

B.Tech. (Computer Science And Engineering)

Submitted to

LOVELY PROFESSIONAL UNIVERSITY

PHAGWARA, PUNJAB



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SUBMITTED BY

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Task 1 : Environment Setup

```
③ Select jamiya@koorkonjamia:~  
base) jamiya@koorkonjamia:~$ sudo apt update  
[sudo] password for jamiya:  
it:1 http://archive.ubuntu.com/ubuntu noble InRelease  
it:2 http://security.ubuntu.com/ubuntu noble-security InRelease  
it:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]  
it:4 https://download.docker.com/linux/ubuntu noble InRelease  
it:5 http://archive.ubuntu.com/ubuntu noble-backports InRelease  
it:6 http://mirror.math.princeton.edu/pub/ubuntu noble InRelease  
etchcd 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@koorkonjamia:~$ 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).  
Upgraded, 0 newly installed, 0 to remove and 117 not upgraded.  
base) jamiya@koorkonjamia:~$ sudo mkdir -p /var/log/auto_recover  
base) jamiya@koorkonjamia:~$ sudo touch /var/log/auto_recover/auto_recover.log  
base) jamiya@koorkonjamia:~$ sudo chmod 755 /var/log/auto_recover  
base) jamiya@koorkonjamia:~$ sudo chmod 644 /var/log/auto_recover/auto_recover.log  
base) jamiya@koorkonjamia:~$ nano ~/auto_recover.sh  
base) jamiya@koorkonjamia:~$ chmod +x ~/auto_recover.sh  
base) jamiya@koorkonjamia:~$
```

Task 2 : System Resource Monitoring

```
jamiya@koorkonjamia:~$ sudo apt update
[sudo] password for jamiya:
[git-1 http://archive.ubuntu.com/ubuntu noble InRelease
[git-2 http://security.ubuntu.com/ubuntu noble-security InRelease
[git-3 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
[git-4 https://download.docker.com/linux/ubuntu noble InRelease
[git-5 http://archive.ubuntu.com/ubuntu noble-backports InRelease
[git-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.
(jamiya@koorkonjamia:~$ 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.
(jamiya@koorkonjamia:~$ sudo mkdir -p /var/log/auto_recover
(jamiya@koorkonjamia:~$ sudo touch /var/log/auto_recover/auto_recover.log
(jamiya@koorkonjamia:~$ sudo chmod 755 /var/log/auto_recover
(jamiya@koorkonjamia:~$ sudo chmod 644 /var/log/auto_recover/auto_recover.log
(jamiya@koorkonjamia:~$ nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ chmod +x ~/auto_recover.sh
(jamiya@koorkonjamia:~$ 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
(jamiya@koorkonjamia:~$ cat /var/log/auto_recover/auto_recover.log | tail -n 20
:at: /var/log/auto_recover/auto_recover.log: Permission denied
(jamiya@koorkonjamia:~$ sudo chmod 666 /var/log/auto_recover/auto_recover.log
(jamiya@koorkonjamia:~$ 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 07:15:03 +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 07:15:03 +0000 [INFO] auto_recover run started
2025-11-10 07:17:20 +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
(jamiya@koorkonjamia:~$ nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ rm ~/auto_recover.sh
(jamiya@koorkonjamia:~$ nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo chmod +x /root/auto_recover.sh
chmod: cannot access '/root/auto_recover.sh': No such file or directory
(jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo chmod +x /root/auto_recover.sh
chmod: cannot access '/root/auto_recover.sh': No such file or directory
(jamiya@koorkonjamia:~$ ls -l ~/auto_recover.sh
-rw-r--r-- 1 jamiya jamiya 1879 Nov 10 07:26 /home/jamiya/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo chmod +x ~/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo chmod +x /root/auto_recover.sh
chmod: cannot access '/root/auto_recover.sh': No such file or directory
(jamiya@koorkonjamia:~$ sudo mv ~/auto_recover.sh /root/
(jamiya@koorkonjamia:~$ sudo chmod +x /root/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo /auto_recover.sh
sudo: /home/jamiya/auto_recover.sh: command not found
(jamiya@koorkonjamia:~$ sudo /root/auto_recover.sh
/root/auto_recover.sh: line 27: [: 8.2: integer expression expected
(jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo /root/auto_recover.sh
/root/auto_recover.sh: line 27: [: 8.2: integer expression expected
(jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
```

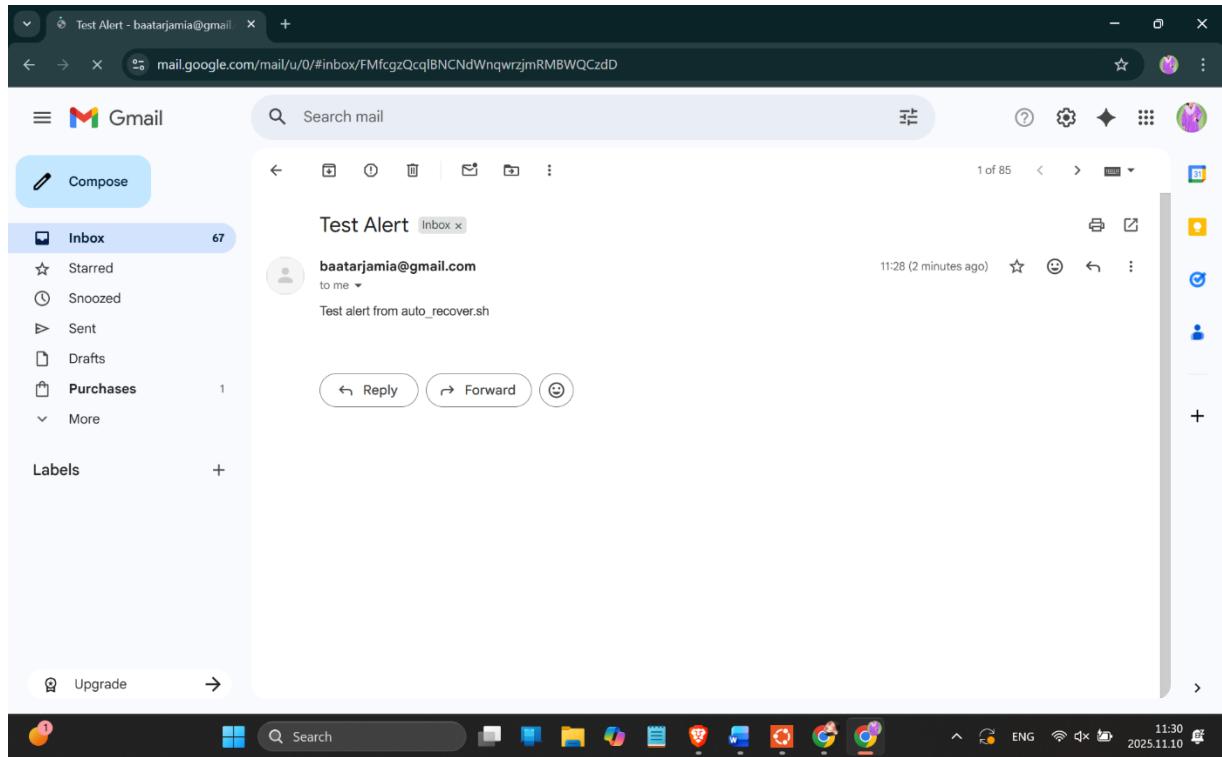
```
2025-11-10 07:10:05 +0000 [INFO] auto_recover run started
2025-11-10 07:10:05 +0000 [INFO] auto_recover run started
2025-11-10 07:10:05 +0000 [INFO] Snapshot written to /var/log/auto_recover/snapshot_20251110_071005.log
2025-11-10 07:10:06 +0000 [INFO] No offending processes found (threshold CPU>=80% 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 07:15:03 +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 07:15:03 +0000 [INFO] auto_recover run started
2025-11-10 07:17:20 +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
(jamiya@koorkonjamia:~$ nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ rm ~/auto_recover.sh
(jamiya@koorkonjamia:~$ nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo chmod +x /root/auto_recover.sh
chmod: cannot access '/root/auto_recover.sh': No such file or directory
(jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo chmod +x /root/auto_recover.sh
chmod: cannot access '/root/auto_recover.sh': No such file or directory
(jamiya@koorkonjamia:~$ ls -l ~/auto_recover.sh
-rw-r--r-- 1 jamiya jamiya 1879 Nov 10 07:26 /home/jamiya/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo chmod +x ~/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo chmod +x /root/auto_recover.sh
chmod: cannot access '/root/auto_recover.sh': No such file or directory
(jamiya@koorkonjamia:~$ sudo mv ~/auto_recover.sh /root/
(jamiya@koorkonjamia:~$ sudo chmod +x /root/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo /auto_recover.sh
sudo: /home/jamiya/auto_recover.sh: command not found
(jamiya@koorkonjamia:~$ sudo /root/auto_recover.sh
/root/auto_recover.sh: line 27: [: 8.2: integer expression expected
(jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ sudo /root/auto_recover.sh
/root/auto_recover.sh: line 27: [: 8.2: integer expression expected
(jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(jamiya@koorkonjamia:~$ 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: %
Top 5 CPU Consuming Processes:
PID COMMAND %CPU
2776 yes 103
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
-----
```

Task 3 : Auto-Recovery Mechanism

```
[root] jamiya@koorkonjamia:~$ sudo nano ~/auto_recover.sh
(base) jamiya@koorkonjamia:~$ yes > /dev/null &
[2] 6088
(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: %
Top 5 CPU Consuming Processes:
PID COMMAND %CPU
2776 yes 103
6088 yes 103
95 systemd-udevd 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@koorkonjamia:~$ sudo crontab -e
(base) jamiya@koorkonjamia:~$ sudo grep CRON /var/log/syslog | tail -n 10
2025-11-10T07:05:03.072319+00:00 koorkonjamia 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 koorkonjamia CRON[4574]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T07:15:02.730280+00:00 koorkonjamia CRON[5122]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T07:17:05.555261+00:00 koorkonjamia CRON[5205]: (root) CMD (cd / && run-parts --report /etc/cron.hourly)
2025-11-10T07:20:04.809541+00:00 koorkonjamia 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 koorkonjamia 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 koorkonjamia CRON[5698]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
2025-11-10T08:04.537228+00:00 koorkonjamia 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 koorkonjamia 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 koorkonjamia CRON[6198]: (root) CMD (/usr/local/bin/auto_recover.sh >> /var/log/auto_recover/auto_recover.log 2>&1)
(base) jamiya@koorkonjamia:~$ sudo tail -n 20 /var/log/auto_recover/auto_recover.log
6080 yes 103
95 systemd-udevd 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@koorkonjamia:~$
```

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=88
THRESHOLD_MEM=88
SERVICE="nginx"
ADMIN_EMAIL="baatar.jamia@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 "%0.f", $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:~$ ..
```