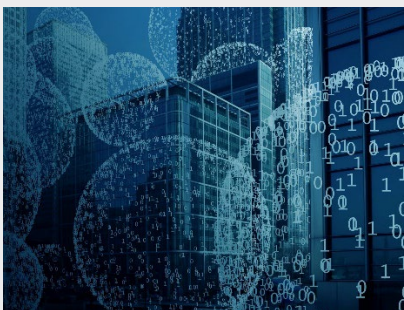


Dell EMC Solutions for Oracle on Containers

Simplify the deployment, protection and operational management of Oracle applications.



Essentials

Containers

- Leverage a flexible platform for even the most complex applications and Oracle databases
- Deploy updates and upgrades of the database application and services
- Empower teams with portability to build locally, deploy to the cloud and run anywhere
- Create predictable environments, isolated from other applications

Oracle Databases on Containers

- Deliver secure, isolated development and test environments in seconds
- Enable greater productivity, improved security, and reduced maintenance and economies at scale
- Improve software release quality and frequency

Dell EMC Modern Infrastructure for Containerized Databases

- Create persistent storage for stateful applications
- Simplify provisioning, management and orchestration of container storage via Container Storage Interface (CSI) plugins

Containers

Containers have reshaped the way companies think about developing, deploying, and maintaining applications. A container consists of an entire runtime environment—an application, plus all its dependencies, libraries and other binaries, and the configuration files needed to run it—bundled into one package. Containers isolate software from its runtime environment, enabling applications to run quickly and reliably from one computing environment to another.

Much like virtualization via virtual machines (VMs) and hypervisors, containers were created to improve data center efficiency and the speed and agility of application deployment and development. In addition to increasing hardware efficiency by supporting multiple users and applications in parallel, containerization also:

- Simplifies the deployment and development of applications and databases consistently across multiple environments because the core operating system (OS) can be configured independently from the application container.
- Improves productivity by simplifying application portability, making it possible for IT operations teams to build and run applications and databases anywhere there is a compatible OS or control plane—on-premises and in the cloud.
- Enables creation of predictable, autonomous and agile environments that are isolated from other applications, so DevOps teams spend less time debugging and diagnosing differences in environments, and more time building new applications and business services.
- Provides developers with a sandboxed view of the OS, logically isolated from other applications. This reduces the number of fixes post release because developers know that what is built in development and test environments will hold true in production.

Because agile DevOps strategies are all about speed, efficiency and portability, developers clearly recognize the value of using containers for application dev/test. However, container adoption for databases, such as Oracle, has been hindered by two factors:

1. Lack of support for persistent storage of database files separate from ephemeral container files
2. Concerns over compatibility with infrastructure components and software.

Oracle Database containers

As organizations embrace digital transformation, they are looking for technologies that drive innovation across the entire organization. Containers can help enterprises modernize legacy applications and create new cloud-native applications that are both scalable and agile in this new digital era. Container engines such as Docker and orchestration frameworks such as Kubernetes, provide a standardized way to package applications—including the code, runtime and libraries—and to run them in a consistent manner across the entire software development life cycle. As a result, there has been an increase in the adoption of containers.

Oracle has been supporting containers for years. Starting with adding support for Kubernetes and Docker in Oracle Database 12c, Oracle has been continually expanding its capabilities and integration with containers on Linux. Moving to a Docker plus Kubernetes infrastructure provides a faster and more consistent way to package and deploy an Oracle database. In the Dockerhub, Oracle provides images of database applications that can be deployed in days and instantiated in seconds. Installations and other repetitive tasks are replaced with packaged applications that allow the developer to quickly work in the database. The ease of using Docker and Kubernetes which aid in rapid provisioning of persistent storage ensures high availability of data and transforms development by removing wait time and enabling the developer to move closer to the speed of thought. The Docker containers have also eased the workload of Oracle DBAs as they don't have to divide their attention between performing production database maintenance and copying the production copies to the developers for development/test work.

Dell EMC CSI plugins: Integration for better orchestration, automation and management of container storage




Containers are by nature designed to be “short-lived” or “stateless,” which is why many organizations use them for test and development purposes. Most often, application developers work outside of the server environments their programs need to run in. To minimize conflicts in library versions, dependencies and configuration settings, the production environment needs to be recreated multiple times for development, testing and pre-production integration. However, when it comes to building or updating databases like Oracle, the data needs to be persistent and must survive restarting, re-scheduling, or deleting a container. When containers are rescheduled, the storage should also be shifted and made available on a new host, for the container to start without incident.


To effectively address the challenges of stateless containers and the need for persistent storage, Dell EMC storage solutions provide unique CSI Plugins that allow customers to deliver persistent storage for container-based applications for both development and production scale. This solution features point-and-click simplicity and frees up valuable time so that the storage administrator can focus on business-critical tasks.

Developers can also protect their progress by using the snapshot feature of Dell Technologies storage solutions to create a point-in-time copy of the database. The integrated copy data management (iCDM) tools within Dell EMC storage solutions provide simple creation, management, orchestration, and automation of Oracle database copies for testing or applications. DBAs can create and manage their own database copies to suit their requirements.

Dell EMC Modern Infrastructure for Containerized Databases

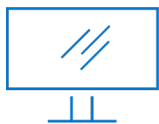
Dell Technologies designs and tests solutions for Oracle to help organizations jump start their application development transformation with a modern infrastructure, including realizing the benefits deploying containers for application and databases. A recent [white paper](#) demonstrates the advantages of using Oracle with containers for an application development and testing environment that is hosted on a Dell EMC platform.

Key Component	Capabilities
<p data-bbox="186 758 407 789">Hyper-converged</p>  <p data-bbox="164 1031 431 1089">VxFlex integrated rack and appliance</p>	<p data-bbox="513 657 1507 993">A software-defined storage platform designed to significantly reduce operational and infrastructure complexity, VxFlex enables organizations to move more swiftly by delivering flexibility, elasticity, and simplicity with predictable performance and resiliency at scale. The VxFlex family provides a solid foundation that combines compute and high-performance storage resources in a managed unified fabric. VxFlex is available in flexible deployment options—integrated rack, appliance, or Ready Nodes—which enable Server SAN, HCI, and storage-only architectures. This architectural choice allows you to optimize how you deploy your infrastructure while minimizing TCO and software licensing expenses. VxFlex provides comprehensive IT Operations Management (ITOM) and Lifecycle Management of the entire infrastructure stack, eliminating IT complexity.</p> <p data-bbox="513 1010 1511 1190">VxFlex is ideal for high-performance applications and databases when building an agile private cloud or consolidating workloads in heterogeneous environments. With its ability to support massive transactional performance, and a broad set of container management platforms including Kubernetes, VxFlex makes an ideal platform use cases such as Oracle databases containers, continuous integration, logging and monitoring platforms.</p>
<p data-bbox="248 1276 347 1308">Storage</p>  <p data-bbox="228 1457 367 1488">XtremIO X2</p>  <p data-bbox="237 1675 358 1707">PowerMax</p>	<p data-bbox="513 1224 1511 1346">The XtremIO X2 of all-flash storage array is an ideal storage platform for running online transaction processing (OLTP), online analytical processing (OLAP), or mixed workloads. It delivers impressively high IOPS, ultra-wide bandwidth, and consistent sub-millisecond latency for databases of all sizes.</p> <p data-bbox="513 1362 1511 1455">The XtremIO X2 CSI Plugin provides Kubernetes technology with built-in enterprise-grade container storage, and uncompromising performance that extends Kubernetes multi-cloud portability to the private cloud.</p> <p data-bbox="513 1472 1500 1623">Dell EMC PowerMax is the world's fastest storage array³. It delivers new levels of performance and efficiency with a future-proof architecture that features end-to-end, non-volatile memory express (NVMe) and a built-in machine learning engine. It also leverages Storage Class Memory (SCM) as true persistent storage and further boosts performance with support of NVMe over Fabrics (NVMeoF).</p> <p data-bbox="513 1640 1503 1761">The CSI plugin for PowerMax is available to provision and manage storage for containerized workloads running on Kubernetes. The CSI plugin extends PowerMax performance and data services to a growing number of applications built on a microservices-based architecture.</p>

Key Component	Capabilities
<p style="text-align: center;">Server</p>  <p style="text-align: center;">PowerEdge Family</p>	<p>Dell EMC PowerEdge servers provide a scalable business architecture, effortless management and integrated security for high-value data management and analytics workloads.</p> <p>Dell EMC offers one of the broadest selections of servers, enabling customers to configure compute to match business requirements. The vast configuration choices in using PowerEdge servers means you can optimize per-core licensing for containers, Docker's Enterprise Edition as an example. The key to getting the greatest return on your containerized environment is consolidation that maximizes the efficiency of CPU utilization.</p>

As modern businesses adapt to the digital economy, IT needs to be prepared with a data management strategy that enables the business to make better use of data that lives in distributed hybrid environments, from edge to core to cloud.

Dell Technologies provides the powerful foundation customers need to meet the challenges they face in connecting data across the Oracle landscape. We simplify the deployment, protection and operational management of Oracle applications, making it easier to achieve data-driven outcomes and make better business decisions.



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