

Power Management: What's new in SLED 11

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Power Management: What's new in SLED 11

- 1 Powersave Daemon → gone
- 2 Extending Battery Runtime
 - CPU Power Management
 - Wireless
 - Hard Disks
 - Sound Cards
- 3 Sleeping...
- 4 Energy Star



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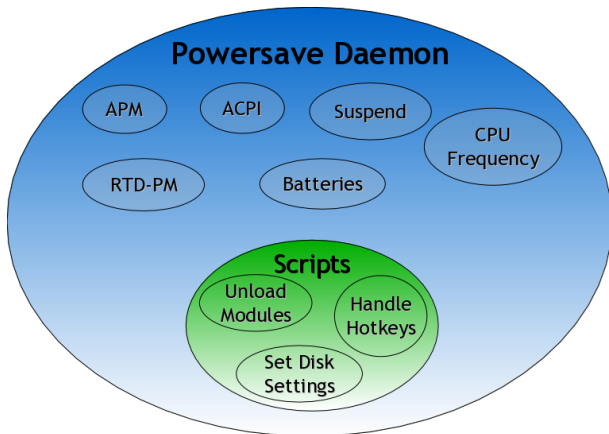


Past: Powersave Daemon

Powersaved

- Client (KPowersave/Gnome-Power-Manager)/ server (powersaved) architecture
- Growing project
- Slightly overengineered: Binaries, scripts, desktop interaction, etc.
- All-in-One-Solution





Dropped! Common Goal: Split up functionality into different subsystems



New Power Management Infrastructure

Mechanism

- Question: How to do it?
- Hibernate/Suspend → pm-utils (pm-`{hibernate,suspend}`)
- Saving power → pm-utils (pm-powersave `{true,false}`)
- HAL

Policy

- Question: When to do it?
- Gnome-Power-Manager/KPowersave are the *Policy Managers*
- Easily configurable by the desktop user



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Known Techniques

CPU Frequency Scaling (ACPI P-States)

- Reduce CPU frequency when unused
- Already in good shape in SLE 10

CPU Idle States (ACPI C-States)

- Set CPU to low power mode if no instructions are executed
- Example Intel Core 2 Duo T7700: Power consumption ranges from 13.5 W (no C-State) to 1.2 W (Deepest Sleep State)

Huge potential!



Improvements

Fixing Bad Userspace Applications

- Applications must not unnecessarily wake up the CPU
- Ongoing process over the last year(s)
- It seems to pay off!

Multi-Core aware CPU scheduler

- Schedule load so that only one CPU is woken up, if possible
- `$ echo 1 > \`
`/sys/devices/system/cpu/sched_mc_power_savings`



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Wireless

Put the Chip to Sleep

- Enabling WLAN chip power management to save power in times of no or only low traffic
- Can save up to 2 W

Supported Chips

IWL3945 and IWL4965

```
$ echo 6 > \  
/sys/bus/pci/drivers/iwl*/000*/power_level
```



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SATA: Aggressive Link Power Management

- SATA link to the disk is put into low power mode when no IO
- Automatically woken up when requests arrive
- Can save up to 1 W

```
$ echo {min/medium}_power > \  
/sys/class/scsi_host/$HOST/link_power_management_policy
```

Try to wake up the disk as seldom as possible

- Remount devices with relatime when on battery
- Use some kind of laptop mode to make use of caches



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Shutdown When Idle

- Disable sound cards after time out period
- Short wakeup delay
- Clicking noise when coming out of the low power mode on some hardware
- Power savings: $\approx 0.5\text{Watt}$

```
$ echo 10 > \  
/sys/module/snd_hda_intel/parameters/power_save
```



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Hibernation - the slow one



Splashy

- Eye-candy suspend/resume
- For debugging, set `/etc/suspend.conf:splash=no`

New Features

- Speed up with compression and threading

Suspend - the fast one

Whitelist for Reportet Machines

- Extended whitelist for all known working machines
- Please report working, but not listes systems:
<http://en.opensuse.org/S2ram>

Default Whitelisted Machines

- Machines with Intel/NVidia/fglrx are automatically whitelisted
- Please report non-working machines



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Wikipedia

“Energy Star is a United States government program to promote energy efficient consumer products”

General Goal

Energy Star by default, that's it!



Requirements

- Three classes of requirements:
 - Power consumption limits (ie. < 14W)
 - Functionality like suspend, wake on LAN
 - Proper default configuration
- <http://www.energystar.gov>
- <http://opensuse.org/PowerMeasurements>: Presentations, guides



What has been done... 1/2

Power Consumption Limits

- Work has been done, see above
- Very hardware dependent, varies from 7 to 35 Watts on laptops

Functionality

- We have working suspend for whitelisted systems
- Wake On LAN works with most recent network cards (ethtool)
- New: Possibility to schedule wakeups from sleep



What has been done... 2/2

Compliant Default Configuration

- Display to go into sleep after 15 minutes
- New: System to go into sleep after 30 Minutes, *even on AC!*

Software Adaptions

- Gnome-Power-Manager and KPowersave have been adapted to have a Energy Star compliant default configuration



Communication

Bugzilla is the First Choice

<http://bugzilla.novell.com>: Component *Mobile Devices*

Or...

- http://en.opensuse.org/Mobile_Devices_Team
- Please don't hesitate to contact me directly for any questions you might have



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Thanks for listening!
Q & A

