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Letter from the Editor

Making High Availability Easy
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Dear Reader,

From the High Availability team in the Industry Standard Server business, we would like to once again thank you for your interest in ProLiant Server Platforms and High Availability. In our November issue we introduce HP’s clustering products as well as our high availability strategy for ProLiant Servers. In this issue, we would like to build upon the topics that we introduced in the last issue.

One of our primary goals in the HA group is to deliver solutions that help our customers protect their business critical applications, while minimizing the complexity to deploy these solutions. The HP ProLiant DL380 G3 Packaged Cluster is a prime example of our desire to meet our customer’s requirements for simple and affordable high availability solutions.

The HP ProLiant DL380 G3 Packaged Cluster contains everything you need to deploy a complete 8U SCSI cluster solution, including two density-optimized ProLiant DL380 G3 servers, a Smart Array Cluster Storage system, cabling, and the latest HP Smart Array cluster technology. All pre-packaged into one cost-effective, space-efficient cabinet capable of delivering record levels of availability for your business critical applications.

In order to make the Fibre Channel clustering products less complex, we have also added Integrated Cluster Solutions and Non-integrated Bundles to our product offerings. The ProLiant DL360 G3, DL380 G3, and DL580 G2 F100 and F200 solutions & bundles for MSA1000 are designed to simplify the deployment of fibre channel cluster solutions. Integrated Cluster Solutions are fully integrated cluster products built in a 22U rack, which are ready for software installation at the customer’s site. If a customer does not wish to use a 22U Rack, then the Non-Integrated Cluster Bundles is the right solution for them. The Non-Integrated Cluster Bundles include all of the required hardware to build an F100 or F200 cluster, shrink wrapped on a pallet, ready to set-up at the customer site by the customer or an HP field service engineer. Each product can be ordered with one part number. These products are featured in the New ProLiant High Availability Products section of this newsletter. We have added new sections that highlight the latest white papers as well as an overview of new product features.
Selling High Availability

Establishing the Value of High Availability
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Selling high availability is not just about selling technical solutions and products to our customers, and it is usually much more difficult to sell an HA solution than it is to simply sell servers and storage. Why is this?

For many customers, high availability is something that they hope will happen, but many times they do not give it enough real thought and analysis to understand what it takes to achieve a highly available environment. This is where we can help.

The first step in discussing HA with your customers is to get them to internally establish the value of HA, and most important, what it means to them in the context of their business. There are many related buzzwords that are often intermixed and used entirely differently from one customer to the next. You may hear customers talk about high availability, clustering, fault tolerance, fault resilience, disaster recovery, disaster tolerance, or business continuity. Or, you may even bring these topics up in a discussion with your customers. The biggest problem with this is that each of these terms means something totally different to everyone. This is further compounded by the context of initiatives or programs offered by HP – when we say disaster tolerance, we are usually thinking of a specific technology or product (like Data Replication Manager or XP Continuous Access). The problem is that the customer may have a totally different view of what this term means to them, and so they may not directly relate to your discussion because you are using the terms in your context, not theirs.

The way to overcome this initially is to not focus on the specific products or technologies that HP provides, but instead to discuss with the customer what their real availability needs and concerns are. Based on this, you can then select the technologies, products, services, and solutions that will best address what they believe their most important availability issues are. They may say “fault tolerance”, but in fact they may really be satisfied with a clustering solution.

So what are some ways that you can really understand what your customer’s availability needs and concerns are? To formulate a sales strategy it is essential to
know just how dependent an enterprise is on its IT systems. Asking customers the following questions can help you determine the right strategy:

- What are your plans for availability? Do you have standard configurations and processes that address HA?
- What does your current strategy provide you in terms of data protection/loss? Do you have ideas as to what you would do differently to improve on this?
- What are your uptime requirements? What is the maximum length of time you can afford to have your systems down?
- How much downtime can your company sustain? Different applications may have different downtime objectives, and some downtime may be acceptable for some applications.
- Do you know what the cost of downtime is to your business? This can be measured in both direct revenue losses and indirect costs.
- Which applications are you most concerned with from an availability perspective? Which applications would have the biggest impact on your business if they were not available? This helps them prioritize where to start.
- What was your last downtime event, and how long did it last? What was the impact to your organization because of it?
- How do you measure availability? Do you have Service Level Agreements (SLA)? And if so, what are their requirements? Are there penalties associated with downtime?

There may be no clear answers to these questions, and in many cases, the customer may not have any idea what the answers are. But this is an important part of the process because it gets the customer to think about the impact of downtime in ways that they may not have thought of before. This may include the tangible effects (such as lost revenue) as well as intangible effects (like damaged reputation or decreased employee morale). And this is a key part in establishing the value of HA in their thought process.

By focusing on and understanding the availability issues that motivate your customers, you will have personalized the discussion to what is important to them. Once your customers realize the value of high availability within their specific context, then your job is much easier. You have crossed over from the point of trying to convince them that they need it, to the point where they are convinced that they cannot do without it. Your role then turns to a consultative role to help determine what technologies and services can be combined to provide them with
an HA solution that balances their availability requirements, risks they are willing to take, and additional costs they may incur.

Don’t sell high availability on the cost of doing it, but instead, sell high availability on the cost of not doing it.

**Availability Needs a Broad Approach – HP Customer Support**

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In the November issue of “The Cluster Connection” we asked the question, *Availability – what are we really selling?* Where Doug de Werd started to discuss the topic of availability and some of the ways in which we can approach our customers. In this article let’s take that discussion a little further. As Doug said, customers can be categorized into two types, those that understand availability and those that don’t. In either case we need a way to start the discussion with the customer. In 2001 Gartner conducted a piece of research to determine the true cause of downtime across a broad spectrum of customers. Their research concluded that downtime could be covered in three areas:....

1. Hardware, System Software and environment  
2. Application  
3. Operator Error

The implications of this research are quite significant and completely in line with the conclusions drawn by Doug that technology such as clusters do not prevent failures but they do reduce the impact of failures.

By use of redundant technology customers are reducing the risk of unplanned downtime due to a hardware or System Software failure even further, but good management becomes necessary to ensure that failures are monitored and appropriate action taken. It is probably safe to assume that advances in technological redundancy, improved manufacturing processes and greater levels of software testing are actually reducing this category further.
Whereas the category of Operator Error in the Gartner research contributes to twice as many failures as the hardware & System Software section. Operator Errors are a good indication that there are people and process issues that need to be addressed. It doesn’t really matter where anyone sits in terms of availability experience, everyone is trying to do a better job, improving the level of service offered to their customers or reducing their ongoing service delivery costs (IT Departments spend about 80% of their total budget on support and unplanned downtime is a major contributor to this cost). Many IT Departments are looking to adopt best practices to improve the quality of service that they provide to their customers. Rather than develop these best practices themselves, they are turning to external sources rather than develop everything themselves. One of the most popular sources is ITIL – (IT Infrastructure Library) http://www.itil.co.uk which publishes a comprehensive set of IT Management best practices which are likely to become a set of ISO standards within the next two years. Many IT departments are investing in training their staff on the use and implementation of these best practices. With the increasing complexity of IT Infrastructure these processes become the key to achieving high levels of availability whilst keeping IT costs under control.

What becomes clear is that IT Departments need to have the right mix of technology combined with an excellent process for Availability Management. The objective of the Availability Management process is to ensure that any given IT Service consistently and cost-effectively delivers the level of availability required by the business.

Availability has become one of the most important aspects of service delivery in the highly visible e-business global economy and the demand for 24x7 operations is greater than ever. Availability, or the lack of it, has a dramatic influence on customer satisfaction and can very quickly impact the overall reputation and success of the enterprise. Many factors affect the availability of an IT Service such as hardware failure, environmental issues and human error. A hardware failure such as a broken power supply or disk drive is one of the most obvious hazards to consider - if the only power supply within a server should fail then this might cause the whole IT Service to be lost. Dual redundant power supplies installed within the server can be employed to remove this risk. From a wider environmental perspective, even if power to the whole computer room or Datacenter is disrupted, battery backup systems can be employed to cover the short time it might take to start up a standby generator. Exposures such as these are referred to as availability risks and the actions that might be taken to mitigate them are called countermeasures.
Risks to availability also exist within process and procedure and of course also arise out of human error. If a badly tested change is introduced that inadvertently prevents users connecting to the IT Service, then the complete service will be unavailable until access is restored. If the production database is accidentally overwritten with last night’s backup data instead of a new backup being taken, then clearly this could have catastrophic consequences on availability. Countermeasures can also be employed to help mitigate these types of risk, examples could include, carefully designed testing and release procedures, and appropriate staff training plans.

As can be seen, risks to availability exist throughout the whole IT infrastructure and within every management process. Although not directly responsible for each of these processes, Availability Management is responsible for making sure that all areas of risk to availability are taken into account and that the overall IT infrastructure and the maturity of management processes supporting a given IT Service are sufficient. Availability Management and Service Continuity Management are closely related in this respect as both processes strive to eliminate risks to the availability of IT Services. The prime focus of Availability Management however, is handling the routine risks to availability that can be reasonably expected to occur on a day-to-day basis. Where no straight-forward countermeasures are available or would be prohibitively expensive or beyond the scope of a single IT Service to justify in its own right then these availability risks are passed to Service Continuity Management to handle. Availability Management is not just concerned with the management of risks to the availability of an IT Service, it is also responsible for ensuring that timely and effective action is taken in response to any service affecting incident that does still occur, and in preventing these from escalating unnecessarily. For example if a power supply fails and the backup power has taken over, the fault needs to be reported and the failed component repaired and brought back into service.

Finally, in addition to this focus on minimizing unplanned downtime, Availability Management also needs to concentrate on minimizing the amount of planned downtime where necessary. Planned downtime such as scheduled maintenance or the introduction of new functionality can also affect availability if it has to be undertaken within the agreed service window. Clearly, planned downtime needs to be scheduled outside of this window wherever possible but the ever increasing demand for today’s businesses to be available 24x7 makes this increasingly difficult and the requirement for planned downtime needs to be reduced as much as possible.
Obviously this article has only addressed this subject at a high level. But when selling High Availability it is important to understand just how well the customer is doing from a process and a people perspective. Within HPS there is a wide range of services from C&I, Education and Customer Support that can be used in opportunities for high availability. Availability Assessments can be performed that will provide a detailed gap analysis showing strengths and weaknesses across people, process and technology. Design services can be provided to assist in building processes that will support the business objectives. Education can provide courses that will help IT Departments to increase their skills in availability management. Support services can be provided that focus on continuous improvement of IT environments that must deliver high availability to the business. HPS can help play a key role in opportunities where High Availability is required, from a perspective of helping to justify the technology solution through to Mission Critical Services that ensure that the customer’s business objectives are met.
New ProLiant High Availability Products & Solutions

ProLiant DL580 G2, DL380 G3, & DL360 G3 F100/F200
Integrated and Non-Integrated Cluster Solutions & Bundles

Fibre Channel Clustering made easy
Tim.ellerbe@hp.com

In an environment where uptime is money and resources are stretched, why take the costly and complicated route of proprietary cluster solutions when there’s a smarter way? Introducing the new ProLiant F100/F200 Integrated Cluster Solutions and Non-Integrated Cluster Bundles for the StorageWorks™ Modular SAN Array 1000. These solutions and bundles are available today on ProLiant DL360 G3, DL380 G3, and DL580 G2 servers. These flexible, scalable fibre channel clusters, powered by ProLiant servers and StorageWorks MSA1000 storage systems, ensure your business-critical applications are highly available. When you factor cost, benefits and ease of management; these solutions and bundles are simply the best way to beat downtime.

The ProLiant F100/F200 Integrated Cluster Solutions and Non-Integrated Cluster Bundles for the MSA1000 are ideal for running your company’s mission critical applications, all at a much lower cost than traditional proprietary cluster solutions.

High Availability for Continuous Data and Service Delivery
With the ProLiant F100/F200 Integrated Cluster Solutions and Non-Integrated Cluster Bundles for the MSA1000, you receive fewer system outages, a shorter duration of outages, automatic detection of an application or server failure, and a single point of simplified cluster management. You can easily monitor the status of all cluster resources to transfer workloads when necessary. These solutions and bundles also allow for manual load balancing and rolling updates without taking important data and applications offline.

High availability extends throughout each cluster solution, starting with its award-winning HP hardware. Features include Ultra3 drive support, storage capacity of up to 42 drives, redundant data paths, and 2 Gb/s fibre channel connections. The optional StorageWorks MSA hub 2/3 lowers your infrastructure costs by interconnecting server and storage in a space-saving design.

These solutions and bundles also allow you to implement your server/storage consolidation strategy with confidence. This is done by allowing up to three 2-node Microsoft clusters to share one MSA1000.

RAID Advanced Data Guarding means an extremely high data fault tolerance that can sustain multiple simultaneous drive failures. And the HP SANWorks™ Virtual Replicator software management tool lets you create instant, virtual replicas ("snapshots") of production data without physically copying data. Imagine the ability of backing up and restoring in seconds, with minimal impact.

**Maintain your Infrastructure; Safeguard your Investment**
Cluster your existing HP ProLiant servers or choose from a wide range of new ProLiant server models. Universal drives offer commonality and smooth migration across servers and storage. And you can easily expand storage capacity as your needs grow: each controller provides support for up to 42 72GB Ultra320 drives, increasing your total capacity to 15 TB per fully loaded two-node cluster.

**Single Point of Simplified Cluster Management**
The ProLiant F100/F200 Integrated Cluster Solutions and Non-Integrated Cluster Bundles for the MSA1000 are designed to reduce the complexity of SAN deployment. Maintenance can be done offline without disrupting service. All HP cluster kits include detailed installation instructions. HP offers a variety of services and support to meet your set-up needs. You can have your cluster completely built with IP addresses set and customized images loaded in our factories. (See your account manager for details.)
Simple, Powerful, High Availability

The ProLiant F100/F200 Integrated Cluster Solutions and Non-Integrated Cluster Bundles are ideal for business critical functions like mail, Internet servers, file/print, IT Consolidation, and databases – environments where high availability is imperative.

Key features and benefits include:

- Uses standard Microsoft clustering software, provided as part of the operating system, which provides clustering functionality and failover (Operating System software must be purchased separately)
- Internal hardware components for server and storage are installed and cabled
- Choice of single path or redundant path from servers to storage for cost effective availability
- Ability to upgrade to redundant paths (See ProLiant Cluster F200 for MSA1000 Upgrade Bundle)
- Industry-leading HP installation and management functionality for lights-out management (optional) of your cluster solution
- Scalable architecture that can grow with your future needs
- Includes ProLiant Cluster HA/F100 or HA/F200 for MSA1000 Kit that provides detailed instructions on set-up and installation of Microsoft Cluster Server
- ProLiant Cluster HA/F200 for MSA1000 Kit includes HP StorageWorks Secure Path v.4.0 for Windows Workgroup Edition
- One part number makes ordering simple
- HP continues to offer ProLiant Cluster HA/F100 and HA/F200 for MSA1000 Kits separately for flexibility with a range of ProLiant DL and ML servers.

These products are a part of a family of integrated cluster solutions designed to simplify the deployment of highly available fibre channel cluster solutions. The ProLiant F100/F200 Integrated Cluster Solutions are available in a compact 22U rack or if you do not wish to use a 22U rack, then the Non-Integrated Cluster Bundles is the right choice for you. The Non-Integrated Cluster Bundles are delivered as separate parts and are integrated at the customer site by the customer or an HP field service engineer.
Adaptive Infrastructure
In today’s IT environments, change is a constant. Mounting competitive pressures, shrinking resources, and expanding customer expectations present new challenges for your IT staff every day.

HP’s portfolio of servers, storage, and management tools addresses your unique needs with a wide range of flexible, cost-effective technologies and infrastructure solutions. With a full range of global services and strong partnerships with industry leaders, HP helps you create agile, efficient IT environments that help solve your toughest business challenges. Whether you manage a small business or run a global enterprise, an adaptive infrastructure from HP will benefit your business operations and your bottom line.

Summary
Give downtime a run for its money while making complex cluster installations a thing of the past. Deploy the affordable ProLiant DL360 G3, DL380 G3 or DL580 G2 F100/F200 Integrated Cluster Solutions and Non-Integrated Cluster Bundles for the high availability your critical applications require.

For details, please see the solutions page on our website: www.hp.com/servers/proliant/highavailability

Together with its partners, HP also offers a complete array of flexible, innovative enterprise solutions designed to help maximize server performance and simplify system management. For more information, visit www.hp.com/large/globalsolutions

The following solutions and bundles can be ordered directly from HP or an authorized HP reseller. Reference the appropriate part number below when ordering.

Order Information

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ISS to support High Performance Technical Computing Solutions
Daniel.cox@hp.com

Key Information
Introduction: The HPTC market is a $5-8B market in 2002 with a CAGR of 13.1%. In 2006 it is expected to reach $12-13B and we have a 43% share of this marketplace. In fact, the closest competitor, IBM, only has a 21.2% share. The merger of HP and Compaq was tremendous for us in that in this industry segment, we had almost no overlap of function and responsibility. Where we have been successful is the total solution from HP with hardware and software offerings combined with tested applications, services and support to give us leadership in the marketplace.

This marketplace is dominated across the four segment areas with proprietary solutions ranging from the Alpha SC, a Alpha based Tru64 Cluster with special interconnect hardware and proprietary software utilities for the Capability segment usually dominated by the national labs like DOE – Los Alamos, Lawrence Livermore, Oak Ridge, and the latest HP win Pacific Northwest National Labs, PNNL. These systems are for the most challenging problems in the world such as weather, oceanography, and other “Grand Challenge” problems. A key point is that some of these clusters are Linux based. For example, the largest Linux cluster of over 2094 Nodes based at Sandia Labs using Alpha servers. But sitting right next to this cluster is a Dell Linux cluster of 1024 Power Edge Servers.
In the Enterprise, Divisional, and Departmental segments PA RISC and Alpha solutions were prevalent in both proprietary and Linux solutions either as large SMPs like Superdome or multi node 2P and 4P Alpha clusters using TruCluster or Linux based solutions. These solutions are now being challenged by IA32 and AMD offerings from Dell, IBM, and a series of HPTC Niche VAR’s like Rack Saver, Western Scientific, Paralogics, and Linux NetworX.

So, all is not good in that the market is shifting from high cost proprietary systems like Alpha and PA-RISC and Tru64 and HPUX UNIX to COTS solutions with Linux. What’s COTS? This is a term derived from the first Beowulf cluster project in 1994 at NASA Goddard Space Center for Commodity off the Shelf products. With the performance and packaging gains of IA32 Pentium III and now the IA32 Pentium IV Xeon DP processors, we equal or outperform on a raw power viewpoint current proprietary solutions as well as density space and the market knows this. So the market is shifting to Linux, with about 50% of current HPTC clusters based on Linux. HP’s presence and viability in the HPTC sector requires a solid Linux capability and portfolio mix. There are three main segments to our HPTC strategy.

We, in ISS, are focused on Value solutions and BCS are focused on Performance and Specialty solutions. In these industry standard compute clusters, known as Beowulf clusters, the applications can be run in serial or parallel fashion depending on how the application(s) have been coded and as such a Control Node is used to receive the job request from the user or client on a remote or local
workstation and the job submitted to be run on the cluster. If the job is a serial job, then it will be allocated to a single node and if a parallel job, to a number of nodes that are available. Hence, the use of a cluster manager to monitor and manage job processes is important. Other aspects that may not be familiar to some readers are the use of job batch queues, job accounting for departmental charge backs, parallel compilers and debuggers, and software management utilities for loading new code across 10’s, 100’s, and 1000’s of nodes quickly. Other aspects of these types of clusters are the cluster interconnects which, besides the raw power of the processors, dictate the overall performance of parallel processing. In traditional departmental systems with clients and servers the LAN is used to pass data and sometimes commands between machines and as the traffic is usually small packets of data, Ethernet hardware and TCP/IP is sufficient, but when looking at trying to optimize parallel processes, a new protocol was developed called MPI or Message Passing Interface and has added API’s for programmers to link directly to adapters and send data using simple Get / Put commands. This eliminates the round robin, collision detection techniques used by TCP/IP and Ethernet. Also a new form of NIC(s) have been developed to handle the higher I/O bandwidth and lower I/O latency called Myrinet or in the most extreme case, Quadrics. Both of these NIC are extremely expensive but if you job is running for 10 days, you do anything you can to speed it up.

As such we have developed a three-tier solution suite as illustrated below:
We will offer a select set of commodity cluster hardware SKU’s, beginning with 16 Compute nodes and a Control node as the management node or console. We will support this as a single SKU, which can be sold as a single unit. We will then also offer a 16 Compute Node complementary SKU, which will then give the customer a 32 Node compute cluster, which is the market sweet spot. We are basing this on a DL360 G3 Compute Node and a DL380 G3 Control Node. These SKU’s will come standard with 2P and 1 GB Memory and 1 18 GB Disk in the DL380 G3. The interconnect will be default 10/100 Ethernet supported by two Ethernet Switches: the first for cluster communications and the second for ILO Out of Band (OOB) Management. The customer will be able to option up memory and disk on the Control and Compute Nodes. We will also offer a Professional Services Consulting and Implementation option to install open source software such as OSCAR and ROCKS cluster managers as well as any additional open source software they require on a site by site Services agreement.

The second mid range offering called ProLiant LC for Linux Cluster will be the same except will have the additional options of Gigabit Ethernet and Myrinet in the future for clusters up to 512 nodes as well as factory loaded support for certified and tested partner cluster management and cluster or global file system software. These partner based products from Scyld Computing, Scali, Platform Computing, and Sistina have been certified on ProLiant clusters for the past two years and we have been reference selling them with moderate success. These software packages are also supported today with optional Professional Services offerings and in the future with Customer Service Solutionpaq options. See the following websites for additional partner information:

http://www.scyld.com
http://www.scali.com
http://www.platform.com
http://www.sistina.com
Or go to
http://hptc.inet.cpqcorp.net/products/cluster_categories.html#beowulf

This offering is complementary to the third tier Linux Supercomputer or XC offering by BCS which will be comprised of Industry Standard servers and proprietary HP software stack(s) as well as commercial ISV products to meet customer needs of a more demanding character than considered for the ProLiant LC solution.

The LC Series will be the emerging market and mid range Linux offering in the HPTC marketplace, addressing requirements for high single-application performance, and scaling of the system to 512+ nodes. HP will utilize technology
from our existing and new partners as well as Open Source software, to the extent possible to satisfy customer need. Our differentiation will be the delivery of a certified, tested integrated solution from our internal manufacturing facilities or our certified resellers. This is in line with previous cluster offerings for high availability with the main difference being the code will be loaded during the manufacturing integration process to test the cluster prior to leaving the HP or certified reseller site. Since much of the underlying software is available from developers, HP’s differentiation will come from managing the complexity that exists due to:

1. Configuring and deploying Linux clusters and the software components
2. Large-scale integration and implementation of the machine
3. Specific application performance and optimization handled through HP’s Services organization

The LC Series program will deliver a suite of products and services that they have traditionally required and funded with proprietary RISC platforms. The requirements of our customers have not changed, although the underlying technologies and the accompanying business model have. The program will capture return for its value adds through volume sales through the HP ProLiant brand identity and HP Services expertise.

**ABACUS – ProLiant Computational Cluster SKU**

A scalable multi-node Compute Cluster based on 32 DL360 G3 2P Compute nodes and 1 DL380 G3 2P Control Node.

Options for Interconnect, Software, Services.

Direct and Indirect Sales models with HP ESG Mfg or certified Partner/Distributors providing assembly.

What are your primary goals and objectives for this product?

- Provide HP ISS Volume economics and product leadership to the HP HPTC portfolio
- Provide a superior offering to that of Dell, IBM and “White Box” Niche VAR’s with certified and proven partnership applications
- Provide optional solution stacks addressing our chosen industries
HP Serviceguard for Linux Multipath Support
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This article provides an overview on the current FibreChannel multipath capabilities supported in a Serviceguard for Linux environment and provides information on its limitations. Until HP’s multipath software products (Secure Path and/or AutoPath) support selected Linux distributions, Serviceguard for Linux will support this implementation in order to provide highly available redundant paths to storage. Detailed set up instructions and recovery procedures can be found at: http://docs.hp.com/hpux/ha/#ServiceGuard%20for%20Linux as part of Managing Serviceguard for Linux.

One of the features available for the standard Linux kernel is a Software RAID function, which can be used to implement software based RAID1 or RAID5 to protect data from hardware failures. The core of this function is implemented in the “MD Driver” (the Multi-device disk driver). More explanation on this is in the document “Software-RAID-HOWTO” which can be found at: http://www.ibiblio.org/pub/Linux/docs/HOWTO/other-formats/pdf/Software-RAID-HOWTO.pdf. One feature that is supported by the MD Driver, but not well described in the HOWTO is multipath1. In some storage environments, especially FibreChannel, a system can be configured with redundant components such that there are two, or more, paths to the same LUN. Multipath allows you to take advantage of that by having the software utilize one path and failover to another fairly transparently by presenting a virtual “LUN”, the same way as it presets a virtual LUN for software RAID.

Serviceguard for Linux utilizes the multipath capability of the MD driver in some configurations. The high availability benefit it provides in a clustered environment is clear. With a single path to storage, any failure in that path generally causes the cluster to act like the server has failed. All applications are forced to failover to another node in the cluster. Since a failover causes a restart, and often a recovery of an application, which can be very disruptive to users – less disruptive than without clustering but there is an impact nonetheless. With this multipath feature of the MD driver, a failure of an HBA, a switch in the FibreChannel SAN, or a controller failure in a storage subsystem can be nearly transparent to the application – just a delay caused by the path failover time versus node failover time.

1 Some information on the web indicates that multipath and software RAID can be done at the same time. Experiments trying to do this have not been successful. RAID protection in a Serviceguard system is provided by the hardware.
The features the MD driver provides are limited, so the system administrator needs to understand and manage the system appropriately. This remainder of this write-up focuses on these limitations and the necessary management.

- The multipath functionality is used for failover only without any performance benefits from the currently available version. Many commercial versions of software (such as Secure Path and AutoPath) that provide a “multipath” feature also utilize both of those paths simultaneously whereas the MD driver does not.
- With retries in the system, the MD driver typically takes about 1 minute to failover from one path to another.
- There is no automatic monitoring of the alternate path. This can leave the system open to a “latent failure” where a component in the alternate path fails and it is not known until you have a second failure and the primary path fails. At that point, it is as if multipath didn’t exist. While this is a low probability, it is useful to know ahead of time. If there are management tools within the system that can monitor the health of the path, then they should be used. Otherwise, a simple mechanism to periodically check the path can be scripted by the administrator. In this case, the purpose is to see if any hardware fails in the path. One would not use the MD driver in this case, but might create a small partition with a file that is just written periodically. A failure here would indicate a probable hardware failure that should be fixed.
• The final limitation is that restarting the Linux raid system or rebooting when a path has failed. Serviceguard scripts start the raid system (multipath) when a package starts. If the path that has failed is the path to the first device in the raidtab file, /dev/sda1 in this case, then that MD device will not start. Changing the order of the devices in the raidtab file will allow it to start. This can be done manually or the package startup script can be modified to use an alternate raidtab if the first fails. If the failed path is repaired, then `sfdisk` and `raidhotadd` can be used to re-enable it.

• If the system is rebooted when a path is down, Linux will re-order the disk names, i.e. in this case the old /dev/sde might wind up as /dev/sda, or some other name. In this case, fix the path before allowing the node back into the cluster or the fix would have to be manual, based on how all of the devices get renamed.

Due to the limitations of the MD driver, the Serviceguard for Linux team plans to recommend HP’s multipath software product (Secure Path and/or AutoPath) when available on supported FibreChannel devices and Linux distributions. However, the MD driver provides redundancy for a key component of a cluster’s architecture, so the Serviceguard for Linux team decided to document the limitations and management practices in order to enable its appropriate usage.
**ProLiant DL380 G3 Packaged Cluster**
- Up to 2 Intel Xeon 2.8GHz processors with 512K Cache
- ServerWorks GC-LE chipset, supporting a 400MHz FSB
- 3 full-length PCI-X expansion slots: 2 hot plug 100MHz and 1 133MHz
- 512MB of 2-way interleaved, 200MHz DDR SDRAM with Advanced ECC and Online Spare Memory capabilities, expandable to 6 GB
- 2 embedded NC7781 Gigabit Ethernet NIC ports
- Embedded Wide Ultra3 Smart Array 5i Plus RAID controller
- Simplex/duplex backplane, enabling the 6 internal SCSI drives to run on 1 or 2 channels

**ProLiant Cluster HA/F100 and HA/F200 for MSA1000**
- HP ProLiant Cluster HA/F100 for MSA1000 (Part Number 252408-B22)
- HP ProLiant Cluster HA/F200 for MSA1000 (Part Number 252409-B22)
- Multi-Cluster support for the MSA1000 (up to 3 two cluster per MSA1000)
- Hot add of a cluster to a SAN
- Hot add of an enclosure to a cluster
- Ability to expand with redundancy
- Hot add of an Host Bus Adapter
- New Redundant path via Secure Path (HA/F200 only)
- 3 Port Integrated Mini-Hub (Optional)
- ProLiant DL580 G2 F100/F200 Integrated Cluster Solution with MSA1000 in a 22U Rack for NA and EMEA
- ProLiant DL380 G3 F100/F200 Integrated Cluster Solution with MSA1000 in a 22U Rack for NA and EMEA
- ProLiant DL360 G3 F100/F200 Integrated Cluster Solution with MSA1000 in a 22U Rack for NA and EMEA
- ProLiant F100/F200 Non-Integrated Cluster Bundle with MSA1000 (all parts are shrink wrapped and shipped on a pallet) NA only
ProLiant Parallel Database Cluster for Oracle9i Real Application Clusters on Red Hat Linux

- Oracle9i Real Application Cluster Support and certification on Red Hat Linux Advanced Server
- Multiple HP StorageWorks MSA1000 storage Support and Certification
- Industry leading HP Server technology with price/performance, Reliability, Availability and Scalability features offered by ProLiant DL580 G2
- Customized clustering solution delivered by HP Services and select HP Certified integration Partners (CIP)

PDC/O2000-MSA1000 for Oracle 9i Real Application Cluster Release 9.2 on Windows

- Oracle9i Real Application Cluster (RAC) Release 9.2 Support and certification
- HP StorageWorks MSA1000 V2 Storage Support and Certification
- Windows 2000 Advanced Server support
- Secure Path V4.X

- New Servers
  - ProLiant DL580 G2
- HP Channel/ direct and CIP Partner delivery model

ProLiant Clusters for NetWare

- Support for NetWare Clusters on the StorageWorks MSA1000
- DtS Architecture (Direct Attached to SAN) provides seamless data migration from Smart Array direct attached storage to the MSA1000.
- High degree of fault tolerance with redundant components – Controllers, Embedded Switches, Fans and power supplies
- Advanced Data Guarding (RAID ADG) - Provides a high level of data protection and better utilizes drives in large RAID volumes
- Embedded 6-port 2Gb Fabric Switch Option or 3 port mini-hub option - Efficient space saving design lowers the infrastructure cost of deploying a SAN
- Redundant data paths with the use of Secure Path software
- New 2Gbit Host Bus Adapter
- Supports current 1Gb fabric switches - SAN Switch 8/16 and SAN Switch 8EL/16EL
- Supports new 2Gb fabric switches
- SANworks Secure Path for NetWare Workgroup Edition v3.0C
ProLiant Cluster HA/L100 - LifeKeeper for Linux

- ProLiant Cluster HA/L100 LifeKeeper for Linux cluster kit – 303523-B21
  - Is an installation and documentation kit including LifeKeeper for Linux 30-day evaluation software for a one stop implementation experience
  - Cluster kit contains an HP ProLiant documentation CD containing a ProLiant Cluster Installation Guide and Installation Poster providing hardware, operating system, and LifeKeeper installation instructions
- Smart Array Cluster Storage support
- MSA1000 and MA8000 support
- New servers certified - Now supporting the ProLiant DL360 G3, DL380 G3, ML570 G2 and DL580 G2 as well as previously announced ML350 G3 and ML370 G3 servers
- ProLiant DL380 G2 Packaged Cluster and HA/L100 LifeKeeper - Oracle Solution for NA and EMEA
- ProLiant DL380 G2 Packaged Cluster and HA/L100 LifeKeeper - Samba Solution for NA and EMEA

HP Serviceguard for Linux ProLiant Cluster

- HP Serviceguard for Linux ProLiant cluster kit includes two Serviceguard for Linux licenses, all necessary software, complete documentation and heartbeat cable.
- HP’s industry-leading ProLiant Servers DL580 G2DL 360 G3, DL380 G2 and G3, HP Smart Array Cluster Storage fully certified for mission critical Serviceguard for Linux environments in addition to existing certified HP Storage Works VA and XP configurations
- Red Hat Professional 7.3 for SCSI and Red Hat Advanced Server 2.1 for Fibre Channel configurations
- Software enhancements increase the maximum number of packages to 150, provide administration capabilities through Serviceguard Manager, and support Journal File System and parallel fsck to minimize failover time
- Quorum service (arbitrator) for two node configurations may be any HP server or PC that supports Red Hat 7.1, or above, one quorum service supports a total of up to 100 nodes in up to 50 heterogeneous HP-UX and Linux Serviceguard clusters
- Application toolkits to speed deployment of leading Linux applications: Apache, NFS, Samba, and Sendmail
Cluster Concepts

What is Microsoft Cluster Server?
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A **Microsoft Cluster Server** cluster consists of a loosely coupled collection of two or more independent Microsoft® Windows NT® Server/Windows® 2000 Server systems. Nodes have the following characteristics:

- Every node is attached to one or more shared storage buses. Each shared storage bus attaches one or more disks. The disks store all of the cluster’s configuration and resource data. Each disk can be owned by only one node at any point in time, but ownership can be transferred between nodes. The result is that each node has access to all cluster configuration data.
- Every node communicates with the other nodes in the cluster through one or more physically independent networks, which are sometimes referred to as interconnects. Network adapters, referred to in server clusters as network interfaces, attach nodes to networks.
- Every node in the cluster is aware when another system joins or leaves the cluster.
- Every node in the cluster is aware of the resources that are running locally as well as the resources that are running on the other cluster nodes.
- All nodes in the cluster are grouped under a common name, the cluster name, which is used for accessing and managing the cluster.

When a node starts, it searches for active nodes on the networks designated for internal communication. If it finds an active node, it attempts to join the node’s cluster. If it cannot find an existing cluster, it attempts to form a cluster by taking control of the quorum resource. The quorum resource stores the most current version of the cluster database, which contains cluster configuration and state data. A server cluster maintains a consistent, updated copy of the cluster database on all active nodes.

Administrators organize cluster resources into functional units called groups and assign these groups to individual nodes. If a node fails, the server cluster transfers the groups that were being hosted by the node to other nodes in the cluster. This transfer process is called failover. The reverse process, failback, occurs when the
failed node becomes active again and the groups that were failed over to other
nodes are transferred back to the original node.

All server cluster objects (that is, nodes, networks, network interfaces, groups,
resources, and resource types) are associated with a set of properties, which are
data values that describe an object's identity and behavior in the cluster.
Administrators manage cluster objects by manipulating their properties, typically
through a cluster management application such as Cluster Administrator.
Developers use the Server Cluster APIs to create cluster-aware applications, cluster
management applications, and custom resource types.

Server Cluster Application Types

Server clusters are open-ended providing an environment in which many different
kinds of applications, services, and devices can run. The Server Cluster APIs are
designed to allow the integration new and existing hardware and software into the
cluster environment.
Developing applications for server clusters begins by deciding how the
application, service, or device needs to interact with the cluster. Use the following
application types as a guide to determine the level of interaction needed:

- Cluster-unaware applications do not interact with the cluster at all and can
  still perform well in the cluster.
- Cluster-aware applications achieve optimal performance by implementing
  awareness of the cluster environment, allowing them to react to cluster
  events.
- Cluster management applications such as Cluster Administrator and
  Cluster.exe allow administrators to manage and configure clusters.
- Custom resource types provide customized cluster management for
  applications, services, and devices.

Cluster-Unaware Applications
The following features distinguish a cluster-unaware application:

- The application does not use the Server Cluster APIs. Therefore, it cannot
discover information about the cluster environment, interact with cluster
objects, detect that it is running in a cluster, or change its behavior between
clustered and non-clustered systems.
- If the application is managed as a cluster resource, it is managed as a
  Generic Application resource type or Generic Service resource type. These
  resource types provide very basic routines for failure detection and
application shutdown. Therefore, a cluster-unaware application might not be able to perform the initialization and cleanup tasks needed for it to be consistently available in the cluster.

Most legacy applications are cluster-unaware. However, a cluster-unaware application can be made cluster-aware by creating a custom resource type to manage the application. A custom resource type provides the initialization, cleanup, and management routines specific to the needs of the application.

There is nothing inherently wrong with cluster-unaware applications. As long as they are highly functioning and available to cluster resources when managed as Generic Applications or Generic Services, there is no need to make them cluster-aware. However, if an application does not start, stop, or fail over consistently when managed by the generic types, it should be made cluster-aware.

**Cluster-Aware Applications**

An application is cluster-aware if it satisfies one or both of the following conditions:

- A custom resource type manages the application as a cluster resource.
- The application uses the Server Cluster APIs to discover information about the cluster environment and take advantage of the features that clustering offers.

An application can be made cluster-aware if it has the following characteristics:

- Uses TCP/IP as a network protocol.
- Maintains data in a configurable location.
- Supports transaction processing.

Typical cluster-aware applications include database applications, transaction processing applications, file and print server applications, and other groupware applications.

The following steps can be used as a guide when creating a cluster-aware application:

- Determine the ways in which the cluster-aware application needs to be aware. For example, does it need to detect nodes on which it can run, locate specific resources, or check for available disk space? Can multiple instances of the application run simultaneously in the cluster? By answering
these kinds of questions, a set of cluster behaviors that the application must implement, can be defined.

- List dependencies that the application requires as a cluster resource.
- Determine if the application requires one or more private properties.
- Implement the cluster behaviors determined in step 1.
- Create a custom resource type to manage the cluster-aware application.

### Cluster Management Applications

Cluster management applications are used to administer clusters and to perform such tasks as adding resources, establishing resource dependencies and failover policies, changing the membership of groups, and moving a group from one node to another. Cluster management applications can typically run locally on one of the cluster nodes or remotely on a non-clustered system. One example of a cluster management application is Cluster Administrator; another is a command line tool also provided with Windows Clustering called Cluster.exe.

There are two ways to create a cluster management application:

- Use C or C++ and the Server Cluster APIs.
- Use Microsoft Visual Basic or a scripting language and the cluster automation server.

A cluster management application should enable administrators to perform basic cluster management tasks, including:

- Listing all cluster objects. This includes objects contained within other objects; for example, the resources in a group or the network interface on a network.
- Displaying and changing the state of objects. For example, an administrator should be able to see if a resource is online, off-line, or pending; and should be able to pause a node to perform maintenance.
- Displaying and changing object properties.
- Adding and removing groups and resources.
- Assigning resources to groups.
- Establishing resource dependencies.
- Moving groups between nodes

For more detailed information on Microsoft Cluster Server, see Microsoft’s cluster web site at:
Cluster Support

Cluster Support for ProLiant BL20p G2 and BL40p

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HP offers the industry’s broadest portfolio of blade servers and technologies optimized to address customers’ needs. The next two ProLiant BL p-Class systems announcing soon are part of the new generation of ProLiant BL server blades and infrastructure portfolio developed for adaptive computing and optimized for rapid deployment and automated provisioning. The ProLiant BL p-Class system provides high performance, high availability server blades for clustering and multi-tiered data center architectures.

The ProLiant BL p-class system enables dynamic scaling and protects your investment with an intelligent, modular infrastructure that can accommodate future server blades. The first 4-way server blade in the ProLiant BL p-Class family is the BL40p, engineered for the back-end enterprise space. The new ProLiant BL20p G2 dual processor server blade is designed for performance front-end and mid-tier computing with enterprise availability. Both of these new server blade models will be supported for Microsoft Cluster failover solutions by 2Q03. Customers will be able to utilize these new blades as server nodes within ProLiant Cluster HA/F100 – MSA1000, HA/F200 – MSA1000, and HA/F500 – MA8000 (HSG80) and EVA cluster environments.

The ProLiant BL20p G2 and BL40p server blades will support the full range of HP StorageWorks arrays. This will allow blade servers to integrate with StorageWorks SANs, supporting the complete line of cluster storage offerings available to customers today. The StorageWorks arrays supported for Microsoft Cluster will include:

- StorageWorks Modular SAN Array 1000 (MSA1000)
- StorageWorks Enterprise Virtual Array (EVA)
- StorageWorks Modular Array (MA8000 - HSG80)

Both the ProLiant BL20p G2 and the ProLiant BL40p can support redundant SAN connectivity to provide the highest levels of availability. Secure Path is required for multi-path functionality support.
For additional information about the ProLiant BL p-Class products, refer to product information located at:

**ProLiant BL20p G2 - Key Benefits**
- Two Xeon processors and hot-plug SCSI drives provide no-compromise performance and availability
- Redundant 2-Gb Fibre Channel option for high performance SAN connectivity for multi-vendor SAN solutions
- Perfect solution for multi-server applications such as dynamic web hosting, application server, terminal server farm and media streaming

The ProLiant BL20p G2 delivers optional Fibre Channel support for SAN implementations and clustering capabilities. Through the implementation of a SAN with the ProLiant BL20p G2, customers can achieve improved data availability, easily scale capacity, and realize management cost savings from consolidating disk resources. In addition, with HP’s StorageWorks SAN product offerings, customers can design a storage architecture that incorporates application, database and file serving solution functionality.

The new ProLiant BL20p G2 can be used with all of the existing p-Class infrastructure components (server blade enclosure, interconnects, power, bus bars and diagnostic station), although new interconnects must be used for Fibre Channel SAN connection. Fibre Channel capability for the BL20p G2 is achieved using a Dual Port Fibre Channel Mezzanine Card (2-Gb) specifically designed for this member of the blade family. The ProLiant BL20p G2 is optimized for HP StorageWorks SANs. Microsoft Cluster support is planned for 2Q03 for the StorageWorks MSA1000, MA8000 (HSG80), and EVA.

The ProLiant BL20p G2 can be ordered with the Dual Port Fibre Channel Mezzanine Card installed or the Dual Port Fibre Channel Mezzanine Card Option Kit can be ordered separately. The Dual Port Fibre Channel Mezzanine Card supports up to 2 Gb/s and the card is backward compatible with existing 1 Gb/s Fibre Channel equipment. The Dual Port Fibre Channel Mezzanine Card can only be installed in the ProLiant BL20p G2. It cannot be installed in the first generation ProLiant BL20p.
The existing ProLiant BL p-Class GbE Interconnect Switch Kit and RJ-45 Patch Panel are designed for network signals. The new interconnects (either Patch Panel 2 or GbE2 Interconnect Switch) must be used for the ProLiant BL20p G2 Fibre Channel SAN connection. A GbE2 Interconnect Switch that provides both network cable consolidation and connections for the ProLiant BL20p G2 Fibre Channel storage signals is planned for the near future.

In summary, the following components are required to support Microsoft Cluster and SAN connectivity on the ProLiant BL20p G2:

- Dual Port Fibre Channel Mezzanine Card installed
- Interconnect Switch Kit that provides Fibre Channel pass-through - there are 2 options:
  - ProLiant BL p-Class Patch Panel 2
  - ProLiant BL p-Class GbE2 Interconnect Switch with the GbE2 Storage Connectivity Kit option (available 2Q03)

**ProLiant BL40p – Key Benefits**

- Four Xeon processors, hot-plug SCSI drives, and redundant SAN capability provide for a “no compromise” server blade which adapts effortlessly into the existing p-Class environment
- Perfect solution for back-end enterprise and database applications that require maximum computing power and robust high availability features
- Designed with back-end enterprise availability in mind through two PCI-X slots for redundant SAN connectivity
- The intelligent p-Class infrastructure reduces today’s operational costs and protects your future investment

The ProLiant BL40p is a 4-way server designed for environments that require maximum computing power and robust high availability features in the versatile blade infrastructure. The ProLiant BL40p is fully compatible with all existing and future components of the p-Class system (server enclosures, interconnect switches, power enclosures, bus bars, and cabling). The ProLiant BL40p will protect your mission critical server information using intelligent fault-resilient power, redundant
SAN connectivity, integrated RAID, intelligent fault-resilient power and hot-plug SCSI drives.

Fibre Channel support for SAN implementations and clustering capabilities are standard benefits of the ProLiant BL40p. The ProLiant BL40p provides two PCI-X slots (64-bit/100MHz) for redundant SAN connectivity to HP StorageWorks MSA1000, MA8000 (HSG80), and EVA. The ProLiant BL40p fully supports HP StorageWorks SANs. Microsoft Cluster support for the ProLiant BL40p and StorageWorks MSA1000, MA8000 (HSG80), and EVA cluster solutions is planned for 2Q03. Two HBAs in each BL40p blade server provide support for redundant SAN connectivity in this Microsoft Cluster Server failover solution. The redundant path configuration requires Secure Path to provide multi-path functionality. The following Fibre Channel Host Bus Adapters (HBAs) are supported HBA options for the BL40p server blades that will participate in a Microsoft Cluster Server failover solution:

- FCA2101 (LP952)
- 64-Bit/33-MHz PCI-to-Fibre Channel HBA (LP8000)

Cluster Support

Thus far, mention of one type of clustering has been made – high availability failover clustering. The ProLiant BL20p G2 and BL40p will support several different types of clustering, including the following:

- IP Failover/Network Load Balancing
- Application Servers
- High Availability (Failover) Clustering

IP Failover and Network Load Balancing applications distribute incoming TCP/IP traffic between multiple servers, providing increased performance and faster response times. This is also a very scalable architecture because you can simply add more servers to increase capacity and performance. Blades, as an "edge of the Web" solution for internet linkages and IP transaction routing, are very cost effective and provide tremendous scaling. Blades can operate as Web Servers and provide interconnect routing to application and data servers, which can coexist in the same rack making a very dense packaged solution for web application processing.

Application servers can provide software scaling and increase the capacity of an application by adding servers. A management application is used to coordinate the activities of the individual application servers. This typically involves managing
the replication of data and applications across the applications servers so that they are all identical, and then routing incoming requests to achieve load balancing and availability across the application servers. Because the applications and data are stored locally on each server, Blade servers can provide an excellent platform for an application server environment.

Most application failover clustering requires that the server nodes in the cluster be connected to a shared storage system. Microsoft Cluster Server is an example of a failover cluster solution and requires the BL40p server blades to be connected to a shared storage system. The ProLiant BL p-Class Microsoft Cluster solutions that will be offered by HP will include support for the StorageWorks MSA1000, MA8000 (HSG80), and the EVA fibre channel storage systems. The BL40p and the BL20p G2 failover cluster solutions will be supported for Microsoft Windows 2000 Advanced Server by 2Q03 and Windows Server 2003 at official release.

The BL20p G2 provides performance similar to the ProLiant DL380 server and will be well suited for the following failover clusters:

- Small databases
- Smaller scale Messaging and Collaboration
- Application Server
- File/Print

The BL40p provides performance similar to the ProLiant DL580 server and will be well suited for the following failover clusters:

- Medium to large enterprise database
- Messaging and collaboration
- Enterprise Resource Planning (ERP)
- Customer Relation Management (CRM) solutions
- Data Warehousing
- File/Print

For additional information about the ProLiant BL p-Class products, refer to product information located at: http://h18000.www1.hp.com/products/servers/proliant-bl/p-class/.
Support for Clustering Insight Manager 7 on Windows 2000 Advanced Server

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Insight Manager 7 offers the ability to run in a Microsoft Windows 2000 Advanced Server clustered environment, using Microsoft SQL Server 2000 Enterprise Edition on any ProLiant Cluster. By installing Insight Manager 7 as a clustered application, this versatile and simple management product becomes highly available.

The ProLiant cluster product offerings that will support Insight Manager 7 running as a cluster application include:

- ProLiant DL380 Packaged Cluster
- ProLiant Cluster HA/F100 and HA/F200 – Modular SAN Array 1000
- ProLiant Cluster HA/F100 and HA/F200 – Raid Array 4100
- ProLiant Cluster HA/F500 – Enterprise Virtual Array
- ProLiant Cluster HA/F500 – Modular Array 8000 (HSG80)

Insight Manager 7 is available on the Management CD that ships with all ProLiant servers as part of the ProLiant Essentials Foundation Pack. Clustering support is available when using the Insight Manager Service Pack 2, Service Pack 1.1, or Service Pack 1.

Insight Manager 7 can be installed on the same node where Microsoft SQL Server 2000 Enterprise Edition is running or on the other node of the cluster. By distributing the load of Microsoft SQL Server 2000 and Insight Manager 7 on separate nodes, you are able to take advantage of maximum operating efficiency. The Insight Manager 7 database, the repository for all management information used by Insight Manager 7, will reside on a Microsoft SQL Server 2000 virtual server, which is also clustered.

A configuration with the load distributed across the cluster nodes provides the highest level of availability. The primary node will be used as the Microsoft SQL Server 2000 Enterprise Edition processor, handling remote SQL Server commands. The secondary node will be used to handle the following:

- Run the Insight Manager 7 service
• Run component services specific to the Insight Manager 7 application
• Run the DMI service
• Catch traps from managed devices

In case of a problem with the node running Insight Manager 7, Microsoft Cluster Server resources will fail over to the surviving node. At this point, SQL Server and Insight Manager will be running on the same node.

Because an Insight Manager virtual server name/IP address is created during the installation process and can be accessed to obtain information from Insight Manager, client access will continue to be available if a failover occurs. During failover, the virtual server name and IP address will fail over to the surviving node. The clients browse using this Insight Manager virtual server name and IP address.

Similarly, devices that report their events to Insight Manager 7 should use the cluster virtual IP address/name for the location of the Event Consolidator (SNMP Trap Destination). If a failover occurs, the virtual server name and IP address will fail over to the surviving node. Devices will continue to report events to Insight Manager via the virtual reference.

A white paper titled, “Clustering Insight Manager 7 on Windows 2000 Advanced Server”, is available on the HP Management CD that ships with all ProLiant servers. This paper provides the steps required to install a highly available clustered version of Insight Manager 7 on a ProLiant Cluster in a Windows 2000 Advanced Server environment.

For additional information about ProLiant Cluster offerings, refer to product information located at:

For additional information about Insight Manager 7, refer to the product information located at:
Partnerships

SteelEyes LifeKeeper for Linux at AFC 2002 (Americas Field Conference)
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The LifeKeeper for Linux Cluster was a huge hit at the AFC in Las Vegas, Nevada. I demoed the failover capabilities of LifeKeeper for Linux running the Apache Web Server Application Recovery Kit (ARK) on a ProLiant DL380 Packaged Cluster. It seems that the Americas field organization was semi aware of the product but did not have much of an idea of its true capabilities and ease of installation and configuration especially on the ProLiant DL380 Packaged Cluster. Besides the ease of installation and configuration, the audience was in awe of the ARKs and of the number of OSs supported by LifeKeeper. If the customer has an understanding of the application associated with an ARK, the installation and configuration of that ARK is extremely easy. The matrix of supported ARKs and operating systems is located at http://www.steeleye.com/products/supported_apps.html. With the availability of over 20 ARKs for Linux, the LifeKeeper Cluster customer has a huge breadth of Linux Applications to provide the High Availability and Fault Resilience that most customers want and expect from HP. LifeKeeper for Linux also supports up to a 32 Node configuration, which makes this particular solution highly flexible and scalable, as illustrated below:
Having SteelEye Technology as a key HA partner gives HP a solid and mature clustering solution that runs on Linux and Windows 2000. Supported operating system versions on ProLiant can be found at ftp://ftp.compaq.com/pub/products/servers/os-support-matrix-310.pdf. Since LifeKeeper runs on selected ProLiant Servers on both Linux and Windows 2000, this gives HP customers their personal choice of an operating system environment that best suits their needs. What most people do not know is that SteelEye bought LifeKeeper from NCR back in 1999. This product has been around for 10+ years and is an extremely mature clustering product and not a newly developed solution like most may think. Key points of interest of what LifeKeeper for Linux gives to our customers that need HA on Linux is noted below:

- High Availability
- Fault Resilience
- Proactive Protection
- Scalability
- Data Access and Integrity
- Recovery Operations
- Application Recovery Kits
- Uptime During Maintenance and Upgrades

Detailed information on the above bullets can be found at http://www.steeleye.com/products/linux/.

HP now provides a cluster kit, ProLiant Cluster HA/L100 - LifeKeeper for Linux Cluster Kit (303523-B21), to increase the awareness of LifeKeeper for Linux on HP hardware as well as to allow HP to provide LifeKeeper to our customers. The kit does not include LifeKeeper for Linux licenses which must be purchased from SteelEye. It provides the LifeKeeper for Linux software and additional documentation on the installation of cluster configurations involving ProLiant servers and storage systems including the Smart Array Cluster Storage, the MSA1000, the MA8000, and the RA4100.

It was apparent from my demo that the Americas field organization sees a fit for LifeKeeper for Linux into those accounts that want a highly-available solution on their applications and are currently running a Linux OS or contemplating the use of Linux in the future within their IT environment.

For more information on the LifeKeeper products, visit the SteelEye Technology website at http://www.steeleye.com.
Marathon Technologies is continuously meeting HP Customers’ needs with “Five Nines” of High Availability

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When HP customers need 99.999% availability and cannot afford to drop a single transaction (all Windows NT or Windows 2000 applications execute without modifications to the application), they turn to Marathon Technologies’ Endurance 6200. Endurance eliminates the failover process, continuing to operate through faults and disasters without interruption. Unlike RAID or load balancing technologies that mirror data on multiple servers, Endurance mirrors transactions for processing on two servers simultaneously. If one server fails, the other continues to operate with no lost data, no dropped transactions, and no loss of performance to the end user.

Marathon Launches Exchange Initiative

Marathon is launching a new initiative to help partners sell Endurance for Exchange platforms. Although Endurance supports all Windows applications, the business-critical nature of email systems make Exchange a particularly good fit for Endurance. With this initiative, Marathon is providing partners with in-depth technical expertise on the configuration, setup, and administration of highly available Exchange systems. A wide range of collateral templates and marketing campaign guidance is also available to Marathon partners.
HP customers, who desire to have a “Compute-Thru” environment, turn to Marathon Technologies and HP ProLiant Servers for their High Availability Windows Platforms:

The following customers recently bought HP ProLiant servers with Marathon Endurance 6200 to run their Microsoft Exchange systems:

- El Paso County, Colorado - ProLiant DL380 G2s
- Lone Pine Capital - ProLiant DL380 G2s
- Massachusetts Army National Guard - MA8000s

Several recent sales are for customers using HP ProLiant servers with Marathon Endurance 6200 to protect their process control applications, including:

- Wyeth Labs - ProLiant DL380 G2s
- Samsung - ProLiant DL380 G2s
- Indian Point Nuclear - ProLiant DL380 G2s

These are just a few of the latest HP/Marathon Technologies wins. Other huge opportunities are being worked on. If Stratus is threatening an existing HP account that needs 99.999% availability, then the best X86/Windows solution is to partner with Marathon Technologies. With Marathon, HP wins the hardware business and Marathon or a Certified Marathon Partner owns the overall solution.

If Stratus moves into our accounts and wins, we absolutely win nothing and furthermore we could lose other business within these accounts once Status has entered into our accounts with their high-end solutions. Customers will turn to as much high-availability as possible without minimal interruption to their business critical applications and partnering with Marathon Technologies is way of keeping Stratus out of new and existing accounts. If you have any questions give George Tilley at hp a call (281) 514-3431 or email george.tilley@hp.com, remember no question is too simple or complex to avoid the competition from winning in our new or existing accounts.

NOTE: Partnering with Marathon Technologies was handled differently before the merger. HP at one time had an OEM agreement with Marathon Technologies which ended as of 12/31/2001 and Compaq’s relationship was more of a partnership where Compaq worked extremely close with Marathon on potential sales as well as supporting Marathon with hardware to be placed on Marathon’s web site along with joint engineering discussions for future development from both companies. Going forward after the merger, pre-merger Compaq partnering
model was adopted. Going forward, HP will support all HP related hardware and
Marathon Technologies or a certified Marathon Technologies Partner will support
the overall solution including any Marathon hardware. This gives the HP
customers a complete support model that has and will continue to work as if it was
one unified solution.

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Microsoft Cluster Server (MSCS) Support Matrices-UPDATED!

Supported ProLiant Cluster Configurations for MSCS
mailto:Jennifer.Olguin@hp.com

The High Availability Microsoft Cluster Services (MSCS) Configuration Support Matrices have been updated and are now posted on the external HA web site. These support matrices represent quality tested and supported ProLiant Cluster configurations. There is a support matrix for each HA ProLiant Cluster product. Each matrix will let you know if your customer's cluster configuration is valid by providing exact details of components for the configuration desired.

Whether you are putting together cluster configurations for customers or assisting in trouble shooting cluster configurations, these matrices are a great tool. Please double check that you're only proposing supported configurations and you include the appropriate cluster kit for fibre SAN-based configurations.

As a reminder, these are the cluster configurations we support for MSCS only.

1) The MSCS Support Matrix for the ProLiant DL380 G2/G3 Packaged Clusters can be found respectively under the product resources, support heading located at:

   http://h18000.www1.hp.com/solutions/enterprise/highavailability/dl380/index-g2.html


2) The MSCS Support Matrix for HA/F100 and HA/F200 for RA4100 can be found respectively under the support heading located at:

3) The MSCS Support Matrix for HA/F100 and HA/F200 for MSA1000 can be found under the product resources, support heading located at:

soft/haf100-200/index-msa1000.html

4) The MSCS Support Matrix for HA/F500 for Enterprise Virtual Array can be found under the product resources, support heading located at:

soft/haf500/index-eva.html

5) The MSCS Support Matrix for HA/F500 for MA8000 (HSG80) can be found under the product resources, support heading located at:

soft/haf500/index-ma8000.html
What Does Multi-cluster Support for the ProLiant Cluster with StorageWorks Modular SAN Array 1000 (MSA1000) Really Mean?

Multi-cluster and multi-OS support for the ProLiant Cluster HA/F100 and HA/F200 for StorageWorks Modular SAN Array (MSA1000) is now available. With the support of multiple clusters using one MSA1000, the return on the investment of the ProLiant Cluster HA/F100 and HA/F200 for MSA1000 has increased to provide excellent investment protection for HP customers. Customers can invest in a single MSA1000 storage enclosure and have support for up to three Microsoft or Novell clusters. The ProLiant Cluster HA/F100 and HA/F200 for the MSA1000 now provides simultaneous support for up to three 2-node Windows clusters on a single MSA1000 storage enclosure.

The operating systems supported for multi-cluster, and multi-OS configurations include:

- Microsoft Windows 2000 Advanced Server
- Microsoft Windows NT Server 4.0, Enterprise Edition
- Novell NetWare 5.1
- Novell NetWare 6.0

Any combination of these four operating systems can make up the three clusters of a multi-cluster configuration. Three separate clusters of the same operating system are supported as well as three separate clusters with each cluster running a different operating system. Each node within a cluster must be running the same OS as other node(s) in that same cluster.

For instance, a customer can now plan to build one 2-node Microsoft Windows NT 4.0 cluster and two 2-node Windows 2000 Advanced Server clusters on the same external storage enclosure. Similarly, a customer can now run one 2-node Microsoft Windows NT 4.0 cluster, one 2-node Windows 2000 Advanced Server cluster, and one Novell NetWare 6.0 cluster on the same external storage enclosure. Selective Storage Presentation is used to ensure that each cluster accesses only the data that it needs and isolates the remaining clusters from
accessing data on that LUN. The MSA1000 currently supports a maximum of 32 LUNs, so this ceiling would need to be considered when planning the LUN distribution across the multiple clusters supported with one MSA1000.

Multi-cluster support will require upgrades to existing ProLiant Cluster HA/F100 and HA/F200 environments. For Microsoft Windows multi-cluster and multi-OS support, the MSA1000 controller firmware needs to be upgraded to v2.38 and the Environmental Monitoring Unit (EMU) firmware needs to be upgraded to v1.86. Existing ProLiant Cluster HA/F100 and HA/F200 customers can obtain the MSA1000 Firmware Upgrade v2.38 from the following HP MSA1000 download software and drivers web location:

An additional upgrade is required for redundant path (HA/F200) clusters in order for Secure Path to support these enhanced multi-cluster and multi-OS MSA1000 features. Customers currently running Secure Path Workgroup Edition v3.1b can download this necessary Secure Path 4.0 Windows Workgroup Edition upgrade from the HP MSA1000 download software and drivers web location:
The Secure Path 4.0 upgrade is free for Secure Path v3.1b customers and requires a licensed copy of Secure Path v3.1b.

For customers who have increasing scalability requirements, the number of MSA1000 enclosures that can be accessed from a single cluster is five. For example, a customer could configure a ProLiant HA/F200 Microsoft Windows 2000 Advanced Server 2-node cluster to access LUNs across five (5) MSA1000s. Since each MSA1000 currently supports up to 32 LUNs, the total storage available to this cluster increases drastically.

For additional information about the ProLiant Cluster HA/F100 and HA/F200 for MSA1000, refer to product information located at:

For additional information about the ProLiant Cluster HA/N100 and HA/N200 for MSA1000, refer to product information located at:
For additional information about the StorageWorks MSA1000, refer to product information located at:
Recently Released Documentation for ProLiant Cluster Solutions

New White Papers
mailto:estella.jangaon@hp.com

Several new White Papers that provide internal and external customers with guidance for the planning, installation setup and configuration of their ProLiant Cluster solutions have been recently posted to the ProLiant High Availability Web site. These papers are a collection of installation checklists, application reference sheets, and procedures for adding storage capacity to an existing cluster.

ProLiant Cluster Installation Checklists

Installation checklists provide the customer with the step-by-step procedures for deploying HA ProLiant Cluster solutions. Installation checklists are available for the following cluster solutions:

- ProLiant DL380 Generation 2 Packaged Cluster
- ProLiant Cluster HA/F100 and HA/F200 for the Modular SAN Array 1000 (MSA1000)
- ProLiant Cluster HA/F500 for Enterprise Virtual Array (EVA)

The installation checklist incorporates best practice recommendations as well as tips for avoiding common configuration errors. Please utilize the links below to obtain these new installation checklists from the HP Web site:

- [ProLiant DL380 Generation 2 Packaged Cluster installation checklist for Microsoft Windows 2000 Advanced Server](#)
- [ProLiant DL380 Generation 2 Packaged Cluster installation checklist for Microsoft NT Server 4.0, Enterprise Edition](#)
- [ProLiant DL380 Generation 2 Packaged Cluster installation checklist for Novell NetWare 6](#)
- [ProLiant DL380 Generation 2 Packaged Cluster installation checklist for Novell NetWare 5.1](#)
- [ProLiant HA/F100 Cluster for MSA1000 installation checklist with Microsoft Windows 2000 Advanced Server](#)
ProLiant Cluster Application Reference Sheets

Cluster application reference sheets are intended to provide internal and external customers with sizing information specific to a particular application running on one of the HA ProLiant Cluster product offerings. The application reference sheets include a cluster product overview, information about clustering a specific application, sizing considerations, and information and part numbers for server and storage options. Three new application reference sheets are available. Please utilize the links below to obtain these new application reference sheets from the HP Web Site:

- ProLiant packaged cluster application reference sheet for Microsoft SQL Server 2000 Enterprise Edition
- ProLiant Cluster HA/F100 and HA/F200 application reference sheet for Microsoft SQL Server 2000 Enterprise Edition

Additional Support Documentation

Additional support documentation that has been recently posted to the HA Web site includes procedures for adding storage capacity to an existing ProLiant Cluster HA/F200 for the Modular SAN Array 1000 (MSA1000) and the Raid Array 4100 (RA4100). Please utilize the link below to obtain this new white paper from the HP Web site:

- Adding storage capacity to a ProLiant HA/F200 Cluster using Microsoft Windows 2000 Advanced Server

For additional information about ProLiant Cluster offerings, refer to product information located at the following vanity URL:

http://www.hp.com/servers/proliant/highavailability

For a complete listing of white papers, including installation checklists and application reference sheets, access the following URL to the HP ProLiant Cluster Web site: