COMPAQ
Inspiration Technology

Special Intel Edition January 2002

Compaq OpenVMS Times

Welcome to this special edition of OpenVMS Times. *This edition is dedicated to the Compaq* OpenVMS™ *port to the Intel® Itanium™-based systems. As additional information becomes available, we will publish articles in this newsletter and on the Web site, which you can visit at www.compaq.com/hps/ipf-enterprise/* — *Editor*

The inside story: *OpenVMS* port to Intel® Itanium™ architecture

Mark Gorham, Vice President, *OpenVMS* Systems Group

The Compaq and Intel announcement of 25 June, 2001, has created interesting and exciting times for Compaq and the *OpenVMS*™ Systems Group. *OpenVMS* engineering, business development, marketing and partner groups have been engaged in extensive research and investigation to understand what the port of *OpenVMS* to Itanium™-based systems entails, and to ensure that our progress is communicated as the work unfolds. This special issue of *OpenVMS Times* is dedicated to updating you on our progress and plans since 25 June.

I have spoken with many *OpenVMS* customers and partners about our future plans. Their very positive reactions strongly affirm our future strategy. Additionally, the focus and new direction have positively energized the entire *OpenVMS* organization.

Key highlights of our work:

- The investigation is complete, and we have included a detailed road map with dates and deliverables in this issue on page 2.
- We expect to boot *OpenVMS* on an Itanium™-based server during the second half of 2002, provide releases for ISVs, partners and early adopters during 2003, and ship the production release in the first half of 2004.
- There will be a single code base from which we will build *OpenVMS Alpha*™-based systems and *OpenVMS* on the Itanium™ processor family. This will enable us to bring enhancements to both platforms simultaneously.

- Our design center for the *OpenVMS* port enables non-privileged applications to recompile and relink from *Alpha* to run on Itanium™-based systems. Source compatibility is planned so that maintaining applications on both of the platforms will be easier and less costly for you. We researched layered products running on *OpenVMS*, and have confirmed that the vast majority will only require recompiling and relinking.
- We have proactively engaged with our strategic ISVs to brief them on our plans and intend to continue working closely with them so they can port as quickly as possible. Nearly 100 percent have agreed to port.
- We have a program in place to help you as you transition, at your own pace, to the Itanium™-based systems when they become available.

In parallel, we are delivering new functionality and continuing to improve *OpenVMS* performance. We are also developing follow-on enhancements to Compaq *AlphaServer*™ systems with the EV7 and EV79 chips and the new Marvel architecture.

In closing, I want to assure you that Compaq is committed to a healthy future for *OpenVMS*.

Questions? Click onto our list of FAQs!

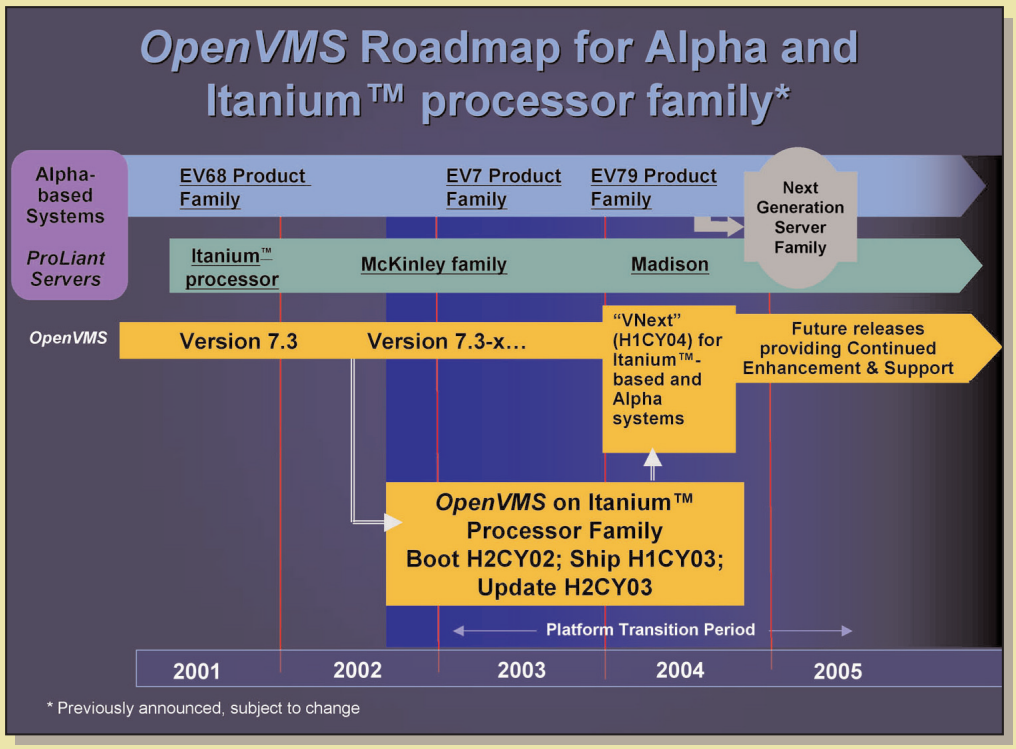
For more answers about *OpenVMS* and the Itanium™ processor family, check out our list of Frequently Asked Questions at www.compaq.com/hps/ipf-enterprise/openvms.html

OpenVMS partners get on board!

"BEA's long-standing relationship with Compaq has been enhanced by Compaq's decision to embrace Intel®'s Itanium™ processor family. There is great synergy between the two companies as BEA works to bring BEA WebLogic to our customers on high-end Itanium™-based servers. Together, Compaq and BEA have the ability to capture a large segment of the Itanium™-based systems market, with the potential of becoming the standard stack for Intel architecture."

Rauline Ochs, VP World Wide Partners Initiatives BEA Systems, Inc.

The porting timeline



This graphic shows the *OpenVMS* release timeline relative to the *Alpha* chip and the Itanium™ processor family plans. More detailed road maps are available in the *OpenVMS* strategy presentation entitled "Building Your Business Future with Compaq *OpenVMS,"* which is available at: www.openvms.compaq.com/presentations

The Compaq *AlphaServer* Customer Assurance Program

Compaq Computer Corporation is setting a new standard for commitment to customer satisfaction by being the only vendor to offer a broad-based, money-back satisfaction guarantee. This exclusive guarantee is available with all new *AlphaServer* systems.

The Compaq *AlphaServer* Customer Assurance Program underscores our overwhelming commitment to *AlphaServer* systems. We will ensure these systems continue to deliver significant business value for your business today and in the future — as the product line transitions to the 64-bit industry-standard architecture with the Itanium™ processor family.

This program delivers a comprehensive suite of investment protection initiatives designed to reduce risk and ensure that your current and future investments in *AlphaServer* systems and Compaq operating systems are secure.

Specific components of the program include:

- Money-back customer satisfaction guarantee on Itanium™-based systems
- *AlphaServer* product continuity guarantee
- Technology refresh incentives and guaranteed trade-in values
- Transition lease program
- Compaq software license trade-ins
- Support for ISV license transfers
- Storage product continuity guarantee
- Transition tools, resources and services

This program is available to customers and partners who purchase new *AlphaServer* systems running *OpenVMS* or *Tru64™* UNIX today, and who anticipate transitioning to an Itanium™-based system running *OpenVMS* or to the new converged enterprise UNIX environment in the future. This program also covers *StorageWorks™* and *SANworks™* customers and partners. The Compaq *AlphaServer* Customer Assurance Program can be tailored for specific business practices and geographies.

The essence of *Alpha* systems remains unchanged

Compaq is continuing to design and build new *AlphaServer* systems based on current and upcoming *Alpha* processor technology. Because your investments are protected, you can buy now with assurance for the future. For instance, we just upgraded the current high-end *AlphaServer* GS series with a 1 GHz *Alpha* processor. We also plan to deliver an additional generation of *Alpha* technology (EV7) to advance system performance prior to the new generation of the Itanium™-based systems.

Compaq is so confident in the *AlphaServer* product plans and technological directions that we are providing customers and partners with a variety of investment protections, trade-in guarantees and monetary guarantees — along with comprehensive tools, resources, services and support — to ensure a seamless transition to running *OpenVMS* or the planned converged enterprise UNIX environment on future Itanium™-based systems.

Specific details, along with terms and conditions surrounding these investment protection initiatives, are available from your Compaq representative or authorized reseller, and at www.compaq.com/hps/ipf-enterprise/index.html

OpenVMS partners get on board!

"Oracle and Compaq have a long and successful history of delivering enterprise solutions to our OpenVMS *customers. In July, 2001, Oracle released Rdb 7.1 for* OpenVMS. *In September, 2001, Oracle9i for* OpenVMS *was released. Compaq has announced plans to consolidate its 64-bit servers on Itanium™-based systems. Oracle is committed to working with Compaq on its enterprise platform offerings, which include working to deliver Oracle DBMS and Oracle Rdb DBMS on* OpenVMS *for Itanium™-based platforms."*

Doug Kennedy, Vice President, Global Platform Partnerships, Oracle Corporation

A technical perspective on porting *OpenVMS* to the Itanium™ processor family

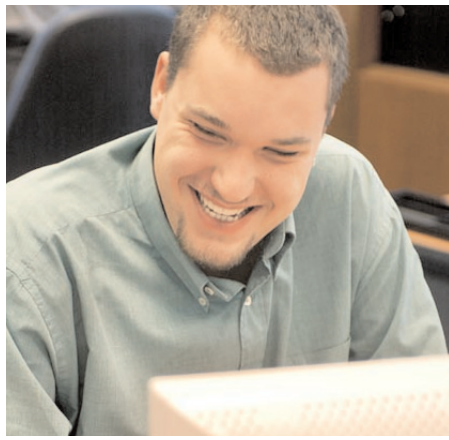
Here are some important technical facts from the *OpenVMS* engineering organization.

- In porting *OpenVMS* to the Itanium™ processor family, there will not be an *Alpha* abstraction or emulation layer. Rather, *OpenVMS* will directly use the address space regions, page protection bits, internal registers, stacks and console interface defined by Intel.
- The Itanium™ architecture has four processor modes, identical to Compaq *VAX*™ and *Alpha*.
- The Itanium™ processor console requires the operating system loader to be in a FAT32 file partition. *OpenVMS* will overlay the current boot block with a PC-style Master Boot Record that will point to an ODS-2/5 container file for the FAT32 partition.
- The Intel-defined Advanced Configuration and Power Interface (ACPI) will be the basis for *OpenVMS* device discovery during booting, partitioning information and RAS capabilities.
- The *Alpha* PALcode services will be incorporated into *OpenVMS* itself for Itanium™-based platforms. For example, REMQHI is a *VAX* instruction, an *Alpha* PAL function and will be an *OpenVMS* service on Itanium™-based systems.
- *OpenVMS* will implement the *Alpha* console run-time services that are not defined in the Intel console architecture. For example, operator console I/O will be done directly from the operating system. *OpenVMS* will also provide the device driver for writing crash dumps. Remote booting protocol will be PXE rather than MOP.
- The Itanium™ architecture provides the primitives for all the important *OpenVMS* memory management functions. *OpenVMS* will continue to use three levels of page tables. There are eight address space regions. The 8 TB *OpenVMS* address space will have user space in Region 0 and system space in Region 7. Multiple page sizes are defined, and initially *OpenVMS* will use 8 KB pages. Granularity hints (huge pages) and address space numbers will be implemented.
- *VAX* has interlocked instructions for atomic operations, and *Alpha* has the load-locked/store-conditional pair. The Itanium™ processor family has its own sets of atomic instructions upon which *OpenVMS* will create spinlocks, MUTEXes and queue instructions.

For more information, visit www.compaq.com/hps/ipf-enterprise/openvms.html

Porting your *OpenVMS* applications

At Compaq, it's our goal to make the porting of *OpenVMS* applications from *Alpha* to the Itanium™ processor family as easy as possible. To achieve this goal, Compaq will provide compilers on the Itanium™ processor family that are source code compatible with the compilers available today on *OpenVMS Alpha*. Compaq will also port all of the existing *OpenVMS* development tools to the Itanium™ processor family. In addition, Compaq will ensure that all of the basic operating system functionality currently available on *OpenVMS* will also be ported to the Itanium™ processor family.



The C, C++, FORTRAN, BLISS and IMACRO compilers, DECnet IV and TCP/IP services for *OpenVMS*, the Java JDK, all existing development tools and utilities that ship with the operating system and a majority of the DECset products will be available with the first SDK release of *OpenVMS* on the Itanium™ processor family in the first half of 2003.

The PASCAL, BASIC and COBOL compilers, DECnet/OSI, Advanced Server and the remainder of the DECset products will be available with the update in the second half of 2003. This means that developers should be able to use their existing procedures for developing, debugging, testing and deploying their applications as they are ported to the Itanium™ processor family.

Most user mode code written in a high-level language or languages should port to the Itanium™ processor family with little or no source code changes. However, if an application contains code that is dependent on the *Alpha* architecture, that code will need to be rewritten. For example, assembly language code that deals with specific

machine instructions or makes assumptions about the number of registers or the functions of specific registers will have to be rewritten. This type of architecture-specific code is usually not found in applications written in high-level languages.

Some code may include logic that assumes it's running on either a *VAX* or *Alpha* system, and might not be able to deal with a third platform. For example, a C or C++ application may contain the following code that may have to be modified to work correctly when ported to the Itanium™ processor family:

```
#ifndef VAX
/* Alpha specific code */
#endif
```

For those situations where application source code is no longer available, Compaq will provide a binary translator that will translate user mode *OpenVMS Alpha* images to *OpenVMS* Itanium™-based system images.

As Compaq progresses with the port of *OpenVMS*, we will continue to document details of the port and provide additional information about porting applications to the Itanium™ processor family. This information will be in the form of white papers, articles and product documentation.

For more information, visit www.compaq.com/hps/ipf-enterprise/openvms.html

OpenVMS partners get on board!

"FORTEL, a leader in real-time performance management solutions that ensure end-to-end e-business service-level goals, is pleased to announce that FORTEL will be working toward the OpenVMS *Itanium port migration in support of Compaq's delivery of Itanium™-based systems for* OpenVMS. *FORTEL currently works with Compaq as an Alliance Partner for the support of the current* OpenVMS *platform and is the developer of SightLine.*

"SightLine is the first real-time solution that proactively ensures your e-business service levels. FORTEL proposes that development on this new initiative will commence during 2002 for a scheduled delivery date of Q1 2004 in line with Compaq's migration plans."

Deanne Walker, Vice President of Consulting Services FORTEL Inc.

Compaq Global Services commitment to *OpenVMS* customers

As the *Alpha* to Intel® transition moves forward, we all will see many changes. However, one thing will never change, and that's Compaq Global Services' commitment to our *OpenVMS* customers' success and investment protection.

Integral to demonstrating our customer commitment is continued support of Compaq Global Services for the upcoming EV7 and EV79 *Alpha* systems, as well as a continuation of the port and release on Itanium™-based systems. As previously stated, we will work to migrate our *OpenVMS* applications — ensuring the ongoing operating environment for our *OpenVMS* customers and partners.

Customer demand will dictate the longevity of selling our *Alpha* systems, which we anticipate to be at least several years beyond the introduction of the EV79 *Alpha* processor. Compaq Global Services is committed to continuing hardware and software support and other business-critical services for at least five years beyond that.

We strive to do what is necessary to meet the needs of our customers. A case in point: today we are still providing support for Digital PDP-11 and *VAX* systems purchased well over 10 years ago.

We understand the importance of making any transition as smooth as possible, bringing the benefits of the new platform while minimizing any disruption during the transition. We have proven, established migration methodologies. Our extensive experience will leverage your existing investments, applications and skills — and help you reduce risk and achieve your business objectives faster.

The bottom line is that you have the complete commitment of Compaq Global Services for implementing the services you need, when you need them. You should expect nothing less.

For more information, visit www.compaq.com/hps/services.html

OpenVMS clusters move to the Itanium™ processor family

The porting of *OpenVMS* cluster software technology is a central and key piece of the overall effort of moving the *OpenVMS* operating system to the Itanium™ processor family. Key components of clustering are integral to the workings of *OpenVMS*, and are relied upon even when a system is running in standalone mode.

The first multi-node cluster on Itanium™-based systems is scheduled for the second release of *OpenVMS* on the Itanium™ platform, allowing mixed *Alpha* and Itanium™-based systems in the configuration. As time progresses into 2004, the number of systems and complexity of the IT environment will increase; by the end of 2004, you will be able to run *OpenVMS* on Itanium™-based systems mixed with *Alpha* systems without restriction in clusters.

From an interconnect standpoint, our goal is to support most current storage interconnects and SCS (host-to-host) interconnects, as supported on *Alpha* today. Specifically, support of current direct-attach SCSI will be provided. Additionally, multi-host shared Fibre Channel environments will be supported, including mixed architecture environments with both *Alpha* and Itanium™-based systems running *OpenVMS* software. From an SCS standpoint, Gigabit Ethernet and Fast Ethernet will be the initial choices of interconnect, with FDDI and ATM following during 2004. Note that support for Memory Channel and CI will not be provided on *OpenVMS* on Itanium™-based systems. When possible, any new interconnects for SCS and/or storage will be supported on both *Alpha* and the Itanium™ processor family for at least the next several years.

Functionally, an *OpenVMS* application will not notice which platform it may be running on, at least from a cluster and storage standpoint. All common cluster capabilities will be supported on all platforms. Applications on any platform will be able to directly access data connected to a specific system. Any cluster members that are not directly connected to a particular storage type can continue to use data-serving technologies to obtain data in a cluster-wide fashion.

While there may be some subtle interconnect and application differences between *Alpha* and the Itanium™ processor (as was true when *Alpha* was introduced into a *VAX* environment), the *OpenVMS* cluster software architecture will allow for almost seamless integration as customers add new systems into their existing environments.

We need your feedback on *VAX* systems

Compaq is investigating the feasibility of including *OpenVMS VAX* systems as nodes into a mixed architecture cluster. To a great degree, this decision depends on the actual customer requirements for having *VAX* systems in a production cluster in the 2004 time frame.

To help Compaq make the right decision, please send an e-mail to openvmstimes@compaq.com with the subject line "VAX Clusters." Please include the business reason why *VAX* systems will still be required, along with the number and models of the *VAX* systems required.

For more information, visit www.openvms.compaq.com/openvms/products/clusters/index.html

OpenVMS partners get on board!

"We at ISE see the Compaq and Intel announcement as a positive commitment by Compaq regarding the future of OpenVMS. *Our plans are to port our ISE Schedule and Backup enterprise solutions to the Itanium™-based platform, as well as to continue the development of our leading-edge scheduling and backup system management capabilities.*

"We see this announcement as a logical transition by Compaq that will broaden the appeal of OpenVMS. *This continued commitment to* OpenVMS *by both Compaq and ISE will give our users continued unparalleled and proven technological solutions for the foreseeable future. We at ISE have always enjoyed a strong relationship with Compaq and* OpenVMS, *and our plans are to continue our partnership at this same level for many years."*

Bengt Mossberg, President
International Structural Engineers, Inc. (ISE)

Terry Shannon on *OpenVMS*

OpenVMS on the Itanium™ processor family: you can get there from here

Much of the controversy surrounding Compaq's 25 June Itanium™ processor family consolidation announcement is now ancient history, which is probably just as well. While a paucity of detailed information about the road to the Itanium™ processor family precipitated concern in the user community directly after the announcement, during the past few months Compaq has done a good job communicating the new architectural game plan. Between roadshows, teleconferences, one-on-one customer engagements and a slew of sessions at the CETS2001 conference in Anaheim, California, Compaq has covered the waterfront when it comes to things Itanium™-related.

Not surprisingly, the *OpenVMS* constituency — which is both intensely loyal and technologically savvy — raised the bulk of the tough questions that demanded better answers. And there's no better place to get such answers than from Clair Grant, the captain of the Compaq *OpenVMS*-on-Itanium™-based systems porting program. During a recent meeting with Mr. Grant, SKC received an update on the latest developments on a porting project that will differ in many respects from the decade-old *VAX* to *Alpha* effort.

The new porting program will render *OpenVMS* far more portable than the OS has been in the past. When the job is done, *OpenVMS* will no longer be constrained by hardware or firmware dependencies. In fact, 75 percent of the base OS effort will involve moving *OpenVMS* components that currently exist as *Alpha* firmware (a.k.a. PALcode, or Privileged Architecture Library code and console functions) directly into the operating system. Once the firmware is removed from the *OpenVMS* equation, the OS will be far more amenable to being re-hosted on architectures that may emerge in the future.

Porting *OpenVMS* to the Itanium™ architecture is a very significant undertaking, but the nature of the port ensures that the effort will not consume the resources of the entire *OpenVMS* development staff. Indeed, while the Itanium™ processor porting exercise is more complex than the *VAX* to *Alpha* transition, an order of magnitude less code will be affected by the Itanium™ processor effort. Consequently, the majority of the *OpenVMS* development staff will be free to concentrate on OS enhancements in domains including Java, e-business and the Galaxy software architecture. Since *OpenVMS* engineering will be able to port and develop concurrently, future *Alpha* and Itanium™-based system releases for *OpenVMS* will be based on a single code stream. There will be no need to implement a code freeze — a limiting factor that complicated the *VAX* to *Alpha* transition. Hence, the *Alpha* and Itanium™ processor versions of *OpenVMS* will be functionally identical from day one.

One aspect of the porting project — Compaq's decision to base the Itanium™ processor port on the Intel Calling Standard and the ELF object language — reflects a deliberate plan to render the OS a more attractive platform for Intel-centric apps. By relying on these *de facto* standards and fortifying *OpenVMS* with Defense Information Infrastructure Common Operating Environment (DII COE) compliance, Compaq is taking a big step to ensure that the operating system becomes a lodestone for applications that heretofore have been unsupportable. With an expanded applications portfolio and compatibility with what is sure to emerge as the dominant 64-bit hardware platform, *OpenVMS*, by the middle of the decade, will be well-equipped to boldly go where no Compaq proprietary operating system has gone before.

Compaq launches new strategic business seminars

From Casablanca to Kuala Lumpur, from Paris to Chicago, customers and partners are turning out for Compaq IT Forums — our latest round of strategic business seminars. With joint sponsorship from Intel, Compaq has launched this global customer forum series to take the enthusiasm and interest in the *AlphaServer* to Itanium™ processor family transition to our customers and partners.

Presentations are delivered by senior management from both Compaq and Intel, and are complemented by presenters from Oracle at each event. There are also sessions on key Compaq solutions such as server consolidation, enterprise storage, high-performance technical computing and global services solutions.

Each forum hosts a large breakout session for *OpenVMS* and *Tru64* UNIX solutions, with a particular focus on *Alpha* road maps for both products and *Alpha* to Itanium™ processor family road maps.

The Compaq IT Forums are an outgrowth of the highly successful *OpenVMS* Diamond Forums, with an expanded audience and agenda, as well as a greater number of events. Starting with Dallas this past September, the forums will reach approximately 4,000 customers in 44 locations through February.

Each forum is managed by Compaq's local sales team to ensure that the events are tailored to local audiences. Many locations have added a Solutions Showcase to the forum that highlights our partner solutions in an informal, roundhouse format.

For more information on a Compaq IT Forum in your area, please contact your local Compaq representative or www.compaqitforums.com/

Compaq partners demonstrate commitment to *OpenVMS*

As we contact our partners to discuss the announcement around the port of *OpenVMS* to the Intel® Itanium™ architecture and road maps for the port, we have received numerous statements of commitment to the future of partner solutions on *OpenVMS*. Some of these comments appear in this issue.

For the current list of all the partner quotes, visit www.compaq.com/hps/ipf-enterprise/partner_quotes.html

OpenVMS partners plan for the Itanium™ processor family

Partners are a critical part of the *OpenVMS* plans to support Itanium™ processor family systems. Since the Intel announcement in June, the *OpenVMS* Systems Group has been proactively working with *OpenVMS* partners (including ISVs and application VARs) to communicate *OpenVMS* porting plans and understand partner requirements. We are helping *OpenVMS* partners develop and implement multi-year support programs that will continue to provide *Alpha* systems over an extended period — in parallel with a smooth introduction of Itanium™-based platforms.

If ISVs keep their existing applications current on *Alpha* systems, then the transition to Itanium™-based systems will be simplified. Our goal is to have all *OpenVMS* ISVs support the Itanium™ architecture, which will provide a full set of application development and porting tools. The good news is that most of our partners have agreed to port.

OpenVMS partners get on board!

"We will make our Alpha-*based* OpenVMS *products available on the new Intel® Itanium™-based platforms. We are working closely with Compaq through the company's extensive transition support program for independent software vendors (ISVs). Our goal is to continue the Process Software tradition of providing customers with a high-performance TCP/IP solution, and we will continue to support existing* VAX *and* Alpha *platforms."*

Habib Khoury, President and CEO
Process Software

OpenVMS partners get on board!

"Twobyfour Software has a great deal of experience in the design, development and surveillance of business-critical systems for the financial markets such as trading, clearing and back-office systems. All of these systems have used Compaq OpenVMS *and RDB. Furthermore, most have also used RTR, Reliable Transaction Router. Twobyfour Software is convinced that* OpenVMS *will stay as a vital platform for financial systems. This conviction has made Twobyfour Software take part in the* OpenVMS *port to the Itanium platform of the Twobyfour AppMind surveillance products."*

Per Lofqvist, Director, Strategic Partners
Twobyfour Software AB

"We were founded as an OpenVMS *software company and we intend to remain an* OpenVMS *software company. Porting JAMS from* VAX *to* Alpha *was very simple and we expect the Itanium™ processor family port to be even easier. We're looking forward to getting started."*

John Vottero, Vice President of Development,
MVP Systems

"Compaq's move to the Itanium™ architecture and transition of Alpha *technology to Intel is good news for the industry and our customers. It assures them that the outstanding performance of SAS solutions running on* AlphaServer *systems will continue to accelerate. This plan also allows them to reap the benefits of their investment in Compaq's operating systems, which SAS has supported for many years, on the Itanium family of processors."*

Keith Collins, Chief Technology Officer,
SAS Institute

The Compaq *OpenVMS Times* is published by the *OpenVMS* Group, Compaq Computer Corporation, to keep you informed about the latest in *OpenVMS* strategy, solutions, products and activities.

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Editor: Sue Skonetski
Compaq Computer Corporation
110 Spit Brook Road
Nashua, New Hampshire 03062-2698 USA

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