Set 1: Monitoring System Resources for a Proxy Server

Task Description:

You are required to create a Bash script that monitors various system resources and presents them in a dashboard format. The script should refresh the data every few seconds, providing real-time insights. Additionally, it should allow users to call specific parts of the dashboard individually using command-line switches.

Requirements:

1. **Top 10 Most Used Applications:**
   - **Display the top 10 applications consuming the most CPU and memory.**
2. **Network Monitoring:**
   - **Number of concurrent connections to the server.**
   - **Packet drops.**
   - **Number of MB in and out.**
3. **Disk Usage:**
   - **Display the disk space usage by mounted partitions.**
   - **Highlight partitions using more than 80% of the space.**
4. **System Load:**
   - **Show the current load average for the system.**
   - **Include a breakdown of CPU usage (user, system, idle, etc.).**
5. **Memory Usage:**
   - **Display total, used, and free memory.**
   - **Swap memory usage.**
6. **Process Monitoring:**
   - **Display the number of active processes.**
   - **Show top 5 processes in terms of CPU and memory usage.**
7. **Service Monitoring:**
   - **Include a section to monitor the status of essential services like sshd, nginx/apache, iptables, etc.**
8. **Custom Dashboard:**
   - **Provide command-line switches to view specific parts of the dashboard, e.g., -cpu, -memory, -network, etc.**

Ans :

1. First launch a server (configuration here – t2.micro free-tier) from AWS management console. Now, using keypair file login server, SSH using Putty. Enable required ports 22, 80.
2. In putty shell, first update Package Manager
   - ⇨ sudo yum update -y
3. Create a directory where we can create shell script files
   - ⇨ mkdir task
   - ⇨ cd task
4. After getting inside our created directory, create a file with extension of sh
   - ⇨ nano TaskA-FileA.sh

now, make a script that will help to monitor all resources

TaskA-FileA.sh

```
#!/bin/bash

# Function to show CPU usage
cpu_usage() {
    echo "Top 10 Processes by CPU Usage:"
    ps aux --sort=-%cpu | head -n 11
}

# Function to show memory usage
memory_usage() {
    echo "Memory Usage:"
    free -h
    echo ""
    echo "Top 10 Processes by Memory Usage:"
    ps aux --sort=-%mem | head -n 11
}

# Function to monitor network connections and traffic
network_monitoring() {
    echo "Network Connections and Traffic:"
    ss -s
```

```
    echo ""
    echo "Network Interface Traffic:"
    ifconfig eth0 | grep 'RX packets\|TX packets\|RX bytes\|TX bytes'
}

# Function to monitor disk usage
disk_usage() {
    echo "Disk Usage:"
    df -h | awk '{if($5 >= 80) print $0}'
}

# Function to monitor system load
system_load() {
    echo "System Load and CPU Usage:"
    uptime
    echo ""
    echo "Detailed CPU Usage:"
    mpstat
}

# Function to monitor processes
process_monitoring() {
    echo "Process Monitoring:"
    echo "Number of active processes: $(ps aux | wc -l)"
    echo "Top 5 Processes by CPU Usage:"
    ps aux --sort=-%cpu | head -n 6
}

# Function to monitor essential services
service_monitoring() {
    echo "Service Status:"
    systemctl is-active sshd
```

```
    systemctl is-active nginx
    systemctl is-active iptables
}

# Parse command-line arguments for specific monitoring options
while [ "$1" != "" ]; do
    case $1 in
        -cpu )      cpu_usage ;;
        -memory )   memory_usage ;;
        -network )  network_monitoring ;;
        -disk )     disk_usage ;;
        -load )     system_load ;;
        -process )  process_monitoring ;;
        -services ) service_monitoring ;;
        -all )      cpu_usage; memory_usage; network_monitoring; disk_usage; system_load; process_monitoring; service_monitoring ;;
        * )         echo "Usage: $0 [-cpu] [-memory] [-network] [-disk] [-load] [-process] [-services] [-all]"; exit 1
    esac
    shift
done
```

Now, save this file (ctrl+x & enter)

5. Now give execution permission to this file
   - ⇨ sudo chmod +x TaskA-FileA.sh

6. Now, execute the file with required arguments
   - ⇨ sudo ./ TaskA-FileA.sh -cpu
   - ⇨ sudo ./ TaskA-FileA.sh -memory
   - ⇨ sudo ./ TaskA-FileA.sh -network
   - ⇨ sudo ./ TaskA-FileA.sh -disk
   - ⇨ sudo ./ TaskA-FileA.sh -service
     to see everything we can use -all argument
   - ⇨ sudo ./ TaskA-FileA.sh -all

OutPut :

Top 10 Processes by CPU Usage:

USER PID %CPU %MEM VSZ RSS TTY STAT START TIME COMMAND

root 1967 0.1 0.6 89004 5880 ? Ssl 08:17 0:08 /usr/sbin/rngd -f -x pkcs11 -x nist

root 1 0.0 1.6 105044 16444 ? Ss 08:17 0:00 /usr/lib/systemd/systemd --switched-root --system --deserialize=32

root 2 0.0 0.0 0 0 ? S 08:17 0:00 [kthreadd]

root 3 0.0 0.0 0 0 ? I< 08:17 0:00 [rcu_gp]

root 4 0.0 0.0 0 0 ? I< 08:17 0:00 [rcu_par_gp]

root 5 0.0 0.0 0 0 ? I< 08:17 0:00 [slub_flushwq]

root 6 0.0 0.0 0 0 ? I< 08:17 0:00 [netns]

root 8 0.0 0.0 0 0 ? I< 08:17 0:00 [kworker/0:0H-events_highpri]

root 10 0.0 0.0 0 0 ? I< 08:17 0:00 [mm_percpu_wq]

root 11 0.0 0.0 0 0 ? I 08:17 0:00 [rcu_tasks_kthread]

Memory Usage:

total used free shared buff/cache available

Mem: 949Mi 119Mi 622Mi 0.0Ki 207Mi 692Mi

Swap: 0B 0B 0B

Top 10 Processes by Memory Usage:

USER PID %CPU %MEM VSZ RSS TTY STAT START TIME COMMAND

root 1046 0.0 2.4 60656 23464 ? Ss 08:17 0:00 /usr/lib/systemd/systemd-journald

root 2150 0.0 1.7 725420 17192 ? Ssl 08:17 0:00 /usr/bin/amazon-ssm-agent

root 1 0.0 1.6 105044 16444 ? Ss 08:17 0:00 /usr/lib/systemd/systemd --switched-root --system --deserialize=32

systemd+ 1742 0.0 1.3 21212 13384 ? Ss 08:17 0:00 /usr/lib/systemd/systemd-resolved

ec2-user 2472 0.0 1.3 19900 12904 ? Ss 08:25 0:00 /usr/lib/systemd/systemd --user

root 1716 0.0 1.1 31276 11520 ? Ss 08:17 0:00 /usr/lib/systemd/systemd-udevd

root 6273 0.0 1.0 14764 9792 ? Ss 10:14 0:00 sshd: ec2-user [priv]

root 1970 0.0 1.0 17740 9760 ? Ss 08:17 0:00 /usr/lib/systemd/systemd-logind

systemd+ 1972 0.0 0.9 235872 9696 ? Ss 08:17 0:00 /usr/lib/systemd/systemd-networkd

root 2155 0.0 0.8 13308 8344 ? Ss 08:17 0:00 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups

Network Connections and Traffic:

Total: 142

TCP: 5 (estab 1, closed 0, orphaned 0, timewait 0)

Transport	Total	IP	IPv6
RAW	1	0	1
UDP	4	2	2
TCP	5	3	2
INET	10	5	5
FRAG	0	0	0

Network Interface Traffic:

eth0: error fetching interface information: Device not found

Disk Usage:

Filesystem Size Used Avail Use% Mounted on

System Load and CPU Usage:

10:17:40 up 2:00, 2 users, load average: 0.00, 0.00, 0.00

Detailed CPU Usage:

Linux 6.1.102-111.182.amzn2023.x86_64 (ip-172-31-84-224.ec2.internal) 08/25/24 _x86_64_ (1 CPU)

10:17:40	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle
10:17:40	all	0.21	0.00	0.09	0.04	0.00	0.00	0.38	0.00	0.00	99.27

Process Monitoring:

Number of active processes: 107

Top 5 Processes by CPU Usage:

USER PID %CPU %MEM VSZ RSS TTY STAT START TIME COMMAND

root 1967 0.1 0.6 89004 5880 ? Ssl 08:17 0:08 /usr/sbin/rngd -f -x pkcs11 -x nist

root 1 0.0 1.6 105044 16444 ? Ss 08:17 0:00 /usr/lib/systemd/systemd --switched-root --system --deserialize=32

root 2 0.0 0.0 0 0 ? S 08:17 0:00 [kthreadd]

root 3 0.0 0.0 0 0 ? I< 08:17 0:00 [rcu_gp]

root 4 0.0 0.0 0 0 ? I< 08:17 0:00 [rcu_par_gp]

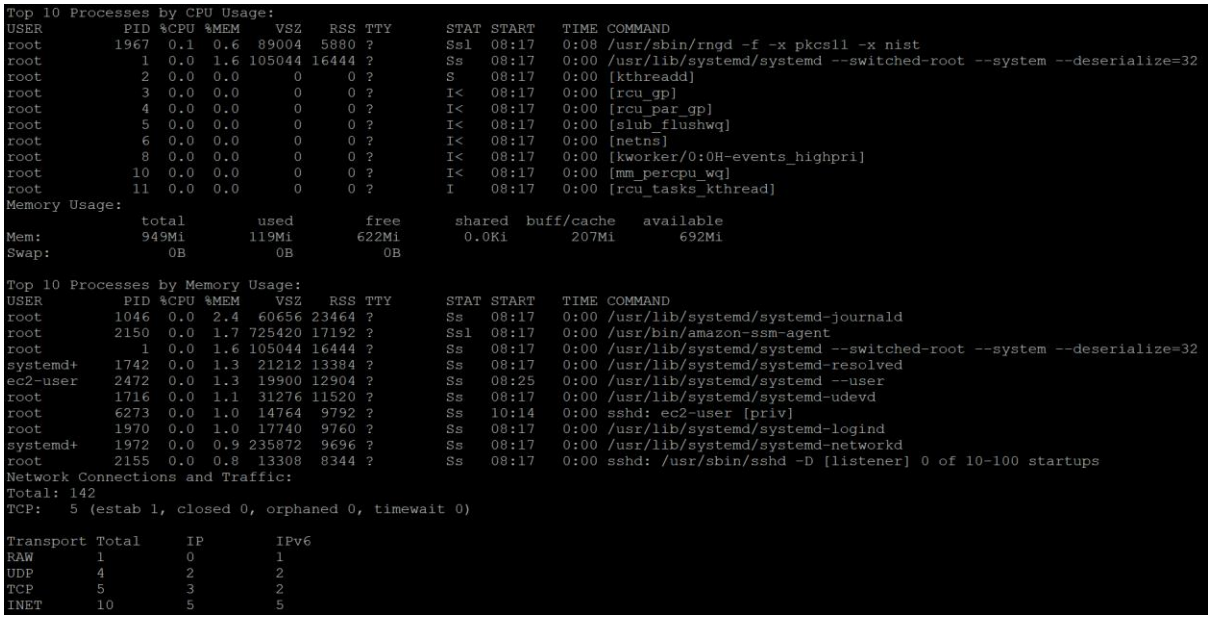
Service Status:

active

active

inactive

Here output obtained is as following:



```
Top 10 Processes by CPU Usage:
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root        1967  0.1  0.6  89004  5880 ?        Ssl  08:17   0:08 /usr/sbin/rngd -f -x pkcs11 -x nist
root           1  0.0  1.6 105044 16444 ?        Ss   08:17   0:00 /usr/lib/systemd/systemd --switched-root --system --deserialize=32
root           2  0.0  0.0      0     0 ?        S    08:17   0:00 [kthreadd]
root           3  0.0  0.0      0     0 ?        I<   08:17   0:00 [rcu_gp]
root           4  0.0  0.0      0     0 ?        I<   08:17   0:00 [rcu_par_gp]
root           5  0.0  0.0      0     0 ?        I<   08:17   0:00 [slub_flushwq]
root           6  0.0  0.0      0     0 ?        I<   08:17   0:00 [netns]
root           8  0.0  0.0      0     0 ?        I<   08:17   0:00 [kworker/0:0H-events_highpri]
root          10  0.0  0.0      0     0 ?        I<   08:17   0:00 [mm_percpu_wq]
root          11  0.0  0.0      0     0 ?        I    08:17   0:00 [rcu_tasks_kthread]
Memory Usage:
               total        used        free      shared  buff/cache   available
Mem:           949Mi       119Mi       622Mi       0.0Ki       207Mi       692Mi
Swap:             0B          0B          0B

Top 10 Processes by Memory Usage:
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root        1046  0.0  2.4  60656 23464 ?        Ss   08:17   0:00 /usr/lib/systemd/systemd-journald
root        2150  0.0  1.7 725420 17192 ?        Ssl  08:17   0:00 /usr/bin/amazon-ssm-agent
root           1  0.0  1.6 105044 16444 ?        Ss   08:17   0:00 /usr/lib/systemd/systemd --switched-root --system --deserialize=32
systemd+    1742  0.0  1.3  21212 13384 ?        Ss   08:17   0:00 /usr/lib/systemd/systemd-resolved
ec2-user    2472  0.0  1.3  19900 12904 ?        Ss   08:25   0:00 /usr/lib/systemd/systemd --user
root        1716  0.0  1.1  31276 11520 ?        Ss   08:17   0:00 /usr/lib/systemd/systemd-udevd
root        6273  0.0  1.0  14764  9792 ?        Ss   10:14   0:00 sshd: ec2-user [priv]
root        1970  0.0  1.0  17740  9760 ?        Ss   08:17   0:00 /usr/lib/systemd/systemd-logind
systemd+    1972  0.0  0.9 235872  9696 ?        Ss   08:17   0:00 /usr/lib/systemd/systemd-networkd
root        2155  0.0  0.8  13308  8344 ?        Ss   08:17   0:00 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
Network Connections and Traffic:
Total: 142
TCP:   5 (estab 1, closed 0, orphaned 0, timewait 0)

Transport Total     IP        IPv6
RAW       1         0         1
UDP       4         2         2
TCP       5         3         2
INET      10        5         5
```

```
Transport Total     IP        IPv6
RAW       1         0         1
UDP       4         2         2
TCP       5         3         2
INET      10        5         5
FRAG      0         0         0


Network Interface Traffic:
eth0: error fetching interface information: Device not found
Disk Usage:
Filesystem      Size  Used Avail Use% Mounted on
System Load and CPU Usage:
 10:17:40 up  2:00,  2 users,  load average: 0.00, 0.00, 0.00

Detailed CPU Usage:
Linux 6.1.102-111.182.amzn2023.x86_64 (ip-172-31-84-224.ec2.internal)   08/25/24        _x86_64_        (1 CPU)

10:17:40     CPU    %usr   %nice    %sys %iowait    %irq   %soft  %steal  %guest  %gnice   %idle
10:17:40     all    0.21    0.00    0.09    0.04    0.00    0.00    0.38    0.00    0.00   99.27
Process Monitoring:
Number of active processes: 107
Top 5 Processes by CPU Usage:
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root        1967  0.1  0.6  89004  5880 ?        Ssl  08:17   0:08 /usr/sbin/rngd -f -x pkcs11 -x nist
root           1  0.0  1.6 105044 16444 ?        Ss   08:17   0:00 /usr/lib/systemd/systemd --switched-root --system --deserialize=32
root           2  0.0  0.0      0     0 ?        S    08:17   0:00 [kthreadd]
root           3  0.0  0.0      0     0 ?        I<   08:17   0:00 [rcu_gp]
root           4  0.0  0.0      0     0 ?        I<   08:17   0:00 [rcu_par_gp]
Service Status:
active
active
inactive
```

Here, services are active they are sshd and nginx are active on this server

Note: nginx(webserver) is installed manually by

- ⇨ sudo yum install nginx -y
- ⇨ sudo start service nginx
- ⇨ sudo systemctl enable nginx

Now, here is another script for same, but in customized and well organised manner. Likewise, using table format.

(Refer script TaskA-FileB.sh for the same from GitHub Repository)

```
Top 10 Processes by CPU Usage:
USER            PID     %CPU    %MEM    VSZ             RSS             COMMAND
USER            PID             %CPU    %MEM    VSZ             RSS             COMMAND
root            1967            0.1     0.6     89004           5880            /usr/sbin/rngd
root            1               0.0     1.7     105208          16544           /usr/lib/systemd/systemd
root            2               0.0     0.0     0               0               [kthreadd]
root            3               0.0     0.0     0               0               [rcu_gp]
root            4               0.0     0.0     0               0               [rcu_par_gp]
root            5               0.0     0.0     0               0               [slub_flushwq]
root            6               0.0     0.0     0               0               [netns]
root            8               0.0     0.0     0               0               [kworker/0:0H-events_highpri]
root            10              0.0     0.0     0               0               [mm_percpu_wq]
root            11              0.0     0.0     0               0               [rcu_tasks_kthread]

Memory Usage:
               total        used        free      shared  buff/cache   available
Mem:           949Mi       121Mi       620Mi       0.0Ki       207Mi       690Mi
Swap:            0B          0B          0B

Top 10 Processes by Memory Usage:
USER            PID     %CPU    %MEM    VSZ             RSS             COMMAND
USER            PID             %CPU    %MEM    VSZ             RSS             COMMAND
root            1046            0.0     2.4     60656           23532           /usr/lib/systemd/systemd-journald
root            2150            0.0     1.7     725420          17192           /usr/bin/amazon-ssm-agent
root            1               0.0     1.7     105208          16544           /usr/lib/systemd/systemd
systemd+        1742            0.0     1.3     21212           13384           /usr/lib/systemd/systemd-resolved
ec2-user        2472            0.0     1.3     19900           12904           /usr/lib/systemd/systemd
root            1716            0.0     1.1     31276           11520           /usr/lib/systemd/systemd-udevd
root            6701            0.0     1.0     14764           9840            sshd:
root            1970            0.0     1.0     17740           9760            /usr/lib/systemd/systemd-logind
systemd+        1972            0.0     0.9     235872          9696            /usr/lib/systemd/systemd-networkd
root            2155            0.0     0.8     13308           8344            sshd:
```

```
Network Interface Traffic (eth0):
Direction       Packets Bytes
eth0: error fetching interface information: Device not found

Disk Usage (Threshold: 80%):
Filesystem      Size    Used    Avail   Use%    Mounted on
Filesystem      Size    Used    Avail   Use%    Mounted

System Load and CPU Usage:
 10:23:53 up  2:06,  2 users,  load average: 0.00, 0.00, 0.00

Detailed CPU Usage:

10:23:53     CPU    %usr   %nice    %sys %iowait    %irq   %soft  %steal  %guest  %gnice   %idle
10:23:53     all    0.20    0.00    0.09    0.04    0.00    0.00    0.39    0.00    0.00   99.27

Process Monitoring:
Number of active processes: 108

Top 5 Processes by CPU Usage:
USER            PID     %CPU    %MEM    VSZ             RSS             COMMAND
USER            PID             %CPU    %MEM    VSZ             RSS             COMMAND
root            1967            0.1     0.6     89004           5880            /usr/sbin/rngd
root            1               0.0     1.7     105208          16544           /usr/lib/systemd/systemd
root            2               0.0     0.0     0               0               [kthreadd]
root            3               0.0     0.0     0               0               [rcu_gp]
root            4               0.0     0.0     0               0               [rcu_par_gp]

Service Status:
Service         Status
sshd            active
nginx           active
iptables                inactive
```