COMPAQ
White Paper

Contents

Compaq Rack 9000 Series:

The "Intelligent Choice."

Abstract: New data-intensive, e-business applications are creating high-density data centers, where system growth is rapidly consuming floor space. This growth is also outpacing available IT resources. Compaq has developed an "intelligent" solution for this disturbing trend. A solution found in the Compaq Rack 9000 Series the Intelligent Rack.

The Rack 9000 Series is a universal rack that supports the full range of Compaq servers and storage arrays, as well as third party servers. Compaq has built intelligence into this rack, providing heightened manageability for the data center by monitoring power and environmental conditions. As an element of Compaq's Intelligent Manageability strategy, the Rack 9000 Series delivers the high-density solutions needed today and the ongoing support for future requirements. It is the "Intelligent Choice."

This white paper explains how the capabilities of the Compaq Rack 9000 Series helps control the space and environmental issues that plague today's high-density data centers.

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Compaq Rack 9000 Series: The Intelligent Choice prepared by Rack and Power Systems Group

The High-Density Data Center

A New Business Environment

A new business environment is emerging due to the rise in unique business applications, such as e-commerce, data warehousing, 24x7 information repositories, customer relationship marketing, etc. These data-intensive applications provide vital revenue streams for companies in virtually every industry. However, launching and supporting these applications is having a dramatic impact on today's data centers.

The growth of IT resources in this "info-business" environment has exploded. In extreme cases, there are examples of application service providers (ASPs) that double their server and storage resources every 90 days. There are other cases where data-centric service providers have added hundreds of new servers each year. Even traditional enterprise data centers are not immune to the accelerated resource requirements of e-business applications.

The data centers supporting this new business environment are described as "high-density" centers. They are centralized data operations with rapidly expanding system resources and dwindling floor space/real estate. There are key issues facing these centers that must be addressed if these new business-critical applications are to succeed. These issues cover the physical and management requirements associated with rapid growth.

Data Center Issues

The issues impacting today's high-density data centers are shaped by rapid growth, finite floor space, limited IT resources and heterogeneous systems as well as environmental and power management.

Limited Real Estate

With the level of growth experienced by these companies, data center real estate is precious. The best method of maximizing available floor space is to migrate server and storage capacity to a rackmount configuration. This trend toward a rackmount form factor is more efficient that a tower server for several reasons. Racks maximize data center space by enabling the stacking of many computing resources within a consolidated, and therefore much smaller, footprint. . The customer uses less real estate when they consolidate devices into a rackmount configuration.

IT Staff

The growth in computing system resources is simply outpacing the growth of IT management staff. Larger, faster system rollouts demand a higher degree of efficiency from IT staffs so fewer people can manage more resources. Unfortunately, the more individual server systems there are to manage the greater the stress on the limited personnel resources. In addition to responsibilities within the data center itself, central staff is often called upon to provide management support for remote locations.

System management in a high-density, heterogeneous computer center is very labor intensive. IT system administrators are required to manage a wide variety of systems and variables, which are typically reported through a single management application. This management task is very tedious when all variables are monitored on a per-server basis versus what could be accomplished monitoring the environmental (temperature, humidity, smoke) and power characteristics of the entire rack.

Heterogeneous Environment

A heterogeneous system environment with servers and storage from different vendors is a standard characteristic of data center environments. Much of the benefit that can be gained from efficient rack mounting is lost if vendor-specific racks do not provide heterogeneous system support. This mixed system environment also increases the management duties of IT staffers if physical location and system manageability are not consolidated.

Environmental Management

Increased density is also outgrowing the capacity of management consoles to monitor activity and alert system administrators. Today, manageability is based on individual servers and systems, including those components that are rack-mounted. If the temperature is rising in the server due to faulty fan, the system administrator is alerted by the server's monitor program. However, if the temperature or humidity rises in a certain area of the data center, the system administrator could receive dozens of alerts from the dozens of units effected by the change in temperature.

Twenty feet in a computer room can mean big environmental differences. Especially if devices are in different rack cabinets, the temperature in one cabinet can be significantly higher or lower that the one right next to it. A more efficient, effective method of isolating environmental changes would be to have a rack issue a single alert, rather than receiving one for each server in the rack. This would allow system administrators pinpoint problems faster.

Power Management

Increased power requirements to support a growing number of systems are outstripping power supplies in some markets. Studies show that power outages cause more damage and data loss than computer viruses. Data-intensive, business applications require high-availability, 24x7 power protection. So, system developers are turning to higher amperage and higher voltage to increase system efficiency. At another level, there is also the simple requirement for more receptacles in the rack to power more equipment.

In some parts of the country, businesses are having difficulty getting enough power from their local utilities to expand their data centers. Data is so critical that many companies are wiring their data centers for two separate power grids to ensure an uninterrupted supply. Other technologies such as the AC Transfer switch helps ensure that even if a problem occurs with one power source the supply to the rack carries on, nonstop.

The "Intelligent" Choice for Data Centers

To meet the requirements of today's high-density data centers, there is one "intelligent" choice – the Compaq Rack 9000 Series Rack. The Compaq 9000 Series Rack addresses the growing demands of today's high-density environments, by maximizing the center's limited floor space and improving overall monitoring of environmental and power levels.

Compaq Rack 9000

Compaq 9000 Series Rack provides universal support for the full range of Compaq products including ProLiant? , Alpha? , Himalaya? and StorageWorks? platforms. To meet the needs for heterogeneous system support, the 9000 Series Rack will support Sun, IBM, HP and Dell servers through a set of easy to use mounting kits. The Rack 9000 is specifically designed to ensure outstanding performance and seamless integration throughout the entire enterprise to organize, protect and to centralize IT resource equipment.

Compaq is working to reduce form factors in its power management products and rack options, including monitor, keyboard, PDUs and console switches. Compaq's UPS products are also getting smaller, consuming less space in the rack.

The external proportions of the Compaq Rack 9000 Series have been reduced as well. The overall height of the rack is 2 meters (42U of internal storage), which allows the rack to be rolled, upright, through standard doorframe for easy deployment. In addition, efficient front to back airflow ensures optimized cooling and operation.

Compaq delivers intelligently engineered racks that make it easy to centralize, protect, organize, and access server and storage components for servicing and upgrading. Here are some key features that come standard with Rack 9000 Series Cabinets:

Unique Frame and Rail Design – Equipment installation effort is dramatically reduced due to the vertical mounting platform. The 9000 Series racks are specifically designed to minimize the time required to install all system components. This enables fast assembly, easy mounting, and outstanding structural integrity.

Thermal Integrity – Front to back natural convection cooling is greatly enhanced by the innovative multi-angled, perforated design of the front door. For additional heat removal, an optional roof-mount fan kit can be easily installed.

Security Provisions – Both front and rear doors can be locked to provide the security of preventing unauthorized entry.

Flexibility – The front and rear doors are reversible, and can to be mounted for left or right access to support strategic or personal preference. This features also enables full back door accessibility.

Cable management – This outstanding cable management features also simplify the development of effective and easy to maintain configurations.

Coupled Configuration – The Rack 9000 series has a sophisticated mechanism that uses rails and bolts to maximize stability in coupled environments and dust striping to keep the equipment clean.

Custom Expandability – Several options kits are available to allow for quick and easy expansion of the Rack 9000 Series to create a custom solution.

Intelligently Managing the Rack

With space, resources and staff at a premium, Compaq has taken a unique approach to enhancing the efficiency and effectiveness of high-density data centers. Compaq has focused on the key component of today's IT infrastructure – the rack – giving it the intelligence to provide a new level of manageability for the systems and devices residing within it. This intelligence is not limited to the cabinet; it includes the cabinet, cabling, consoling, and software applications for power management and power distribution.

A powerful combination of proactive power management and rack environmental monitoring applications deliver robust monitoring and alert capabilities. These ensure that potential problems are identified quickly and resolved before operations are interrupted. By providing this level of manageability for the entire rack, the complexity of operating multiple systems is reduced as total number of servers and storage devices per rack increases. Compaq recently performed a study that showed an average of six to eight servers per rack in most data centers. This figure is expected to rise in the coming years as the size of the servers is reduced.

The strategy behind Compaq's "intelligent" rack concept is to provide IT organizations with software that not only controls the power management, but also monitors the environmental conditions that can effect system operation. This software allows system administrators to monitor and manage the rack environment, including:

- ? Monitoring of:
  - Input voltage
  - Temperature
  - Humidity
  - Smoke
  - Shock
  - Intrusion
- ? Activating relay controls
- ? Logging all events
- ? Activating up to two fan arrays

Enhanced console/cable management solutions are also employed to solve the high-density issues of multiple servers in each rack.

Compaq's Intelligent Rack solutions can be configured to deliver the 24x7 power supply availability required for today's demanding e-business environments

The Intelligent Rack concept spans the solution lifecycle from configuration and ordering through delivery, deployment and operation. This enterprise-class rack system combines next-generation structural integrity and ease of use capabilities to deliver industry-leading performance. Compaq 9000 Series Racks provide customers with the power to maximize the use of available space, while protecting and simplifying network management.

Intelligent Manageability Strategy

While there are a variety of solutions in the marketplace for system monitoring, no one offers these management capabilities as a single package, or as part of an umbrella "Intelligent Manageability" strategy.

The Compaq "intelligent" rack strategy helps improve data center management. It also enables the implementation of emerging IT trends such as "lights out management" (the fully automated un-staffed data center. In this situation, the Rack 9000 would monitor the environment, and alert a designated IT technician, via pager, of any problem. The technician could either come to the data center or login over the Internet to diagnose the problem. This concept provides around-the-clock support without the need for onsite personnel.

Given the trends and issues facing IT managers responsible for successfully managing high-density data centers, it is time to think differently about the role that rack and power products can, and should, play in optimizing and streamlining the IT infrastructure. Compaq has a *long-range* vision and strategy in terms of how a rack and power requirements, combined with powerful management application tools, can make a significant contribution enhancing the IT environment.

Intelligent Manageability Strategy

?   Simplifying management requirements & increasing availability

    -   *Proactive, rack-level environmental monitoring and alerting*

    -   *Intelligent & highly available power management solutions*

    -   *Web-enabled configuration tools to speed ordering and deployment*

?   Delivering on high availability with redundant power solutions

?   Simplifying the rack infrastructure & rack deployment

    -   *NonStop availability with system-level hot plug support*

    -   *Simplified cable management for maximum density*

?   Conserving valuable data center real estate via high-density solutions

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Summary

The Compaq 9000 Series Rack, with integrated rack and power management software, brings a new level of intelligent manageability to your data center. This powerful combination of proactive power management and rack environmental monitoring tools deliver robust monitoring and alerting capabilities.

By providing manageability for the rack, complexity is reduced even as total number of servers per rack increases. It will allow a user to manage a fully loaded rack as a single unit instead of individually managing each server, storage and power system mounted inside.