SOLUTION BRIEF
JUNE 2017

HIGHLIGHTS

- SOFTWARE ENVIRONMENTS HAVE EVOLVED FASTER THAN HARDWARE INFRASTRUCTURE
- THE X86-ARCHITECTURE SERVER PROCESSOR MARKET HAS SEEN ONLY INCREMENTAL IMPROVEMENTS
- AMD EPYC™ SYSTEM ON CHIP (SOC) OFFERS MORE RESOURCES AT A COMPETITIVE PRICE POINT. MORE CORES, MEMORY, I/O BANDWIDTH, AND THE INDUSTRY'S FIRST HARDWARE-EMBEDDED SECURITY FOR AN X86-ARCHITECTURE SERVER SOC
- AMD EPYC SOC BRINGS MUCH-NEEDED INNOVATION TO RE-ESTABLISH A VIBRANT AND COMPETITIVE SERVER PROCESSOR MARKET

AMD EPYC SoC: Innovation to Accelerate Today's Applications

Flexibility. Performance. Security. Born in the cloud, the AMD EPYC™ system on chip (SoC) delivers innovation to better support the needs of existing and future datacenter applications. Whether you deploy bare metal, virtualized, or cloud environments, the AMD EPYC SoC powers fast, responsive, and secure IT.

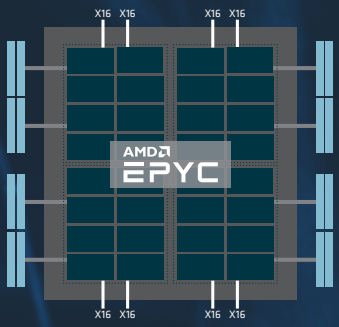
THE CLOUD HAS CHANGED EVERYTHING

Rapid cloud computing adoption has precipitated a paradigm shift in the industry. Resources are now software defined, and security is more important than ever. Beyond the cloud, advances in software have created entirely new workload classes. These include mobile applications, digital business transformation, big data, predictive analysis, and machine learning where data is analyzed and conclusions are made in real time, all without human intervention.

While the pace of software innovation has quickened, it has been lacking support from the foundational infrastructure in silicon. More than just incremental improvements in processor speed are needed to efficiently support today's software-defined datacenter. With automatic Moore's Law performance increases slowing, innovation is now more important than ever. An approach that better balances the ratios of cores, memory, I/O bandwidth, and that deploys security features embedded in silicon is essential to achieve optimized performance for today's datacenter applications.

AMD EPYC: Innovation to Accelerate Today's Applications

AT A GLANCE



- SYSTEM-ON-CHIP (SOC) DESIGN
- UP TO 32 AMD "ZEN" CORES
- UP TO 16 DIMMS (2 TB) OF MEMORY PER SOCKET
- 8 MEMORY CHANNELS FOR HIGHER BANDWIDTH
- 128 LANES OF PCIE® BANDWIDTH
- SERVER CONTROLLER HUB
- DEDICATED, EMBEDDED SECURITY PROCESSOR WITH SECURE BOOT AND FULL MEMORY ENCRYPTION THROUGH ON-CHIP MEMORY CONTROLLERS

HEALTHY COMPETITION DRIVES INNOVATION

Over the last four decades, AMD has earned a reputation for a commitment to innovation. In the server marketplace, we were the first to break the gigahertz clock-speed barrier, deliver a 64-bit architecture processor, and develop native dual- and quad-core processors. Our roots are in the server market and we maintain the engineering strength to deliver industry-transforming innovation. All of these factors will help us to restore healthy competition to the server market with innovations that deliver real value to IT organizations everywhere.

NEW DATACENTER BALANCE

We took a hard look at the x86-architecture server processor market and evaluated the gaps between the capabilities of current silicon and needs of today's software-defined datacenters. The AMD EPYC SoC bridges the gaps with innovations designed from the ground up to efficiently support the needs of existing and future datacenter requirements.

- PERFORMANCE. The AMD EPYC SoC brings a new balance to your datacenter. The highest core count in an x86-architecture server processor, largest memory capacity, most memory bandwidth, and greatest I/O density are all brought together with the right ratios to help performance reach new heights.[1]
- FLEXIBILITY. You can match core count with your application needs without compromising processor features. Our balanced set of resources gives you more freedom to rightsize your server configuration for your workload.
- SECURITY. We have created the industry's first dedicated security processor embedded in an x86-architecture server SoC. The processor manages secure boot, memory encryption, and secure virtualization on the SoC itself. Encryption keys never have to leave the processor where they can be exposed to intruders.

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Our history is marked by a commitment to innovation that's truly useful—putting real customer needs ahead of technical one-upmanship

HIGHER PERFORMANCE

We designed the AMD EPYC SoC to deliver performance that matters. We understand that when resources are delivered in the wrong ratios, performance and cost effectiveness suffer. Today, a large percentage of datacenter applications are limited by memory constraints. The majority of all datacenter network traffic is east-west. And ever more datacenter applications are multithreaded.

The AMD EPYC SoC brings performance optimization to a higher level. We deliver the highest core count, memory capacity, most memory bandwidth, and greatest I/O density in the industry. But real-world performance depends not just on raw capabilities, but on the ratio of resources to balance performance and minimize bottlenecks.

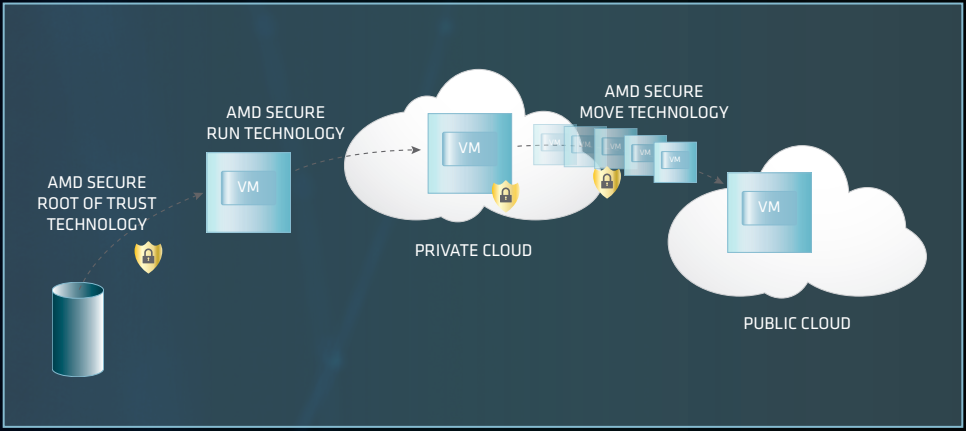
To achieve real-world performance, the AMD EPYC SoC has the memory capacity and bandwidth to satisfy the voracious appetite of the processor cores for data. It has I/O bandwidth that matches the capability of the CPU cores to move data to and from the network, spinning disks, NVMe storage, and graphics acceleration devices.

For your datacenter, the AMD EPYC SoC increases the capacity of cloud computing environments and virtual desktop infrastructure deployments. Big data analytics and in-memory databases are accelerated with additional parallelism enabled by up to 32 cores in the SoC, more main memory and memory bandwidth, and the I/O capacity needed to read in large amounts of persistent data for analysis. It offers the parallelism to speed high performance computing environments. Machine learning and predictive analysis benefit from the capability to process more data in memory and to accelerate computation with more direct GPU connectivity than any other processor. Virtualized and cloud computing environments benefit from high security with minimal overhead.

AMD EPYC: Innovation to Accelerate Today's Applications

SINGLE-SOCKET SERVER COST BENEFITS

- NO ADDITIONAL CPU OR SOCKET
- NO ADDITIONAL HEAT SINK
- NO NEED FOR LARGER POWER SUPPLIES
- NO NEED FOR ADDITIONAL CONNECTIVITY COMPONENTS
- NO NEED FOR HIGH-DENSITY MEMORY



ENHANCED FLEXIBILITY WITH BALANCED RESOURCES

Getting the most useful work out of a system means balancing resources to closely match workload needs. For all three key resources—CPU, memory capacity and bandwidth, and I/O—we deliver a broader range so that you have the utmost flexibility in matching resources to workloads.

- INDUSTRY-LEADING I/O CAPACITY with 128 lanes of PCIe® throughput accelerates performance of clustered systems and I/O-intensive applications from big data to software-defined storage.
- FLEXIBLE RANGE OF 8 TO 32 CORES PER PROCESSOR means users can choose to maximize parallelism or minimize licensing costs.
- UP TO 2 TB OF MEMORY per socket and more bandwidth satisfy the most data-hungry applications.

This broad choice of resources helps you rightsize your servers to your applications and deliver optimal performance with low cost of ownership. For example, many 2-socket servers ship with only one socket populated because they would otherwise be resource compromised. This is because they need more memory or I/O capacity that only a 2-socket server can support.

With AMD EPYC, you can use an uncompromised single-socket server to efficiently run many workloads formerly requiring a 2-socket-server. You can reach higher utilization levels, enhance performance, and reduce hard costs—all while bringing an optimal balance of resources to your applications with unprecedented security.

AMD EPYC: Innovation to Accelerate Today's Applications

When your workloads need more than 32 cores, you can rightsize with a 2-socket configuration that gives you even more resources. You can support more virtual machines per server, process more data in parallel, directly access more local storage, hold larger databases in memory, and execute even larger HPC workloads.

UNPRECEDENTED SECURITY

Years of security-related headlines have made one thing clear: IT organizations of all sizes must consider everyone as a potential adversary. You need to have a comprehensive security foundation not as an afterthought but as an integral part of your infrastructure. Only then can you minimize potential attack surfaces as software is booted, executed, and processes your critical data.

AMD EPYC is the first server CPU with an embedded security processor on the x86 server SoC itself. This dedicated processor manages a secure boot process and memory encryption. Combined, these technologies keep your software and data safe as it boots, runs, and as virtual machines move between AMD EPYC SoC-powered servers.

- AMD SECURE ROOT-OF-TRUST TECHNOLOGY provides the capability to boot only from trusted firmware images, depending on your server vendor's implementation.
- AMD SECURE RUN TECHNOLOGY is designed to encrypt main memory, keeping it private from malicious intruders having access to the hardware. No application modifications are needed to use this feature and the security processor never exposes the encryption keys outside of the SoC. With AMD Secure Run technology enabled in future hypervisor versions, virtual machines will be able to have separate encryption keys, isolating them from other virtual machines, tenants, and even the hypervisor itself. They can be securely booted, with proof given to their owners that their software has booted on a system of their choosing with no modifications.
- AMD SECURE MOVE TECHNOLOGY will be able to provide the underlying technology to set up a secure SoC-to-SoC communication channel. Virtual machines will be able to use this channel to move between AMD EPYC SoC-powered servers so that at no time is any data unencrypted nor are any encryption keys exposed.

AMD EPYC ECOSYSTEM SUPPORT

- MICROSOFT® WINDOWS® SERVER 2016
- VMWARE VSPHERE 2016U1
- RED HAT ENTERPRISE LINUX 7.3
- SUSE LINUX ENTERPRISE SERVER 12.2
- CANONICAL UBUNTU LINUX 17.04
- CITRIX XENSERVER 2017

BROAD ECOSYSTEM SUPPORT

AMD has been working with the leading software vendors and developers to create a rich ecosystem of supported software so that your applications will run on AMD EPYC SoC-powered servers on day one.

ACHIEVE BETTER BUSINESS OUTCOMES WITH AMD

As an IT practitioner, you understand that the real value you provide to your company and your clients is not simply how well you assemble systems. It's how well you deliver high-quality services, to a global audience, 24-by-7. The core principles that matter today are the same that have mattered for decades: Time to market. Time to deploy. Service levels. Cost to deploy. Despite evolving workloads and an unprecedented emphasis on security, the fundamentals have not changed. But today you need better tools to manage emerging challenges.

With a system on chip that delivers more performance, flexibility, and security through an optimal balance of resources, AMD EPYC can help you better match your resources to your workloads. With AMD EPYC you can unleash the power of today's software with the support in silicon that it needs: more cores, more memory and memory bandwidth, more I/O, and the industry's first embedded, dedicated security processor on an x86-architecture server chip.

LEARN MORE

To learn more about the AMD EPYC SoC, visit amd.com/epyc.

FOOTNOTES

1. Most cores: the AMD EPYC™ processor includes up to 32 CPU cores versus the Xeon E5-2699A v4 processor with 22 CPU cores.

More memory capacity: the AMD EPYC processor offers up to 128 GB LRDIMMs in a 2-DIMM-per-channel configuration, so up to 256 GB/channel x 8 channels = 2.048 TB/processor, versus the Intel Xeon E5-2699A v4 processor with 128 GB LRDIMM in a 3-DIMM-per-channel configuration, so up to 384 GB/channel x 4 channels = 1.54 TB/processor.

Memory bandwidth: the AMD EPYC processor supports up to 21.3 GB/s per channel with DDR4-2667 x 8 channels (total 170.7 GB/s), versus the Intel Xeon E5-2699A v4 processor with 19.2 GB/s with maximum DDR4-2400 x 4 channels (total 76.8 GB/s).

Greater I/O Density: AMD EPYC processor offers up to 128 PCI Express high-speed I/O lanes per socket, versus the Intel Xeon E5-2699A v4 processor with 40 lanes per socket.

NAP-02, NAP-03, NAP-04, NAP-05

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