ServerReady and Open Standards Accelerating Delivery

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Arm
The Cloud to Edge Infrastructure Foundation for a World of 1T Intelligent Devices

- High Performance, Secure IP and Architectures
- Diverse Solutions and Ecosystem
- Scalable from Hyperscale to the Edge
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Why do we need a standards-based approach?

Arm architecture supports a very diverse variety of devices

Diversity is good, but uncontrolled diversity is bad, particularly for servers

- Servers are very different to embedded devices – you have to install standard OSs which may even pre-date the SoC
- Installation process needs to ‘just work’
- Modifying the operating to suit the HW is not a viable option, as it is in embedded

Servers rely on standards to solve this - Common rules for hardware and for firmware
What is the Arm standards-based approach to servers

Arm takes a collaborative standards-based approach to servers
We collaborate with companies across the server ecosystem to create Arm standards for servers
We ensure existing industry standards work well with the Arm architecture
Support open source projects for software and firmware

Collaboration
- ArmServerAC 46+ companies
- CSPs, OSVs, ISVs, Silicon vendors, IP vendors...

Create Arm server standards
- SBSA, SBBR SGMG, PSCI, SMCCC...

Standards approach

Participation in industry standards
- Ensure good compatibility for Arm
- UEFI, ACPI, PCIe, RedFish...

Open source projects and software support
- Trusted Firmware
- EDK2
- Linux kernel
Arm Server Advisory Committee

Formed in 2011 to create hardware and firmware ground rules to enable standard OSs to work on Arm-based servers.

Initially, it consisted of OS vendors, OEMs, and BIOS vendors; later we added silicon vendors and ODMs.

Today, it consists of 46+ companies with members from every sector server ecosystem (SoC, ODM, OSV, BIOS, ISV, CSP, IP vendors...).

Members have an NDA with Arm and can access specifications whilst they are in development – helping us to shape the specs.

The forum has a mailing list and an issue tracker, monthly meets and yearly events in Asia and the US.
SBSA: Server Base System Architecture

Hardware requirements for Arm-based infrastructure SoCs

Developed in conjunction with the server ecosystem
Arm architecture and system architecture and standards

[Link to Arm architecture and system architecture]

Arm Arch:

- Armv8.x-A
- SMMU
- GIC
- Extensions:
  - RAS
  - MPAM
SBBR: Server Base Boot Requirements

Firmware requirements for Arm based infrastructure SoCs

Developed in conjunction with the server ecosystem

Requirements for industry standards and Arm firmware specifications


Arm Specs

- PSCI
- SMCCC
- Arm TF
- Arm FFH
- Arm MM

Industry Standards

- UEFI
- ACPI
- SMBIOS
- TCG FW spec
- PCI FW spec
Software and firmware development

We participate in important open source projects for server

- Linux kernel
- EDK2 for UEFI firmware
- Trusted Firmware–A – formerly Arm Trusted FW
- Open BMC

We also work with OS vendors that are not open source.
Server journey

- **2011**
  - ServerAC created
  - First OSVs
  - Later SiPs

- **2014**
  - First release of Server Base System Architecture (2.2)

- **2016**
  - Server Board Boot Requirements 0.9

- **2017**
  - SBBR v1.0
  - Alpha releases of SBSCA ACS Enterprise ACS

- **2018**
  - SBSCA 3.0/3.1
  - SBSCA ACS Enterprise (SBBR) ACS
  - SBSCA 5.0
  - SBBR 1.1
Strong OS support

Availability across multiple architectures
Red Hat Enterprise Linux 7.5 is simultaneously available across all supported architectures, including ... 64-bit Arm.

26th April 2018, London, UK: Ubuntu 18.04 LTS – the newest version of the most widely used Linux for workstations, cloud and IoT, is now available.

SLES 12 for HPC is tailored for HPC workloads by including the HPC Module. The HPC Module consists of a number of HPC packages that are fully supported on 64-bit Arm.

We released Oracle Linux 7 for Arm .... General Availability. We have been making previews available for a few months now but the time has come to put support behind it and make clear to customers and partners that this is a real product, not just a preview.

“We’re announcing that we are driving innovation with ARM server processors for use in our datacenters”
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Compliance tools help in scaling out

- Like other segments the server ecosystem is complex and contains multiple vendors
- An OS vendor cannot check every possible system
- Compliance tools can help one vendor check the input they receive from another
  - e.g. OEM can check Silicon vendor HW is compliant with SBSA hardware requirements
  - OSV can check ODM is compliant with SBSA hardware requirements and SBBR firmware requirements
- There is no specification without verification
- For these reasons, we introduced tests for our specifications and a compliance program
Arm ServerReady

It’s a set of tests:
• Architecture compliance test suites for SBSA/SBBR
• Booting of standard linux distros and smoke tests

It’s a compliance process:
• Partners run the tests, we help debug issues
• Once successful we provide a certificate

It’s a right to marketing materials:
• Partners can use the logo if they pass the process
ACS: Architectural Compliance Suites

SBSA hardware requirements (CPU, GIC, SMMU, PCIe...) properties

- SBSA CPU properties
- SBSA defined system components
- SBSA rules for PCIe integration
  - Based on the PCIe specification
  - Based on standard OS drivers with no quirks enabled

SBBR defined FW requirements (UEFI, ACPI and SMBIOS tests)

- UEFI testing based on the UEFI SCT
- ACPI testing based on FWTS
- SMBIOS testing

The test suites are hosted in GitHub and are open source (Apache v2):

https://github.com/ARM-software/sbsa-acs
https://github.com/ARM-software/arm-enterprise-acs
Testing

We are engaging with silicon vendors, ODMs, OEMs and BIOS vendors to run the tests.

Tests are developed by our architecture team, which also develops the specifications.

We have a support team that helps in running of test, debugging etc.
How do we support you – What’s the process?

ArmServerAC mailing list.

A support team in Taipei.

A certification team in Bangalore.

We help you run the tests and fix any issues.

We are well placed to help!

Once passed, our marketing team gives you the certificate and helps with communication.
Where have we seen problems?

- PCIe enumeration
- SBSA Watchdog
- Coherency and powering cores up and down:
  - Bugs in Trusted FW
- Firmware – 100s of bugs fixed in ACPI description and SMBIOS
Supporters
“The Arm ServerReady compliance program builds on Arm’s server standards and community contributions to the infrastructure industry. It enforces a set of common principles that software developers and customers alike can rely on. I am pleased to see this come to fruition with several server platforms already certified as ServerReady.”

- Dr. Leendert van Doorn,  
  Distinguished Engineer, Microsoft Azure, Microsoft Corp.

“As technological innovations spanning silicon, networking and storage spawn new server architectures and enable new workloads, it’s important that enterprises have common standards upon which they can base their decisions. Red Hat has long supported standards in open source innovation, from common microprocessor criteria to the base components of the Linux kernel, and today we’re pleased to extend this support to include the Arm ServerReady program which is designed to help enterprises adopt microarchitecture innovation with greater confidence.”

- Jon Masters, Chief Arm Architect, RedHat
Where next?

We are planning annual updates to our server standards
With updated test suites
We are working with other vendors to enable testing upstream and dow

Find out more
https://developer.arm.com/products/architecture/platform-design/server-and-infrastructure

Contact us: arm.serverreadyprogram@arm.com
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