

Teradata IntelliFlex™

Powerful Analytics Platform with Rapid, Self-Service Elasticity

In today's fast-paced, ever-changing competitive environment, your analytics platform must provide higher performance, availability, agility, and scalability to support your company's increasing tactical and analytical workloads. Teradata IntelliFlex™ meets the widest range of operational and strategic intelligence needs as the highest performing, most dependable, most flexible, most elastic, and most cost-effective platform for a Teradata solution.

The Teradata IntelliFlex hardware platform and Teradata Vantage, the platform for pervasive data intelligence—together compose a totally integrated, scalable solution to manage all the relevant data, all the time, and deliver analytics that matter. Vantage combines in a single platform descriptive, predictive, prescriptive analytics, machine learning, and graph analytic functions; and IntelliFlex is the most powerful, scalable, and robust hardware platform for running Vantage.



To support your business analytics and to deliver the answers you need, the Teradata IntelliFlex platform is purpose-built to run Teradata Vantage to its fullest capabilities, including the industry-leading NewSQL Engine, along with software-defined Machine Learning and Graph engines. IntelliFlex also incorporates Teradata Virtual Storage, the world's most advanced temperature-based storage management system, and Teradata Active System Management (TASM), which is unique and unmatched in the industry for real-time, automated, self-balancing workload management. The massively parallel processing (MPP) architecture of the platform is the perfect match to the parallel, shared-nothing architecture of Teradata Vantage. The fabric-based network architecture enables flexible growth as never seen before—allowing you to independently scale processing power and data capacity depending on your business requirements.

Teradata IntelliFlex delivers real-time intelligence to place vital data into the hands of front-line decision makers, while extending traditional data warehouse functionality into the realm of tactical decision making and advanced analytics. With IntelliFlex, you can combine strategic, operational, and discovery workloads in a single analytics platform.

Now you can focus on your business and not on managing technology—enabling you to make smarter, faster decisions on any data at any time, and with maximum return on investment. Key attributes are:

High-Performance Technology

With exceptionally modular design and architecture, Teradata IntelliFlex is implemented with best-in-breed system elements that enable the most powerful, yet most flexible Teradata hardware platform to date. IntelliFlex features the latest 18-Core Intel® Xeon® Processors, and the platform's parallel architecture fully leverages both the Intel Multi-Core and Hyper-Threading processor technologies to gain maximum processor and system performance.

Another key technology featured in IntelliFlex is the use of hybrid storage that now combines two sizes of **Solid State Drives (SSD)**[®] for performance optimization of your data. With Teradata's all-SSD hybrid storage, the frequently used hot data are stored on very high-performance SSD devices that are designed for write-intensive operations (many writes per day) while the less frequently used warm/cold data are placed on the larger drives optimized for read-intensive usage (few writes per day). Unique to Teradata, the placement and migration of data based on data temperature is fully automatic with the Teradata Virtual Storage feature.

The bottom line is that IntelliFlex is designed specifically for Vantage to deliver the highest query throughput, fast query performance, and consistent query response times. IntelliFlex provides greater business value by allowing more real-time users, faster response to events, deeper and more complex analytics, more insightful answers, and broader application of your business-critical analytics.

Intelligent Design

Valuable business intelligence starts with intelligent and agile system design. Teradata IntelliFlex is designed for your business requirements now and your future growth plans. How much hot data space do you need, how much processing power, what kind of query response time, which analytic engine do your data scientists prefer? Because every customer has different business needs, Teradata IntelliFlex offers a broad range of performance, analytic tools, and data capacity to meet a variety of workload requirements. You may have fewer users or applications or need less data storage, but still require active workload management with TASM or mission-critical business continuity with hot standby nodes. You may have outgrown the capabilities of a Teradata Data Warehouse Appliance and want to step up to fully-active data warehousing. You may want to explore pathing and time-series functions, or utilize other tools and languages within Teradata Vantage.

Flexible Scalability with Built-In Elasticity

The whole IntelliFlex system can scale to 2,048 nodes, and accommodates well over 100PB of user data. It supports 1000s of concurrent users and 100s of applications. Built-in performance elasticity means you can tailor your configuration to exactly what you want now, and easily grow by activating only what you need—data capacity and/or processing power. Using software controls, scale your performance up or down as your workload requirements fluctuate. And do this all from a user-controlled

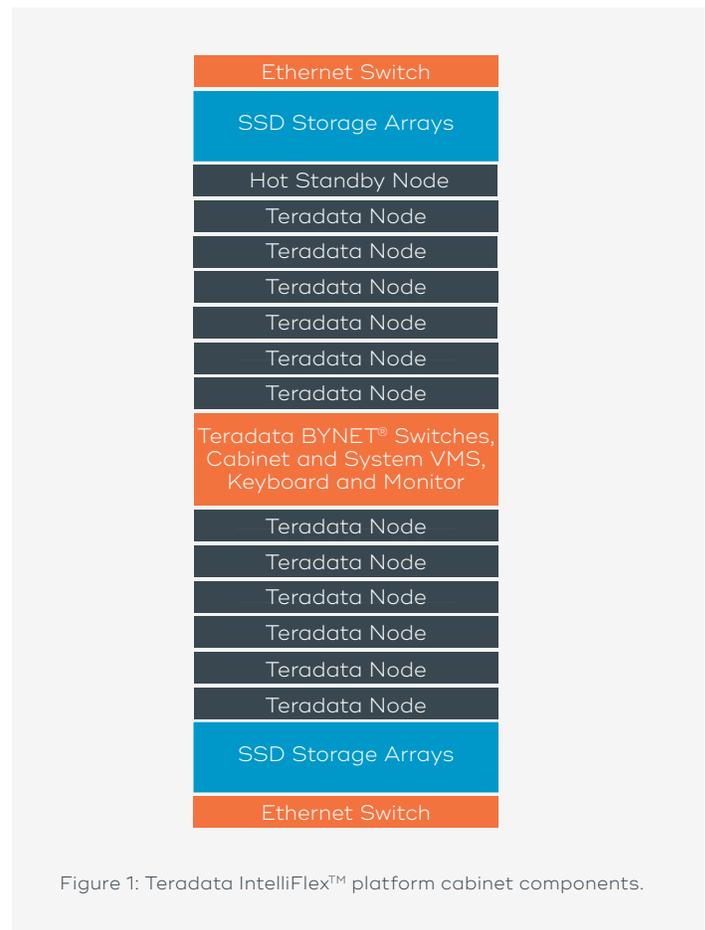


Figure 1: Teradata IntelliFlex™ platform cabinet components.

interface with no or limited database downtime. When data capacity needs increase, add more storage drives with no additional software license costs.

The Teradata BYNET[®] system interconnect for high-speed, fault tolerant messaging between nodes is a key ingredient to achieving scalability. The BYNET is based on a robust, powerful protocol with innovative database messaging features that optimize the use of a dual InfiniBand fabric for the Teradata MPP architecture.

Availability

Teradata IntelliFlex achieves availability through a unique clique architecture in which up to twelve active nodes and a hot standby node are connected to common storage through the network. This approach allows the NewSQL Engine to seamlessly failover workloads between the active and hot standby nodes in a clique if a node fails. The **data resilience feature**[®] within the NewSQL Engine manages duplicate copies of data objects on alternate storage subsystems to ensure there is always a second copy of your data readily available. The platform also contains redundant hardware

components, so if a failure occurs, it won't affect Teradata operations or the end-user experience. Many of the hardware components are hot-swappable, allowing service repair without affecting system availability.

Robust Workload Management

Teradata Workload Management provides capabilities to classify, manage, and prioritize workloads so the database resources (CPU and I/O) are evenly distributed according to the predefined priorities. TASM provides advanced, fine-grained workload management and prioritization capabilities suitable for heavy mixed workload or active environments.

Manageability and Ease of Use

The platform features simplified platform administration, control, and monitoring with the single operational view provided by the Teradata Server Management Web Services.

The industry-leading, integrated systems management infrastructure monitors and controls the system, performs routine events, such as orderly start up and shut down, and prevents harm from a disruptive failure, such as a power outage or extreme heat. Combined with Teradata Viewpoint, which provides an intuitive, easy-to-use interface for managing and monitoring one or more Teradata systems, the platform enables users to have continuous access to the status of their business results.

Growth with Investment Protection

Teradata IntelliFlex and Teradata Vantage support multiple platform generations within a single system to ensure your current investment is completely protected. By enabling expansion with newer generations, you can grow your system to include the latest platform technology, while reaping a return on your initial technology investment and leveraging the price/performance curve as it evolves.

Tightly Integrated Solution

Teradata IntelliFlex supports a variety of processing and storage elements fully integrated into the system cabinets for the flexibility to meet customer needs.

These include:

- **Teradata node**—The basic processing element for the Teradata Vantage NewSQL Engine.
- **Hot standby node**—A redundant Teradata node added to a clique to provide full performance continuity in the event of a node failure.

- **Teradata analytics node**—With extra memory and SSDs for Machine Learning and Graph engines.
- **Data storage arrays**—Multiple storage arrays that encompass both the RAID controllers and data storage drives.
- **Teradata BYNET InfiniBand Switches**—Support the high-performance BYNET system interconnect with high availability, fault tolerant, dual networks that ensure highly scalable, error-free MPP communication.
- **Channel node**—A dedicated Teradata node that supports a unique capability for mainframe connectivity. Also, the Extended Channel Server enables connection to a remotely located mainframe.
- **Teradata Multipurpose Server**—Applies enterprise-level Teradata system management capabilities to a commodity server for applications that support the NewSQL Engine. A base model of the server can be configured to meet your needs and supports the Linux® operating system. Pre-configured models are available for specific Teradata tools and applications, such as Teradata Unity, BAR (Backup and Restore), and others. Several Teradata Multipurpose Servers can be supported in the cabinet and in a separate Teradata Cabinet.
- **Virtual Management Server (VMS)**—Based on the Teradata Multipurpose Servers and virtualization technology, this server virtualizes multiple key system functions into a single physical server. These functions include Teradata Viewpoint, server management functions, and the Teradata Customer Services Workstation for remote access to the system. The VMS saves valuable cabinet rack space by eliminating the need for separate physical servers for each of these functions.
- **Teradata Cabinet**—Provides a flexible approach to the packaging and management of all platform elements described above that are not Teradata node or storage related. In addition to these elements, BAR storage hardware for smaller sized systems is supported as space permits.

Platform Sustainability

The Teradata IntelliFlex platform's performance and flexible scalability enable you to save significant energy and floor space. The densely packed cabinet provides ample processing power, CPU cores, memory, hot data space, and bandwidth in a single cabinet to easily satisfy your toughest active workload requirements. The capability to utilize multiple generations lengthens the useful life of Teradata systems resulting in less carbon and electronic waste.

Teradata IntelliFlex Description

Teradata Nodes

Processors

- Dual Intel® Xeon® 6140 18-core Processors
- Clock speed: 2.3GHz
- Intel Hyper-Threading Technology with 2 threads per core

Memory

- 512GB per node using DDR4 fully-buffered DIMMs with ECC
- Node Internal Storage Devices
- Integrated RAID controller with SAS backplane
- Eight media bays per node
- Up to six hot-swappable SAS drives (plus two 800GB SSD as standard for operating system)

Connectivity per Node

- Two PCIe Gen 3 slots
- Fabric Attached Storage Connectivity
- Multiple Customer Network Ports

Teradata Vantage

NewSQL Engine

- Shared-nothing parallel architecture linearly scales applications, data volumes, and users
- Mission-critical availability
- In-database advanced analytics, including geospatial, temporal, data mining, and modeling
- Teradata Virtual Storage feature provides automatic temperature-based data migration and management in hybrid storage
- Industry-leading optimizer attains maximum query efficiency
- Teradata Active System Management

Operating System

- SUSE® Linux

Data Storage

Data Capacity

- System scalable to more than 100PB with 15.3TB drives

Storage Devices

- 1.6TB, 6.4TB, and 15.3TB SSD SAS enterprise flash drives
- SSD provides ECC data protection and supports robust, five-year write wear out protection
- Full disk encryption on all drives (array and node) for secure data if drive lost or stolen

NetApp® Disk Arrays

- 12 or 24 SSD per E5600 and E2800 arrays
- High availability with dual redundant RAID controllers

Integrated Cabinets

IntelliFlex System Cabinet

- High-density cabinet contains complete Teradata solution (nodes, storage, networking, and monitoring)
- Six or twelve active nodes in a cabinet
- Hot standby node
- Four or eight SSD arrays per cabinet
- Dual, 36-port BYNET V6 switches support node to storage connectivity
- Ethernet network switches
- Virtualized Managed Server combines Teradata Viewpoint, cabinet management, and services workstation functions

- Dual AC distribution with raised floor or overhead AC cable egress
- Optional analytics nodes for machine learning and graph engines

Teradata Cabinet

- Teradata Multipurpose Servers for related applications such as Teradata IntelliSphere and SAS
- Teradata Channel Nodes for Mainframe Connectivity: FICON
- Teradata Backup and Restore (BAR)
 - Quantum Tape Libraries
 - EMC Data Domain Disk Backup
 - Veritas NetBackup storage management software

Teradata BYNET V6 MPP

Interconnect

- Enables linear scalability up to 2,048 nodes maximum
- Fault tolerant interconnect via dual networks
- EDR InfiniBand interconnect for physical layer
- Up to 100M link cable length for data center flexibility (other lengths available)
- InfiniBand adapters on PCIe Gen 3 for optimal interconnect performance
- High Availability Hardware Features
- Multiple AC inputs enable power sourcing from two grids for maximum uptime
- Hot pluggable/replaceable components include power supplies, disks, and cabinet fans
- Fault resilient fan modules, redundant power supplies, fault tolerant BYNET Interconnect

Purpose-Built Platform Excellence

The Teradata IntelliFlex platform can easily adapt and grow along with your business. Backed by the award-winning professional services, support, consulting,

and demonstrated data warehousing expertise from Teradata, Teradata IntelliFlex is the solid foundation you need to drive real value from your data to maximize the return on your investment.

Teradata IntelliFlex Specifications

Cabinet Specifications

- Height: 80.5 in. (204.5 cm)
- Width: 24 in. (61.4 cm)
- Depth: 49 in. (124.4cm)
- 47 in. (119.4 cm) without doors
- Weight: 2,000 lbs. (907 kg) fully loaded

Operating Specifications

Environment

- Operating Temperature: Allowable: 59°F to 90°F (15°C to 32°C)
 - Recommended: 64.8°F to 80.6°F (18°C to 27°C)
- Relative Humidity: Allowable: 20% to 80% (non-condensing)
 - Recommended low end moisture: 5.5°C DP (41.9°F DP); High end moisture: 60% RH and 15°C DP (59°F DP)

Electrical

- Worldwide: 200 – 240V (Phase to Phase or Single Phase)
 - 30A/32A, 4-cord

- North America: 200 – 240V
 - 30A, 3-p delta, 4-cord
 - 60A, 3-p delta, 2-cord
- International: 220 – 240/381
 - 415V
 - 30A/32A, 3 phase wye, 2-cord, (including North America with EU style power)
- All plugs are IEC 60309 CEE17
- Frequency: 50Hz/60Hz
- Dual AC: Standard
- Bottom or top egress supported
- Compliant with U.S. and International Safety and Emissions Standards
- RoHS compliant; WEEE Services available

Support Services

Premier Warehouse Support

- Delivers a single source service to maximize value and availability of your solution
- Flexible support options that

allow you to select the coverage and response times you need

- Integrated, proactive tools, such as Teradata Vital Infrastructure and Teradata ServiceConnect™ remote connectivity
- Optional Services: Priority Service, On-Site Spare Parts

Teradata Vital Infrastructure

- Built-in hardware and software support capability
- Automatic alerting and seamless incident creation (Call Home)

Implementation Services

- System Installation
- Software Implementation
- Analytic Consulting Services available

Operational Services

- Critical System Management
- Data Migration
- Operational Mentoring

Each platform is integrated according to the configuration that best meets your needs and is pre-tested, so it's ready to run right after delivery. You can begin loading data and running queries shortly after initial delivery—and quickly begin getting business value.

The Teradata IntelliFlex platform provides unmatched performance for all your strategic and operational analytics needs, eliminates risk, and allows you to focus on driving the highest return on your analytics investments—today and in the future.

Teradata transforms how businesses work and people live through the power of data. Teradata leverages all

of the data, all of the time, so you can analyze anything, deploy anywhere, and deliver analytics that matter most to your business. And we do it on-premises, in the cloud, or anywhere in between. We call this pervasive data intelligence. It's the answer to the complexity, cost and inadequacy of today's approach to analytics. Get the answer at [Teradata.com](https://www.teradata.com).

Endnotes:

❏ <https://www.teradata.com/Resources/White-Papers/High-Performance-SSDs-Enable-Teradata-IntelliFlex>

❏ <https://www.teradata.com/Resources/White-Papers/Data-Resilience-with-Fallback-Protection>

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