

SW/Drivers for Readout Upgrades

Introduction

- Follow up from the last joint meeting
- Focus on **software and driver aspects**
 - including, e.g. debugging and performance tuning tools
- Each experiments has specific problems, hardware and goals
 - e.g. ATLAS plans to use e-links, LHCb does not
 - ***“one size fits all”* may not be realistic**
- **Share results, experience, developments**
 - building blocks
 - tools
 - performance results

(DMA) Memory Allocation

- Phymem (ALICE solution)
- CMEM (ATLAS solution)
 - <https://edms.cern.ch/document/336290/3>
- CMA (Contiguous Memory Allocator)
 - since Linux 3.5
 - RHEL7 → Linux **3.10**
 - <http://lwn.net/Articles/396707/>
- IOMMU: maps device virtual addresses into physical addresses
 - Intel → "Virtualization Technology for Directed I/O" (VT-d)
 - available in Xeon family since 2009
 - supported in Linux (dma_map_sg)
 - performance effects?

FIFO & IRQs

- FIFO baseline exchange data structure
 - on contiguous memory, of page pointers, ...
 - read/write pointers sharing and handling
 - sequential vs random access
- Inform other end about changes
 - interrupt vs polling
 - threading

Interface to userspace

- memory mapping vs ioctl vs device files vs socket
 - why did you choose one or the other?
- UIO (User I/O)
 - interesting concept → minimize code in kernel space
 - easier maintenance for **non-expert**
- More advanced framework like DPDK
 - packet processing in x86
 - i.e. CPU-based network devices

Tools & Ancillary Features

- Hardware configuration and monitoring
- Reset and Hot-plugging
- Resource allocation
- PCIe performance monitoring and tuning
- PCIe debugging
- ...

Discussion

How do we continue?

- **Synergy**
 - create occasion for **expert** information exchange and discussion
 - any common development will arise from this
- **Dedicated mailing list?**
 - don't be shy. Post your findings and your questions
- **Regular or specific meetings?**
 - few months schedule
 - **expert forum** → no status updates, but technical sharing on recent findings
- **Promote also direct personal interaction and knowledge sharing within our community**