



CE Linux Forum

Status of Embedded Linux

(Update for Jamboree #30)

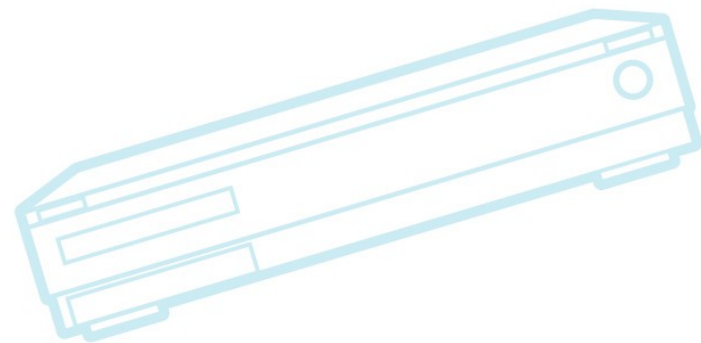
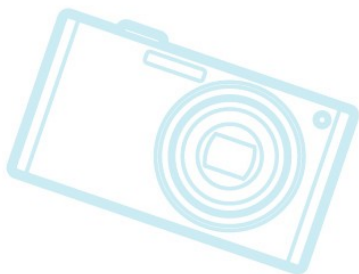
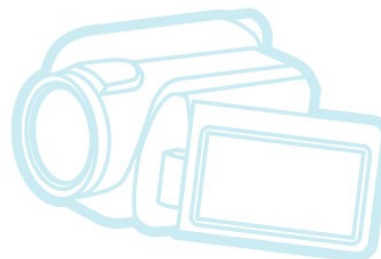
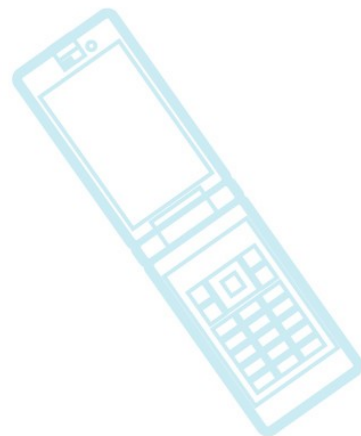
Tim Bird - CELF AG Chair



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Outline

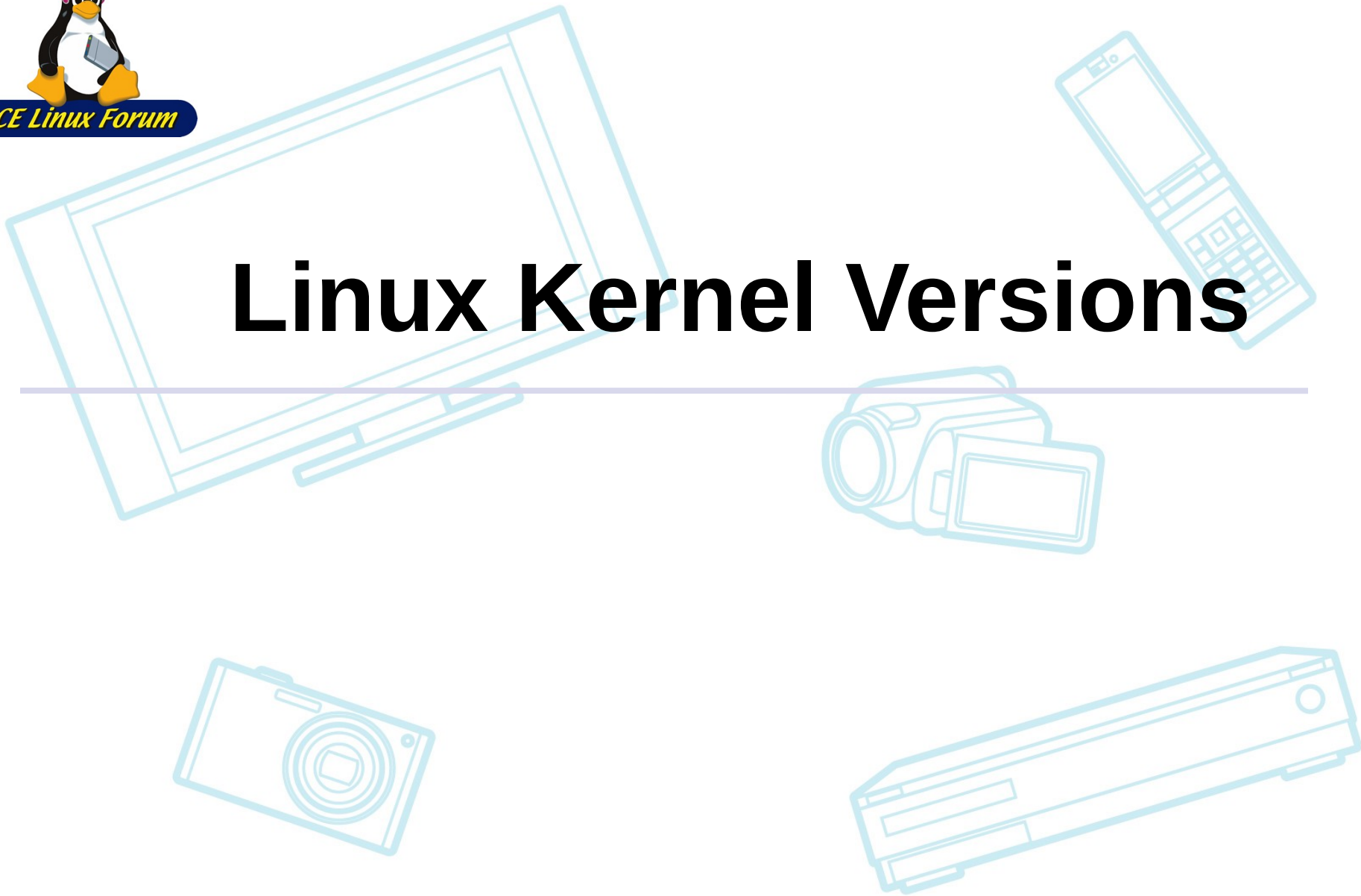
- Kernel Versions
- Technology Areas
- Embedded Distributions
- Community
- Resources





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Linux Kernel Versions

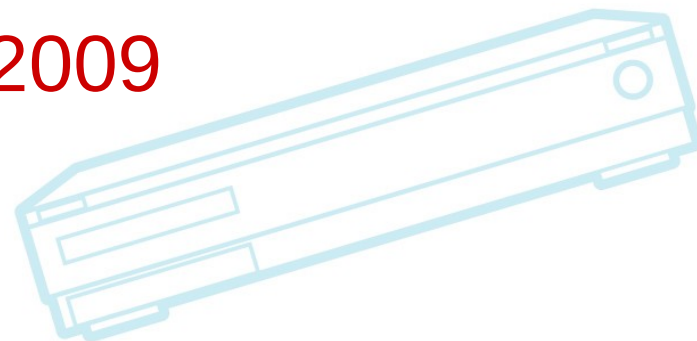
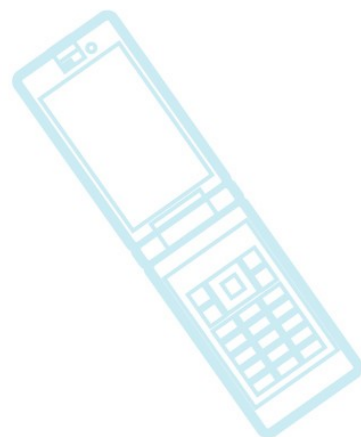




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Kernel Versions

- Linux v2.6.27 – 9 Oct 2008
- Linux v2.6.28 – 24 Dec 2008
- Linux v2.6.29 – 23 Mar 2009
- Linux v2.6.30 – 10 June 2009
- **Linux v2.6.31 – 9 Sep 2009**
- **Linux v2.6.32-rc1 - 27 Sep 2009**





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Linux v2.6.31

- Ftrace features
 - Generic filters, function profiler, new tracepoints, new documentation
- SMACK security module logging
- Performance counters
 - <http://lwn.net/Articles/311850/>
- kmemleak - detect kernel memory leaks
 - <http://lwn.net/Articles/187979/>
- `/proc/softirqs` - show per-CPU softirqs



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Linux v.2.6.32-rc1 (pre-32)

- devtmpfs
 - Dynamic, fast population of /dev
 - Very good for embedded!
 - <http://lwn.net/Articles/331818/>
- New scheduler tracepoints
 - Interesting to see work building on ftrace
- timechart tool
 - New tool to create SVG chart of kernel events
 - See <http://blog.fenrus.org/?p=5>
- new info in /proc/meminfo
 - Good for finding OOM problems
- Markers are gone



Patches to watch

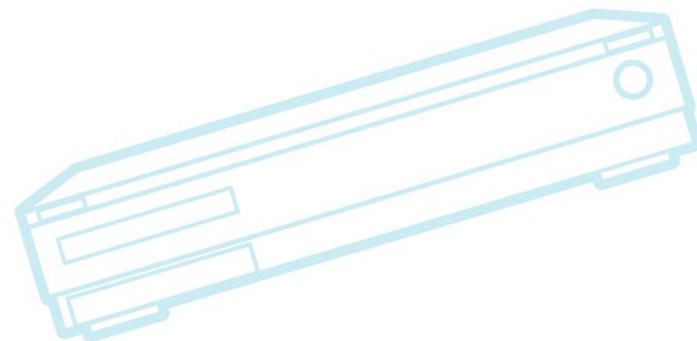
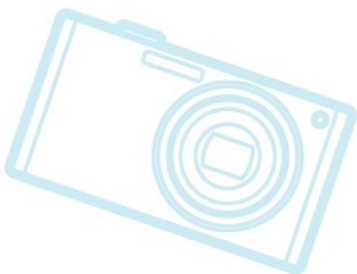
- kbuild: kconfig CROSS_COMPILE option
 - Puts ARCH and CROSS_COMPILE into files in build directory
 - Makes it easier when building for multiple architectures
- Speed up symbol resolution during module loading
 - Sorts symbol table and avoid linear lookup cost per symbol when loading a module
 - Developer, Alan Jenkins, reports saving 20% of time on coldboot
 - Depends on modules being loaded



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Patches to watch (cont.)

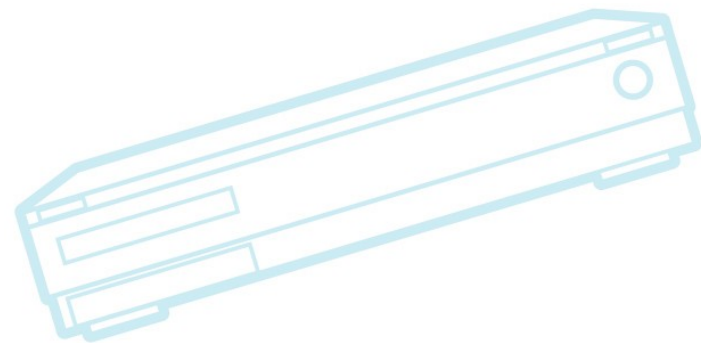
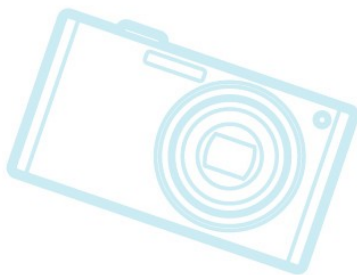
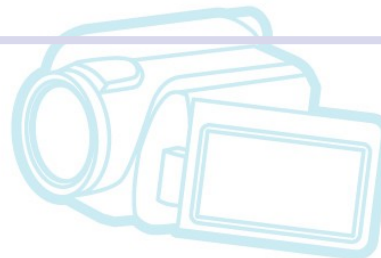
- **CONFIG_PRINTK_VERBOSITY**
 - Allows compiling out printk messages below a certain printk level





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Technology Areas

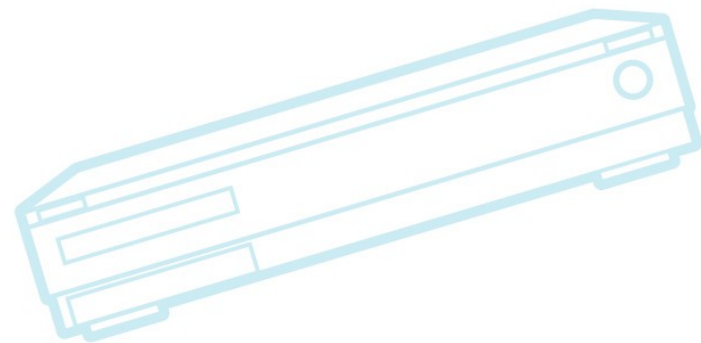
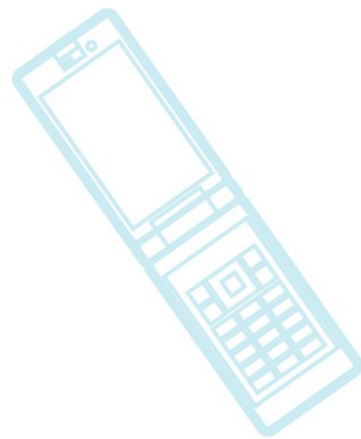




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Technology Areas

- Just a few notes...
- System Size
- Bootup Time
- Tracing
- Real-time
- Security

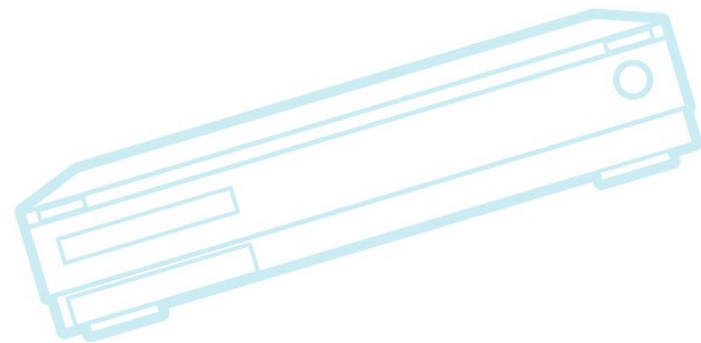
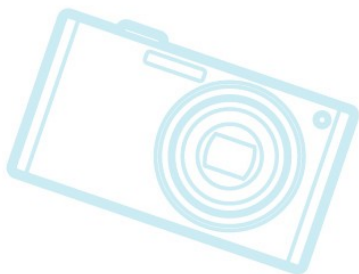




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System Size / Memory

- Compression
 - LZMA support
 - Support for LZMA kernel image compression (up to 30% better than gzip)
 - Still would like to see generic LZMA support in kernel (for e.g. SquashFS)
 - See <http://www.squashfs-lzma.org/>
 - **LZO kernel image compression**

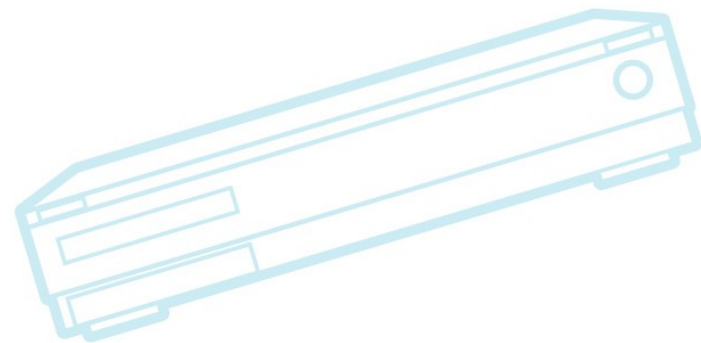
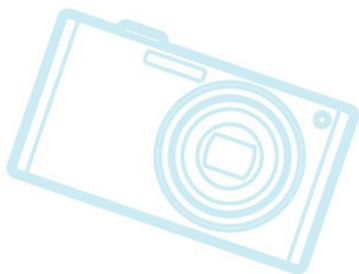
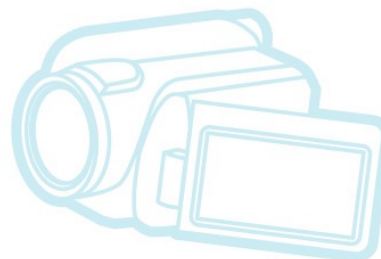
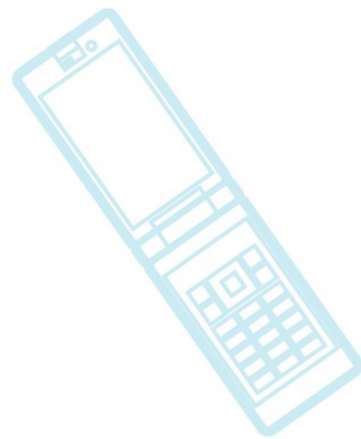




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Bootup Time

- Ubuntu achieves 5-second boot (on SDD)
 - sreadahead
 - Upstart - parallelized init
 - Not based on SYSV init
- Devtmpfs
 - Already described

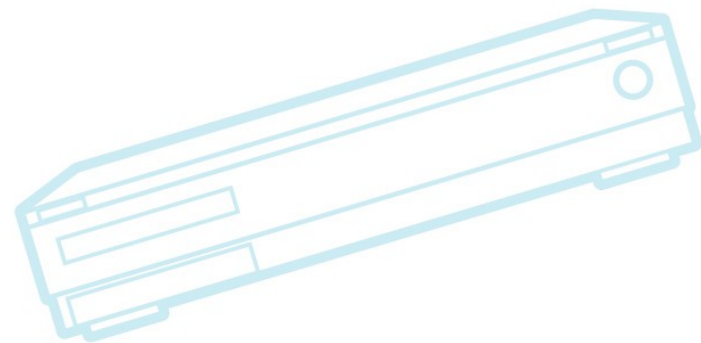
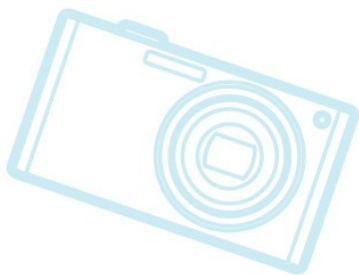
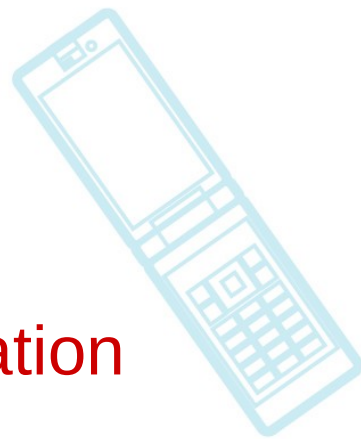




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Tracing

- **SystemTap 1.0 released**
 - Now includes support for cross-compilation
 - See <http://lwn.net/Articles/353842/>

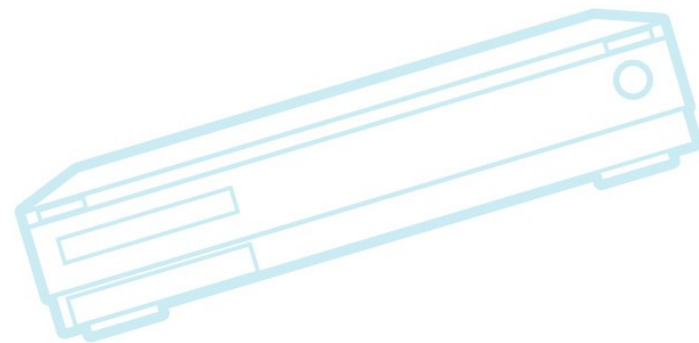
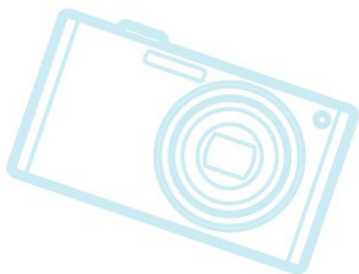
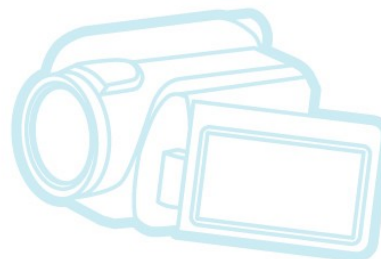




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Real-time

- RT-preempt
 - Confirmed push to add RT-preempt to mainline
 - Linux Realtime mini-summit
 - <http://lwn.net/Articles/354690/>

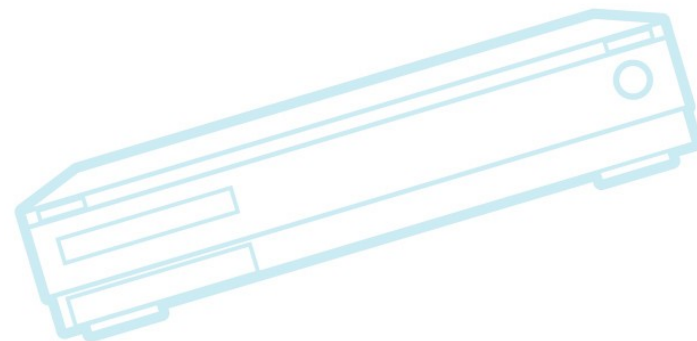
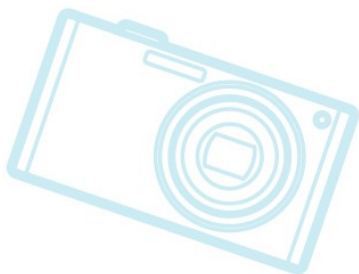
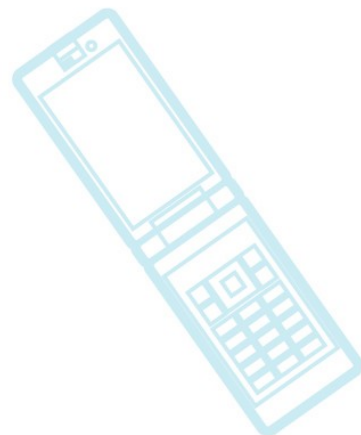




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Security

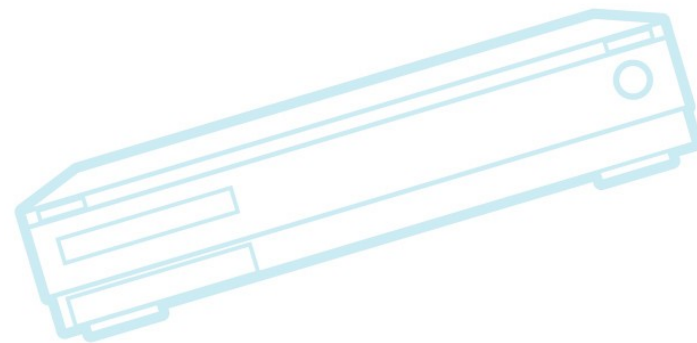
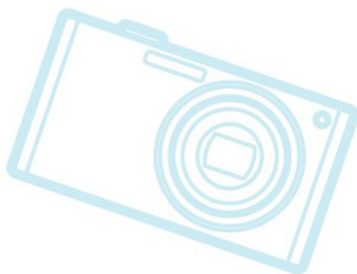
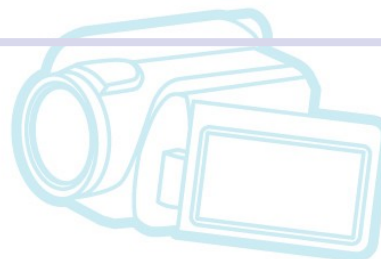
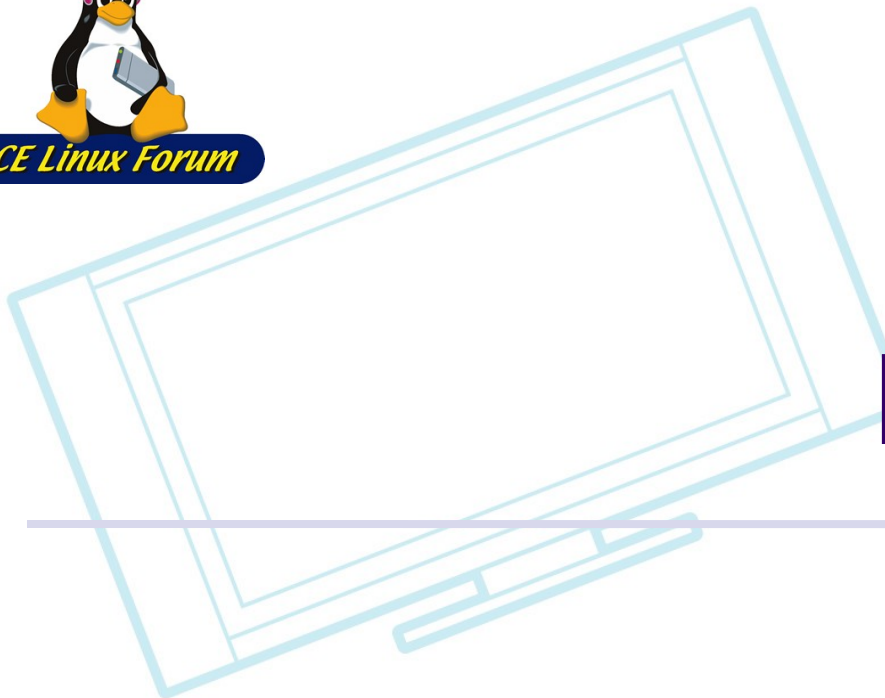
- **SMACK**
 - CELF project to analyze SMACK
 - Now published! (see other presentation)





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Embedded Distributions





Embedded Distributions

- Moblin
 - Intel transferred control to Linux Foundation
 - Moblin 2.0 released (24 Sep 2009)
 - Lots of netbooks announced at Intel Developer's Forum
- Android
 - Android 1.6 SDK released (15 Sep 2009)
 - Number of devices still increasing
 - Motorola, LG have announced phones
 - Waiting for non-phone devices to appear (?)
- Maemo
 - Maemo to use Qt (not a big surprise)
 - <http://lwn.net/Articles/341391>



Stuff I just learned about

- echo “printk from user-space” >/dev/kmsg
 - Great to use with printk_times feature
 - echo 1 >/sys/module/printk/parameters/time
- Dynamic debug
 - Merge of dynamic printk and dprintk()
 - System to allow runtime enable/disable of debug printk messages
 - <http://lwn.net/Articles/286191/>
 - Paper at Linux Symposium Canada
 - <http://www.linuxsymposium.org/2009/lis-2009-proceedings.pdf> (“Dynamic Debug” - page 39)
 - <Documentation/dynamic-debug-howto.txt>



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Resources

- LWN.net
 - <http://www.lwn.net/>
 - If you are not a subscriber, please do so
 - This is an invaluable community resource that needs your support
- eLinux wiki
 - <http://elinux.org/>
- Linux-embedded mailing list
 - <http://vger.kernel.org/vger-lists.html#linux-embedded>

