Energy-efficient computing using Citrix PowerSmart Utility for Presentation Server (Beta) with HP Integrated Lights-Out

Executive summary

Data center costs for computer power and cooling are staggering. The Environmental Protection Agency (EPA) estimates that data centers used 61 billion kilowatt hours in 2006 – or 1.5% of all power consumed in the United States[1] – at a cost of $4.5 billion, the consumption of approximately 5.8 million average households.

The no-cost Citrix PowerSmart Utility for Presentation Server (PowerSmart) is designed to reduce the power consumption of a Citrix Presentation Server farm. During off-business hours, PowerSmart intelligently focuses the farm's workload on a few Presentation Servers so that it can power off idle servers. Initial estimates show that based on usage patterns, energy costs for a Citrix Presentation Server farm can be reduced by up to 50%.

PowerSmart integrates seamlessly with HP Integrated Lights-Out (iLO) 2 technology to automate the remote power management of Citrix Presentation Server farms deployed on HP ProLiant servers.

By combining Citrix's market-leading Application Delivery infrastructure with HP's Lights-Out remote management solution, customers can support environmentally-friendly (green) initiatives by increasing the utilization of their existing hardware and lowering power and cooling requirements.

Target audience: This white paper is intended for business and IT professionals interested in power management in a Citrix and HP environment.

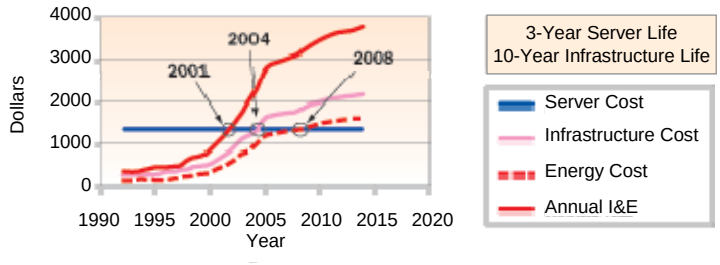
Introduction

As companies of all sizes have become increasingly dependent on applications to run their businesses, the costs involved in running a data center continue to grow rapidly. IT departments are being challenged to maintain – and even increase – the capacities of their IT infrastructures while reducing energy consumption and total carbon footprints.

The cost of powering and cooling a data center is high, constituting a significant – if not the most significant – portion of total IT infrastructure costs. Indeed, more and more studies are indicating that server hardware is no longer the leading data center[2] expense. As shown in Figure 1, the purchase price of a new, 1U server has already been exceeded by the capital cost of the power and cooling infrastructure needed to support it and will soon be exceeded by its lifetime energy costs.

[1] For further information, refer to the "Report to Congress on Server and Data Center efficiency"
[2] For further information, refer to Electronics Cooling magazine article

Figure 1: Data center capital costs



Simplifying the application delivery and management infrastructure can help an IT department operate efficiently within a tightly-controlled budget while still meeting increasing demands from users for wider, faster access with more functionality. The powerful, mutually-supportive combination of Citrix Application Delivery solutions and an HP Adaptive Infrastructure helps integrate and synchronize IT with business processes, while sustaining the rapid deployment of resources. This is a balanced infrastructure that helps overcome application delivery challenges by virtualizing data center servers, consolidating application workloads more efficiently and optimizing application traffic over the network.

Utilizing the new PowerSmart tool can further improve a Citrix Presentation Server environment by enabling more intelligent server provisioning and load management based on a specific knowledge of how applications are being used. By powering down unused Presentation Servers during off-peak hours, you can support environmentally-friendly (green) computing initiatives, while, at the same time, significantly reducing energy consumption.

Important:
PowerSmart as described in this paper is a beta release; its capabilities, features, and functions are subject to change. While this beta release is not formally supported by Citrix, support is available from the Citrix MFCOM discussion forum at http://support.citrix.com/forums/forum.jspa?forumID=44. .

During off-business hours, the freely-downloadable beta version of PowerSmart can be used to intelligently concentrate the workload of a Citrix Presentation Server farm on a few servers and power off idle servers, thus reducing power consumption in the data center. Initial estimates show that, based on usage patterns[3], energy costs for such a farm can be reduced by up to 50%.

Designed to support servers featuring HP iLO 2, PowerSmart has been validated by HP. HP iLO 2 gives you the freedom to enable full remote control for your HP ProLiant servers; anything you can do at the server's physical location, you can achieve remotely, at any time, regardless of the server's state of operation or operating system.

Value of the HP and Citrix partnership

Citrix and HP have been working together since 1995, creating a partnership that provides end-to-end infrastructure solutions that enable IT organizations to reduce risk, control costs, and equip users to become more productive.

The benefits of deploying Citrix Application Delivery infrastructure on HP hardware and software include:

- **Integrated**
  Citrix and HP work together to provide the processes, methodologies and tools needed to implement global application delivery solutions. This partnership is distinguished by knowledge-sharing and complementary product development; for example:
  - HP is a Strategic Partner within the Citrix Global Alliance Partner Program and maintains a full-time engineer onsite at Citrix, working with Citrix test engineers to help ensure compatibility between HP and Citrix products.
  - HP validates the installation of Citrix Presentation Server on select HP ProLiant servers prior to product announcements.
  - There is a sizer for Citrix Presentation Server deployments on the HP website.
  - Citrix is a member of the HP BladeSystem Solution Builder Program and works with HP to build the industry's broadest offering of blade-based customer solutions.
  - HP and Citrix have signed agreements for On-Site Engineering, Cooperative Support, and Global Systems Integration and Professional Services.
- **Preferred**
  More than half of all Citrix Presentation Server implementations worldwide run on HP technologies.
- **Validated**
  Citrix on HP access solutions have been proven in production deployments at more than 75,000 mutual customers.
- **Field-proven**
  There are more than 150 public case studies attesting to the value of Citrix on HP access solutions in addressing real-world business challenges.
- **Enterprise-optimized**
  Because HP and Citrix have partnerships with industry leaders such as SAP, Cisco, Microsoft®, and Oracle®, Citrix on HP access solutions can integrate seamlessly with almost any enterprise IT environment.

As a result, Citrix Application Delivery solutions can be deployed with confidence on HP hardware and software; no other vendor has such extensive solution support or as long a history with Citrix solutions.

[3] For more information, refer to the Citrix website

HP Server Based Computing

HP, in partnership with Microsoft and Citrix, provides one of the most complete solutions for the server-based computing environment.

As a leader in server-based computing, HP has already deployed thousands of solutions for large enterprises, such as financial and telecommunications services, government, education and healthcare agencies. HP Server Based Computing (SBC) experts can provide the knowledge, hardware, software and services needed to deliver benefits like rapid return on investment, unmatched simplicity, unprecedented scale-out, lower total cost of ownership, and faster time-to-solution.

Deploying HP ProLiant servers in an HP SBC environment (such as the Citrix Application Delivery platform) offers many benefits to the customer over conventional client/server computing. These benefits include:

- Lower application ownership costs
- Enhanced security
- Elimination of additional development, testing or deployment procedures for individual applications
- Improved data backup and recovery
- Improved end-user support
- Uniform desktop experience from any network
- Accelerated application deployment access point
- Extended application availability

HP iLO 2 technology

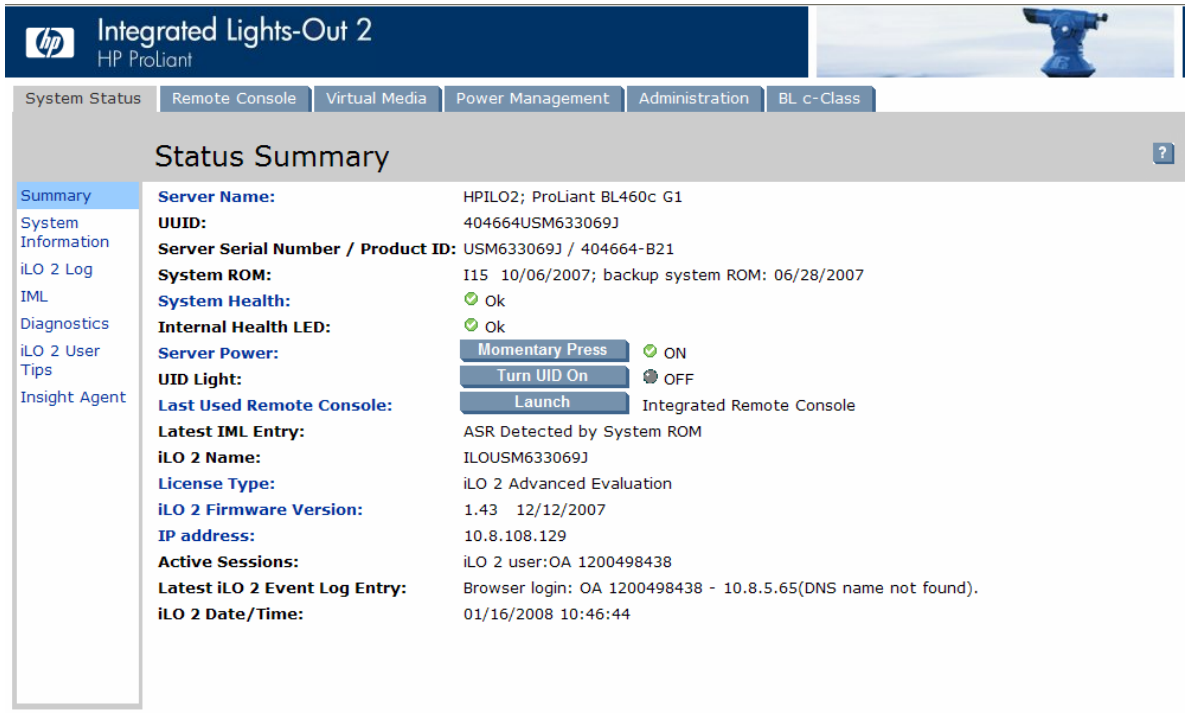
HP iLO 2, the second-generation Integrated Lights-Out product, virtualizes system controls so that routine system administration, troubleshooting and maintenance can be performed remotely over a network, regardless of the server's operational state.

Consisting of an intelligent processor and firmware, HP iLO 2 offers two levels of lights-out, remote management functionality:

- **Basic** – System board management features, diagnostics, and essential lights-out functionality are provided with HP iLO 2 Standard and HP iLO 2 Standard Blade Edition
- **Advanced** – Advanced functionality can be licensed with the optional HP ProLiant Essentials Integrated Lights-Out Advanced Pack or HP ProLiant Essentials Integrated Lights-Out Select Pack

Figure 2 shows a typical HP iLO 2 screen.

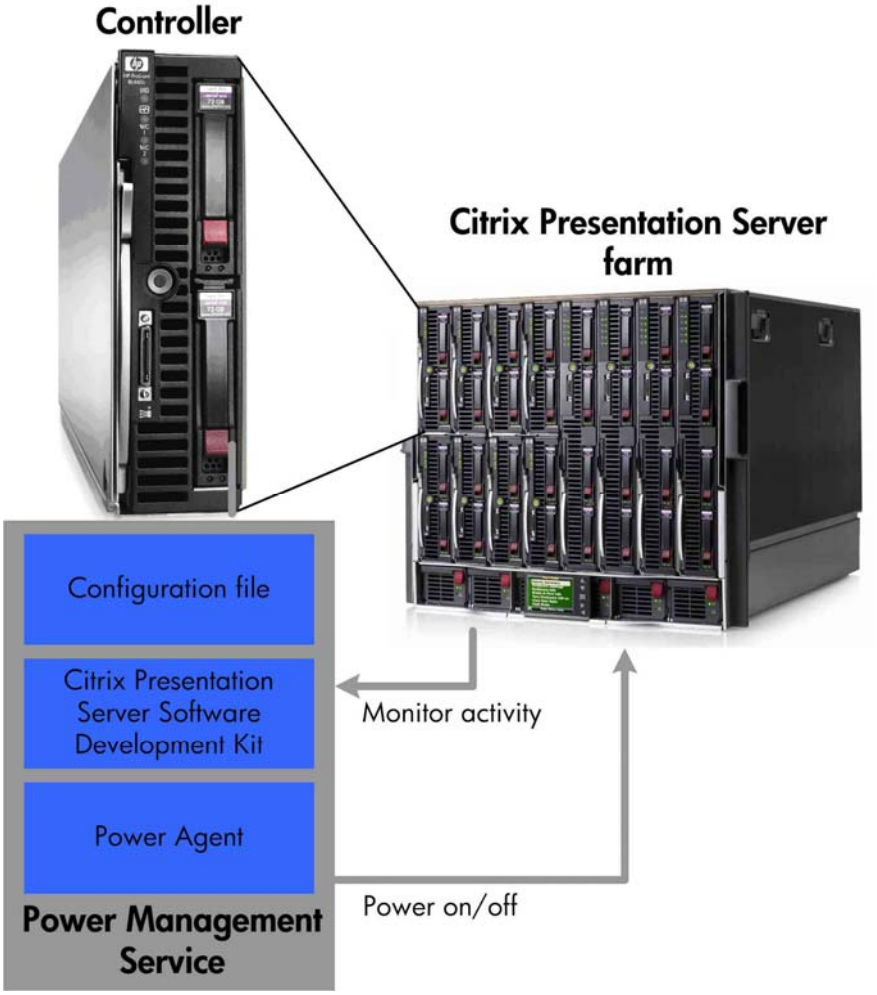
Figure 2: Showing a Status Summary for an HP ProLiant BL460c server blade



PowerSmart architecture

This section provides a high-level overview of the PowerSmart architecture, which is outlined in Figure 3.

Figure 3: Overview of the PowerSmart architecture, with a controller managing power distribution to a Citrix Presentation Server farm



Citrix Power Management Service is installed as a Microsoft Windows® service on one of the Citrix Presentation Servers – known as the **controller** – in the farm being managed. Only a small number of files are copied to the installation directory on the controller; there are no registry changes; and no Windows Component Object Model (COM) registration is required. Uninstall is supported.

A **configuration file** module consisting of Extensible Markup Language (XML)-based files is used to configure PowerSmart. These files define variables such as the servers to be managed and the specific off-business hours during which inactive servers or those with disconnected user sessions are powered off. During business hours, the service can be configured to power up servers that had earlier been powered off.

The service uses the **Citrix Presentation Server Software Developer Kit** (CPS SDK) to monitor user sessions on the Citrix Presentation Servers being managed.

The **Power Agent** module is responsible for powering servers on or off and can be customized to meet the needs of your specific environment[4]. PowerSmart can be configured to invoke any custom script or program to power servers on or off; for example, PowerSmart provides sample scripts designed to power HP iLO 2-enabled servers on or off.

Power events are logged in the controller's event log; additional debug and test tools are provided.

Configuring PowerSmart

Configuration steps include:

- Use the XML-based configuration files on the controller to define the following:
  - The Citrix Presentation Servers whose power you wish to manage
  - Off-business hours – the time period during which servers may be powered off
  - The frequency with which PowerSmart checks the time and the state of the servers
- Use the Citrix Presentation Server console to configure user connection rules that prevent servers being managed by PowerSmart from accepting new connections during off-business hours

During business hours, PowerSmart can automatically power on servers to accept user connections.

[4] For further information, refer to the Citrix PowerSmart Utility Beta User Guide

PowerSmart with HP iLO 2

PowerSmart is designed to work with HP iLO 2 technology. As shown in Figure 4, the Power Management Service directly addresses the HP iLO 2 processor, utilizing its capabilities to power the server up or down – regardless of the state of the operating system.

Figure 4: Overview of the PowerSmart architecture, with a controller managing power distribution to a Citrix Presentation Server farm

Validation

The integration of PowerSmart with HP iLO 2 was validated on HP servers at the Citrix eLab in Fort Lauderdale, Florida.

Summary

The powerful combination of HP iLO 2 and no-cost PowerSmart helps you automatically and reliably manage the power load of Citrix Presentation Servers.

By intelligently concentrating the off-peak workload to a few Presentation Servers and using HP iLO 2 technology to power-off idle HP servers, the power consumption of a Citrix Presentation Server farm can be reduced by up to 50%.

For more information

HP ActiveAnswers for Server Based Computing	http://www.hp.com/solutions/activeanswers/hpsbc
Consolidated HP SBC online sizer tool	http://h71019.www7.hp.com/activeanswers/Secure/70245-0-0-0-121.aspx
HP ProLiant servers	http://www.hp.com/go/proliant
HP iLO 2	http://www.hp.com/go/ilo
HP Adaptive Infrastructure	http://www.hp.com/go/adaptiveinfrastructure
HP ProLiant Essentials Rapid Deployment Pack (RDP)	http://www.hp.com/go/rdp
Citrix Presentation Server	http://www.citrix.com/English/ps2/products/product.asp?contentID=186
Citrix PowerSmart information and download	http://community.citrix.com/display/cdn/Citrix+PowerSmart+Utility+for+Presentation+Server+%28Beta%29
Discussions, questions, and feedback regarding PowerSmart	http://support.citrix.com/forums/forum.jspa?forumID=44

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