Karlsruhe Institute of Technology

HDRI Workshop WP2

27. - 29. Oct 2010

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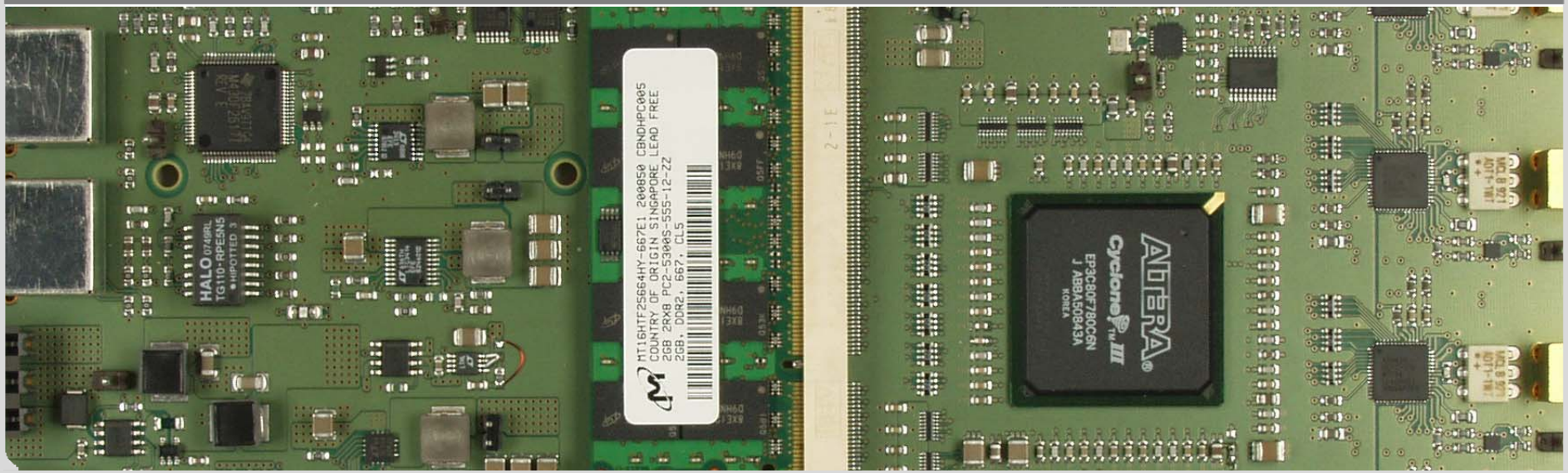
Institute for Data Processing and Electronics (IPE)



WP2: Real time processing

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Data processing with dedicated hardware:

- 12 months: Survey of available solutions for programmable hardware for signal pre-processing usable für PNI applications

Real-time data assessment with parallel computing:

- 3 months:
  - Review of imaging application at the PNI beam lines
  - Selection of two sample applications for real-time data assessment
  - Road-map for implementation of sample applications

Data rates of PNI applications

	Current data rates [GB/h] peak	average	Future data rates [GB/h] [GB/s] peak		average
Protein crystallograhphy	500	50	500	0.15	200
Coherent diffraction imaging	500	50	4000	1.11	400
Tomography	700	50	800	0.22	200
Small angle scattering	1400	140	14400	4.0	4200
Grain mapping	140	80	800	0.22	300
In-situ dilatometry	14	12	530	0.15	200
In-situ imaging	N/A	N/A	500	0.14	110
Focal spectrometer	150	150	3000	0.83	3000

Tomography (KIT)

- 2 Mega Pixel Detector with 10 or 12 bit
- frames/second > 1000
- Continous raw data rate: > 3 GB/s
- Online data reduction is nescessary

Hardward Survey

GSI

- FEBEX
  - 8 Channel 12bit@65MHz
  - FPGA Lattice ECP2M50
  - 2 x 2 Gbps SFP, USB
- PEXOR3
  - PCIe Card
  - 4 x 2 Gbps SFP
  - PCIe1 4 lanes

Hardward Survey

GSI

- VULOM 5 (VME Universal Logic Modul)
  - Digital inputs
  - FPGA Xilinx XC5VLX(30 – 110) 2 FFG 676 (VULOM5)
- VUPROM 3 (VME Universal Processing Modul)
  - 258 Front-Panel Digital I/O
  - FPGA Xilinx
  - DSP TI

Hardware Survey

KIT

- KIT DAQ C3S2 Board
  - 4 channels x 12bit@180MHz
  - FPGA Altera
  - SOPC (Nios Processor with OS Linux)
  - Ethernet 100 Mb/s

Hardware Survey

KIT

- Data Acquisition System V4
  - 20 boards x 24 channels x 12bit@20MHz
  - 4 FPGA Altera

  - 1 Main board
  - PrPMC (Processor Mezzanine Board)
  - Ethernet 100Mb/s
  - (PCIe 1 x1 in development)

- DAQ V4.1
  - (development in process)

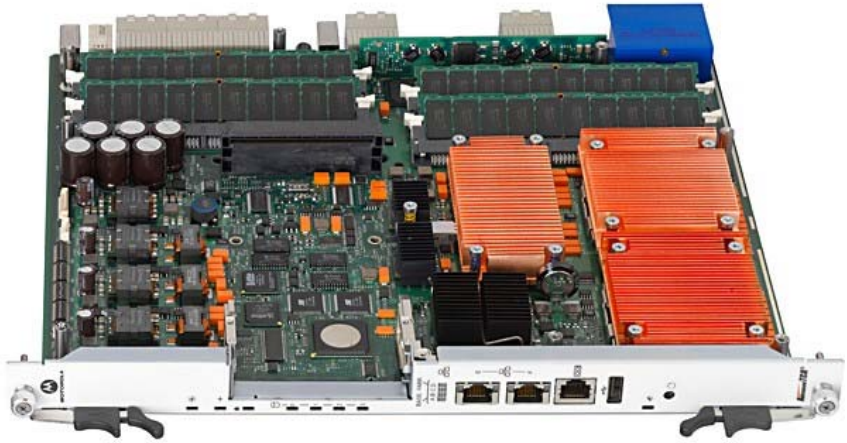
Hardware Survey

- GKSS (Helmholtzzentrum Geesthacht)
- Forschungszentrum Jülich
- Helmholtzzentrum Berlin
- Forschungszentrum Dresden
- DESY
- Commercial suppliers (Struck, Wiener, CAEN, …)

Advanced Telecommunication Computing Architecture (ATCA)

- PICMIG Standard since 2003
  (PCI Industrial Computers Manufacturers Group)

- Related Standards
  - Advanced mezzanine cards (AMC)
  - µTCA
  - **xTCA for physics**



xTCA for Physics

- Members of working group (DESY, FZ Jülich, SLAC, FNAL, etc.)
- Implicit system management
- High Bandwidth with 10GbE, PCIe, SRIO
  - Serial point 2 point connections
- Definition of a Rear-Transition-Module
  - Connector
  - Size
  - Power

Conclusion

- Hardware survey is started, but not finished

- **More information about application is required**
  - Detailed Specification
  - Time Schedule
  - **Contact Person**