SUSE HPC on Arm

Jay Kruemcke
Sr. Product Manager, HPC, Arm, POWER
jayk@suse.com
@mr_sles

What's changed in the last year?

More capable Arm server chips

- New processors from Cavium, Qualcomm, HiSilicon, Ampere

THENEXTPLATFORM

ARM SERVERS: QUALCOMM IS NOW A CONTENDER

August 23, 2017 Timothy Prickett Morgan

Many have tried to wrench the door of the datacenter open with ARM processors, but Qualcomm, which knows a thing or two about creating and selling chips for smartphones and other client devices, has perhaps the best chance of actually selling ARM chips in volume inside of servers.

Maturing software ecosystem

- OpenHPC
- ARM Open Source Enablement Council
- Ready for ARM
- Increasing commercial software enablement

allinea
Now part of ARM

cadence®

HPCwire

GIGABYTE Announces Expansion of ARM Server Portfolio Based on ThunderX2

May 29, 2017

TAIPEI, Taiwan, May 29 -- GIGABYTE Technology, a leading producer of high performance server hardware, and Cavium, Inc., a leading provider of semiconductor products that enable intelligent processing for enterprise, data center, cloud, wired and wireless networking -- today announced availability of high performance ARM server platforms based on Cavium's second generation 64-bit ARMv8 ThunderX2 product family.

Growing market awareness

- 2017 SC17 conference
- GW4 and Comanche early access projects
- ODM vendor activity

HEXUS

Macom X-Gene 3 is "the most powerful ARM CPU available"

SUSE Linux Enterprise Server for Arm

provides customers with an enterprise-grade Linux distribution optimized for 64-bit Arm servers to deliver outstanding performance, reliability and scalability for data intensive, mission-critical workloads.

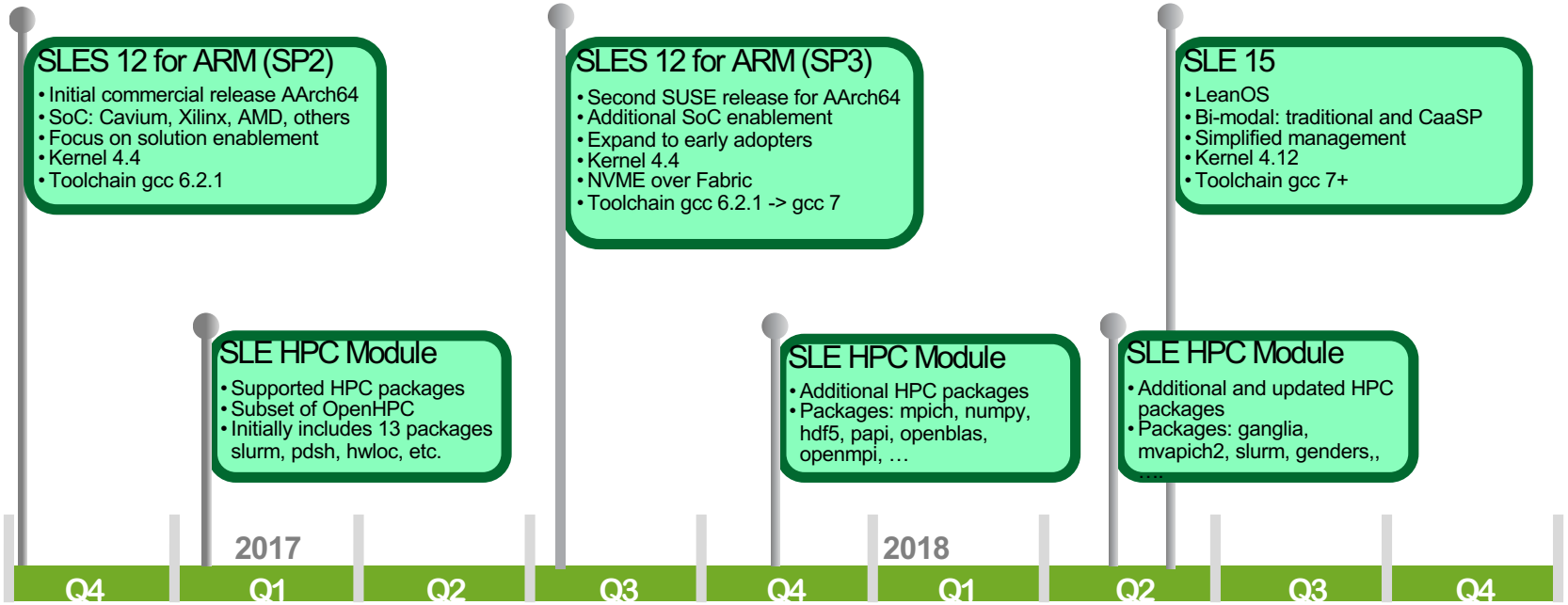
SUSE Linux Enterprise Server for ARM enables solution developers and early adopters to:

- **Accelerate innovation and improve deployment times** for a broad choice of open source and partner solutions.
- **Provide a rock solid mission-critical foundation** for emerging 64-bit ARM servers while exploiting unique ARM capabilities for storage, networking and high performance computing
- **Deliver a high-performance platform to meet increasing business demands** with improved application performance, scalability for growth and instant access to data.

First release: SLES 12 SP2 in November 2016

SUSE Linux Enterprise Server for Arm releases

Offering commercial Linux support for ARM AArch64 since November 2016



SUSE Linux Enterprise 15 for Arm

Includes enablement for these Arm SoCs*

- Advanced Micro Devices (AMD) – Opteron A1100
- Broadcom – BCM2835 Raspberry Pi 3 Model B & Model B+
- Cavium - ThunderX
- Cavium - ThunderX2 CN99xx
- Cavium - Octeon TX
- NXP - QorIQ LS2085A / LS2045A, LS2080A / LS2040A
- NXP - QorIQ LS1043A
- Ampere Computing - X-Gene 1, X-Gene 2
- Ampere Computing - eMAG 3
- Marvell - Armada 7040/8040
- HiSilicon - Hi1616
- Rockchip - RK3399
- Qualcomm - Centriq 2400
- Xilinx – Zynq UltraScale+ MPSoC

- Upstream kernel version: 4.12
- KVM with libvirt
- GCC 7.1.3
- HPC module

HPE Apollo 70 is the first Arm server to receive SUSE "YES" certification

** Please check with your specific hardware vendor. Due to the rapidly evolving availability of ARM System on a Chip hardware, not all platforms have undergone the same degree of hardware testing*

SUSE and the High Performance Computing Ecosystem

Partnerships with HPE, Cray, Arm, Cavium, Intel, Microsoft, Qualcomm, and others

SUSE Linux with the HPC Module for Supported HPC packages

OpenHPC Community

Half of the Top 100 systems are running SUSE Linux*

At 13.8%, SUSE Linux is the leader in paid Linux on the Top 500

* Includes CLE which is based on SLES, CentOS has ~18%, RHEL has ~5%

SUSE Linux Enterprise HPC Continuum

- **SUSE Linux Enterprise for HPC (X86 and ARM)**
  - Fully supported by SUSE
- **HPC Module (part of SUSE Linux)**
  - Fully supported through your SUSE Linux subscription
  - Content inspired by OpenHPC
- **PackageHub**
  - SUSE curated, community supported packages https://packagehub.suse.com/
  - Over 500 packages available for Aarch64
- **OpenSUSE LEAP**
  - Free, community supported Linux
- **Related Products**
  - SUSE Enterprise Storage
  - SUSE Manager
  - SUSE OpenStack Cloud

High Performance Computing
SUSE

SUSE Linux HPC delivers built-in supported HPC functionality

HPC Module updated multiple times a year

Simple Installation

X86 and Arm Aarch64

SUSE Linux Enterprise HPC Module

Simplifying access to supported HPC software

Easy installation via zypper or Yast

All packages supported by SUSE

- Support included in the SLES Subscription

Available for X86 and ARM platforms beginning with SLES 12 SP2

Flexible release schedule. Releases are independent of Service Pack schedule

Package	HPC Module 1Q17	HPC Module 4Q17	HPC Module 1Q18	HPC Module SLES 12	HPC Module SLE HPC15
conman	0.2.7	0.2.8		0.2.8	0.2.8
cpuid (X86)	20151017	20170122	20170122	20170122	20170122
fftw		3.3.6		3.3.6	3.3.6
ganglia			3.7.2	**3.7.2**	**3.7.2**
ganglia-web			3.7.2	**3.7.2**	**3.7.2**
genders			1.2.2	**1.2.2**	**1.2.2**
GCC	6.2.1	7.3.1		7.3.1	7.3.1
hdf5		1.10.1		1.10.1	1.10.1
hwloc	1.11.5		1.11.8	1.11.8	1.11.8
Icinga2*			2.8.2	**2.8.2**	n/a
lua-lmod	6.5.11	7.6.1		7.6.1	7.6.1
memkind (X86)	1.1.0			1.1.0	**1.6.0**
mpiP		3.4.1		3.4.1	3.4.1
mrsh	2.12			2.12	2.12
munge	0.5.12			0.5.12	**0.5.13**
mvapich2		2.2	2.2.13	2.2.13	2.2.13
netcdf		4.4.1.1		4.4.1.1	**4.6.1**
netcdf-cxx		4.3.0		4.3.0	4.3.0
netcdf-fortran		4.4.4		4.4.4	4.4.4
numpy		1.13.3		**1.13.3**	**1.14.0**
openblas		0.2.20		0.2.20	0.2.20
openmpi		1.10.7		**1.10.7**	**2.1.3**
papi		5.5.1	5.5.1	5.5.1	5.5.1
pdsh	2.31	2.33	2.33	2.33	2.33
petsc		3.7.6		3.7.6	**3.8.3**
phdf5		1.10.1		1.10.1	1.10.1
powerman	2.3.24			2.3.24	Base OS
prun	1.0			1.0	1.0
rasdaemon	0.5.7			0.5.7	Base OS
ScaLAPACK		2.0.2		2.0.2	2.0.2
slurm	16.05.8	17.02.09	17.02.10	17.02.10	**17.11.5**

* Note: A separate support agreement is required for Icinga2

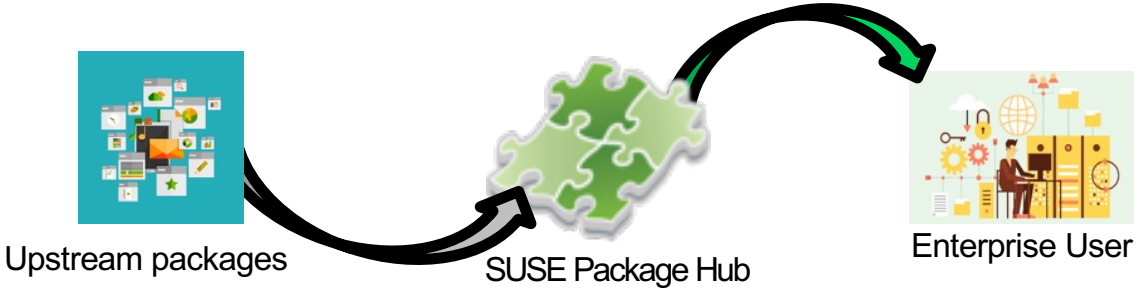
SUSE PackageHub

Community Packages for SLES

- Built and maintained by the community of users
- Approved and supported by SUSE
- High-quality, up-to-date packages delivered by openSUSE Factory

About 900 packages available for X86-64

More than 475 packages available for Arm



Package	*Category*
clustershell	Administrative
robinhood	Administrative
singularity	Runtime

Catalyst UK project:

HPE, Arm, SUSE, and three leading UK universities establish one of the largest Arm-based supercomputer deployments in the world

***Goal:* Propel the Arm HPC ecosystem and exascale computing in the UK**

- More than 12,000 Arm-based cores running across three universities
- 64 Apollo 70 systems per site
- Two 32 core Cavium ThunderX2 processors per system
- Running SUSE Linux Enterprise for High Performance Computing

Other SUSE Products for Arm

SUSE Enterprise Storage

Available 2017

SUSE Manager

Available 2018

SUSE OpenStack Cloud*

* Technology Demonstration

Technology preview

SUSE ARM Partners

We adapt. You succeed.

Jay Kruemcke
Sr. Product Manager, HPC, Arm, POWER
jayk@suse.com
@mr_sles