Consolidate and Simplify Mixed Database Workloads with Dell EMC

Dell EMC Solutions for business applications enables you to consolidate mixed database workloads onto fewer servers and storage to realize a cost savings and return on your underlying infrastructure investments.

Data growth and proliferation challenges

The typical business today is running hundreds of applications, with the average enterprise having as much as 464 custom applications. It would be great if all of your applications used the same type of workload (OLAP/OLTP) or at least the same vendor, but this is simply not the reality. While most organizations will say they are ‘primarily’ a SQL Server, Oracle or SAP shop, there is always at least one other database somewhere in the environment supporting at least one application. This means more infrastructure is needed to support multiple databases and workloads, leading to additional costs and less space within the data center.

This problem is only compounded by data growth and proliferation. Data-intensive workloads (internet of things (IoT), big data, artificial intelligence (AI), machine learning, etc.) require more and more resources. Database growth, both in number and size, leads to:

- Increase in database and server sprawl
- Larger workload footprints
- Greater cost and complexity running workloads on siloed IT
- Longer maintenance and upgrade cycles
- Inefficient copy data management

How can you address the challenges brought on by multiple workloads, databases and rapid data growth?

Consolidation

Data center consolidation has long been seen the answer to many challenges when it comes to dealing with application and storage silos. However, organizations often stop short of consolidating mixed workloads or even databases for fear of impacting performance, throughput and protection. For many organizations, the perceived risks and complexities in consolidating databases overshadows the expected benefits.

It is for this very reason consolidation strategies must take into consideration ensuring the availability and performance of business-critical applications while maintaining low latency with fewer resources. The introduction of faster more powerful CPUs and new storage technology has made it possible for businesses to consolidate databases without the traditional associated risks.
Consolidation and IT modernization

Consolidation has many benefits the greatest of which is the ability of the business to increase infrastructure utilization without sacrificing performance while having the elasticity and agility to respond to new requests. Perhaps the greatest challenge to designing and delivering a consolidation solution is the uncertainty of how all the components will integrate and deliver on the investment.

A reference architecture which has been designed, integrated and tested to run mixed workloads and databases on the same validated infrastructure must ensure the underlying infrastructure components meet the unique demands of each workload and database.

Modular server architectures

When it comes to consolidation, modular server infrastructures enable IT organizations to quickly add more storage, compute, or networking depending on workloads and business needs. Designed to flexibly support both traditional and emerging workloads, such as IoT, artificial intelligence and machine learning, while simplifying and consolidating IT management, users can easily grow their workloads as needed.

This becomes especially important when looking to consolidate multiple databases and workloads on a single infrastructure. Modular servers enable the business to dedicate servers to each database, separating the workloads from a compute perspective which in turn optimizes licensing by limiting costs and helps to simplify management, scalability and efficiencies.

Storage designed for performance and parallelism

Mixed database workloads like Online Transaction Processing (OLTP) and Decision Support Systems (DSS) / Online Analytic Processing (OLAP) have traditionally been difficult to manage on the same infrastructure. Each of these workloads place different demands on the storage system. The storage system cannot be tuned for one workload or the other; instead, it must support both database loads at performance levels that meet Service Level Agreements (SLAs).

For example, when consolidating a smaller environment running a database on OLTP, while you may be looking to scale and grow, you may also require a smaller memory cache. If you are looking to consolidate 1 database on OLTP and OLAP with test/development, you may require larger memory cache while balancing IOPS and throughput. The infrastructure should also enable administrators to easily deploy test/development alongside production with minimum effort and resources. Finally, when considering hyper-consolidation of multiple databases, workloads and bringing in analytics onto a single infrastructure platform, the challenges and concerns of performance and response times can now have even greater impact to the business.

Non-Volatile Memory Express (NVMe) drives introduce new levels of performance and parallelism making it an ideal match for mixed database workloads. NVMe drives offer increased speed combined with the ability to service more requests in parallel. It was designed to overcome the limitations of Serial Attached Storage (SAS) – a storage protocol designed for hard disk drives. NVMe solves a problem that occurs when fast flash-based storage collides with legacy data transport technologies – bottlenecking. NVMe maximizes the power of flash drives and opens the door to the next media disruption with storage class memory (SCM).

Consolidate mixed databases and workloads on the same Dell Technologies infrastructure

Dell EMC solutions are designed to assure performance, reliability, flexibility and manageability for high value workload environments and machine learning services. Built using a scalable and resilient IT foundation to exploit the dynamic capabilities of today's database management systems and beyond.

The Dell EMC Ready Solutions teams for Oracle and Microsoft SQL Server designed, integrated and validated a mixed workload and database reference architecture comprised of Dell EMC components. One key goal of these tests was to push the system to realistic service level limits and to generate the maximum amount of load on the reference architecture.
without most of the reads and writes exceeding 1 millisecond in latency. The validation testing exceeded our expectations demonstrating performance at scale.

<table>
<thead>
<tr>
<th>Component</th>
<th>Key Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Server and Networking</strong></td>
<td>Designed to flexibly support both traditional and emerging workloads, such as IoT, artificial intelligence and machine learning, the <a href="https://www.dell.com/poweredge">Dell EMC PowerEdge MX7000</a> modular chassis are ideal for consolidating workloads and databases. Its unique kinetic infrastructure, enables customers can break free from the bounds of technology silos and time-consuming, routine operational management while also dynamically assigning IT to optimally match different applications and needs. The low latency, high-bandwidth switching modules for multi-chassis environments include automated processes for topology compliance, quality of service and autonomous healing for peak network performance.</td>
</tr>
<tr>
<td><strong>Storage Array</strong></td>
<td>Consolidation with <a href="https://www.dell.com/powermax">Dell EMC PowerMax</a> lowers the overall cost of ownership by reducing the physical footprint, power and cooling requirements, and operating expenses. As the world’s fastest storage array it can deliver up to 10 million IOPS and 150 GB per second with 290 microsecond response times for demanding OLTP, decision support, real-time analytics and virtualized applications. PowerMax arrays can support up to 64,000 devices/LUNs providing database administrator and test/development teams with plenty of space for replicas, snapshots, and unexpected bursts in storage growth. The NVMe drives introduce new levels of performance and parallelism that is the ideal match for mixed database workloads -- offer greater speeds combined with the ability to service more requests in parallel.</td>
</tr>
<tr>
<td><strong>Data Protection and Backup</strong></td>
<td><a href="https://www.dell.com/dataprotection">Dell EMC Data Protection Suite</a> empowers application owners/database admins to backup directly to Data Domain through native utilities. Dell EMC Data Domain backup appliances reduce the amount of disk storage needed to retain and protect data by ratios of 10-55x and greater. Dell EMC Data Protection software solutions accelerate backups up to 20x and recovery up to 10x faster for mission-critical applications. It protects data and applications residing in on-premises traditional infrastructures to virtualized environments including public and hybrid clouds.</td>
</tr>
<tr>
<td><strong>Simplified Management</strong></td>
<td><strong>CloudIQ</strong>: A no cost, no maintenance cloud-based storage analytics application which uses near real-time intelligence, proactive monitoring, predictive analytics, and machine learning to deliver comprehensive health scores at-a-glance. <strong>Integrated Dell Remote Access Controller (iDRAC)</strong>: Embedded within every Dell EMC PowerEdge server, it provides functionality that helps IT administrators deploy, update, monitor, and maintain servers with no need for any additional software to be installed. iDRAC functions regardless of operating system or hypervisor presence because from a pre-OS or bare-metal state because it is embedded within each server from the factory. iDRAC alerts administrators to server issues, helps them perform remote server management, and reduces the need for physical access to the server.</td>
</tr>
</tbody>
</table>
Benefits of Consolidation

Consolidating your mixed workloads and databases onto a single platform with Dell Technologies can help you to avoid multiple storage silos, drive efficiencies, and achieve greater visibility into the performance, availability and health of your supporting infrastructure.

Maximize ROI

- Save energy as fewer servers require less heating and cooling
- Maximize valuable datacenter floor space as fewer servers have a smaller footprint
- Improve CAPEX and OPEX at scale with great performance

Simplify management

- Improve backup and disaster recovery through centralization
- Lower licensing costs because fewer instances of the database software are required
- Deliver predictable performance at scale for mixed workloads
- Ensure application-driven data protection and long term reliable backup retention
- Provision copies at the speed of the business through greater agility

Future-proof

- Enable cloud operating model efficiency and savings
- Strive for Always On in the digital era

Learn More about Dell EMC Ready Solutions for Oracle and Ready Solutions for SQL Server

Contact a Dell EMC Expert

2. Based on Dell EMC internal analysis of published bandwidth for PowerMax 8000 versus competitive mainstream arrays, March 2018.
3. Based on Dell EMC internal analysis of max IO/s per second (within a single array) for the PowerMax 8000, March 2018.
4. Based on Dell EMC internal analysis of GBs per second (within a single array) for PowerMax 8000, March 2018.
5. Based on Dell EMC internal analysis of >15,000 Data Domain systems deployed worldwide. The backup software used was Dell EMC Avamar. Actual results may vary.
6. Based on Dell EMC internal testing, July 2016 compared to traditional backup.