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News from the ARM architecture

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Historic issues with ARM kernel code

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History of ARM linux code, some time ago

- Strong focus on embedded systems

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- Lots of out of tree code

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- Losing the war on complexity

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History of ARM linux code, some time ago

- Strong focus on embedded systems
- Lots of out of tree code
- Aging code base
- Losing the war on complexity
- Close to collapse

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Technical problems in the ARM codebase

- Any new hardware mandates code changes
- No common platform model
- Multiple platforms mutually exclusive at compile time
- Infrastructure in hardware specific code

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Management problems

- Independent vendor specific communities
- Little incentive for cooperation and peer review

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Management problems

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- Russell King could no longer keep up
  $\Rightarrow$ Lack of pushback on crap

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Management problems

- Independent vendor specific communities
- Little incentive for cooperation and peer review
- Russell King could no longer keep up
  $\Rightarrow$ Lack of pushback on crap
- Linus Torvalds could not keep up either
  $\Rightarrow$ Lack of merging new code

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Future directions

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Going beyond embedded

- Desktops
- Servers
- 64 bit CPU implementation

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Going beyond embedded

- Desktops
- Servers
- 64 bit CPU implementation
- One out of the two main linux architectures

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Ideal architecture port

- Generic user space ABI
- Device drivers in subsystems, not subarchitectures
- Boot time hardware detection
- No mutually exclusive build time options
- Minimum kernel changes for new hardware

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Current workflow

2011 direction changes

- Flattened device tree
- Single zImage for armv6/v7
- Duplicate code removal
- Moving device drivers to subsystems
- Co-maintaining arm-soc.git

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Changes we did not do

- Converge on a single clean platform
- Move legacy platforms to subdir

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2011 achievements

- 1 new source tree

2011 achievements

- 1 new source tree
- 2 subarch maintainer summits

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2011 achievements

- 1 new source tree
- 2 subarch maintainer summits
- 3 merge windows using arm-soc.git

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2011 achievements

- 1 new source tree
- 2 subarch maintainer summits
- 3 merge windows using arm-soc.git
- 4 clean new subarchitectures

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Changesets merged

Kernel	rmk	arm-soc	arch/arm total	overall
2.6.39	680	0	1187	11031
3.0	265	22	518	9843
3.1	274	557	980	9380
3.2	286	701	1355	12695
3.3-rc3	231	572	899	10263

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Top arm-soc contributors by changesets

174 Arnd Bergmann
 78 Olof Johansson
 69 Shawn Guo
 65 Kevin Hilman
 57 Benoit Cousson
 53 Kukjin Kim
 52 Tony Lindgren
 51 Linus Torvalds
 50 Jean-Christophe PLAGNIOL-VILLARD
 46 Fabio Estevam

Total number of contributors: 236

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Top contributors by non-merge changesets

- 69   Shawn Guo
- 65   Kevin Hilman
- 57   Benoit Cousson
- 50   Jean-Christophe PLAGNIOL-VILLARD
- 46   Fabio Estevam
- 43   Stephen Warren
- 43   Mark Brown
- 38   Thomas Abraham
- 34   Paul Walmsley
- 32   Kukjin Kim

Total number of contributors: 235

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arm-soc maintainer role

- Sponsored by Linaro and Google
- Vendor neutral
- Define and enforce common rules for everyone
- Merging code upstream to Linus
- Coordination with Russell
- Pushing back on crap

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arm-soc workflow

- Pulling many per soc topic branches
- Pushing cross-soc topic branches
- One for-next branch, rebasing
- Early staging branches
- Not quite clean allowed when doing cleanups

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- DEMO

Ongoing code changes

Multiplatform: Single zImage status

- Taking longer than expected

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- Breakthrough imminent

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Multiplatform: Single zImage status

- Taking longer than expected
- Breakthrough imminent
- Progress largely invisible
- One problem at a time, across all platforms
- Focus on ARMv6 and ARMv7

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Multiplatform: Single zImage status

- Taking longer than expected
- Breakthrough imminent
- Progress largely invisible
- One problem at a time, across all platforms
- Focus on ARMv6 and ARMv7
- Rob Herring has some success with two platforms

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Device tree status

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- New platforms: prima2, zynq, highbank, picoxcell
- Largely converted: exynos, i.mx, tegra
- In progress: vexpress, at91, omap, ux500, msm

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Device tree status

- Taking longer than expected
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- Pinmux bindings for 3.4 (Linus Walleij)
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- New platforms: prima2, zynq, highbank, picoxcell
- Largely converted: exynos, i.mx, tegra
- In progress: vexpress, at91, omap, ux500, msm
- Lots of simple device driver bindings

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Randconfig builds

- Taking longer than expected

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Randconfig builds

- Taking longer than expected
- `Delayed-by: Arnd Bergmann <arnd@arndb.de>`
- Integration into Linaro CI loop

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Randconfig builds

- Taking longer than expected
- `Delayed-by: Arnd Bergmann <arnd@arndb.de>`
- Integration into Linaro CI loop
- about 150 patch series
- Regression testing
- Looking for volunteers

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Memory management changes

- Continuous memory allocator
- dma-buf infrastructure
- generic iommu handling in dma-mapping API

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Summary

- Lots of work getting done:
  device tree, consolidation, cleanup
- Not running out of work anytime soon:
  new platforms, ARMv8, multiplatform kernels

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Summary

- Lots of work getting done:
  device tree, consolidation, cleanup
- Not running out of work anytime soon:
  new platforms, ARMv8, multiplatform kernels
- Linux on ARM world domination coming,
  still busy with the details

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Questions?