

B.Tech. (Computer Science And Engineering)

Submitted to

LOVELY PROFESSIONAL UNIVERSITY

PHAGWARA, PUNJAB



SUBMITTED BY

Name of student: Jamiyanmyadag

Registration Number: 12325947

Task 1 : Environment Setup

```
Select jamiya@koorkonjania: ~
base) jamiya@koorkonjania:~$ sudo apt update
sudo] password for jamiya:
Hit:1 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Hit:4 https://download.docker.com/linux/ubuntu noble InRelease
Hit:5 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:6 http://mirror.math.princeton.edu/pub/ubuntu noble InRelease
Fetched 126 kB in 2s (67.4 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
17 packages can be upgraded. Run 'apt list --upgradable' to see them.
base) jamiya@koorkonjania:~$ sudo apt install -y mailutils curl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
mailutils is already the newest version (1:3.17-1.1build3).
curl is already the newest version (8.5.0-2ubuntu0.6).
0 upgraded, 0 newly installed, 0 to remove and 117 not upgraded.
base) jamiya@koorkonjania:~$ sudo mkdir -p /var/log/auto_recover
base) jamiya@koorkonjania:~$ sudo touch /var/log/auto_recover/auto_recover.log
base) jamiya@koorkonjania:~$ sudo chmod 755 /var/log/auto_recover
base) jamiya@koorkonjania:~$ sudo chmod 644 /var/log/auto_recover/auto_recover.log
base) jamiya@koorkonjania:~$ nano ~/auto_recover.sh
base) jamiya@koorkonjania:~$ chmod +x ~/auto_recover.sh
base) jamiya@koorkonjania:~$
```

Task 2 : System Resource Monitoring

```
jamiya@koorkonjania: ~  
(base) jamiya@koorkonjania:~$ sudo apt update  
[sudo] password for jamiya:  
Hit:1 http://archive.ubuntu.com/ubuntu noble InRelease  
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease  
Get:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]  
Hit:4 https://download.docker.com/linux/ubuntu noble InRelease  
Hit:5 http://archive.ubuntu.com/ubuntu noble-backports InRelease  
Hit:6 http://mirror.math.princeton.edu/pub/ubuntu noble InRelease  
Fetched 126 kB in 2s (67.4 kB/s)  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
117 packages can be upgraded. Run 'apt list --upgradable' to see them.  
(base) jamiya@koorkonjania:~$ sudo apt install -y mailutils curl  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
mailutils is already the newest version (1:3.17-1.1build3).  
curl is already the newest version (8.5.0-2ubuntu10.6).  
0 upgraded, 0 newly installed, 0 to remove and 117 not upgraded.  
(base) jamiya@koorkonjania:~$ sudo mkdir -p /var/log/auto_recover  
(base) jamiya@koorkonjania:~$ sudo touch /var/log/auto_recover/auto_recover.log  
(base) jamiya@koorkonjania:~$ sudo chmod 755 /var/log/auto_recover  
(base) jamiya@koorkonjania:~$ sudo chmod 644 /var/log/auto_recover/auto_recover.log  
(base) jamiya@koorkonjania:~$ nano ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ chmod +x ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ sudo ~/auto_recover.sh  
2025-11-10 07:17:20 +0000 [INFO] auto_recover run started  
2025-11-10 07:17:21 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)  
2025-11-10 07:17:21 +0000 [INFO] auto_recover run completed  
(base) jamiya@koorkonjania:~$ cat /var/log/auto_recover/auto_recover.log | tail -n 20  
cat: /var/log/auto_recover/auto_recover.log: Permission denied  
(base) jamiya@koorkonjania:~$ sudo chmod 666 /var/log/auto_recover/auto_recover.log  
(base) jamiya@koorkonjania:~$ cat /var/log/auto_recover/auto_recover.log | tail -n 20  
2025-11-10 07:05:03 +0000 [INFO] auto_recover run completed  
2025-11-10 07:05:03 +0000 [INFO] auto_recover run completed  
2025-11-10 07:10:05 +0000 [INFO] auto_recover run started  
2025-11-10 07:10:05 +0000 [INFO] auto_recover run started  
2025-11-10 07:10:05 +0000 [INFO] Snapshot written to /var/log/auto_recover/snapshot_20251110_071005.log  
2025-11-10 07:10:06 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)  
2025-11-10 07:10:06 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)  
2025-11-10 07:10:06 +0000 [INFO] auto_recover run completed  
2025-11-10 07:10:06 +0000 [INFO] auto_recover run completed  
2025-11-10 07:15:02 +0000 [INFO] auto_recover run started  
2025-11-10 07:15:02 +0000 [INFO] auto_recover run started
```

```
jamiya@koorkonjania: ~  
2025-11-10 07:10:05 +0000 [INFO] auto_recover run started  
2025-11-10 07:10:05 +0000 [INFO] auto_recover run started  
2025-11-10 07:10:05 +0000 [INFO] Snapshot written to /var/log/auto_recover/snapshot_20251110_071005.log  
2025-11-10 07:10:06 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)  
2025-11-10 07:10:06 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)  
2025-11-10 07:10:06 +0000 [INFO] auto_recover run completed  
2025-11-10 07:10:06 +0000 [INFO] auto_recover run completed  
2025-11-10 07:15:02 +0000 [INFO] auto_recover run started  
2025-11-10 07:15:02 +0000 [INFO] auto_recover run started  
2025-11-10 07:15:02 +0000 [INFO] Snapshot written to /var/log/auto_recover/snapshot_20251110_071502.log  
2025-11-10 07:15:03 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)  
2025-11-10 07:15:03 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)  
2025-11-10 07:15:03 +0000 [INFO] auto_recover run completed  
2025-11-10 07:15:03 +0000 [INFO] auto_recover run completed  
2025-11-10 07:17:20 +0000 [INFO] auto_recover run started  
2025-11-10 07:17:21 +0000 [INFO] Snapshot written to /var/log/auto_recover/snapshot_20251110_071720.log  
2025-11-10 07:17:21 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)  
2025-11-10 07:17:21 +0000 [INFO] auto_recover run completed  
(base) jamiya@koorkonjania:~$ nano ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ nano ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ rm ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ nano ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ rm ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ nano ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ sudo chmod +x /root/auto_recover.sh  
chmod: cannot access '/root/auto_recover.sh': No such file or directory  
(base) jamiya@koorkonjania:~$ sudo nano ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ sudo chmod +x /root/auto_recover.sh  
chmod: cannot access '/root/auto_recover.sh': No such file or directory  
(base) jamiya@koorkonjania:~$ ls -l ~/auto_recover.sh  
-rw-r--r-- 1 jamiya jamiya 1879 Nov 10 07:26 /home/jamiya/auto_recover.sh  
(base) jamiya@koorkonjania:~$ sudo chmod +x ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ sudo chmod +x /root/auto_recover.sh  
chmod: cannot access '/root/auto_recover.sh': No such file or directory  
(base) jamiya@koorkonjania:~$ sudo mv ~/auto_recover.sh /root/  
(base) jamiya@koorkonjania:~$ sudo chmod +x /root/auto_recover.sh  
(base) jamiya@koorkonjania:~$ sudo ~/auto_recover.sh  
sudo: /home/jamiya/auto_recover.sh: command not found  
(base) jamiya@koorkonjania:~$ sudo /root/auto_recover.sh  
/root/auto_recover.sh: line 27: [: 8.2: integer expression expected  
(base) jamiya@koorkonjania:~$ sudo nano ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ sudo /root/auto_recover.sh  
/root/auto_recover.sh: line 27: [: 8.2: integer expression expected  
(base) jamiya@koorkonjania:~$ sudo nano ~/auto_recover.sh  
(base) jamiya@koorkonjania:~$ sudo nano ~/auto_recover.sh
```

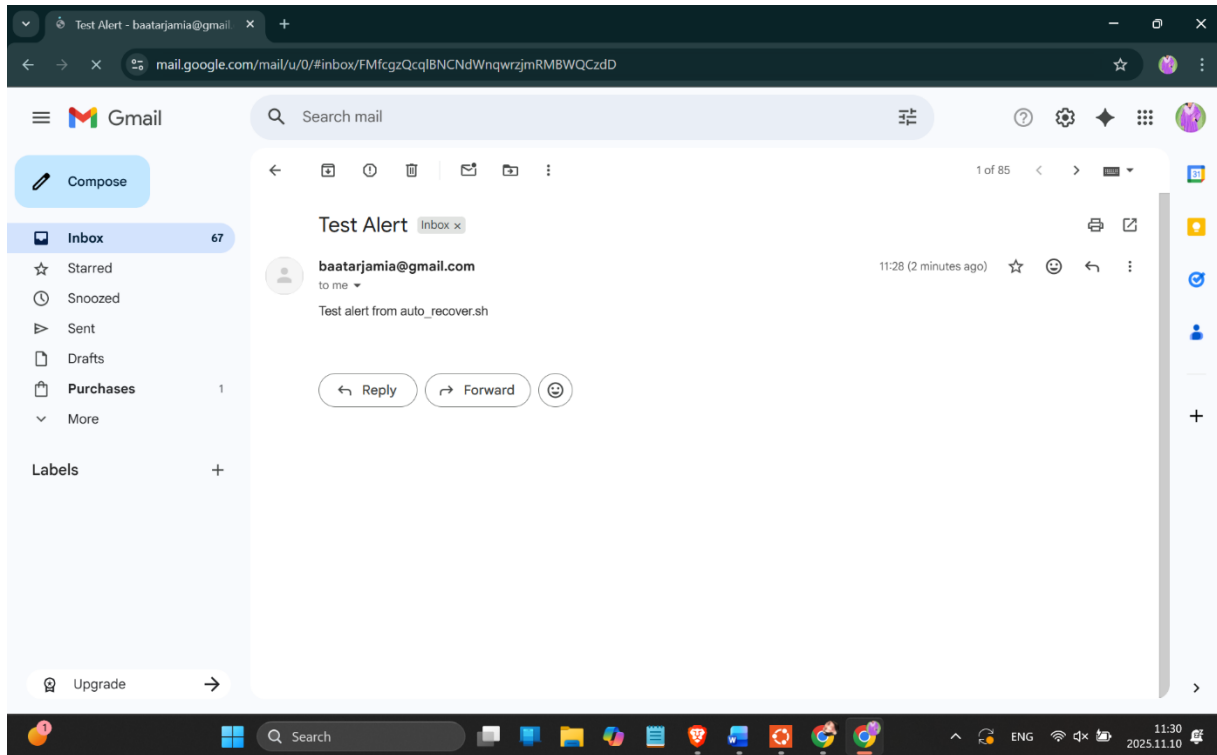
```
(base) jamiya@koorkonjamia:~$ sudo tail -n 20 /var/log/auto_recover/auto_recover.log
-----
[2025-11-10 08:46:33] Resource Report from koorkonjamia
CPU Usage: 8.1%
Memory Usage: 9%
Top 5 CPU Consuming Processes:
  PID COMMAND      %CPU
  2776 yes           103
    95 systemd-udev  0.0
   252 containerd    0.0
   619 Relay(620)    0.0
   321 dockerd        0.0
Top 5 Memory Consuming Processes:
  PID COMMAND      %MEM
   321 dockerd        0.9
   252 containerd     0.6
   253 unattended-upgr 0.2
    53 systemd-journal 0.2
   208 wsl-pro-service 0.2
-----
```

Task 3 : Auto-Recovery Mechanism

```
jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(base) jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(base) jamiya@koorkonjamia:~$ yes > /dev/null &
[2] 6080
(base) jamiya@koorkonjamia:~$ sudo /root/auto_recover.sh
/root/auto_recover.sh: line 27: [: 22.2: integer expression expected
(base) jamiya@koorkonjamia:~$ sudo tail -n 25 /var/log/auto_recover/auto_recover.log
2025-11-10 08:50:01 +0000 [INFO] Snapshot written to /var/log/auto_recover/snapshot_20251110_085001.log
2025-11-10 08:50:01 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)
2025-11-10 08:50:01 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)
2025-11-10 08:50:01 +0000 [INFO] auto_recover run completed
2025-11-10 08:50:01 +0000 [INFO] auto_recover run completed
-----
[2025-11-10 08:50:55] Resource Report from koorkonjamia
CPU Usage: 22.2%
Memory Usage: 9%
Top 5 CPU Consuming Processes:
  PID COMMAND      %CPU
  2776 yes           103
  6080 yes           103
    95 systemd-udev  0.0
   252 containerd    0.0
   619 Relay(620)    0.0
Top 5 Memory Consuming Processes:
  PID COMMAND      %MEM
   321 dockerd        0.9
   252 containerd     0.6
   253 unattended-upgr 0.2
    53 systemd-journal 0.2
   208 wsl-pro-service 0.2
-----

(base) jamiya@koorkonjamia:~$ pkill yes
[1]- Terminated          yes > /dev/null
[2]+ Terminated          yes > /dev/null
(base) jamiya@koorkonjamia:~$
```

Task 4 : Alerting Mechanism



Task 5 : Automation with Cron

```
jamiya@koorkonjama:~$ sudo crontab -e
crontab: installing new crontab
(base) jamiya@koorkonjama:~$ sudo grep CRON /var/log/syslog | tail -n 10
2025-11-10T07:05:03.072319+00:00 koorkonjama CRON[4420]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T07:10:05.651604+00:00 koorkonjama CRON[4574]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T07:15:02.730200+00:00 koorkonjama CRON[5122]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T07:17:03.555261+00:00 koorkonjama CRON[5205]: (root) CMD (cd / && run-parts --report /etc/cron.hourly)
2025-11-10T07:20:04.800541+00:00 koorkonjama CRON[5325]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T07:25:05.591548+00:00 koorkonjama CRON[5481]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T07:30:05.754035+00:00 koorkonjama CRON[5698]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T08:45:01.537228+00:00 koorkonjama CRON[5832]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T08:50:01.463059+00:00 koorkonjama CRON[6022]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T08:55:05.017805+00:00 koorkonjama CRON[6198]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
(base) jamiya@koorkonjama:~$ sudo tail -n 20 /var/log/auto_recover/auto_recover.log
6080 yes 103
95 systemd-udev 0.0
252 containerd 0.0
619 Relay(620) 0.0
Top 5 Memory Consuming Processes:
PID COMMAND %MEM
321 dockerd 0.9
252 containerd 0.6
253 unattended-upgr 0.2
53 systemd-journal 0.2
208 wsl-pro-service 0.2
-----
2025-11-10 08:55:05 +0000 [INFO] auto_recover run started
2025-11-10 08:55:05 +0000 [INFO] auto_recover run started
2025-11-10 08:55:05 +0000 [INFO] Snapshot written to /var/log/auto_recover/snapshot_20251110_085505.log
2025-11-10 08:55:05 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)
2025-11-10 08:55:05 +0000 [INFO] No offending processes found (threshold CPU>=80% or MEM>=80%)
2025-11-10 08:55:05 +0000 [INFO] auto_recover run completed
2025-11-10 08:55:05 +0000 [INFO] auto_recover run completed
(base) jamiya@koorkonjama:~$
```

Bonus Questions

1. Disk Usage Monitoring & Cleanup Automation

```
jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(base) jamiya@koorkonjamia:~$ sudo /root/auto_recover.sh
/root/auto_recover.sh: line 27: [: 0.8: integer expression expected
(base) jamiya@koorkonjamia:~$ sudo tail -n 20 /var/log/auto_recover/auto_recover.log
-----
[2025-11-10 09:01:39] Resource Report from koorkonjamia
CPU Usage: 0.8%
Memory Usage: 9%
Top 5 CPU Consuming Processes:
  PID COMMAND          %CPU
  6441 sudo              4.0
   95 systemd-udevd     0.0
  252 containerd        0.0
  619 Relay(620)         0.0
  321 dockerd           0.0
Top 5 Memory Consuming Processes:
  PID COMMAND          %MEM
  321 dockerd           0.9
  252 containerd       0.6
  253 unattended-upgr   0.2
   53 systemd-journal  0.2
  208 wsl-pro-service   0.2
-----
```

2.

```
jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(base) jamiya@koorkonjamia:~$ sudo /root/auto_recover.sh
/root/auto_recover.sh: line 27: [: 0.8: integer expression expected
(base) jamiya@koorkonjamia:~$ sudo ls /var/log/auto_recover/reports/
ls: cannot access '/var/log/auto_recover/reports/': No such file or directory
(base) jamiya@koorkonjamia:~$ sudo cp ~/auto_recover.sh /root/auto_recover.sh
(base) jamiya@koorkonjamia:~$ sudo chmod +x /root/auto_recover.sh
(base) jamiya@koorkonjamia:~$ sudo head -n 20 /root/auto_recover.sh
#!/bin/bash

LOG_FILE="/var/log/auto_recover/auto_recover.log"
THRESHOLD_CPU=80
THRESHOLD_MEM=80
SERVICE="nginx"
ADMIN_EMAIL="baatarjamia@gmail.com"

TIMESTAMP=$(date "+%Y-%m-%d %H:%M:%S")
HOSTNAME=$(hostname)

CPU_USAGE=$(top -bn1 | grep "Cpu(s)" | awk '{print 100 - $8}' | cut -d'.' -f1)
MEM_USAGE=$(free | awk '/Mem/{printf "%.0f", $3/$2 * 100.0}')

echo "-----" >> $LOG_FILE
echo "[${TIMESTAMP}] Resource Report from $HOSTNAME" >> $LOG_FILE
echo "CPU Usage: ${CPU_USAGE}%" >> $LOG_FILE
echo "Memory Usage: ${MEM_USAGE}%" >> $LOG_FILE

echo "Top 5 CPU Consuming Processes:" >> $LOG_FILE
(base) jamiya@koorkonjamia:~$ sudo /root/auto_recover.sh
(base) jamiya@koorkonjamia:~$ sudo ls /var/log/auto_recover/reports/
system_report_2025-11-10.html
(base) jamiya@koorkonjamia:~$ sudo nano /root/auto_recover.sh
(base) jamiya@koorkonjamia:~$ sudo nano /root/auto_recover.sh
(base) jamiya@koorkonjamia:~$
```