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WHITE PAPER

Improving Efficiencies with Kaminario K2.N and Flex

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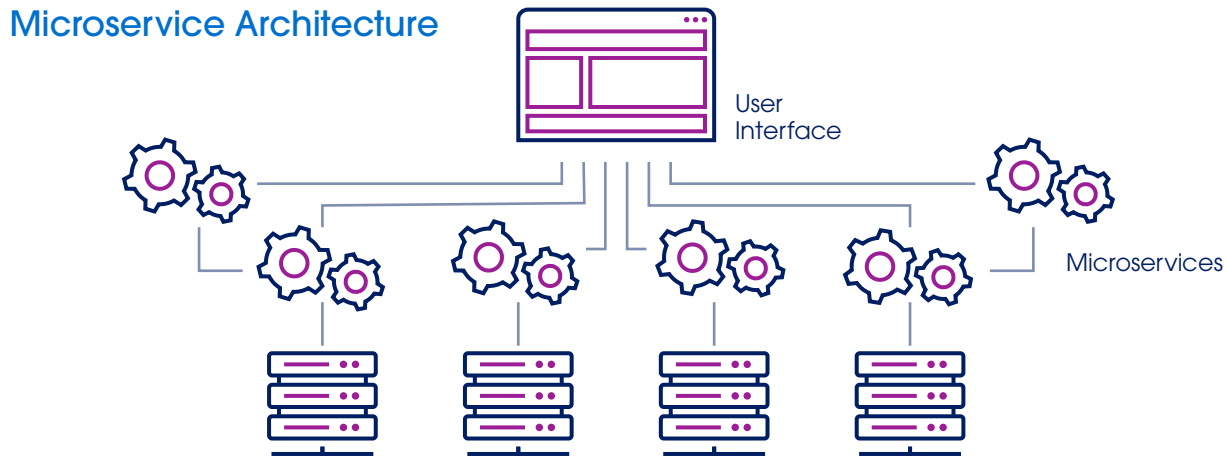
TABLE OF CONTENTS

Executive Summary

A global financial services firm needed to rearchitect its infrastructure to meet the needs of its microservices-based application. After deploying the application in its existing, monolithic server and SAN environment, the customer realized that it needed to modernize its infrastructure in order to achieve the desired performance. With the Kaminario K2.N, the customer incorporated a 100GB Non-Volatile Memory Express over Fabrics (NVMeOF) ethernet networking and composable storage offering based on the Kaminario Storage as a Service (STaaS) platform and Western Digital's Ultrastar® Serv24-HA NVMe Storage Server. By rearchitecting its storage infrastructure, the firm was able to demonstrate how it could reduce the spawning of new development environments **from over 90 minutes to as low as 28 minutes – at least a 67% savings.** As the customer gets a better understanding of their workloads and the capabilities of the Kaminario solution, it expects to gain further efficiencies. In addition, by using Kaminario Flex for orchestrating storage, the customer was able to greatly simplify the process of provisioning storage for these applications and recover resources when no longer needed.



Introduction: Leveraging Microservices Architectures to Develop and Deploy Cloud and SaaS Applications

In order to speed development, testing and deployment of cloud-native or Software as a Service (SaaS) applications, many companies are beginning to leverage microservices architectures. A microservices architecture is a variation of a service-oriented architecture (SOA), a common method for building distributed software systems. In fact, it is closely aligned with DevOps and the movement towards continuous integration and continuous delivery (CI/CD).

Under a microservices architecture, an application is split into a loosely coupled set of services which together comprise a complete application. Each service can be separately developed, tested and deployed without impacting other services – resulting in rapid development and deployment of updates, and the ability to independently scale a single process based on workload requirements. However, without a modern and properly designed data storage infrastructure that is able to meet the performance needs of the microservices architecture, companies will see slow performance in their environments that could potentially result in missed deadlines or time to market of a new offering or service.

The Challenge: Rearchitecting Storage for Microservices-Based Applications

A global financial services firm needed to rearchitect its infrastructure to meet the needs of its microservices-based application. This application, comprised of thousands of microservices and hundreds of SQL databases, handles millions of transactions a year. While the development of a microservices-based application environment allowed the customer to more rapidly build, test and deploy the application, it also exposed the weaknesses of its legacy storage infrastructure.

The microservices application had been implemented on the company's existing, monolithic server and all-flash storage area network (SAN) environment. Upon implementation, the application immediately began experiencing performance issues including high latency and low throughput, while the existing infrastructure experienced slower overall efficiency. A simple task, such as supplying an on-demand development environment, required stakeholders to take a snapshot of the production database and cleanse it to remove personal data before providing it to developers. This process took over an hour and a half to complete and when performed multiple times per day, the team saw significant delays in the development process. They knew that the storage infrastructure would have to be modernized in order to continue meeting their SLAs with internal stakeholders as well as exceed future SLAs.

The Solution: NVMeOF and Composable Infrastructure

Kaminario and Western Digital were enlisted to help the financial services company architect a new topology in their environment, including server, storage and network aspects. Leveraging the Kaminario K2.N next generation all-flash storage architecture, this new infrastructure incorporated a 100Gb NVMeOF Ethernet network and composable infrastructure based on the Kaminario STaaS platform and Western Digital technology. The Kaminario K2.N delivered a significantly higher level of performance and agility while leveraging the full set of enterprise-class data services and features of Kaminario.

The customer started by replacing its SAN environment with a RDMA over Converged Ethernet (RoCE) network which supports NVMeOF. This new network was implemented in a flexible spine-leaf configuration, which added resiliency and minimized latency while enabling the composable infrastructure solution.

kaminario. VisionOS

Kaminario VisionOS is a software-defined storage architecture and framework. VisionOS runs on industry-standard hardware to deliver enterprise-class data services with a highly flexible scale-out shared storage framework. With all-flash storage array functionality and controller resources (c.nodes) logically decoupled from capacity (m.nodes), VisionOS offers an extremely flexible and scalable storage environment.

Kaminario K2.N delivers the exact level of performance and capacity needed for a workload by enabling customers to build storage resources comprised of any number of c.nodes and m.nodes. With this approach K2.N moves away from traditional scale-up or scale-out storage based on a dual controller architecture.

kaminario. CLARITY

Kaminario Clarity is a SaaS-based predictive analytics platform that includes a comprehensive set of management and monitoring functionalities for Kaminario infrastructure. These include the unique capability of leveraging application-level intelligence, machine learning, and big data analytics. Every day, Clarity analyzes over 150 million call-home data points from Kaminario deployments around the world to drive automation and predictive alerting. Clarity's advanced analytics engine provides recommendations on preemptive resource optimization and enables a whole new approach of managing business and application SLAs. In the K2.N platform, Kaminario Clarity incorporates new reporting that better enables Kaminario's pay-as-you-go pricing model, allowing customers to only pay for storage based on usage.

kaminario. FLEX

Kaminario Flex is a storage orchestration platform for managing storage resources in customers' Kaminario environment. With Flex, customers can dynamically compose, optimize, manage, and release storage resources with no physical reconfiguration. Storage resources can be orchestrated as new workloads emerge, move, and evolve over time whether they need to be scaled up, out, in, or off. Flex leverages Kaminario VisionOS to dynamically associate c.nodes and m.nodes and build shared storage assets that deliver industry-leading all-flash capabilities. Virtual arrays deliver enterprise-class storage capabilities but with a game-changing level of flexibility. Storage resources can be built and managed with the swipe of a finger or a simple line of code.

Kaminario Flex supports dynamic orchestration of K2.N resources including the creation of Virtual Private Arrays (VPAs) that are comprised of any number of c.nodes and m.nodes. The platform also makes it possible for customers to allocate resources from one VPA to another at the software layer – meaning there is no need to physically reconfigure resources.

Western Digital's Ultrastar® Serv24-HA NVMe Storage Server

Considered as a "cluster-in-a-box" for Software-Defined Storage, the Ultrastar® Serv24-HA combines the speed of NVMe™ SSDs with a dual-server architecture to deliver a high availability two node server. Each server canister contains a dual-socket Intel® Xeon® CPUs with the servers connected with a Non-Transparent Bridge (NTB) - a PCIe Gen3x16 link - which the software-defined storage stack can use to synchronize metadata between the two compute canisters, enabling one server to continue operations if the other goes offline.

Results and Next Steps: Improved Performance and Efficiency

Upon implementing Kaminario K2.N and Flex, the financial services firm ran a comprehensive proof of concept (POC) using its microservices architecture application and saw immediate results.

By rearchitecting around a converged spine-leaf network topology and composable infrastructure, the customer was able to show a more efficient development process. It was able to reduce the time needed to create a new development environment from over 90 minutes to 28 minutes – an initial 67% savings.

The customer is now able to manually or dynamically adjust resources available to various microservices based on periodic (daily, weekly, monthly, etc.) demand spikes, as well as decommission old storage components -- all without touching the physical hardware. Using Kaminario Flex, the company can dynamically monitor the performance of K2.N storage resources and add performance if the latency or throughput falls outside a designated threshold. It also has the ability to monitor and add capacity when the utilized capacity of a particular K2.N reaches a designated threshold. As a bonus, both the performance and capacity provisioning can be accomplished automatically using Flex's priority policy-based automation capability. This automation enables the company to reduce time spent adjusting storage performance or capacity from hours (or days, in cases where downtime was required) to minutes, without any system downtime.

By implementing Kaminario K2.N and Flex, the customer was able to achieve its goal of having an autonomous, application infrastructure. Development, testing, and deployment times for microservices have been accelerated by at least 67% and the flexibility to scale performance and capacity has enabled the customer to consistently meet or exceed its SLAs to internal stakeholders. As a next step, the customer is planning to deploy its entire production environment onto the new architecture. This will allow for continued growth in its transactional environment while enabling the customer to meet external SLAs.

Conclusion

As more businesses begin adopting microservices-based architectures to meet the evolving needs of their SaaS go-to-market strategy, they will need to reevaluate their legacy data storage systems. With the introduction of the Kaminario K2.N and Flex for storage orchestration, this financial services firm was able to improve the efficiency of its development process and, in turn, maintain its competitiveness in the industry.

Discover how Kaminario K2.N and Flex can give you a faster data storage experience.
Contact Kaminario and Western Digital today to learn more.