Status of Embedded Linux
(Update for Jamboree #30)

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Outline

• Kernel Versions
• Technology Areas
• Embedded Distributions
• Community
• Resources
Linux Kernel Versions
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
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/](http://lwn.net/Articles/311850/)
- **kmemleak - detect kernel memory leaks**
  - [http://lwn.net/Articles/187979/](http://lwn.net/Articles/187979/)
- **/proc/softirqs - show per-CPU softirqs**
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
Patches to watch (cont.)

- CONFIG_PRINTK_VERBOSITY
  Allows compiling out printk messages below a certain printk level
Technology Areas
Technology Areas

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

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

- SystemTap 1.0 released
  - Now includes support for cross-compilation
  - See http://lwn.net/Articles/353842/
Real-time

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

- SMACK
  - CELF project to analyze SMACK
  - Now published! (see other presentation)
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/](http://lwn.net/Articles/286191/)
  - Paper at Linux Symposium Canada
  - Documentation/dynamic-debug-howto.txt
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