

# CPU-frequency scaling on Slackware

## Overview

CPU frequency scaling is carried out by the kernel, but requires that the relevant UEFI/BIOS options be enabled, such as Intel (Enhanced) Speedstep. Slackware comes with all requirements necessary to use this feature.

## Kernel Config Requirements

The kernel options for CPU frequency scaling are as follows. You need both a governor (one set to default) and a driver. The Slackware default governor is 'userspace'.

- **Power management and ACPI options**

- CPU Frequency scaling

- CPU Frequency scaling (CPU\_FREQ [=y])

- 'performance' governor (CONFIG\_CPU\_FREQ\_GOV\_PERFORMANCE)  
This sets CPU frequency to the maximum available.
- 'powersave' governor (CONFIG\_CPU\_FREQ\_GOV\_POWERSAVE)  
This sets CPU frequency to the minimum available.
- 'userspace' governor for userspace frequency scaling (CONFIG\_CPU\_FREQ\_GOV\_USERSPACE)  
This allows userspace programs to set the CPU frequency.
- 'ondemand' cpufreq policy governor (CONFIG\_CPU\_FREQ\_GOV\_ONDEMAND)  
This governor is recommended for desktops.
- 'conservative' cpufreq governor (CONFIG\_CPU\_FREQ\_GOV\_CONSERVATIVE)  
This governor is recommended for laptops/netbooks. Although similar to the 'ondemand' governor, frequency is gracefully increased and decreased rather than jumping to 100% when speed is required.
- x86 CPU frequency scaling drivers
  - Intel P state control (X86\_INTEL\_PSTATE [=n])  
This driver is mutually exclusive with CONFIG\_X86\_ACPI\_CPUFREQ. It is a newer driver for Sandy Bridge processors and [may cause problems](#).
  - Processor Clocking Control interface driver (CONFIG\_X86\_PCC\_CPUFREQ)  
This is only required for HP ProLiant servers, which use this interface. Otherwise, disable it.
  - ACPI Processor P-States driver (CONFIG\_X86\_ACPI\_CPUFREQ [=y])  
This is the recommended driver for newer CPUs Intel (Enhanced) Speedstep enabled and AMD K10 and newer.
  - AMD Opteron/Athlon64 PowerNow! (CONFIG\_X86\_POWERNOW\_K8)  
This is for K8/early Opteron/Athlon64 processors.
  - Intel Enhanced SpeedStep (deprecated) (CONFIG\_X86\_SPEEDSTEP\_CENTRINO [=n])  
This is a deprecated option that has been superseded by CONFIG\_X86\_ACPI\_CPUFREQ, so leave this disabled.

- Intel Pentium 4 clock modulation (CONFIG\_X86\_P4\_CLOCKMOD [=n])  
This is a hack for Pentium 4s that may cause severe slowdowns and noticeable latencies, so disable it.

It is recommended that the drivers be built-in to the kernel. If they are not, they may load automatically or you may have to load them yourself.

## Checking the CPU frequency settings

Slackware comes with the `cpufrequtils` package which helps to configure frequency scaling in an appropriate manner. You can check the settings on your system with the command

```
cpufreq-info
```

Or if you don't have the package installed:

```
cat /sys/devices/system/cpu/cpu*/cpufreq/scaling_governor  
cat /proc/cpuinfo
```

where "cpu\*" is the CPU you want the info on, for example `cpu0`.

## Setting the CPU frequency settings

The `cpufreq-set` command can be used to set the appropriate governor.

Adding the following to the `/etc/rc.d/rc.local` file

```
# CPU-frequency scaling  
cpufreq-set --cpu 0 --governor conservative  
cpufreq-set --cpu 1 --governor conservative
```

will set the governor to 'conservative' on each boot.

The same can be done using `sysfs`:

```
echo "conservative" > /sys/devices/system/cpu/cpu0/cpufreq/scaling_governor  
echo "conservative" > /sys/devices/system/cpu/cpu1/cpufreq/scaling_governor
```

If you have Turbo Boost enabled in the UEFI/BIOS, you can turn boost on (1) or off (0) by running:

```
echo 1 > /sys/devices/system/cpu/cpufreq/boost
```

as long as the interface exists.

## Further reading

The manpages for `cpufreq-info` and `cpufreq-set` are useful.

The kernel Documentation/cpu-freq directory contains detailed explanations of CPU frequency drivers, governors, and other settings.

A decent explanation of P states and how they are handled in the kernel:

<https://plus.google.com/+ArjanvandeVen/posts/dLn9T4ehyWL>

## Sources

- Originally written by [Markus Hutmacher](#)
- Updated by [metaschima](#)
- Descriptions of kernel options in `make menuconfig`.

[howtos](#), [CPU](#), [frequency](#), [Laptop](#)

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