

AMD EPYC™ 7002 Series Processors in the Cloud: Server Side Java® Performance on IBM Cloud™ Bare Metal Servers

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Run Enterprise Applications on AMD EPYC Processors

AMD is committed to industry standards, offering you a choice in x86 architecture. x86 compatibility means you can run your applications on AMD EPYC instances in the cloud.

Broad Partner Ecosystem

AMD's broad partner ecosystem and collaborative engineering provide tested and validated solutions that help lower risk.

Flexible Cloud Solutions

IBM Cloud™ brings you the flexibility to choose CPUs, storage, networking, security and more. The high core count from AMD EPYC CPUs brings more choice and flexibility to IBM Cloud with customizable bare metal servers.

Seamless Workload Migration

Migrate applications currently running on other existing cloud instances to AMD EPYC processor-based IBM Cloud instances with little to no modification.

SPECjbb® 2015

The SPECjbb® 2015 benchmark from the Standard Performance Evaluation Corporation (SPEC®) enables performance benchmarking of Java based applications. It is relevant to all audiences who are interested in Java server performance, including JVM vendors, hardware developers, Java application developers, researchers and members of the academic community.

AMD EPYC™ Processors: Cost-Effective Computing for Cloud-Based Application

Increasingly, companies of all sizes are taking advantage of the benefits offered by public cloud providers. The reasons are many and varied: flexible pricing structures, ease of setup, optimization of both staffing and capital budgets, economies of scale, agility, and the ability to go from local to global instantly, are just some of the many benefits.

Leading cloud service providers now feature AMD EPYC™ 7002 series processors to power cloud instances of various types and sizes. The AMD EPYC processor-based instances are compatible with existing x86-based applications. They provide additional options for customers, offering a choice for many workloads matching compute resources to application needs at low cost.

Server Side JAVA Performance on IBM Cloud

Java® is a widely accepted language used by programmers for many data-oriented applications, popular for its simple, secure, robust, interpreted, and multithreaded features. Tens of thousands of enterprise applications are powered by Java and millions of people use them daily. While using actual Java applications as a benchmark would demonstrate a real-world difference in instance sizing, performance and scalability evaluation, this approach may not be feasible due to other challenges. The SPECjbb® 2015 benchmark from the Standard Performance Evaluation Corporation (SPEC®) enables performance benchmarking of Java based applications. SPECjbb® 2015 simulates a company with an IT infrastructure that handles a mix of point-of-sale requests, online purchases and data-mining operations. It is relevant to all audiences who are interested in Java server performance, including Java Virtual Machine (JVM) vendors, hardware developers, Java application developers, researchers and members of the academic community.

SPECjbb® 2015 Benchmark on IBM Cloud AMD EPYC™ 7642 Bare Metal Server

AMD engineers ran SPECjbb® 2015 benchmark on IBM Cloud AMD EPYC™ 7642 Bare Metal Server in two different tunings – tuned for max-jOPS and critical-jOPS. The max-jOPS (Java operations) metric represents pure throughput measuring transaction count handled by the server, whereas the critical-jOPS metric measures the number of transactions that completed within SLA (Service Level Agreement) specifying the response times of the transactions. While the Composite benchmark has all of the benchmark components running inside a single Java Virtual Machines (JVM), for many workloads, it is important to understand performance across multiple JVMs on the same physical server in a NUMA aware manner so as to maximize performance.

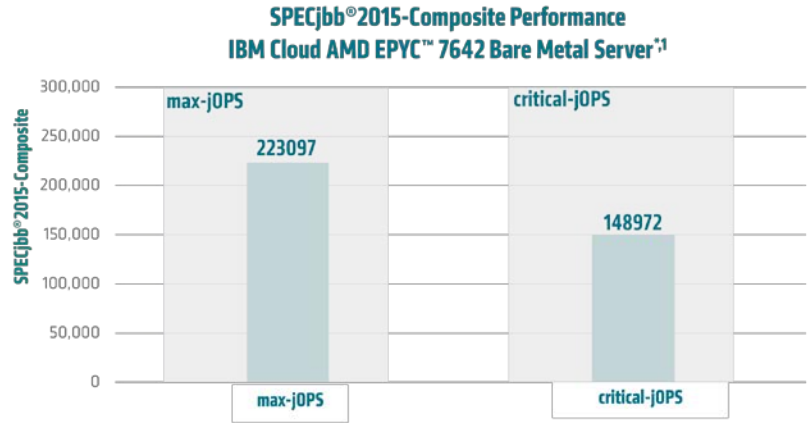


Figure 1 SPECjbb® 2015-Composite Performance on IBM Cloud AMD EPYC™ 7642

SPECjbb® 2015	Processor	# of Cores / Sockets	NPS Setting ^{2,*}	max-jOPS	critical-jOPS
SPECjbb® 2015-Composite	IBM Cloud AMD EPYC™ 7642 Bare Metal Server ³	96 / 2	NPS1	223,097	145,835
SPECjbb® 2015-Composite	IBM Cloud AMD EPYC™ 7642 Bare Metal Server ⁴	96 / 2	NPS1	215,743	148,972
SPECjbb® 2015-MultiJVM	IBM Cloud AMD EPYC™ 7642 Bare Metal Server ⁴	96 / 2	NPS1	229,976	151,131

Bold : Indicates the way benchmark result is tuned to obtain best score among the two metrics: max-jOPS and critical-jOPS

SPECjbb® 2015 performance showed in Figure 1 was obtained on IBM Cloud AMD EPYC™ 7642 Bare Metal Server with 192 vCPUs and 512 GB of memory using Oracle Java SE 13.0.2. SPECjbb® 2015-MultiJVM benchmark allows to change affinity of benchmark components across multiple JVMs pinned to CPU and memory nodes in a NUMA aware manner to obtain best performance out of IBM Cloud AMD EPYC™ 7642 Bare Metal Server. Java workloads do perform well with SMT enabled and NUMA per Socket (NPS) setting tuned in the BIOS towards achieving finer NUMA affinity. IBM Cloud customers can't access the BIOS themselves, but they can create a support case by going to Support > Create a Case through the [IBM Cloud console](#)^{*} and request the specific changes they need in the BIOS, including boot order, disabling SMT, changing NPS settings, etc^{*,2}.

Conclusion

AMD EPYC processors' innovative architecture translates to tremendous performance. I/O intensive workloads can utilize the plentiful I/O bandwidth, while compute-intensive workloads can make use of a high number of cores and plenty of memory support. IBM Cloud provides a scalable computing platform that allows you to only pay for what you use, when you want it - without having to invest in on-premises server hardware. IBM Cloud is ready when you are to scale your solutions up and out to whatever scale you require to service the needs of your business.

Together AMD and IBM Cloud enable the implementation of a wide variety of application solutions. Here we have shown excellent Java performance and discussed ways to optimize Java workload on IBM Cloud AMD EPYC™ 7642 Bare Metal Server.

References

- AMD EPYCTM powered IBM Cloud Bare-Metal Servers - <https://cloud.ibm.com/docs/bare-metal?topic=bare-metal-about-bm#amd-cpu-support>
- Build your own EPYC 7642 processor-based server - <https://cloud.ibm.com/catalog?category=compute>

* Links to third party sites are provided for convenience and unless explicitly stated, AMD is not responsible for the contents of such linked sites and no endorsement is implied.

FOOTNOTES

1. IBM Cloud AMD EPYC™ 7642 Bare Metal Server with 192 vCPU, 512 GiB memory, Local SSD 128 GiB, BIOS Settings : NPS1, SMT Enabled. OS: Ubuntu 18.04.4 LTS Kernel version 4.15.0-91-generic, 1 x 3.5 TB SSD. Performance measured with Oracle Java SE 13.0.2.
2. More detail on changing BIOS settings on IBM Cloud AMD EPYC™ Bare Metal Server : <https://cloud.ibm.com/docs/bare-metal?topic=bare-metal-bm-faq>
3. Benchmark is tuned to obtain best max-jOPS score from the same server configuration described in footnote[1].
4. Benchmark is tuned to obtain best critical-jOPS score from the same server configuration described in footnote[1].

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