Running Traditional Database Applications on VxRack FLEX

Date: August 2017  Author: Mike Leone, Senior Validation Analyst

Background

As organizations continue to look for ways to modernize their infrastructures by delivering a cloud-like experience on-premises, hyperconverged offerings are exceeding expectations. In fact, the adoption of hyperconverged infrastructure has more than doubled over the last year and there are no signs of slowing down. Simplified, flexible deployment options that are easily managed and easily scale are just a few of the factors driving the rapid adoption of hyperconverged technology. As consolidation and modernization efforts are well underway across all of IT, hyperconverged offerings continue to meet the needs of the business while satisfying existing and future application SLAs, whether it be related to performance, scalability, reliability, or cost.

With many organizations running enterprise applications and databases of different shapes and sizes, including hypervisors and operating systems, on traditional physical or virtual infrastructure models, all configurations and architectures must be considered when planning and expanding further adoption of hyperconverged infrastructure in the datacenter.

VxRack System FLEX

VxRack System FLEX (VxRack FLEX) is a rack-based hyperconverged solution that leverages Dell EMC ScaleIO to deliver flexible, scalable, and performant software-defined storage. The ScaleIO software runs on industry-proven Dell EMC PowerEdge servers to deliver a full hyperconverged stack that enables IT organizations to deal with one vendor that can supply all the software, hardware, and support required to modernize their data centers. Key to the solution is the scale-out architecture, offering organizations flexibility to start small and grow based on their needs. Further, this elasticity delivers on the hyperconverged promise of cloud-like scale and flexibility on-premises. While many other hyperconverged offerings disregard networking altogether, VxRack FLEX supports both physical and virtual networking and includes top of rack switches that control network traffic, management, and redundancy. Put it all together and organizations get a hyperconverged solution that can easily be used with all other Dell EMC products and services, together with ScaleIO delivering impressive performance and protection at scale. In addition to ScaleIO data protection capabilities, advanced data protection, replication, availability, and recovery are available with technologies such as Data Domain with Data Domain Boost and RecoverPoint.

ScaleIO – Data center grade software-defined storage

Powering the VxRack FLEX solution is ScaleIO, Dell EMC’s scale-out software-defined storage solution that abstracts the direct-attached storage found in Dell EMC PowerEdge servers into a pool of shared block storage. By converging the storage and compute on the same physical servers, this single and/or two-layer architecture helps to simplify management and maximize storage efficiency as the infrastructure grows from four to thousands of nodes. Whether using HDDs, SSDs, or even NVMe or PCIe flash, storage is combined into virtual block-storage pools with varying performance tiers. Combined with QoS, snapshots, caching, fault sets and protection domains, and data-at-rest encryption, ScaleIO running within the VxRack FLEX system delivers a data-center-grade, fully-integrated, hyperconverged solution. Leveraging a software-defined storage approach to satisfy enterprise application and database block storage requirements enables organizations to potentially break free of large initial investments and high operational costs commonly associated with traditional SANs. Further, fears of technology updates, refreshes, and data migrations impacting costs, risk, and periods of downtime can be all but eliminated.

1 Source: ESG Research Report, Hyperconverged Infrastructure Continues to Gain On-premises Momentum, to be published.
Traditional Database Applications in a Modern World

A majority of today’s IT organizations run a combination of Oracle, Microsoft, and SAP, each with its own infrastructure and operational requirements. As consolidation and modernization efforts are underway, it is essential for organizations to understand how their existing mission-critical applications fit into their plans.

For these mission-critical applications and databases, the ability to satisfy a varying set of business requirements and SLAs on the same infrastructure without impacting any other applications or workloads is imperative to a successful deployment. With a goal of standardizing on a single infrastructure for simplified management and reduced costs, VxRack FLEX offers a way to consolidate and optimize traditional applications and database infrastructures, including support for multiple hypervisors, operating systems, and bare metal configurations.

For optimal utilization, VxRack FLEX and ScaleIO enables independent scaling of compute and storage, eliminating stranded resources. ScaleIO enables organizations to deploy storage-only nodes, compute-only nodes, and hybrid nodes. This serves as a logical approach for most organizations already familiar with traditional database deployment models.

From an operational efficiency standpoint, VxRack FLEX comes pre-integrated and pre-tested. This enables cross-functional communication to be more productive between DBAs and IT administrators, with less focus on interoperability and scalability concerns, and more focus on product integration and best practices. With that, IT can do their jobs more effectively while SAP admins’ and DBAs’ time is given back to focus on more strategic initiatives like future optimizations and innovation.

Performance

ESG recently completed a validation of the Dell EMC ScaleIO solution. Key to the validation was a performance analysis using both synthetic and real-world benchmarking tools to understand the scalability potential of the product. A four-node all-flash hyperconverged cluster was leveraged in an Oracle RAC environment and the results of internal performance scalability tests were audited by ESG. The cluster was then scaled to six nodes, and again to eight nodes. Each node in the cluster was running ScaleIO, which provided clustering and storage services. At the same time, each node in the cluster was running an RHEL VM providing Oracle database services and tests were run simultaneously on each node on the cluster.

The results were impressive in that, throughout all tests, performance scaled predictably when measured at the 1ms response time threshold. The SLOB benchmark was used to exercise all components of the ScaleIO hyperconverged solution and tested a mix of reads and writes to emulate a real-world, mission-critical OLTP database workload. ESG also witnessed the ScaleIO cluster easily handle a demanding transactional data workload while simultaneously handling the demands of additional application workloads.

Further, resiliency was tested, showing the ScaleIO cluster able to maintain these high levels of performance when failures occurred, such as a lost node.
Business Continuity

As organizations continue to expect constant data and application availability, a complete data protection strategy is essential for 24/7 access. This is increasingly difficult as applications leverage a heterogenous mix of infrastructure components and vendors. Specifically for databases, it is not just about protecting the production environment. The same copy of the production database is used across various business units within an organization—test/dev, QA, analytics. Including non-production environments, the size of and workloads running on a database are diverse and constantly growing.

As such, there is pressure on IT to minimize backup windows and reduce the costs associated with storing, copying, and protecting mission-critical databases, whether in production or non-production copies being used by different business units. SAP admins, DBAs and IT operations are constantly fielding question after question: How can I reduce the amount of time spent monitoring applications and database systems? How can I ensure performance and availability? How can I provision new database and application instances, while continuing to oversee backup, recovery, replication, and failover processes?

The VxRack FLEX together with ScaleIO supports and integrates with Dell EMC’s comprehensive set of data protection services that organizations are accustomed to when protecting traditional database applications, such as Oracle, SQL Server, and SAP. This enables SAP admins and DBAs to manage, control, and protect their growing physical and virtual systems and database environments effectively using tools from the Dell EMC Data Protection Suite, such as Data Domain with DD Boost, Networker, and RecoverPoint.

Backup and Recovery

By leveraging Networker and Data Domain with DD Boost, IT can automate and optimize the processes associated with protecting their mission-critical databases using fully integrated deduplication backup software and systems. Data Domain can integrate directly with enterprise applications, which allows application owners to have control and visibility of their own backups to Data Domain systems using their native tools, while Dell EMC Networker serves as unified data protection software for the enterprise that centralizes, automates, and accelerates backup and recovery across the entire IT environment. Regardless of which software is used (there are some feature overlaps) to manage everything related to backups, including policies, rules, and schedules, DD Boost is used to ensure only unique data traverses the connection between the backup server or clients and the Data Domain system. This also helps free up resources on the customer’s network and the Data Domain system for improved target-side deduplication performance.

In a VxRack FLEX environment with mission-critical database applications, DD Boost enables parts of the deduplication process to occur on the client-side, meaning backups complete faster. Further, application owners can leverage native tools based on their database to complete the recoveries faster and without going through a vendor-specific or application-specific backup administrator. Application owners can directly control both backups and recoveries using traditional backup utilities based on the vendor. Oracle RMAN, Microsoft SQL Server Management Studio, and SAP BR*Tools all work with DD Boost to perform backups faster, reliably recover, and reduce backup storage footprint.
Continuous Data Protection (Local/Remote)

The ability to keep mission-critical databases online while also enabling simultaneous data access is crucial to a next-generation architecture. This level of data accessibility and availability is not only required from within a data center, but between remote data centers through replication. Dell EMC RecoverPoint provides continuous data protection and mobility of data through local and remote replication with continuous data protection for any Point-in-Time (PIT) recovery that optimizes Recovery Point Objective (RPO) and Recovery Time Objective (RTO). It simplifies recovery operations for applications such as SAP and the management infrastructure deployed on databases in a mixed virtual and physical environment. With VxRack FLEX and specifically ScaleIO, RecoverPoint can replicate data to other local or remote ScaleIO software-defined storage clusters as well as other supported storage arrays, including Dell EMC VMAX, XtremeIO, and Unity. This level of flexibility enables IT to efficiently address a host of use cases, as shown in the next section of this paper, for traditional enterprise applications and database.

For SAP, RecoverPoint delivers on its ability to recover from any point-in-time snapshots with little to no impact on a production environment. Further, RecoverPoint provides true CDP capability for SAP environments by supporting consistency groups. There is no data loss and full write-order consistency for all protected volumes across multiple, heterogenous infrastructures. With Microsoft SQL Server, RecoverPoint maximizes the availability of mission-critical databases between geo-dispersed clusters in different multi-subnet sites. RecoverPoint expands on SQL Server’s native transactional replication technology by offering the ability to restore beyond the last log window without having to restore the entire database. DBAs can also simply rewind the database to address data corruption issues if they arise. In Oracle RAC environments, RecoverPoint offloads remote replication workloads to the RecoverPoint replication appliance, freeing up production RAC server resources and therefore eliminating potential performance issues. For patching Oracle RAC clusters, node downtime is minimized with RecoverPoint, improving stability and performance of the overall cluster. And lastly, using RecoverPoint’s bookmark technology, migrating to the latest Oracle database version is seamless, allowing for clone creation, upgrading, and testing without impacting the production database.

Use Cases

As consolidation and modernization efforts are underway, the practical reality must be considered. Traditional enterprise applications and databases continue to run on a pre-existing infrastructure, whether converged or built using Dell EMC storage and servers. Since total and immediate transformation is impractical, a hyperconverged model needs to become part of an existing datacenter architecture enabling transformation in a phased approach.

Many organizations wish to continue running production on their current infrastructure and choose to leverage hyperconverged for non-production tasks. In this case, VxRack FLEX is designed to interact with data between the two types of environments. With RecoverPoint, VxRack is capable of consistent replication both locally or remotely, allowing for movement of data from production to non-production environments with heterogenous mixes of servers and storage arrays. Further, with Dell EMC Data Domain, backed up production data can be restored to the non-production environment, enabling organizations to keep their primary workloads on the traditional infrastructures.
VxRack FLEX is also built to run iterative testing for maintenance, patches, migrations, and upgrades. For scenarios related to system copies or database refreshes, organizations can leverage continuous local and remote replication to track any changes to data that can be restored to any prior Point-in-Time (PiT). RecoverPoint allows for consistent application bookmarking and grouping to accelerate restoration in the event of data errors or corruption. And with organizations looking to replicate applications and data across both physical and virtual environments, they can rest easy knowing VxRack FLEX with ScaleIO falls under the supported Dell EMC umbrella.

While traditional infrastructures may have several tools and services to manage backup, restoration, data retention, and disaster recovery, VxRack FLEX with ScaleIO offers these capabilities in one package without sacrificing existing implementations. DD Boost gives complete backup and recovery control through any native applications. Networker’s single management interface allows for traditional on-premises and cloud data protection to work alongside RecoverPoint’s local and remote data replication. Data Domain provides data retention on-premises as well as longer-term storage geared for public, private, and hybrid cloud. With all the technology integrated in VxRack FLEX, the architecture is flexible enough to make data retention fit any organization’s data protection and availability requirements.

**The Bigger Truth**

As organizations look for solutions to help modernize their infrastructure, hyperconverged infrastructures are serving as go-to architectures due to their underlying ability to improve time to value. With VxRack FLEX, customers receive a pre-integrated, pretested, and pre-validated hyperconverged infrastructure that can be operational within hours of arriving on the loading dock. With software-defined storage from ScaleIO, organizations gain a flexible underlying storage solution that enables linear performance scalability, while the VxRack FLEX node configuration flexibility enables organizations to easily scale out just compute, just storage, or both.

For mission-critical database applications such as Oracle, Microsoft SQL Server, and SAP, organizations require a flexible infrastructure to handle the independent needs of each application and database implementation, while delivering enterprise-class levels of performance and protection. With VxRack FLEX, organizations can standardize on a single scalable architecture to handle all of their mission-critical database needs, helping to speed up deployment, simplify management, and scale up or down depending on current needs of the business. Further, advanced data protection and replication services are provided through the integration of tools like Dell EMC RecoverPoint with ScaleIO.

ESG suggests exploring the VxRack FLEX offering as a way for organizations to future-proof their IT infrastructures while continuing to meet the strict performance and protection requirements of their mission-critical database applications.