Cpufrequtils

Dynamic CPU frequency scaling (also known as CPU throttling) is a technique in computer architecture where a processor is run at a less-than-maximum frequency in order to conserve power.

Here is a setup process using “cpufrequtils”.

1. Install "cpufrequtils"

```
$ sudo apt-get install cpufrequtils
```

2. Set governor and cpu speed

You need to create **/etc/default/cpufrequtils** file and fill it as the following format.

```
$ sudo vi /etc/default/cpufrequtils
```

```
ENABLE="true"
GOVERNOR="ondemand"
MAX_SPEED=1536000
MIN_SPEED=100000
```

You can check the available list of governor and cpu speed under those nodes.

```
/sys/devices/system/cpu/cpufreq/policy0/scaling_available_governors
```

```
/sys/devices/system/cpu/cpufreq/policy0/scaling_available_frequencies
```

3. Restart cpufrequtils service

Restart cpufrequtils service.

```
$ sudo service cpufrequtils restart
```

Then, you can check the cpufreq info is updated.

```
$ cpufreq-info -o
          minimum CPU frequency  -  maximum CPU frequency  -  governor
CPU          100000 kHz (  6 %)  -    1536000 kHz (100 %)  -  ondemand
CPU  1       100000 kHz (  6 %)  -    1536000 kHz (100 %)  -  ondemand
CPU  2       100000 kHz (  6 %)  -    1536000 kHz (100 %)  -  ondemand
CPU  3       100000 kHz (  6 %)  -    1536000 kHz (100 %)  -  ondemand
```

4. [Option] Ubuntu 18.04 - Disable ondemand.service using systemctl

In case of **Ubuntu 18.04**, ondemand.service overrides the default governor, so you should disable it to use cpufrequtils.

```
$ sudo systemctl disable ondemand
```

If you want to restore this service as default, please use this command.

```
$ sudo systemctl enable ondemand
```

Set-up Examples

[Example] ODROID-N2

Available governor and cpu frequency sets

```
$ cat /sys/devices/system/cpu/cpufreq/policy0/scaling_available_governors
ondemand powersave userspace conservative interactive performance schedutil
```

```
$ cat /sys/devices/system/cpu/cpufreq/policy0/scaling_available_frequencies
100000 250000 500000 667000 1000000 1200000 1398000 1512000 1608000 1704000
1896000

$ cat /sys/devices/system/cpu/cpufreq/policy2/scaling_available_frequencies
100000 250000 500000 667000 1000000 1200000 1398000 1512000 1608000 1704000
1800000
```

cpufrequtils option

```
$ sudo vi /etc/default/cpufrequtils

ENABLE="true"
GOVERNOR="ondemand"
```

cpufreq-info

```
$ sudo service cpufrequtils restart

$ cpufreq-info -o
          minimum CPU frequency  -  maximum CPU frequency  -  governor
CPU          100000 kHz (  5 %)  -    1896000 kHz (100 %)  -  ondemand
CPU  1       100000 kHz (  5 %)  -    1896000 kHz (100 %)  -  ondemand
```

```
CPU  2       100000 kHz (  5 %)  -    1800000 kHz (100 %)  -  ondemand
CPU  3       100000 kHz (  5 %)  -    1800000 kHz (100 %)  -  ondemand
CPU  4       100000 kHz (  5 %)  -    1800000 kHz (100 %)  -  ondemand
CPU  5       100000 kHz (  5 %)  -    1800000 kHz (100 %)  -  ondemand
```

[Example] ODROID-XU3/XU4

Available governor and cpu frequency sets

```
$ cat /sys/devices/system/cpu/cpufreq/policy0/scaling_available_governors
conservative userspace powersave ondemand performance schedutil
```

```
$ cat /sys/devices/system/cpu/cpufreq/policy0/scaling_available_frequencies
200000 300000 400000 500000 600000 700000 800000 900000 1000000 1100000
1200000 1300000 1400000 1500000
$ cat /sys/devices/system/cpu/cpufreq/policy4/scaling_available_frequencies
200000 300000 400000 500000 600000 700000 800000 900000 1000000 1100000
1200000 1300000 1400000 1500000 1600000 1700000 1800000 1900000 2000000
```

cpufrequtils option

```
$ sudo vi /etc/default/cpufrequtils

ENABLE="true"
GOVERNOR="ondemand"
```

cpufreq-info

```
$ sudo service cpufrequtils restart

$ cpufreq-info -o
          minimum CPU frequency  -  maximum CPU frequency  -  governor
CPU         200000 kHz ( 13 %)  -    1500000 kHz (100 %)  -  ondemand
CPU  1      200000 kHz ( 13 %)  -    1500000 kHz (100 %)  -  ondemand
CPU  2      200000 kHz ( 13 %)  -    1500000 kHz (100 %)  -  ondemand
CPU  3      200000 kHz ( 13 %)  -    1500000 kHz (100 %)  -  ondemand
CPU  4      200000 kHz ( 10 %)  -    2000000 kHz (100 %)  -  ondemand
CPU  5      200000 kHz ( 10 %)  -    2000000 kHz (100 %)  -  ondemand
CPU  6      200000 kHz ( 10 %)  -    2000000 kHz (100 %)  -  ondemand
CPU  7      200000 kHz ( 10 %)  -    2000000 kHz (100 %)  -  ondemand
```

[Example] ODROID-C2

Available governor and cpu frequency sets

```
$ cat /sys/devices/system/cpu/cpu0/cpufreq/scaling_available_governors
hotplug interactive conservative ondemand userspace powersave performance
```

```
$ cat /sys/devices/system/cpu/cpu0/cpufreq/scaling_available_frequencies
100000 250000 500000 1000000 1296000 1536000
```

cpufrequtils option

```
$ sudo vi /etc/default/cpufrequtils

ENABLE="true"
GOVERNOR="performance"
MAX_SPEED=1536000
MIN_SPEED=100000
```

cpufreq-info

```
$ sudo service cpufrequtils restart

$ cpufreq-info -o
          minimum CPU frequency  -  maximum CPU frequency  -  governor
CPU          100000 kHz (  6 %)  -    1536000 kHz (100 %)  -  performance
CPU  1       100000 kHz (  6 %)  -    1536000 kHz (100 %)  -  performance
CPU  2       100000 kHz (  6 %)  -    1536000 kHz (100 %)  -  performance
CPU  3       100000 kHz (  6 %)  -    1536000 kHz (100 %)  -  performance
```

[Example] ODROID-C1

Available governor and cpu frequency sets

```
$ cat /sys/devices/system/cpu/cpu0/cpufreq/scaling_available_governors
hotplug interactive conservative ondemand performance
```

```
$ cat /sys/devices/system/cpu/cpu0/cpufreq/scaling_available_frequencies
96000 192000 312000 408000 504000 600000 696000 816000 912000 1008000
1104000 1200000 1296000 1416000 1488000 1536000 1632000 1728000 1824000
```

cpufrequtils option

```
$ sudo vi /etc/default/cpufrequtils
```

```
ENABLE="true"
GOVERNOR="ondemand"
MAX_SPEED=1824000
MIN_SPEED=100000
```

cpufreq-info

```
$ sudo service cpufrequtils restart

$ cpufreq-info -o
          minimum CPU frequency  -  maximum CPU frequency  -  governor
CPU          96000 kHz (  5 %)  -    1824000 kHz (100 %)  -  ondemand
CPU  1       96000 kHz (  5 %)  -    1824000 kHz (100 %)  -  ondemand
CPU  2       96000 kHz (  5 %)  -    1824000 kHz (100 %)  -  ondemand
CPU  3       96000 kHz (  5 %)  -    1824000 kHz (100 %)  -  ondemand
```

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