

OpenVMS: When Continuous Availability Really Matters

Compaq's OpenVMS and IBM's z/OS (formerly OS/390) are generally regarded in the industry to be the two "world class" operating systems. These are the operating systems to use for really critical business applications. Many of the applications in the banking, securities, healthcare, government, transportation and telecommunications industries require both high scalability and extremely high application uptime. Application downtime requirements can range from almost zero to no more than 60 seconds. Online transaction performance requirements can be in the thousands per second. Disk storage requirements can be multiple terabytes.

OpenVMS, introduced in 1978, has 23 years of heritage in helping customers deploy high performance "business critical" applications and achieve a very competitive total cost of ownership. Compaq pioneered OpenVMS Clusters, a key enabling technology for high scalability and availability that was introduced in 1983. Compaq continues to lead in clustering technology. Compaq has an installed base of approximately 450,000 OpenVMS systems. HRG estimates that there are over 50,000 OpenVMS Clusters deployed all over the world. Compaq believes that customers will spend several billion dollars on OpenVMS AlphaServer systems, services, and applications in 2001.

However, the best news for Compaq is that *new* OpenVMS customers are now providing 15% of its OpenVMS-based systems' annual revenue. Compaq reports that total OpenVMS systems revenues actually grew by 4% in Q4 2000 over Q4 1999.

Harvard Research Group's June 2001 survey indicates that OpenVMS customers continue to be extremely loyal. The majority of customers have no plans to migrate away from OpenVMS. However, they want a lot more applications supported on OpenVMS. Compaq's decision to port OpenVMS to the Intel™ Itanium Processor Family will provide customers with OpenVMS systems for the next 25 years and guarantee continued customer loyalty.

OpenVMS powers five of the world's top ten stock exchanges, 65% of the world's short message subscriber services, 50% of cell phone billing systems and three of the world's top four derivatives exchanges.

Compaq's OpenVMS platform is one with a rich history of successfully deploying high performance "business critical" systems. There is a large and loyal customer base. In June 2001, Harvard Research Group interviewed over 275 current users of OpenVMS to get a clear picture of perceptions in the marketplace. Users want to see a future for what they consider one of the most highly available and cost-effective servers on the market. Compaq's decision to port OpenVMS to Intel's Itanium Processor family finally puts the issues surrounding Alpha's longevity, and the commitment to OpenVMS to bed.

The Growing Customer Requirements for Highly Available Systems

Customer need for deploying highly available systems that can scale is driven by the following trends:

- The highly interconnected global economy is now operating at lightning speed.
- There is an increased focus on world trade by most countries. Also there has been a significant decrease in trade barriers. This has opened up opportunities for industrial and financial services companies. The rapid growth of middle class consumers in countries like China and India is significantly increasing the demand for consumer goods and services.
- Many large corporations have product development centers in many countries.
- A substantial number of high technology components are now manufactured in Asia. Manufacturers in western countries are highly dependent on their plants and suppliers in Asia. This has fueled the demand for high availability IT infrastructure.
- Significantly improved voice and data communications during the last twenty years is enabling corporations to base many customer services in low cost “English speaking” countries to support customers in North America.
- The Global 2000 companies who operate in most countries of the world are relentlessly focused on increasing revenue and profit and obtaining dominant market share. They want to engineer, manufacture, sell, source and support all over the globe.
- The leading multinational companies see highly available and scalable systems as a necessity because their customers, employees, partners and suppliers are located in many different time zones. The “business critical” e-Commerce applications (ERP, CRM, SCM, Financial, Web, e-mail) must be up at all times. The time available for backup, maintenance and upgrades continues to shrink at a rapid rate.

HRG’s August 2001 High Availability Systems Forecast predicts that the market for systems that operate at Availability Environment 3 (recovery in minutes, 99.99% uptime) and Availability Environment 4 (no lost transactions, 99.999% to 100% uptime) will grow at a compound annual growth rate (CAGR) of 14.8 %. The revenue associated with these systems is expected to grow from \$16.2B in 2001 to \$28.1B in 2005.

Key Technologies and Services for Deploying “Bullet Proof” Systems

Highly available systems need to be able to continuously run critical applications. This implies that backup, maintenance and upgrades must be done without bringing the application down.

Some of the necessary key technologies and services are:

- Applications designed for high availability
- An ultra-reliable, high performance and modular midrange or high end SMP system with lots of redundancy
- Very Large Memory (VLM) capability
- Hardware and software system partitioning features

- High end clustering technology (large number of computer nodes, high performance, long distances, mixed systems / operating system versions)
- High performance and high capacity redundant storage with multi-path
- Data Replication software
- Middleware for fault tolerant transaction routing
- Disaster Resilience technology
- Redundant networks
- Systems management tools
- Highly skilled IT staff
- Security (user authentication, secure transactions, intrusion detection)
- Environment (power, cooling)
- Service Processors with remote diagnostics capability
- Professional Services for pre-planning and installation
- Worldwide service with onsite spares and service engineers.

Compaq: Do they have the “right stuff” for Continuous Availability?

HRG strongly believes that OpenVMS-based AlphaServer systems can be deployed for building scalable systems with 99.99 to 100% availability. In fact, Compaq already has many customer installations that achieve this high level of application uptime.

Compaq’s key products and services for building highly available systems are:

- GS320/GS160/GS80: 32 way, 64 bit Alpha CPUs, 1.01GHz, 256GB memory, up to eight hardware partitions on Quad Building Block (QBB) boundaries. Each QBB has 4 CPUs and up to 32GB of memory. Mixed OpenVMS, Tru64 Unix and Linux are supported on hardware partitions. A hardware partition can have 1-8 QBBs.
- OpenVMS and Clusters: a cluster-wide file system, high performance distributed lock manager, high performance shared-disk cluster technology with high performance cluster interconnects (shared memory, memory channel, gigabit Ethernet, ATM). OpenVMS supports 96 node clusters. Wide area clusters, up to 500 miles (800km), are also supported.
- OpenVMS Galaxy: a key technology that allows soft partitions within a hardware partition. Each soft partition can run an independent OpenVMS instance. OpenVMS instances can be modified dynamically under software control. Resources (CPU, memory) can be redeployed from one instance to another. OpenVMS instances within a Galaxy can be clustered using high performance shared memory communications. A Galaxy OpenVMS instance can be clustered with another Alpha/OpenVMS node.
- OpenVMS Volume Shadowing: data-replication software that allows multiple geographically distributed shadow sets. This is a key technology for disaster tolerance and online backup.
- Switched, redundant-path Fibre Channel Storage with multi-path support for high performance StorageWorks RAID subsystems.
- Compaq’s StorageWorks provides leading enterprise level networked storage systems.

- Reliable Transaction Router, 4.0: the fault tolerant transactional messaging middleware necessary for 100% application uptime.
- OpenVMS security: Kerberos v5 and cluster-wide intrusion detection.
- Professional Services for planning and deploying complex systems.
- Compaq Global Services: can provide 24 X 365 business critical support.

Compaq offers a choice in Uptime Guarantee for business-critical computing environments.

OpenVMS: Customer Satisfaction Survey

Starting well before the acquisition of Digital by Compaq, HRG has tracked the satisfaction and needs of the OpenVMS community. From Digital to Compaq the loyalty of OpenVMS customers has not wavered significantly. Their needs have not changed much since we first spoke with them prior to Compaq's assimilation of Digital.

In the June 2001 survey, Harvard Research Group interviewed 275 IT professionals who manage their companies' OpenVMS servers and clusters. All interviews were conducted randomly and comprise a mix of industries, and geographies (38 states and 6 countries). The top industries represented are: manufacturing (28%); health care (16%); government (13%); education (13%); financial services (11%); telecommunications (4%); and other (15%).

Customers Rate OpenVMS Highly as Business Critical Servers

HRG, in the June 2001 survey asked respondents, who ran other operating systems in addition to OpenVMS systems, to rate the following:

- a) The selection criteria for all "business critical" servers.
- b) Their OpenVMS clusters using the same criteria.

Table 1
Rating of "Business Critical" Server Selection Criteria and OpenVMS Clusters

Selection Criteria	"Business Critical" Server Selection Criteria	OpenVMS
Service and Support	7.17	8.51
Server Availability / Fault Recovery	8.67	8.97
Performance	8.08	8.73
Scalability	5.92	8.92
Total Cost of Ownership	7.74	7.92
Availability of New Applications	8.80	5.69
Price	8.38	7.13
e-Business Readiness	8.74	7.97

Server Criteria Listed by Importance to the Customer (Mean Rating 1= unimportant, 10 = very important)

The data in Table 1 clearly shows that OpenVMS is easily meeting most of the selection criteria for "business critical" servers. OpenVMS clearly satisfied customers in the two most important categories: customer service and server availability. OpenVMS cluster customers rated application availability and price lower than their requirements for "business critical" servers.

OpenVMS Systems Just Keep On Running

There is no question that Compaq's OpenVMS Servers are among the most highly available servers in the market. With industry averages for unscheduled downtime running 240 minutes per year, VAX and AlphaServers average half that number--115 minutes per year! Of the respondents HRG spoke with, 83% experience less than one-hour per month of unscheduled downtime, *while 23% experienced no downtime at all.* In addition, some respondents said that they could not comment on OpenVMS technical support because they have never needed it.

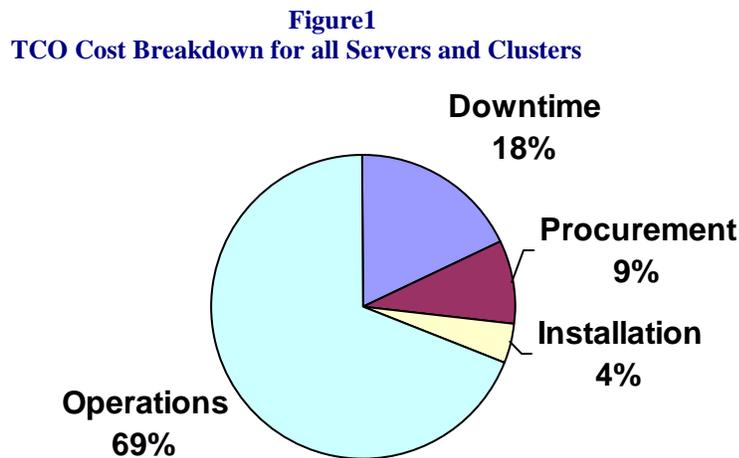
OpenVMS Systems Require Fewer Human Resources

Of those users surveyed, 63% said that fewer people are required to run their OpenVMS servers compared to their non-OpenVMS servers.

Overall Total Cost of Ownership (TCO) is among the lowest in the industry

A study conducted by HRG in February 2001 focused on the primary factors that contribute to the TCO for servers and clusters. The key contributing factors to TCO are procurement, installation, downtime and operational costs.

The results of our research are shown below.



Operational costs are the most significant component of TCO. A system vendor cannot control some of the operational costs (Skilled level of IT personnel, training, overhead). Compaq's OpenVMS-based servers are much easier to manage and therefore reduce the TCO by requiring less staff than the competition to keep them up and running.

Downtime is the second most critical factor and accounts for 18% of the total TCO. OpenVMS clustering technology minimizes downtime by allowing for system upgrades and maintenance without bringing the system down. Application failover time is among the fastest in the industry.

The cost of having a critical application “down” can be considerable. Average losses are estimated to be \$70,000/hour. In financial industries, losses can reach \$1 million or more per hour. These costs can be due to lost sales, lost employee productivity, government penalties and/or a slowdown in manufacturing.

Loyal OpenVMS Customers want Further Improvement in a Few Areas

HRG’s June 2001 survey showed that OpenVMS customers are quite loyal. Table 2 shows what OpenVMS customers want Compaq to further improve. The data is from HRG’s June 2001 survey.

**Table 2
OpenVMS Customers’ Views on what Compaq Needs to Further Improve**

Feature Needing Improvement	Percent Who Said #1 Issue
Availability of 3 rd Party Applications	26%
Marketing	20%
*Customer Service for Sales and Support	20%
Integration With Open Systems	6%
Systems Management Tools	5%
Other (nothing higher than 1%)	23%

* Still, customers felt that Compaq was better than its competitors in this area.

The feedback from OpenVMS customers is that they would like Compaq to continue to increase application availability, further increase marketing efforts on OpenVMS and to strengthen sales representatives’ abilities to answer technical questions. In HRG’s opinion, since Compaq acquired Digital Equipment, upper management commitment to keeping OpenVMS as a major operating system has steadily increased. Compaq has significantly increased the marketing, sales and engineering resources for OpenVMS.

Compaq’s Commitment to OpenVMS: 25 Years Is a Likely Scenario

In HRG’s opinion, OpenVMS has a very good chance of lasting another 25 years. The primary reasons are the following:

- Compaq’s decision is to slowly move away from Alpha microprocessor development while focusing on porting OpenVMS and Tru64 UNIX to Intel’s Itanium Processor family. Compaq made this decision because the performance gap between AlphaServers and Itanium was expected to shrink rapidly and would no longer have been a differentiating factor. This will save Compaq significant development, manufacturing and support costs. Starting in 2004, Compaq’s midrange and high-end Itanium based systems will be able to support OpenVMS, Tru64 UNIX, Windows and Linux. The volume economies of standard high volume Intel servers will be available to customers. This should significantly lower the total cost of ownership for customers.
- Compaq’s plan is to make OpenVMS compliant with the Defense Information Infrastructure Common Operating Environment (DII COE) standards. Compliance also requires an explicit twenty years of commitment to OpenVMS. OpenVMS-based systems have a very good track record in meeting the needs of the defense establishment. DII COE certification is expected to be complete by

the end of 2002. Compliance with DII COE standards will allow OpenVMS to participate in bids from the U.S. Department of Defense.

- Compaq's well planned installed base integration of Itanium systems in AlphaServer customer environments. Early OpenVMS/Itanium ISV development kits are planned for 2003. Customer revenue shipments are planned for 2004. Compaq will also introduce new EV7-based Alpha Systems in late 2002 /early 2003. Customers will be able to continue to invest in Alpha-based systems for several years beyond the introduction of the last EV7-based systems. About four years of overlap between Alpha and Itanium systems will provide customers with a very orderly plan for integrating Itanium systems into their IT installations.
- Compaq's continuing heavy investment in OpenVMS technology.

The Server Consolidation and the e-Business Opportunity

Server consolidation is a key market opportunity for OpenVMS. The ability of Compaq to deploy high performance OpenVMS /AlphaServer systems with guaranteed 99.99 to 99.999% uptimes makes server consolidation a viable option for customers. This will allow customers to significantly upgrade their IT infrastructure in terms of performance, scalability, uptime and manageability, and also achieve a significantly lower TCO. Customers will also be able to safely deploy e-Business applications that require Availability Environment 4--continuous availability.

OpenVMS customers know that Compaq can deploy systems with high levels of availability. They have had operational systems for years with very little downtime.

AlphaServer GS Series systems will enable customers to consolidate OpenVMS and Tru64 UNIX systems. This will further guarantee investment protection.

OpenVMS Management: Are they On the Right Track?

HRG had a lengthy interview with Mark Gorham, Vice President of the OpenVMS Group in August 2001 to discuss the state of OpenVMS and its future direction. HRG was struck with his refreshing candor, his openness to discussing issues and his ability to clearly articulate future directions. HRG also talked with several other OpenVMS marketing managers. One thing is clear--OpenVMS marketing management is extremely enthusiastic about OpenVMS and its future direction. The move to Itanium-based systems has lit a fire under the OpenVMS team and they are passionately talking about OpenVMS to customers and analysts.

Mark Gorham indicated that Compaq upper management has been very supportive and has significantly increased funding for print advertising and marketing. The OpenVMS port to Itanium has started. Significant engineering resources are being added. The port is a challenging task, but is significantly less difficult than the task to move from 32-bit VAX to 64-bit Alpha.

The plan is to support mixed Alpha and Itanium clusters just like Compaq did with support for mixed Alpha and VAX clusters. This will enable customers to simply add an Itanium node to an existing Alpha cluster.

The majority of applications are expected to require a recompile to run on Itanium. Compaq is also developing a binary translator for OpenVMS/Alpha to OpenVMS/Itanium application conversions

Compaq is currently focusing OpenVMS on five key strategic industries: Financial, Health care, Telecommunications, Public Sector and Manufacturing. They are actively signing up additional partners in these industries. Compaq will also provide the necessary support to ISVs in other industries.

OpenVMS management clearly understands that OpenVMS-based systems are ideal for the emerging e-Business systems market that requires highly available and scalable platforms. Currently there are over one hundred e-Business applications supported from companies like BEA, BMC Software, iPlanet and Iona Technologies. The OpenVMS Group is working with other ISVs to get more e-Business applications supported on OpenVMS.

Conclusions

In HRG's opinion, Compaq has a good chance to significantly grow revenues from OpenVMS-based systems in this decade. This conclusion is based on the following:

- OpenVMS-based systems currently have all the key technologies necessary to deploy high performance continuous availability systems. Compaq has been extremely successful in deploying OpenVMS Clusters for the last 18 years. There are over 50,000 cluster installations--the largest in the industry.
- Compaq has a large Global Services organization.
- The market for high availability systems is large and growing rapidly.
- The e-Business market is in its infancy and OpenVMS-based systems can easily meet the performance and uptime requirements.
- Compaq has solved the Alpha and OpenVMS longevity issues with the decision to port OpenVMS to Itanium.
- The large OpenVMS customer base is loyal.
- Compaq is now generating substantial revenue from new OpenVMS customers.

Compaq is actively working on getting more e-Business applications supported on OpenVMS. The OpenVMS-based AlphaServer and Itanium systems will be hard to beat in terms of availability, scalability and price/performance. Compaq's plans for OpenVMS will now attract many more application vendors focused on e-Business. These vendors will soon be able to consider porting e-Business applications to OpenVMS and reap the financial rewards as corporations increasingly deploy e-Business systems in the coming years. End users should put OpenVMS-based systems on the "short list" for deploying e-Business applications.

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