

REPORT REPRINT

Kaminario does a two-step into all-NVMe flash storage and composability

TIM STAMMERS

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The all-flash storage specialist is poised to ship a version of its all-flash storage system based on the emerging high-speed NVMe interface, one that it promises is far more composable than rival systems. How will its core service-provider customers take to this?

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Kaminario was one of the wave of startups that pioneered all-flash storage about five years ago. Alongside a strategy to expand its focus on service providers and move to a software-only business model, the company says that it will ship a major new product this quarter, which was first unveiled in 2017 but has not yet entered GA. This will be a version of its existing scale-out all-flash array (AFA) that will be based on the NVMe and NVMe over Fabric (NVMe-oF) standards. It will make Kaminario one of the first of the existing AFA suppliers to fully adopt the new standard, both inside and outside the system. The company says the new system is up to twice as fast as its predecessor. Kaminario will also ship management software that it says will make the new device highly composable (dynamically reconfigurable).

THE 451 TAKE

We believe Kaminario's AFA was already competitive, and the new version of the system should sharpen the company's edge. The composability promised for the K2.N looks impressive, and we presume it will appeal most strongly to the service providers that are Kaminario's primary target customers. Buyers will have to pay a premium to gain this composability, alongside the K2.N's boosted performance. This is largely because of the current cost of the NVMe drives inside the system. Kaminario does not expect this situation to change during 2018, but the company could be wrong about that - some observers think the price of the relevant NVMe drives may fall heavily this year. If that happens, it would be to Kaminario's benefit, since it will amplify the company's NVMe first-mover advantage.

COMPANY BACKGROUND

Founded in 2008, Kaminario launched its first K2 storage system in 2010. But the company did not settle on the current form of the K2 (powered by SAS flash drives, like most other AFAs) until 2012, and the device did not become truly competitive until 2014, when it gained dedupe and compression functions. We believe the company was also slow to develop a channel partner network. It says that almost 100% of its sales are now made through its network of more than 200 partners.

Kaminario has never said how many customers it has won, but since 2016 it has been saying that they number in the hundreds. There are just over two dozen named customer case studies on Kaminario's website, including SaaS providers and conventional enterprises. Privately, the company has revealed the names of several dozen customers to 451 Research. The company says it expects to become cash-flow positive this year. Given the struggles of other would-be entrants to the storage system sector over the last several years, that is noteworthy.

Headcount at the firm is roughly 280. Funding to date totals \$218m. The most recent (fifth) round of funding was announced in January 2017 - raising a sizeable \$75m - and was led by new investor Waterwood, a private equity firm, and CIRTech, a venture capital firm, with participation from previous investors.

ALL-NVME STORAGE

Kaminario claims that because of its underlying architecture, the K2 outperforms rival AFAs in terms of cost, flexibility and resiliency, and the ability to handle mixed workloads. The company says the K2 can cost as little as \$0.50 per effective GB (post data reduction.) To 451's knowledge, in 2015 Kaminario became the first major AFA vendor to offer guaranteed data reduction ratios.

The K2 scales to a maximum capacity of 4PB. In addition to adding nodes to a K2 cluster, the capacity of individual nodes can be scaled up independently. During 2017, Kaminario updated its Clarity management and remote monitoring, diagnostics and planning tool to include, among other things, a machine-learning cloud back end for predictive analytics. We presume that larger customers and service providers will have also appreciated new abilities to manage multiple K2 clusters in multiple locations with role-based access controls, and to define service groups of data volumes serving specific customers or workloads.

In the current quarter (Q1 2018), Kaminario says it will ship a version of the K2 powered entirely by NVMe flash drives, which will be called the K2.N. NVMe is a protocol that runs on PCIe, and this is not the first time Kaminario has shipped an AFA based entirely on PCIe flash. Before 2012, when the K2 switched to SAS drives, it was an all-PCIe system.

Alongside the use of NVMe flash drives inside the system, the K2.N will use the NVMe-oF standard as a back-end network within a K2.N cluster, running on top of RoCE Ethernet. Outside the system, the K2.N will link to host servers using a customer's choice of NVMe-oF on Fibre Channel, NVMe-oF on RoCE Ethernet, or via plain Fibre Channel or iSCSI.

The NVMe standard is widely predicted to replace SAS as the dominant interface for datacenter flash drives within the next few years, and it gives a significant boost to performance. The NVMe-oF standard is more recent, and stretches NVMe over a choice of existing network technologies, to give another boost to performance.

Overall, Kaminario says the K2.N will provide up to twice the performance of the K2 and quadruple its IOPS to GB ratio. Because the K2.N is based on a version of the VisionOS software that powers the K2, it will provide the same services, such as data reduction, snapshots, replication and RAID data protection.

The doubling of performance comes at a price. For any AFA, the bulk of the hardware cost is in the flash drives, and the dual-port NVMe flash drives used in the K2.N are currently more expensive than the SAS equivalents used in the K2. The NVMe-oF back end also boosts the price of the K2.N, and as a result, Kaminario says the new system costs about 40-50% more than the K2. The prices of dual-port NVMe drives will inevitably fall, but Kaminario doesn't expect that to happen for at least another 18 months. As a result, it also doesn't expect the K2.N price to change significantly during 2018.

Kaminario expects to continue selling the K2 alongside the K2.N for a while yet, until the price gap between NVMe and SAS drives has diminished. How far the gap has to narrow will depend on how much customers are prepared to pay for the extra performance. How soon the gap will narrow is in the hands of the major flash drive-makers. In contrast with Kaminario's prediction, other sources say price parity could happen this year. Until then, the K2 will offer better value in terms of dollars per GB, and the K2.N will offer better value in terms of dollars per IOPS.

COMPOSABLE STORAGE

The K2.N will ship alongside management and orchestration software called Flex, which Kaminario says will create what it calls composable storage. The company is not the only vendor to have recently begun using that adjective, and we interpret it as meaning the ability to deliver far greater dynamic (or on-the-fly) configurability than existing infrastructure. The term might appear ripe for marketing abuse because it can only be loosely defined. But in combination with the Flex software, the K2.N is certainly more dynamically configurable – or composable – than other storage systems, in a way that appears to promise much, especially for service providers.

Flex is described as a management and orchestration tool. Among other features, it allows a physical K2.N cluster to be carved on the fly into logically defined smaller clusters, which Kaminario calls virtual private arrays. Unlike the K2, a K2.N comprises two separate types of node: controller nodes and JBOF (just a bunch of flash) media nodes. This means that for each virtual private array, administrators can choose from a wide range of values for the ratio of controller resources to storage capacity, to best suit the workload. Importantly, the ratios can also be drag-and-drop adjusted at any time to suit changing conditions or workloads, with automatic data redistribution. Flex will link to OpenStack via a Cinder driver, and via APIs to other management platforms such as Puppet and Turbonomics.

The K2.N uses NVMe-oF on RoCE Ethernet as the back-end network that links together the system's nodes. As well as contributing to overall performance, this is one of the keys to the creation of virtual arrays, since it presents a homogeneous back-end network, compared with the combination of InfiniBand and SAS networks inside the K2 and many other AFAs. Kaminario says another key is the distributed metadata management in the VisionOS that powers the K2, and now the K2.N, which it says enables the decoupling of capacity from compute, and already allows the K2 to scale both up and out.

COMPETITION

The overall market for AFAs is dominated by five companies – Dell EMC, HPE, IBM, NetApp and Pure Storage. Although the majority of those companies' AFA sales are made to conventional enterprises, they all also sell to nonhyperscale service providers. These are the companies that Kaminario will encounter in the majority of deals, and as yet, they are only in the early stages of adopting NVMe.

Pure Storage the only major supplier currently selling a device powered entirely by NVMe drives, in the form of its FlashArray//X, which began shipping in 2017. However, that system currently only uses NVMe internally. External support for NVMe-oF has been demonstrated, and is expected to ship this year. In 2016, EMC was one of the very first suppliers of any size to launch an all-NVMe AFA, but within a year it cancelled that product, which was called the DSSD D5. The company blamed weak overall demand for such systems, although rivals claimed the product was uncompetitive. Dell EMC has promised to ship a second all-NVMe AFA this year.

IBM has demonstrated a version of its FlashSystem 900 AFA supporting NVMe-oF links outside the system, and again we presume that will ship later this year. While the FlashSystem 900 does not use NVMe drives internally, it uses custom PCIe drives, which IBM says are faster than NVMe drives. NetApp is shipping a version of its SAS-powered E-Series AFA that supports NVMe-oF outside the system.

A number of startups have developed all-NVMe storage systems from scratch, but their devices are not direct competitors to Kaminario's forthcoming K2.N. These startups, such as Apeiron, Attala, E8 Storage, Excelero and Vexata, have focused on performance above all else, and as a result have created unusual software and hardware architectures. In contrast, the K2.N sticks to the relatively conventional architecture of its predecessor, alongside its well-developed data services. The startups named above are so strongly focused on performance that they include no cost-slashing data reduction functions. While that maximizes the performance of their systems, it makes them far more expensive than the K2.N, in terms of dollars per GB of capacity.

Composability cannot be quantified or easily defined, as shown by the fact that Kaminario describes its existing K2 AFA as composable, albeit less so than the K2.N. However, 451 is unaware of any other vendor offering scale-out AFAs that offer the same degree of flexibility of controller to capacity ratios as the K2.N (or the ability to change those ratios on the fly), or that has declared any plans to do so.

SWOT ANALYSIS

STRENGTHS

Kaminario is early to market with its performance-boosting use of all-NVMe flash, and is offering a very high level of composability or flexibility for its new system.

WEAKNESSES

Kaminario's biggest weakness is its small size compared with the incumbent suppliers that dominate AFA sales.

OPPORTUNITIES

Kaminario is staking its future on sales to service providers. Spending in this sector is growing faster than in the enterprise market.

THREATS

Kaminario's early-mover advantage in all-NVMe storage is only temporary, because other existing AFA makers will certainly adopt the new technology.