



FORMULUS  
BLACK™



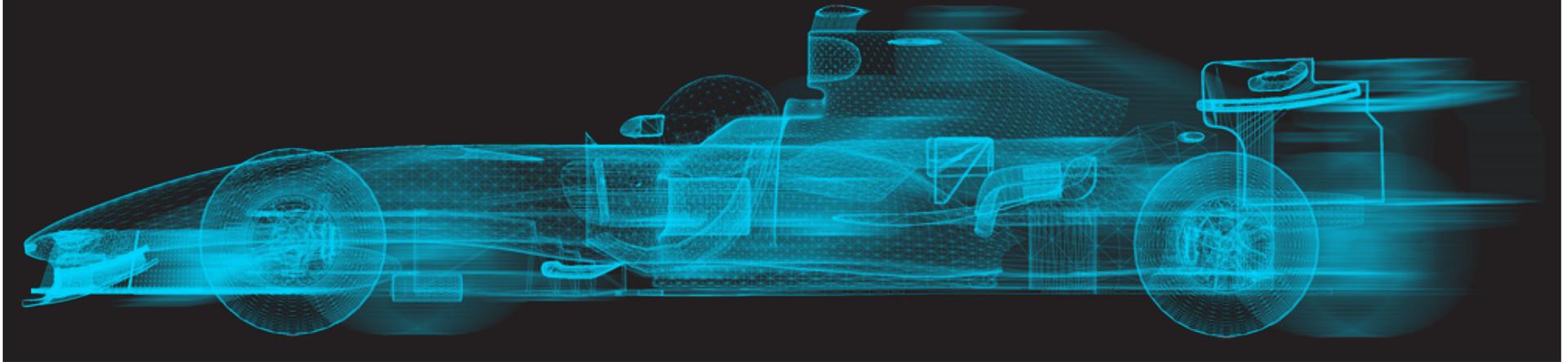
# FORMULUS BLACK

Unlocking the power of  
in-memory computing for all.

Formulus Black selects Lenovo ThinkSystem—featuring 2nd Gen Intel® Xeon® Scalable processors and Intel® Optane™ persistent memory—for on-premises and cloud deployments of its next-generation In-Memory Storage virtualization solution, FORSA™.

Lenovo





Tech startup Formulus Black is a leader in In-Memory Storage virtualization software. Founded with the ambitious vision to revolutionize in-memory computing, Formulus Black breaks the historical boundary between compute and storage with FORSA™, its award-winning software solution.

FORSA deploys in 20 minutes or less on commodity server hardware and provisions industry-standard DRAM or Intel® Optane™ persistent memory (PMem) as in-memory block storage, delivering ultra-low-latency, high-throughput storage and data services for application acceleration. Unlike legacy approaches that require specialized hardware and costly in-memory feature updates from application vendors, FORSA supercharges the performance of any application using DRAM or PMem, without the need for code modification.

Jing Xie, COO of Formulus Black, takes up the story: “FORSA is a total game-changer. It enables server memory to be provisioned and managed as high-performance block storage, so that companies can store, access, and process data in real time within the memory channel, reducing data center operating costs by requiring fewer servers, and improving performance and reliability at the same time.”

“This technology’s impact on users will improve overall system performance,” according to Gartner, Inc.<sup>1</sup> “The specific workloads expected to see early adoption are in the in-memory computing, virtualization, analytics, AI and HPC segments. There may also be an impact on traditional storage subsystems as applications are rearchitected to take advantage of large amounts of nonvolatile memory accessible as part of the main server system memory.”

<sup>1</sup> Source: Gartner, Hype Cycle for Storage and Data Protection Technologies, 2020, July 2020, Persistent Memory DIMMs

## Reimagining storage for tomorrow's challenges

Formulus Black is on a mission to bring In-Memory Storage to the mainstream, as Xie explains: “FORSA eliminates the cost and complexity typically associated with running applications in memory, removing barriers to adoption. We want to help customers of all sizes and in all verticals take advantage of in-memory technology to optimize performance of data-intensive applications.”

IDC predicts that global data will grow from 33 ZB (2018) to 175 ZB (2025)<sup>2</sup>, and 30% of this data will be so-called “fast data” that must be available in real time by 2025 to support data analytics, machine learning, artificial intelligence, and Internet of Things use cases. FORSA delivers the high-performance and low-latency storage tier needed to support fast-data use cases, without breaking the bank.<sup>3</sup>

“We empower businesses to make data-driven decisions in real time by providing the fastest and most cost-efficient In-Memory Storage solution on the market,” says Xie. “Over a dozen data services such as high-availability replication, instant snapshot and clone, and non-disruptive BLINK™ backup and restore enable FORSA to transform standard server hardware into next-generation in-memory computing systems—quickly, easily, and hassle-free.”

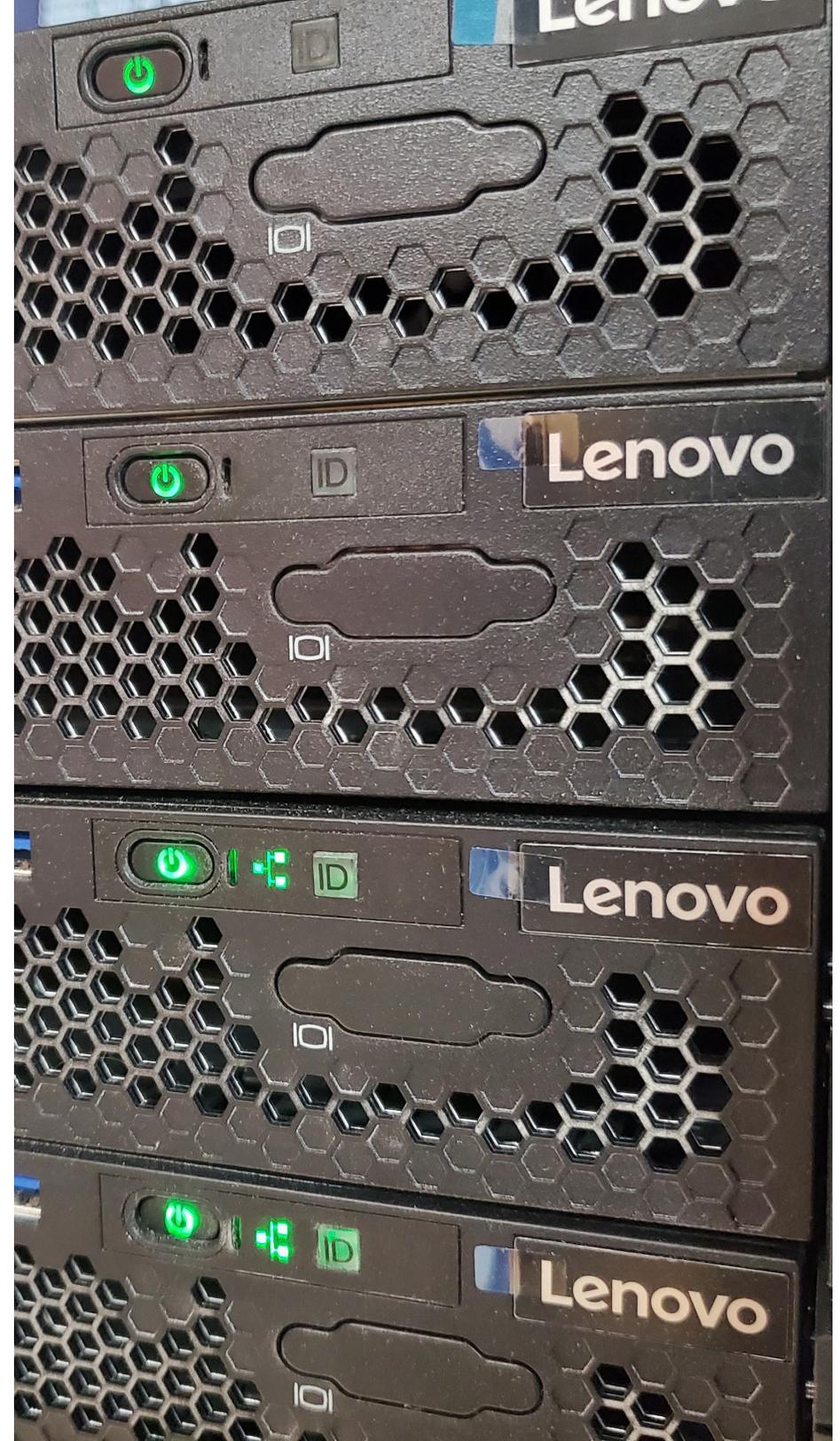
## Teaming up with Lenovo to reach more customers

Formulus Black chose to partner with Lenovo to bring its FORSA solution to market based on Lenovo’s long history of collaboration with Intel and support of Intel® Optane™ persistent memory technology. Xie adds: “Crucially, I also had prior experience with Lenovo systems while working at IBM and know them to be robust, resilient, and highly reliable.”

Formulus Black and Lenovo are working together closely to advance the In-Memory Storage and virtualization space.

<sup>2</sup> Source: *The Digitization of the World From Edge to Core* IDC White Paper, available at: <https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf>

<sup>3</sup> Source: Formulus Black Performance Benchmark Reports, available at <https://formulusblack.com/performance-benchmarks/>



“We couldn’t have asked for a better partner,” says Xie. “Lenovo has lots of programs in place to incubate small companies like ours, and the team is very understanding and accommodating of our needs as a fast-growing startup. Lenovo provided us with loan systems to support development and testing, and for us to use in proof of concepts with customers.”

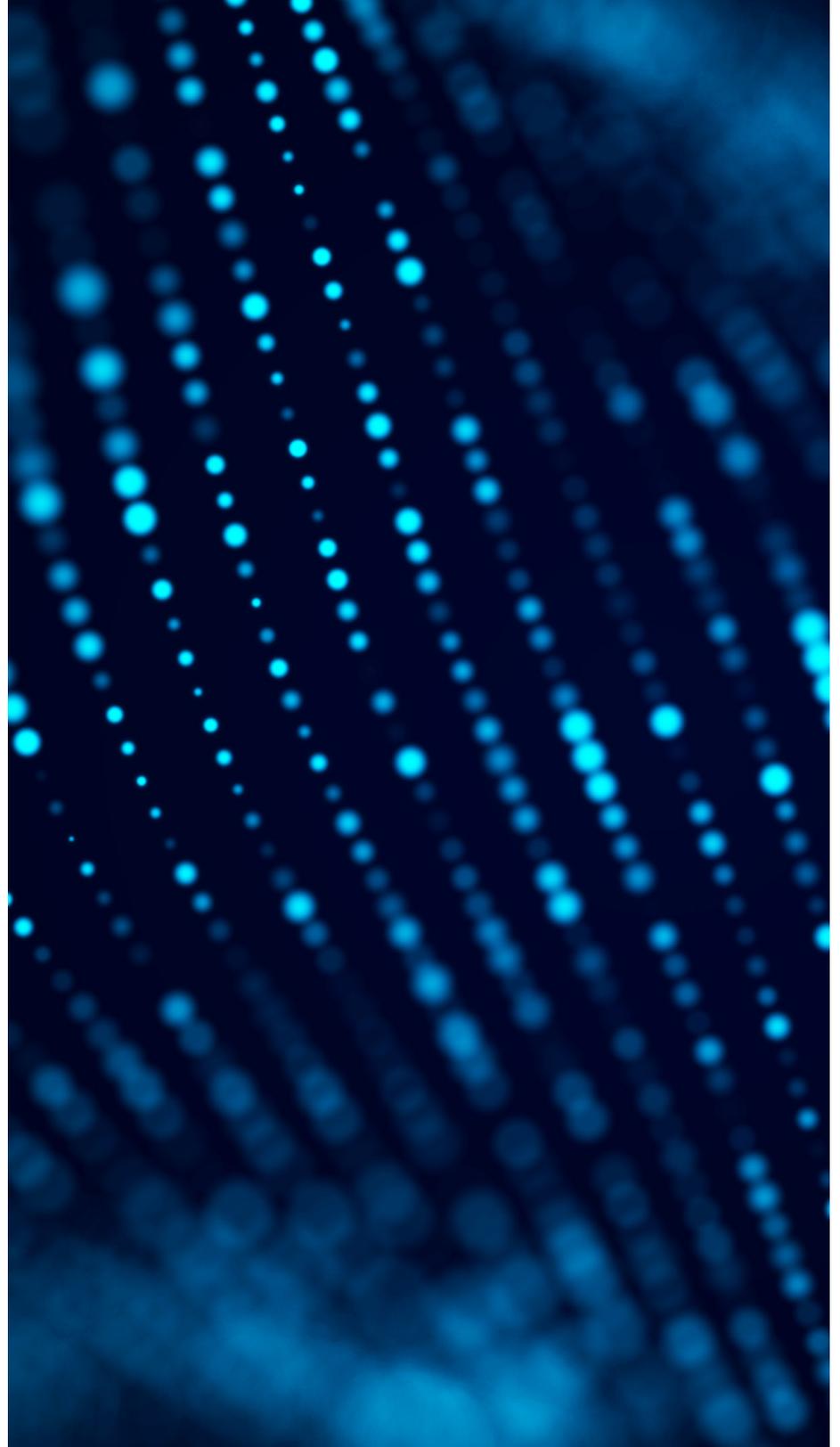
Today, FORSA software is available pre-loaded on Lenovo ThinkSystem SR630 servers—featuring 2nd Gen Intel® Xeon® Scalable processors and Intel® Optane™ PMem. Formulus Black and Lenovo have joined forces to deliver this joint solution to customers as both on-premises and private-cloud deployments.

Formulus Black and Lenovo are also working closely together to build a next-generation cloud computing infrastructure that delivers compute instances with local storage powered by Intel® Optane™ PMem. Running on Lenovo ThinkSystem servers hosted by Formulus Black, FORSA FC2 is a first-of-its-kind, self-service IaaS offering that delivers unmatched per-core IOPS and latency performance for real-time database and analytics applications.

Louis Yip, Worldwide Sales Director, CSP & Hyperscale, Lenovo, remarks: “Formulus Black’s FORSA is a unique software-defined solution that provisions Intel® Optane™ PMem as in-memory storage. FORSA’s unique in-memory storage and in-line data reduction algorithms combined with Intel® Optane™ PMem powered servers from Lenovo enable a new performance standard in the data center market for real-time and I/O-intensive applications in the data center.”

### **Why Lenovo? Unmatched support and scalability**

Supported by Lenovo, the sky’s the limit for Formulus Black, FORSA, and its FC2 cloud infrastructure. The company chose to platform its cloud solution on Lenovo ThinkSystem servers for its initial data center deployment—an install base that looks set to grow in the coming months and years.

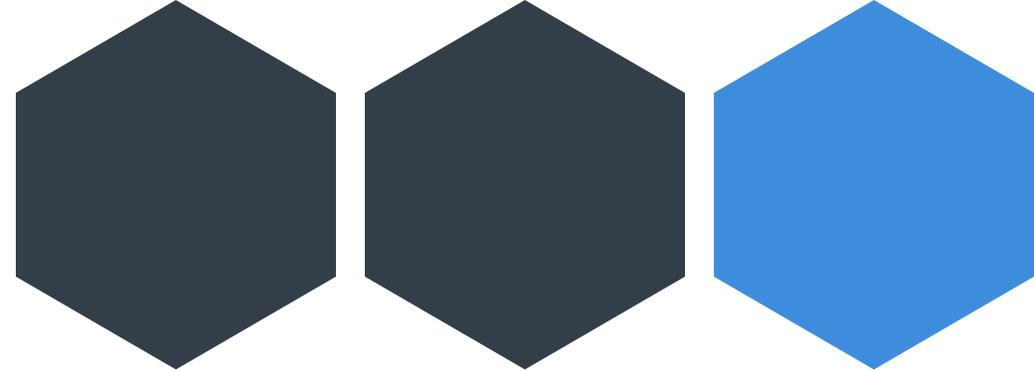


Xie comments: “There is a huge amount of interest in our solution and our new cloud service. We’re growing fast, so it’s important to work with a partner like Lenovo that can scale very quickly. Lenovo helped us build our cloud solution and data center in just six months. As our solutions continue to gain traction, we’re confident that Lenovo will help us to quickly scale up in line with demand.”

Whether customers choose to deploy FORSA on-premise or as a service via FORSA FC2, they can be sure that their I/O-intensive workloads will run much faster. Running on Lenovo ThinkSystem servers and harnessing Intel® Optane™ PMem, FORSA delivers vastly improved performance for real-time workloads while utilizing fewer cores.

In some instances, FORSA can deliver more than twice the application performance at less than half the price of servers that rely on legacy NVMe or SATA SSDs for storage.<sup>4</sup>

Xie concludes: “FORSA is driving complete transformation of the data center with In-Memory Storage virtualization. What’s more, we’re using standard server hardware to do it. We have already achieved so much working with Lenovo and are excited to grow with them as our technology partner.”



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– Jing Xie, COO, Formulus Black



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Lenovo and Intel together are powering the future of enterprise compute to accelerate customer transformation. From edge and AI to HPC and hybrid cloud, Lenovo innovates quickly to deliver the very latest Intel technologies—compute, networking, memory—at the speed of today’s data-centered businesses. Your enterprise can rely on Lenovo and Intel as trusted technology partners to deliver the game-changing solutions of today and tomorrow.

<sup>4</sup> Source: Formulus Black Performance Benchmark Reports, available at <https://formulusblack.com/performance-benchmarks/>