

# The Emerging ARM 64 Server Software Ecosystem

## Opportunities for Developers with AMD's Standards-Based, Datacenter-Grade ARM Server Hardware

### ARM is coming to the datacenter.

After a tremendous collaborative effort between software developers, standards bodies, and hardware manufacturers, ARM is now making its debut as a viable, 64-bit datacenter-grade server technology.

### The Developer Opportunity

New ARM server offerings, such as those powered by AMD Opteron™ 1100 Series processors create a unique opportunity for developers to get involved and contribute to the software ecosystem that is poised to transform the IT industry. To help make this goal a reality, AMD is now offering an ARM Developer Kit that includes a physical server development environment.

### The ARM 64 Server Ecosystem

ARM-based systems-on-a-chip (SoCs) are expected to run a range of server workloads, storage arrays, and virtualized networks. Getting ARM ready for these roles meant creating a 64 bit ARM processor, but that was only the start. To make ARM 64 work for the enterprise, ARM servers must adhere to server-based standards that are at the core of the data center. They need a unified, common software platform capable of supporting multiple hardware designs.

The **Server Base System Architecture (SBSA)** specification released by ARM in January, 2014 provides a framework for the deployment of ARM architecture-based solutions in the data center. Support and input for this document came from software leaders such as Canonical, Citrix, Linaro, Microsoft, Red Hat and SUSE.

The **Linaro Enterprise Group (LEG)** is the other force driving ARM ecosystem development. With membership that includes industry players such as AMD, ARM, Canonical, Facebook, HP, and Red Hat, LEG is dedicated to accelerating Linux ARM server software ecosystem development. LEG's accomplishments for 64-bit ARM Architecture (AArch64) include Linux kernel work, OpenJDK, and bindings for [UEFI 2.4](#) and [ACPI 5.1](#).

The goal now is to get a broader group of software developers engaged in developing the ARM server ecosystem. Linux distributions for AArch64 encompass a rich software environment, with hypervisors, compilers, libraries, debuggers, and scripting tools.

### Highlights

- ARM is maturing as a server technology with the availability of 64 bit ARM processors, enterprise-grade ARM server platforms, and an expanding software ecosystem.
- Developers can seize on an opportunity to get involved and help build the next generation of low-power server infrastructure.
- AMD pulls together all the elements needed for developers to turn the ARM64 server vision into a reality.
- The ARM Developer Kit includes a fully-functioning ARM 64 server, a complete OS/Hypervisor/Database/Programming language software stack, and development tools.

### AMD's ARM Developer Kit

The AMD Opteron™ A1100 development kit is packaged in a microATX form factor and includes:

- An AMD Opteron™ A1100-Series processor with 4 cores
- 2 Registered DIMM with 16 GB of DDR3 DRAM
- PCI Express® connectors configurable as a single x8 or dual x4 ports
- 8 Serial-ATA connectors
- Compatibility with standard power supplies
- Standard UEFI boot environment
- Linux environment based on Fedora technology from the Red Hat-sponsored Fedora community
- Standard Linux GNU tool chain, including cross-development version
- Platform device drivers
- Apache web server, MySQL database engine, and PHP scripting language for developing robust Web serving applications
- Java 7 and Java 8 versions to enable developers to work in a 64-bit ARM environment

## The AMD ARM Developer Kit

AMD has combined the hardware and software needed to help developers create the kind of portable code needed to make the ARM ecosystem thrive as a credible enterprise server technology. The AMD ARM Developer Kit includes a server in a microATX form factor powered by a 4-core AMD Opteron A1100 series processor, with a complete development environment for ARM-based applications. Software includes Linux environment based on Fedora technology from the Red Hat-sponsored Fedora community and a standard Linux GNU tool chain for cross-development ships with the Kit.

The Developer Kit ships as a complete unit. Developers can apply for the Kit at [www.amd.com/arm](http://www.amd.com/arm).

## AMD and the ARM 64 Server Software Ecosystem

Having been in the server business for decades, AMD understood that developers and infrastructure managers would only give serious consideration to ARM-based servers if the server platform is based on open standards and the software ecosystem is robust. Taking the approach of customized platforms used in mobile ARM devices into a server form factor would not be adequate to address the sophisticated needs of large data centers. With this in mind, AMD set out to create an ARM-based server that combined a powerful processor with well-established server standards, like UEFI, ACPI, PCIe Gen3, and SATA along with a full complement of open source software.

The AMD Opteron™ A1100 Series processor is the fulfillment of this vision. It is designed to “feel like a real server” for users accustomed to conventional X86 commercial servers. The AMD Opteron A1100 runs either 4 or 8 ARM Cortex-A57 cores. It features two 10 Gigabit Ethernet ports, 8 SATA 3 ports, 8 lanes of PCIe, and advanced memory characteristics. The A1100 also offers sophisticated security functions, such as crypto and data compression co-processors and ARM TrustZone® technology.

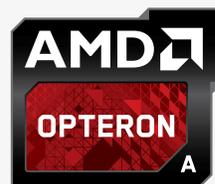
## Developer Tools to Bring Potential Use Cases to Life

The ARM 64 community has focused on making available the base set of developer tools that bring ARM 64's use cases to life. The growing toolset is comprised of compilers, debuggers, and scripting languages. An effective cross compiler is essential, allowing developers to use existing x86 systems to generate ARM-based code. Emerging Linux distributions are now offering tools needed by developers using Java or scripting languages such as PHP, Perl, Python and Ruby.

## Red Hat ARM Partner Early Access Program

Red Hat has launched an ARM Partner Early Access Program to enhance collaboration and facilitate partner-initiated system designs based on the 64-bit capable ARMv8-A architecture that include Red Hat software. This program enables Red Hat and its partners to better address the evolving ARM ecosystem by collaborating to create a singular 64-bit ARM server software platform that relies on common standards. Interested developers can apply at:

<http://connect.redhat.com/early-access-programs>



## Operating Systems, Hypervisors, Tools, Applications for AMD-based ARM 64 Servers

### OS/HYPERVISOR

Linux kernel 3.16

Fedora 21 (sponsored by Red Hat)

OpenSUSE 13.2 (sponsored by SUSE)

KVM (Hypervisor included with Linux Kernel)

Xen ARM

### TOOLS

GCC 4.8, 4.9 (compiler)

Linaro GCC (performance focused GCC compiler)

Binutils (libraries)

glibc (libraries)

gdb (debugger)

LLVM 3.5 (compiler)

Python (scripting language)

PHP (scripting language)

Perl (scripting language)

Ruby (scripting language)

OpenJDK (Java)

Oracle JVM (Java)

### APPLICATIONS

Apache Web Server

Nginx Web Server

Tomcat App Server

WordPress

MySQL

Squid (Caching proxy)

Gluster FS

NFS

OpenStack

Hadoop

## Apply for the Development Kit

To apply for the development kit and learn more about the AMD Opteron™ A1100-Series processor visit: [www.amd.com/arm](http://www.amd.com/arm)