Question 1 : Write a HEARTBEAT job using BASH using the system log of your choice on your desired operating system.

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#!/bin/bash

# Define color variables
COLOR_GREEN="\033[1;32m"  # Bright Green
COLOR_RED="\033[0;31m"    # Normal Red
COLOR_YELLOW="\033[0;33m" # Normal Yellow
RESET_COLOR="\033[0m"     # Reset color

echo -e " "

# System Information
echo -e "${COLOR_GREEN}---------------------------- System Information ----------------------------
--${RESET_COLOR}"
echo -e "${COLOR_RED}Hostname:${RESET_COLOR}\t\t$(hostname -f)"
echo -e "${COLOR_RED}IP Address:${RESET_COLOR}\t\t$(hostname -I)"
echo -e "${COLOR_RED}Uptime:${RESET_COLOR}\t\t$(uptime -p)"
echo -e "${COLOR_RED}Machine Type:${RESET_COLOR}\t\t$(if lscpu | grep -q Hypervisor;
then echo "VM"; else echo "Physical"; fi)"
echo -e "${COLOR_RED}Product Name:${RESET_COLOR}\t\t$(cat
/sys/class/dmi/id/product_name)"
echo -e "${COLOR_RED}Operating System:${RESET_COLOR}\t\t$(cat /etc/redhat-release
2>/dev/null || cat /etc/os-release | grep 'PRETTY_NAME' | cut -d= -f2)"
echo -e "${COLOR_RED}Kernel:${RESET_COLOR}\t\t$(uname -r)"
echo -e "${COLOR_RED}Architecture:${RESET_COLOR}\t\t$(uname -m)"
echo -e "${COLOR_RED}Processor Name:${RESET_COLOR}\t\t$(awk -F':' '/^model name/
{print $2}' /proc/cpuinfo | uniq | sed -e 's/^[ \t]*//')"
echo -e "${COLOR_RED}CPU Cores:${RESET_COLOR}\t\t$(nproc)"
echo -e "${COLOR_RED}Total RAM:${RESET_COLOR}\t\t$(free -h | awk '/^Mem:/{print $2}')"
echo -e "${COLOR_RED}Disk Usage:${RESET_COLOR}\t\t"
df -h | grep '^/dev/'

echo -e "${COLOR_RED}Load Average:${RESET_COLOR}\t\t$(uptime | awk -F'load average:'
'{ print $2 }')"
echo " "

# Resource Usage
echo -e "${COLOR_GREEN}---------------------------- Resource Usage ----------------------------
${RESET_COLOR}"
echo -e "${COLOR_RED}CPU Usage:${RESET_COLOR}\t\t$(awk '{u=$2+$4; t=$2+$4+$5; if
(NR==1){u1=u; t1=t;} else print ($2+$4-u1) * 100 / (t-t1) "%";}' <(grep 'cpu ' /proc/stat) <(sleep 1;
grep 'cpu ' /proc/stat))"
echo -e "${COLOR_RED}Memory Usage:${RESET_COLOR}\t\t$(free | awk
'/Mem/{printf("%.2f%\n", $3/$2*100)}')"
echo -e "${COLOR_RED}Swap Usage:${RESET_COLOR}\t\t$(free | awk '/Swap/{if ($2>0)
printf("%.2f%\n", $3/$2*100); else print "No Swap"}')"

echo -e "${COLOR_RED}Top 5 Processes by CPU Usage:${RESET_COLOR}"
ps -eo pid,ppid,cmd,%mem,%cpu --sort=-%cpu | head -6
```

```
echo -e "${COLOR_RED}Top 5 Processes by Memory Usage:${RESET_COLOR}"
ps -eo pid,ppid,cmd,%mem,%cpu --sort=-%mem | head -6

echo -e "${COLOR_RED}Disk I/O:${RESET_COLOR}\t\t"
iostat -x 2>/dev/null | head -10

echo -e "${COLOR_RED}Network Usage:${RESET_COLOR}\t\t"
netstat -i | grep -vE '^Kernel|Iface|lo'

echo -e "${COLOR_RED}Active Network Connections:${RESET_COLOR}"
netstat -ant | grep 'ESTABLISHED'

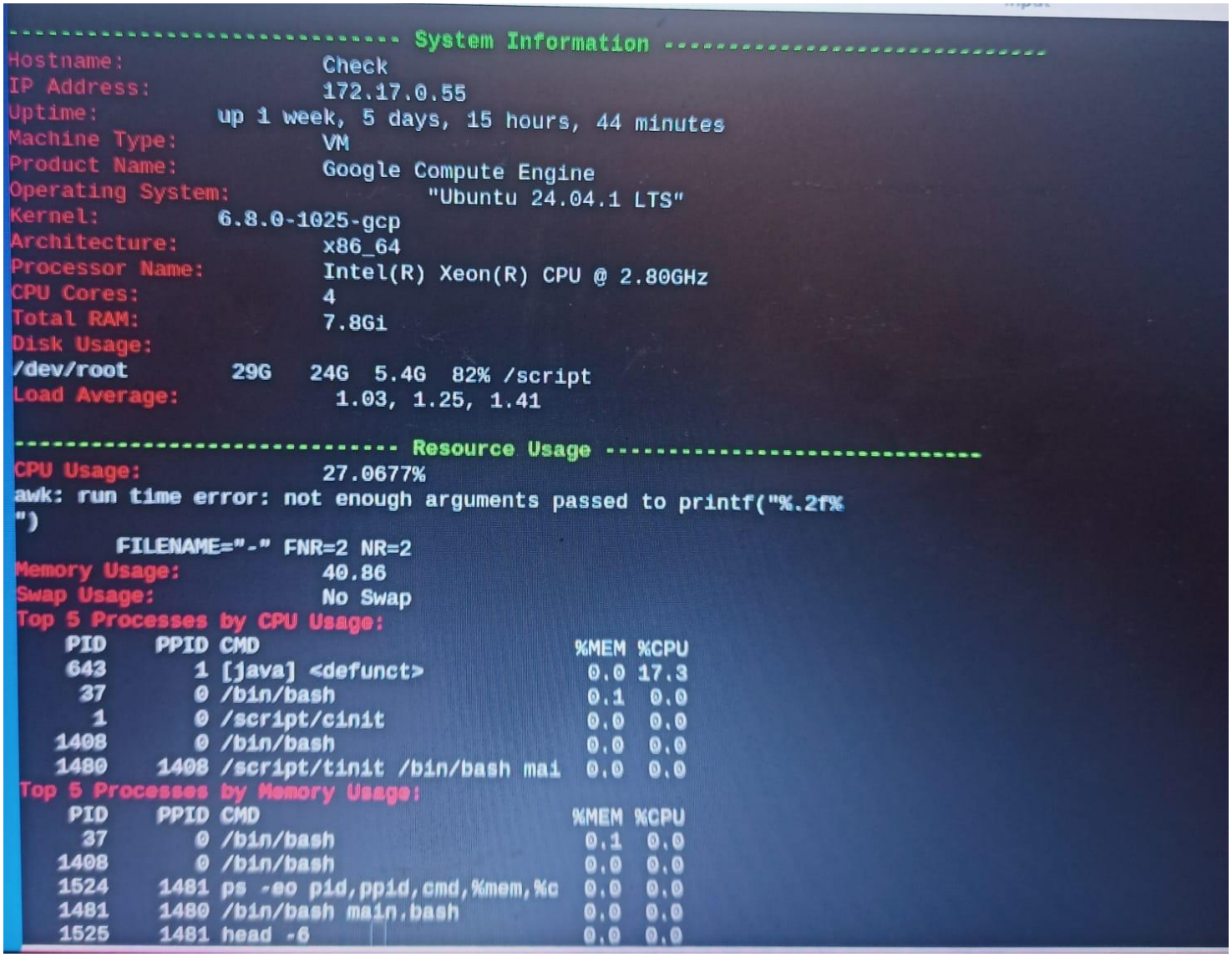
echo -e "${COLOR_RED}Swap Activity:${RESET_COLOR}"
vmstat 1 5

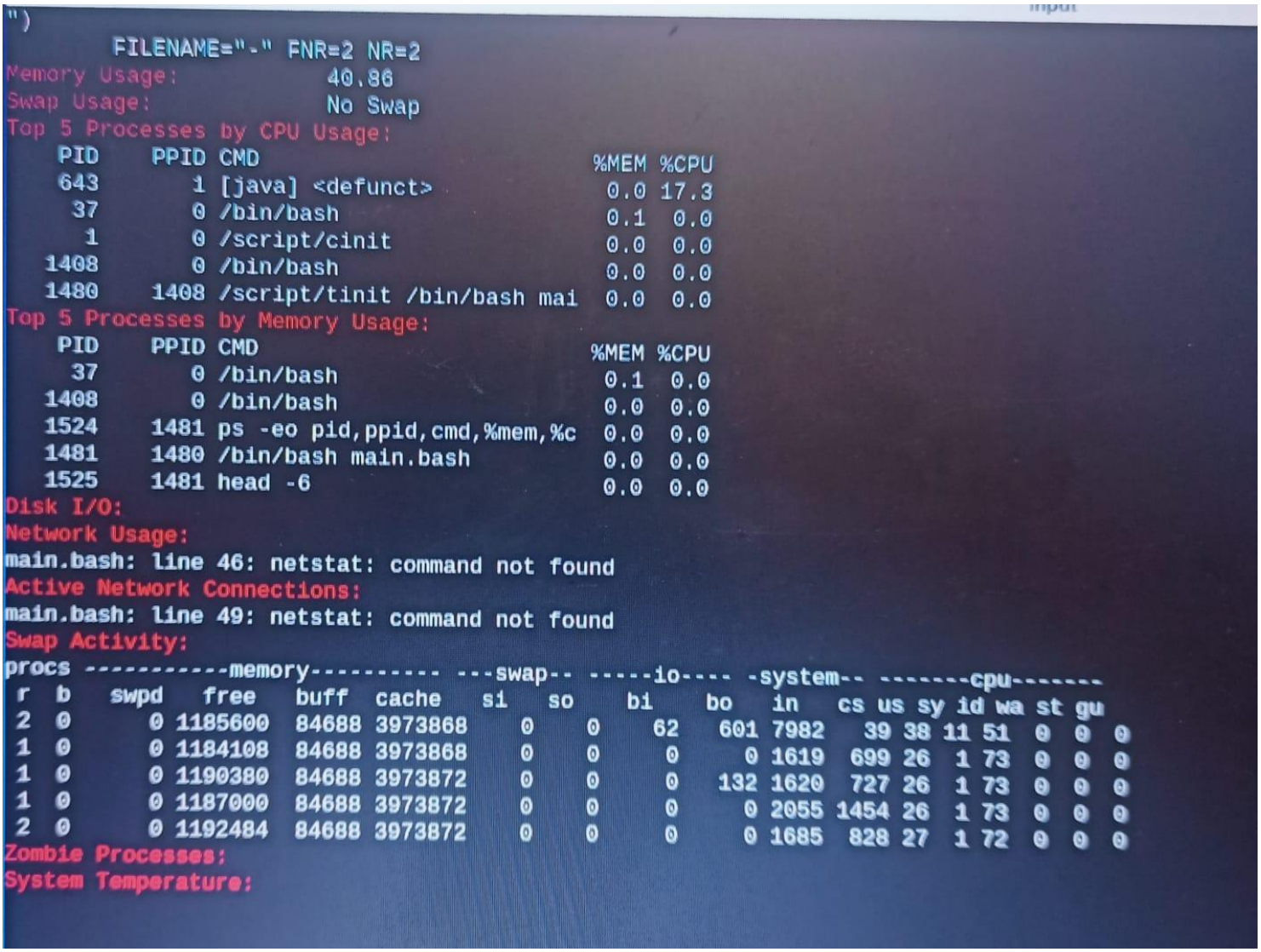
echo -e "${COLOR_RED}Zombie Processes:${RESET_COLOR}\t\t"
ps aux | awk '$8=="Z" {print}'

echo -e "${COLOR_RED}System Temperature:${RESET_COLOR}\t\t"
sensors 2>/dev/null | grep 'Core'

echo " "
```

Output ::


System Information
Hostname: Check
IP Address: 172.17.0.55
Uptime: up 1 week, 5 days, 15 hours, 44 minutes
Machine Type: VM
Product Name: Google Compute Engine
Operating System: "Ubuntu 24.04.1 LTS"
Kernel: 6.8.0-1025-gcp
Architecture: x86_64
Processor Name: Intel(R) Xeon(R) CPU @ 2.80GHz
CPU Cores: 4
Total RAM: 7.8Gi
Disk Usage:
/dev/root 29G 24G 5.4G 82% /script
Load Average: 1.03, 1.25, 1.41
Resource Usage
CPU Usage: 27.0677%
awk: run time error: not enough arguments passed to printf("%.2f%
")
FILENAME="-" FNR=2 NR=2
Memory Usage: 40.86
Swap Usage: No Swap
Top 5 Processes by CPU Usage:
PID PPID CMD %MEM %CPU
643 1 [java] <defunct> 0.0 17.3
37 0 /bin/bash 0.1 0.0
1 0 /script/cinit 0.0 0.0
1408 0 /bin/bash 0.0 0.0
1480 1408 /script/tinit /bin/bash mai 0.0 0.0
Top 5 Processes by Memory Usage:
PID PPID CMD %MEM %CPU
37 0 /bin/bash 0.1 0.0
1408 0 /bin/bash 0.0 0.0
1524 1481 ps -eo pid,ppid,cmd,%mem,%c 0.0 0.0
1481 1480 /bin/bash main.bash 0.0 0.0
1525 1481 head -6 0.0 0.0


")
FILENAME="-" FNR=2 NR=2
Memory Usage: 40.86
Swap Usage: No Swap
Top 5 Processes by CPU Usage:
PID PPID CMD %MEM %CPU
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Top 5 Processes by Memory Usage:
PID PPID CMD %MEM %CPU
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1524 1481 ps -eo pid,ppid,cmd,%mem,%c 0.0 0.0
1481 1480 /bin/bash main.bash 0.0 0.0
1525 1481 head -6 0.0 0.0
Disk I/O:
Network Usage:
main.bash: line 46: netstat: command not found
Active Network Connections:
main.bash: line 49: netstat: command not found
Swap Activity:
procs ----------memory---------- ---swap-- -----io---- -system-- -------cpu-------
r b swpd free buff cache si so bi bo in cs us sy id wa st gu
2 0 0 1185600 84688 3973868 0 0 62 601 7982 39 38 11 51 0 0 0
1 0 0 1184108 84688 3973868 0 0 0 0 1619 699 26 1 73 0 0 0
1 0 0 1190380 84688 3973872 0 0 0 132 1620 727 26 1 73 0 0 0
1 0 0 1187000 84688 3973872 0 0 0 0 2055 1454 26 1 73 0 0 0
2 0 0 1192484 84688 3973872 0 0 0 0 1685 828 27 1 72 0 0 0
Zombie Processes:
System Temperature: