



CE Linux Forum

Embedded Linux Update December, 2009

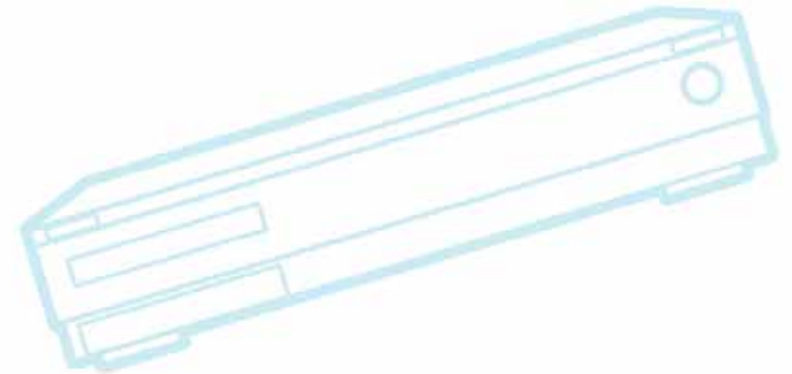
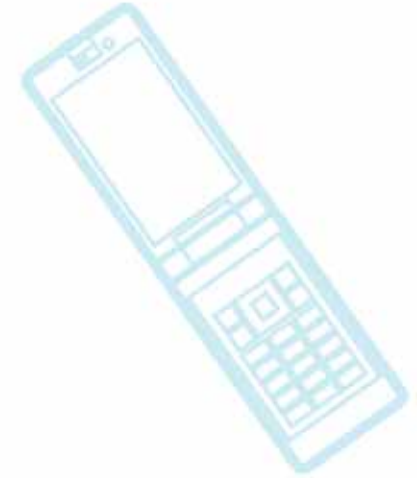
Tim Bird

CELF Architecture Group Chair



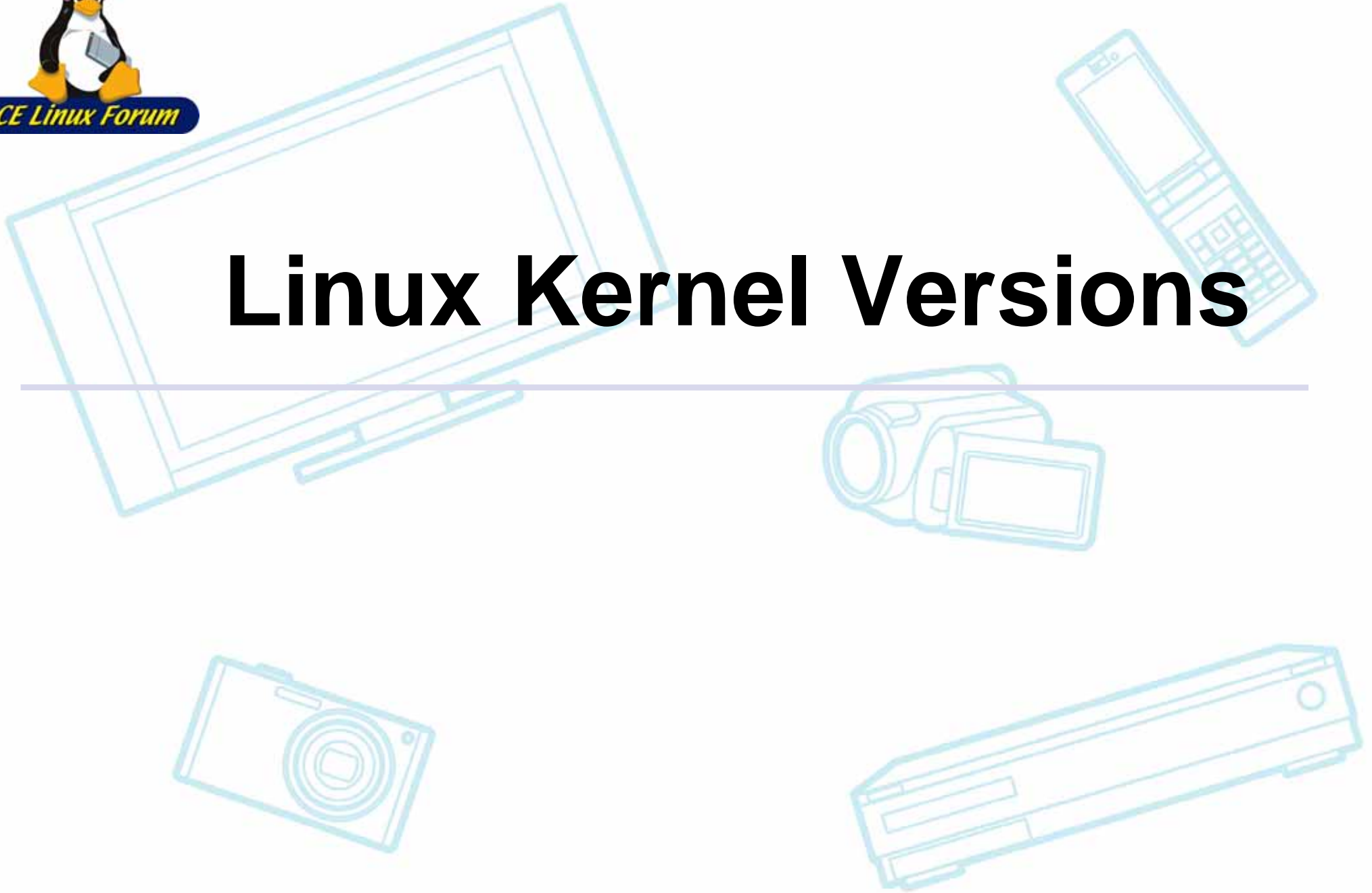
Outline

- Kernel Versions
- Technology Areas
- Embedded Distributions
- Resources





Linux Kernel Versions





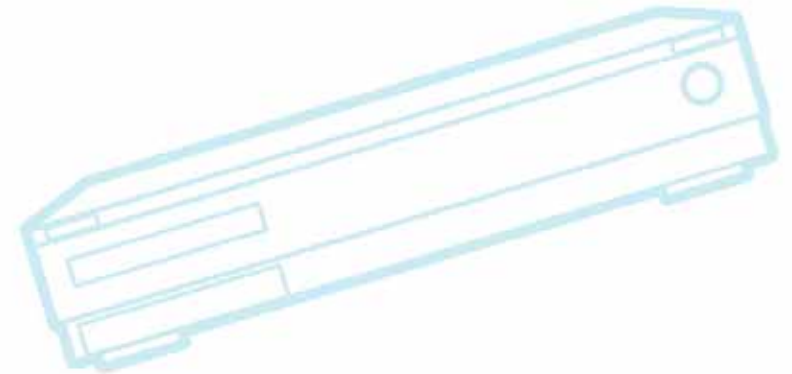
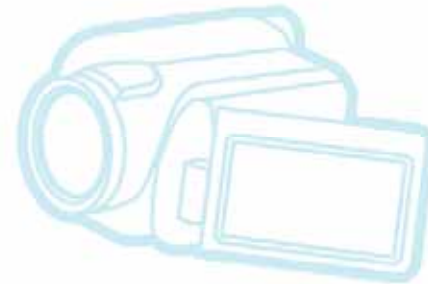
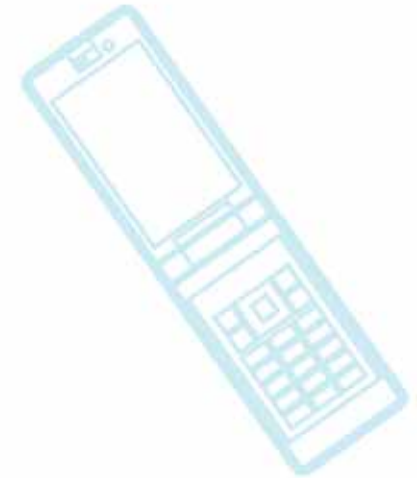
Kernel Versions

- 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 – 2 Dec 2009**
- **Linux v2.6.33 (merge window open)**



Linux v.2.6.32

- devtmpfs
 - Dynamic, fast population of /dev
 - Very good for embedded!
 - <http://lwn.net/Articles/331818/>
- New scheduler tracepoints
- 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





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
 - Mainline effort stalled, was recently re-submitted again
- 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
 - Did not make it into 2.6.33



Patches to watch (cont.)

- **CONFIG_PRINTK_VERBOSITY**
 - Allows compiling out printk messages below a certain printk level
- **Generic clock frameworks**
- **Generic-asm**
 - Simplifications and cleanup of architecture support
 - Was discussed at Kernel Summit



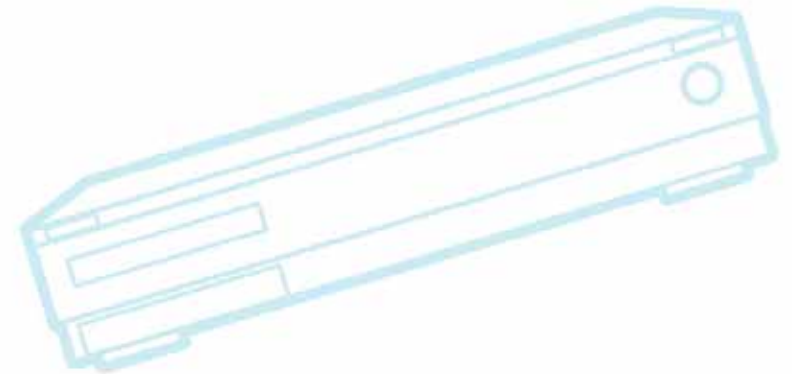
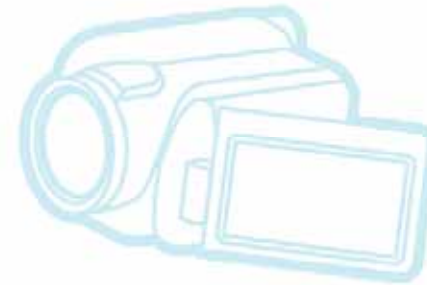
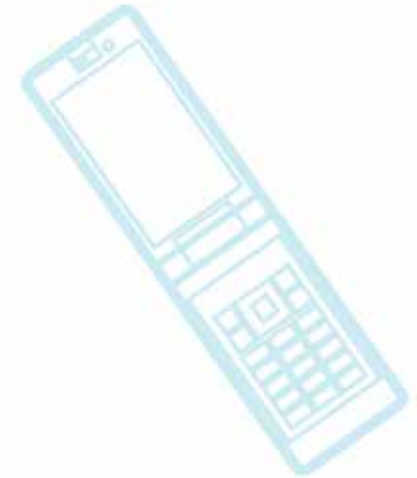
Technology Areas





Technology Areas

- File Systems
- Real-time
- Security
- System Size
- Tracing





File Systems

- SquashFS
 - Patches for LZMA support were submitted to kernel mailing list Dec 7.
 - See V2 patches submitted December 10
 - See <http://lkml.org/lkml/2009/12/10/456>
 - It looks like it missed the 2.6.33 merge window
 - But should be in good shape for 2.6.34
 - Note: CELF is funding this work



File systems (cont.)

- UBIFS

- Toshiba has good report on UBIFS performance and issues:
 - I don't have link to JLS presentation, but Jamboree presentation is at http://elinux.org/images/f/f8/CELFJamboree30-UBIFS_update.pdf

- BTRFS

- David Woodhouse talked about using BTRFS directly on raw flash at kernel summit and JLS (in private conversations)
 - Most kernel developers thought he was crazy



Real-time

- RT-Preempt
 - Interrupt threads - Mainlined 2.6.30
 - But still needs support in individual drivers
 - Need to switch drivers from using `request_irq()` to `request_threaded_irq()`
 - Sleeping Spinlocks
 - Spinlock name cleanup is merged (23 patches) for 2.6.33
 - See <http://lkml.org/2009/12/6/162>
 - Now need the macros that do the switch from regular spinlocks to semaphores



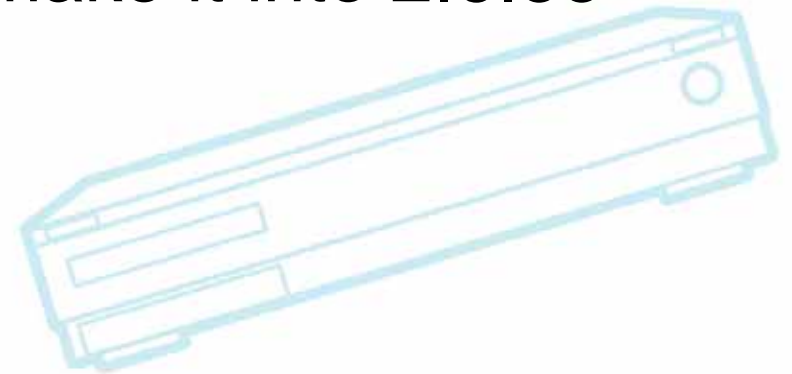
Security

- Tomoyo Linux
 - See <http://elinux.org/TomoyoLinux>
 - Presentations on using Tomoyo with Android were made at Japan Technical Jamborees 27 and 28 and at JLS



System Size / Memory

- Compression
 - LZO kernel image compression
 - See <http://lwn.net/Articles/350985>
 - Was submitted to LKML again in November
 - See <http://lkml.org/lkml/2009/11/11/129>
 - Albin Tonnerre thinks it may make it into 2.6.33





System Size / Memory

- Ramzswap – (aka compcache) made the 2.6.33 merge window
 - See <http://lwn.net/Articles/334649>



smem

- Tool for analyzing system memory
 - Better numbers than ps or top
 - Home page: <http://www.selenic.com/smem>
 - Good article at: <http://lwn.net/Articles/329458>
- 0.9 release was made in November
 - See <http://lwn.net/Articles/361497>
 - Release includes a man page and smemcap (lightweight snapshotting tool for using smem with an embedded system)



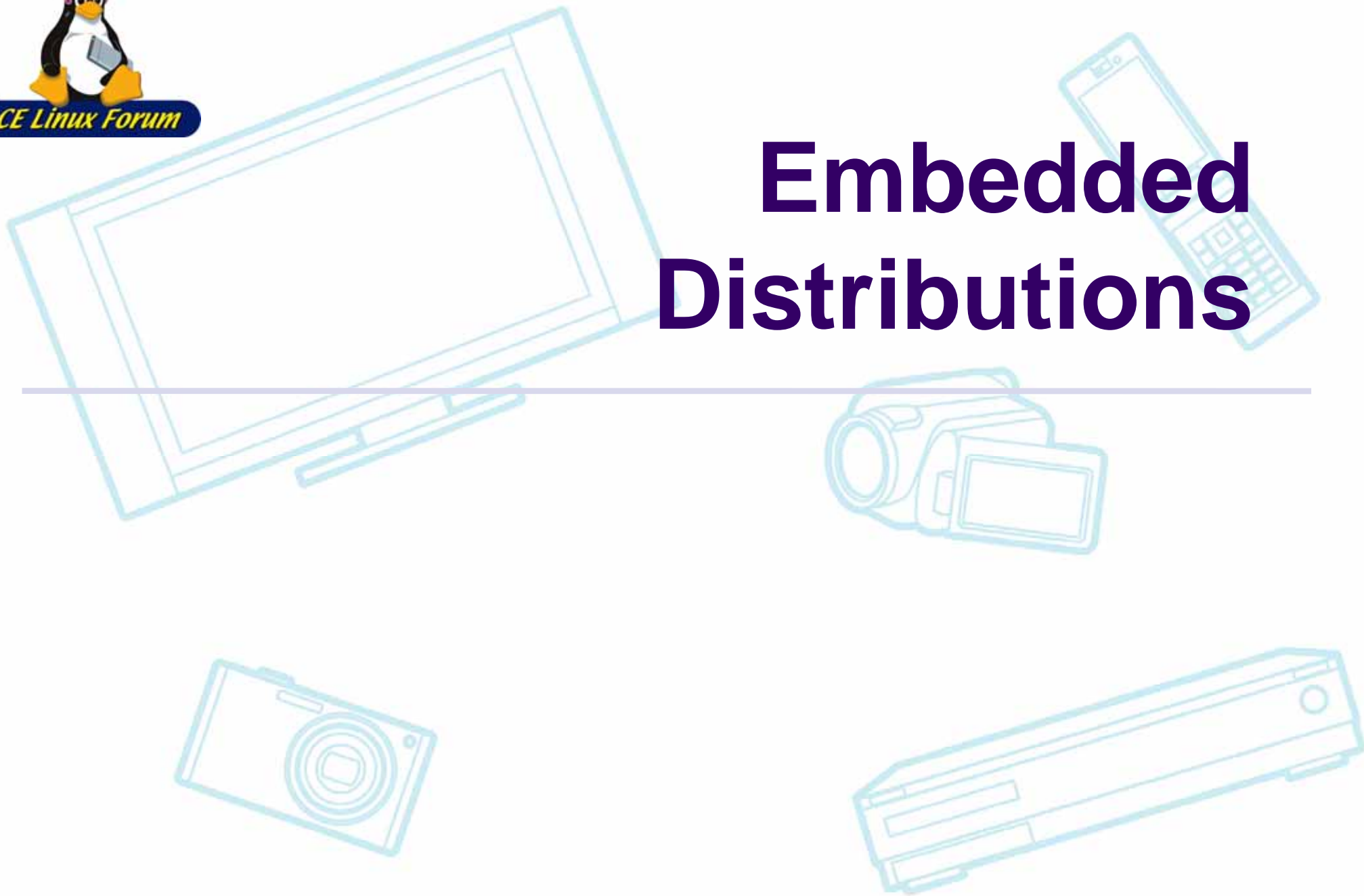
Tracing

- Ftrace
 - New stuff coming in 2.6.33:
 - Regular expression support in tracing filters
 - Tracing of accesses and modifications to arbitrary kernel variables
 - Dynamic probes for ftrace
 - Perf tool can place and use dynamic tracepoints
- Perf
 - Perf tool now has “diff” mode which shows change in performance between two runs



CE Linux Forum

Embedded Distributions





Android

- Android 2.0 SDK (Eclair) released (28 Oct 2009)
- Number of devices **still** increasing
 - Non-phones starting to appear
- Android patches removed from mainline kernel (2.6.33)
 - Patches lived in drivers/staging for a while, but they're gone now



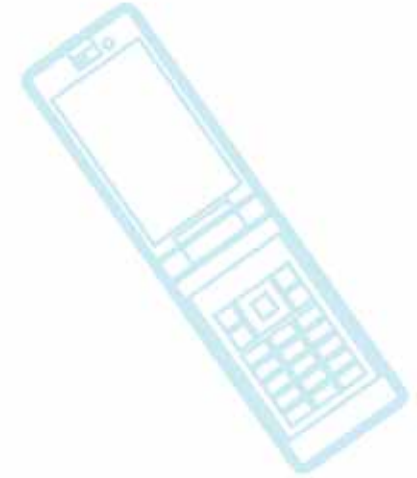
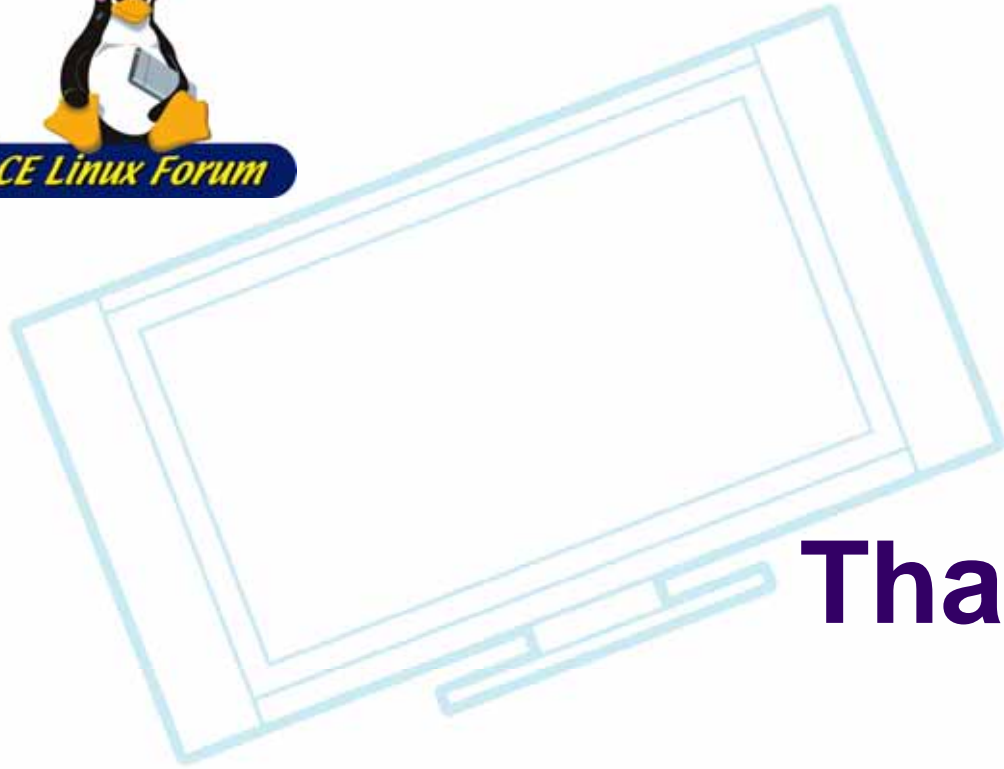
Conferences

- ELC Europe 2009
 - Videos should be available by end of year
- Japan Linux Symposium
 - Videos showing up at:
<http://video.linuxfoundation.org/>
- ELC 2010 – April 12-14, San Francisco
 - **CFP deadline is Jan 15 !!**
 - See <http://www.embeddedlinuxconference.com/>



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>



Thanks!

