uninterrupted
data access

hp and SteelEye introduce affordable Linux-based high availability for Oracle9*i* on ProLiant servers

Large enterprises rely on Oracle9*i* database solutions for mission-critical applications using dynamic data content such as data warehouses, e-commerce applications, financial systems, supply-chain management, and business intelligence systems. These applications require high availability — downtime can result in of the loss of millions of dollars per hour.

Until recently however, ensuring 24x7 availability for these applications has been costly, requiring numerous redundant systems, and a dedicated IT staff. Fortunately, today there is a cost-effective alternative. SteelEye Technology's® LifeKeeper® for Oracle9*i* high availability solution running on HP ProLiant clusters for Linux enables enterprises with mission-critical applications to implement high availability database servers at a fraction of the cost of traditional UNIX® solutions. SteelEye™ LifeKeeper monitors system and application health, maintains client connectivity, and provides uninterrupted data access, regardless of where clients reside — on the Internet, corporate intranets, or extranets.

SteelEye LifeKeeper for Oracle9*i* delivers maximum uptime of database applications, while enabling enterprise IT managers to keep a tight rein on costs. With built-in ease of use, SteelEye LifeKeeper on ProLiant clusters enables companies, their customers, and suppliers to quickly benefit from always-on enterprise applications.

SteelEye's LifeKeeper for Oracle9*i* is comprised of the following components:

- **LifeKeeper for Linux** — SteelEye solutions are based on LifeKeeper™ for Linux industry-proven software that enables companies to cluster multiple applications such as databases, web servers, email systems, file services and print services, into fault resilient, robust, and highly available systems.
- **Oracle9*i* Application Recovery Kit** — LifeKeeper for Oracle9*i* provides off-the-shelf application recovery, which ensures seamless, non-stop database operations.
- **LifeKeeper IP Recovery Kit** —Required if remote clients would be accessing the Oracle database.

LifeKeeper for Oracle9*i* on ProLiant servers is a robust high availability application and data cluster solution supported on HP ProLiant servers and HP StorageWorks storage systems. HP has fully tested and certified LifeKeeper for Oracle9*i* on select ProLiant servers for optimal performance on Red Hat and SuSE. This solution provides a wide range of application failover configurations from simple active-passive clusters to more sophisticated clusters supporting active-active and cascading failover configurations.

fault resilient

the solution

The SteelEye LifeKeeper clustering solutions on ProLiant servers and StorageWorks storage options are tested and certified by SteelEye and HP to ensure customer satisfaction and operational success. HP adds customer value by providing a range of tested and certified ProLiant server and StorageWorks configurations, plus documentation, and global support across a range of leading Linux distribution offerings. LifeKeeper for Linux is certified to operate on select ProLiant servers with the following Linux distributions (on 2.4 Linux kernel):

- Red Hat Linux 7.2 and Advanced Server
- SuSE Linux 7.1 and Enterprise Server

redundant cluster Interconnects: SteelEye LifeKeeper on ProLiant servers supports multiple (redundant) Ethernet TCP cluster interconnects between grouped servers, which can also be used for other system communications. At least two cluster interconnects are required. Ethernet TCP interconnects may be private or combined with the public LAN. If a public LAN is used for the cluster interconnect, it is strongly recommended that it be used only as the redundant, backup for the primary link. This shuld be done via a dedicated private LAN for the cluster interconnect. A backup serial TTY interconnect is also supported for 2-node condigurations.

shared data failover: LifeKeeper allows multiple Proliant servers to share access to the same set of disks on StorageWorks storage devices. In the case of a failure of the primary server, LifeKeeper automatically manages the unlocking of the disks from the failed server, and the locking of the disks on the next available backup server.

shared communication: LifeKeeper automatically manages switching of communications resources, such as TCP/IP addresses, allowing users to connect to an application regardless of where the application is currently active.

LifeKeeper GUI: The LifeKeeper GUI is a client/server application developed using Java technology, which provides a graphical administration interface to LifeKeeper and its configuration data. The GUI may be accessed locally on a node within the cluster and remotely via a UNIX, Linux, or Microsoft® Windows®-based web browser.

shared fibre clusters: These clusters utilize the StorageWorks Modular San Array 1000 (MSA1000) FC-AL storage system. Shared Fibre configurations provide the greatest performance scaling to terabytes of protected storage.

proactive protection: Hardware component and application faults at the resource level are detected in advance of a full system failure through multiple fault-detection mechanisms. LifeKeeper monitors Linux clusters using intelligent processes and multiple LAN heartbeats. By sending redundant signals between server nodes to determine system and application health, LifeKeeper confirms a system's status before taking action. This reduces the risk of server failure and minimizes false failovers. LifeKeeper also limits unnecessary failover by recovering failed applications locally. For instance, LifeKeeper performs periodic checks of the Oracle services, and it restarts any protected service that does not respond.

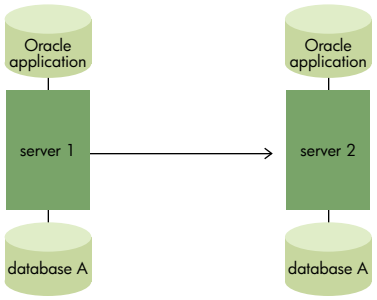
If required, failover is transparent to clients and does not impact users' productivity. LifeKeeper migrates all applications and transfers connectivity in such a way that clients have continuous access to applications and data. This ensures that all clients are not affected by unanticipated system failures. Failover recovery mechanisms include:

- **n-way failover:** SteelEye LifeKeeper on ProLiant servers can support the configuration and failover of an application across more than two servers. This feature ensures that as long as one server in the cluster remains active, an application will be available, no matter what the sequence of failures that occurs.
- **multi-directional failover:** If more than one LifeKeeper-protected application is configured to run on the same primary server, LifeKeeper allows each of those applications to be configured to failover to a different backup server. This feature allows the additional load of the failed primary server to be distributed across multiple backup servers, rather than burdening a single backup server with the full additional load.
- **cascading recovery:** Applications that are protected by more than two servers may be recovered on other servers in the cluster based on a priority ordering. For a given application, the servers on which it is configured are assigned priorities to determine the sequence in which the application will move from server to server in the event of multiple failures.
- **flexible configurations:** SteelEye LifeKeeper on ProLiant servers supports multiple ways to configure your highly available Oracle9*i* database.

active/standby with data replication

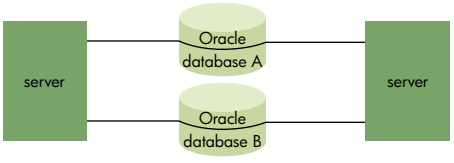
Oracle is installed and configured on both systems. Server 1 is considered active because it is the source of the mirror, and has exclusive access to the database. Server 2 does other processing. If server 1 fails, server 2 gains access to the target of the mirror containing the database, and LifeKeeper re-establishes the database operations.

active/standby shared storage configuration



Oracle is configured on both systems. Server 1 is considered active because it has exclusive access to the database. Server 2 does other processing. If server 1 fails, server 2 gains access to the database and LifeKeeper re-establishes the database operations.

active/active shared storage configuration



Oracle is configured on both systems, and Oracle application is the same on both servers. The Oracle databases are on shared storage disks. Server 1 runs database A and server 2 runs database B. In a switchover situation, one system can run both databases.

hp ProLiant DL380 server

affordable high availability

benefits of SteelEye LifeKeeper on hp ProLiant servers

- Low total cost of ownership
- Low-cost initial investment
- Proven — thoroughly tested on the ProLiant server platform
- Low service and support costs
- Open source Linux OS reduces service and support costs
- Fast, easy installation
- Investment protection

Both the Linux operating system and open source software have emerged as an alternative for organizations seeking to better control their system environments, improve performance, and reduce cost. Linux is proving itself a reliable solution in many markets across many applications. The markets are ideally suited for HP ProLiant servers — the server the world depends on most. Additionally, Linux has become the fastest growing operating system in the industry today and customers on industry standard servers are now demanding Linux high availability cluster platforms. To satisfy the requirement for affordable high availability, you now have a solution comprised of HP ProLiant servers, Oracle9*i* and SteelEye Technology's LifeKeeper for Oracle9*i* cluster software.

for more information

For more information, visit SteelEye's website at **www.steeleye.com** or visit the HP website at **www.compaq.com/solutions/enterprise/highavailability/linux/ha-index.html**.

invent

11/2002

5981-4217ENUS