# How to Limit the Use of CPU in Linux?

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A large application that consumes a lot of CPU on a Linux server will cause unusual server conditions. Therefore, you have to limit the use of the CPU for the application.

## Problem

How to limit the use of CPU in Linux?

## Solution

You can use the cpulimit tool to limit CPU use. Below is the command to install the tool in Linux:

**Debian/Ubuntu**

```
sudo apt update
sudo apt-get install cpulimit -y
```

**RockyLinux/AlmaLinux/CentOS**

```
yum install epel-release -y
yum install cpulimit -y
```

**OpenSUSE15**

```
zypper install -y cpulimit
```

Here are some methods using the cpulimit command:

**A. Using --pid option**

To use the **--pid** or **-p** option, you need to know the PID of an application that you want to limit its CPU usage. To run this cpulimit tool, use the format below:

```
cpulimit --pid xxx --limit xxx --background
```

Where PID is the ID number of the ongoing application, you can see by using the format below:

```
ps aux | grep application_name
```

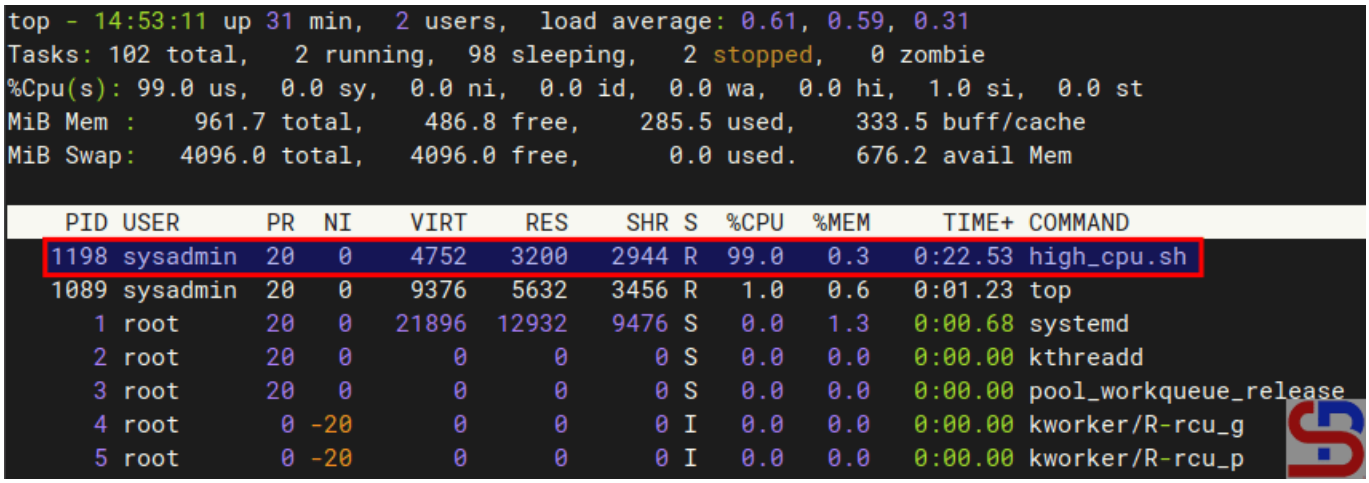
The limit is a percentage figure from the CPU that you want to limit for the use of the application. We will use the bash script to simulate this CPU server to be high. Create a **high_cpu.sh** file and copy the script below

```
#!/bin/bash

# Simple infinite loop that uses 100% CPU
while true
do
    :  # No-op (no operation) to keep CPU busy
done
```

Run the command below to give permission and run this bash script:

```
chmod +x high_cpu.sh
./high_cpu.sh &
```

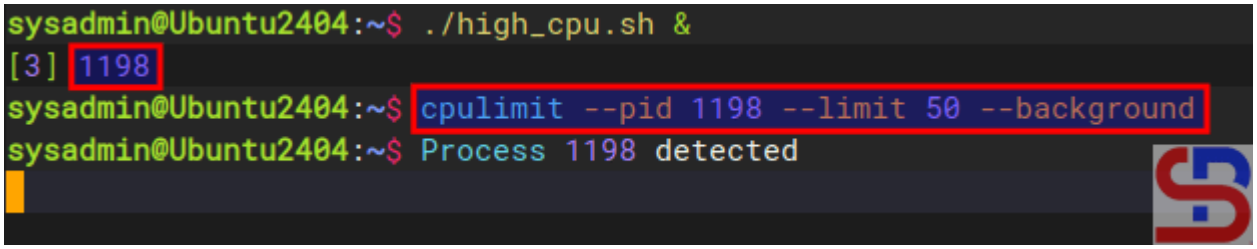
Run the **top** command on another terminal, and as you can see in the image below, the script uses 99 percent of the CPU on the server:



Before using the cpulimit command

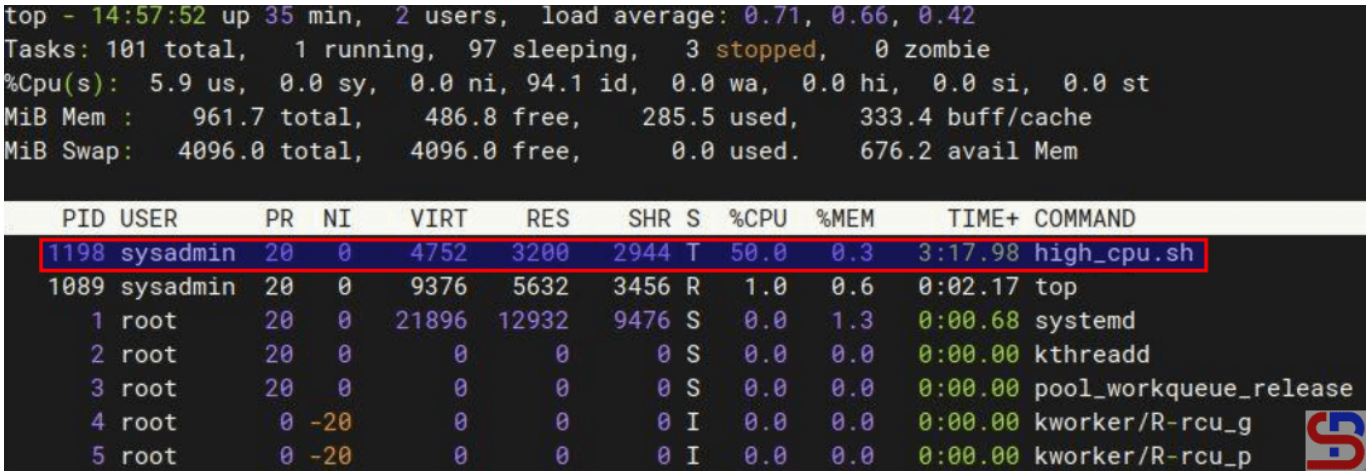
Now run the cpulimit command by limiting this script to run using only 50 percent of the CPU on this server:

```
cpulimit --pid 1198 --limit 50 --background
```




Run the cpulimit command

If you look at the top command, this script is no longer utilizing 99 percent of the CPU on this server.




After using the cpulimit command

WARNING

I don’t think there is a problem when an application consumes the CPU more than the limit you set after running the cpulimit command. For example, you limit the CPU to 50 percent using the cpulimit command, but in reality, the application runs with more than 50 percent in the use of CPU usage on your server. But at least the application doesn’t take up a lot of CPU.

The disadvantage of using the **--pid** option is that if the application is restarted, the PID of the application will change, and you have to change the cpulimit command. So,

there is another option where you just write the name of the application in the cpulimit command using the --exe option.

**B. Using --exe option**

To use the **--exe** or **-e** option, you need to know the application name that you want to limit its CPU usage. To run this cpulimit tool, use the format below:

```
cpulimit --exe application_name --limit xxx --background
```

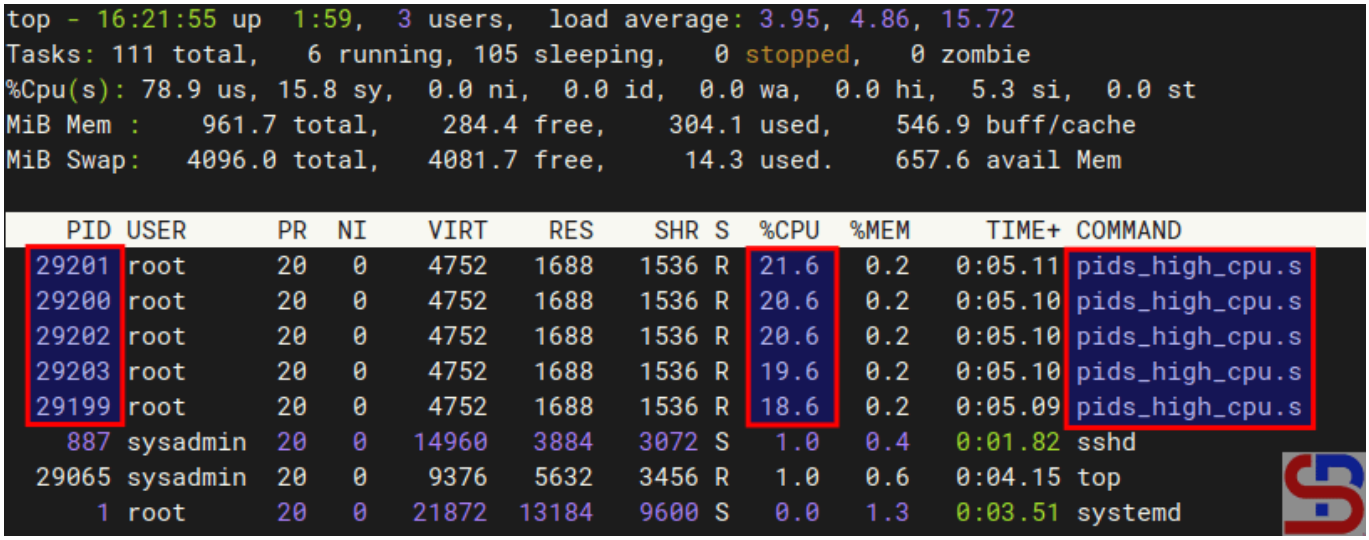
We will use the bash script to simulate a CPU server to be high with many PIDs. Create a **pids_high_cpu.sh** file in the folder **/etc** and copy the script below:

```
#!/bin/bash

# Number of processes to spawn
num_processes=5

# Function to keep the CPU busy in each child process
cpu_intensive_task() {
    while true
    do
        :  # No-op command to keep the CPU busy
    done
}

# Spawn the specified number of processes, redirecting output to /dev/null
for ((i=0; i<num_processes; i++))
do
    cpu_intensive_task > /dev/null 2>&1 &  # Run the task in the background
and suppress output
done

# Optionally, wait for all background processes to complete (won't happen
unless manually killed)
wait
```

Run the command below to give permission and run this bash script:

```
chmod +x /etc/pids_high_cpu.sh
/etc/pids_high_cpu.sh &
```

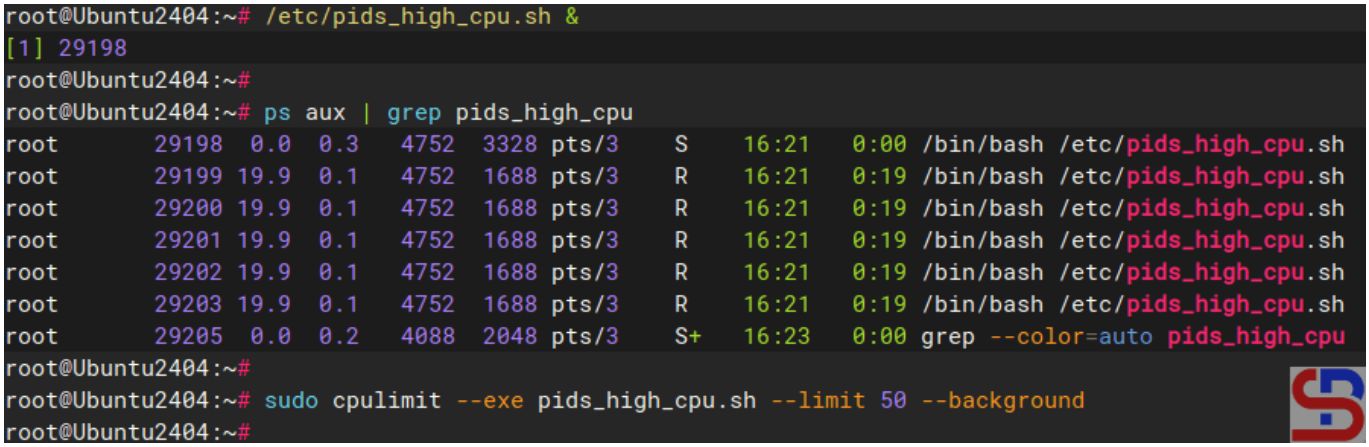
Run the **top** command on another terminal. As you can see in the image below, the script has many PIDs and uses a lot of CPU resources on the server:



Display the app with many PIDs

Run the cpulimit command to restrict this script to utilizing just 50% of the server's CPU:

```
sudo cpulimit --exe pids_high_cpu.sh --limit 50 --background
```



Run the cpulimit command with the --exe option

### C. Using --path option

Besides using the --exe option, you can also use the **--path** option or **-P** option. To use this option, you have to know the path of the application that you want to limit its CPU usage. Use the format below to run the **--path** option in the

cpulimit command:

```
cpulimit --path /folder/path/of/the/application --limit xxx --background
```

For the same case, type the command below to use the cpulimit command with the **-path** option to limit CPU usage to **65** percent for **pids_high_cpu.sh** application in the /etc folder:

```
cpulimit --path /etc/pids_high_cpu.sh --limit 65 --background
```

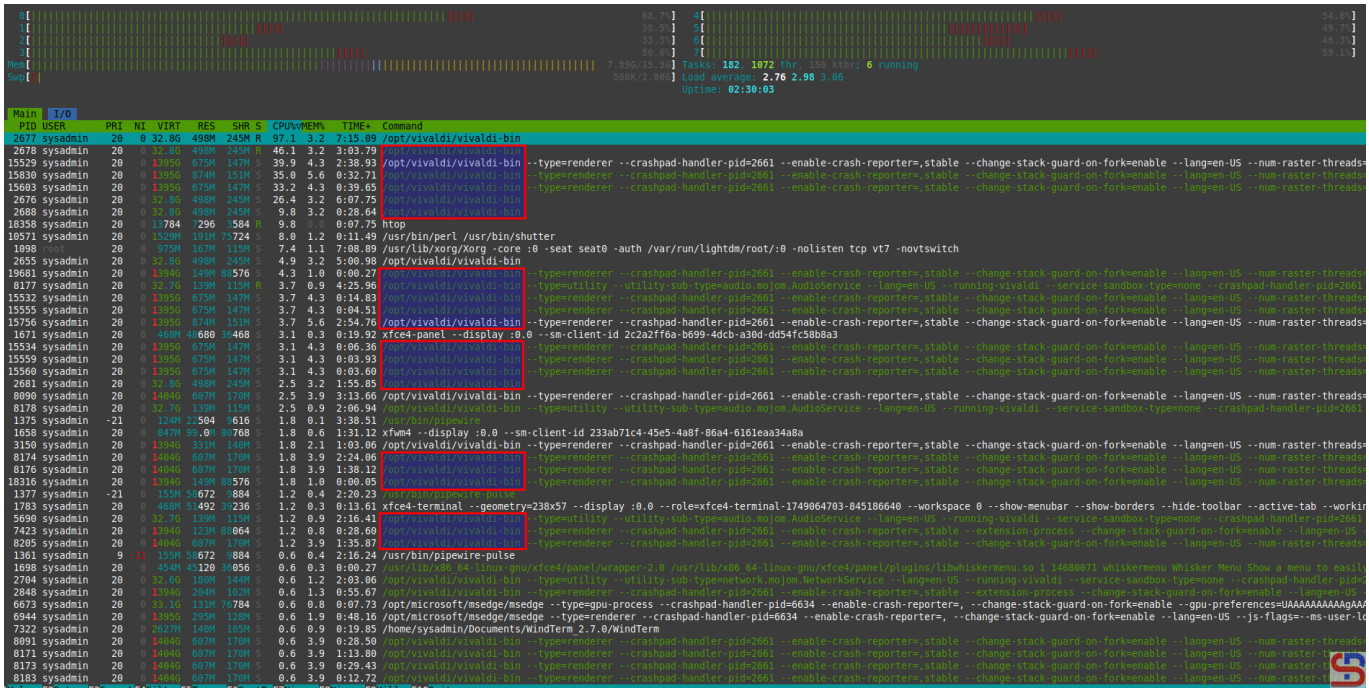
WARNING

You can enter the cpulimit command into the crontab so the command will run automatically after the device restarts. But, the cpulimit command that you enter into the crontab can only use the **--exe** or **--path** option because, by default, the application name or application path will never change after the server restarts. Here is an example of the crontab:

```
@reboot        cpulimit --path /etc/pids_high_cpu.sh --limit 65 --background
```

## Note

If you see an application running that generates a lot of PIDs, as shown in the image below:

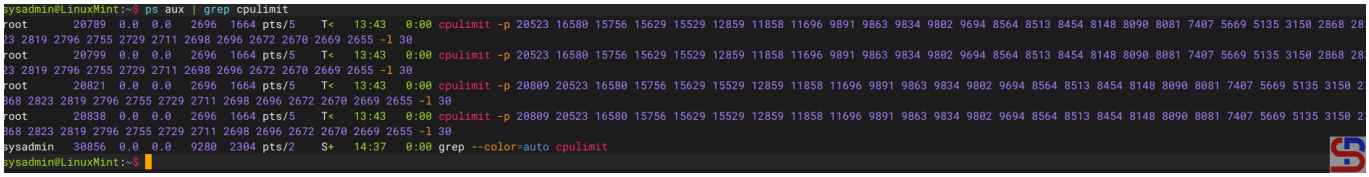


The application with many PIDs

From the picture above, you can see that the application Vivaldi has many PIDs. So, you have to write a script to restrict apps with numerous PIDs. Here is a copy of the bash script:

```
#!/bin/bash

LIMIT=50
PROCESS_NAME="vivaldi-bin"

# Kill existing cpulimit instances related to vivaldi-bin
pkill -f "cpulimit -p" 2>/dev/null

# Get all vivaldi PIDs
PIDS=$(pidof $PROCESS_NAME)

if [[ -z "$PIDS" ]]; then
  echo "[$(date)] $PROCESS_NAME not running."
  exit 0
fi

echo "[$(date)] Limiting CPU for PIDs: $PIDS"

# Start cpulimit for each PID in background
for pid in $PIDS; do
  cpulimit -p "$pid" -l "$LIMIT" > /dev/null 2>&1 &
done
```

Change the **LIMIT** and **PROCESS_NAME** sections according to your needs and permit the script to be executed. If the script runs, it will limit the CPU to the PIDs.



Check the cpulimit command that runs in the background

Enter the script into the crontab using the script below:

```
#Limit CPU vivaldi
*/30 * * * *     /root/limit_vivaldi.sh
@reboot         /root/limit_vivaldi.sh
```

The script will restart every 30 minutes, and if the device restarts, the script will start automatically.

## References


tecmint.com
linuxsec.org
id.ubunlog.com
linuxsec.org
youtube.com