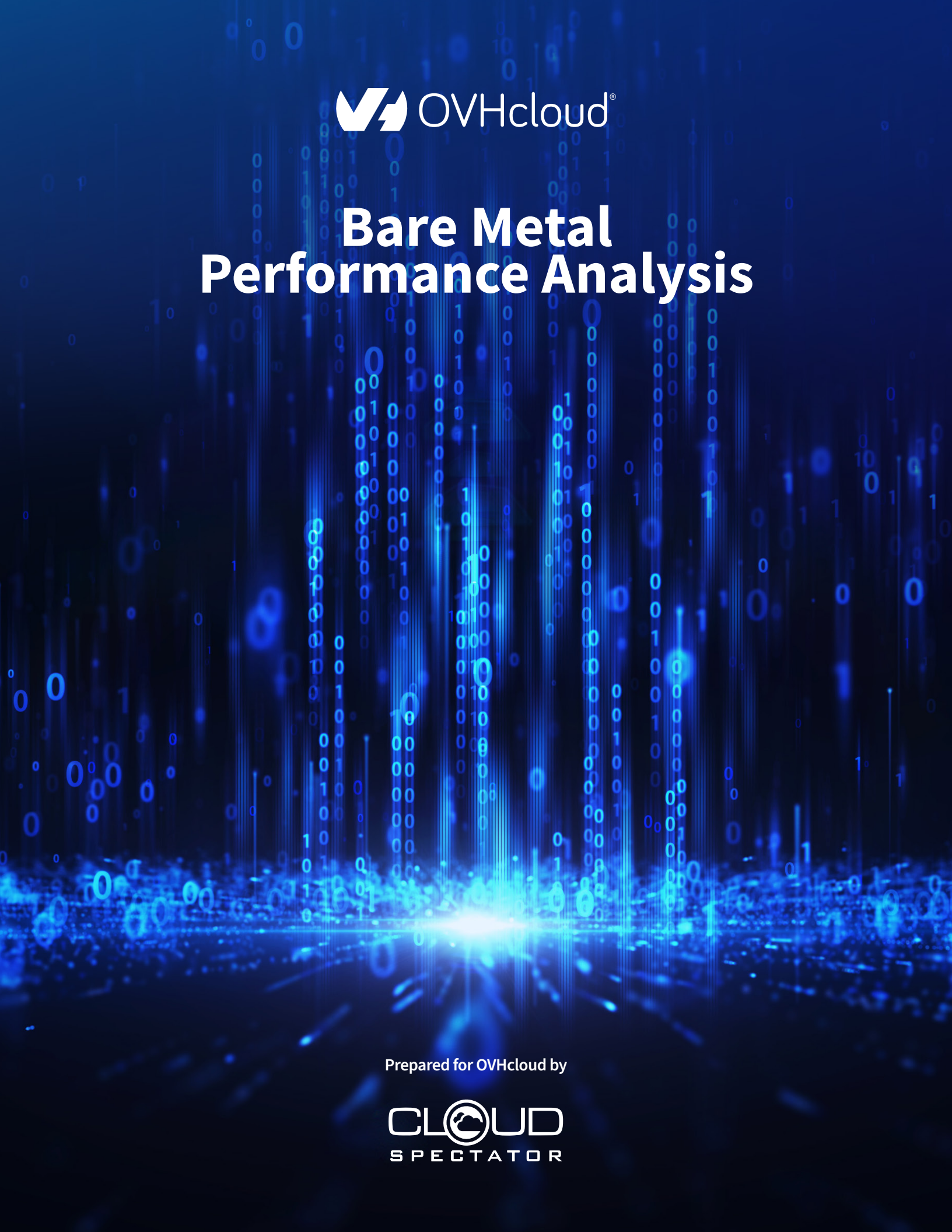

OVHcloud®
Bare Metal
Performance Analysis
Prepared for OVHcloud by
CLOUD
SPECTATOR

Contents

Introduction

Bare metal servers solve some of the most challenging IT infrastructure problems facing businesses that demand high-performance and critical compute power. While VMs remain the primary unit of measure for cloud computing, the growing prevalence of containers and I/O-intensive workloads has ensured the revival of bare metal servers.

With bare metal servers, there is no VM-platform overhead or performance impact from other tenants. You can customize servers to your needs and retain complete control of your environment. You gain powerful, reliable performance, increased response times, and quick, easy provisioning so you can focus on your business, not your infrastructure.

Bare metal servers are an excellent solution for massive databases, game servers, 3D modeling, software development, data analytics, transcoding, website hosting, machine learning, artificial intelligence and application services planning. They offer many advantages over public or shared cloud hosting – but are only as good as the hardware used.

Superior, high-end bare metal servers can handle complex operations and even create a hyperconverged infrastructure (HCI). Because there is no storage, connection or bandwidth sharing, you get consistent performance and improved privacy and security. You also won't encounter challenges caused by hardware that doesn't meet your exact specifications.

And, by using the right bare metal servers to create a bare metal cloud, you can enjoy all the benefits of the cloud without refactoring applications. A bare metal cloud is similar to an on-premise environment. It gives you the ability to build servers and customize them to your unique specifications, including BIOS-level access and options for high IOPS disks and GPUs. You maintain complete control of your software stack and can shift to an OpEx versus a CapEx model while ensuring your resources are being supported efficiently and effectively.

According to research by Enterprise Strategy Group (ESG) on Hybrid Cloud Trends, it takes an average of 27 days to refactor and migrate an application to public cloud services, which means it could take 7.4 years to migrate 100 applications.[1] If that isn't enough reasoning to consider bare metal servers, read on.

[1] Source: *Hybrid Cloud Trends, Strategies for Optimizing On-premises and Public Cloud Infrastructure, May 2020.*

Key Findings

Cloud Spectator recently evaluated the performance of two different bare metal server offerings, which were recently released by OVHcloud, to find out how these offerings compete with other bare metal and dedicated offerings.

This analysis focuses on bare metal servers. They are generally more powerful than most VMs, which often share resources with other tenants, potentially leading to inconsistent performance during peak traffic hours. While bare metal servers may not be as flexible as VMs in terms of on-demand pricing, they are extremely cost-effective for workloads that are long-running or require consistent levels of performance.

Cloud Spectator tested eight different bare metal configurations from a total of five cloud providers to see how OVHcloud's Scale and High-Grade servers stack up in terms of performance and price against other similarly sized offerings using a standardized, repeatable testing methodology.

Based on the analysis, both of OVHcloud's Bare Metal offerings provided superior CPU and storage performance compared to similarly sized offerings from other well-known cloud providers. Additionally, OVHcloud's offerings achieved excellent price performance per dollar spent for both CPU and storage workloads.

CPU Performance

Compute and memory performance were measured using the Geekbench 5 test suite, which runs a wide range of workloads to assess CPU and memory performance. The following highlight emerged from these tests:

- OVHcloud's Scale Server outperformed all other offerings tested for raw CPU performance, offering **12% faster CPU performance than the second-place provider, AWS**.

Storage Performance

Storage performance was tested using the FIO benchmark. Various RAID configurations were tested on all servers to provide a more comprehensive view of storage performance. Random 4K read and random write I/O were the focus for this analysis. Here are the key findings:

- **OVHcloud's NVMe-based storage arrays displayed the highest random read and write IOPs** when running in a RAID 10 or RAID 1 configuration.
- In addition to offering excellent performance storage, **OVHcloud also offered the largest capacity of storage**, more than all the other competitors' offerings.

Price Performance

Price performance, or performance per dollar spent, is summarized below. Price performance is calculated by dividing a performance metric (such as IOPS) by the monthly price without long-term or committed discounts applied. This simple but effective formula helps identify which offerings provide the most value or bang for your buck. The price performance highlights are summarized here:

- **OVHcloud offers 74% better CPU performance per dollar spent** than the runner-up provider, IBM.
- OVHcloud offers over **six times the value for storage random read performance per dollar spent** compared to all other providers. This makes OVHcloud a great provider to use if you run very storage-intensive applications.

Following are details of the testing set-up, design and methodology, along with results and observations from this analysis.

Server Specs and Selection Methodology

Bare metal servers are the main focus of this analysis. All servers were deployed with a current release of Ubuntu (20.04 or higher, if offered). Storage was set up in various configurations to understand what performance looks like under unsafe (RAID 0) and safe (RAID1 or RAID 10) configurations.

The servers were broken up into two groups; one group offered a total of 64 CPU threads while the other group offered between 72 and 80 CPU threads. AWS EC2 VMs were included to provide some perspective on raw performance. All servers were provisioned with the vendor-provided storage configurations unless there was no preset configured. In that case, at least two storage volumes were provisioned. NVMe was selected if available, otherwise SSDs were used. The servers selected for this engagement are listed in the table.

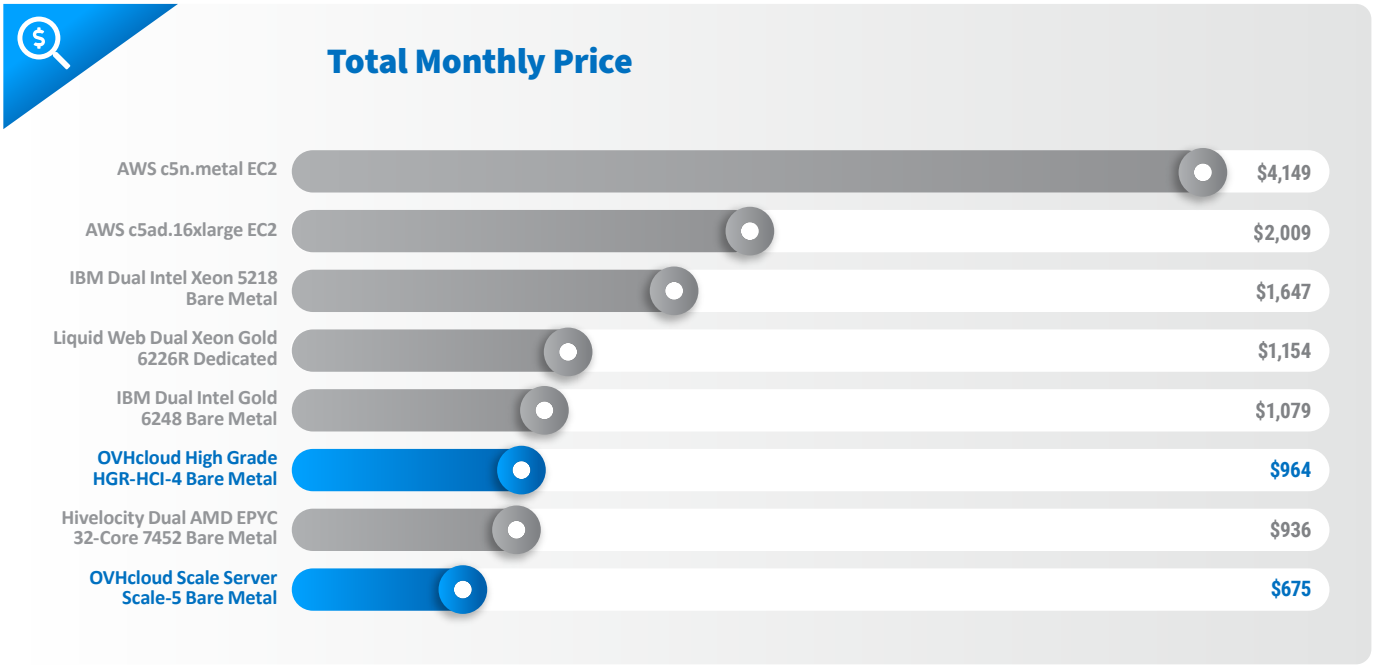
Server Configuration	Location	CPU Count	CPU Model	RAM	Storage	Total Monthly
AWS c5ad.16xlarge EC2	US	32 Core 64 Thread	AMD EPYC 7R32	128GB	2 x 1.9TB NVMe	$2,009
Hivelocity Dual AMD EPYC 32-Core 7452 Bare Metal	US	32 Core 64 Thread	Dual AMD EPYC 32-Core 7452	128GB	4 x 1.76TB SSD	$936
IBM Dual Intel Xeon 5218 Bare Metal	US	32 Core 64 Thread	Dual Intel Xeon 5218	128GB	4 x 3.8TB SSD	$1,647
Liquid Web Dual Xeon Gold 6226R Dedicated	US	32 Core 64 Thread	Dual Xeon Gold 6226R	128GB	6 x 1.92TB SSD	$1,154
OVH High Grade HGR-HCI-4 Bare Metal	US	32 Core 64 Thread	AMD EPYC 7302	128GB	6 x 3.8TB NVMe	$964
AWS c5n.metal EC2	US	36 Core 72 Thread	Intel Platinum 8124M	192GB	1 x 16TB EBS	$4,148.96
OVH Scale Server Scale-5 Bare Metal	US	40 Core 80 Thread	Dual Intel Gold 6242R	192GB	2 x 1.75TB NVMe	$675
IBM Dual Intel Gold 6248 Bare Metal	US	40 Core 80 Thread	Dual Intel Gold 6248	192GB	2 x 1.76TB SSD	$1,079

The chart also shows the monthly price of each server, without any long-term commitment or contract. AWS tends to offer the highest monthly pricing while OVHcloud provides some of the lowest monthly pricing despite offering matching specifications.

Test Design and Methodology

Synthetic Testing: CPU and Memory

CPU and memory testing were conducted with the Geekbench 5 benchmarking suite, which allows modern testing scenarios such as floating-point computations, encryption and decryption, as well as image encoding, life science algorithms and other use cases.



Synthetic Testing: Storage

- Storage results were obtained using FIO (Flexible I/O tester), with 4KB blocks and threads corresponding to vCPU count. Several hundred 60-second random iterations were conducted to compensate for the high variability often seen when stressing storage volumes. Results were gathered and represented in IOPs (input/output operations per second).

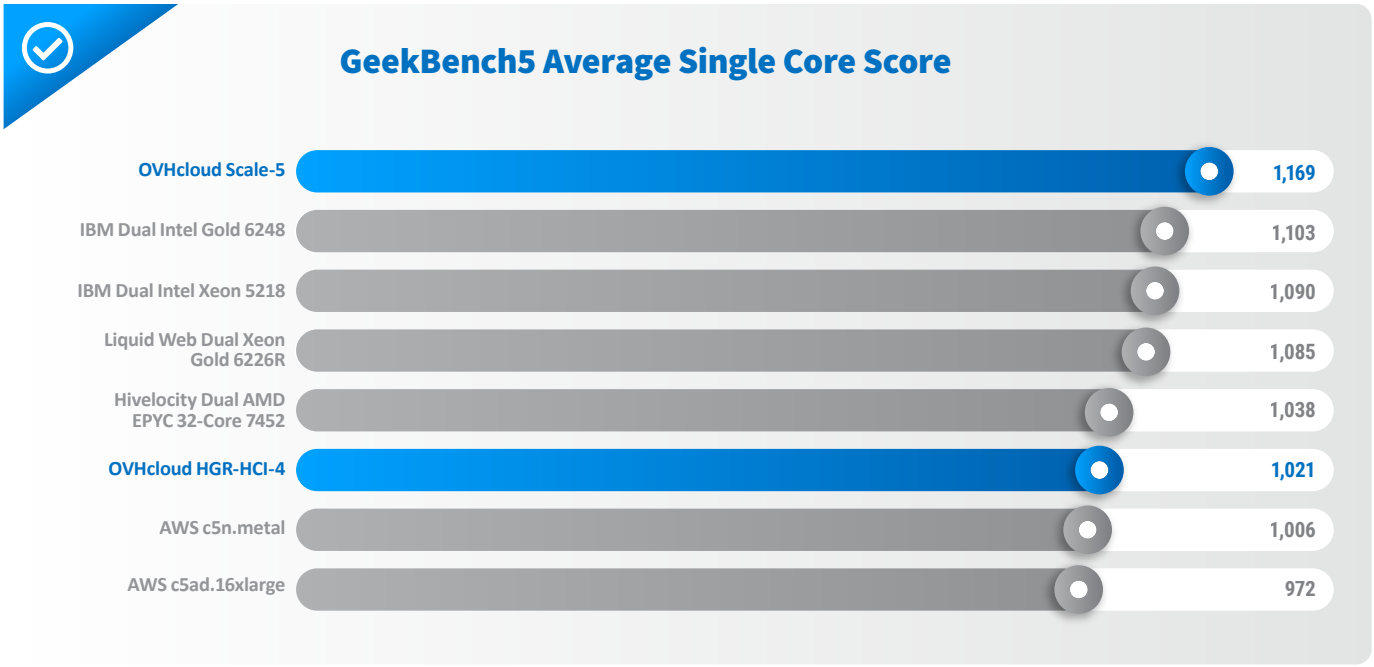
Synthetic Testing: OLTP Database

Database performance was evaluated using the Sysbench OLTP (online transaction processing) benchmark. A 2GB database was created on each offering and was queried with Sysbench's built-in OLTP read and write Lua script to measure how many queries per second each server could provide under various levels of concurrency.

CPU Performance

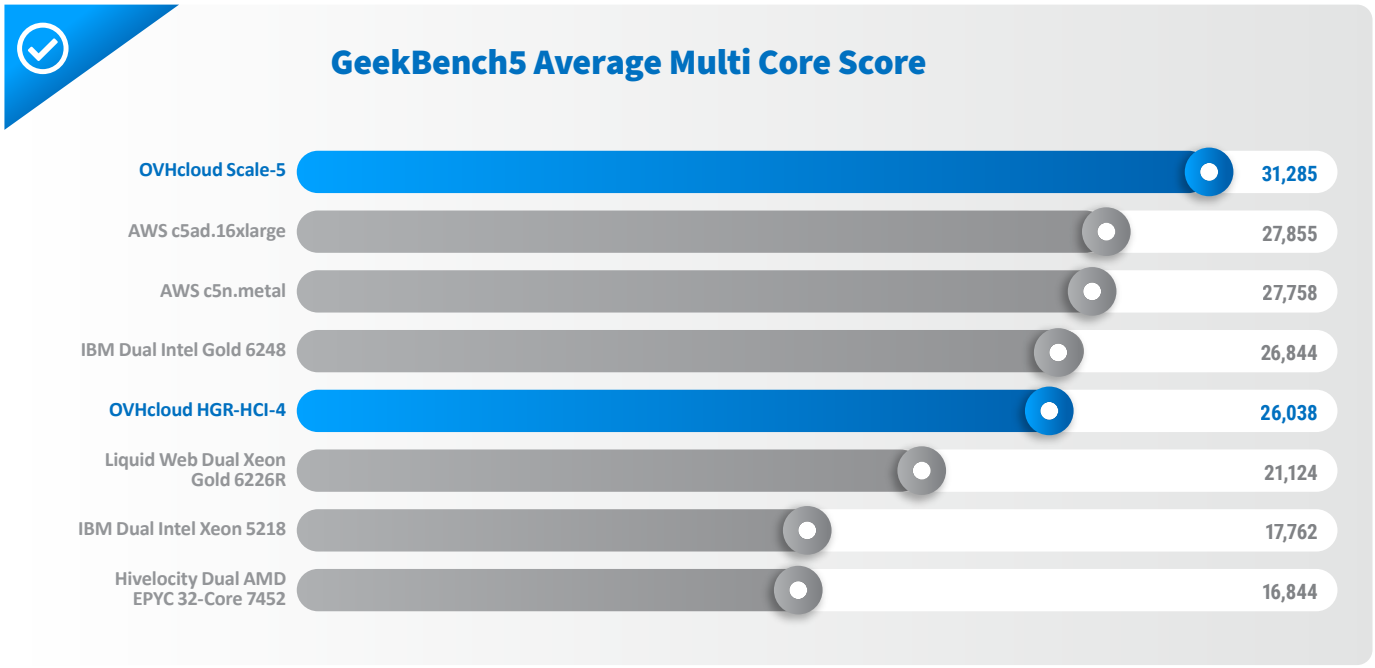
Single-Core CPU Performance

This chart depicts the CPU single-core performance of all servers evaluated in this study. The Geekbench 5 single-core score represents the processing speed of one CPU (or core) processing a single stream of instructions rather than multiple parallel streams per core. This benchmark is useful for understanding how performance scales on each server when utilizing all CPU cores. CPUs with higher clock speeds tend to have higher scores for this single-core benchmark. OVHcloud's Scale-5 server offers the fastest single-core CPU performance, running Intel's Gold 6242R CPU. IBM and Liquid Web place second and third, also running Intel CPUs.



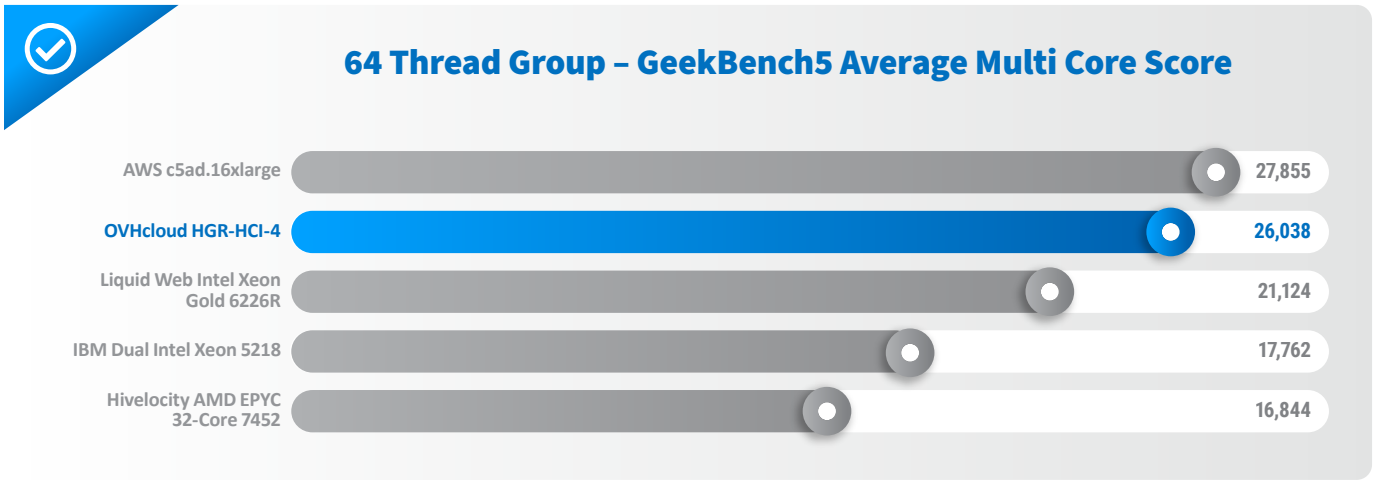
Multi-Core CPU Performance

Moving on to multi-core CPU performance, once again the OVHcloud's Scale-5 server takes the top spot, beating the runner-up provider (AWS) by a little over 12%. Interestingly, both AWS VMs take the next top spots, beating the other servers' Geekbench 5 multi-core scores.



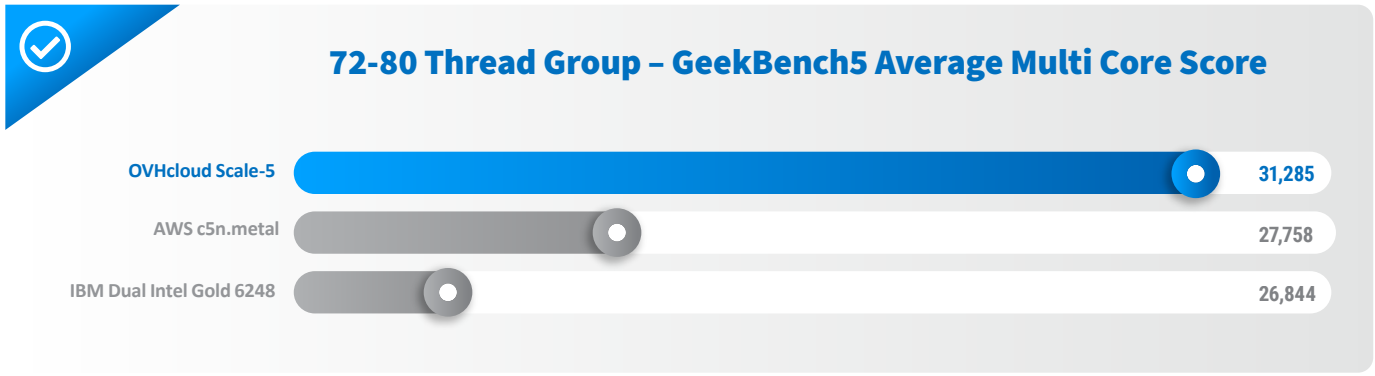
Multi-Core CPU Performance – 64 Thread Configurations

Focusing on 32-core, 64-thread servers, AWS's c5ad.16xlarge VM takes the top spot for average CPU performance, followed closely by OVHcloud's High Grade server. Liquid Web, IBM, and Hivelocity follow behind, offering significantly lower CPU performance.



Multi-Core CPU Performance – 72-80 Thread Configurations

Focusing on servers with 72 and 80 CPU threads, OVHcloud's Scale-5 server takes the top spot based on average CPU performance. It beat the slightly under-spec'd AWS VM by 12% and the equally spec'd IBM server by 16%.



Regardless of how you compare the results, OVHcloud offers extremely strong CPU performance compared to the other providers, while offering a much lower monthly price. Price performance is explored later in this report.

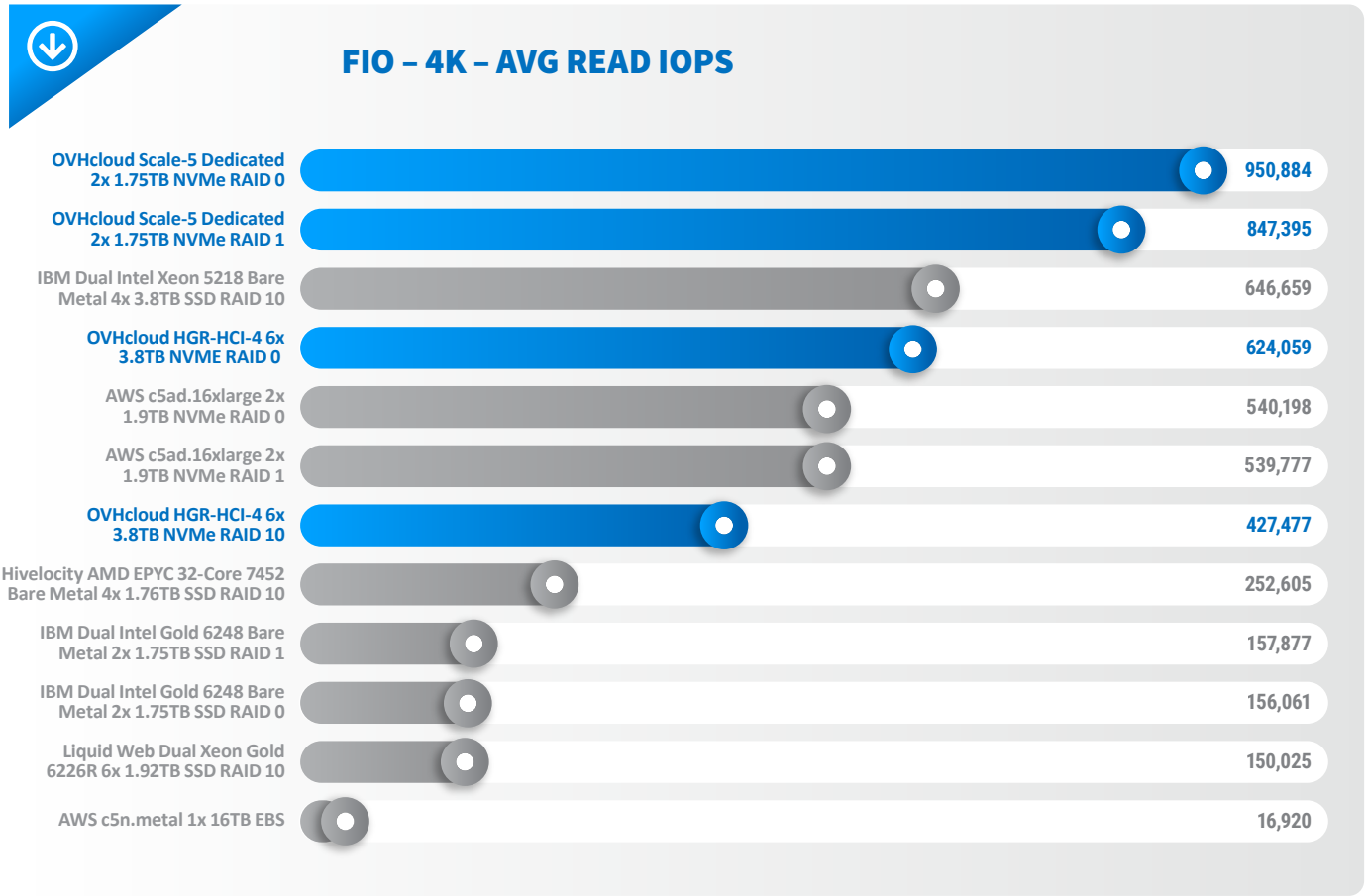
Storage Performance

Testing methodology for benchmarking storage ensured that all configurations were tested for a minimum of 100 iterations for read and write operations using FIO with a block size of 4KB. Software RAID was configured using MDADM; all storage volumes used the EXT4 filesystem. Various RAID configurations were tested to provide a wider view of what storage performance may look like. AWS VMs were tested either with the included NVMe storage (C5ad series) or with the largest possible EBS volume possible if NVMe storage was not included.

Storage Performance – Random Read

This chart shows the average random read IOPs observed from all configurations tested. OVHcloud's Scale-5 server takes the top spot when running RAID 0 or RAID 1, beating the next closest offering by over 30% (IBM using RAID 10). AWS's NVMe-based VM takes the third-place spot when focusing on production-ready RAID configurations (RAID 1 or RAID 10). The AWS c5n.metal VM trails all other offerings by a wide margin due to the performance scaling limitations of EBS volumes.

There's a large difference in storage performance between these offerings. However, it's clear that OVHcloud has the fastest storage when compared to some of the most well-known cloud providers. As you know, raw performance is not always the most important metric to focus on. Later in this report, the total server price is factored in to show which servers offer the most value.

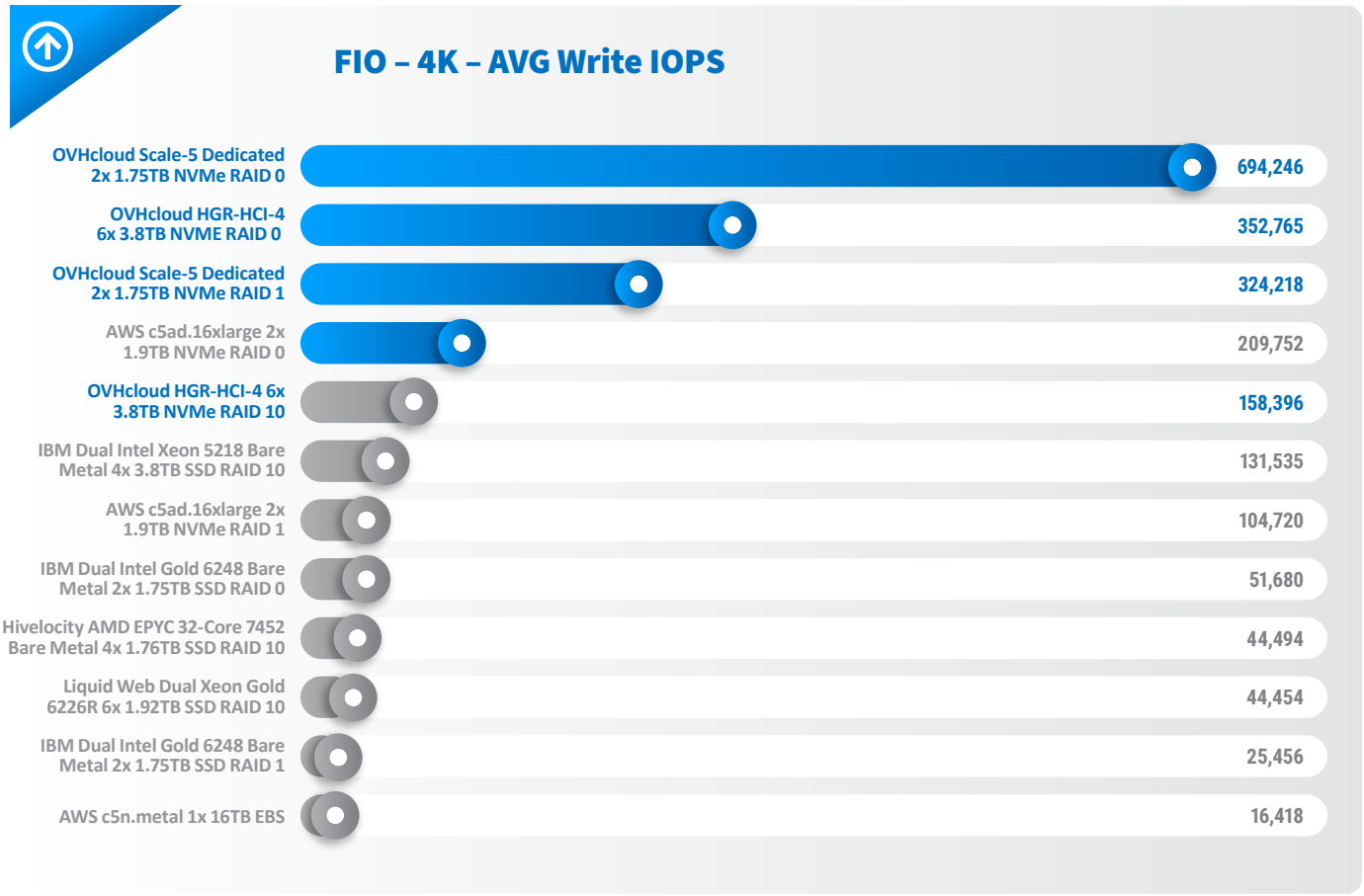


Storage Performance – Random Write

When it comes to I/O, the most demanding operation on storage is writing to a disk, which involves more work to ensure the data being written will persist if power is lost. Read operations don't require as much work and can utilize various types of caches to improve performance without having to worry about data loss. This is why there is typically a higher read IOPs than write IOPs.

The chart shows the average write IOPs observed for all tested configurations. Both OVHcloud servers running RAID 0 take the top spots, beating the next closest provider (AWS) by over three times. Keep in mind that RAID 0 is generally not considered production safe, as there's no data redundancy. When focused on RAID 1 or RAID 10, OVHcloud still offers the best random write performance with its High Grade and Scale servers, both using NVMe storage. The Scale-5 server with NVMe RAID 1 offers close to 2.5 times better performance compared to IBM's SSD RAID 10 configured server, despite having fewer disks.

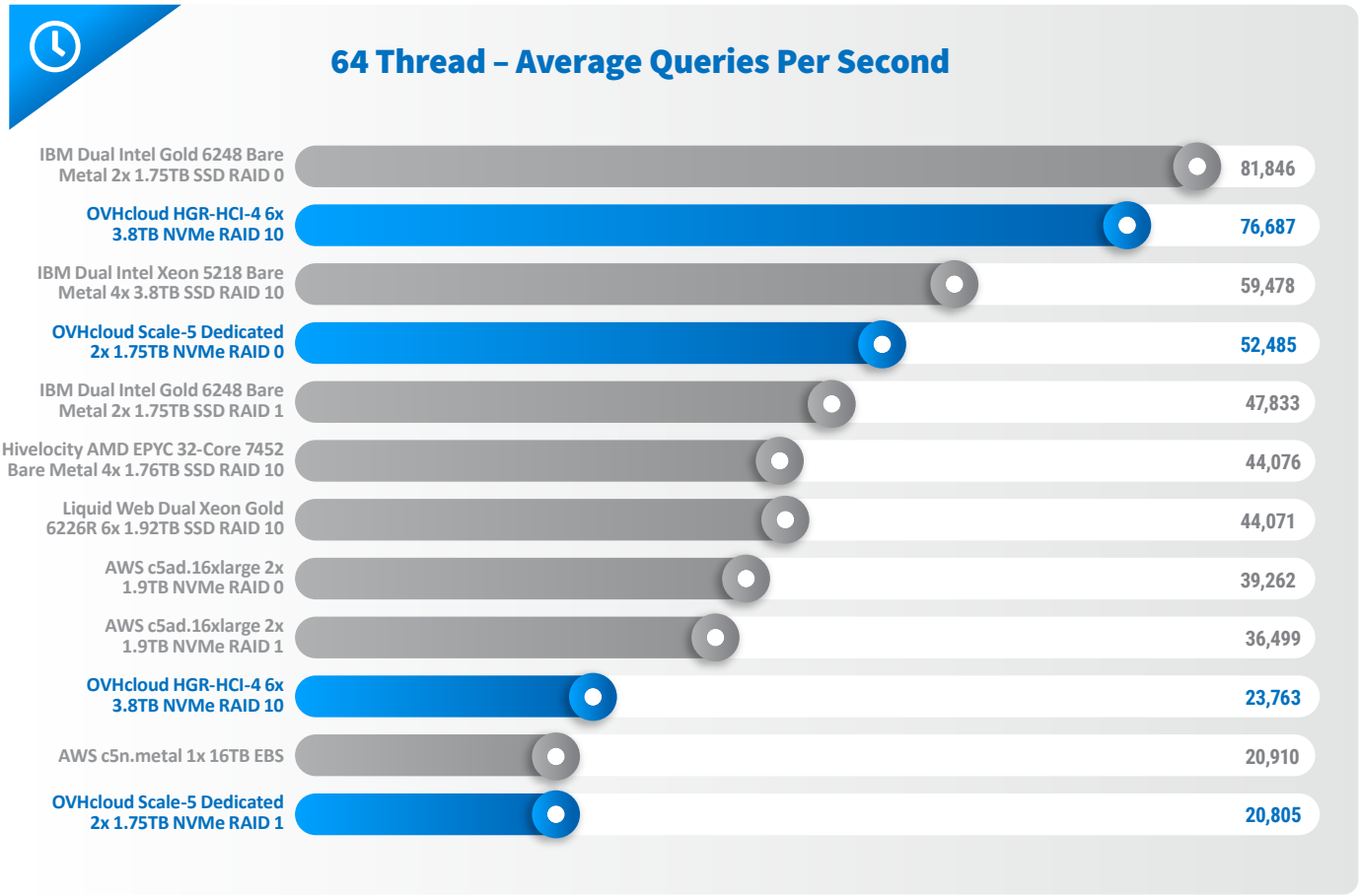
To summarize, both OVHcloud servers provide excellent read and write performance, regardless of RAID configuration, thanks to extremely fast NVMe-based storage.



Database Performance

Now that CPU and storage performance has been explored, here is a look at database performance, which utilizes quite a lot of CPU and storage resources. For this analysis, Sysbench's OLTP benchmark was used to measure the average queries per second produced while handling a blend of read and write queries. Again, multiple RAID configurations were tested to identify the best possible performance (RAID 0) along with the most realistic and production-ready performance (RAID 1 or RAID 10).

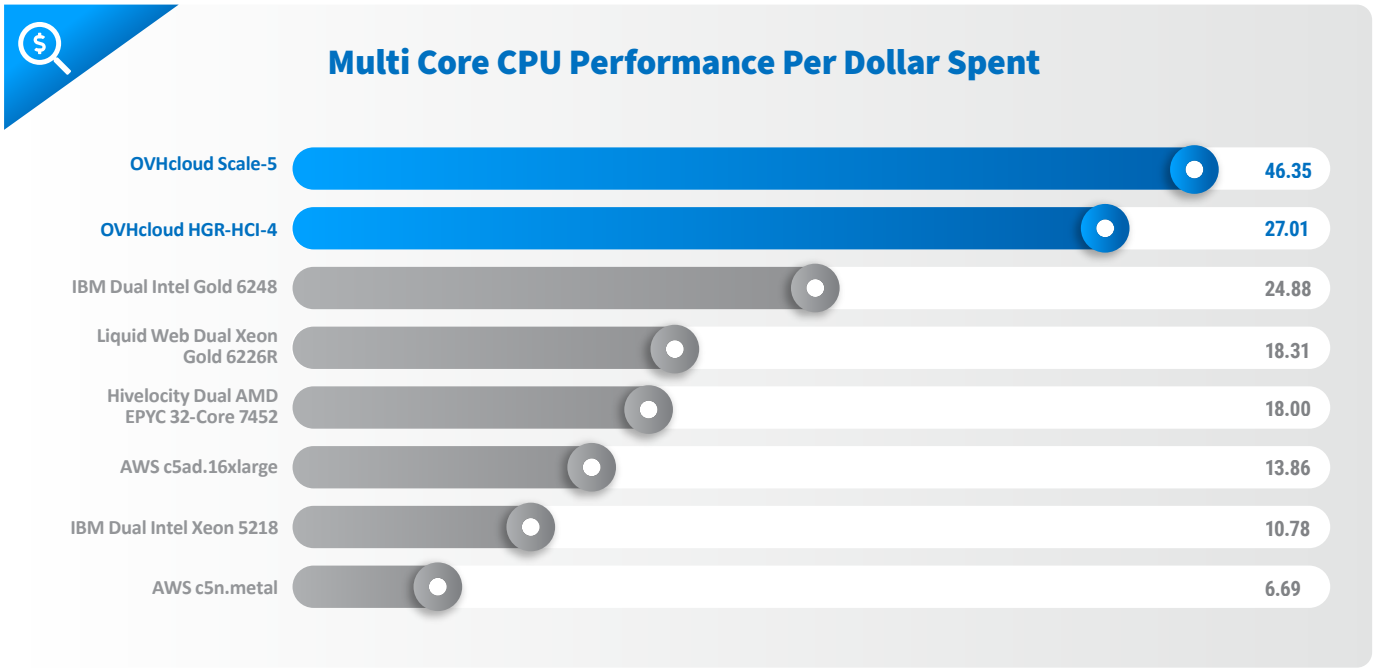
OVHcloud's RAID 10-configured High Grade server takes the top spot when looking at production-ready RAID configurations, offering 29% faster database performance than IBM's RAID 10-configured server.



CPU Performance Per US Dollar Spent

This section focuses on the compute and memory price performance or value. The values shown are linear and unweighted, using the multi-core performance scores and monthly price. Higher scores indicate more performance per dollar spent, which means you get more for your money.

OVHcloud's Scale and High Grade servers take the top two spots for CPU performance per dollar spent, followed by IBM and Liquid Web. OVHcloud's Scale-5 server offers almost double the value of the next closest provider (IBM) for CPU performance per dollar.

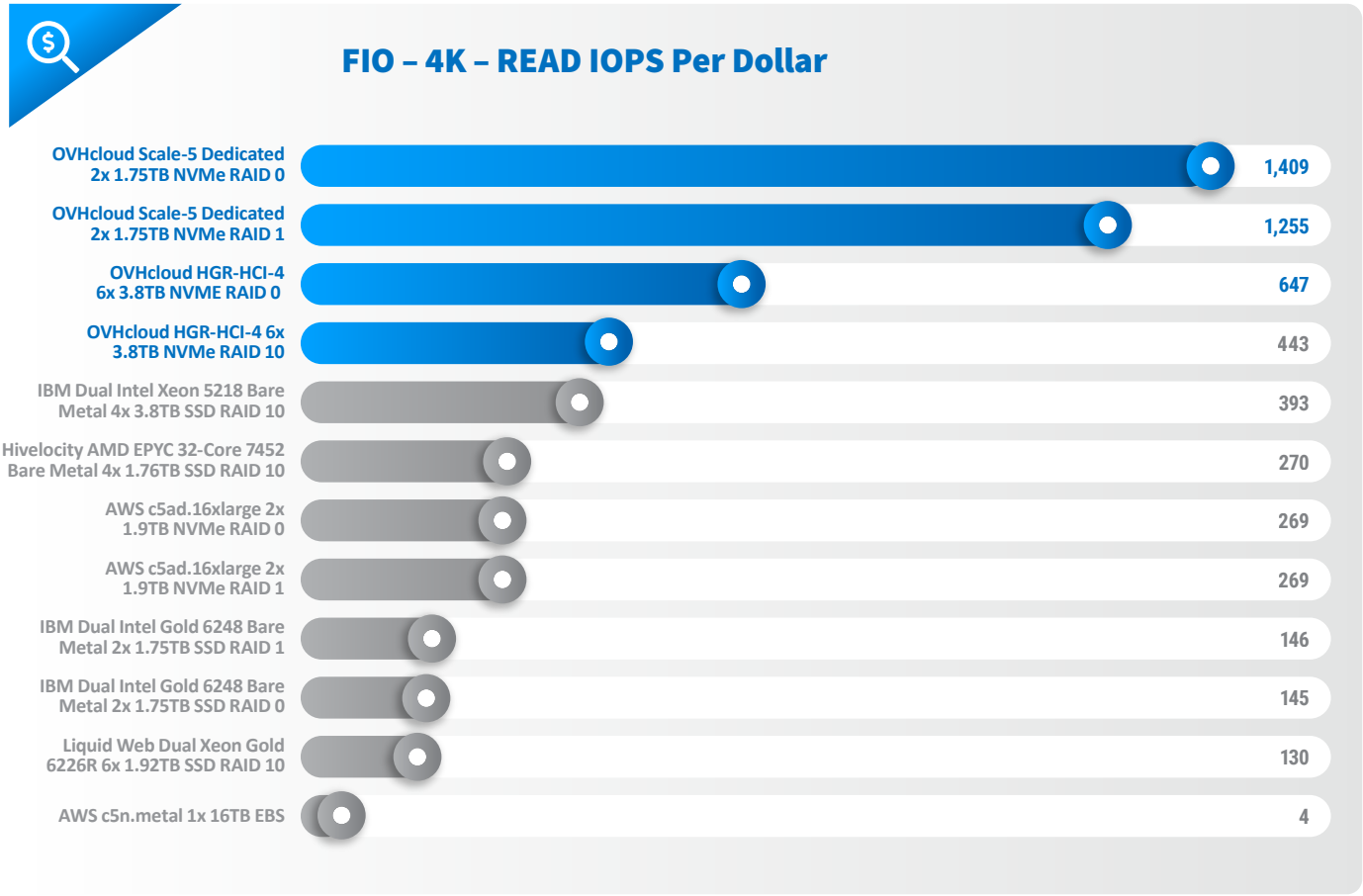


Storage Performance Per US Dollar Spent

Storage performance can be a major bottleneck for certain applications. And storage pricing can be a budgeting challenge because of the way some providers scale storage performance based on capacity, which increases overall storage spend. Again, higher scores indicate a better price performance or value.

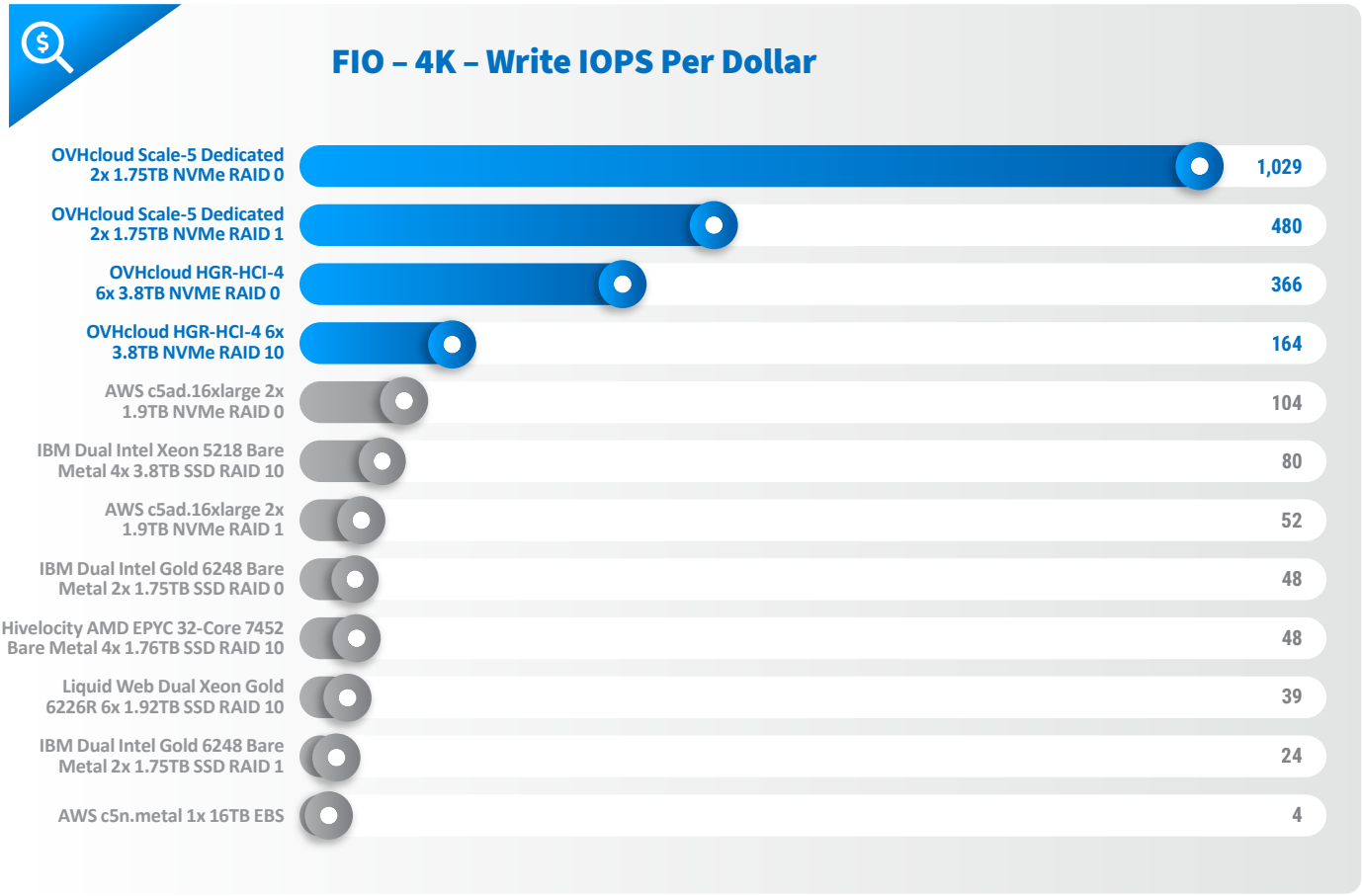
For random read performance per dollar spent, both OVHcloud servers delivered superior price-performance value compared to the other providers, regardless of RAID configuration.

Price Performance – Random Read



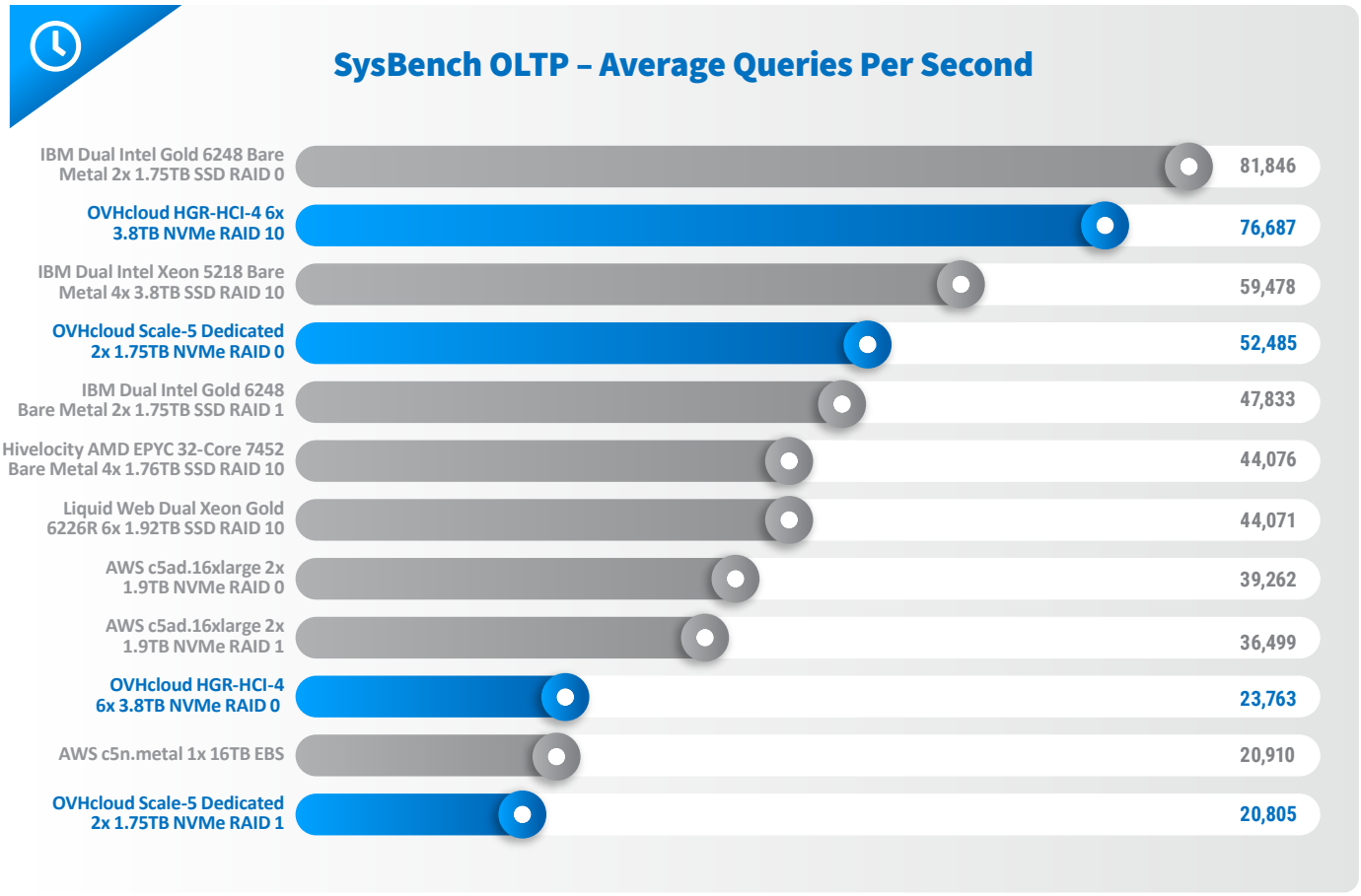
Price Performance – Random Write

Again, both OVHcloud servers achieved significantly higher write IOPS per dollar spent than any of the other providers tested, regardless of the RAID configuration used.



Database Performance Per US Dollar Spent

Looking at database price performance, OVHcloud servers using production-ready RAID continue to achieve significantly higher queries per second per dollar spent compared to the other offerings. This theme is consistent with the trends seen in the previous sections.



Conclusion

OVHcloud continues to offer high performance at a low cost, whether you require on-demand cloud VMs or longer-term bare metal servers. OVHcloud achieves this by offering the latest CPU and storage technology to its customers without attaching a large price tag. In this analysis, both OVHcloud bare metal servers displayed excellent performance and value in all observed price and performance dimensions. In addition to high performance at a low price, OVHcloud offers a lot more storage space by default compared to the other providers' server configurations.

OVHcloud Scale and High Grade servers are an excellent alternative to larger virtual machines, especially if you are running constant, resource-intensive workloads. Businesses looking to cut their cloud spend may want to take a look at OVHcloud's superior performance and capacity, offered for much less than other cloud providers.

If you haven't assessed your infrastructure spend in a while, it's a good time to do so. NVMe-based storage has come a long way since it was first introduced in terms of performance and pricing. OVHcloud is focused on offering the fastest and most cost-effective infrastructure out there with the Scale and High Grade server lines, making these great options for any resource-intensive workloads.

About OVHcloud

OVHcloud is a global cloud hosting provider that specializes in delivering industry-leading performance and cost-effective solutions to better manage, secure and scale data. OVHcloud provides a smarter solution for bare metal servers, hosted private cloud, hybrid and public cloud. The group manages 33 data centers across 12 sites on four continents, manufactures its own servers, builds its own data centers and deploys its own fiber-optic global network to achieve maximum efficiency. Through the OVHcloud spirit of challenging the status quo, the company brings freedom, security and innovation to solve data challenges – today and tomorrow. With a 22-year heritage, OVHcloud is committed to developing responsible technology, as the group strives to be the driving force behind the next cloud evolution.

About Cloud Spectator

Cloud Spectator is a benchmarking and consulting firm founded in 2011 to focus on the cloud computing industry. The company offers the full spectrum cloud consulting services including strategy and planning, architecture and technology selection, and deployment, implementation and migration services. Cloud Spectator helps cloud providers understand their market position and helps businesses make intelligent decisions related to cloud strategy, cloud readiness, cost reduction and vendor analysis. Cloud Spectator actively monitors many of the largest IaaS providers in the world, comparing cloud services performance and pricing to achieve transparency in the cloud market.

OVHcloud®

enterprisesales@us.ovhcloud.com

twitter.com/ovhcloud_US

us.ovhcloud.com