CUSTOMER SOLUTIONS

ABB Minden Counts on CHARON™-VAX: Long Life for Power Plant Control Technology

CUSTOMER PROFILE

ABB AG – Division Energietechnik-Systeme is headquartered in Mannheim, Germany. Its business consists of engineering and service for control systems in power plants, water installations, switchboard plants, network control systems, and electrical grids. The Minden branch designs, delivers, and maintains turnkey customer- made control and communication systems for gas-, oil- and coal-fired power plants. There, ABB Automation Products, as an independent corporation, is developing and manufacturing pressure and flow sensor technology, as well as element actuation in various procedural fields within industry and power plant technology. For more information, visit http://www.abb.com/

invenate
Business & IT Consulting

PARTNER PROFILE

The Invenate GmbH team consists predominantly of HP OpenVMS CSE (Certified Systems Engineers), databases and unified messaging. The business unit of highly and constantly available server concepts focuses on virtualization. DEC/Compaq/HP installations are used for legacy systems. Invenate has consulting competence in all of the leading virtualization solutions at its disposal for x86 based solutions, and works primarily with major clients in industry, finance or aviation. Invenate is active in representing leading IT service providers. For more information, visit http://www.invenate.de/

THE CHALLENGE

The position of Minden is of great significance for ABB AG. This subsidiary of the power engineering system division, headquartered in Mannheim, Germany, is designing, delivering, and maintaining turnkey customer-made control and communication systems for gas-, oil- and coal-fired power plants. Also in Minden, ABB Automation Products, as an independent corporation, is developing and manufacturing the most critical elements in power plant construction, including pressure and flow sensor technology, and element actuation in various procedural fields within industry and power plant technology.

"Our slogan for industrial IT is simply: 'The land of total automation'," explains Horst Krückemeier, who is in charge of system integration, IT support, and logistics for the Division Energietechnik-Systeme at ABB AG Minden. Although ABB has outsourced the bulk of its IT systems to IBM Global Services, including long-standing staff, "There are still production environments which we cannot outsource, because those who want industrial IT cannot give up their core competencies," Krückemeier says. Decades before ABB took over Hartmann & Braun in 1999, there were already facilities being set up in Minden whose automation process had been developed, documented, and transcribed to their proprietary self-developed automation system.

For almost three decades, ABB Minden kept two matching redundant VAX-11/750 machines in operation. They continuously updated the VAXes with hardware refreshes and software updates, including cluster technology after Digital introduced it in 1998. With the cluster technique, they upgraded the operating system, VAX/VMS V4.0, to VAX/VMS V5.0, and later to OpenVMS VAX V7.2. All systems ran steadily and served engineering, as well as allocating the function and connection plans in the engineering workstations.

After Compaq's acquisition of Digital in 1999, refurbishment or further development of the VAXes was impossible. In 1995, ABB integrated the VAX-based engineering software into its newly developed automation system, "Symphony." This meant they had to continue running the VAXes, which were still providing protection for all software releases. They had maintained the VAXes so well that they could activate tape backups at any time, with the required hardware, and the VAXes are still in use as database servers in Minden, for the development of another business unit. However, the VAXes and their storage clusters required a disproportional amount of space, energy, and maintenance in the ABB Minden data center.

THE SOLUTION

In 2007, they had to restructure and downsize the data center considerably. The only VAX at ABB Minden, attended by Dietmar Weide (IBM Global Services), would not fit into the new facilities. At the time, ABB Minden was in no position to abandon the old data pool. Horst Krückemeier and his team began to look for a virtualization tool, which would be able to emulate the old VAX/VMS environment, using contemporary x86 hardware.

They found what they were looking for at Stromasys SA, which has been providing and deploying CHARON-VAX virtualization software worldwide for many years. The CHARON-VAX suggestion came from Rolf Thiele, Business Consultant at Invenate GmbH, who provides Business & IT Consulting services and has a long-standing business relationship with ABB. After an intensive assessment of the cost to benefit ratio, CHARON-VAX seemed like the optimal solution, especially since Weide says that in 2008, "Hardware malfunctions have heaped up copiously. Although this didn't lead to a supply shortage, it caused a constant cost increase." Additionally, the operating expenses for the VAX systems' power supply were very high.

They laid the cornerstone for a successful project during the sales process in 2008, when they accurately reported the environment, defined goals, formed a migration plan, and ran the first tests. In 2009, the project team met again to implement the plan thoroughly. "There isn't another person in Germany who is as familiar with OpenVMS as Volker Halle from Invenate. Confidence in CHARON-VAX at the Minden site continues to grow," Horst Krückemeier said with excitement, "and even long-serving employees are convinced by the reliability of the Swiss-made virtualisation software. ABB immediately benefitted from the flexibility."

Neither Krückemeier nor Weide worried about the last shutdown of the old VAX data center, and the project has become a precedent for other ABB subsidiaries. "Green IT isn't the strongest argument for most of the power plant makers, but it is at ABB. It is very efficient for a new data center area bigger than 60 m². However, being able to use all data assets, programs, and development tools actively for another decade will be the biggest benefit to ABB and its customers," says Thiele, who is happy that his customer is so satisfied.

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THE RESULT

Since early 2009, the trouble-free CHARON-VAX test run at ABB has proven the effectiveness of virtualization. All old applications are running in the virtual environment without any challenges, and provide the same look and feel as the original system. Martin Schäfer, project technician in DCS-Engineering at ABB Minden, also endorses this opinion, "If there weren't a noticeable increase in operating speed, development and maintenance engineers wouldn't even recognize that their data is not coming from an old VAX anymore."

At present, only one CHARON-VAX licence is in use at ABB Energietechnik, but this will change. Due to power and space consumption alone, they will shut down the old VAXes and replace them with contemporary x86 workstations and CHARON-VAX software. For Horst Krückemeier, this is a bit like passing away; only the ghost of the old machines will remain, but CHARON-VAX has immortalized the databases and specialized software.

As a graduate engineer in system integration, Horst Krückemeier sees another opportunity, "It was way too expensive to install a VAX at the client's end so he could revise his power plant's documentation. Therefore, we computed such revisions into our VAX as part of customer service in the past. With CHARON-VAX, however, our whole VAX data center fits into an x86 machine with a 19 inch footprint and two units of height, with more performance and full functionality, and customer-made connection plans for power plant automation."

ABOUT STROMASYS

Stromasys SA is a privately held company headquartered in Geneva, Switzerland, serving thousands of users in more than 50 countries. Stromasys develops and markets Cross-Platform Virtualization solutions that allow owners of PDP, VAX, and Alpha computers to continue to run their business-critical applications unchanged on modern, industry-standard computer systems.

Stromasys SA was established in 1998 as part of a management buyout of DEC's (Digital Equipment Corporation) European Migration and Porting centre following the HP/Compaq merger. The vast experience gained from years of large-scale migration and porting projects, System-level VMS engineering projects, and development of Binary translators eventually led to the development of the CHARON-VAX and CHARON-AXP products. For more information, please visit www.stromasys.com.

Customer Solutions

Only the Best is Good Enough: CHARON™-VAX on Duty at the European Transonic Wind Tunnel

EUROPEAN TRANSONIC WINDTUNNEL

Customer Profile

The European Transonic Wind Tunnel, ETW, in Cologne, Germany, is the most modern wind tunnel in the world; a unique test facility for the development of new transport aircraft. The aircraft manufacturers from all over the world use the special features of this high technology facility enhancing the economic and environmental friendliness of their products and attaining the aimed climate protection goals.

Developed and supported by four European countries, this extraordinary wind tunnel exemplifies the leading position for European aerospace technology. For more information, visit http://www.etw.de/

EQUIcon

Partner Profile

EQUIcon® designs and develops software for industrial and technical users with especially high demands for software performance, operational reliability and stability.

EQUIcon® offers solutions, when complex processes are to be controlled, when maximum precision must be achieved by means of software, when real time requirements must be met, when different system platforms are necessary in a project, or when hardware and software must be developed at the same time through close cooperation between partners. For more information, visit http://www.equicon.de/

The Challenge

With the motto, "Only the best is good enough," the European Transonic Wind Tunnel has developed into one of the most important aerodynamic research and development facilities in the world's aviation industry. Since 1995, ETW has supported a number of aircraft manufacturers from all over the world to optimize their designs, including Airbus, Dassault, and Boeing. At ETW, the aerodynamic characteristics of aircraft can be tested on scaled-down models in actual flight conditions.

The control of the wind tunnel (compressor, flow control, nitrogen supply, pressure compensation), the transport mechanism for the model and the airlock system, and the complete data acquisition in real-time are accomplished using almost two dozen VAX computers. The real-time system used for data acquisition is comprised of six Digital VAX computers, and with good reason, "OpenVMS is evidentially still one of best operating systems in the world," explains Dipl.-Math Wolfgang Strudthoff, Group Leader of Computer Systems at ETW, "and OpenVMS has proven to be very robust, too. During the past 20 years, we had very few breakdowns."

The challenge for ETW is that workstations running VMS are aging, and will become even rarer in the future. In the mid-1990's, Digital Equipment replaced their 32-bit CISC-Computers named "VAX" with 64-bit RISC Systems named "Alpha AXP," because the second generation RISC chips, in addition to the newer SPARC architecture, promised a better price-performance ratio than the earlier VAX line-up.

Despite some attempts and studies (PRISM, Mica), Digital did not adapt the VAX-VMS process IO (e.g. GPIB IX-driver or 16bit parallel IO) on the new RISC platform. As a result, porting process-related software to the Alpha platform was not feasible, and ETW had no choice but to maintain its VAX platform. "Software development costs had been immense," explained Wolfgang Strudthoff. "About four Million Deutschmarks flowed into the software development during the construction phase, and at that time we had much more manpower than today."

The Solution

It is not easy to find a substitute for VMS, which is characterised by its virtual memory based multi-user/multi-processing operating system, and capable of time sharing, batch- and real-time processing. However, ETW realised that VMS could feasibly be used for control systems, as in this context "real-time" implies that processes can take priority over the Kernel jobs of the operating system itself. The solution to their predicament, enabling the "old" operating system to remain with the "new," points to virtualisation. EQUIcon Software GmbH has been working with Stromasys AG to deliver virtualisation solutions since 2001, and advised ETW on the possibilities of adopting CHARON-VAX software to solve their problem.

In 2005, ETW purchased their first CHARON-VAX license for testing purposes. "EQUIcon introduced CHARON-VAX into our development environment, where VMS is now run in parallel to our current production system," says ETW Computer Systems Coordinator Stefan Crump.

Customer Solutions

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- Stefan Crump, Computer Systems Coordinator, ETW

"The conversion into the Windows world succeeded without any problems. The functionality of the new system comes through the local network, and except for the increased speed, we didn't recognize any difference from the original." Wolfgang Strudthoff agreed, "When operating with CHARON-VAX, VMS came up as I knew it – with the same look and feel."

Following the initial evaluation and testing phase, ETW GmbH purchased another CHARON-VAX license in December of 2009, this time to replace a VAX Workstation. The second implementation did not proceed as smoothly as the first, because of the lack of a Graphical User Interface in the original VMS operating system, as a GUI was defined for VMS Workstations only. To combat this problem, ETW arranged an adaptation for the VAX Workstations in their control room. However, the company that provided the software for the Workstations no longer exists, and this left their documentation incomplete, but even this problem was not without a resolution. "It was sufficient to identify and modify 24 commands in the start-up sequence," explained Stefan Crump. "This task was completed within the relatively short timescale of one week. Now, the GUI adaptation for CHARON-VAX works in 99 percent of all cases."

Encouraged by their success, Strudthoff and Crump are even planning to convert the VAX machines for the measurement data acquisition to CHARON-VAX. However, one important component is still missing – the virtualisation of the relevant VAX I/O sub-systems by CHARON-VAX, especially the General Purpose Interface Bus (GPIB). To control this, extra hardware is required, which cannot be integrated into the CHARON-VAX emulator, and EQUIcon is already working on this solution. Crump explained, "It would be good if EQUIcon could substantiate a time horizon for the GBIP implementation, as we need to ensure high reliability." Strudthoff added, "If this could be achieved in one to two years we would be able to substitute another six VAX machines – each of them equipped with eight GPIBs." Thousands of VAX systems all over the world are still running real-time applications and the implementation would certainly be worth the effort.

The Results

Although the ETW consumes up to 50 Megawatts for the wind tunnel's drive system, the power savings achieved by modern computing hardware is a very positive side effect. Second-hand VAX servers are gradually becoming rarer, pushing ETW to carry on using virtualization software such as CHARON-VAX. This is because after 30 years, VMS remains robust and versatile – it only lacks 'new blood' with the correct level of expertise necessary to cope with the operating system.

"Overall our experience with CHARON-VAX has been very positive," Wolfgang Strudthoff confirms, adding, "From a technical point of view there is no disadvantage in using CHARON-VAX. The software adaptations for graphics have the advantage that old applications stay usable forever!" Five to six more systems are waiting to be virtualized using CHARON-VAX. Furthermore, VMS is much safer than any Windows system, as VMS malware is almost unheard of, allowing them to preserve the security of the system. "We don't need a lot of computing power," Stefan Crump says, "except for a stable real-time environment, because we only collect data which we forward to our customers. We do not have to visualize them or process them. CHARON-VAX provides the ideal vehicle for this ETW task by substituting old VAX hardware with modern systems."

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