Tech Company

Zen4 System Hardware Guide

Contents

Preface

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This guide describes the Tech Company™ Systems Zen4™ enterprise server and provides detailed information about how to install the system.

Audience

The audience for this guide includes data center, facilities, and operations personnel, system administrators, network administrators, and applications engineering personnel.

Scope

This guide provides an introduction to the Zen4 enterprise server. It includes information about the chassis, component modules, physical installation, and initial system boot.

Getting Help

Tech Company Systems offers a variety of support services. Visit the Tech Company web site to:

- Contact Tech Company Customer Support
- Get information on the latest patches, upgrades, and service bulletins
- View the Frequently Asked Questions (FAQs) related to the Tech Company [ProductNameShort™] system.

The web address for the Tech Company Customer Support site is:

Refer to for additional information.

Conventions Used in this Guide

This guide uses the following formats to highlight special messages in the text:

Note: This format highlights information that is important or that has special interest.

Caution: This format highlights information that will help you prevent equipment damage or loss.

Warning: This format highlights safety information that is related to electrical shock.

Warning: This format highlights safety information that will help you prevent damage from electrostatic discharge (ESD).

Warning: This format highlights safety information that will help you prevent damage to your eyes.

This guide uses the typographical conventions listed in .

Table 1-1.   Typographical Conventions

Text Style	Usage
Courier font	Screen text, CLI commands, or user-typed text entries
Italic font	Book titles, new terms, or emphasis
Arial font	Messages and labels on the front panel display

Related Publications

The following publications provide additional information about the Zen4 system:

- *Zen4 Software Configuration Guide* (part number 503-0001-01)
- *Zen4 CLI Reference* (part number 503-0002-01)
- *Zen4 Release Notes* (part number 500-0001-01)

Safety

General Safety Cautions and Warnings

Caution: Restricted Area—This product is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

Caution: Backplane Energy Hazard—Hazardous energy is present on the backplane when the system is operating. Use caution when servicing.

Warning: SELV Connection—To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.

Warning: Lightning Activity—Do not work on the system or connect or disconnect cables during periods of lightning activity.

Caution: Disposal—Ultimate disposal of this product should be handled according to all national laws and regulations.

Installation Safety

Caution: Equipment Installation—Only trained and qualified personnel may install, replace, or service this equipment.

Module-Handling Procedures

A damaging static electrical charge can be generated by the rubbing and sliding of materials against each other. Static electricity buildup can be of a sufficient potential to damage electronic circuitry. When working on Tech Company equipment, technicians must always wear an approved personnel ground device.

Industry experience has shown that all devices containing integrated circuits can be damaged by static electricity that builds up on work surfaces and personnel. The effect of electrostatic discharge (ESD) damage can be immediate failure, or it can show up as a latent failure affecting the reliability of the equipment.

Warning: When you handle modules, always wear a grounded wrist strap or wear a heel strap and stand on a grounded, static-dissipating floor mat or carpeting.

To avoid equipment damage from static charges and discharges:

• Always store and transport modules in static-safe packaging.

- Do not remove modules from antistatic packaging until they are ready for use.
- Handle all modules by the faceplate and by the top and bottom edges. Never touch the components, conductors, or connector pins.
- When you remove modules from a chassis, immediately place the modules in static-safe packages.

> **Warning: Class 1 Laser Product—The Zen4 system is a Class 1 laser product.**

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> **Warning: Laser—For diverging beams, viewing the laser output with certain optical instruments within a distance of 100 mm may harm your eyes. For collimated beams, viewing the laser output with certain optical instruments designed for use at a distance may harm your eyes.**

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> **Warning: Open Port Aperture Radiation—Because invisible radiation may be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.**

Power Warnings

> **Warning: Multiple Power Sources—This unit has more than one power module connection. To completely remove power from the chassis, disconnect all power cords.**

> **Warning: Power Cabling—Secure all power cabling when installing this unit to avoid disturbing field-wiring connections.**

About this Guide

briefly describes each chapter and appendix in this guide.

Table 1-2.   Guide Organization

Chapter or Appendix	Description
Chapter 1,	Provides an overview of the Tech Company enterprise server and its major features.
Chapter 2,	Describes the physical and operational features of the Zen4 chassis; includes specifications.
Chapter 3,	Describes the physical and operational features of the

Chapter or Appendix	Description
	Quaternia System Module (ZSM); includes specifications.
Chapter 4,	Describes the physical and operational features of the Processor and Memory Module (PMM); includes specifications.
Chapter 5,	Describes the physical and operation features of various Ethernet Network Modules, includes specification.
Chapter 6,	Describes the Fibre Channel Module.
Chapter 7,	Describes the Application Service Modules.
Chapter 8,	Describes the physical and operational features of the power module; includes specifications.
Chapter 9,	Describes the physical and operational features of the fan tray and air filter; includes specifications.
Chapter 10,	Provides site requirements for installing and operating the Zen4 equipment; describes console connection requirements.
Chapter 11,	Provides detailed unpacking and installation instructions for the Zen4 chassis and system components.
Chapter 12	Describes the operation and use of the front panel display.
Chapter 13	Describes basic maintenance tasks for the Zen4 equipment; provides typical troubleshooting issues for the hardware; summarizes hot-swap and emergency shut-down procedures.
Appendix A,	Provides reference tables of LED indications for the Zen4 chassis and components.
Appendix B,	Describes how to get technical support and customer service for Tech Company products; explains the product warranty; provides the web address and phone numbers for Tech Company Customer Service; describes how to return Tech Company products for replacement or repair.
Appendix C,	Lists acronyms used in this guide.

Chapter 1   Introduction to the Tech Company Servers

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Zen4 System

This chapter introduces the Tech Company enterprise servers and their major features. It consists of the following introductory sections:

- System and Architectural Overview
- Technical Overview
- Operation
- Software Components
- Typical System Installation

System and Architectural Overview

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[Author to insert short description: topic purpose in 2 or 3 sentences. no more than 50 words]

The Tech Company Zen4 enterprise server combinespartitionable symmetric multiprocessing (SMP) using 64-bit AMD Opteron® processors with multi-Gigabit Ethernet networking, Fibre Channel storage I/O, and offloaded application services. The network and storage I/O can be dynamically allocated across a built-in 80-Gbps switch fabric. Multiple Zen4 system chassis can be directly coupled and managed as a single pool of resources. The result is a mainframe-class architecture that offers high throughput and stability for enterprise applications.

The Zen4 system consists of a chassis with the following installed resources ():

- **Processor and Memory Modules (PMMs)** that support general-purpose computing requirements. Two types of PMMs are available: PMM-0410s and PMM-0200s.

> PMM-0410s provide processor sockets for up to four AMD Opteron 64-bit x86 CPUs with memory. The PMM-0410 also offers a total of 8 Gbps of storage I/O bandwidth using Fibre Channel interfaces.
>
> PMM-0200s provide CPU sockets for a maximum of two AMD Opteron 64-bit x86 CPUs with memory. Applications can be installed on a PMM-0200 to provide low-latency access by the PMM-0410. Such a configuration can improve performance for certain applications on the PMM-0410 that depend on other applications that can be accessed with low latency.

- **Q-Series System Modules (ZSMs)** that implement provisioning, system management, and fabric management capabilities.
- **Ethernet Network Modules (ENMs)**, each providing 10 Gbps of network I/O bandwidth, using either copper or fiber optic interfaces.

- **Fibre Channel Modules (FCMs)** that interface to storage arrays and storage devices, either directly or indirectly through storage area networks (SANs).

- **Application Service Modules (ASMs)** that provide acceleration facilities for specialized functions such as load balancing, SSL encryption, and XML processing. The initial ASM implementation is the ASM-0201, which hosts SSL acceleration and server load balancing (SLB) services either in standalone or "cluster" mode.

Major Zen4 components are designed for front-accessible servicing. Power modules are located on the back of the chassis (). Fan trays above and below the resource modules provide system cooling.

Figure 1-1. Zen4 Chassis—Front View

Figure 1-2. Zen4 Chassis—Rear View

Technical Overview

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The Zen4 system is a collection of resources arranged around a coherency fabric and a network or I/O fabric. Three broad types of resources are attached to the fabrics and linked through an internal switch: processing and memory, I/O modules (Ethernet and Fibre Channel), and off-load or acceleration services. The ZSM monitors and manages these resources. The processors and associated memory are organized as standard SMP servers, allowing flexible combining and partitioning to meet application needs. The Ethernet and Fibre Channel interfaces provide connections to the external network and to storage resources. The Zen4 system includes built-in layer 2 network switching capabilities.

There are multiple operating environments within a Zen4 system, including user operating environments for customer application deployment and internal operating environments for the Zen4 system software. The user operating system (for example, SUSE™ Linux Enterprise Server 9) runs in a partition to create a server that runs user applications.

Reliability, availability, and serviceability (RAS) are three qualities that represent the collective quality-of-service attributes of network systems. The Zen4 system has a combination of features, hardware design, and software design that maximizes uptime and minimizes downtime. Hardware design features that contribute to high levels of RAS include front access to most components for servicing, redundant cooling and power systems, and redundancy of system control modules and network interfaces. A graphical user interface and command line user interface are available for management of the system resources; in addition, an SNMP agent allows the Zen4 chassis to be integrated into enterprise monitoring systems such as HP OpenView® or IBM Tivoli® for diagnostics,

monitoring, and troubleshooting. The partition boot architecture of the Zen4 system helps minimize downtime arising from disruptive operating system updates.

Server administration and network administration are combined in the Zen4 system; the flexible security model provided by the Zen4 platform allows these functions to be separated in settings where this is preferred. The Zen4 platform provides fine-grained security and role-based access control that defines specific access privileges for different user roles. In addition to the default user roles, you can define other specific roles and access privileges. Within each user role, you can also specify query-only access and query-plus-set access for individual management and administration operations.

Processors, Memory, and Partitioning

Application processors are deployed on modules called Processor and Memory Modules (PMMs). PMMs support general-purpose computing requirements and are available in two series: PMM-0410s and PMM-0200s.

- PMM-0410s provide processor sockets for up to four AMD Opteron 64-bit x86 CPUs with memory. The PMM-0410 also offers a total of 8 Gbps of storage I/O bandwidth using Fibre Channel interfaces.

- PMM-0200s provide CPU sockets for a maximum of two AMD Opteron 64-bit x86 CPUs with memory. Applications can be installed on a PMM-0200 to provide low-latency access by the PMM-0410. Such a configuration can improve performance for certain applications on the PMM-0410 that depend on other applications that can be accessed with low latency.

The application processors and memory are the only resources that attach to the coherency fabric. The processors and memory on a PMM can be organized into standard SMP servers; in a chassis equipped with PMM-0410s, multiple PMM-0410s can be linked through the coherency fabric (backplane) to create instances of SMP servers containing up to eight processor sockets. Smaller partitions of two or four processors can also be configured.

A chassis equipped with two PMM-0410s can support eight system processors (8 cores with single-core processors or 16 cores with dual-core processors), 128 GB of system memory, 30 Gbps allocated between network traffic and storage traffic, and three Application Service Modules (ASMs).

The PMM-0410s and coherency fabric support physical partitioning of the processors and memory. Because each partition is an independent server, multiple independent instances of operating systems can be hosted concurrently.A partition can be created, initialized, started, stopped, reset, or destroyed without affecting the operation of other partitions. Each partition appears as a separate entity for system management.

Physical partitioning is implemented in the hardware and in system software. The hardware ensures that hardware and software faults in one hardware partition cannot propagate to another partition.

For more information about the PMMs, refer to

System Management

System management is implemented through a combination of management software components and a distributed hardware management subsystem. Through the hardware management subsystem, system components communicate with the ZSM, which manages chassis resources. The hardware management subsystem also allows remote, "lights-out" operation of the Zen4 system. This management capability extends to a system in the standby power state, when it has limited operational capabilities as it waits for instructions. All system messages are directed to the ZSM console and system log (syslog) facility. For more information about the ZSM, refer to

Access to the Zen4 system for management and software installation is through network or serial connections, eliminating the need for keyboard, video, and monitor connectors on the system itself. All necessary software installation can be accomplished through a network connection.

The Zen4 chassis has a front panel display with associated selection buttons. Using the front panel display, you can view system status information and shut down or restart the

chassis. A command line interface (CLI), accessible through a direct console port connection or a network connection, provides complete management functions for the system. The Tech Company Q-Visor™ software provides the same management capabilities as the CLI, through a user-friendly graphical interface. Q-Visor software also provides visual alarms and alerts.

For more information about configuring and managing the Zen4 system, refer to the *Zen4 Software Configuration Guide*.

Storage I/O

The Zen4 system has slots for two installed Fibre Channel Modules (FCMs). One FCM provides access to an aggregate of 16-Gbps Fibre Channel I/O bandwidth through 2-Gbps Fibre Channel interfaces. A system with two installed FCMs, therefore, provides a total of 32 Gbps of Fibre Channel I/O.

In addition, each PMM-0410 has dedicated Fibre Channel ports that are associated only with the server partitions on that PMM.

Internal Storage

The Zen4 system has slots for two installed Fibre Channel Modules (FCMs). One FCM provides access to an aggregate of 16-Gbps Fibre Channel I/O bandwidth through 2-Gbps Fibre Channel interfaces. A system with two installed FCMs, therefore, provides a total of 32 Gbps of Fibre Channel I/O.

In addition, each PMM-0410 has dedicated Fibre Channel ports that are associated only with the server partitions on that PMM.

System Battery/System Time

To increase system reliability, the ZSM uses a capacitor, rather than a battery, to maintain the system time when the chassis is not plugged into a power source. The system time can be maintained for approximately 48 hours while the chassis is unplugged.

Operation

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This section outlines the operational features of the Zen4 system.

Operational Features

Hot-Plug and Controlled Hot Removal Capability

All of the modules used in the Zen4 system have circuitry to allow removal and insertion of a module without interrupting system power. This is accomplished by controlling the inrush current and power sequencing on the boards.

High Availability

The Zen4 system is designed with redundant subsystems to ensure high availability of resources. Four power modules can be connected to two independent power feeds. These power modules share the power load during normal operation. If one power feed fails, the remaining two power modules can provide sufficient power for the system. System operation requires at least two power modules. Two fan trays, each with six fans, provide cooling for the chassis. If one tray (or part of a tray) fails, the ZSM increases the speed of the remaining fans to maintain cooling until the faulty fan tray can be replaced. Multiple interfaces are available on the PMM-0410s and ENMs to provide redundancy for storage and network access.

Software Components

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Software components of the Zen4 system include the system software image, user operating system, and management software that includes a command line interface (CLI) and the Z-Visor software graphical user interface (GUI).

System Software Image

The system software image resides on the ZSM; it manages the chassis hardware resources, including the server partitions.

User Operating Systems

User operating systems are associated with partitions and execute on the processors on the PMM.

Management Software

The command line interface is accessible through a console connection or from a client workstation. Z-Visor software is accessed from a management workstation and manages the Zen4 system through an Ethernet connection to the ZSM.

Typical System Installation

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[Author to insert short description: topic purpose in 2 or 3 sentences. No more than 50 words.)

shows a typical installation of the Zen4 system with four server partitions. Each partition has two Fibre Channel I/O connections to a storage area network (SAN) and two virtualized Ethernet connections to the external network. The ZSM has an Ethernet connection and a serial connection to a management network.

Figure 1-1.   Logical View of Typical Installation

Appendix B Product Support

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This appendix provides information about product warranties, customer service, returning components, and ordering replacement or spare components.

> **Note:** For additional product support information that is not covered in this appendix, visit the Tech Company Customer Support web site or call one of the customer service phone numbers listed in .

Warranty

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Zen4 systems are covered by a comprehensive warranty. For detailed information about the standard warranty, contact the Tech Company Sales or Customer Support Team.

Verifying Warranty Status

To verify warranty status, contact Tech Company Customer Support or your Tech Company account representative. You will need the chassis serial number from the label on the back of the Zen4 chassis.

Service Features and Levels

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Providing Customer Service 24/7

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The goal of the Tech Company Customer Support organization is to consistently deliver the quality of service you require in a mission-critical, data center environment.

Service Features

Tech Company is committed to providing around-the-clock customer service, either directly or through our service partners who have been factory-trained and certified by Tech Company Systems. You can log calls at any time by telephone or email, or through a web interface to our support system. All calls are actively managed to conclusion by a Tech Company Support Engineer. (A service partner may provide the on-site repair services.) Status tracking is available via the web interface to our support system.

Service Levels

Tech Company provides multiple scalable service levels to suit individual customer needs. Some of the service levels include access to an assigned Tech Company Customer Support account engineer. This engineer can help you with installation and upgrade planning and provide progress reviews. An assigned account engineer is the primary point of contact for handling service calls.

Customers with the appropriate service contract may designate one of the following priority levels for service calls:

- Priority 1, highest severity; work starts immediately to resolve the problem.
- Priority 2, medium severity; work starts within 1 hour to resolve the problem.
- Priority 3, lowest severity; work starts within 4 hours to resolve the problem.

Contacting Customer Support

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Contact Methods

To contact Customer Support, use the phone numbers or email address in .

Table 1-1.   Contacting Tech Company Customer Support

USA 24-hour hotline	1-800-968-6501	Email: support@Tech Company.com

Return Materials Authorization (RMA)

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RMA Policy Summary

Products returned to Tech Company must be pre-authorized by Tech Company with an RMA number marked on the outside of the package, and sent prepaid, insured, and packaged appropriately for safe shipment using the packaging that the replacement was sent in. Only packages with RMA numbers written on the outside of the shipping carton and/or the packing slips and shipping paperwork will be accepted by the Tech Company receiving department. All other packages will be rejected.

Title to any returned products or components will transfer to Tech Company upon receipt. Tech Company will be responsible for all freight charges for returned products or components as long as you use the carrier designated by Tech Company.

To return a component please refer to the Returning Materials Procedure section.

Returning Materials Procedure

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RMA Procedure Summary

Prerequisite

Please refer to Return Materials Authorization (RMA) section and read our return policy carefully to ensure your defective item will be accepted and product warranty remains effective.

Returning a component:

1. **Contact the Tech Company Customer Support Center Hotline to request a replacement component. Be prepared to provide the following information:**
   — Chassis serial number
   — Serial number of item to be returned
   — Model number of item to be returned
   — Description of problem
   — Return address and phone number

   Tech Company will issue an RMA number and ship a replacement component.

2. **After the replacement item has been unpacked and installed, use the same packaging materials to pack the defective item for return to Tech Company.**

3. **Make sure that the RMA number is clearly marked on the packaging exterior.**

4. **Ship the product back to Tech Company using the carrier designated by Tech Company.**

Ordering Replacement Parts or Spares

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Order Methods

To order replacement parts or spares, visit the Tech Company Customer Support web site or contact your Tech Company account representative.