

# Teradata VantageCore Powered by Dell Technologies

## White Paper

### Abstract

This white paper describes Teradata VantageCore powered by Dell Technologies with a focus on the Dell Validated Design for Enterprise Data Warehouse, which streamlines and optimizes advanced data analytics and machine learning systems.

### Dell Technologies Solutions



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# Revision history

**Table 1. Document revision history**

<b>Part number</b>	<b>Release date</b>	<b>Description of changes</b>
H19542.1	April 2024	Removed "Solutions" from mentions of Teradata VantageCore. Revised the "Teradata" section of the Partner technology overview.
H19542	March 2024	Initial release.



## Topics:

- [Introduction](#)
- [Business challenges](#)
- [Solutions overview](#)
- [Partner technology overview](#)
- [Solution architecture](#)
- [Dell Technologies helps you every step of the way](#)
- [Conclusion](#)
- [References](#)

# Introduction

## Executive summary

Enterprise data analytics is a rapidly evolving field that plays a crucial role in delivering trusted AI that enables businesses to make better decisions. The primary goal of data analytics is to gain a deeper understanding of data and extract insights that can lead to strategic and operational improvements. By integrating data across the organization, companies can empower all users to proactively uncover patterns and trends that provide insights into customer behavior, market dynamics, operational efficiencies, and potential risks.

Today, organizations are running business critical workloads with stringent service level agreements (SLA) to meet core business requirements. Flexibility in data utilization and fast analytical performance are important accelerators that contribute to significant competitive advantages. Together, Dell and Teradata have developed a portfolio of solutions for holistic, data-driven insight with a variety of deployment options that offer flexibility of the cloud with the control and security of on-premises implementation. The validated Enterprise Data Warehouse (EDW) solution architecture described in this white paper combines industry-leading Teradata Vantage data management and enterprise analytics software with Dell Technologies' enterprise data infrastructure.

## Document purpose and audience

This document is intended for the following roles involved in advanced analytics and data center modernization:

- Data and application administrators
- Data engineers
- Data analysts
- Data scientists
- IT decision-makers

The paper outlines the architecture, components, and use cases for Teradata VantageCore powered by Dell Technologies. It also provides valuable insights into how the Dell validated EDW solution architecture can support advanced analytics customers by modernizing their data collection, allowing them to consolidate mixed workloads, eliminating data silos, and driving real business insight.

# Business challenges

While many organizations are proficient in data analysis for business insights, there are few with a process that is anywhere near ideal. As the demand for innovative data analysis continues to soar in tandem with the exponential growth of data volumes, organizations find themselves grappling with the complexities of maintaining secure, comprehensive, and efficient data repositories capable of supporting these evolving analytical workloads.

The landscape is characterized by a proliferation of data dispersed across multiple clouds and hybrid infrastructures, spanning diverse regions, and encompassing a myriad of formats and storage systems. These disparate data silos present formidable challenges, hindering the ability to leverage data in a cohesive manner for holistic analysis. Despite the emphasis placed on multi-cloud environments, the necessity for hybrid infrastructures persists, driven by imperatives such as performance optimization, stringent security protocols, and governance requirements.

Consequently, organizations are tasked with navigating a complex ecosystem where data must be seamlessly integrated from diverse sources to paint a comprehensive picture for analysis. In such a landscape, achieving a unified data strategy that transcends cloud boundaries and hybrid environments becomes imperative for organizations aspiring to unlock the full potential of their data assets.

## Solutions overview

Teradata VantageCore powered by Dell Technologies include Quick Start and Enterprise Data Warehouse. Quick Start and the more comprehensive Enterprise Data Warehouse solution have distinct considerations based on their specific requirements and contexts. The Quick Start is an appealing choice for organizations seeking a streamlined, efficient setup with a focus on simplicity and speed. This option reduces the complexity and time required for deployment, offering a pre-configured, simplified path to harnessing the analytics capabilities of Teradata Vantage. It is an ideal deployment for small to medium-sized enterprises, test and development, or departments within larger organizations looking for a quick, hassle-free implementation.

On the other hand, the full-fledged Enterprise Data Warehouse solution is tailored for organizations requiring a comprehensive, robust, and highly scalable data warehouse environment. This option provides extensive customization, advanced analytics and machine learning capabilities, and the ability to handle massive volumes of data across diverse data sources. The EDW solution offers higher performance, greater scalability, and extensive support for complex, diverse business intelligence requirements.

## Quick Start

Quick Start is a deployment option that provides a simple, yet optimized solution on a single physical VMware ESXi host. It is designed for smaller, non-mission-critical workloads that enable customers to easily deploy on their own. Workloads such as proof of concept, development, test, or departmental datamarts are ideal for Quick Start. It is an ideal deployment for small to medium-sized enterprises, test and development, or departments within larger organizations looking for a quick, hassle-free implementation.

This customer-installable option can be operational within hours. The Quick Start deployer prompts the user for the information required to perform the installation and then deploys the Vantage Analytics Database and the optional ecosystem products onto a single VMware-enabled server. It requires no deployment services.

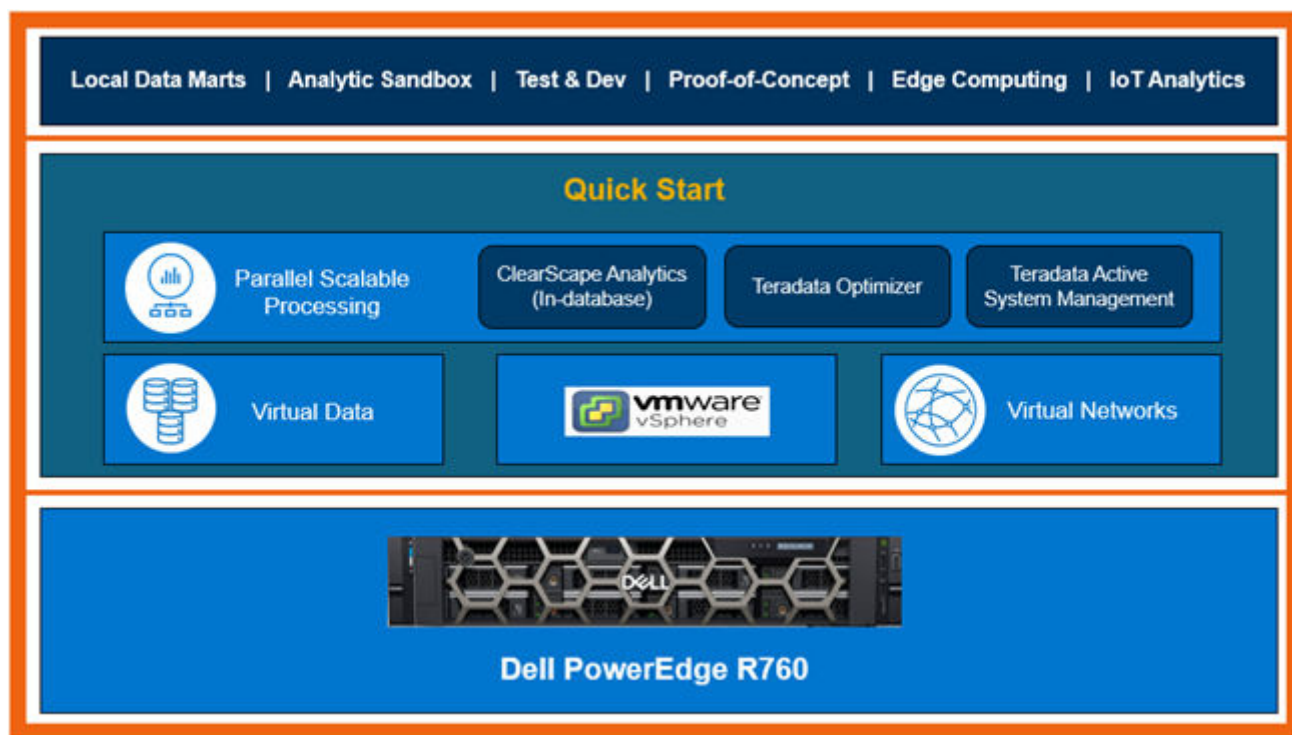
Customers can start small with Quick Start and grow to larger-scale deployments, all within a consistent Vantage software stack that is 100% compatible across various deployment options. Quick Start consists of the following components:

<b>Teradata Vantage Analytics Database</b>	Includes Analytics Database and other capabilities that vary based on customer requirements. It provides the same full-featured data warehouse software that powers analytics at many of the world's greatest companies and is available with local or shared storage.
<b>Teradata Data Stream Controller (DSC)</b>	Provides administrative functions and metadata storage. It is a key component of the backup and restore of Teradata systems. The DSC is an administrative server required to enable object-level backup and restore of Vantage. It contains a repository for all backup and restore job definitions and related configuration details for Teradata systems and backup targets.
<b>Teradata Server Management</b>	Monitors the VM and generates alerts related to database and operating system errors and operational state changes.
<b>Teradata Tools and Utilities</b>	Provides utilities and libraries for integrating your Teradata system into your enterprise and streamlining the daily data warehouse management tasks, such as moving massive volumes of data, accessing multiple data sources in parallel, and improving your overall Teradata system performance.

**Teradata Viewpoint**

Provides a web-based management portal for Teradata performance and health management which is easy to use. It provides a consistent interface using configurable portlets to customize personal systems management dashboard.

The figure below shows the high-level architecture of Quick Start solution powered by a single Dell server infrastructure.



**Figure 1. Quick Start**

This complete Quick Start solution is designed for customers who want to quickly stand up a single-node Teradata Vantage platform to hit the ground running, eliminating, or reducing variables related to a full-blown production deployment such as the networking for BYNET. It is suitable for environments like proof of concept, test & dev, or edge computing. For details, see [this Teradata article](#).

## Enterprise Data Warehouse

In today's data-driven world, organizations face the challenge of efficiently managing and delivering value from vast and diverse data sets. To address this, a comprehensive and robust data warehouse management system is essential.

The end-to-end Enterprise Data Warehouse solution requires careful consideration of various components and their capabilities. Dell has worked closely with Teradata to develop a joint solution that addresses the growing challenges to analytics and machine learning caused by the architectural differences between data warehouses and data lakes. The Dell Validated Design for Enterprise Data Warehouse addresses the demands for organizations already down the path of deploying data warehouses and data lakes today. It also addresses the requirements of organizations that have not deployed yet but recognize the value that advanced analytics and machine learning can deliver to their data-driven decision-making process.

The end-to-end Enterprise Data Warehouse requires careful consideration of various components and their capabilities. This purpose-built solution combines Dell compute, networking, storage, and Teradata Vantage software into a powerful analytical platform. It gives business users, data analysts, and data engineers access to a streamlined, and highly available advanced analytic and machine learning data warehouse platform to derive insights quicker and make well-informed decisions from vast amounts of data.

Figure 2 shows the Enterprise Data Warehouse architecture.

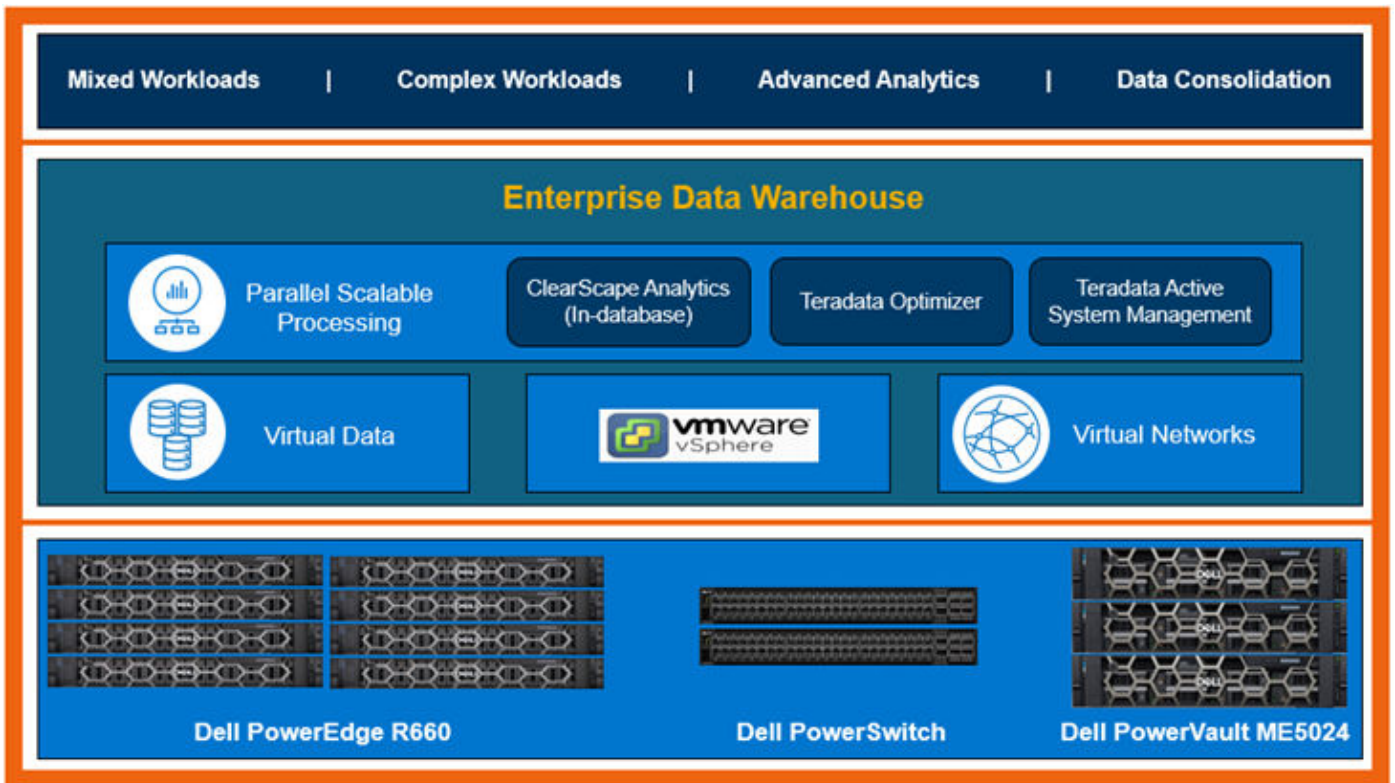


Figure 2. Enterprise Data Warehouse

This complete Enterprise Data Warehouse solution is designed for AI, ML, and other advanced analytics deployment across a wide range of environments. The validation process ensures that the solution provides flexibility for organizations to configure according to their requirements.

## Partner technology overview

### Teradata

Teradata is a software company that provides the most complete analytics and data platform for AI. By delivering harmonized data, trusted AI, and faster innovation, we uplift and empower our customers—and our customers' customers—to make better, more confident decisions. The world's top companies across every major industry trust Teradata to improve business performance, enrich customer experiences, and fully integrate data across the enterprise.

### Teradata Vantage Overview

Teradata Vantage is the most complete analytics and data platform. It prioritizes harmonized data, trusted AI, and faster innovation.

Integrating data from any source and in any deployment to ensure consistency across organizations and enterprises for more cost-effective results. Teradata Vantage contains a cross-engine orchestration layer that pipelines the right data and analytic request to the right analytic engine across a high-speed data fabric.

Leveraging powerful, open, and connected analytics that perform with speed, deliver better insights, and inspire the confidence to act—continuously enriching customer experiences.

Making breakthroughs that unlock the next great discovery to improve performance and drive profitable growth with velocity.



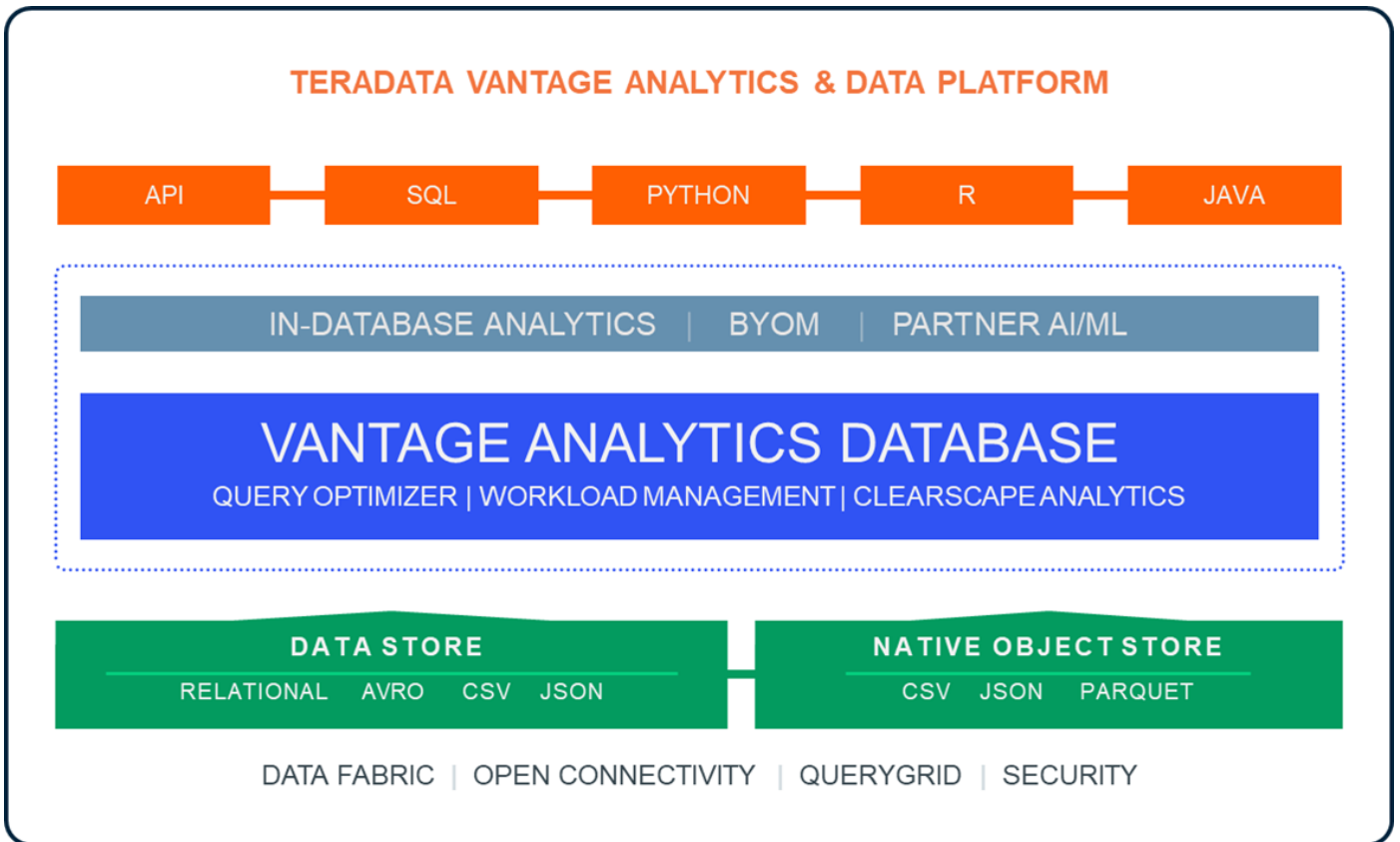


Figure 3. Teradata Vantage Architecture

## Solution architecture

### Enterprise Data Warehouse components

The Dell Validated Design for Enterprise Data Warehouse consists of the finest hardware and software from Dell Technologies and Teradata, which have been carefully chosen for their ability to handle compute-intensive workloads and scale to the demanding requirements of modern data warehouse environments for advanced data analytics and machine learning.

This validated design offers an end-to-end solution for on-premises or multi-cloud enterprise data warehouse; an alternative to cloud-based Teradata Cloud. It includes the partnership between Dell Technologies and Teradata to deliver a modern enterprise data warehouse platform powered by Dell's infrastructure. This collaboration combines Dell's latest generation PowerEdge servers and PowerVault ME5 Series block storage with Teradata Vantage—Teradata's flagship analytic platform offering. It also includes technologies like SUSE Linux Enterprise Server operating system and VMware ESXi hypervisor.

These integrated technologies enable customers to process, store, and analyze large-scale data workloads efficiently and cost-effectively. It empowers organizations to perform advanced data analytics, including machine learning and artificial intelligence to get valuable insights and make sound business decisions.

The Dell Validated Design for Enterprise Data Warehouse includes:

**SUSE Linux Enterprise Server** A Linux-based operating system developed by SUSE. It is available in two editions, Server (SLES) for servers and Desktop (SLED) for workstations and desktop computers. SUSE Linux is known for its reliability, scalability, and flexibility, making it a popular choice for a wide range of computing environments, from servers to desktops.

**VMware vSphere** A suite of products that include ESXi and vCenter. ESXi is an enterprise-class, type-1 hypervisor developed by VMware for deploying and serving virtual computers. It runs directly on bare-metal servers without the requirement of an operating system. Also known as a bare-metal hypervisor. ESXi consolidates hardware for higher capacity utilization while streamlining IT administration through

centralized management. vCenter is the management software that allows administrators to control the vSphere environment including virtual infrastructure automation and delivery across the hybrid cloud.

Some key benefits of this solution include:

- Unified Data Management** Teradata Vantage provides a unified platform for data management and analytics. It contains a cross-engine orchestration layer that pipelines the right data and analytic request to the right analytic engine across a high-speed data fabric.
- Advanced Analytics** Teradata Vantage offers a wide range of advanced analytics capabilities, including machine learning and 4D analytics which combines geospatial, temporal, and time series data. These tools enable organizations to gain deeper insights from their data and make more informed, data-driven decisions.
- Data Integration** Teradata Vantage transforms the complexity of the most advanced analytics technologies into a simple, seamless user experience. It offers data scientists and business analysts a wide range of advanced analytic functions available in powerful engines without worrying about where they reside.
- Data Democratization** Teradata Vantage provides various technical capabilities such as schema discovery as well as data catalog, making data discovery a reality. This feature makes data democratization possible by automatically discovering data with intelligence, allowing business users to easily find the data they are looking for.

The figure below shows the end-to-end enterprise data warehouse architecture.

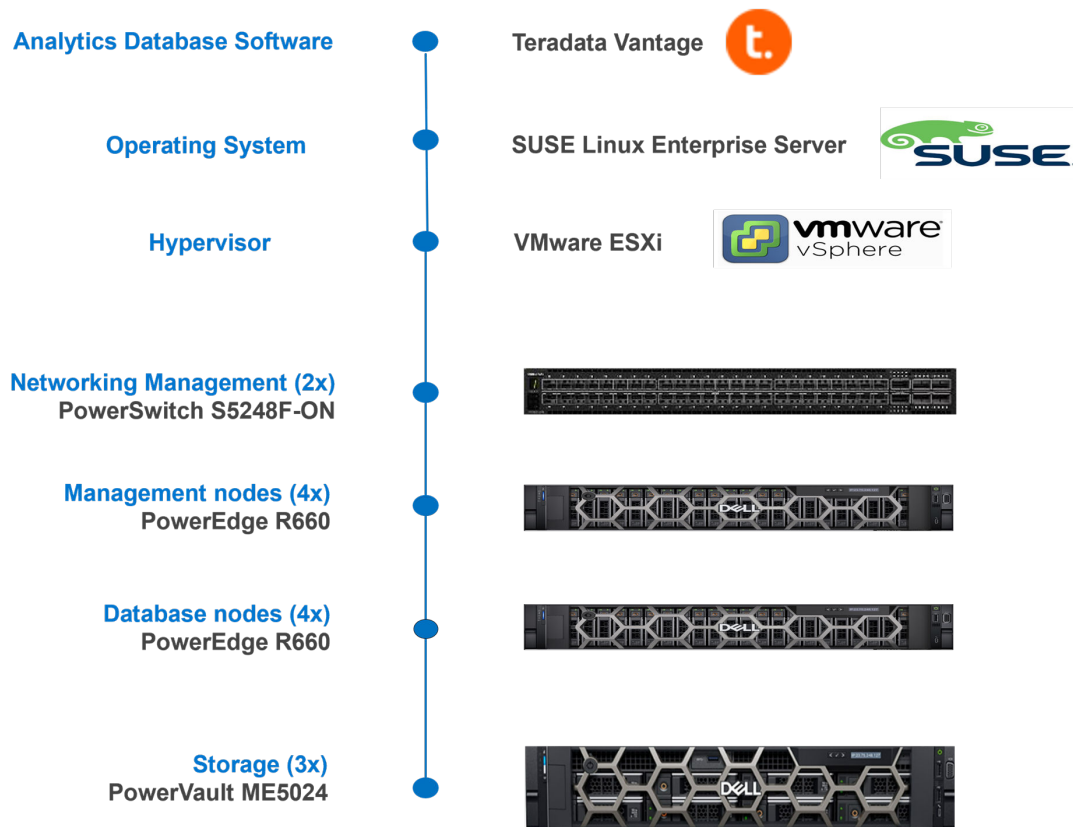


Figure 4. Teradata VantageCore Enterprise Data Warehouse solution stack

## Hardware

Hardware components of the Dell Validated Design for Enterprise Data Warehouse include:

- The Dell PowerEdge R660 server is perfectly matched for compute-intensive workloads while also minimizing the data center footprint through its 1U form factor. The PowerEdge R660 design enables businesses to easily scale while still handling challenging and emerging workloads. This dual-socket compute platform is ideal for Teradata Vantage database nodes and management nodes.
- The database nodes handle all the "heavy lifting" for the solution. The PowerEdge R660 server model was chosen for this purpose due to its ample performance and flexibility to efficiently handle the Teradata Vantage Advanced SQL Engine

components. This server supports PCIe Gen5 for faster access and transport of data, optimizing application output. Also, this server has enough capacity to support GPUs and I/O bandwidth.

- The Dell PowerSwitch S5248F-ON delivers the top of rack switching. It is a 25 GbE/100 GbE open networking switch that provides state-of-the-art, high-density switching. The open networking capability provides extra flexibility for ever-changing network configurations. The software-defined networking enables a communications fabric that can change and adapt to the scaling of the cluster. The fabric optimizes communications paths with the compute demands as workloads are deployed and shifted across the database nodes.
- The Dell PowerVault ME5 model is a simple, fast, and affordable SAN/DAS storage platform that is optimized to run a variety of mixed workloads - physical and virtual - for small to medium size businesses. The flexibility of PowerVault ME5 offers multiple protocols such as SAS, FC, and iSCSI, supports a wide range of drive types and capacities, and validated with Dell PowerEdge 16G servers. Using fast Intel Xeon processors, Dell PowerVault ME5 storage implements a dual-active controller architecture that provides high redundancy and performance. It is suited for the demands of Teradata Vantage Advanced SQL engine.

The following table lists the hardware components used for the enterprise data warehouse solution.

**Table 2. Enterprise Data Warehouse hardware list**

Type	Usage	Resource
Servers	Teradata management nodes	Four PowerEdge R660 servers
	Teradata database nodes	Four PowerEdge R660 servers
Storage	SAN/DAS	Three Dell PowerVault ME5024
Networking	Management network	One PowerSwitch S3148 switch
	iSCSI data network	Two PowerSwitch S5248F-ON switches

## Software

Software components of the Dell Validated Design for Enterprise Data Warehouse system include:

**Teradata Vantage Analytics Database** Provides the same full-featured data warehouse and analytics software that powers analytics at many of the world's largest companies and is available with local or shared storage. SUSE Linux Enterprise Server is a highly reliable, scalable, and secured server operating system designed to power mission-critical workloads. It is an adaptable and easy-to-manage operating system that allows developers and administrators to deploy business-critical workloads on-premises, in the cloud, and at the edge.

**VMware vSphere** A suite of server virtualization products that includes ESXi hypervisor and vCenter management software. VMware ESXi is a type 1 hypervisor responsible for abstracting processors, memory, networking, storage, and other resources into multiple virtual machines (VMs). VMware vCenter is the centralized management utility that allows IT administrators to manage virtual machines and all dependent components through a single pane of glass.

The following table shows the software components used for the enterprise data warehouse solution.

**Table 3. Partner software details**

Type	Partner	Version
Teradata Vantage	Teradata	17.20.03
Operating System	SUSE Linux Enterprise Server	12 SP3
VMware vSphere	VMware	7.x

# Dell Technologies helps you every step of the way

## The Dell Technologies Customer Solution Center

The Dell Technologies Customer Solution Center (CSC) is an important supporting organization for your analytics and machine learning implementation. The CSC uses the Dell Validated Design for Teradata Vantage - Enterprise Data Warehouse and many other solutions to accelerate achievement of your goals and realize your digital future:

- Proof of Concept** Validate that your preferred solution meets your needs with a custom Proof of Concept. Dell Technologies solution architects enable practical, firsthand implementation based on your test cases.
- Design Session** Collaborate with Dell Technologies experts to design a solution framework. Brainstorm with our experts to explore your current IT environment, your future objectives, and potential solutions.
- Technical Deep Dive** Dive into the technical solution details that you are considering for your organization. Learn from live product demonstrations and solution-focused discussions with Dell Technologies subject matter experts.

Contact your Dell Technologies sales representative today to schedule a customized briefing or solutions engagement for this or any other Dell Validated Design.

## Deployment and support

Dell Technologies can provide a broad set of capabilities for implementing and maintaining solutions, linking people, processes, and technology to accelerate innovation and enable optimal business outcomes.

- Consulting Services help you create a competitive advantage for your business. Our expert consultants work with companies at all stages of data analytics and machine learning. They can help you plan, implement, and optimize solutions that enable you to unlock your data capital and support advanced techniques, such as AI, ML, and DL.
- Deployment Services help you streamline complexity and bring new IT investments online as quickly as possible. Leverage our 30 plus years of experience for efficient and reliable solution deployment to accelerate adoption and return on investment (ROI) while freeing IT staff for more strategic work.
- Support Services driven by AI and DL will change the way you think about support with smart, groundbreaking technology backed by experts to help you maximize productivity, uptime, and convenience. Experience more than fast problem resolution-our AI engine proactively detects and prevents issues before they impact performance. Select ProSupport Plus for a single point of contact for hardware support.
- Payment Solutions from Dell Financial Services help you maximize your IT budget and get the technology you need today. Our portfolio includes traditional leasing and financing options, and advanced flexible consumption products to let you leverage OPEX instead of CAPEX if that suits your business requirements.
- Dell Technologies APEX offers a simple approach that gives you a wide range of consumption models, payment solutions, and services so you can optimize for various factors while realizing more predictable outcomes.

Residency Services provide the expertise needed to drive effective IT transformation and keep IT infrastructure running at its peak. Resident experts work tirelessly to address challenges and requirements, with the ability to adjust as priorities shift.

## Conclusion

### Summary

In a world driven by data, the choice of infrastructure and platform for an enterprise data warehouse architecture is pivotal. Dell Technologies combined the power of Teradata Vantage and technologies like VMware vSphere and SUSE Linux, offers a transformative solution. This complete enterprise data warehouse solution empowers organizations to manage, analyze, and derive actionable insights from their data assets while ensuring reliability, flexibility, scalability, and security.


The Dell Validated Design for Enterprise Data Warehouse delivers the power and sophistication required by companies with mixed, complex workloads. Dell Validated Designs are tested and proven configurations, designed from the start to dynamically

fit the needs based on specific use cases. These integrated solutions help speed and simplify advanced analytics and machine learning deployments.

## We value your feedback

Dell Technologies and the authors of this document welcome your feedback on the solution and the solution documentation. Contact the Dell Technologies Solutions team by [email](#).

Authors: Dell Technologies Integrated Solutions Engineering, Technical Marketing, and Content Engineering and Translation teams

 **NOTE:** For links to additional documentation for this solution, see the [Dell Technologies Info Hub for Data Analytics](#).

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## References

### Dell Technologies documentation

The following Dell Technologies documentation provides additional and relevant information. Access to these documents depends on your login credentials. If you do not have access to a document, contact your Dell Technologies representative.

- [Dell Technologies Info Hub for Artificial Intelligence](#)
- [Dell Technologies Info Hub for Data Analytics](#)