SVHW

By migrating its Oracle databases from Solaris to SUSE® Linux Enterprise Server, virtualized on KVM and running on HPE ProLiant servers, SVHW boosted availability and performance while cutting capital and operational costs. The organization also uses SUSE Linux Enterprise Live Patching to maintain practically continuous uptime for its virtualization layer. This helps ensure security and reliability while eliminating the need for reboots that would bring down all 40+ guest virtual servers on KVM.

Overview
SVHW (in Dutch: Samenwerkingsverband Vastgoedinformatie Heffing en Waardebepaling) is a government organization in the Netherlands that levies and collects taxes on behalf of the District Water Board of Hollandse Delta, a regional waste material collection service (RAD) and 20 municipalities. SVHW also assesses the value of real estate located in these municipalities.

Challenge
SVHW runs a large number of interconnected applications to support its core business activities, which ultimately help the regional authorities to collect the tax that pays for water and waste-water services to citizens. As these are extremely important municipal services, SVHW must strive to keep its systems working securely and effectively at all times. And as a public body, the organization also has a duty to control its costs and offer the best possible value to taxpayers.

SVHW had chosen to run the data layer for its business-critical applications on Oracle databases, initially on proprietary mid-range servers running HP-UX (HP’s implementation of Unix). Subsequently, the organization migrated to Oracle Solaris (also a Unix variant) running on proprietary Oracle SPARC servers. While this platform continued to offer high standards in performance, availability and security, the acquisition, licensing and maintenance costs were high.

Hans Lenting, IT Architect at SVHW, said: “Our Oracle database landscape is always growing, and we could see that the longer-term expense of staying on the existing Oracle stack was not sustainable. We wanted to find a less costly alternative that would offer the same performance and also greater flexibility.”

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IT Architect  
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SVHW at a Glance:
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Industry and Location
Government, The Netherlands

Product and Services
- SUSE Linux Enterprise Server
- SUSE Linux Enterprise Live Patching
- SUSE Linux Enterprise High Availability Extension
- SUSE Manager

Results
+ Increased flexibility and reduced costs for Oracle databases
+ Cut planned downtime to a minimum with live patching capability
+ Saved at least two man-days per month in administration alone
+ Reduced operational costs through platform standardization and Windows-Linux interoperability
“Running Oracle on our VMware landscape was not a viable option, but we certainly wanted the flexibility of a virtualized landscape,” said Hans Lenting. “Particularly for test and development environments, it is very useful to be able to quickly start up a new VM or clone an existing one.”

As SVHW continued to look for a new hardware and operating system stack for its Oracle databases, its key objectives were to: maximize efficiency, flexibility and performance; minimize costs for acquisition, maintenance and operations; and maximize the availability of business-critical databases while keeping them fully patched and updated.

Solution
Building on internal experience with both technologies, the SVHW team set up a test environment for SUSE Linux Enterprise Server virtual machines running on the KVM hypervisor, which in turn also runs on SUSE Linux Enterprise Server.

“We started running some Oracle test and development instances on virtual Linux servers on KVM, and saw very impressive results in terms of the performance and stability,” said Hans Lenting. “This is a somewhat unconventional way of running Oracle Database, but it works very well.”

SVHW then considered whether to extend this trial environment into a full production platform on new HPE servers, weighing the potential merits against those of a competing option: Oracle x86 Rackmount Servers, Oracle VM Server, Oracle Linux and, of course, Oracle Database.

“There were definitely some advantages in going with an all-Oracle stack, not least in the flexibility of moving software licenses,” said Hans Lenting. “However, we concluded that the performance, management tools and support provided by SUSE Linux Enterprise Server with KVM are superior, and that we could achieve more with hardware of the same specification if we chose the option proposed by SUSE. Although the final pricing was slightly higher for the SUSE proposal, we felt that it offered better value overall.”

SVHW deployed two new HPE ProLiant DL380 two-socket servers running SUSE Linux Enterprise Server 12 SP2. The base operating system runs the KVM virtualization layer, which currently supports more than 40 virtual instances of SUSE Linux Enterprise Server, both version 11 and version 12.

Currently, one physical server is configured as the production system and one acts as a warm standby. The servers share storage, so that SVHW can quickly and easily restart its virtual machines on the second server in the event of a problem with the first. In the near future, the organization plans to use the SUSE Linux Enterprise High Availability Extension to create a full active-active cluster as an online recovery option, and first needs to test this approach extensively with its Oracle landscape.

“The only real advantage we see for VMware over KVM is that the management tools are better developed,” said Hans Lenting. “Assuming you have experience and are comfortable on the command line, the big upside of KVM is that it’s smaller and lighter, which translates into better performance for virtual machines. And that applies even if you use it with virtualized disk, as we do.”

SVHW has migrated several large Oracle databases to its new SUSE Linux Enterprise Server and KVM environment, and will continue the migration on a phased basis. It also plans to move a few remaining databases from Windows to the new platform.

To minimize licensing fees, SVHW has split its Oracle databases into multiple smaller instances. Each of these has its own virtual server with processing resources of up to 16 threads, which keeps them within the limits of Oracle’s standard licensing terms.
“There is naturally some additional work involved in setting up this approach, but it enables us to achieve very high performance without moving into the enterprise licensing bracket, which would be more costly overall,” said Hans Lenting.

In total, SVHW runs more than 40 virtual instances of SUSE Linux Enterprise Server, each supporting an Oracle or PostgreSQL database. Also running on SUSE Linux Enterprise Server virtual instances is SVHW’s ESRI ArcGIS Enterprise platform that powers their GeoWeb (Geographical Information System).

As all of these critically important systems depend on the underlying KVM virtualization, SVHW must maximize uptime for the host operating system to avoid causing disruption to the business. With SUSE Linux Enterprise Live Patching as part of SUSE Linux Enterprise Server 12, SVHW can apply essential security and reliability patches to the virtual server running its KVM landscape without ever needing to reboot.

“The live patching function on SUSE Linux Enterprise Server is a huge benefit for the hypervisor layer, which we need to keep ‘in the air’ for as long as we can,” said Hans Lenting. “Without this, we would be faced with bringing down all 40+ virtual machines each time we needed to apply critical patches—at least once a month. It would be very difficult to find a time when it was convenient to take down the whole landscape!”

To help keep patching synchronized across all virtual servers, SVHW has recently added SUSE Manager. The organization values the ease this brings to Linux administration, in particular for technical staff with limited experience of the operating system.

Results
SVHW completed the migration of several of its largest Oracle databases to SUSE Linux Enterprise Server on KVM at the turn of the year, just before what are always its two busiest months. The new solution proved that it was more than up to the challenge, and it continues to deliver exceptional performance and flawless availability.

“In our experience to date, running Oracle on SUSE Linux Enterprise Server on KVM is a great choice in terms of performance, flexibility and reliability,” said Hans Lenting. “One major efficiency advantage is that virtual CPUs in KVM are just threads. Compared with our experience of VMware, it seems that KVM is better at spreading the load for the VMs across all the available processor cores. We don’t see a lot of threads or cores going to 100 percent utilization, so it’s clear that the load is handled more efficiently, even if you have lots of virtual CPUs, as we do.”

Before the introduction of SUSE Linux Enterprise Live Patching and SUSE Manager, it was hard and time-consuming work to keep all patches up-to-date and in-sync across all systems. SVHW estimates that two man-days each month were spent on this task alone, and that this administrative burden will soon essentially disappear. As the organization introduces dashboards in SUSE Manager, the visibility of patching status will improve, helping SVHW plan its patching schedule more effectively and avoid business disruption.

“It will be great to save those two-man days a month once we have completed the set-up of the live patching functionality and SUSE Manager,” said Hans Lenting. “But more important than saving time is avoiding the problems associated with having different levels of patching and systems that remain unpatched. The graphical approach of SUSE Manager and of tools like YaST® within SUSE Linux Enterprise Server contributes to better management of large virtual landscapes, by making it easier for staff who are not experts in Linux to handle the administration.”
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In addition to using SUSE Linux Enterprise Live Patching on the Linux instance supporting the KVM environment, SVHW is using it on all guest instances that are already on version 12 of the SUSE operating system (some systems remain on earlier OS versions for the time being for software compatibility reasons).

“The live patching feature in version 12 is almost invisible: it just runs and there are no reboots!” said Hans Lenting. “It enables us to apply major maintenance and security patches with no downtime. So the main advantage is on the KVM level, where we don’t need to shut down all of the guest VMs each time we patch the kernel.”

For SVHW, a further advantage of using SUSE Linux Enterprise Server is its interoperability with Microsoft Windows, as Hans Lenting said: “We can use Microsoft Active Directory to add SUSE Linux Enterprise Server virtual machines into the Windows domain, so that we have a shared authentication environment with Windows users. And for security-related projects that need to use Active Directory as the central authority, we can easily enable that from SUSE Linux Enterprise Server. We still have many applications running on Windows, even if we are continuing to move databases to Linux because of the higher availability and performance. By standardizing on Windows and SUSE Linux Enterprise Server as our two strategic operating systems, we don’t need to maintain so many different skills internally. We have only a small IT department, so it is better if we can focus on key skills rather than trying to master lots of different platforms.”

Platform standardization contributes to reducing the total cost of operations for SVHW, helping the organization to achieve better value from its expenditure of public budget. In particular, choosing SUSE Linux Enterprise Server enabled the organization to deploy an enterprise-class operating system on regular x86-architecture hardware, dramatically reducing acquisition and licensing costs as well as keeping options open for the future.

“We really like the openness of SUSE Linux Enterprise Server,” said Hans Lenting. “Many other vendors try to lock you into their full stack, but it seems that SUSE is happy for us to mix and match to find the best combination of technologies for our needs. The OS seems to be very robust—more so that the other Linux distributions I have used—and the professional support is excellent also.

“We are always aiming to achieve the best balance we can between cost and capabilities, so that we can deliver great service at low cost to the taxpayer. SUSE Linux Enterprise Server is one of the elements that helps us to achieve this goal.”

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