F5 White Paper

Getting Green

Decreasing the impact of hardware on the environment and IT's bottom line through more efficient and better performing application delivery platforms.

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Introduction

There's been a lot of hype over the past year about "green" computing and the drive to lower the impact of IT and data centers on the environment. While just about everyone can get behind the concept of green computing and reducing the impact of computing on our environment, we should also be aware that every IT organization also has to worry about the other kind of green: its bottom line.

The good news is that there is some amount of overlap between these green computing goals. Reducing power consumption and management expenses while also increasing efficiency of existing resources through consolidation and virtualization decreases both the impact of devices on the environment and on IT's increasingly tightening budget.

Going Green

Power and Heat

The easiest way to reduce the impact of any device on the bottom line, be it a server or networking equipment, is to reduce the amount of power it requires. Modern servers often draw variable amounts of power based on the processing power in use by applications. Similarly, some networking equipment and other devices provide the same functionality, drawing varying amounts of power based on their load and configuration. This can be beneficial in reducing the operating cost of the server or device, but like dealing with variable costs of bandwidth due to bursts in usage, it also makes it difficult to estimate annual costs and budget appropriately.

Another simple, but often overlooked, facet is how many BTUs (British thermal units) are generated by any given device. One BTU is the energy required to raise one pound of water by one degree Fahrenheit. By decreasing the BTUs generated, there is less heat generated and thus less cooling required within the data center. The costs of cooling a data center are often more significant than those required to heat it, because heat—and not cooling—is naturally generated by devices. Reducing these costs can have a significant impact on the operating expenses of any IT organization.

Reducing power consumption and generation of BTUs for devices and servers is something over which IT has no control. While IT can certainly use such ratings as part of its decision making process for purchasing, it really can't affect how much power is consumed or how many BTUs are generated by any given device. It's simply a cost of doing business.

Yet IT can make decisions, both in purchasing and architecture, which reduce power consumption and heat generation by reducing the number of servers and devices that make up its data center. Consolidation and virtualization are both ways in which IT can positively impact its bottom line.

Consolidation

Consolidation has been an "initiative" in IT for many years. It generally revolves around the consolidation of the data center in terms of the number of servers deployed to support mission-critical applications. While reducing the number of servers in the data center, and thus rack density, both power consumption and heat generation can be positively affected.

Yet capacity needs must be balanced with consolidation efforts, and at some point consolidation is no longer possible. As the volume of users and application usage grows, so must the number of servers—and devices such as Application Delivery Controllers (ADCs)—necessary to scale mission-critical applications.

Striking a balance between scalability and controlling costs is difficult, and thus far it has been nearly impossible to avoid the deployment of additional ADCs as a way to scale a data center. Whether chassis or appliance-based, these devices have only added to the cost of power consumption and increased the generation of heat within the data center, boosting operational costs.

Solving this problem requires effort from the ADC vendor to reduce the power consumption and BTU generation of devices while simultaneously providing a way to scale without increasing the number of devices required for data center deployment. A single, chassis-based ADC requiring less power and generating fewer BTUs that also scales via a virtualized bladed architecture can address the growing need for capacity without adversely impacting IT's bottom line, or the environment.

Virtualization

By architecting a new breed of chassis-based ADCs that take advantage of virtualization not only at the server level but also at the chassis and blade level, these new devices can provide better performance in a single unit than could previously be obtained with multiple appliance-based solutions or legacy chassis-models.

By virtualizing blades and CPUs—essentially creating a single, powerful processing matrix—this new breed of chassis-based ADC can scale nearly linearly. This internal processing scalability means that every last ounce of processing power is used and this device can provide a much higher capacity than its legacy ancestors. By more efficiently using the processing power available, the performance per power ADC unit is increased, making the power consumption of each transaction cost a fraction of what would otherwise be possible.

	Layer 7 CPS	Watts	CPS per watt	BTUs
Legacy chassis	58000	4620	12	15763
New chassis model	1260000	1463	862	4991

Figure 1: Comparison of performance per watt for legacy and new chassis model ADCs

Consider the comparison in Figure 1. Regardless of what the cost per kilowatt hour, there is a significant savings in terms of power when moving from the legacy chassis-model to a new, virtualized chassis-model. This has a significant positive impact on the environment as well as on the organizational budget. Given the higher performance capacity of the new chassis model, fewer devices are necessary to meet the growing traffic management and application delivery needs of today's IT organizations, which lowers the cost of operations as well as management.

The management costs of this new breed of ADC are inherently lower than a traditional application delivery solution, owing to its virtualized architecture and the ability for the device—and IT manager—to manage the system as a single entity rather than as individual blades in a larger system. This reduces the amount of management necessary, and in turn reduces the costs associated with managing the device. This is especially true as capacity is added, as it would require multiple legacy chassis-based devices to match the processing power of a single virtualized chassis-based system. Each added device must be managed, and this adds to the amount of power consumed and BTUs generated, making it much more expensive to scale.

The BTUs generated by each device also have a large financial and environmental impact. There is a definitive cost associated with removing the heat generated by these devices in the form of cooling, so the lower BTU generation of the new breed of chassis-based solution is a definite boon both on the environment as well as on the budget.

Conclusion

It's rare that an environmental friendly movement such as green IT results in reducing costs, especially in its early stages. And yet in the case of this new breed of chassis-based ADCs, that's exactly the result. With the decreased management and power consumption costs and increased performance, these new ADCs are both green like the Earth and green as in cash.

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