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Q1: Write a HEARTBEAT job using BASH using the system log of your choice on your desired operating system.

Ans: Code

```
#!/bin/bash

#

white="\033[1;23m"

cyan="\033[1;36m"

reset="\033[0m"

echo " "

echo -e "${white}-----System
Information-----${reset}"

echo -e "${cyan}Hostname:${reset}\t\t$(hostname -f)"

echo -e "${cyan}IP Address:${reset}\t\t$(hostname -I)"

echo -e "${cyan}Uptime:${reset}\t\t$(uptime | awk '{print $3,$4}' | sed 's/,//')"

echo -e "${cyan}Machine Type:${reset}\t\t$(vserver=$(lscpu | grep Hypervisor | wc -l); if [
$vserver -gt 0 ]; then echo "VM"; else echo "Physical"; fi)"

echo -e "${cyan}Product Name:${reset}\t\t$(cat /sys/class/dmi/id/product_name
2>/dev/null || echo "Not available")"


# OS Detection - works across different distributions

echo -e "${cyan}Operating System:${reset}\t\t(

if [ -f /etc/os-release ]; then

    # Modern distros use /etc/os-release

    source /etc/os-release

    echo "$PRETTY_NAME"

elif [ -f /etc/redhat-release ]; then

    # Red Hat based systems

    cat /etc/redhat-release

elif [ -f /etc/debian_version ]; then

    # Debian based systems
```

```

    echo "Debian $(cat /etc/debian_version)"
elif command -v lsb_release >/dev/null 2>&1; then
    # LSB compliant systems

    lsb_release -ds
else
    # Fallback to uname

    uname -sr
fi
)"

echo -e "${cyan}Kernel:${reset}\t\t$(uname -r)"
echo -e "${cyan}Architecture:${reset}\t\t$(arch)"
echo -e "${cyan}Processor Name:${reset}\t\t$(awk -F: ' /^model name/ {print $2}'
/proc/cpuinfo | uniq | sed -e 's/^[ \t]*//')"
echo -e "${cyan}CPU Cores:${reset}\t\t$(grep -c ^processor /proc/cpuinfo)"
echo -e "${cyan}Total RAM:${reset}\t\t$(free -h | awk '/^Mem:/{print $2}')"
echo -e "${cyan}Disk Usage:${reset}\t\t"
df -h | grep '^/dev/'
echo -e "${cyan}Load Average:${reset}\t\t$(uptime | awk -F'load average:' '{ print $2 }')"
echo " "
echo -e "${white}-----Resource Usage--
-----${reset}"
echo -e "${cyan}CPU Usage:${reset}\t\t$(awk '{u=$2+$4; t=$2+$4+$5; if (NR==1){u1=u;
t1=t;} else print ($2+$4-u1) * 100 / (t-t1) "%";}' <(grep 'cpu ' /proc/stat) <(sleep 1; grep
'cpu ' /proc/stat))"
echo -e "${cyan}Memory Usage:${reset}\t\t$(free | awk '/Mem/{printf("%.2f%%"),
$3/$2*100}')"
echo -e "${cyan}Swap Usage:${reset}\t\t$(free | awk '/Swap/{printf("%.2f%%"),
$3/$2*100}')"
echo -e "${cyan}Top 5 Processes by CPU Usage:${reset}"
ps -eo pid,ppid,cmd,%mem,%cpu --sort=-%cpu | head -6

```

```
echo -e "${cyan}Top 5 Processes by Memory Usage:${reset}"
```

```
ps -eo pid,ppid,cmd,%mem,%cpu --sort=-%mem | head -6
```

```
# Check if iostat is available
```

```
echo -e "${cyan}Disk I/O:${reset}\t\t"
```

```
if command -v iostat >/dev/null 2>&1; then
```

```
    iostat -x | head -10
```

```
else
```

```
    echo "iostat command not found. Install sysstat package with: sudo apt install sysstat"
```

```
fi
```

```
# Check if netstat is available
```

```
echo -e "${cyan}Network Usage:${reset}\t\t"
```

```
if command -v netstat >/dev/null 2>&1; then
```

```
    netstat -i | grep -vE '^Kernel|Iface|lo'
```

```
else
```

```
    echo "netstat command not found. Install net-tools package with: sudo apt install net-tools"
```

```
fi
```

```
echo -e "${cyan}Active Network Connections:${reset}"
```

```
if command -v netstat >/dev/null 2>&1; then
```

```
    netstat -ant | grep 'ESTABLISHED'
```

```
else
```

```
    echo "netstat command not found. Install net-tools package with: sudo apt install net-tools"
```

```
fi
```

```
# Check if vmstat is available
```

```
echo -e "${cyan}Swap Activity:${reset}"

if command -v vmstat >/dev/null 2>&1; then

    vmstat 1 5

else

    echo "vmstat command not found. Install procps package with: sudo apt install procps"

fi
```

```
echo -e "${cyan}Zombie Processes:${reset}\t\t"

zombie_count=$(ps aux | awk '{ if ($8 == "Z") print $0; }' | wc -l)

if [ "$zombie_count" -gt 0 ]; then

    ps aux | awk '{ if ($8 == "Z") print $0; }'

else

    echo "No zombie processes found"

fi
```

```
# Check if sensors is available

echo -e "${cyan}System Temperature:${reset}\t\t"

if command -v sensors >/dev/null 2>&1; then

    sensors | grep 'Core' || echo "No temperature sensors detected"

else

    echo "sensors command not found. Install lm-sensors package with: sudo apt install lm-sensors"

fi

echo " "
```

OUTPUT:

```
-----System Information-----
Hostname: MSI.
IP Address: 172.20.95.35
Uptime: 29 min
Machine Type: VM
Product Name: Not available
Operating System: Ubuntu 22.04.5 LTS
Kernel: 5.15.167.4-microsoft-standard-WSL2
Architecture: x86_64
Processor Name: Intel(R) Core(TM) i5-9300H CPU @ 2.40GHz
CPU Cores: 8
Total RAM: 3.8Gi
Disk Usage:
/dev/sdc 1007G 1.5G 955G 1% /
Load Average: 0.00, 0.00, 0.00

-----Resource Usage-----
CPU Usage: 0.123916%
Memory Usage: 9.84%
Swap Usage: 0.00%
Top 5 Processes by CPU Usage:
PID PPID CMD %MEM %CPU
1393 303 /bin/bash ./q2.sh 0.0 2.0
1 0 /sbin/init 0.3 0.1
302 301 /init 0.0 0.1
2 1 /init 0.0 0.0
7 2 plan9 --control-socket 6 -- 0.0 0.0
Top 5 Processes by Memory Usage:
PID PPID CMD %MEM %CPU
228 1 /usr/bin/python3 /usr/share 0.5 0.0
976 1 /usr/libexec/packagekitd 0.5 0.0
183 1 /usr/bin/python3 /usr/bin/n 0.4 0.0
63 1 /lib/systemd/systemd-journ 0.3 0.0
106 1 /lib/systemd/systemd-resolv 0.3 0.0

Disk I/O:
Linux 5.15.167.4-microsoft-standard-WSL2 (MSI) 03/25/25 _x86_64_ (8 CPU)

avg-cpu:  %user  %nice %system %iowait  %steal   %idle
           0.10   0.00   0.16   0.04   0.00  99.70

Device            r/s    rkB/s    rrqm/s    %rrqm  r_await  rareq-sz    w/s    wkB/s    wrqm/s    %wrqm  w_await  wareq-sz    d/s    dkB/s    drqm/s    %drqm  d_await
t dareq-sz        f/s  f_await  aqu-sz    %util
sda  0.00   0.64   42.41   0.23  26.51   66.68   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.0
0  0.00   0.00   0.00   0.00   0.06
sdb  0.00   0.06   1.28   0.00   0.12   21.84   0.00   0.00   0.00   0.00   4.00   2.00   0.00   0.00   0.00   0.00   0.0
0  0.00   0.00   5.00   0.00   0.00
sdc  5.61   300.33  1.91  25.40   0.54  53.52   1.73  125.80   3.07  63.90   5.61  72.54   0.14  202.47   0.01  3.64   0.2
9 1483.41  0.45   1.41   0.01   0.63

Network Usage:
eth0 1500 640 0 0 0 434 0 0 0 BMRU
Active Network Connections:
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
0 0 0 3269580 3684 272924 0 0 43 16 8 20 0 0 100 0 0
0 0 0 3267856 3684 272924 0 0 0 0 10 58 0 0 100 0 0
0 0 0 3267856 3684 272924 0 0 0 0 3 36 0 0 100 0 0
0 0 0 3267856 3684 272924 0 0 0 0 5 40 0 0 100 0 0
0 0 0 3267856 3684 272924 0 0 0 32 5 36 0 0 100 0 0

Zombie Processes:
No zombie processes found
System Temperature:
No sensors found!
Make sure you loaded all the kernel drivers you need.
Try sensors-detect to find out which these are.
No temperature sensors detected
```