

Container Infrastructure in 15 Minutes

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Containers have revolutionized how applications are architected, developed, and deployed, but legacy infrastructure can't match their agility and speed. Enterprises waste time and resources trying to leverage outdated networking and storage to support containerized applications — usually without success. The result is slower time to market, rising personnel and equipment costs, and growing frustration between developers and IT operations.

With Diamanti, enterprises get the agility and performance of containers, from development through to production-scale deployment. The Diamanti bare-metal container platform is purpose-built for modern cloud and open-source environments, integrating open-source Docker and Kubernetes with high-performance storage, networking, and compute. Diamanti is a proven full container stack that deploys in minutes, versus weeks or months for DIY infrastructure solutions.

WHICH CONTAINER INFRASTRUCTURE SOLUTION IS RIGHT FOR YOU?

This 451 Research report provides valuable background on the benefits and potential pitfalls of containerization. It also introduces a variety of container infrastructure solutions and vendors. When evaluating infrastructure alternatives, keep these points in mind:

- Bare-metal or virtualized? Bare metal can be the most efficient approach for production containers. Running containers inside VMs adds an additional layer to the stack that must be managed and debugged, adding cost and complexity.
- DIY, SDS, or full-stack solution? DIY infrastructure and software-defined storage solutions require separate component purchases, integration, and testing. Hyperconverged solutions can be up and running in minutes.
- Persistent storage: Applications running inside containers need to be able to save data permanently. Container solutions must provide a mechanism for persistent storage, even as containers come and go.
- Networking model: Getting networking right remains one of the most difficult aspects of container environments, and container networking must integrate smoothly with your existing data center networking.
- Orchestration: Dynamic container environments require orchestration tools to coordinate activities and automate operations. While there are many options, Kubernetes has emerged as the clear leader.
- Support: How will you get support for the full infrastructure stack, including both hardware and software? From a single vendor, multiple vendors, or the open-source community?

To learn more about Diamanti's hyperconverged container platform, visit www.diamanti.com.

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REPORT REPRINT

Container storage edges closer to mainstream, driving consolidation and acceleration

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The market opportunity for containers will only grow as enterprise adoption continues to gain momentum as a result of DevOps implementation. This report looks at the intersection point of containers and storage, and some of the vendors addressing this market.

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Containers offer a lightweight alternative to virtualization, and for this reason have seen increasing adoption in recent years. A container is made up of an application and the dependencies needed to run it. This avoids the inclusion of a full OS, as one would find with a VM. The form factor of a container makes it easy to transplant to different environments, whether they be bare metal, virtualized or based in the cloud. However, although they are more portable and less resource-intensive than a VM, containers still require persistent data storage, and a number of storage vendors are currently catering to this market opportunity.

THE 451 TAKE

For those making storage buying decisions, container functionality should rank among the attributes of systems being considered. 451 Research's Voice of the Enterprise: Storage, Organizational Dynamics 2017 survey shows that 57% of respondents feel that increasing operational costs represent the primary reason storage is more of an IT pain point. Containers offer a degree of cost savings over VMs with regard to resource efficiency, and this is not considering their potential positive impact on app development within an organization, where they bring efficiency and manageability. Containers are a tool that developers will want to utilize in building cloud-native applications and revamping existing traditional applications, and enterprises need to ensure that storage is an enabler of this effort rather than a potential bottleneck for production. As software-defined storage (SDS) leveraging commodity hardware becomes an increasingly viable alternative to traditional storage arrays, the opportunity for more container-centric storage offerings also grows. Although containers will drive hardware innovation as well, as more consolidation is done with containers, high-performance capabilities will be required to ensure that consolidated applications are not starved of resources.

CONTEXT

From a development standpoint, containers are a path toward microservice-based application architectures over the still-prevalent legacy method of building monolithic applications. Although DevOps is a major driver, and containers are seeing more usage, widespread adoption hasn't happened yet. In our Voice of the Enterprise: Storage, Workloads and Key Projects 2017 survey, 20.6% of respondents currently have containers in use, while another 33.5% have container adoption planned for some time within the next 24 months. As the market opportunity for application containers grows, so does the potential opportunity for storage vendors to cater to the needs associated with these containers. Application containers may be disruptors of existing technologies like VMs, but VMs are far from becoming obsolete. For now, containers are often deployed on or alongside VMs, meaning current infrastructure approaches, including existing enterprise storage systems, are still reasonably viable, although this will change as container adoption increases and products better suited to containerized applications are needed. Just as virtualization revealed some of the inefficiencies of single-vendor proprietary storage systems and required more flexible and resource-efficient alternatives, containers and microservice-based applications will also necessitate that storage keep pace lest the efficiencies be lost. The current offerings also highlight the fact that many storage companies are putting a greater focus on what users are doing from a faster, more iterative and automated DevOps perspective.

CURRENT CONTAINER STORAGE OFFERINGS

Container storage involves supplying the technology needed to store and back up the data of containerized applications at scale – without hampering performance. Some storage vendors have developed their products specifically to cater to the needs of containers, while others have SDS products (in this context, SDS denotes storage management software leveraged in conjunction with commodity x86 hardware) that can be geared toward addressing such needs. For some, this simply includes support for Docker's Volume Plugin, which handles persistent data across external storage systems, as well as integrations with popular container orchestration tools like Docker Swarm and Kubernetes.

Many of the major storage players that currently dominate the industry target the interaction of containers and persistent data storage in some capacity. Dell EMC leverages its ScaleIO SDS product for management of container storage and uses the open source REX-Ray management tool for the orchestration of persistent storage for Docker. NetApp includes Docker Volume Plugin support in ONTAP, SolidFire and E-series products, and similarly HPE targets container environments with its existing Nimble and 3PAR arrays, and offers Docker plug-ins for both systems.

The startup space includes some of the products more specifically designed with containers in mind. Diamanti (previously known as Datawise.io) leverages hyperconverged infrastructure for container storage, offering an HCI appliance that is geared specifically toward bare-metal containers, rather than containers running on VMs. The appliance makes use of NVMe flash for its block storage.

StorageOS also provides persistent block-level storage for containers, with access permitted through Docker and Kubernetes plug-ins. Elastifile's distributed file system promises to offer a scalable means of providing containers with persistent storage. SDS vendors Hedvig and Virtuozzo also have distributed storage platforms, both with Docker certifications, although Hedvig also touts a VMware certification. CloudByte is another vendor leveraging its software for the purpose of supporting storage for containers; the company also offers several of its own flash-based appliances.

Virtuozzo provides SDS for containers and VMs on HCI-based systems. Its platform offers integration for both Docker Swarm and Kubernetes, and the company boasts an installed base of more than 100 customers. Virtuozzo's platform leverages the Docker volume plug-in in a way that allows Docker Swarm nodes to function as SDS nodes, and received its Docker Enterprise Edition certification in June. Added in October 2017, the Kubernetes support is a recent addition to the platform that is aimed at providing storage to cloud-native apps within Kubernetes environments.

Nexenta is a provider of open-source-based SDS, and it bills its NexentaEdge product as a 'container-converged' application-centric infrastructure option. Like other SDS products, NexentaEdge leverages commodity hardware for scale-out clusters with compute, networking and storage, in the style of HCI, but it also offers integration with container management software (such as Docker Swarm or Kubernetes) to ensure that resources are available for stateless or stateful containers.

Portworx provides software-defined storage built specifically for containers that manages the movement of persistent volumes along with containers to maintain the agility and efficiency associated with containers. The company recently announced a partnership with Mesosphere to offer persistent volumes for Mesosphere's DC/OS software that provides features and functionality for both container orchestration and distributed data services. Portworx has even accrued eight of the Fortune 500 among its customer base. MapR is another vendor in the space; it added stateful storage for containers in 2017. The road to persistent container storage has had some casualties, as well, with VC-backed ClusterHQ closing down in late 2016.

Backup and recovery vendor Asigra represents another intersection point of containers and storage – it offers cloud backup for Docker containers as part of its data protection portfolio. This highlights the fact that containers are subject to secondary storage needs – it is pertinent that there be backups of persistent data.

OUTLOOK

In 451 Research's Voice of the Enterprise: Storage, Organizational Dynamics 2017 survey, 57% of respondents indicated that increasing operational costs are the primary reason storage is more of an IT pain point. TCO and ROI are as important as ever, and aside from offering dev-centric benefits, like a gateway to microservices architecture for application development, they also offer a degree of cost saving, since containers don't require the same level of overhead as VMs. This is one incentive for container take-up. The emergence of more pure-play container storage vendors will depend on market size, but it's likely that more SDS vendors that can adapt their platforms to accommodate containers will do so moving forward. We can also anticipate more of the HCI vendors tailoring their offerings to support the container space.

We expect further movement away from containers running on top of VMs, and growth of containers running separately or in place of VMs, thus demanding container-specific storage beyond VM-based technology. This may also foster consolidation in the space as established vendors further fill out their container-specific storage capabilities.

In terms of outlook for container storage as a part of the broader application container market, 451 Research's Market Monitor & Forecast projects a compound annual growth rate of 38.8% between 2016 and 2021 for the storage segment within application containers, with market sector revenue for 2018 forecast to be \$45m, and \$104m by 2021. However, storage represents only a sliver (3%) of the container market's revenue, which is estimated to be over \$1bn in 2017 and growing to nearly \$3.5bn by 2021.