

# ***Laptops, Linux and Life***

**Getting the most out of  
your laptop with Linux**

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# *Laptops, Linux and Life*

- ◆ Software Suspend (Hibernation)
- ◆ Laptop Mode
- ◆ cpufreq
- ◆ acpid
- ◆ Roamability
- ◆ Tidbits

# *Software Suspend (aka hibernation)*

- ◆ Allows you to suspend your machine by writing the contents of memory to disk and powering off.
- ◆ No power needs to be supplied to the machine while suspended (can be suspended indefinitely).
- ◆ No BIOS support required.

# Software Suspend: A history lesson

Initial implementation by Gabor Kuti for 2.2 kernels (1998)

Ported to 2.4 and worked on by many many people  
(Florent Chabaud, Pavel Machek, and others)

Nigel Cunningham starts hacking  
on 2.4 code and takes over.  
It becomes known as “swsusp2”

Nigel ports his code to 2.6.

Pavel Machek ports to 2.5.17

Pavel maintains  
code through to 2.6

Patrick Mochel  
forks off pmdisk

Nigel merges his code with Pavel's  
through akpm and -mm trees

Patrick agrees for  
pmdisk to be dropped.



# *Software Suspend 2: Features*

- ◆ Core code is very reliable.
- ◆ Image compression for speed or size.
- ◆ Support for swap files.
- ◆ Ability to cancel a suspend in progress.
- ◆ Bootsplash compatible (for prettiness :)
- ◆ Highmem support (up to 4GB)
- ◆ SMP support

# *Software Suspend 2: 4-step HOWTO*

1. Downloading patches from [swsusp.sf.net](http://swsusp.sf.net).
2. Patching and compiling your kernel.
3. Getting the script.
4. Using it!

# *Software Suspend 2: getting it*

- ◆ Get a supported vanilla kernel:
  - ◆ Test patches are against latest 2.4 and 2.6 kernels.
  - ◆ Last stable release against recent 2.4 kernels and not-so-recent 2.6 kernels.
- ◆ Download patch tarball for the kernel you desire, from [swsusp.sf.net](http://swsusp.sf.net).

## *Software Suspend 2: patching*

```
$ tar xzf linux-2.6.7.tar.gz
$ tar xzf software-suspend-2.0.0.98-\
    for-2.6.7.tar.bz2
$ cd linux-2.6.7
$ cat ../software-suspend-2.0.0.98-for-
    2.6.7/[23]* | patch -p1
```



## *Software Suspend 2: configuring and compiling*

```
$ make menuconfig
```

- ◆ Enable Swapwriter, LZF compression.
- ◆ Wise to modularise most hardware drivers (sound, video, USB, ethernet, etc).

```
$ make dep ; make bzImage modules (2.4)
```

```
$ make bzImage modules (2.6)
```

```
$ make-kpkg ... (Debian)
```

```
$ make install modules_install (or whatever)
```

# *Software Suspend 2: installing*

- ◆ In lilo.conf:

```
append="resume2=swap:/dev/hdaX"
```

- ◆ Or in grub's menu.lst:

```
kernel ... resume2=swap:/dev/hdaX
```

- ◆ Reboot ...

# *Software Suspend 2: the script*

- ◆ Download suspend-script-0.94.tar.gz

```
# tar xzf suspend-script-  
  0.94.tar.gz  
# cd suspend-script-0.94  
# ./install.sh  
[...]
```

```
# hibernate
```

- ◆ Pray!

## *Software Suspend 2: when things go wrong*

- ◆ Boot with `init=/bin/sh` on the kernel command line and:

```
# mount -t proc proc /proc
# mount -o remount,rw /
# swapon -a
# echo > /proc/swsusp/activate
[... ]
# mount -o remount,ro /
# swapoff -a
# exec /sbin/init S
```

# *Software Suspend 2: debugging*

- ◆ It doesn't suspend?
- ◆ It's probably a driver.
- ◆ Unload all modules and try it. If it works, load them one by one until it succeeds.
- ◆ Curse the broken driver! (or just unload it before suspending)

# *Software Suspend 2: hardware support*

- ◆ What works?
  - ◆ Try it and see :)
  - ◆ Lots of drivers do!
  - ◆ Ultimately, everything.
- ◆ Common things that don't work:
  - ◆ nVidia video & network cards  
(being worked upon by nVidia!)
- ◆ Less common things that don't work:
  - ◆ CPU's without pse or pse36 (includes VIA C3s, Cyrix MediaGX chips as found in Wizards)
    - check `/proc/cpuinfo`

## *Software Suspend 2: caution!*

- ◆ Suspended image is closely linked to state of filesystem.
- ◆ Do **NOT** boot a non-swsusp capable kernel whilst suspended, and then resume.
- ◆ Do **NOT** touch any filesystems mounted in the suspended image (eg, windows filesystems) – ie, unmount them first!

## *Software Suspend 2: future directions*

- ◆ Currently merging Software Suspend 2 with AKPM's -mm tree
- ◆ Ultimately one version in 2.6!
- ◆ More driver support needed.
- ◆ More plugins (NFS writers, encryption modules)
- ◆ UML support ...



## *Laptop Mode patch*

- ◆ Spins the hard disk down when it's not needed.
- ◆ Queues up writes to the hard disk until a given time.
- ◆ Increases risk of data loss in event of a power failure.

## *Laptop Mode patch*

- ◆ Merged since 2.4.24 and 2.6.6.
- ◆ Script in Documentation/laptop-mode.txt  
Copy to /sbin/laptop\_mode.
- ◆ Run /sbin/laptop\_mode start.
- ◆ Can be started/stopped out of acpid too!
- ◆ Lots of useful tips in laptop-mode.txt.

# *cpufreq*

- ◆ Throttles CPU speed to conserve power or heat
- ◆ Very flexible configuration
  - ◆ eg, throttle CPU speed when overheating, *or* start up CPU fan

# *Using acpid*

- ◆ acpid can listen to
  - ◆ some power-related buttons (generally power buttons, sleep buttons and lid buttons)
  - ◆ ac adapter getting plugged/unplugged
  - ◆ temperature sensors

## *Using acpid*

- ◆ Enable laptop mode when off AC power
- ◆ Slow down CPU speed when off AC power
- ◆ Make power buttons do odd things :)

# *Laptops never sit still...*

Packages that can help with a nomadic life:

- ◆ laptop-net
  - ◆ Can detect which network you're on
- ◆ ifplugd
- ◆ waproamd
  - ◆ Sets WEP keys for wireless networks
- ◆ ifscheme
- ◆ PCMCIA configuration schemes
- ◆ VPNs
- ◆ DIY script

## *More information...*

- ◆ Software Suspend 2: <http://swsusp.sf.net/>
- ◆ Linux on laptops: <http://www.linux-laptop.net/>
- ◆ Useful packages:
  - ◆ acpid
  - ◆ cpufreq
  - ◆ laptop-net
  - ◆ waproamd