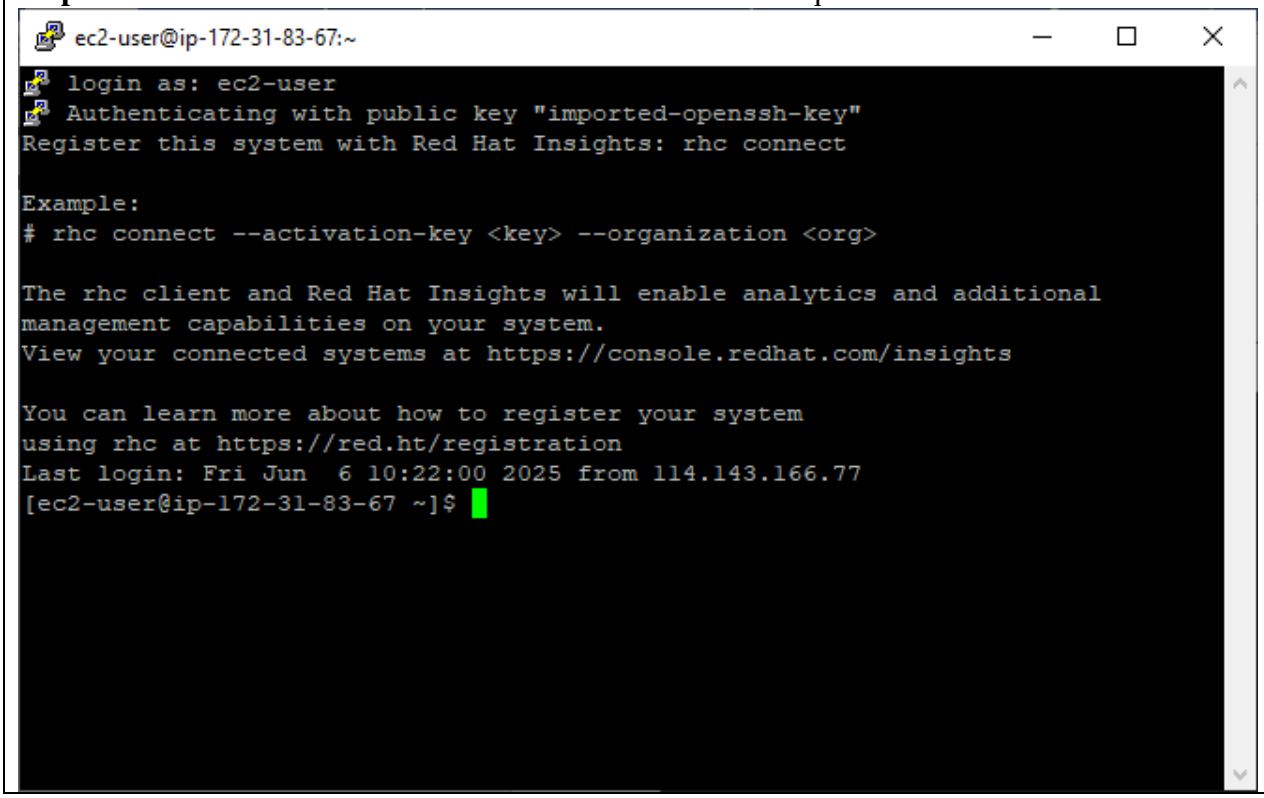
**Step 5:**
Click on **Open**




**Step 6:**
Login as **ec2-user** in the following window




**Step 8:** The connection has now been established. Perform required commands.



## 2. Shell Scripting for following use cases

### a. Case 1: Disk Formatting and Mounting

| **Script:** |
| --- |
| #!/usr/bin/env bash<br>lsblk<br>device="/dev/xvda4"<br>sudo fdisk $device<br>sudo mkfs.ext4 $device<br>sudo mount $device /mnt<br>df -h |
| **Output:** |
| |

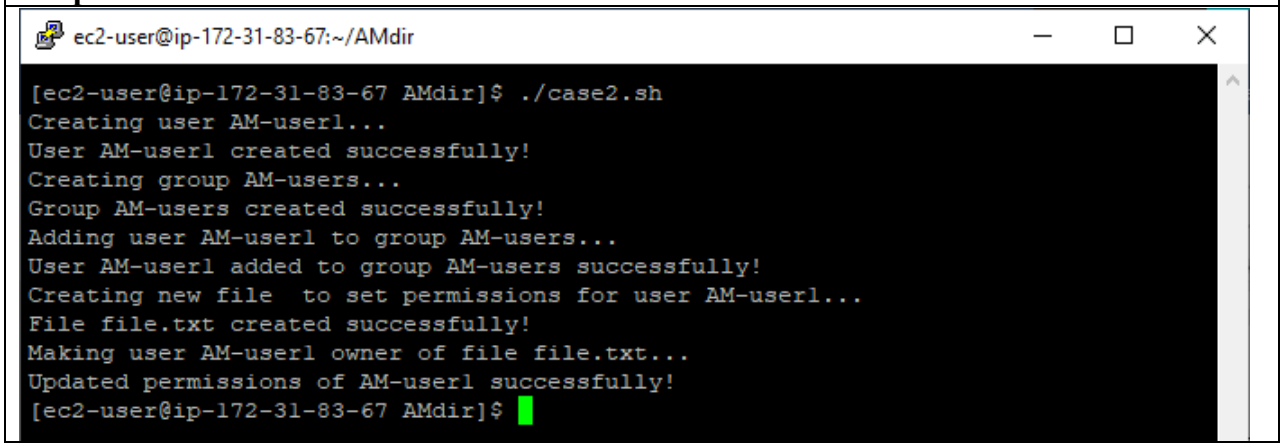
**b. Case 2: Create user, group, add user to group and change permissions of that user**

**Script:**

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

# Case 2
# Create user, usergroup, add user to group and change permissions of that user

# Verify if USER exists
USER="AM-user1"
id $USER > /dev/null 2>&1
if [[ $? -eq 0 ]]
then
  echo "User $USER already exists!"
else
  echo "Creating user $USER..."
  sudo useradd $USER
  if [[ $? -eq 0 ]]
  then
    echo "User $USER created successfully!"
  else
    echo "User $USER could not be created successfully!"
    exit 1
  fi
fi

# Verify if GROUP exists
GROUP="AM-users"
getent group $GROUP > /dev/null 2>&1
if [[ $? -eq 0 ]]
then
  echo "Group $GROUP already exists!"
else
  echo "Creating group $GROUP..."
  sudo groupadd $GROUP
  if [[ $? -eq 0 ]]
  then
    echo "Group $GROUP created successfully!"
  else
    echo "Group $GROUP could not be created successfully!"
    exit 1
  fi
fi

# Add the new USER to the new GROUP
echo "Adding user $USER to group $GROUP..."
sudo usermod -aG $GROUP $USER
getent group $GROUP | grep -w $USER > /dev/null 2>&1
```

```
if [[ $? -eq 0 ]]
then
  echo "User $USER added to group $GROUP successfully!"
else
  echo "User $USER cannot be added to group $GROUP!"
fi

# Creating new file to set permissions on that FILE
echo "Creating new file $FILE to set permissions for user $USER..."
FILE=file.txt
touch $FILE
echo "File $FILE created successfully!"

# Change permissions of new USER for FILE
echo "Making user $USER owner of file $FILE..."
sudo chown $USER $FILE
echo "Updated permissions of $USER successfully!"
```

**Output:**



### c. Case 3: System Boot and Process Management: systemd, systemctl, ps, top, htop, journalctl

**Script:**

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

# Case 3 Script
# System boot and process management with systemd, systemctl, ps, top, htop, journalctl

set -e

# listing all processes in the system
echo "Listing all processes in the system..."
sleep 2
ps -e

# Snapshot of current  process
echo "Snapshot of current process..."
sleep 1
ps

# journalctl for current user
echo "Showing journal entries for $USER..."
sleep 2
journalctl --user

# systemctl for current user listing all files
echo "Connecting to systemd and service manager to list unit files for $USER..."
sleep 2
systemctl list-unit-files --user

# `top` command for current user
echo "Showing processes owned by $USER in interactive terminal..."
echo "-----------PRESS 'q' TO QUIT----------"
sleep 6
top -U $USER
exit
```

**Output:**

ec2-user@ip-172-31-83-67:~/AMdir

```
[ec2-user@ip-172-31-83-67 AMdir]$ ./case3.sh
Listing all processes in the system...
    PID TTY          TIME CMD
      1 ?        00:00:01 systemd
      2 ?        00:00:00 kthreadd
      3 ?        00:00:00 pool_workqueue_release
      4 ?        00:00:00 kworker/R-rcu_gp
      5 ?        00:00:00 kworker/R-sync_wq
      6 ?        00:00:00 kworker/R-slub_flushwq
      7 ?        00:00:00 kworker/R-netns
     10 ?        00:00:00 kworker/0:0H-events_highpri
     12 ?        00:00:00 kworker/u60:1-events_unbound
     13 ?        00:00:00 kworker/R-mm_percpu_wq
     14 ?        00:00:00 rcu_tasks_kthread
     15 ?        00:00:00 rcu_tasks_rude_kthread
     16 ?        00:00:00 rcu_tasks_trace_kthread
     17 ?        00:00:00 ksoftirqd/0
     18 ?        00:00:00 pr/ttyS0
     19 ?        00:00:00 rcu_preempt
     20 ?        00:00:00 rcu_exp_par_gp_kthread_worker/0
     21 ?        00:00:00 rcu_exp_gp_kthread_worker
     22 ?        00:00:00 migration/0
     23 ?        00:00:00 idle_inject/0
     24 ?        00:00:00 cpuhp/0
     25 ?        00:00:00 cpuhp/1
     26 ?        00:00:00 idle_inject/1
     27 ?        00:00:00 migration/1
     28 ?        00:00:00 ksoftirqd/1
     30 ?        00:00:00 kworker/1:0H-events_highpri
     32 ?        00:00:00 kdevtmpfs
     33 ?        00:00:00 kworker/R-inet_frag_wq
     34 ?        00:00:00 kauditd
     35 ?        00:00:00 khungtaskd
     36 ?        00:00:00 oom_reaper
     38 ?        00:00:00 kworker/R-writeback
     39 ?        00:00:00 kcompactd0
     40 ?        00:00:00 ksmd
     41 ?        00:00:00 khugepaged
     42 ?        00:00:00 kworker/R-cryptd
     43 ?        00:00:00 kworker/R-kintegrityd
     44 ?        00:00:00 kworker/R-kblockd
     45 ?        00:00:00 irq/9-acpi
     47 ?        00:00:00 xen-balloon
     48 ?        00:00:00 kworker/R-tpm_dev_wq
     49 ?        00:00:00 kworker/R-md
     50 ?        00:00:00 kworker/R-md_bitmap
```

ec2-user@ip-172-31-83-67:~/AMdir

```
    744 ?        00:00:00 systemd-logind
    754 ?        00:00:00 chronyd
    769 ?        00:00:00 kworker/R-cfg80211
    787 ?        00:00:00 NetworkManager
    806 ?        00:00:01 /opt/saltstack/
    808 ?        00:00:01 tuned
    815 ?        00:00:00 rhsmcertd
   1082 ?        00:00:00 polkitd
   1139 ?        00:00:00 rsyslogd
   1140 ?        00:00:00 sshd
   1150 ?        00:00:00 crond
   1155 tty1     00:00:00 agetty
   1158 ttyS0    00:00:00 agetty
   1662 ?        00:00:00 /opt/saltstack/
   1663 ?        00:00:00 /opt/saltstack/
   1666 ?        00:00:02 /opt/saltstack/
   1668 ?        00:00:00 /opt/saltstack/
   1669 ?        00:00:00 /opt/saltstack/
   1670 ?        00:00:00 /opt/saltstack/
   1671 ?        00:00:00 /opt/saltstack/
   1673 ?        00:00:00 /opt/saltstack/
   1676 ?        00:00:00 /opt/saltstack/
   1677 ?        00:00:00 /opt/saltstack/
   2645 ?        00:00:00 sshd-session
   2669 ?        00:00:00 systemd
   2671 ?        00:00:00 (sd-pam)
   2681 ?        00:00:00 sshd-session
   2682 pts/0    00:00:00 bash
   4285 ?        00:00:00 sshd-session
   4290 ?        00:00:00 sshd-session
   4291 pts/2    00:00:00 bash
   4735 ?        00:00:00 kworker/0:0-events
   5377 ?        00:00:00 /opt/saltstack/
   5382 ?        00:00:00 kworker/u60:0-events_unbound
   5383 ?        00:00:03 /opt/saltstack/
   6487 ?        00:00:00 kworker/1:0-cgroup_destroy
   6562 ?        00:00:00 kworker/0:2-events
   6862 ?        00:00:00 kworker/u60:3-events_unbound
   6918 ?        00:00:00 kworker/1:1-events
   7199 ?        00:00:00 systemd-userwor
   7225 ?        00:00:00 systemd-userwor
   7227 ?        00:00:00 systemd-userwor
   7247 pts/2    00:00:00 bash
   7250 pts/2    00:00:00 ps
Snapshot of current process...
```

ec2-user@ip-172-31-83-67:~/AMdir

```
Snapshot of current process...
    PID TTY          TIME CMD
   4291 pts/2    00:00:00 bash
   7247 pts/2    00:00:00 bash
   7252 pts/2    00:00:00 ps
Showing journal entries for ec2-user...
No journal files were found.
-- No entries --
Connecting to systemd and service manager to list unit files for ec2-user..
UNIT FILE                          STATE    PRESET
dbus-broker.service                enabled  enabled
dbus.service                       alias    -
dirmngr.service                    static   -
gpg-agent.service                  static   -
grub-boot-success.service          static   -
ssh-agent.service                  indirect disabled
systemd-exit.service               static   -
systemd-tmpfiles-clean.service     static   -
systemd-tmpfiles-setup.service     enabled  enabled
yggdrasil.service                  disabled disabled
app.slice                          static   -
background.slice                   static   -
session.slice                      static   -
dbus.socket                        enabled  enabled
dirmngr.socket                     disabled disabled
gpg-agent-browser.socket           disabled disabled
gpg-agent-extra.socket             disabled disabled
gpg-agent-ssh.socket               disabled disabled
gpg-agent.socket                   disabled disabled
ssh-agent.socket                   disabled disabled
basic.target                       static   -
bluetooth.target                   static   -
capsule@.target                    static   -
default.target                     static   -
exit.target                        static   -
graphical-session-pre.target       static   -
graphical-session.target           static   -
paths.target                       static   -
printer.target                     static   -
shutdown.target                    static   -
smartcard.target                   static   -
sockets.target                     static   -
sound.target                       static   -
timers.target                      static   -
xdg-desktop-autostart.target       static   -
grub-boot-success.timer            enabled  enabled
```

ec2-user@ip-172-31-83-67:~/AMdir

```
background.slice                   static   -
session.slice                      static   -
dbus.socket                        enabled  enabled
dirmngr.socket                     disabled disabled
gpg-agent-browser.socket           disabled disabled
gpg-agent-extra.socket             disabled disabled
gpg-agent-ssh.socket               disabled disabled
gpg-agent.socket                   disabled disabled
ssh-agent.socket                   disabled disabled
basic.target                       static   -
bluetooth.target                   static   -
capsule@.target                    static   -
default.target                     static   -
exit.target                        static   -
graphical-session-pre.target       static   -
graphical-session.target           static   -
paths.target                       static   -
printer.target                     static   -
shutdown.target                    static   -
smartcard.target                   static   -
sockets.target                     static   -
sound.target                       static   -
timers.target                      static   -
xdg-desktop-autostart.target       static   -
grub-boot-success.timer            enabled  enabled
systemd-tmpfiles-clean.timer       enabled  enabled

37 unit files listed.
Showing processes owned by ec2-user in interactive terminal...
----------PRESS 'q' TO QUIT----------
top - 05:46:23 up  1:43,  3 users,  load average: 0.09, 0.03, 0.01
Tasks: 124 total,   1 running, 123 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,  0.0 sy,  0.0 ni, 90.9 id,  0.0 wa,  0.0 hi,  0.0 si,  9.1 st
MiB Mem :   3650.1 total,   2810.3 free,    708.2 used,    350.2 buff/cache
MiB Swap:      0.0 total,      0.0 free,      0.0 used.   2941.9 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   2669 ec2-user  20   0   21988  13016  10072 S   0.0   0.3   0:00.28 systemd
   2671 ec2-user  20   0   13808   2760   1616 S   0.0   0.1   0:00.00 (sd-pam)
   2681 ec2-user  20   0   14980   7244   5364 S   0.0   0.2   0:00.09 sshd-session
   2682 ec2-user  20   0    4820   3880   3240 S   0.0   0.1   0:00.01 bash
   4290 ec2-user  20   0   14972   7200   5248 S   0.0   0.2   0:00.89 sshd-session
   4291 ec2-user  20   0    4820   3916   3148 S   0.0   0.1   0:00.14 bash
   7247 ec2-user  20   0    4424   3088   2832 S   0.0   0.1   0:00.00 bash
```

### d. Case 4: Backup with Shell Scripting

**Script:**

ec2-user@ip-172-31-83-67:~/AMdir

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

# Check if FILE exists
FILE="file.txt"
echo "Checking if required file $FILE exists..."
if [[ -e $FILE ]]
then
  echo "File $FILE exists!"
else
  echo "File $FILE does not exist!"
  exit 1
fi

# Check if BACKUP_DEST exists
BACKUP_DEST="/mnt/backups"
echo "Check if backup destination $BACKUP_DEST exists..."
if ls "$BACKUP_DEST" > /dev/null 2>&1
then
  echo "Destination $BACKUP_DEST exists!"
else
  echo "Destination $BACKUP_DEST does not exist!"
  echo "Creating Directory $BACKUP_DEST..."
  sudo mkdir $BACKUP_DEST
  echo "Destination $BACKUP_DEST created successfully!"
fi

# Create Backup
HOST=$(whoami)
DATETIME=$(date +%A)
echo "Creating Backup of file $FILE to $BACKUP_DEST..."
sudo tar czf $BACKUP_DEST/$HOST-$DATETIME $FILE
echo "Backup created successfully!"
```

**Crontab for automatic backup**

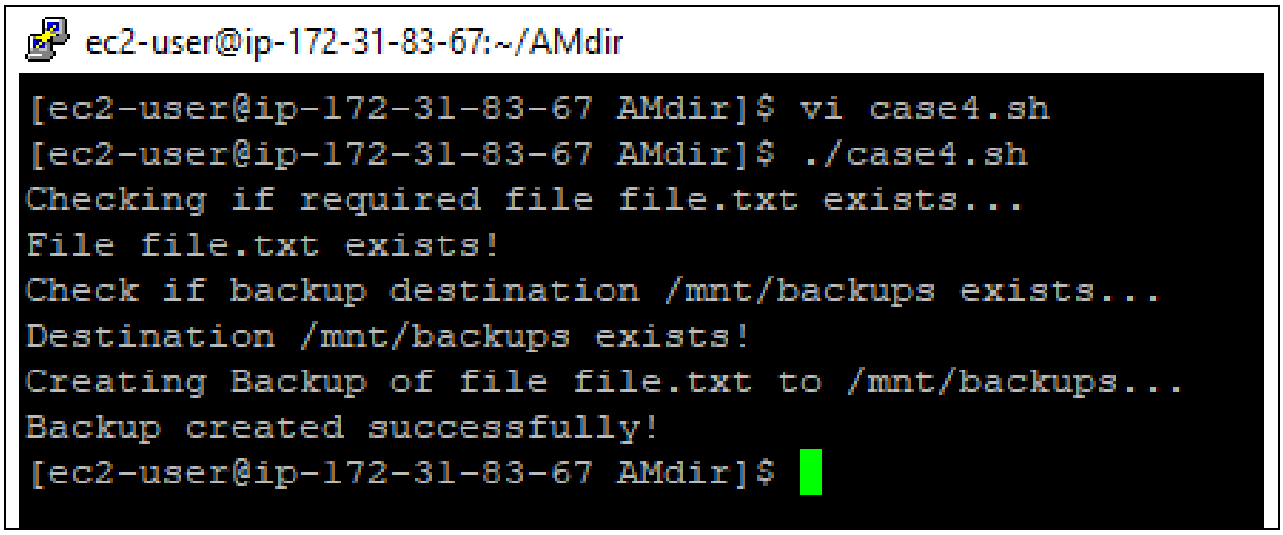
ec2-user@ip-172-31-83-67:~/AMdir

```
[ec2-user@ip-172-31-83-67 AMdir]$ crontab -e
```

ec2-user@ip-172-31-83-67:~/AMdir

```
0 15 * * * /home/ec2-user/AMdir/case4.sh
  tmp/crontab.Hj2lg5" 1L, 41B                                1,40          All
```

**Output**


ec2-user@ip-172-31-83-67:~/AMdir
[ec2-user@ip-172-31-83-67 AMdir]$ vi case4.sh
[ec2-user@ip-172-31-83-67 AMdir]$ ./case4.sh
Checking if required file file.txt exists...
File file.txt exists!
Check if backup destination /mnt/backups exists...
Destination /mnt/backups exists!
Creating Backup of file file.txt to /mnt/backups...
Backup created successfully!
[ec2-user@ip-172-31-83-67 AMdir]$

**e. Case 5: Explore networking basic (IP configuration, DNS, Routing) and also check host's IP and ping google**

**Script:**

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

# Case 5
# Explore Networking basics - IP configuration, DNS, Routing, etc
# Also check host's IP and ping google

# Host's IP
echo
echo "IP of $(hostname): $(hostname -I)"

# DNS lookup to resolve hostname
echo
echo "Resolving google.com..."
host google.com

# Ping google by transmitting 4 packets
echo
echo "Pinging google.com with 4 packets..."
ping -c4 google.com
```

**Output:**

```
onworks@onworks:~/Downloads$ ./case5.sh

IP of onworks: 10.0.2.15 fec0::dca6:b233:1159:a95d fec0::aea2:1610:487f:5959

Resolving google.com...
google.com has address 142.250.186.142
google.com has IPv6 address 2a00:1450:4001:81d::200e
google.com mail is handled by 10 smtp.google.com.

Pinging google.com with 4 packets...
PING google.com (142.250.186.142) 56(84) bytes of data.
64 bytes from fra24s07-in-f14.1e100.net (142.250.186.142): icmp_seq=1 ttl=255 time=5.46 ms
64 bytes from fra24s07-in-f14.1e100.net (142.250.186.142): icmp_seq=2 ttl=255 time=5.10 ms
64 bytes from fra24s07-in-f14.1e100.net (142.250.186.142): icmp_seq=3 ttl=255 time=5.12 ms
64 bytes from fra24s07-in-f14.1e100.net (142.250.186.142): icmp_seq=4 ttl=255 time=5.12 ms

--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3008ms
rtt min/avg/max/mdev = 5.097/5.200/5.461/0.150 ms
onworks@onworks:~/Downloads$
```