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Bruce Claremont, October 2006

Preserving Good Software Maintaining a VAX-based Automation System

A large automotive electronics supplier recently faced an OpenVMS legacy hardware issue at their assemble facility in Huntsville, Alabama. The facility runs 24/7 building automotive electronic components such as engine controllers, dash board instrumentation, and entertainment systems. If you are driving a Chrysler or BMW product, odds are it contains electronic components manufactured at this facility.

The facility relied on a 19 year old automated materials handling system built around a DEC VAX 6410 computer and Litton SiGEN database. The system handles pick orders and inventory management via six automated miniloader and numerous Automatic Guided Vehicles (AGVs). The miniloader are rail mounted robotic cranes that pick and pull inventory items from warehouse shelves. The AGVs are large robotic carts that deliver parts to the assembly lines and finished goods to the warehouse.

The system works well, is critical to the operation of 16 assembly lines, and was not slated for replacement for another two years. However, after 19 years in continuous operation the VAX hardware residing at the heart of the system was beginning to deteriorate and becoming prohibitively expensive to maintain. Upgrading the VAX hardware to HP Alpha or Integrity processors was not an option for two reasons: the OpenVMS operating system had been frozen at version 5.5 and the SiGEN database application was not available on the newer platforms.

Mark, the facilities manager, was given the unenviable task of locating a replacement for the VAX system that preserved existing functionality, improved reliability, and reduced operating costs. Further complicating the situation was that production testing and cutover could only occur during an 8 hour window once a week. This was the only time the lines shutdown for routine maintenance.

Mark delegated the technical aspects of VAX replacement research and evaluation to Jack and John. Jack had previous OpenVMS experience and John supported the SiGEN applications. Jack researched options on HP's web site and located [Migration Specialties International](http://www.MigrationSpecialtiesInternational.com), an HP partner specializing in OpenVMS application ports. Bruce Claremont, a migration specialist, analyzed the VAX configuration and proposed a solution that met all of Mark's criteria.

Bruce recommended deploying SRI's CHARON-VAX emulation software on a Windows-based server to replace the VAX system. The CHARON-VAX product emulates VAX hardware, allowing direct replacement of the existing VAX 6410. All software would port to the emulated system unchanged. Network infrastructure, which included 20 DEC servers supporting serial terminals and communications interfaces via DECnet, TCP/IP, and LAT protocols also remained unchanged. Because CHARON-VAX exactly duplicates VAX hardware functionality, testing and implementation goals could be rapidly achieved. Simply put, the application was going to be updated with new hardware without changing any of its software.

Intrigued by the proposed solution, the site team agreed to an aggressive three step evaluation process:

- 1) **Demonstration:** Supplied with an image backup of the VAX 6410 on TK70 tape, Migration Specialties remotely demonstrated the ported application. The demonstration was delivered on a Compaq Presario R3000 laptop running Windows XP.
- 2) **Proof-of-Concept:** Bruce traveled to the Huntsville site to install and configure the emulated VAX system on a server supplied by the client. Site personnel tested the application both offline and online. The proof-of-concept was successfully delivered over a weekend. The application was installed on an Intel Xeon dual core server running Windows Server 2003. Final pre-production testing was conducting during scheduled line downtime on Sunday and included issuing instructions to automated equipment on the line. Testing was an unqualified success.
- 3) **Production Rollout:** Based on the success of the proof-of-concept, Mark, with the concurrence of the entire test group, felt confident in authorizing leaving the emulator in place when production restarted Sunday night. The entire team was on hand to facilitate a quick fall back to the original VAX environment if problems arose. Production start-up was seamless and the emulator has remained in operation since, fully replacing the VAX 6410.

From a production standpoint, the only visible difference running under the emulator is faster response time. Applications run a full 10 times faster under the emulator. This led to a few minor timing issues, since the VAX applications were responding to requests faster than some external systems were prepared to handle. The porting team anticipated this problem and has the issue well in hand.

The performance improvement had a positive impact on productivity. Faster response times equate to shorter assembly times, leading to an increase in units produced per hour. No one objected to being able to manufacture more product in less time.

Through careful evaluation, testing, and use of targeted resources, the site team achieved their mandate of replacing legacy VAX hardware with faster, more reliable, less costly components, all without giving up system functionality or interrupting scheduled production. These benefits were realized in a short period of time for less than the annual maintenance cost of the legacy VAX 6410. The solution exceeded the goal of providing an additional 2 years of life expectancy to the application, standardized the hardware supporting the application to rack mounted Intel-based Windows servers, and improved operational efficiency.

The revitalized system is working so well the client as indefinitely delayed specifying a replacement system. As long as the robotic components can be mechanically maintained, there is no business justification for replacing the existing system. Hardware emulation technology provided the means to extend the life of a well designed software application.

Comments and feedback on this article are welcome. Send them to Info@MigrationSpecialties.com. Migration Specialties provides OpenVMS porting, migration, and support services along with hardware emulation solutions. We will be happy to assist you with your OpenVMS and hardware replacement needs.