Embedded Linux Update
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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 – 24 Feb 2010
- Linux v2.6.34 (merge window open)
Linux v.2.6.33

- devtmpfs
  - Dynamic, fast population of /dev
  - Very good for embedded!
  - http://lwn.net/Articles/331818/
- LZO kernel compression
- 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
- System Size
- Tracing
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 missed the 2.6.33 merge window
  - But should be in good shape for 2.6.34
- Support for LZO compression is a candidate for CELF funding in 2010
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
- Have a candidate project to fund UBIFS mount-time speedups, but am having trouble finding a contractor
Real-time

- RT-Preempt
  - Interrupt threads - Mainlined 2.6.30
    - Tutorial at ELC about interrupt threads and how to use them
  - Sleeping Spinlocks
    - Spinlock name cleanup is merged (23 patches) for 2.6.33
      - See http://lkml.org/2009/12/6/162
    - Macros for doing switch from spinlocks to semaphores remains to be merged
  - Some issues remain with “Big Kernel Lock”
  - CELF may fund work here in 2010
System Size / Memory

• Compression
  • LZO kernel image compression
    • See http://lwn.net/Articles/350985
    • Compression not so great, but faster than others
  • Was submitted to LKML again in November
  • It was merged in 2.6.33
System Size / Memory

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

- **Ftrace**
  - New stuff 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
  - Greg Kroah-Hartman will talk about this at ELC!!
Meego!!

- Moblin + Maemo = Meego
- Intel and Nokia joining forces to create single embedded distribution
- Ari Jaaski of Nokia, will talk about this at the Collaboration Summit
  - ELC will have sessions on work done for Moblin, how to program Maemo
  - Collaboration Summit will have a whole track on Meego
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!