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Presentation Plan...

- Who am I?
- What we did wrong in the past
- What we can do now
- New word of the day: **Quirk**
- Ways to save power
- How do I fix suspend and resume?
- Conclusions
- Questions

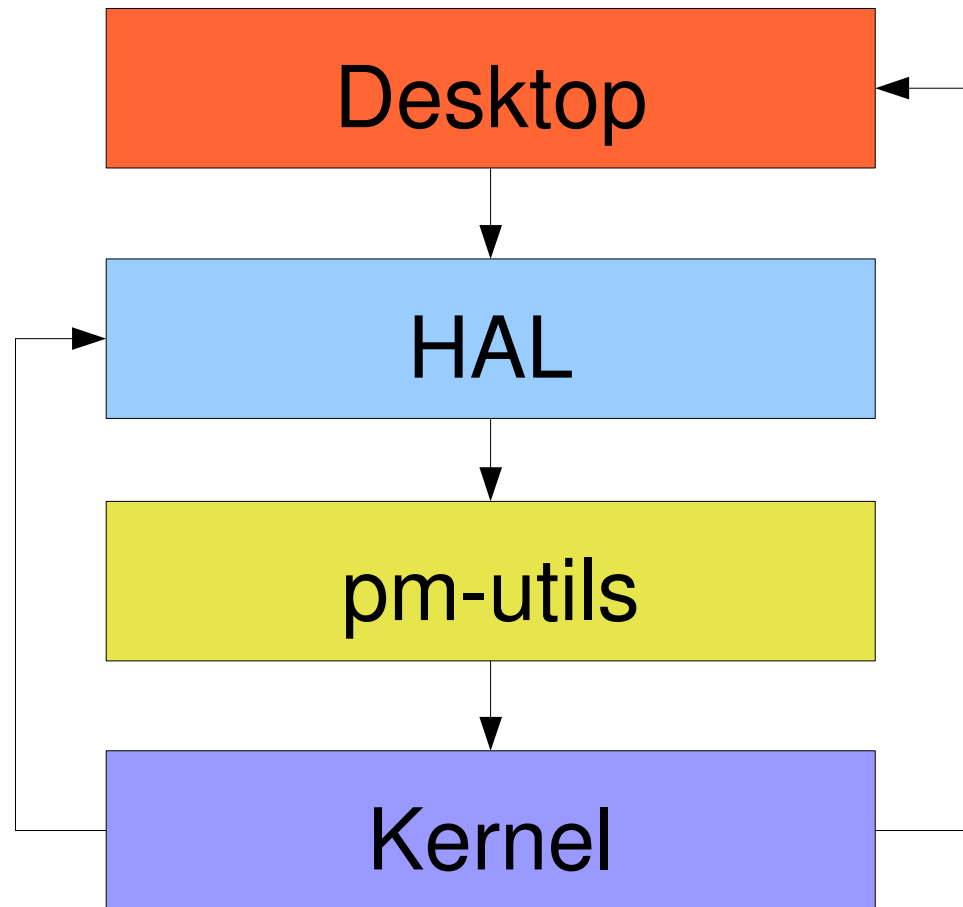
Who am I?

- My name is Richard Hughes
- I've worked for Red Hat UK for a few months now
- I'm the maintainer of
- I'm the maintainer of **PackageKit**
- I'm a major contributor of hal and hal-info
- I've been a maintainer of pm-utils
- I've fixed tons of ACPI kernel drivers

What we did wrong in the past

- We were not as good as Windows XP™
- We were not as good as Apple OSX™
- APM / ACPI / PMU / Servers / Laptops / Embedded
- Different software for different hardware
- No focus on power saving, only speed
- Speed seen as opposite to power saving
- Assumed energy was inexpensive and plentiful

What we can do now: A new stack

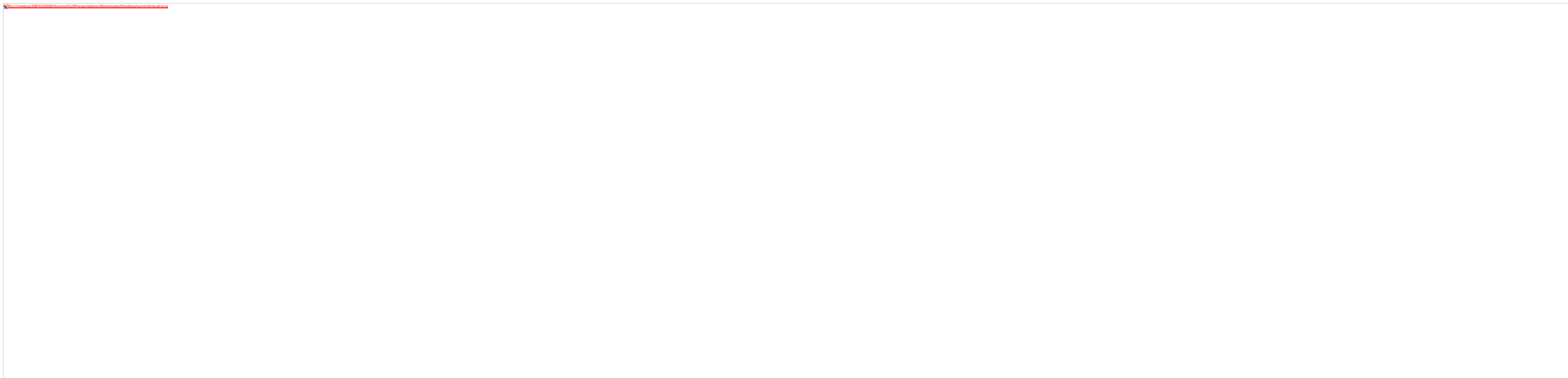


What we can do now : Using HAL

- New stack: desktop \Rightarrow HAL \Rightarrow pm-utils \Rightarrow kernel
- Common parameters for batteries
 - Mouse, keyboard, laptop, UPS
- Run addons and probers
 - hald-addon-storage
 - hald-addon-usb-csr
- Provide methods to be used:
 - Suspend(), Hibernate()
 - Lock(), Shutdown()

What we can do now : Using hal-info

- hal-info as a “quirk” dump
 - Recall data: exploding batteries



- Keyboard multimedia keys
- Suspend and hibernate resume actions

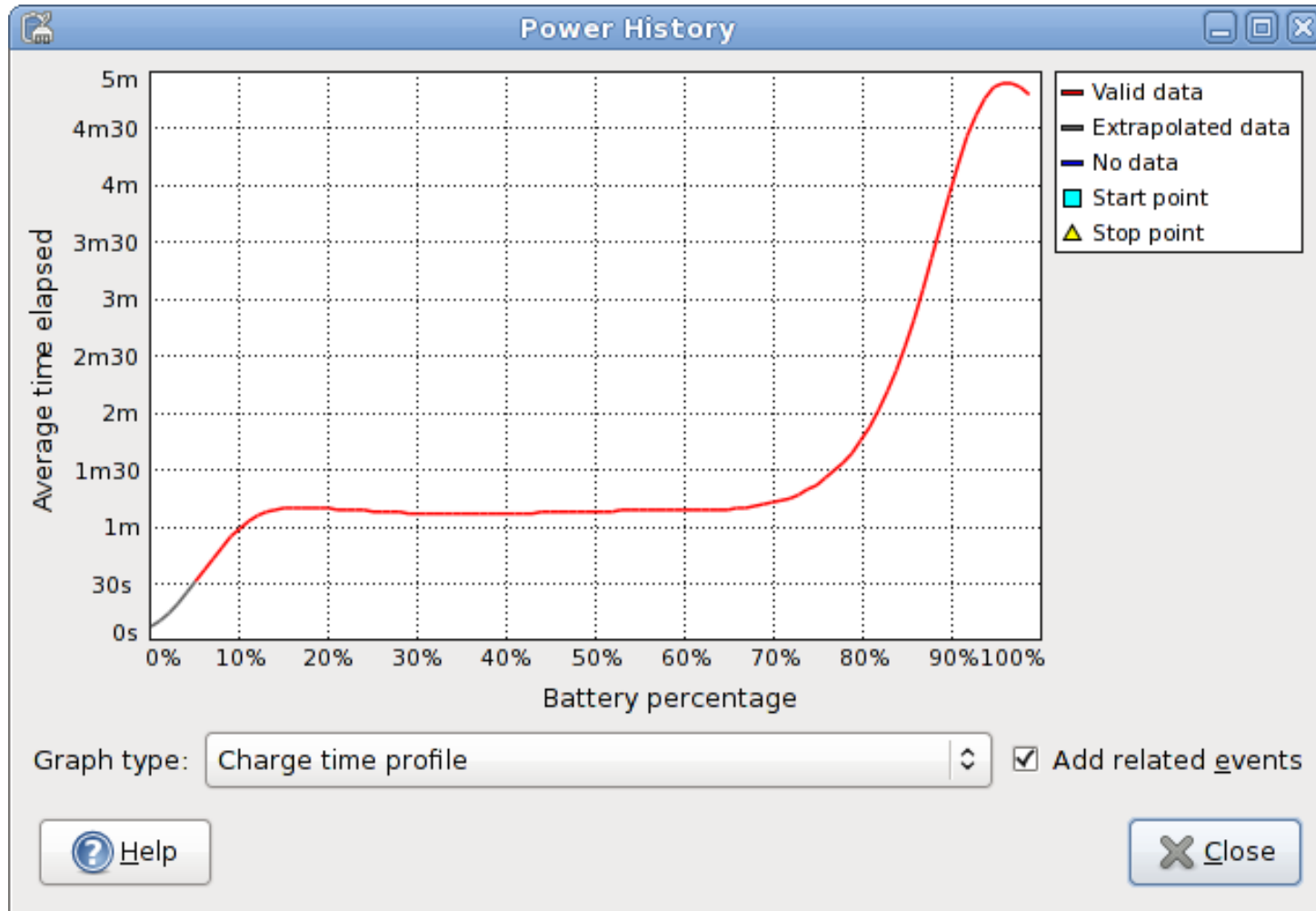
What we can do now: Multimedia buttons

- Less ways of reporting input, now standardized on INPUT
 - Slowly converting wacky drivers
- Using hal-info to do the mapping:

```
<match key="input.product" string="Sony Vaio Keys">  
  <match key="computer:system.vendor" prefix="Sony">  
    <match key="computer:system.product" string_outof="PCG-Z1RMP;PCG-Z1XMP">  
      <append key="input.keymap.data" type="strlist">0x06:mute</append>  
      <append key="input.keymap.data" type="strlist">0x07:volumedown</append>  
      <append key="input.keymap.data" type="strlist">0x08:volumeup</append>  
      <append key="info.capabilities" type="strlist">input.keymap</append>  
    </match>  
  </match>  
</match>
```

- Early access to QA hardware makes Linux Just Work!

What we can do now: Battery Profiling



Word of the day: Quirk

- Something a bit odd
- Helpful website
- How they are applied
- We share information
- Sharing cross distro



The screenshot shows a web browser window with the address bar containing <http://people.freedesktop.org/~hughes/quirk/>. The page title is "HAL Quirk Site". The main content area features three categories of quirks, each with an icon and a text description:

- I want to fix my suspend and resume**: Represented by a green PCI card with a blue 'Z' icon.
- I want to fix my multimedia keys**: Represented by keyboard keys 'y', 'x', and 'Ctrl' with a blue speech bubble icon.
- I want to fix my backlight**: Represented by a grey gear icon.

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Ways to save power (1)

- Tickless kernel and powertop ($\frac{2}{3}W$)



Ways to save power (2)

- Turn wifi off when not needed - and unload hardware... (1W)
- Do we need full gigabit ethernet speed? ($\frac{1}{5}W$)
- Power down the chip when no cable? ($\frac{1}{3}W$)
- Turn bluetooth polling off ($\frac{1}{3}W$)

Ways to save power (3)

- AHCI - powered even if no device ($\frac{2}{3}W$)
 - half an hour extra...
- Use NOATIME on some disks
 - Keep the disk in low power mode
 - Do not do manual powersaving
 - Spindown lifetime!

Ways to save power (4)

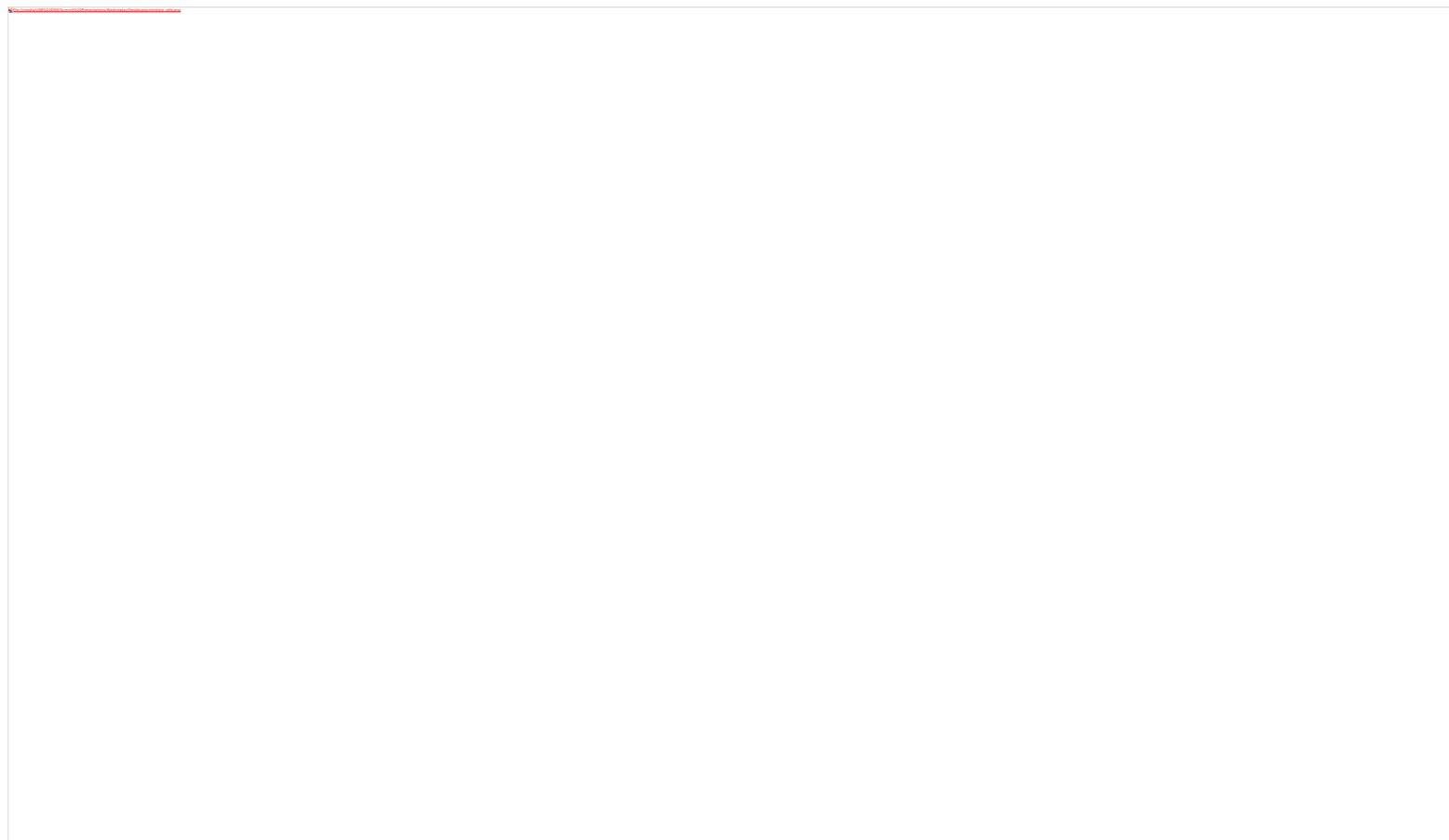
- Dim your backlight brightness when idle (2W)
- Surprisingly, disabling 3D ineffective
- Refresh rate, halve on idle ($\frac{3}{5}W$)
 - What Windows XP™ does
- Disabling TV, VGA or DVI ($\frac{1}{3}W$)
- Disabling screensavers!

How do I fix suspend and resume?

- Update kernel, pm-utils, hal and hal-info packages
- Don't use any of the non-free drivers. **Really.**
- See if already fixed by somebody else (~~quirk site~~)
- See if there is a similar machine
- Test using pm-utils

Using pm-utils directly

- Only useful if there are no quirks for your system already!



Conclusion

- The CPU **uses less power** for the same throughput
- There's still lots of improvements we can make
- There's some top people working on this at Red Hat
- More multimedia keys will work in RHEL 5.3
- More laptops should suspend **and resume!**
- My aim: a hassle-free Linux laptop experience

Questions

- Resume issues fixing fee: **one beer**