

Linux Plumbers Conference

Vienna, Austria | September 18-20, 2024

Power / Thermal / Performance interfaces (Focus on mobile platforms)

Power Management and Thermal Control MC

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Current status

- Custom kernel code abusing the existing frameworks. Commonly the thermal framework with the cooling devices
- Quite common to find up to one hundred cooling devices
- However some of them are not to cool down the system but to export an ABI to userspace
- Dedicated userspace logic uses this ABI to set opaque values



Usage for those thermal zones

- Amps for battery
- indexes for different modes
- brightness for the backlight
- frame rate
- dummy devices for IPC (one process sets a state, another process gets the notification as a thermal event)
- notifier blockchain (cooling device just sends a notification to all subscribers when a state is set)
- CPU / Cluster pause (cpu isolation from scheduler aka fast cpu hotplug)
- ...



Power interfaces

- Powercap / DTPM
 - Basically get power consumption and set power limit
 - Battery is a good candidate but needs a conversion between current limitation and power
 - From the thermal framework POV we can use a generic “power cooling device”



Performance interfaces

- Existing interfaces for cpufreq and devfreq (sysfs)
 - min_freq / max_freq (different formats)
- Out of tree interfaces
 - PM QoS (/dev)
 - Througput unit (kBps)
 - Sum pm qos
 - Temporary constraint



Performance capping + QoS

- Objectives
 - Unify the interfaces and the units
 - Add constraint timeout
 - Notification on constraint change
 - Initial proposal
 - <https://lore.kernel.org/lkml/20231213175818.2826876-2-daniel.lezcano@linaro.org/>



Interfaces

- perf_normal_min, perf_normal_max (Normalized values 0-1023, required)
- perf_normal_map (freq -> perf value, required)
- perf_kbps_min, perf_kbps_max (kBps value, optional)
- perf_kbps_map (kBps value, normalized perf value, required if perf_kbps_min|max)
- All these in /sys/devices/*/power ?
- /sys/class/perfcpap to enumerate all perf limiting devices (links) in order make the userspace life easier ?



Notifications

- Notifications are not supposed to happen in a high rate
- Only when there is a constraint change (QoS notifier block chain)
- kobject_uevent for a sysfs notification
 - PERF_MIN update
 - PERF_MAX update



Constraint timeout

- We may want to set the performance constraint during an amount of time only
- Temporary constraint in ms
- How to set it up ?
 - Second parameter when setting up a perf or throughput constraint ?
 - `echo 512 1200 > perf_normal_max`
 - “Set half performance during 1.2 sec”



LPC 2024 - Overview

Conference Details

The Linux Plumbers Conference is the premier event for developers working at all levels of the plumbing layer and beyond.

Taking place on Wednesday 18th, Thursday 19th and Friday 20th of September, this year we will be both in person and remote (hybrid). However to minimize technical issues, we'd appreciate most of the content presenters being in-person.

The in-person venue is the Austria Center, Vienna, Austria.

Bruno-Kreisky-Platz 1, 1220 Wien, Austria

Unless specified otherwise, the conference information will be shared in Central European Summer Time (CEST, UTC+02:00, Europe/Vienna timezone).

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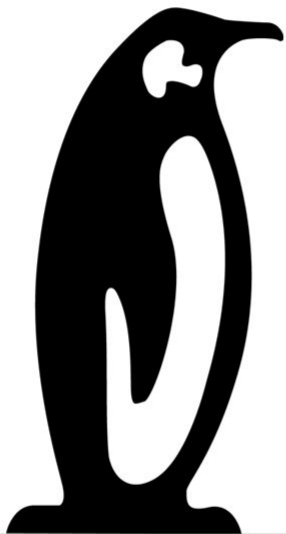
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