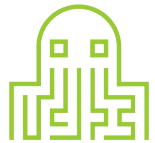
ARM Servers in HPC: Collaboration in Linaro

HPC Special Interest Group



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LEG
Server

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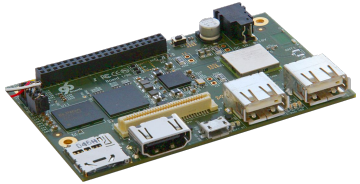
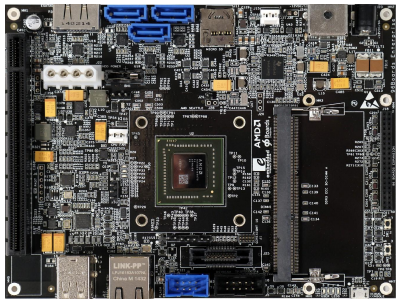
Nov 2016

Linaro Overview

- Linaro leads software collaboration in the ARM ecosystem
- Instead of duplicating effort, competitors share development costs to accelerate innovation and time to market
- Linaro is member funded and delivers output to members, into open source projects, and into the community
- Founded in 2010 with 6 members, now >30 with ~270 OSS engineers distributed globally





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Linaro Segment Groups

LNG
NETWORKING

- Networking
- OpenDataPlane (ODP)

LITE
IoT/EMBEDDED

- IoT client
- Smart sensors
- Embedded devices

LHG
DIGITAL HOME

- Sensor hub
- Gateways
- Home entertainment

End to End Solutions using ARM technology

LMG
MOBILE

- Mobile phone
- Tablet/Clam
- Wearables
- Android optimization

LEG
SERVER

- SDI
- Developer Cloud
- Big Data
- HPDA/HPC

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The Linaro Enterprise Group (LEG)

- Common development center for the ARM Enterprise ecosystem
- Eliminates fragmentation, reduces cost and accelerates time to market
- Members can focus on innovation and differentiated value-add
- Working on core open-source software for ARM servers
  - Server architecture – UEFI/ACPI
  - ARMv8 bringup & optimization
  - OpenJDK, Hadoop and Spark
  - Software Defined Infrastructure, such as OpenStack, Ceph and DPDK
  - Developer Cloud for wider ecosystem deployment

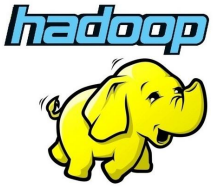
LEG Engineering Collaboration across Linaro

- Virtualization
- RPK/LSK
- Network optimizations and accelerators (OPNFV, OpenDataPlane,...)
- End-to-end secure solution from cloud to client for IoT/Embedded
- Toolchain (GCC, LLVM, LuaJIT)
- QA: LAVA, Kernel CI
- Security

- 96Boards & SoC-specific landing team work

LEG Engineering Workloads

- Close engineering effort with upstream projects
  - Examples: Ceph, Openstack, Hadoop, Debian and CentOS
- Linaro initiatives including the Developer Cloud, 96Boards and Enterprise Reference Platform (ERP)



DeveloperCloud
www.linaro.cloud

HPC Special Interest Group

- The HPC SIG is newly formed:
  - Comprised of ***Members*** (look to the right) and an ***Advisory Board*** that provides:
    - Subject matter expertise on HPC requirements
    - Guidance and feedback on ongoing HPC SIG roadmap
    - Provide and review strategic direction
  - A collaborative project which builds upon the foundations of LEG
  - Will drive HPC open-source software development for the ARM Enterprise ecosystem
  - Will provide:
    - Reference implementations
    - Cloud based development frameworks
  - Aims to lower barriers to deployment and management through:
    - Standardisation
    - Interoperability
    - Modularisation
    - Orchestration
    - Use case development

ARM
FUJITSU
CAVIUM
BROADCOM
HISILICON
redhat
Hewlett Packard Enterprise
QUALCOMM INNOVATION CENTER, INC. QuIC

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Long Term Strategic Scope

- HPC
  - OpenHPC - ARM enablement, Cloud CI
  - Scaleable Vector Extension (SVE) for ARMv8
  - Dev Tools
    - Compiler optimisations
      - LLVM and GCC for Fortran and C optimisations
      - openMP
    - Standardised profilers and debuggers
  - HPC Orchestration
    - OpenHPC
    - Other OS Packages (SLURM)
  - Runtime auto detection of micro arch.
  - Application Libraries
    - Math and scientific libraries optimised for ARMv8
    - MPICH, FFTW, BLAS, cuBLAS, LAPACK, openBLAS, MPI, ScaLAPACK
    - And more…..
  - Hardware acceleration
    - CCIX, GPGPU, FPGA
  - Schedulers
  - Power Management
  - Security
- HPDA
  - Mapping key algorithms to a specific industry
  - Library optimisations
  - Datasets
  - I/O feeds
- Machine Learning
  - MLDM algorithms
  - MaTEx
  - Research emerging ML projects
  - FPGA

Collaborate with us

- Why?
  - Open Source software for HPC is a community effort
- How?
  - Become a Member and influence the strategic and operational engineering
  - Join the Advisory Board and help direct engineering by sharing real use cases and your expertise
  - Be part of the engineering community and help us drive standardisation and interoperability

- For further information please contact hpc@linaro.org

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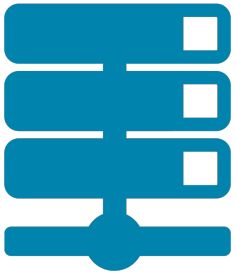
Thank You
Questions?



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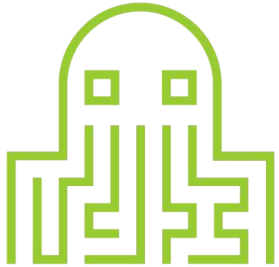

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Developer Hardware Resources

What we provide

- In production 4 Bare-metal systems running within Linaro
- Additional 5 Developer Cloud servers to support engineering development activities coming soon.

Who will this benefit?

- Linaro HPC-SIG members actively working on OpenJDK
- ARM ecosystem SoC and ISV vendors interested in HPC
- HPC community interested in ARMv8 based platforms for their efforts

Where we are trying to go?

- Provide access to ARMv8 servers for SIG member developers
- Provide HPC Orchestrator for ARMv8 based OpenHPC
- Provide CI and QA systems for the OpenHPC project and other SIG related HPC efforts