

By Christine Crandell

ADVANCING APPLICATION AVAILABILITY WITH PAN MANAGER SOFTWARE BY EGENERA FOR DELL

As application services become increasingly interdependent, how can IT departments help ensure continuous availability without creating a costly and complex infrastructure? PAN Manager® software by Egenera® for Dell—part of the Dell™ PAN System for blades—enables high availability and disaster recovery for applications running on Dell PowerEdge™ blade servers.

Once reserved for only the most mission-critical services, high availability and disaster recovery have become essential requirements across the spectrum of enterprise applications. Historically, these capabilities were available as integrated services built into RISC and mainframe systems. Then, as x86-based servers came into prominence, vendors began offering supplemental high-availability and disaster recovery products in the form of layered software and multiple standby servers for each application.

Meanwhile, blade servers have brought RISC- and mainframe-class reliability and serviceability features to x86 server architectures. However, many blade systems still require additional software and dedicated backup servers to help maintain application availability. This approach, while workable, often contributes to decreased performance and to delays in bringing applications back online. In addition, time-consuming and labor-intensive operations are necessary to keep system configurations synchronized, thus adding further cost, complexity, and risk to IT operations. Consequently, IT managers remain hesitant to migrate high-end applications to blade servers, opting

instead to retain their RISC and mainframe systems for those selected applications considered essential to business continuity.

PAN Manager software by Egenera for Dell—part of the Dell PAN System for blades—helps deliver mainframe-class high availability and verifiable disaster recovery to applications running on Dell PowerEdge blade servers.¹ PAN Manager is a factory-integrated, noninvasive solution that helps avoid the need for IT administrators to install separate software products, accept degraded system performance, and sustain cumbersome management practices to help ensure business continuity, and is designed to allow organizations to standardize their computing environment while complying with strict enterprise availability requirements.

INTRODUCING THE DELL PAN SYSTEM FOR BLADES

The Dell PAN System for blades is based on a Dell PowerEdge M1000e modular blade enclosure containing up to 16 PowerEdge M600 or PowerEdge M610 blade servers (see Figure 1). The PAN Manager software runs on two PowerEdge 2950 III servers

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¹ For information on PAN Manager features and its support for Dell PowerEdge rack servers, see "Dell and Egenera Drive a New Path to Virtual Data Center Automation," by Greg Lyon, in *Dell Power Solutions*, November 2008, DELL.COM/Downloads/Global/Power/ps4q08-20090120-Egenera.pdf.

that act as redundant, load-balanced processing area network (PAN) controllers. The blade servers and controllers are designed to communicate over a secure, three-way redundant fabric using Dell PowerConnect™ M6220 Ethernet switches. Together, the servers, controllers, switches, and PAN Manager software constitute the Dell PAN System.

PAN Manager stores each server's configuration information as a server definition file in a storage area network (SAN)-resident database. Server definitions include application and OS images, processor and memory requirements, and other information typically associated with server hardware, such as the IP address, Media Access Control (MAC) addresses, Fibre Channel World Wide Names (WWNs), and storage logical units (LUNs). This approach enables PAN Manager to quickly and automatically move applications from one server to another, helping eliminate the need for physical reconfiguration or other manual intervention.

MAINTAINING RESPONSIVENESS THROUGH HIGH AVAILABILITY

PAN Server Portability™ software by Egenera for Dell, a component of PAN Manager, is designed to provide $n + 1$ high availability for applications without incurring the cost, overhead, and IT complexity of many alternative approaches. With PAN Server Portability, PAN Manager can automatically invoke application recovery operations in response to a variety of conditions such as resource overutilization, communication failure, hardware failure, and unrecoverable software errors. Monitoring, decision-making, and control operations take place on the redundant PAN controllers, thus enabling successful recovery while helping eliminate performance impact on the blade servers.

Using PAN Manager, IT administrators can create policies that specify the conditions and severity thresholds that should trigger the appropriate recovery operations, such as restarting an application, adding a new application instance to a cluster, or initiating application failover to

a backup server. For example, in an environment with a cluster configured to support several instances of a Web application spanning multiple servers, administrators might create a policy that is triggered when user response time increases to a specified level. If this threshold is reached, PAN Manager would automatically start a new application instance on a designated blade server. The cluster software detects the new instance and begins directing incoming transactions to it, thereby enhancing service availability.

Administrators might also specify an escalating set of actions that PAN Manager should take once a server's processor utilization reaches a specific threshold, or when a hardware error is detected. In these cases, the policy might indicate that PAN Manager should first attempt to restart the application. If the restart action does not resolve the problem, the policy could then specify a failover operation, causing PAN Manager to transition the application to an alternate server. If necessary, PAN Manager can fail over an entire virtualized server running multiple virtual machines.

Although PAN Manager is designed to move any application to any server in the

Dell PAN System, administrators typically identify one server to function as backup for all of the applications running on the system. This backup server can remain in a passive state, awaiting a failover, or can actively run nonessential workloads. In the latter case, PAN Manager first shuts down the active workloads and then automatically boots the appropriate OS image on the failover server before restarting the application. This $n + 1$ approach to high availability helps ensure efficient, flexible, and cost-effective utilization of computing resources.

PAN Manager is also designed to simplify high-availability management in several additional ways. First, using just a few mouse clicks, administrators can specify policies and attach those policies to a server definition. Second, PAN Manager can automatically monitor system health and initiate recovery actions without requiring administrator intervention, thus helping to minimize application downtime. Third, PAN Manager provides customization features that allow administrators to tailor monitoring criteria. Finally, PAN Manager is designed to ensure that failover operations work every time, because of its redundant architecture and because

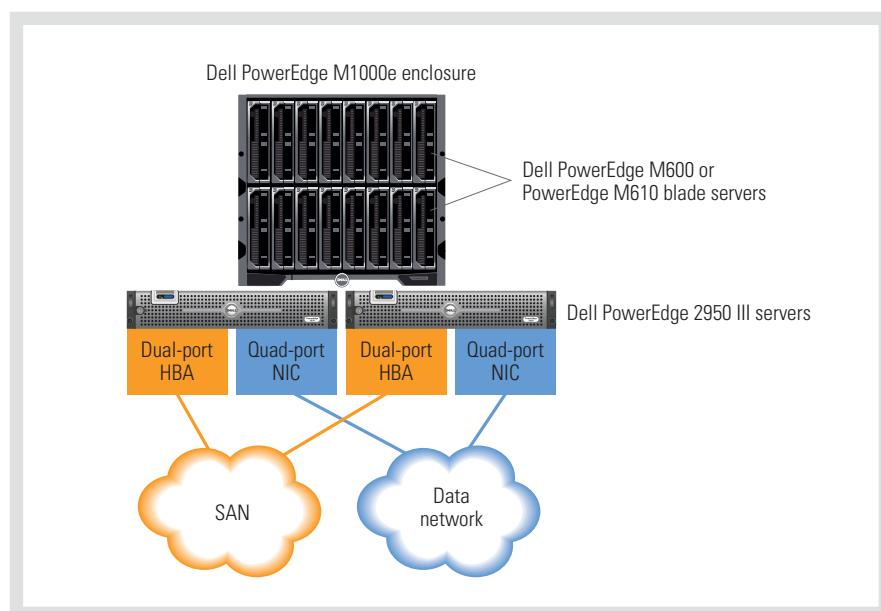


Figure 1. The Dell PAN System for blades combines PAN Manager software with efficient, high-performance Dell PowerEdge blade servers

the configuration and software information necessary to restart an OS and application is contained within the server definition files—thereby rendering unnecessary the painstaking and error-prone measures usually required to both keep backup systems synchronized and perform a failover operation.

SUPPORTING RELIABLE DISASTER RECOVERY

PAN Portability™ software by Egenera for Dell, another component of PAN Manager, enables verifiable disaster recovery protection for production data centers. PAN Manager is designed to ensure that disaster recovery operations replicate the production environment identically, every time, even in data centers where there are frequent modifications to system configurations. In addition, PAN Manager can transition a complete PAN System automatically, without requiring complex manual operations found in typical run-book-based disaster recovery plans.

PAN Manager maintains the hardware and software configuration for each PAN System in a database called the PAN Archive. PAN Manager automatically replicates this archive, thus helping ensure that the disaster recovery site is always synchronized with the production site. Each PAN Archive database contains individual server configuration files as well as information global to the PAN System, such as hardware addresses, log files, and administrative security settings.

Once an administrator initiates a disaster recovery operation, PAN Manager automatically merges the hardware, network, and SAN mappings from the disaster recovery system into the PAN Archive. PAN Manager then installs the new archive file on the PAN System and begins the process of booting individual servers and starting applications. No manual intervention is necessary beyond initiating the operation. The entire recovery process is designed to complete, error free, in a matter of minutes—typically well within the time frames of stringent recovery time objectives.

This design enables administrators to create disaster recovery plans based on an $n + 1$ model, allowing one disaster recovery site to support multiple production sites. This capability can contribute not only to low hardware and software capital costs, but also to low operational costs associated with updating and testing multiple disaster recovery sites. In addition, a PAN System designated for disaster recovery may be used for non-production functions such as development or quality-assurance testing. PAN Manager automatically shuts down active workloads running on the system and saves the local PAN Archive before starting the recovery process.

ENHANCING BLADE SERVER RESILIENCY


The advanced PAN Manager application availability features are based on a resilient and comprehensive system foundation. The PAN controllers perform the internal and external I/O operations on behalf of the blade servers, and are designed to provide high-performance, secure, and reliable communication switching among software applications running within the blade system. To support communication outside the blade system, each PAN controller connects to the SAN through a dual-port Fibre Channel host bus adapter (HBA) and to the data network through a quad-port network interface card (NIC).

The PAN controllers are designed to share all of the system's I/O operations using advanced load-balancing techniques. In addition, both of the controllers have access to the configuration and management database for the entire blade system. If one controller fails, the other controller can automatically detect the failure and assume the management and I/O workload. After the failed controller has been replaced, the load-balancing procedures can automatically resume.

Finally, PAN Manager allows administrators to manage both physical and virtual servers using the same tools and procedures. In addition, PAN Manager

supports industry-standard server virtualization products, including the VMware® Infrastructure 3 and Citrix® XenServer™ platforms. These features help administrators ensure the same levels of resiliency for data centers spanning physical and virtual environments.

RECONSIDERING BUSINESS CONTINUITY SOLUTIONS

The application services that support today's dynamic business processes have become progressively interdependent, blurring the lines that previously separated traditional continuity categories of mission critical, business critical, and edge. Consequently, today's data centers require robust continuity plans designed to ensure availability for all applications. PAN Manager enhances the hardware reliability and serviceability of blade systems by enabling mainframe-class high availability and verifiable disaster recovery for all applications—helping to automatically recover lost production environments accurately and reliably and to restore productivity rapidly even in the event of a total site outage. 

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