cpufreq-stats.txt

CPU frequency and voltage scaling statistics in the Linux(TM) kernel

L i n u x c p u f r e q - s t a t s d r i v e r

- information for users -

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1. Introduction

cpufreq-stats is a driver that provides CPU frequency statistics for each CPU. These statistics are provided in /sysfs as a bunch of read_only interfaces. This interface (when configured) will appear in a separate directory under cpufreq in /sysfs (<sysfs root>/devices/system/cpu/cpuX/cpufreq/stats/) for each CPU. Various statistics will form read_only files under this directory.

This driver is designed to be independent of any particular cpufreq_driver that may be running on your CPU. So, it will work with any cpufreq_driver.

2. Statistics Provided (with example)

cpufreq stats provides following statistics (explained in detail below).
- time_in_state
- total_trans
- trans_table

All the statistics will be from the time the stats driver has been inserted to the time when a read of a particular statistic is done. Obviously, stats driver will not have any information about the frequency transitions before the stats driver insertion.

```
<mysystem>:/sys/devices/system/cpu/cpu0/cpufreq/stats # ls -l
total 0
drwxr-xr-x  2 root root    0 May 14 16:06 .
drwxr-xr-x  3 root root    0 May 14 15:58 ..
-r--r--r--  1 root root 4096 May 14 16:06 time_in_state
-r--r--r--  1 root root 4096 May 14 16:06 total_trans
-r--r--r--  1 root root 4096 May 14 16:06 trans_table
```

- time_in_state

This gives the amount of time spent in each of the frequencies supported by this CPU. The cat output will have "<frequency> <time>" pair in each line, which will mean this CPU spent <time> usertime units of time at <frequency>. Output will have one line for each of the supported frequencies. usertime units here

is 10mS (similar to other time exported in /proc).

```
<mysystem>:/sys/devices/system/cpu/cpu0/cpufreq/stats # cat time_in_state
3600000 2089
3400000 136
3200000 34
3000000 67
2800000 172488
```

- total_trans
This gives the total number of frequency transitions on this CPU. The cat output will have a single count which is the total number of frequency transitions.

```
<mysystem>:/sys/devices/system/cpu/cpu0/cpufreq/stats # cat total_trans
20
```

- trans_table
This will give a fine grained information about all the CPU frequency transitions. The cat output here is a two dimensional matrix, where an entry <i,j> (row i, column j) represents the count of number of transitions from Freq_i to Freq_j. Freq_i is in descending order with increasing rows and Freq_j is in descending order with increasing columns. The output here also contains the actual freq values for each row and column for better readability.

```
<mysystem>:/sys/devices/system/cpu/cpu0/cpufreq/stats # cat trans_table
   From  :    To
         :   3600000   3400000   3200000   3000000   2800000
  3600000:         0         5         0         0         0
  3400000:         4         0         2         0         0
  3200000:         0         1         0         2         0
  3000000:         0         0         1         0         3
  2800000:         0         0         0         2         0
```

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3. Configuring cpufreq-stats

To configure cpufreq-stats in your kernel
Config Main Menu

```
        Power management options (ACPI, APM)  --->
                CPU Frequency scaling  --->
                        [*] CPU Frequency scaling
                        <*>   CPU frequency translation statistics
                        [*]     CPU frequency translation statistics details
```

"CPU Frequency scaling" (CONFIG_CPU_FREQ) should be enabled to configure cpufreq-stats.

"CPU frequency translation statistics" (CONFIG_CPU_FREQ_STAT) provides the basic statistics which includes time_in_state and total_trans.

"CPU frequency translation statistics details" (CONFIG_CPU_FREQ_STAT_DETAILS) provides fine grained cpufreq stats by trans_table. The reason for having a separate config option for trans_table is:
- trans_table goes against the traditional /sysfs rule of one value per interface. It provides a whole bunch of value in a 2 dimensional matrix form.

Once these two options are enabled and your CPU supports cpufrequency, you will be able to see the CPU frequency statistics in /sysfs.