ABSTRACT

More than ever, today’s enterprises need access to desktop solutions that enable productivity and flexibility without compromising security and cost. At the same time, technical innovation in virtualization is creating new and exciting ways to develop improved managed workplace solutions. Developments in client-side type-1 and type-2 hypervisors promise an evolution in flexibility and manageability. However, there are still considerable challenges in ensuring these innovations can scale to production and that they can be offered as a ready-to-use service for enterprise customers. Following an in-depth process of testing and evaluation, Swisscom IT Services chose Citrix’s XenClient Enterprise** (XC-E) running on intelligent clients powered by Intel® Core™ vPro™ processors as the core technologies for its new SmarTop* workplace solution – a truly modern managed workplace service for the enterprise.

The context – Dynamic Workplace Solutions

As a managed workplace service provider, Swisscom IT Services provides enterprise customers with professional management services for modern working environments. This approach requires a broad portfolio of current workplace models, which are all also available as mixed (or hybrid) infrastructures. Swisscom IT Services calls its portfolio of services Dynamic Workplace Solutions. These cover all necessary customer care, security, engineering and hardware services around the main workplace models, which Swisscom IT Services divides into two families – see figure 1:

- Connected Workplaces – workplaces operated and virtually accessed through the data center infrastructure (terminal server, VDI)
- Rich Workplaces – with traditionally known, decentralized computing (notebooks, desktops). The newly designed SmarTop is the latest addition to this family.

Figure 1: Connected Workplaces and Rich Workplaces
The challenges and the response
Swisscom IT Services saw both a desire from its customers, as well as an opportunity to develop an innovative addition to its portfolio of services by combining the benefits of virtualized environments with the benefits of local execution at the user’s hands. The challenge was to create a complete service offering that would leverage state-of-the-art technology but also provide the same flexibility, security and robustness as existing managed workplace solutions.

In 2011 Swisscom IT Services had begun a service development process for the creation of the SmarTop service. This is a service that combines technological engineering with architectural standardization; the development and standardization of maintenance processes; and the commercial bundling of services. It provides cost benefits to the customer through a maximum of service standardization whilst still allowing sufficient space for customization.

Swisscom IT Services started with a technical evaluation of the leading Intelligent Desktop Virtualization (IDV) products, all of which were based on type-1 hypervisors on the client side. It had ruled out type-2 solutions at a very early stage for architectural and security reasons especially as the service is aimed at the enterprise customer. The type-1 products all differed from the offerings in the Connected Workplaces category in that they were based on the concept of central management, local execution. These IDV solutions held the promise of massive savings in back-end infrastructure by centralizing the creation, versioning, deployment and management of the Microsoft Windows* image. However, execution of those images remains on the intelligent PC at the hands of the end user.

The initial evaluations led to a Request for Information (RFI) process. Out of that process Swisscom IT Services selected Citrix XenClient (XC) as the foundation of the SmarTop service. Key to the decision at the time was the robustness and in-built security of the XC hypervisor. A Proof of Concept (PoC) was executed with XC 2.1 early in 2012.

In May 2012 Citrix completed the acquisition of Virtual Computer and in June 2012 Citrix XC-E was released. As an existing XC customer, Swisscom IT Services was closely supported by Citrix and was quickly able to execute an internal PoC with XC-E. End-user response was immediately positive towards the new product.

Citrix XC-E - desktop deployment PoC
A key step in productizing the SmarTop service was an extensive PoC to test not just component technologies, but also how they worked together – see figure 2. The RFI process had identified a number of must-have capabilities for the overall solution. These included:

- A user experience as near as possible to a native Microsoft Windows install
- The ability to run more than one Virtual Machine (VM) on a client PC
- Strict separation between VMs
- Reduced overall cost of maintaining and deploying “gold” images including the ability to efficiently patch or restore images
- The ability to encrypt either by full disk, VM or Windows disk
- The ability to manage the XC Engine instance as a separate entity in the Sychronizer console
- The ability to integrate or not integrate each Windows VM with Active Directory (AD)

In addition there were several additional highly-desirable features such as the ability to issue “kill-pills” to compromised/expired client PCs; the ability to centrally manage deployment policies; and easy integration with the existing image build infrastructure which was based on Microsoft System Center Configuration Manager (SCCM).

Deployment platforms
Suitable hardware was sourced. Because Swisscom IT Services has standardized on VMware ESX products in the data center and the synchronizer for the XC server requires Microsoft Hyper-V, a physical server running Intel Xeon processors was allocated.

Target end-users and a second PoC
Client PCs capable of running multiple VMs were identified. The initial PoC was scoped to require each PC to be able to run a number of VMs but the focus of the initial PoC was to offer a group of software developers access to an open VM, with capabilities and rights not allowed with the standard corporate Windows 7 build. This Windows 7 VM with Microsoft Office 2010 would not be joined to AD and the end-users would have admin rights.
The scope of the internal PoC was limited to a few users, but importantly an additional PoC with 20 users was planned which would run on customer premises. This PoC would be run on the successful completion of the internal PoC and include a broad range of user profiles including office users from HR and IT, as well as developers. This second, customer PoC would run on hardware previously used for a XC 2.1 PoC and would require up to four VMs to be supported:

- Windows 7 standard business VM, locked down and secure
- Windows 7 business VM with admin rights
- Windows 7 VM for personal use
- A Windows XP business VM (which was later dropped to confine the scope of the PoC)

The bulk of the server local storage was consumed by “gold” copies of images deployed to end-user PCs. Experience through the PoC did not indicate that high-throughput storage, such as SSD or memory-based products would be required at any point on the server side. A key customer decision impacting storage requirements was whether to deploy Windows images in custom or shared mode. Custom images are unique to an individual; whereas shared images can be shared across many users. The decision-point in the end was that if the end-user needs admin rights for the private and business VM, custom image mode is used, otherwise shared mode is deployed.

<table>
<thead>
<tr>
<th>SmarTop PoC and production infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Swisscom IT Services internal PoC</strong></td>
</tr>
<tr>
<td>XC-E Synchronizer server: 1 HP ProLiant** DL380 G5, 20 GB RAM, 200 GB local storage</td>
</tr>
<tr>
<td>Client hardware: HP EliteBook** 8460p with Intel® Core™ i7-2620M vPro™ processors, 8GB RAM, 160 GB Intel® Solid-State Drives (Intel® SSDs)</td>
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<tr>
<td><strong>Swisscom IT Services internal production</strong></td>
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<tr>
<td>XC-E Synchronizer server: 2 HP ProLiant DL380 G7 (1 production/ 1 integration), 24 GB RAM, 900 GB local Storage</td>
</tr>
<tr>
<td>Client hardware: Lenovo ThinkPad** T530 and X230 with Intel Core i7-3520M vPro processors, 8GB RAM, 240 GB Intel SSD</td>
</tr>
<tr>
<td><strong>Customer PoC</strong></td>
</tr>
<tr>
<td>XC-E Synchronizer server: 1 HP ProLiant DL380 G6, 20 GB RAM, 400 GB local storage</td>
</tr>
<tr>
<td>Client hardware: Lenovo ThinkPad X220 with Intel Core i5-2540M processor, 8 GB RAM, 320 GB Hard-Disk Drive (HDD)</td>
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</tbody>
</table>

“Intel is pleased that Swisscom IT Services has selected the Intel® Core™ vPro™ processor and Citrix XenClient Enterprise** as the basis for its new SmarTop service offering. Since Citrix XenClient Enterprise is optimized for the Intel vPro platform, it is able to take advantage of hardware-based client capabilities such as encryption acceleration, virtualization and trusted execution. As a result, SmarTop* is able to deliver a best-of-breed service. Local execution and centralized management can help IT organizations, while customers benefit from greater flexibility and a better overall end-user experience.”

Yasser Rasheed, CTO and Director of Architecture, Business Client Platforms Division, Intel
PoC findings

The results of the POC fell broadly into two categories:

- User experience
- Administration, technical and the business experience

The Swisscom IT Services’ PoC team created a process which supported users with the initial install of the XC-E hypervisor and familiarization with the new user interface.

Regarding user experience the PoC with XC-E was a full success. Users reported several ease-of-use improvements over their experience with XC 2.1, in particular the seamless resume from hibernation, docking and multi-monitor support. The new XC-E client user interface was also popular with user-friendly access to commonly used features such as wireless profile management and several customization options. This level of customization was unfamiliar to many users, hence a basic training was provided to the PoC participants upon receiving their new XC-E platform PCs – a practice we recommend.

No show-stopper technical or end-user issues were encountered.

There had been a minor setback to the original scope of the customer PoC as network access to a private VM (aimed at personal use for the end-user) within the customer’s network could not be established. This was because the customer had enabled MAC-address white-listing on its network and customer security would not allow unmanaged images into the network. The customer and Swisscom IT Services mutually agreed to remove the connected use of private VMs in the company network from the scope of the PoC and to investigate the options to resolve this issue for a potential future implementation. However, most users had reported this to be a desirable feature and regretted that this could not be implemented.

The Swisscom IT Services’ internal PoC also created problems for the combined use of business and private images on a certificate-protected corporate WLAN (CwLAN). The security-policies in Swisscom IT Services require CwLAN certificates to be available in the certified corporate VM only, but not to be available to other VMs. Neither should an existing CwLAN connection allow other VMs to use this wireless network access. Certificate-based access to networks is not yet available in XC-E. However, there’s still a way to separate personal and business VMs by assigning VLAN tags to each VM. This is still an experimental feature but is planned to be fully supported later on this year. Therefore the CwLAN access could not be established for the PoC. Swisscom IT Services found a way of using an unsecured WLAN access with a VPN-tunneling infrastructure instead of the certificate-based CwLAN access but is working on a permanent solution with Citrix.

Interestingly, only a few users questioned the lack of Windows 7 aero-design features, and they reported adjusting quickly to this minor limitation and had not found this an issue in everyday use.

One finding of the PoC was that thought needs to be given to client hard-disk space. One of the desirable features of XC-E is the ability to provide background update and rollback capability. XC-E reserves approximately 40GB of hard disk space to support this feature. With enterprise VMs requiring up to 60GB prior to user data being added these were sized at 160GB. However, space was also required for private VMs, so to accommodate both size and performance SSDs with at least 240GB disk space were selected.

Importantly, the key aim of the internal PoC was achieved: the developer user-group were able to efficiently access the open VM and work within that environment on external networks which would not have been possible on the standard corporate VM.

One of the most encouraging additional benefits was that the presence of the new technolo-
gies in the hands of the end-users fostered exciting new discussions about possible new use-models with the customers. All PoCs and installations had shown that the SmarTop solution would eliminate some persistent limitations of existing desktop management solutions, which was considered particularly helpful in user populations that had previously run into these limitations.

The PoC targets regarding administrative benefits were also met, with a number of additional findings. Key additional benefits included:

- The synchronizer for XC was able to successfully interface with the existing infrastructure used to create and deploy corporate images in SCCM
- The ability to manipulate, patch and version images in the Hyper-V environment and deploy with no impact to end-user productivity
- The ability to isolate and manage the hypervisor separate from the Windows image(s) installed on the PC and to do so based on domain-joined or local user accounts
- Back-end server, network and storage requirements did not exceed and in most cases were significantly within the scoped requirements
- Intel vPro platform client PC features worked with XC-E as expected. Note: Intel Active Management Technology (Intel AMT) and 3D graphics support were not part of the PoC scope

Also worthy of note, however, is that while XC-E is a comprehensive image management product it will not remove the need for discipline in controlling the proliferation of images across a PC fleet. That said, the tools and capabilities included in the synchronizer will be of great assistance in achieving image consolidation.

"We have been inspired by the new possibilities that Intel® Core™ vPro™ processors and Citrix XenClient Enterprise** have offered, and are extremely happy to see its enterprise readiness proven. We have chosen an aggressive path for implementation, and the support from the technology providers has helped us achieve service maturity at an early stage of this relatively new technology. We look forward to many interesting SmarTop* projects."

Heiko Timmerkamp,
Product Portfolio Manager Workplace Services, Swisscom IT Services
Conclusions
The SmarTop development process and the PoC processes described have had a number of benefits for Swisscom IT Services and its customers.

The PoCs have led to current projects for production deployments. Swisscom IT Services is now deploying several hundred PCs internally beginning in October 2012 and will deploy in late Q4 to its first external SmarTop customer. Plus there is serious interest within its existing customer base to include the SmarTop service as an add-on to its existing portfolio of managed services.

While this will make the up-front investments in a new technology worthwhile for Swisscom IT Services, it will also produce solutions for customers they have long been waiting for:

- It is no longer necessary to use separate hardware per end user for specific reasons
- There are more and greater possibilities for business continuity through full image backups
- A new approach to workplace management can be taken, where the focus is less on the hardware provided but on the image as a logical entity, creating real business value

All these have already sparked new use cases for client workplaces in the enterprise; and this may be only the beginning. This is the real-world endorsement of Swisscom IT Services’ handling of the technologies involved as well as their relevance in a business context.

Clearly, there are additional steps to be taken before the SmarTop product can scale to thousands of client PCs but the indications at this time are that there are no specific barriers to achieving this.

The PoCs have shown that the technology on the client is performant, enterprise ready and if implemented provides new and superior customer and end-user benefit. During the process, however, it was found that new use cases – like the newly achievable separation of corporate and private client use - push certain issues further down the solution lane. With the client-side solved, intelligent network access solutions now need to be implemented to combine technology, service and network for an even better customer solution.