Embedded Linux Update
December, 2009

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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
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- 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/lkmlk/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
  - 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)
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
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!