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dynamic business needs.

The business case for HP BladeSystem Matrix

White paper



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Executive summary

This paper is designed to help you understand the business case for HP BladeSystem Matrix, a converged infrastructure platform for shared services that is ideal for private cloud deployments. HP BladeSystem Matrix delivers one virtualized pool of network, storage, and compute resources that can be continuously optimized and instantly adjusted to meet dynamic business demands for any workload type. It unites the tools, processes, and architecture of your physical and virtual worlds to help you cut costs and speed time to service delivery.

To illustrate the process of building a business case for HP BladeSystem Matrix, this paper outlines potential savings on capital and operational expenditures stemming from various product characteristics. Specific savings examples are provided that outline hypothetical moves from traditional 1U Intel® servers to a BladeSystem Matrix configuration; a basic BladeSystem configuration to BladeSystem Matrix; a basic BladeSystem configuration to BladeSystem with HP Virtual Connect and Flex-10; and BladeSystem with Virtual Connect and Flex-10 to BladeSystem Matrix.

HP BladeSystem Matrix: fast track to shared services and a private cloud

With HP BladeSystem Matrix, you can get the benefits of shared services and a private cloud environment with the industry's first integrated infrastructure platform that enables you to reduce capital costs and energy consumption and more efficiently utilize the talent of your server administration teams for business innovation rather than operations and maintenance.

HP BladeSystem Matrix is built on HP BladeSystem, the industry's leading blade architecture. With this converged infrastructure platform, you can rapidly adjust to dynamic business demands—by provisioning and modifying complex infrastructure in minutes rather than days, weeks, or even months, as many environments require today.

HP BladeSystem Matrix combines automated design and provisioning through a self-service portal with capacity planning and disaster recovery to deliver a command center that unites your physical and virtual worlds. With BladeSystem Matrix, you get a wire-once infrastructure that converges network, storage, and compute resources to help you accelerate complex IT projects, simplify daily tasks, and lower costs across your data center on an ongoing basis.

About these calculations

The cost and savings calculations presented in this paper were developed with assistance of the Alinean HP BladeSystem and Matrix TCO Calculator, an online tool that gives you the ability to compare the relative costs of selected infrastructure configurations. The tool allows comparisons of each step in the move toward a Matrix environment—including rack servers to blade servers; blade servers to blade servers with HP Virtual Connect Flex-10 technology; and blade servers with HP Virtual Connect Flex-10 technology to HP BladeSystem Matrix. You can customize your inputs to compare specific infrastructure configurations. Visit www.hp.com/go/matrixtco.



The business case for HP BladeSystem Matrix

Cut your capital and operational expenditures.

HP BladeSystem Matrix helps you save money on both capital expenditures (CapEx) and operational expenditures (OpEx).

Capital expenditures are significantly less with HP BladeSystem Matrix than with comparable rack server or blade configurations. As the sample comparisons in this paper illustrate, HP BladeSystem Matrix helps you:

- Reduce acquisition costs
- Consolidate network equipment
- Cut the costs of connectivity to storage area networks (SANs)
- Increase storage utilization and manageability
- Increase server utilization

In addition, you can reduce CapEx further with innovative HP financing and leasing programs, which allow you to pay for equipment as you use it.

Operational expenditures are also significantly less with HP BladeSystem Matrix than with a comparable rack server or blade configuration. These savings stem from various product features that help you:

- Increase management productivity
- Reduce power consumption
- Reduce labor and setup time for application infrastructure provisioning

The costs savings highlighted here stem from the innovative features and integrated design of the HP BladeSystem Matrix. The following sections of this paper explore examples of potential cost savings. These examples describe the significant savings that can be generated by moving from:

- Traditional 1U Intel servers to a BladeSystem Matrix configuration
- A basic BladeSystem configuration to a BladeSystem Matrix configuration
- A basic BladeSystem configuration to BladeSystem with HP Virtual Connect and Flex-10
- BladeSystem with Virtual Connect and Flex-10 to BladeSystem Matrix

The cost comparisons presented here were developed with the help of the Alinean HP BladeSystem and Matrix TCO Calculator, a tool designed to generate estimates of total cost of ownership (TCO) over a three-year period.

TCO examples

Comparing traditional 1U Intel servers to a BladeSystem Matrix environment

The details for this analysis were for a company in a banking industry in the United States and in a suburban area. This analysis looks at the savings difference between two separate solutions running in a test and development environment.

The two solutions for this analysis are:

Traditional 1U Intel servers

- Total number of physical servers—100
- Number of physical servers that are virtual machine (VM) hosts—50
- Average number of VMs per host—10

HP BladeSystem with Matrix

Total number of physical servers—76 BL460c. (Fewer servers are required in a BladeSystem Matrix solution. For additional explanation, see the step below titled “Comparing BladeSystem with Virtual Connect/Flex-10 to BladeSystem Matrix.”)

For this analysis, we assumed:

- These servers are for test and development.
- Included were 100 physical servers of which 50 are virtualized.
- The average number of virtual machines per virtualized server is ten.
- Total time (days) for infrastructure plus application provisioning is 33.

For this analysis, we broke out the three-year total savings into three steps:

Installation/provisioning labor costs are drastically reduced with HP BladeSystem Matrix through HP Insight Dynamics infrastructure orchestration, which automates application infrastructure provisioning. “Push button” provisioning of pre-approved, pre-defined application infrastructure templates eliminates much of the labor for actual provisioning steps as well as the labor time consumed in the many internal meetings required to coordinate the work of teams that focus on system administration, network administration, SAN administration, compliance verification, and facilities.

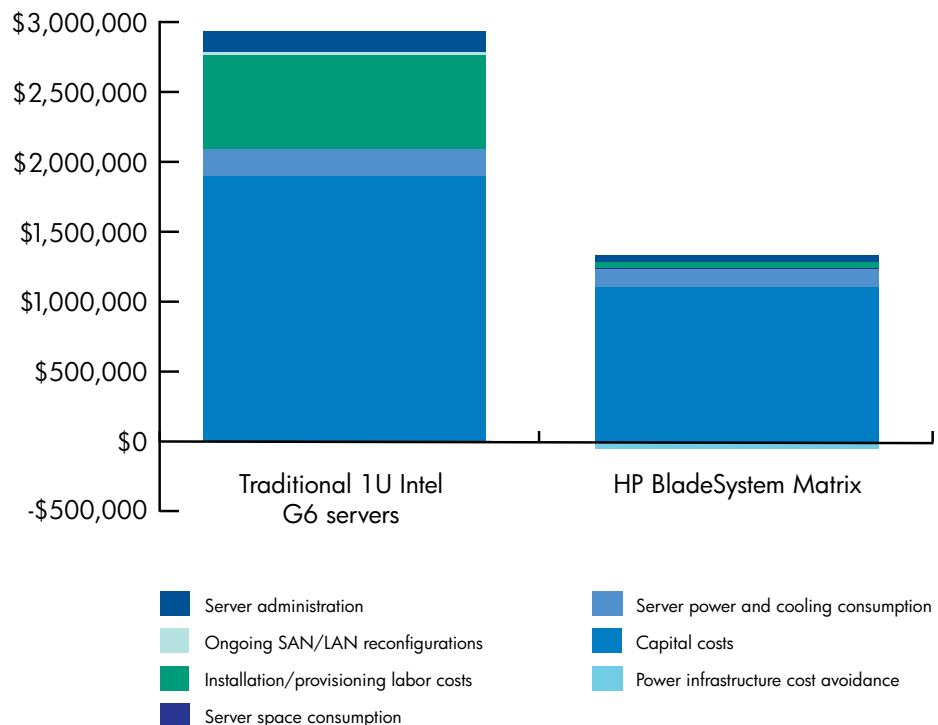
Application provisioning elapsed-time savings: HP BladeSystem Matrix allows applications to be set up in minutes instead of weeks or months. The elapsed time accounts for the actual application provisioning processes and coordination meetings, as well as the lag time between steps. No financial benefit is assigned for the elapsed-time savings; rather the savings translate to superior service level agreements and the ability for lines of business to more rapidly respond to changing business needs.

Power infrastructure cost avoidance is the avoidance of having to add power carrying infrastructure to the data center. This is calculated based on power and cooling savings due to HP Dynamic Power Capping and a ten-year useful life for data center power infrastructure.

Table 1. Sample three-year savings. This table shows sample three-year CapEx and OpEx savings when moving from traditional 1U Intel rack servers to HP BladeSystem Matrix.

Benefit of moving to BladeSystem Matrix	Traditional 1U Intel G6 servers	Blade Server (Matrix) BL460 G6	Savings	Savings (%)
CapEx				
Capital costs	\$1,896,465	\$1,108,066	\$788,399	42%
Power infrastructure cost avoidance	\$0	(\$25,300)	\$25,300	100%
OpEx				
Server power and cooling consumption	\$192,082	\$127,989	\$64,093	33%
Server space consumption	\$6,757	\$4,053	\$2,704	40%
Installation/provisioning labor costs	\$670,916	\$39,562	\$631,354	94%
Ongoing SAN/LAN reconfigurations	\$21,009	\$1,730	\$19,279	92%
Server administration	\$144,403	\$48,876	\$95,527	66%
Total costs	\$2,931,632	\$1,304,976	\$1,626,656	56%
Application provisioning in elapsed-time savings (days)	33.00	0.08 (2 hours)	32.92	99.76%

Figure 1. Sample three-year TCO. This chart compares the three-year TCO of a traditional 1U Intel rack server configuration versus HP BladeSystem Matrix.



Comparing a basic BladeSystem to a BladeSystem Matrix environment

In this example, we used the HP BladeSystem and Matrix TCO Calculator to estimate the three-year TCO savings when comparing an HP BladeSystem Matrix configuration to a basic HP BladeSystem (with no Virtual Connect Flex-10 technology) configuration.

The details for this analysis were for a company in a banking industry in the United States and in a suburban area. This analysis looks at the savings difference between two separate solutions running in a test and development environment. The two solutions for this analysis are the following:

- BL460 G6
- Total number of physical servers—100
- Number of physical servers that are VM hosts—50

- Average number of VMs per host—10
- HP BladeSystem with Matrix—Note: In this environment, the analysis determines that only 76 BL460 G6 servers are needed in the BladeSystem Matrix solution due to reuse/repurpose from the shared pool of servers plus ongoing optimization (workload rebalancing).

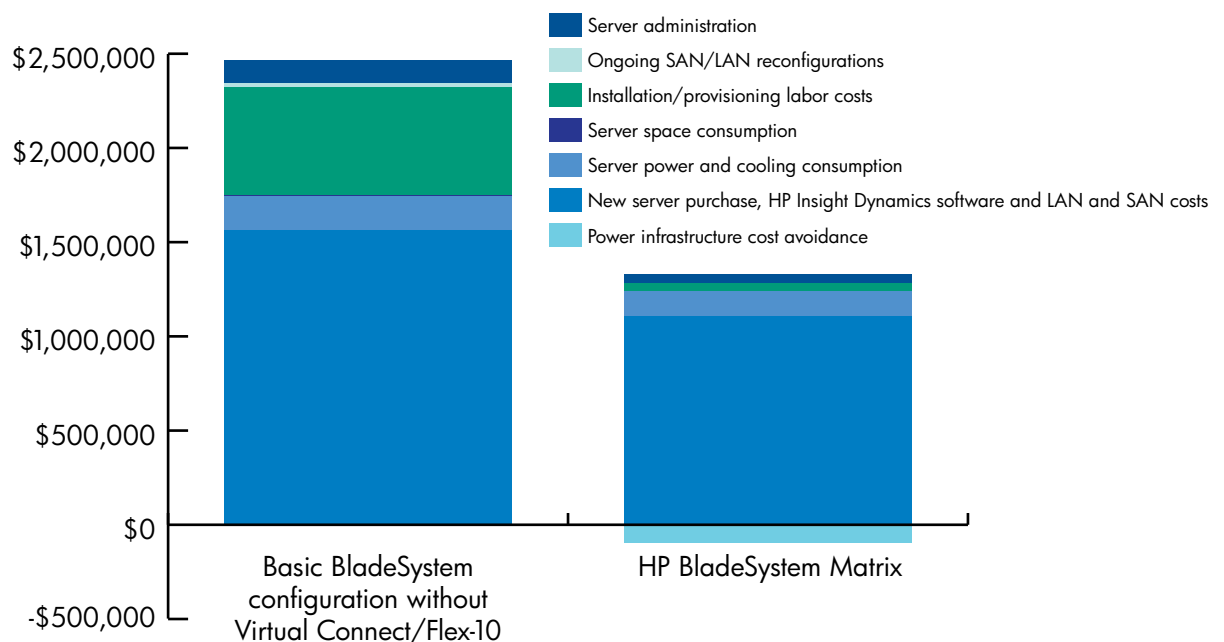
For this analysis:

- These servers are for test and development.
- ProLiant-based servers are used. (HP BladeSystem Matrix also supports HP Integrity server blades.)
- Included are 100 physical servers, of which 50 are virtualized.
- The average number of virtual machines per virtualized server is ten.
- Total elapsed time (days) for infrastructure plus application provisioning is 33 (includes lag time between provisioning steps).

Table 2. Sample three-year savings. This table shows sample three-year CapEx and OpEx savings with consolidation to HP BladeSystem Matrix.

Benefit of moving to BladeSystem Matrix	Blade server (no VC/Flex-10) BL460 G6	Blade server (Matrix) BL460 G6	Savings	Savings (%)
CapEx				
New server purchase, HP Insight Dynamics software and LAN and SAN costs	\$1,561,995	\$1,108,066	\$453,929	29%
Power infrastructure cost avoidance	\$0	(\$25,300)	(\$25,300)	100%
OpEx				
Server power and cooling consumption	\$181,119	\$127,989	\$53,130	29%
Server space consumption	\$6,081	\$4,053	\$2,028	33%
Installation/provisioning labor costs	\$572,916	\$39,562	\$533,354	93%
Ongoing SAN/LAN reconfigurations	\$21,009	\$1,730	\$19,279	92%
Server administration	\$122,715	\$48,876	\$73,839	60%
Total three-year costs and savings	\$2,465,835	\$1,304,976	\$1,160,859	47%
Application provisioning elapsed time savings (days)	33.00	0.08 (2 hours)	32.92	99.76%

Figure 2. Sample three-year TCO. This chart compares the three-year TCO of the HP BladeSystem server with no Virtual Connect or Flex-10 to the full HP BladeSystem Matrix solution.



Comparing blades to blades with HP Virtual Connect and Flex-10

This comparison looks at a basic BladeSystem configuration that doesn't include Virtual Connect, Flex-10, Insight Control, central management console, or boot from SAN compared to HP BladeSystem (ProLiant c-Class blade servers with Virtual Connect, Flex-10, no Insight Control, no central management console, and boot from SAN).

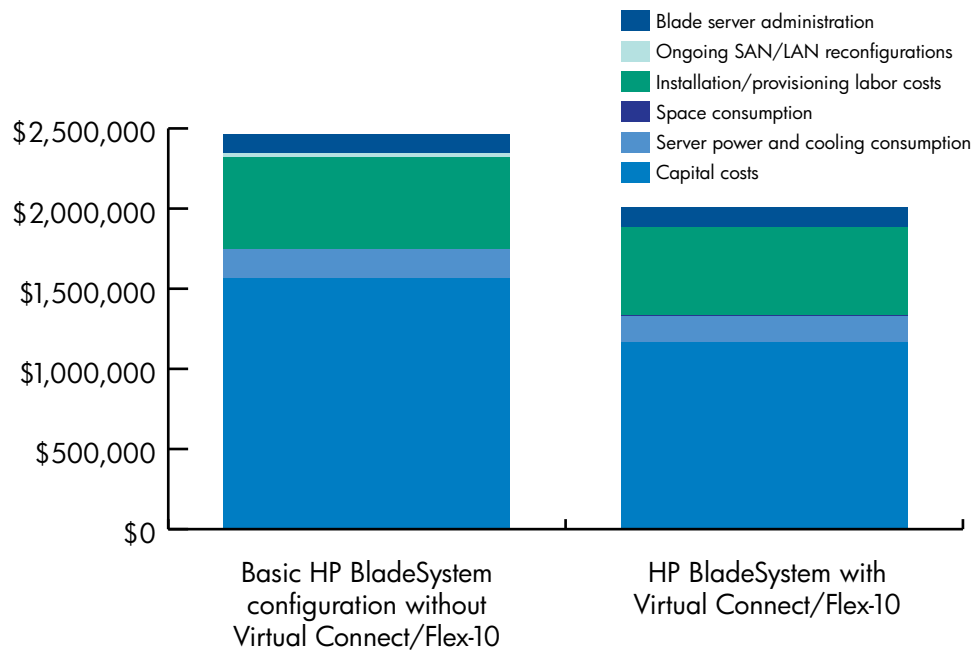
Capital costs savings come from the cost delta between Virtual Connect plus Flex-10 and the cost of conventional LAN and SAN infrastructure required to achieve a comparable level of connectivity and bandwidth.

Power and cooling consumption cost savings come from the delta between energy required to power Virtual Connect plus Flex-10 and the energy required to power the conventional LAN and SAN infrastructure at a comparable level of connectivity and bandwidth.

Table 3. Sample three-year savings. This table shows sample three-year CapEx and OpEx savings when comparing a basic HP BladeSystem configuration to a BladeSystem configuration with HP Virtual Connect and Flex-10.

Benefit of moving to Virtual Connect/Flex-10	Blade server (no VC/Flex-10) BL460 G6	Blade server (VC/Flex-10) BL460 G6	Savings	Savings (%)
CapEx				
Capital costs	\$1,561,995	\$1,163,133	\$398,862	26%
OpEx				
Server power and cooling consumption	\$181,119	\$167,409	\$13,710	8%
Space consumption	\$6,081	\$6,081	\$0	0%
Installation/provisioning labor costs	\$572,916	\$544,648	\$28,268	5%
Ongoing SAN/LAN reconfigurations	\$21,009	\$2,224	\$18,785	89%
Blade server administration	\$122,715	\$122,715	\$0	0%
Total costs	\$2,465,835	\$2,006,210	\$459,625	19%

Figure 3. Sample three-year TCO. This chart compares the three-year TCO of the HP BladeSystem server with no Virtual Connect or Flex-10 to the HP BladeSystem server with Virtual Connect and Flex-10.



Comparing BladeSystem with Virtual Connect/Flex-10 to BladeSystem Matrix

This comparison looks at HP BladeSystem blade servers with Virtual Connect and Flex-10, no Insight Control, no central management server, and boot from SAN compared to an HP BladeSystem Matrix (HP ProLiant c-Class blade servers with Virtual Connect and Flex-10, Insight Dynamics software, boot from SAN, and conventional LAN and SAN connectivity).

Capital costs: With BladeSystem Matrix, fewer blade servers are required to run the same total application workload. This is due to the ability to share a pool of infrastructure resources (reuse/repurpose) across

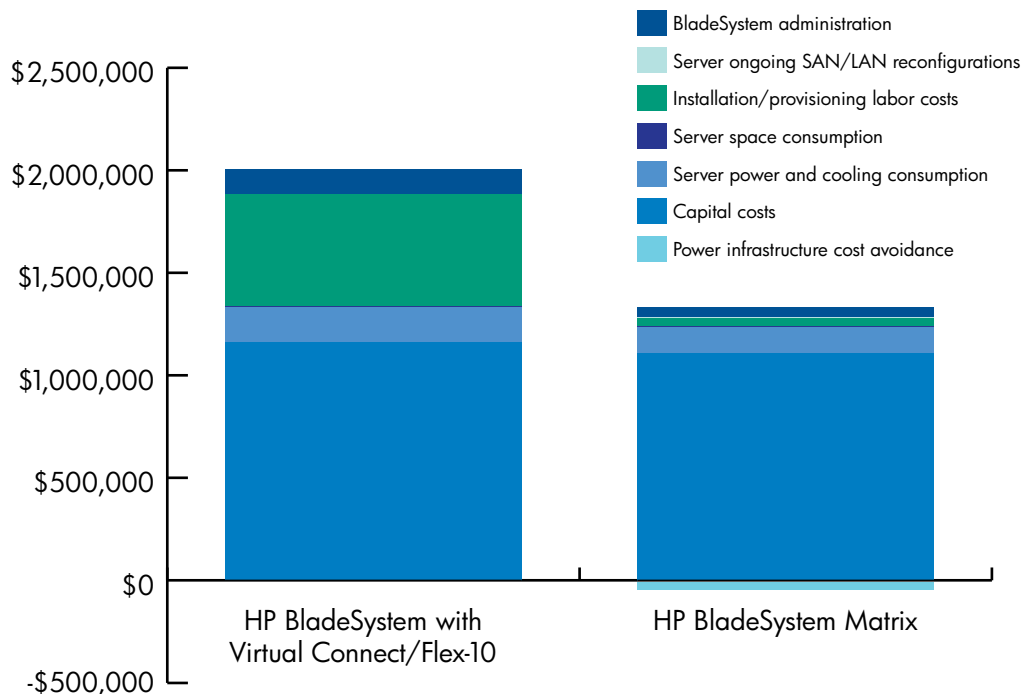
multiple applications and work teams. Insight Dynamic's infrastructure orchestration enables pre-designed, pre-approved physical and virtual server configurations to be quickly provisioned for specific lease periods, and then returned to the resource pool when no longer needed.

This allows test and development teams to share resources for short-term projects. Infrastructure can also be provisioned to accommodate temporary application peaks and returned to the resource pool when demand decreases. HP BladeSystem Matrix further reduces the number of servers necessary through continuous consolidation. Power and cooling costs are lowered due to the reduction of necessary infrastructure.

Table 4. Sample three-year savings. This table shows sample three-year CapEx and OpEx savings when comparing HP BladeSystem with Virtual Connect and Flex-10 to a full BladeSystem Matrix configuration.

Benefit	Blade server (VC/Flex-10) BL460 G6	Blade server (Matrix) BL460 G6	Savings	Savings (%)
CapEx				
Capital costs	\$1,163,133	\$1,108,066	\$55,067	5%
Power infrastructure cost avoidance	\$0	(\$25,300)	(\$25,300)	100%
OpEx				
Server power and cooling consumption	\$167,409	\$127,989	\$39,420	24%
Server space consumption	\$6,081	\$4,053	\$2,028	33%
Installation/provisioning labor costs	\$544,648	\$39,562	\$505,086	93%
Server ongoing SAN/LAN reconfigurations	\$2,224	\$1,730	\$494	22%
BladeSystem administration	\$122,715	\$48,876	\$73,839	60%
Total costs	\$2,006,210	\$1,304,976	\$701,234	35%

Figure 4. Sample three-year TCO. This chart compares the three-year TCO of the HP BladeSystem server with Virtual Connect and Flex-10 to the full HP BladeSystem Matrix solution.



CapEx savings

Reduce acquisition costs.

With the HP BladeSystem Matrix solution, you can achieve higher utilization rates and perform more work with a smaller number of physical resources, thanks to built-in capacity planning and just-in-time resource allocation. You can realize significant savings by reducing server sprawl and the number of servers you need to meet your growing business needs with next-generation BladeSystem technology. You get more capacity and functionality from fewer product components. What's more, HP BladeSystem Matrix is offered at a list price that is 15 percent lower than the cost of buying the components individually and building your own solution.

Consolidate network equipment.

HP BladeSystem Matrix allows you to consolidate Ethernet network equipment by a 4-to-1 ratio, while tripling the number of network interface controllers (NICs) per server. This level of consolidation is made possible by the included HP Virtual Connect Flex-10 Ethernet module. It flexibly allocates the bandwidth of a 10 Gb Ethernet network port across four NIC connections to best meet the needs of your applications and virtual machine channel.

With Flex-10 technology at work, you can avoid purchasing additional costly NICs, switches, and cables while concurrently increasing bandwidth. The net result: HP BladeSystem Matrix can help you reduce network equipment costs by up to 51 percent.

Cut SAN connectivity costs.

HP BladeSystem Matrix helps you cut the cost of connecting your servers to a SAN. With its Virtual Connect technology and full 8 Gb Fibre Channel performance, HP BladeSystem Matrix enables you to reduce Fibre Channel equipment costs by up to 65 percent.

Increase server utilization.

One of the most common causes of IT sprawl and underutilized servers is infrastructure provisioned for temporary use, such as short-term projects in test and development, and infrastructure provisioned to accommodate temporary application load increases, such as end-of-quarter or end-of-year peaks. The temporarily provisioned infrastructure often becomes permanently provisioned infrastructure because it is not returned to the resource pool at the end of the project or application peak period.

In many cases, infrastructure is not returned after the temporary term because it is simply overlooked. In the day-to-day crush of high-priority interrupts, common in today's highly competitive business operations, users often just don't get around to returning the resources. The orphaned physical and virtual servers, and associated infrastructure, sit out in the environment tying up capital, consuming power and cooling, and occupying floor space. The Insight Dynamics infrastructure orchestration lease feature helps you be sure that resources will be returned to the shared pool.

In addition, integrated capacity-planning capabilities help you do more with fewer servers. HP BladeSystem Matrix gives you clear visibility into how your resources are being used, so you can more easily recognize opportunities to shift workloads and consolidate servers to increase utilization, save data center floor space, and cut energy consumption. You can provision and adapt infrastructure resources as needed to support growth, consolidation, and high availability needs.

Increase storage utilization and manageability.

The HP StorageWorks 4400 Enterprise Virtual Array (EVA4400) is the recommended storage for HP BladeSystem Matrix. With built-in virtualization capabilities, the EVA4400 is designed to improve utilization of storage capacity. It's also easy to manage, which helps you lower your cost of ownership compared to conventional arrays. As an alternative, you can use the HP BladeSystem Matrix with an existing supported SAN.

Reduce initial investment and pay as you go with HP financing.

To cut your CapEx further and simplify capacity forecasting, you can take advantage of flexible delivery and HP financing. HP can lower your upfront investment by 65 percent and provide just-in-time delivery of ready-to-run infrastructure that you only pay for as you grow. In addition, HP offers 0 percent lease, buy-back, and trade-in programs. (Programs vary by region.)



OpEx savings

Increase productivity.

Sophisticated management tools from the HP Insight software portfolio enable individual system administrators to manage more resources. Both virtual and physical resources can be managed by the same people using the same set of tools. In addition, remote management capabilities help you cut the time required to manage systems from a distance. And with fewer resources to manage, and resources that are more efficiently utilized, maintenance and licensing costs decline measurably as well.

The use of HP Virtual Connect technology allows blades to be added, replaced, and recovered through software, saving the valuable time of LAN, SAN, and server administrators. Changes can be made in a matter of minutes by one person working at a single console. In a racked, stacked, and wired environment, the same changes might require involvement from four organizations and take weeks to complete, incurring significant labor costs for physically moving resources for re-configuration.

Automated resource orchestration capabilities help you cut management time, standardize configurations, and accelerate service delivery to your business—without causing data center chaos. HP BladeSystem Matrix includes innovative Insight software tools and a web-based portal that allow you to create a catalog of best practice templates for all your applications. This capability helps you meet the needs of the business in less time while removing some of the risk and guesswork related to application planning and provisioning. Imagine provisioning infrastructure in 108 minutes, from logging into the BladeSystem Matrix self-service portal to having a multi-tiered infrastructure with configured applications up and running.

You also gain the benefits of a self-service portal for push-button provisioning of infrastructure. With this HP BladeSystem Matrix capability, you can save the time of skilled infrastructure managers and administrators, while reducing time to service delivery to a line of business from weeks and months to days and hours.

Built-in infrastructure capacity planning resources help you simplify planning and forecasting. And HP BladeSystem Matrix includes automated consolidation analysis capabilities that allow you to accelerate large-scale consolidation planning, potentially reducing months of work to just days or even hours.

Reduce power consumption.

HP BladeSystem Matrix includes sophisticated power management capabilities, including dynamic power capping. These capabilities can help you triple the power capacity of your infrastructure. They also help you capture historical power usage information that you can use for more accurate budget and capacity planning.

In addition, HP BladeSystem Matrix's shared power and cooling resources help you reduce energy consumption and air conditioning bills. And the use of Virtual Connect technology helps prevent cable sprawl and the problem of cables obstructing air flows and increasing your air conditioning bills.

Avoid power infrastructure costs.

HP BladeSystem Matrix also helps you avoid having to add power-carrying infrastructure to the data center. In our savings examples, this is calculated based on total power and cooling reductions due to HP Dynamic Power Capping and a ten-year useful life for data center power infrastructure.

Increase uptime.

The costs of application downtime can be extremely high. HP BladeSystem Matrix helps you avoid downtime with multiple features designed to keep systems up and running. The BladeSystem enclosure adds redundancy to each server. What's more, HP BladeSystem Matrix makes it easy to move workloads to deliver affordable high availability and disaster recovery protection to all your applications—not just a chosen few.

And to help keep your data available, the HP StorageWorks EVA4400 storage array is built on an architecture that offers 99.999 percent availability and a dual redundant design. In addition, the EVA4400 has robust local and remote replication capabilities to help protect your data.

Accelerate application provisioning.

HP BladeSystem Matrix allows applications to be set up in minutes instead of weeks or months. The elapsed time referred to in our saving example accounts for the actual application provisioning processes and coordination meetings as well as lag time between steps. In our examples, no financial benefit is assigned for the elapsed time savings; rather it translates to superior service level agreements and the ability for lines of business to respond more rapidly to changing business needs.

HP BladeSystem Matrix: bringing together the savings

The HP BladeSystem Matrix is easy to buy. It is delivered as a factory-integrated solution that includes HP implementation services. HP technical professionals work with your team to install and configure the solution.

Matrix Starter Kit

Start your BladeSystem Matrix environment quickly with a kit that includes all management, networking, implementation services, and infrastructure for up to 16 server blades to work with your existing supported SAN—or add the option of an HP StorageWorks EVA4400 SAN.

Matrix Expansion Kits

Expand your Starter Kit environment with the ability to scale capacity up to 1,000 blades or virtual servers in a single managed domain.

Factory integration and implementation services

Accelerate provisioning with factory integration combined with included expert end-to-end implementation services. Gain the benefits of project-managed configuration, implementation, and orientation.

To learn more

The examples shown in this paper are sample comparisons meant to illustrate the business case for HP BladeSystem Matrix. To gain a better understanding of the savings that your organization could realize, talk to your HP representative about a detailed analysis specific to your environment or access the online HP BladeSystem and Matrix TCO Calculator at www.hp.com/go/matrixtco.

To learn more about HP BladeSystem Matrix, contact your HP representative or channel partner, or visit www.hp.com/go/matrix.

Appendix: explanation of assumptions

Server utilization benefits

Fewer servers are required with HP BladeSystem Matrix for two reasons.

1. Reuse and repurposing (sharing the infrastructure from the resource pool) are enabled by Insight Dynamics infrastructure orchestration where servers, network, SAN, and storage resources can be provisioned at the “push of a button” according to the predefined, preapproved configuration templates. In production environments, servers can be temporarily provisioned from the resource pool to accommodate application peaks rather than overprovisioning (buying extra servers) for every application to accommodate every individual application peak. These servers can be shared across applications, across lines of business, or temporarily pulled from other uses, such as preproduction stress testing planned failover server pools. In test and development environments, extra reuse and repurposing benefits are assigned because of the increased frequency of shorter-term projects. Using the Insight Dynamics infrastructure orchestration calendar/lease feature, resources are checked out and returned to the pool rather than remaining provisioned but underused. Infrastructure can also be quickly and easily moved between virtual and physical servers (V2P and P2V) during development and quality assurance testing and revisions.
2. Integrated capacity planning and physical plus virtual workload rebalancing tools facilitate continuous optimization. Workloads can be continuously spread across the pool of resources to enable all servers to operate at their optimum utilization.

The default server utilization improvement values are:

- Production—10 percent fewer servers required (20 percent if virtualized)
- Test and development—20 percent fewer servers required (30 percent if virtualized)

Reduced time and labor costs for application infrastructure provisioning.

Most application infrastructure provisioning ROI models, today, account only for the individual provisioning labor steps, such as connecting network cables, installing and

distributing power to racks, connecting SAN fabric, and allocating storage LUNs. What we are finding now is that in order to truly represent the total labor involved, we need to include the person hours required for communication/coordination between each physical deployment/provisioning step. Before connecting the LAN cables, there are usually several meetings with several people, including the installation team and the network administration team. More coordination meetings are required between system administration and storage administration, before storage can be allocated, and with facilities to be sure power distribution is adequate for racks and enclosures. The total person hours consumed in the between-step coordination meetings is often several times the labor required to perform the physical deployment and provisioning steps.

Based on interviews with several large companies, the HP BladeSystem and Matrix TCO Calculator default values (modifiable by tool user) are:

- Tool default value is 36 hours deployment/provisioning labor per blade configured with traditional SAN/LAN.
- For BladeSystem Matrix the default value is 32.25 hours labor per blade with Virtual Connect Flex-10 for the first 16 blades (516 hours total for first 16 blades).
 - TCO tool assumes that template design, preapproval, and placement in the Insight Dynamics orchestration self-service portal is accomplished during this 516 hours.
- Tool also assumes that network, SAN, and LUN allocation coordination has already been accomplished during this initial 516 hours.
 - The initial Matrix environment setup, including the CMS and software installation, is accomplished during standard installation and setup, which is included with the purchase of the HP BladeSystem Matrix Starter Kit.
- For blades 17 and beyond, labor time is 23 minutes per blade with Matrix.
 - This is based on 38 minutes to provision three blades plus 2 hours per enclosure installation (divided by 16 blades/enclosure).

To learn more, visit www.hp.com/go/matrix.

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