ПРЕИМУЩЕСТВА СЕРВЕРОВ НА БАЗЕ AMD EPYC™

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Серверное подразделение AMD

СТРАТЕГИЯ И УСПЕХИ

Predictable Execution
Making Good on our Promises

~2X the Competitive Performance,
Security Enhancements

Accelerating Time to Value

ACCELERATING CUSTOMER VALUE

AMD

СЕМЕЙСТВО AMD EPYC™ 7003

ВЗАИМОДЕЙСТВИЕ С ПОСТАВЩИКАМИ ПРОГРАММНОГО ОБЕСПЕЧЕНИЯ

ОС

Canonical
Citrix
Microsoft
Oracle
Red Hat
Suse
VMware

IHV
(SOLUTION ENGAGEMENTS ONLY)

Broadcom
Mellanox
Micron
NVIDIA
Samsung

Kioxia*
Marvell*
Microchip*
SK Hynix*
Seagate*
Western Digital*

SDS

RHEL Ceph
Excelro
Pivot 3
Quobyte
Weka.IO

Cloudian*
MapR-XD*
StorMagic*

BIG DATA ANALYTICS

Apache Hadoop
Cloudera
Couchbase
DataStax
Elastic
Exasol
MongoDB
Splunk
Transwarp

Databricks*
Hortonworks*
MapR*
MarkLogic*
Splunk*
Tableau*
Snowflake*

DATABASES

MS SQL Server
MySQL
Oracle DB
PostgreSQL
Redislabs
SAP
TigerGraph
Vertica

MemSQL*
Oracle EBS*
SAP HANA*
SAS*

HPC ISVs

Altair
Ansys
Dassault Systems
Emerson
ESI
LSTC
Mentor Graphics
MSC
Shearwater
Siemens PLM
Synopsys

Cadence*
Flow Science*
Haliburton*
Schlumberger*

HPC OPEN SOURCE

Weather: WRF
Weather: HYCOM
Weather: IFS
NAMD
CP2K
Open Foam
GROMACS
LIGGGHTS
LAMMPS

TELCO

Ericcson
Mavenir
Mellanox
NetScout
Nokia
Red Hat
VMware

Keysight (Ixia-BP)*
Palo Alto Networks*

SDI

Microsoft
Red Hat
VMware

ACCELERATORS

Pesando
Xilinx

nCorium*

HIGH PERF.

Formulus Black*
Rescale*
ScaleMP*

MEDIA

Autodesk
BEAMR

ATEME*
Blackmagic*
Chaos Group*
Foundry*
Pixar*

AMD EPYC™ - ЦЕЛЕВЫЕ РЫНКИ

Exascale-вычисления

4.5x-9x faster than today's top supercomputers

High Performance Compute

Design & Simulation

Research & Academia

Machine Learning

Supercomputing

Облака

9 of 10 most powerful Cloud Providers in the World

Cloud Service Providers

IaaS/PaaS

Search

Social

SaaS

Корпоративный рынок

Performance and Security Leadership in the workloads that matter

Enterprise IT

Virtualization

SDS/HCI

Hadoop

NoSQL

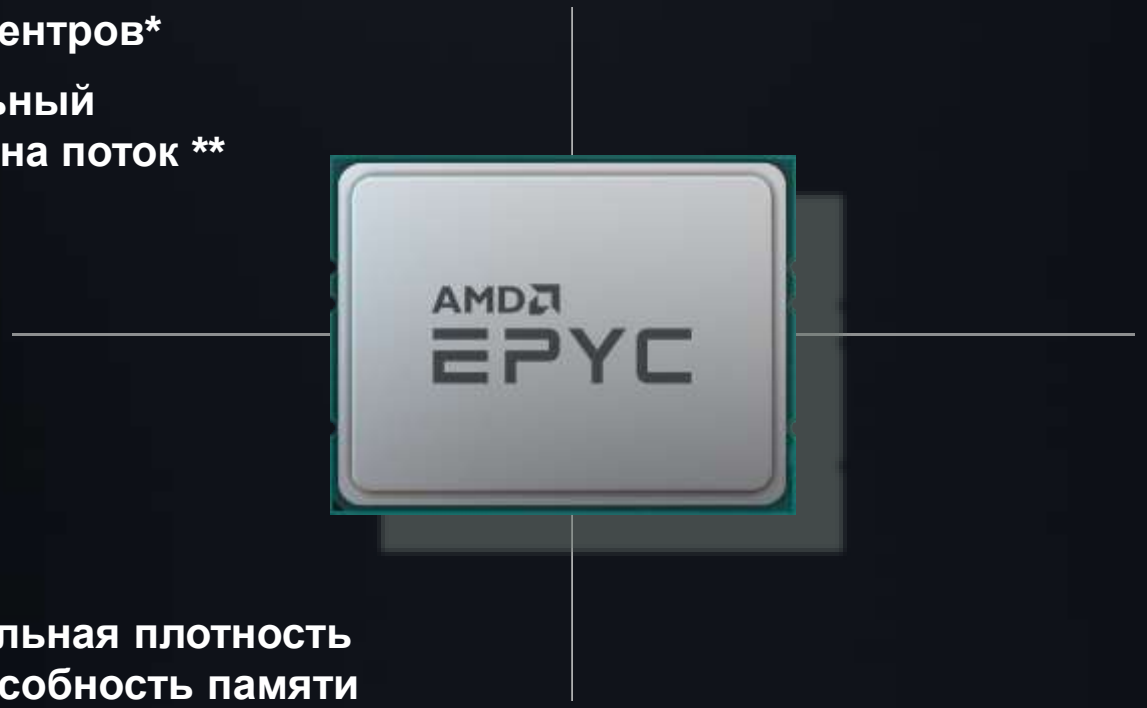
БЕЗОПАСНОСТЬ ДЛЯ «ДАННЫХ В РАБОТЕ» С INFINITY GUARD™

Source: https://www.top500.org/lists/top500/2020/11/

ПРЕИМУЩЕСТВА СЕРВЕРОВ НА БАЗЕ AMD EPYC™

Наиболее производительный процессор x86 для датацентров*

Наиболее производительный процессор x86 в расчете на поток **

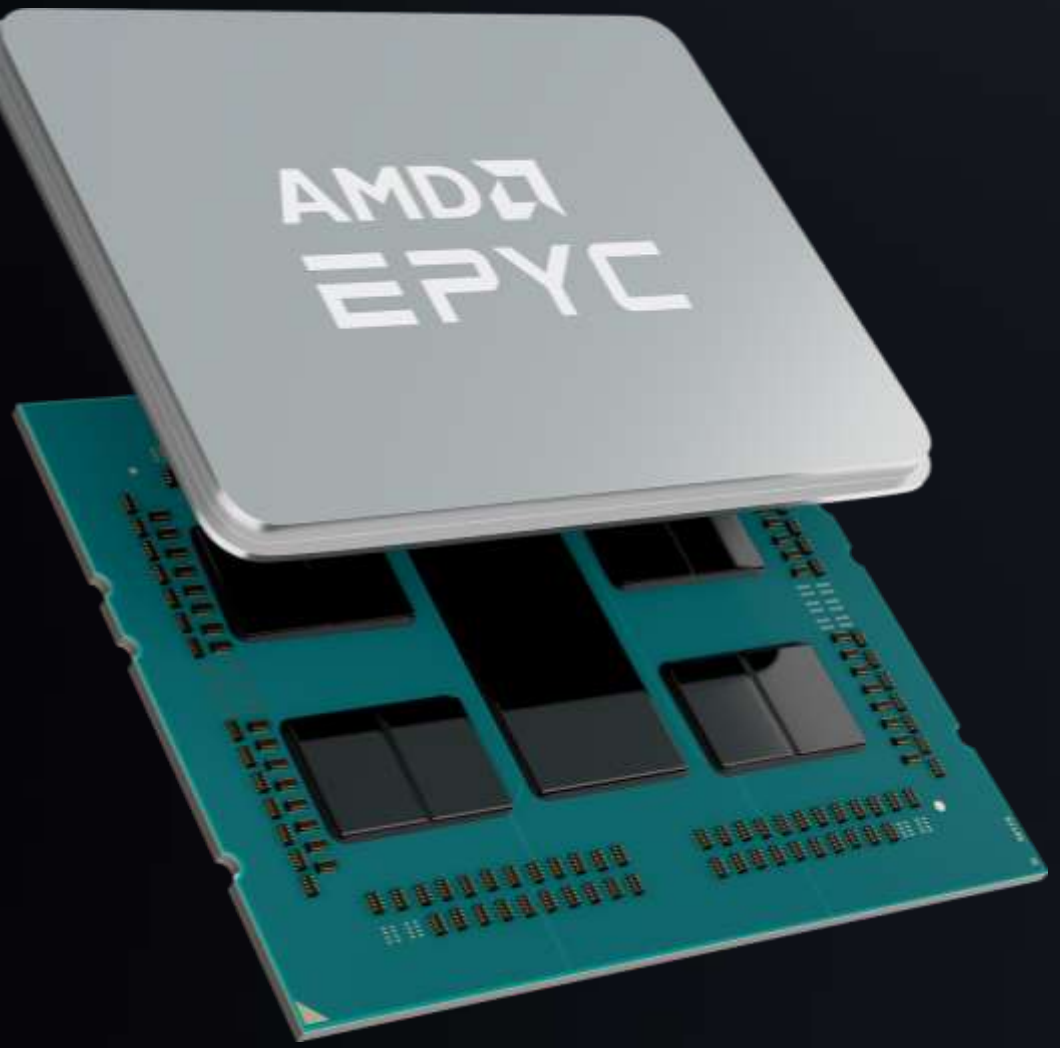


Лидирующая подсистема безопасности

Лидирующая вычислительная плотность
Высокая пропускная способность памяти
Масштабируемая подсистема ввода-вывода***

Привлекательная совокупная стоимость владения

*EPYC 7702, **EPYC 7F32 See endnotes ROM-517, ROM-169, ROM-570
***In Class. See Endnote ROM-11



ТРЕТЬЕ ПОКОЛЕНИЕ ПРОЦЕССОРОВ **AMD EPYC™**

НОВОВВЕДЕНИЯ

САМЫЙ ПРОИЗВОДИТЕЛЬНЫЙ СЕРВЕРНЫЙ ПРОЦЕССОР X86 В МИРЕ*

Новая микроархитектура ядра **“Zen3"**

УЛУЧШЕННАЯ ПРОИЗВОДИТЕЛЬНОСТЬ ПАМЯТИ

- **Синхронизированная частота фабрики и ОЗУ**
- **Наиболее объёмная кэш-память L3 (x86), до 32MB на ядро**

УЛУЧШЕННАЯ ПОДСИСТЕМА БЕЗОПАСНОСТИ

ПОДДЕРЖКА КОНФИГУРАЦИЙ С **4, 6** ИЛИ **8** КАНАЛАМИ **DDR**

СОВМЕСТИМОСТЬ С ПЛАТФОРМАМИ СЕРИИ **EPYC 7002**

(**Требуется обновленный** BIOS)

SEE ENDNOTES: MLN-001 and MLN-016; * EPYC 7763 processor

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3RD GEN AMD EPYC™ - ОБЗОР МОДЕЛЬНОГО РЯДА

Общие характеристики всех моделей ЦПУ серии 7003

- 8 Каналов DDR4-3200
- 4TB адресуемой памяти на сокет
- 128 линий PCIe®4
- SMT & Турбо-частоты
- 18GT/s - AMD Infinity Fabric™
- Защищенная память (SME)
- Защищенная виртуализация (SEV-SNP)
- Единая частота фабрики и ОЗУ

Cores/Threads	AMD EPYC	Base/Boost Freq (GHz)	Default TDP (W)
64 CORES	7763	2.45/3.50	280W
	7713/P	2.00/3.675	225W
56 CORES	7663	2.00/3.50	240W
48 CORES	7643	2.30/3.60	225W
32 CORES	75F3	2.95/4.00	280W
	7543/P	2.80/3.70	225W
	7513	2.60/3.65	200W
28 CORES	7453	2.75/3.45	225W
24 CORES	74F3	3.20/4.00	240W
	7443/P	2.85/4.00	200W
	7413	2.65/3.60	180W
16 CORES	73F3	3.50/4.00	240W
	7343	3.20/3.90	190W
	7313/P	3.00/3.70	155W
8 CORES	72F3	3.70/4.10	180W

"F" – Наиболее высокая производительность на поток

AMD

AMD EPYC™ СЕРИИ 7003 – 3 ПОДГРУППЫ

	Процессорные подгруппы	Ориентировочный прирост производительности *
ПРОИЗВОДИТЕЛЬНОСТЬ НА ПОТОК HIGH FREQUENCY WITH LARGE CACHE/CORE RATIO	**75F3** (32C-280W) **74F3** (24C-240W) **73F3** (16C-240W) **72F3** (8C-180W)	до 23%
ВЫЧИСЛИТЕЛЬНАЯ ПЛОТНОСТЬ HIGHEST CORE & THREAD COUNT	**7763** (64C-280W) **7713** (64C-225W) **7713P** (64C-225W 1P) **7663** (56C-240W) **7643** (48C-225W)	до 15%
МАССОВЫЙ СЕГМЕНТ PERFORMANCE & TCO	**7543** (32C-225W) **7543P** (32C-225W 1P) **7513** (32C-200W) **7453** (28C-225W) **7443** (24C-200W) **7443P** (24C-200W 1P) **7413** (24C-180W) **7343** (16C-190W) **7313** (16C-155W) **7343** (16C-155W 1P)	до 25%

* Результаты предварительного тестирования, сравнение результатов серий 7003 и 7002 в SPECrate® int base 2017

AMD

СОВОКУПНАЯ СТОИМОСТЬ ВЛАДЕНИЯ

Intel

63X Intel® Xeon® 6258R Servers

4 СЕРВЕРНЫХ СТОЙКИ

25,000 ЕДИНИЦ

ЦЕЛОЧИСЛЕННОЙ ПРОИЗВОДИТЕЛЬНОСТИ*

AMD EPYC™ DELIVERS (est.)

49% МЕНЬШЕ СЕРВЕРОВ

25% МЕНЬШЕ ПРОСТРАНСТВА

35% МЕНЬШЕ ЭЛЕКТРИЧЕСТВА

35% ДЕШЕВЛЕ 4-Х ЛЕТНЯЯ ЭКСПЛУАТАЦИЯ

AMD EPYC

32X AMD EPYC™ 7763 Servers

3 СЕРВЕРНЫХ СТОЙКИ

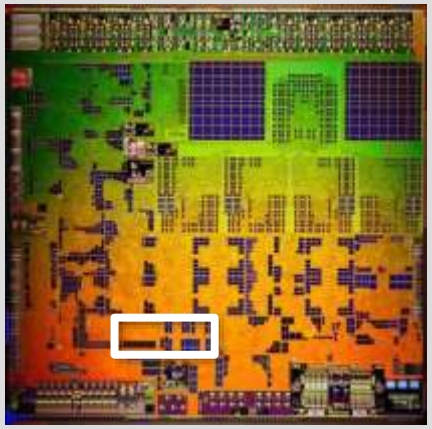
*SPECrate®2017_int_base (est.)
SEE ENDNOTE MLNTCO-001.

AMD

БЕЗОПАСНОСТЬ AMD НА УРОВНЕ КРИСТАЛЛА

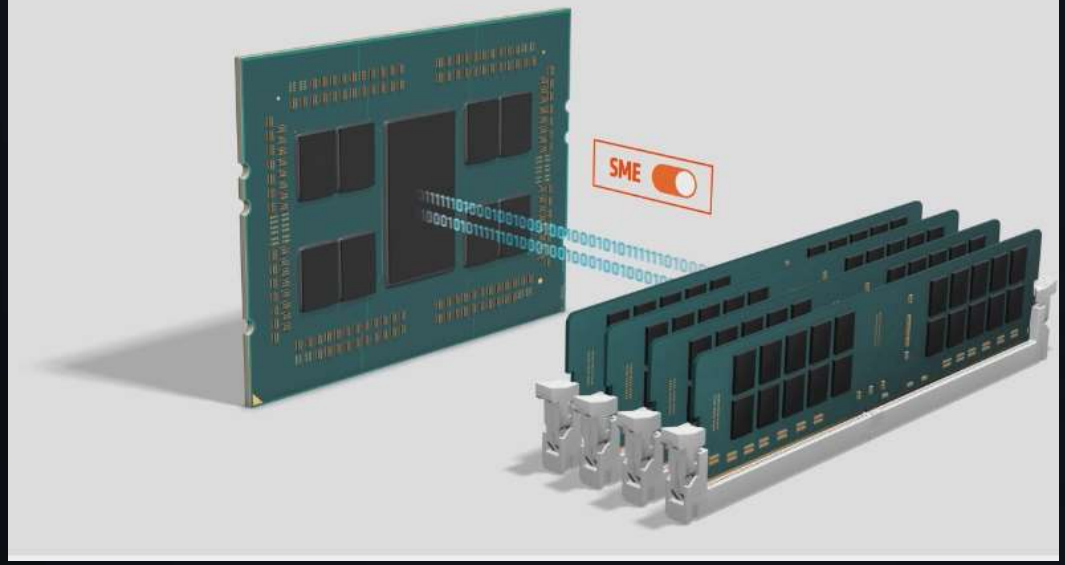
БЕЗ ИЗМЕНЕНИЙ В КОДЕ ЗАПУСКАЕМЫХ ПРИЛОЖЕНИЙ

Secure Processor



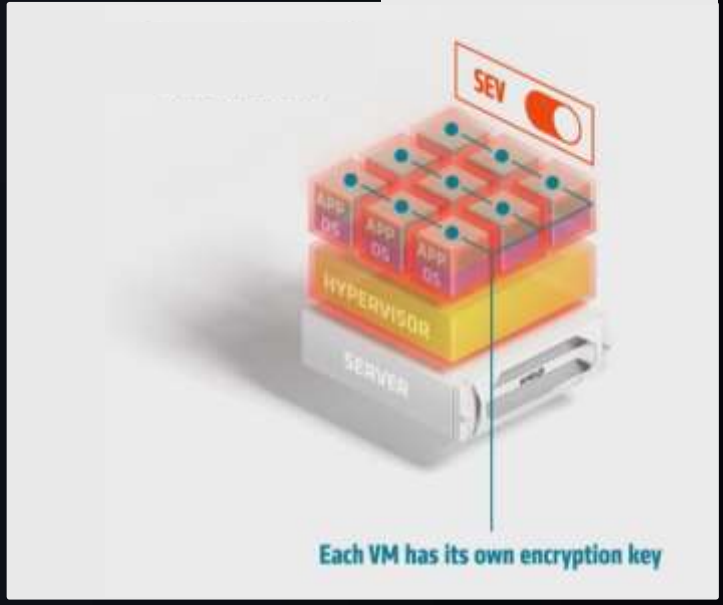
ДОВЕРЕННАЯ ЗАГРУЗКА

DRAM Encryption



ПОЛНАЯ ЗАЩИТА ФИЗИЧЕСКОГО АДРЕСНОГО ПРОСТРАНСТВА

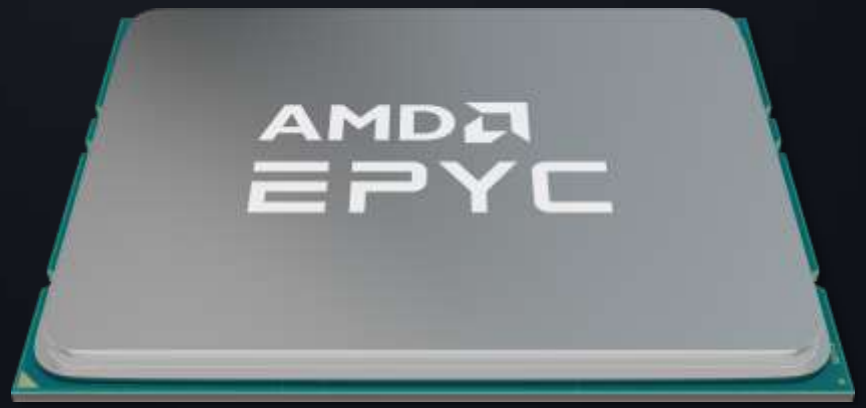
VM Encryption



ИНКАПСУЛЯЦИЯ НАГРУЗОК В ВМ

More at: amd.com/en/technologies/infinity-guard

AMD



3EE ПОКОЛЕНИЕ AMD EPYC™

НАИБОЛЕЕ ПРОИЗВОДИТЕЛЬНЫЕ СЕРВЕРНЫЕ ЦПУ X86, НА ПОТОК И ПО КОЛИЧЕСТВУ ПОТОКОВ

Разработан для обслуживания критических облачных сервисов

Привлекательность для бизнеса

Дополнительная безопасность на уровне процессора

AMD

СПАСИБО!

Вопросы, проекты? Наш эл.адрес: epyc.emea@amd.com

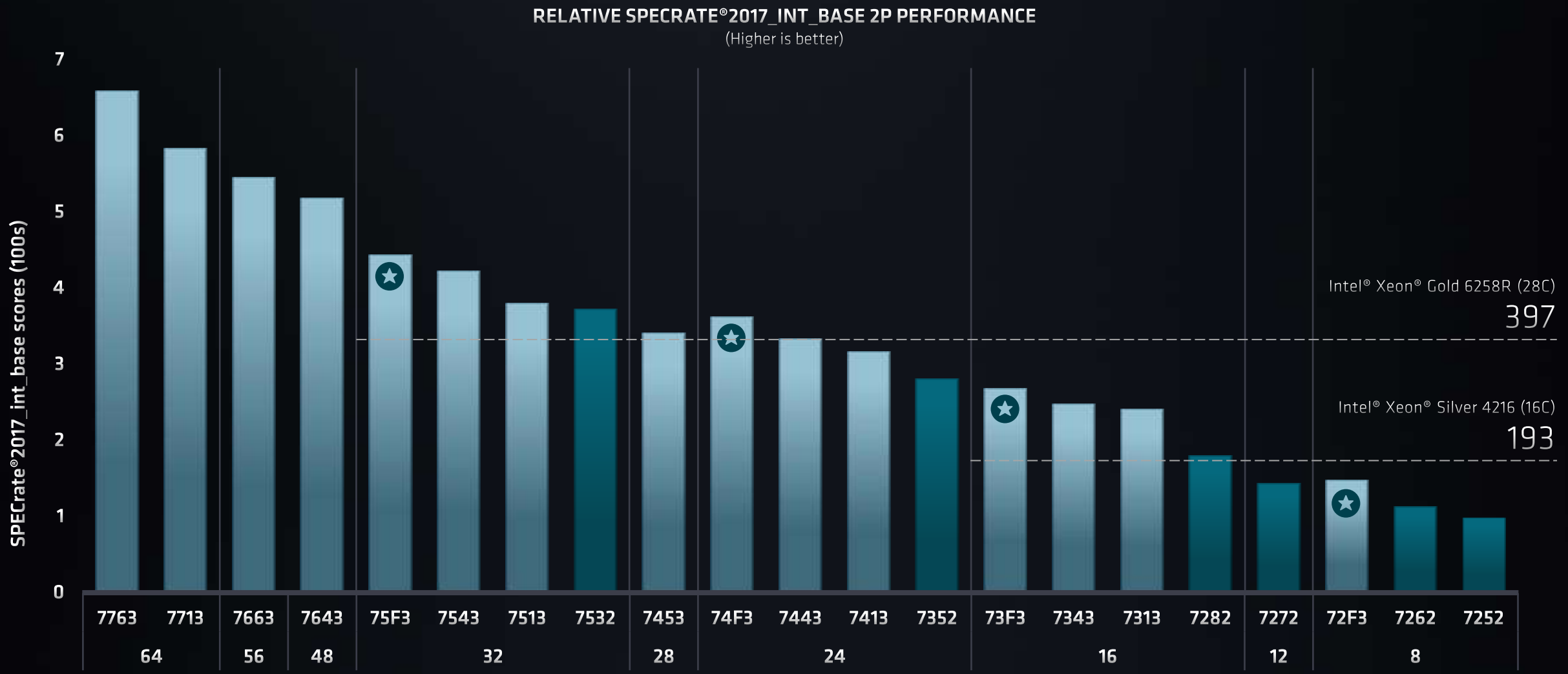
AMD EPYC™ СЕРИИ 7003 В ДЕТАЛЯХ

Model #	Cores / Threads	Base Freq (GHz)	Max Boost Freq[8] (GHz)	Default TDP (W)	cTDP (W)	L3 Cache (MB)	2P/1P
7763	64 / 128	2.45	3.50	280W	225-280W	256	2P or 1P
7713	64 / 128	2.00	3.675	225W	225-240W	256	2P or 1P
7713P							1P Only
7663	56 / 112	2.00	3.50	240W	225-240W	256	2P or 1P
7643	48 / 96	2.30	3.60	225W	225-240W	256	2P or 1P
75F3	32 / 64	2.95	4.00	280W	225-280W	256	2P or 1P
7543	32 / 64	2.80	3.70	225W	225-240W	256	2P or 1P
7543P							1P Only
7513	32 / 64	2.60	3.65	200W	165-200W	128	2P or 1P
74F3	24 / 48	3.20	4.00	240W	225-240W	256	2P or 1P
7453	28 / 56	2.75	3.45	225W	225-240W	64	2P or 1P
7443	24 / 48	2.85	4.00	200W	165-200W	128	2P or 1P
7443P							1P Only
7413	24 / 48	2.65	3.60	180W	165-200W	128	2P or 1P
73F3	16/ 32	3.50	4.00	240W	225-240W	256	2P or 1P
7343	16 / 32	3.20	3.90	190W	165-200W	128	2P or 1P
7313	16 / 32	3.00	3.70	155W	155-180W	128	2P or 1P
7313P							1P Only
72F3	8 / 16	3.70	4.10	180W	165-200W	256	2P or 1P

* Max boost for AMD EPYC processors is the maximum frequency achievable by any single core on the processor under normal operating conditions for server systems.

СЕМЕЙСТВО ЦП AMD EPYC™

ОБЩИЙ ОБЗОР ПРОИЗВОДИТЕЛЬСТИ



2X 3RD GEN AMD EPYC™ CPU RESULTS ARE INTERNALLY MEASURED ESTIMATES BY AMD AS OF 2/18/21. HIGHEST PERFORMING 2X INTEL XEON GOLD AND 2X SILVER PROCESSORS PUBLISHED AT WWW.SPEC.ORG AS OF 01/28/21. INTEL XEON URLS: 2X XEON GOLD 6258R AND 2X XEON SILVER 4216 AND 2X 2ND GEN EPYC URLS: 7532,7352, 7282, 7272, 7262, 7252 AS OF 1/28/21. SPEC® AND THE BENCHMARK NAME SPECrate® ARE REGISTERED TRADEMARKS OF THE STANDARD PERFORMANCE EVALUATION CORPORATION.

AMD

ПОЛЕЗНЫЕ ССЫЛКИ

Страница AMD EPYC™ 7003:
amd.com/epyc3

Репозиторий документов и гидов по настройке и оптимизации:
https://www.amd.com/en/processors/server-tech-docs/

Документация по подсистеме безопасности:
https://developer.amd.com/sev/

Онлайн-инструменты для выбора модели AMD EPYC™:
https://www.amd.com/en/processors/epyc-tools

Документ VMware по оптимизации vSphere 7.0 Update 2 под EPYC™
https://www.vmware.com/techpapers/2021/vsphere70u2-cpu-sched-amd-epyc.html

ОСНОВНЫЕ ИЗМЕНЕНИЯ В СРАВНЕНИИ С “ZEN 2”

~19%

УВЕЛИЧЕНИЕ ИСПОЛНЯЕМЫХ ИНСТРУКЦИЙ ЗА ТАКТ

FRONT-END ENHANCEMENTS

2X Larger L1 BTB (1024)
Improved branch predictor bandwidth
“No-bubble” branch prediction
Faster recovery from mispredict
Faster sequencing of Op-cache fetches
Finer-grained switching of Op-cache pipes

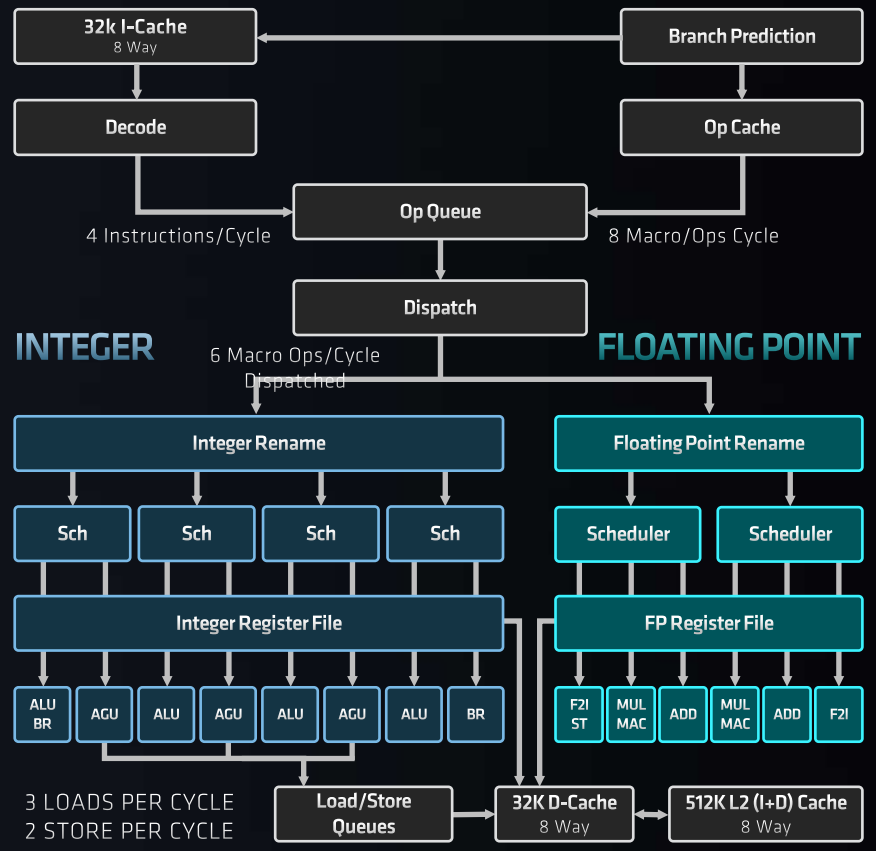
EXECUTION

Int: Dedicated Branch and St-data pickers
Int: Larger windows (+32)
FP/Int: Reduced latency for select ops
FP: 6-wide dispatch and issue (+2)
FP: Faster FMAC (-1 cycle)
FP: Two INT8 IMAC pipes (+1)
FP: Two INT8 ALU pipes (+1)

LOAD / STORE

Higher load bandwidth (+1)
Higher store bandwidth (+1)
More flexibility in load/store ops
Improved memory dependence detection
TLB: 6 table walkers (+4)

“ZEN 3”



SEE ENDNOTE: MLN-003

AMD

НОВЫЙ РЕЖИМ: 6-КАНАЛЬНЫЙ ИНТЕРЛИВИНГ ПАМЯТИ

ПРАВИЛА УСТАНОВКИ DIMM

Supported by all EPYC™ 7003 CPUs

BENEFIT

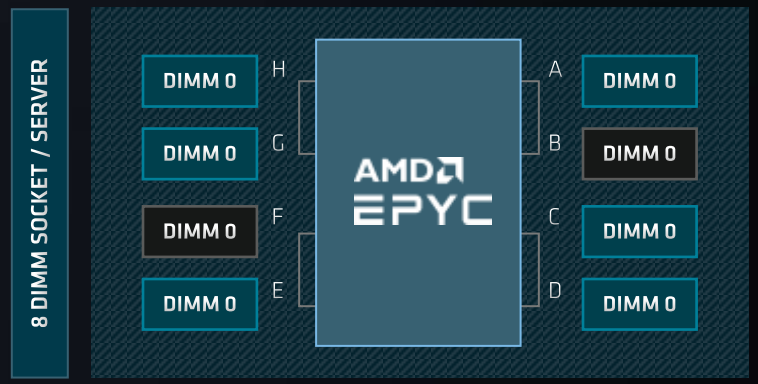
- Help reduce overall memory cost
- Provide efficient memory balance for mid and low core count CPUs
- Can improve Perf / TCO due to lower memory costs
- Can deliver 3200 MHz memory speeds w/ 3200 MHz DIMMs in 1 DIMM per channel (DPC) configs.
- Supports up to 256GB of memory per channel for these configs. This could be 1DPC or 2DPC using these channels.
- Optimized to avoid memory hot-spotting when using the indicated channels.

DIMM Empty DIMM slot

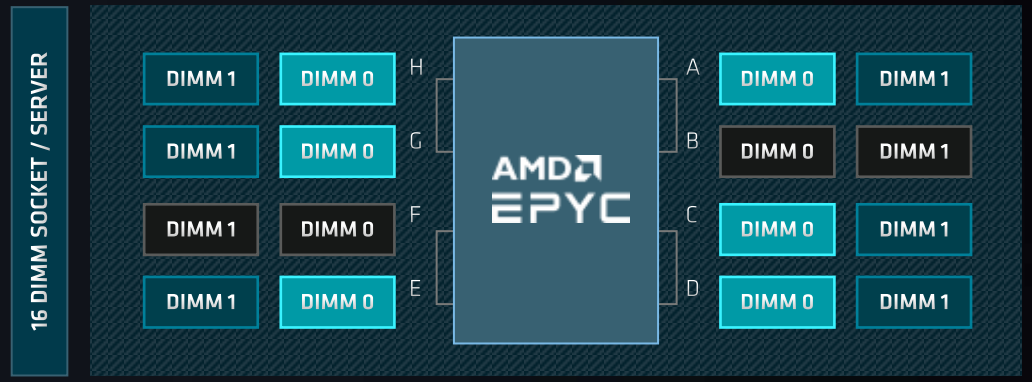
DIMM Populated DIMM slot, 1 DPC

DIMM 2 DPC populated configuration*

1 DIMM PER CHANNEL (DPC) SERVERS



SERVERS WITH 1 OR 2 DIMMS PER CHANNEL



FOR OPTIMUM PERFORMANCE, THE SAME SIZE AND TYPE DIMMS SHOULD BE USED IN ALL POPULATED SLOTS.

*DIMM TYPE AND SIZE RULES APPLY TO THESE POPULATION TYPES. CHECK WITH OEM FOR MEMORY POPULATION RULES.

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ПРИМЕЧАНИЯ

ROM-11: AMD EPYC™ 7002 Series processors have 45% more memory bandwidth than Intel Scalable processors in the same class.

ROM-517: 16-n, 2P 2nd Gen EPYC™ 7702 powered server scores a world record result of 7100 SPECrate®2017_int_base http://spec.org/cpu2017/results/res2020q1/cpu2017-20191223-20452.pdf. The next highest published score is 3920 SPECrate®2017_int_base on a 16-n, 2-socket Xeon® 8180 powered server http://spec.org/cpu2017/results/res2018q1/cpu2017-20171222-01950.pdf as of 02/12/20. ROM-517

ROM-169: For a complete list of world records see http://amd.com/worldrecords.

ROM-570: Highest per-core performance in the world based on SPECrate®2017_fp_base score rankings of result divided by total cores as of 3/20/2020. 2P EPYC 7F32 scoring 13.1 base result per-core (197 SPECrate®2017_fp_base/16 total cores, www.spec.org) compared to the next highest result 1P AMD EPYC 7262 scoring 11.54 base result per-core (92.3 SPECrate®2017_fp_base/8 total cores, http://spec.org/cpu2017/results/res2020q1/cpu2017-20191220-20435.pdf) See www.spec.org/cpu2017/results for full ranking.

GD-83: Use of third party marks / logos/ products is for informational purposes only and no endorsement of or by AMD is intended or implied. GD-177: AMD Infinity Guard security features on EPYC™ processors must be enabled by server OEMs and/or Cloud Service Providers to operate. Check with your OEM or provider to confirm support of these features. Learn more about Infinity Guard at https://www.amd.com/en/technologies/infinity-guard.

MLN-001: AMD EPYC™ 7003 Series processors require a BIOS update from your server or motherboard manufacturer if used with a motherboard designed for the AMD EPYC™ 7002 Series processors. A motherboard designed at minimum for EPYC 7002 processors is required for EPYC 7003 Series processors.

MLN-003: Based on AMD internal testing as of 02/1/2021, average performance improvement at ISO-frequency on an AMD EPYC™ 72F3 (8C/8T, 3.7GHz) compared to an AMD EPYC™ 7F32 (8C/8T, 3.7GHz), per-core, single thread, using a select set of workloads including estimated SPECrate®2017_int_base,SPECrate®2017_fp_base, and representative server workloads.

MLN-016: Results as of 01/28/2021 using SPECrate®2017_int_base. The AMD EPYC 7763 estimated score of 798 is higher than the current highest 2P server with an AMD EPYC 7H12 and a score of 717, https://spec.org/cpu2017/results/res2020q2/cpu2017-20200525-22554.pdf. OEM published score(s) for EPYC may vary.

MLNTCO-001 The Bare Metal TCO (total cost of ownership) Estimator solution compares the selected AMD EPYC™ and Intel® Xeon® CPU based server solutions required to deliver a TOTAL_PERFORMANCE of 25000 unit of integer performance based on published the SPECrate®2017_int_base scores for Intel and AMD measured estimated scores for AMD EPYC 7003. This analysis is based on tool VERSION: 02/20/2021 v0.9982. This estimation reflects a 4 year time frame. This analysis compares a 2 CPU AMD EPYC EPYC_7763 powered server with a measured estimated SPECrate®2017_int_base score of 802; compared to a 2 CPU Intel Xeon Gold_6258R based server with a SPECrate®2017_int_base score of 397, https://spec.org/cpu2017/results/res2020q3/cpu2017-20200915-23981.pdf. Both AMD EPYC and Intel based servers use the same estimated cost for the following elements of the analysis: server chassis size of 2RU at a cost of $2500 per chassis; internal storage $380; physical servers managed per admin: 30; fully burdened cost per admin $110500; server rack size of 42; space allowance per rack of 27 sq feet; monthly cost of data center space $20 per sq foot; cost per kW for power $0.12; power drop per rack of 12kW; and a PUE (power usage effectiveness of 2).The EPYC powered solution estimates are: 32 2P EPYC 7763 powered total servers at a hardware only acquisition cost of $19232 per server, which includes total system memory of 768GB, which is 6GB of memory / core and a total system memory cost of $3072; internal storage cost of $380. The total AMD EPYC hardware acquisition cost for this solution is $615424. Each server draws ~611kWhr per month. For the 4 years of this EPYC powered solution analysis the: total solution power cost is ~$225240 which includes the PUE factor; the total admin cost is ~$471468, and the total real estate cost is ~$77760. The total 4 year TCO estimate for the AMD solution is $1389892.The Intel based solution estimates are: 63 2P Xeon Gold 6258R based total servers at a hardware only acquisition cost of $12316 per server, which includes total system memory of 384GB, which is 6.9GB of memory / core and a total system memory cost of $1536; internal storage cost of $380. The total Intel hardware acquisition cost for this solution is $775908. Each server draws ~476kWhr per month. For the 4 years of this Intel based solution analysis the: total solution power cost is $345460 which includes the PUE factor; the total admin cost is ~$928200, and the total real estate cost is ~$103680. The total 4 year TCO estimate for the Intel solution is $2153248.Delivering 25000 of estimated SPECrate®2017_int_base performance, produces the following estimated results: the AMD EPYC solution requires 49% fewer servers [1-(AMD server count / Intel server count)]; 25% less space [1-(AMD rack count / Intel rack count)]; 35% less power [1-(AMD power cost / Intel power cost)]; providing a 35% lower 4 year TCO [1-(AMD TCO / Intel TCO)].AMD processor pricing based on 1KU price as of February 2021. Intel® Xeon® Scalable processor data and pricing from https://ark.intel.com as of September 2020. All pricing is in USD. Results shown here are estimates and actual results may vary. Product and company names are for informational purposes only and may be trademarks of their respective owners. SPECrate® scores as of 02/20/2021. AMD EPYC performance numbers based on AMD internal estimates and are subject to change based on actual results. SPEC®, SPECrate® and SPEC CPU® are registered trademarks of the Standard Performance Evaluation Corporation. See www.spec.org for more information. AMD EPYC performance numbers based on AMD measured internal estimates and are subject to change based on actual results.Results generated by the AMD EPYC™ BARE METAL SERVER TCO ESTIMATION TOOL, VERSION: 02/20/2021 v0.9982.

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