KWG lightning
Topics

- Thermal
- Cluster idling
- Scheduler
- SCMI server
- Remoteproc/RPMSG
- Storage
- 4G split for Arm32
- SVA
- Coresight
- Arm SoC maintenance
Thermal

- New notification mechanism based on netlinks
  - https://www.linaro.org/blog/thermal-notifications-with-netlink/
  - Versioning to ensure compatibility with user space
  - Will evolve in the future

- Thermal framework needs cleanup and redesign of some part
  - Removed dead code
  - Removed bogus code
  - Removed over-engineered part and unused option

- New framework Dynamic Thermal Power Management
  - Relies on the power capping framework
  - Prevent abuse of the thermal framework
  - Provide to user space a way to act on the power
  - Power budget and power rebalancing between devices planned
Cluster idling

- **Linux Kernel**
  - Evolve support to cope with more use cases and GKI v2.0.
  - Improve performance and avoid wasting energy.
  - Platform deployment.

- **Trusted Firmware-A**
  - Extend PSCI to support the OS-initiated mode.
  - Platform deployment.
Scheduler

- Deadline evaluation
  - Evaluate current Android kernel audio latency
  - (Re)try deadline policy for android audio
  - Fix missing feature

- Enable scheduler feature for Arm server
  - After enabling Frequency invariance for CPPC cpufreq driver
  - Look at thermal management and thermal pressure reporting

- CFS scheduler
  - Improve task placement on NUMA system
  - Improve latency sensitive task placement
SCMI server

- Finalize upstream of 1st step
  - Adding an abstraction layer to ease port on new EE
  - Add OP-Tee transport layer

- Running SCP-firmware in a guest VM
RemotePROC/RPMSG

● New Features
  ○ Detaching a remote processor is now possible (v5.13)
  ○ RPMSG name service is now independent of transport mechanism
  ○ RPMSG name service can be used as a stand alone module
  ○ rpmsg_char driver is now usable from the virtio backen (v5.13)
  ○ Support for “mini” coredumps, useful on platform with limited memory
  ○ Support for a number of new platforms

● Ongoing Work
  ○ More work on piggy-backing various HW protocols on RPMSG
  ○ Properly handle crash recovery when remote processor is attached
  ○ RPMSG protocol extension
Storage

- eMMC/SD cards
  - Common support for discard/erase requests.
  - Boost I/O write performance for SD-cards.
  - Support greater speed modes with SD express and SD UHS-II.
  - Moving into maintenance...

- BFQ I/O scheduler
  - Extend use of BFQ through enablement via Linux distros.
  - Boost performance to enable BFQ for ultra fast HWs.
  - Moving into maintenance...
SVA

Sharing virtual address spaces between CPU and accelerators, using the Arm SMMU

- **PASID: Multiple address spaces per device**
  - Merged in v5.5 - v5.7
- **Sharing CPU page tables with the SMMU**
  - Merged in v5.9 - v5.11
  - User interface “uacce” in v5.7
- **I/O Page Faults (stall)**
  - Aiming for v5.13

- **Future work**
  - PCIe PRI
  - Distributed Virtual Memory
  - Improve IOPF handler
  - Virtualization
CoreSight

- CoreSight System Configuration Management
  - Permits complex device programming - especially for ETM devices, selectable with a single configuration name on the perf command line.
  - Configurations will permit programming of CoreSight devices across the entire system.
  - Initial baseline patchset will provide a built in example implementing ETM strobing for use with autofdo.
  - Follow-up patchsets will permit user creation and dynamic load of custom configurations, and support for other components such as CTI and ETR.

- Interesting Work from the Community
  - Patch-sets adding support for various Cortex devices.
  - Support tracing when kernel is at EL2 (v5.13).
  - Support for arch 8.4 self hosted trace extensions.
  - Support for future technologies ETE and TRBE (Arm).
4G split for Arm32

● Motivation
  ○ highmem deprecation: https://lwn.net/Articles/813201
  ○ 32-bit Arm Linux still in use: https://lwn.net/Articles/838807

● Ongoing work
  ○ vmlinux in vmalloc space
  ○ copy_from_user/copy_to_user access
  ○ Unmap user space during from kernel address space
  ○ Overlapping user and linear mapping
Arm SoC maintenance

● Overview
  ○ Maintainers: Arnd Bergmann and Olof Johansson
  ○ https://git.kernel.org/pub/scm/linux/kernel/git/soc/soc.git/
  ○ Mostly device tree changes these days
  ○ arch/arm/mach-*, arch/arm*/boot/dts, arch/arm*/config/
  ○ drivers/{bus,reset,tee,memory}
  ○ Coach downstream maintainers, review patches
  ○ Forward patches from downstream to Linus Torvalds

● Current status
  ○ 32-bit: 1300 machines, 213 SoCs, 62 SoC families
  ○ 64-bit: 450 machines, 131 SoCs, 40 SoC families
  ○ Each merge window: 800 patches, 200 contributors, 80 pull requests
Thank you

Accelerating deployment in the Arm Ecosystem