

Blade vs. Rack Server Financial Analysis

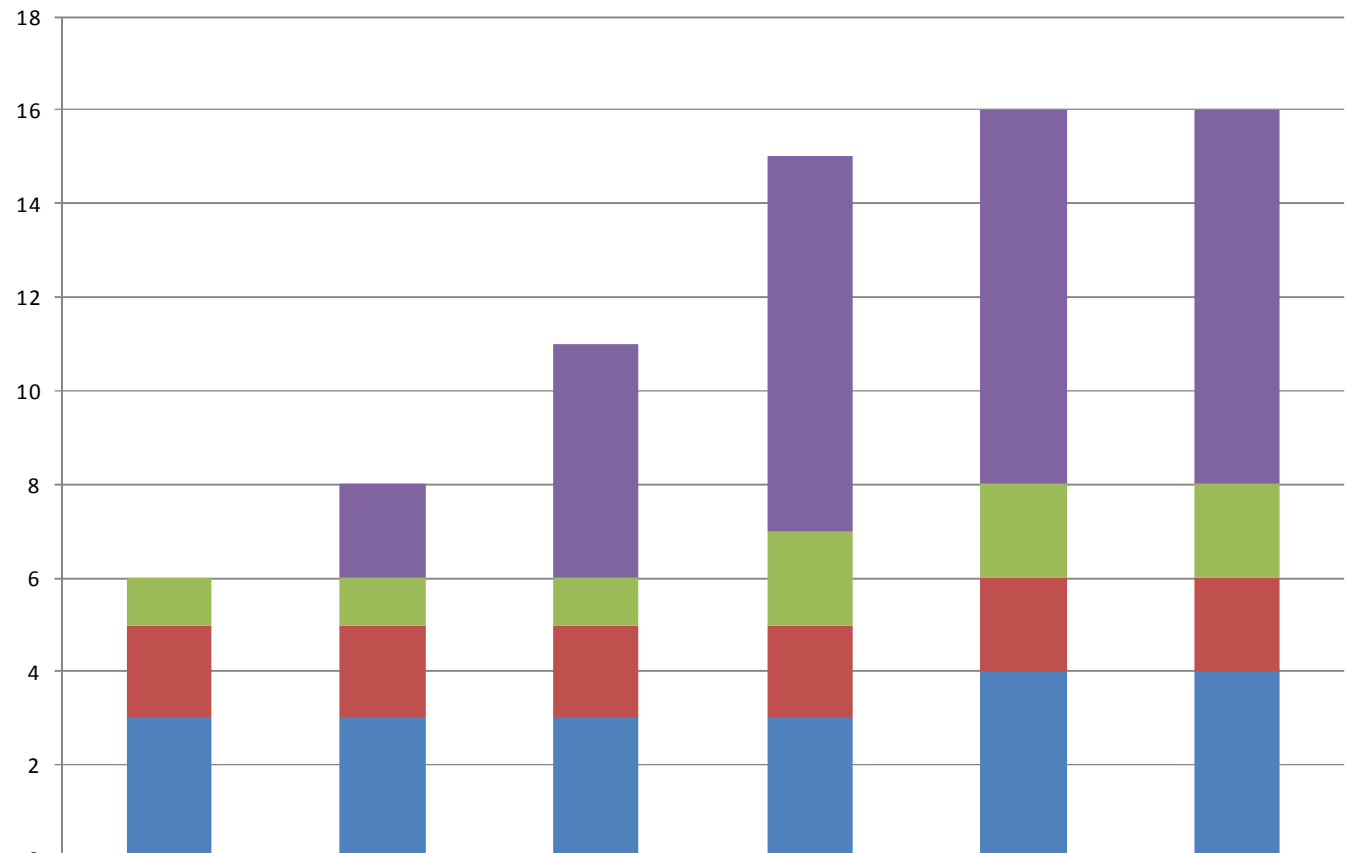
Contact:	STA	888-477-8246	www.staweb.com
Industry:	Health Services		

Desktop Virtualization and new application requirements will drive server growth over the next 5 years.

The new Blade servers can handle twice as many virtual servers as compared with the existing Dell servers.

This chart shows cumulative physical servers required each year.

Physical Server Counts



	Initial	Year 1	Year 2	Year 3	Year 4	Year 5
Virtual Desktop Hosts	0	2	5	8	8	8
Other Servers	1	1	1	2	2	2
Database Servers	2	2	2	2	2	2
Virtual Server Hosts	3	3	3	3	4	4

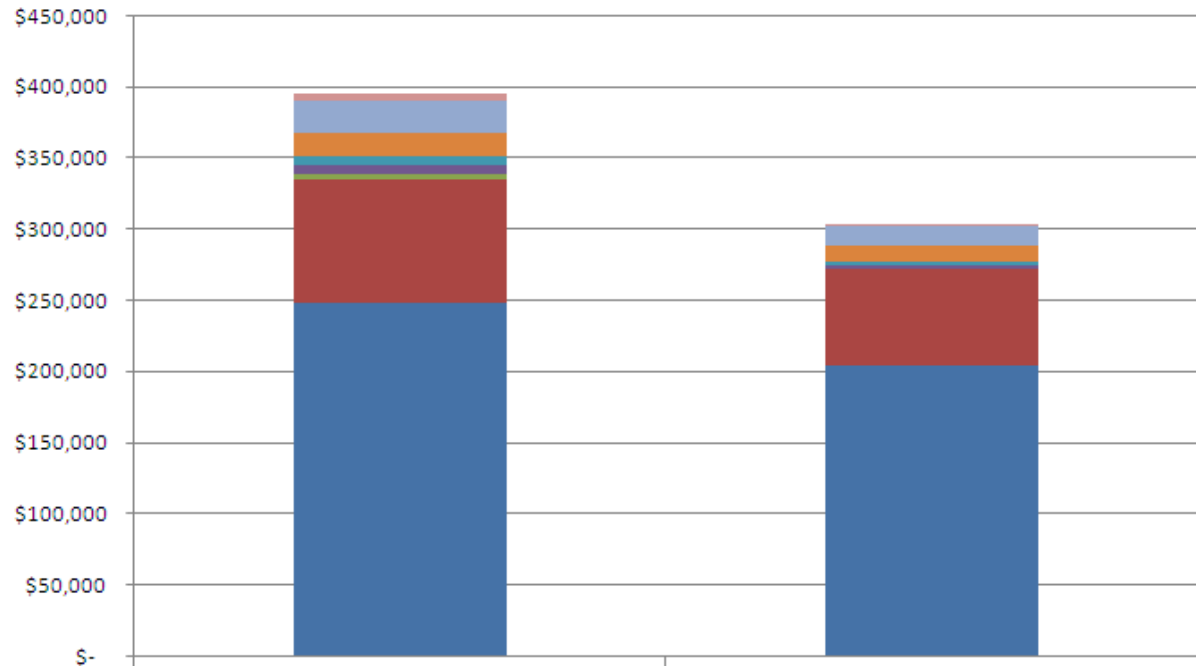
- “ The business case compares the total costs over 5 years of using HP Rack mount servers vs. the costs of using HP Blade servers.
 - . Based on expected server growth it is more cost effective to use Blade servers.
 - . The initial investment in Blade servers is higher than for Rack mount servers but the ongoing costs and upgrade costs are higher with Rack mount servers.
 - . Blade servers provide a more agile and scalable option than Rack mount servers. This will allow IT staff to respond more effectively to expected business growth.

- . Savings come in these areas:
 - “ Server hardware costs
 - “ Networking hardware costs
 - “ Power and Cooling costs
 - “ IT Change Management costs

Difference (Savings with Blades)		
Cost of Category	5 Year Total	% Savings
Server Hardware Acquisition	\$ 43,373	17.5%
Network and Cabeling Costs	19,787	22.7%
Implementation Professional Services	-	0.0%
Server and Cable Setup and Installation Labor	3,791	91.9%
Server and Cables Moves and Changes Labor	3,990	63.6%
Facilities - Space	2,703	44.4%
Facilities - Power	6,013	35.5%
Facilities - HVAC/Cooling	7,814	35.4%
Server Administration Labor	4,689	84.2%
	\$ 92,160	22.9%

As more servers are added, Blade servers become more cost effective.

Total 5 Year Cost Comparison Rack vs. Blade Servers



	with Rack Servers	with Blade Servers
Server Administration Labor	\$5,570	\$881
Facilities - HVAC/Cooling	\$22,045	\$14,231
Facilities - Power	\$16,957	\$10,944
Facilities - Space	\$6,081	\$3,378
Server and Cables Moves and Changes Labor	\$6,275	\$2,285
Server and Cable Setup and Installation Labor	\$4,124	\$333
Other Costs	\$87,038	\$67,251
Server Hardware Acquisition	\$247,650	\$204,277

- “ Blades require fewer network ports and cables
- “ Blades require less time to manage and support
- “ Blades use less energy
- “ Analysis based on servers being added as follows:

	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Totals
Replace current virtual machine host servers (currently use 4)	3				1		4
Management/backup/other servers	1			1			2
Add Virtual Desktop Host Servers		2	3	3			8
Replace current database servers			2				2
Totals	4	2	5	4	1	0	16

- “ Model assumes that 6 virtual servers will be added each year
- “ Cost per kWatt hour (kWHR) = \$0.09
- “ Server operating hours per year = 8,736
- “ Annual burdened salary per server systems administrator = \$86,000

	Rack	Blade
Baseline Server Unit Cost (64 GB Ram)	15,478	12,754
Infrastructure/Connectivity Costs	\$5,440	\$3,399
	<u>20,918</u>	<u>16,153</u>
Infrastructure/Connectivity Costs - Rack Servers		
External FC switches	Specifies the cost for fiber channel port costs. Default pricing specified for 2 Brocade switches at (\$10,000/8)*2 ports for per server pricing. \$24,590/8.	
Cost per edge switch	Defaults to \$287 per port, one port per NIC+1.	
Cost per data center connection	Defaults to \$450 per port, one port per NIC+1.	
Ethernet cables (number of cables)	Note: Cables required for the ethernet (1 per NIC), 1 for iLO and for every 16 cables another 2 cables are required.	
Cost per ethernet cable	Note: Specifies the cost for per ethernet cable. Defaults to \$25 USD per cable.	
FC cables and connectors (number of cables)	Note: By default, 2 cables for every server for the switch, plus four cables for every port for the switch to the SAN. Zero if fibre channel connectivity is not selected. Shown with decimal precision to illustrate	
Cost per FC cable / connector	Note: Specifies the cost for per fibre channel cable. Defaults to \$103 USD per cable.	
Power cables (number of cables)	Note: By default 2 cables for every 28 servers.	
Cost per power cable	Note: Specifies the cost for per power cable. Defaults to \$300 USD per cable.	
PDU (cost per server)	Note: Specifies the cost for the Power Distribution Unit (PDU). For servers needing the PDU, specified as \$436 incremental charge divided by 16 servers per PDU.	
KVM (cost per server)	Note: Specifying \$0 requires headless operation. Default pricing based on \$3310 KVM cost/16 ports per KVM	
Rack hardware cost allocation (see below)	Note: Specifies the rack cost for the server - including only the hardware costs of the rack. Calculated as the cost per rack, divided by the space that the server will consume in the rack. Does not include uplift	
Infrastructure/Connectivity Costs - Blade Servers		
Ethernet switch	Note: Specifies the ethernet switch cost. Default cost for the HP GbE2c Ethernet Blade Switch is \$1399x2. Default cost for the Cisco Catalyst Blade Switch 3020 is \$4799*2.	
FC switch	Note: Specifies the fiber channel switch cost. Default cost for the HP 4Gb Fibre Channel Pass-Thru Module is \$4499. Default cost for the Brocade 4Gb SAN Switch is \$9500*2.	
Ethernet cables (number of cables)	Note: The edge switch is built in, so no cables are required. For the enclosure, 2 cables are required to connect the edge to the DC and 1 cable for the iLO. On a per server basis, the number of cables is	
Cost per ethernet cable	Note: Specifies the cost for per ethernet cable. Defaults to \$25 USD per cable.	
FC cables and connectors (number of cables)	Note: Four cables are required per rack. Number per server is determined based upon the number of slots the BladeSystem server takes up. Shown with decimal precision only for illustrative purposes to get	
Cost per FC cable / connector	Note: Specifies the cost for per fibre channel cable. Defaults to \$103 USD per cable.	
Power cables (number of cables)	Note: By default 2 cables per server.	
Cost per power cable	Note: Specifies the cost for per power cable. Defaults to \$300 USD per cable.	

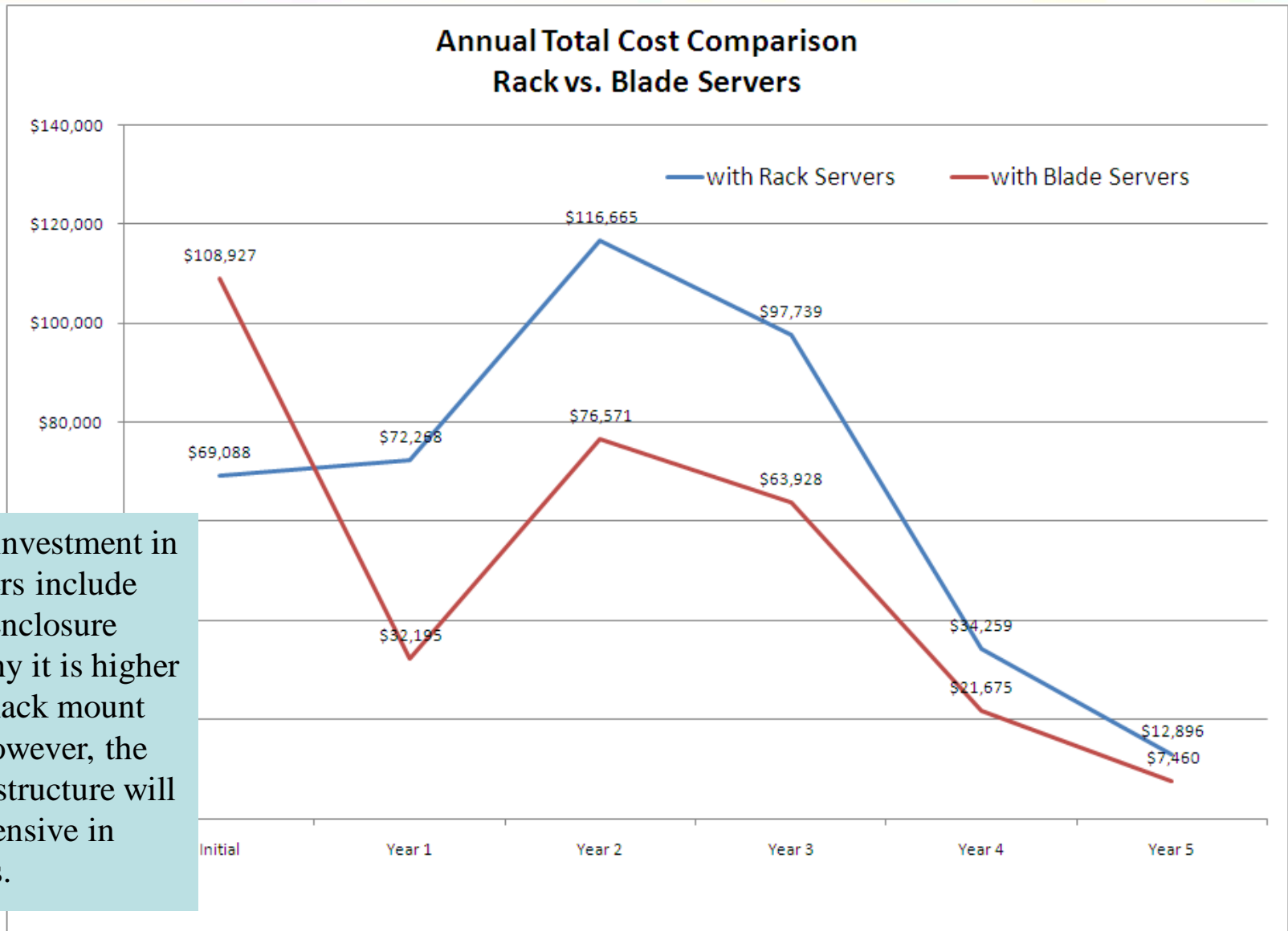
	Rack	Blade	Person Hours per Server	
Server and Cabling Setup and Installation (1), (2)	6.2	0.5		
<p>Note(1): Specified time for setting up specified servers. For rack mounted servers, from solution selection. Includes time for unpack, configuration, cabling, hardware and software installation. For blade servers the time is reduced because of ease of unpack and hardware elimination, consolidation of cabling and management tools. Ethernet cabling consolidation is 32 to 2 for BL-30p, 24 to 2 for BL-20p and 8 to 2 for BL-40p. If the current systems best practices include rapid deployment pack and systems insight manager, the installation time for software is already optimized. Rapid deployment vs. standard install best practice, reduces 4 hour server setup to 2 hours.</p>				
<p>Note (2): Setup and installation for blade servers is reduced because of ease of unpack and hardware elimination, consolidation of cabling and management tools. Ethernet cabling consolidation is 32 to 2 for BL-30p, 24 to 2 for BL-20p and 8 to 2 for BL-40p. If the current systems best practices include rapid deployment pack and systems insight manager, the installation time for software is already optimized. Rapid deployment vs. standard install best practice, reduces 4 hour server setup to 2 hours.</p>				
	Number of Events		Person Hours	
	Rack	Blade	Rack	Blade
Servers to be moved or reconfigured (3), (6)	1	1	4.0	1.0
Servers repaired and replaced (4), (7)	1	1	7.0	2.0
Operating system patches and changes (5), (8)	16	16	1.2	0.5
<p>Note (3): Specifies the annual tasks and person hours per task for servers and related cabling to be moved or reconfigured each year. Assumes 33% of the servers are reconfigured each year, whereby each server is reconfigured once every three years on average. Task time adjusted for best practices regarding systems management software.</p>				
<p>Note(4): Specifies the annual tasks and person hours per task for servers and related cabling to be repaired and replaced each year. Assumes 20% of the servers are repaired or replaced each year, whereby each server is replaced or repaired every five years on average. Task time adjusted for best practices regarding systems management software.</p>				
<p>Note(5): The operating system software and configurations to be patched and changed.</p>				
<p>Note(6): The Blade servers help save the tasks and time needed to move or reconfigure systems due to simplified removal and installation of replacements or reconfigured servers, cable consolidation, and automated tasks performed on remote locations</p>				
<p>Note(7): The Blade servers help save the tasks and time needed to repair and replace systems due to simplified removal and installation of replacements or repaired servers, cable consolidation, and automated tasks performed on remote locations</p>				
<p>Note(8): The Blade servers include management software that helps in configuring and maintaining OS configurations.</p>				



Assumptions - Detail



Floor Space (Sq Ft)	Initial	Year 1	Year 2	Year 3	Year 4	Year 5																																										
Rack Servers	10.81	10.81	21.62	21.62	21.62	21.62																																										
Blade Servers	10.81	10.81	10.81	10.81	10.81	10.81																																										
<p>Note: The number of racks needed to support the server count. Based upon the maximum number of servers per rack and the number of servers of each type specified.</p> <p>Note: The average annual burdened cost per square foot of data center space where the servers are to be installed = \$62.50</p>																																																
Operating Power Consumption - Watts	Initial	Year 1	Year 2	Year 3	Year 4	Year 5																																										
Rack Servers	1,348	2,022	3,707	5,055	5,392	5,392																																										
Blade Servers	870	1,305	2,393	3,263	3,480	3,480																																										
Cooling Power Consumption - Watts	Initial	Year 1	Year 2	Year 3	Year 4	Year 5																																										
Rack Servers	1,752	2,629	4,819	6,572	7,010	7,010																																										
Blade Servers	1,131	1,697	3,111	4,242	4,525	4,525																																										
<table border="1"> <thead> <tr> <th>Server Administration (LAN, SAN, VC)</th> <th>Initial Setup (person hours per server)</th> <th>Annual Re-configuration (person hours per server)</th> </tr> </thead> <tbody> <tr> <td colspan="3">Rackmount Server</td> </tr> <tr> <td>LAN admin hours spent setting up network for server deployment (meetings included)</td> <td>1.50</td> <td>1.00</td> </tr> <tr> <td>SAN admin hours spent setting up fabric for server deployment (meetings included)</td> <td>1.50</td> <td>1.00</td> </tr> <tr> <td>Server admin hours spent setting up NIC, HBA for server deployment (meetings included)</td> <td>1.50</td> <td>1.00</td> </tr> <tr> <td colspan="3">c-Class BladeSystem</td> </tr> <tr> <td colspan="3">Savings with Blades</td> </tr> <tr> <td></td> <td>75%</td> <td>75%</td> </tr> <tr> <td>LAN admin hours spent setting up network for server deployment (meetings included)</td> <td>0.38</td> <td>0.25</td> </tr> <tr> <td>SAN admin hours spent setting up fabric for server deployment (meetings included)</td> <td>0.38</td> <td>0.25</td> </tr> <tr> <td>Server admin hours spent setting up NIC, HBA for server deployment (meetings included)</td> <td>0.38</td> <td>0.25</td> </tr> <tr> <td>Server admin hours to set up VC profile per server (c-Class BladeSystem only)</td> <td>-</td> <td>-</td> </tr> <tr> <td>Annual failure rate of servers (leading to additional re-configuration)</td> <td colspan="2">5.0%</td> </tr> <tr> <td>Annual hours to manage edge switch (rackmount server only)</td> <td colspan="2">10.0</td> </tr> </tbody> </table>							Server Administration (LAN, SAN, VC)	Initial Setup (person hours per server)	Annual Re-configuration (person hours per server)	Rackmount Server			LAN admin hours spent setting up network for server deployment (meetings included)	1.50	1.00	SAN admin hours spent setting up fabric for server deployment (meetings included)	1.50	1.00	Server admin hours spent setting up NIC, HBA for server deployment (meetings included)	1.50	1.00	c-Class BladeSystem			Savings with Blades				75%	75%	LAN admin hours spent setting up network for server deployment (meetings included)	0.38	0.25	SAN admin hours spent setting up fabric for server deployment (meetings included)	0.38	0.25	Server admin hours spent setting up NIC, HBA for server deployment (meetings included)	0.38	0.25	Server admin hours to set up VC profile per server (c-Class BladeSystem only)	-	-	Annual failure rate of servers (leading to additional re-configuration)	5.0%		Annual hours to manage edge switch (rackmount server only)	10.0	
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The initial investment in Blade servers include the Blade Enclosure which is why it is higher than with Rack mount servers. However, the Blade infrastructure will be less expensive in future years.



Blade vs. Rack Server Costs



Estimated Rack Server Costs

Rack Server Option								
	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Notes
Server Hardware Acquisition	\$ 61,913	\$ 30,956	\$ 77,391	\$ 61,913	\$ 15,478	\$ -	\$ 247,650	The initial investment in servers and network hardware
Network and Cabeling Costs	-	\$32,639	27,200	21,760	5,440	-	87,038	Investment in network infrastructure
Implementation Professional Services	7,175	-	-	-	-	-	7,175	One-time implementation cost
Server and Cable Setup and Installation Lab	-	1,546	1,289	1,031	258	-	4,124	The labor costs for setup and installation of the specified server configurations and cables. Includes initial and on-going cost (growth) for server unpack, setup, cabling and installation.
Server and Cables Moves and Changes Lab	-	1,255	1,255	1,255	1,255	1,255	6,275	The ongoing labor costs for server and cabling moves and changes including server and cabling moves and reconfigurations, repairs and replacements and operating system patches and changes.
Facilities - Space	-	676	1,351	1,351	1,351	1,351	6,081	The ongoing costs for data center space of the two server configurations being compared.
Facilities - Power	-	1,590	2,915	3,974	4,239	4,239	16,957	The ongoing costs for data center power of the two server configurations being compared.
Facilities - HVAC/Cooling	-	2,067	3,789	5,167	5,511	5,511	22,045	The ongoing costs for data center cooling of the two server configurations being compared.
Server Administration Labor	-	1,538	1,476	1,289	727	540	5,570	The labor costs for setup and installation of the specified server configuration. Includes initial and ongoing cost (growth) for server administration, LAN administration, SAN administration, and switch management required in setting up and maintaining the network for server deployment.
Totals	\$ 69,088	\$ 72,268	\$ 116,665	\$ 97,739	\$ 34,259	\$ 12,896	\$ 402,915	



Blade vs. Rack Server Costs



Estimated Blade Server Costs

Blade Server Option								
	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Notes
Server Hardware Acquisition	\$ 51,229	\$ 25,508	\$ 63,770	\$ 51,016	\$ 12,754	\$ -	\$ 204,277	The initial investment in servers and network hardware
Network and Cabeling Costs	50,523	2,788	6,970	5,576	1,394	-	67,251	Investment in network infrastructure
Implementation Professional Services	7,175	-	-	-	-	-	7,175	One-time implemenation cost
Server and Cable Setup and Installation Lab	-	125	104	83	21	-	333	The labor costs for setup and installation of the specified server configurations and cables. Includes initial and on-going cost (growth) for server unpack, setup, cabling and installation.
Server and Cables Moves and Changes Lab	-	457	457	457	457	457	2,285	The ongoing labor costs for server and cabling moves and changes including server and cabling moves and reconfigurations, repairs and replacements and operating system patches and changes.
Facilities - Space	-	676	676	676	676	676	3,378	The ongoing costs for data center space of the two server configurations being compared.
Facilities - Power	-	1,026	1,881	2,565	2,736	2,736	10,944	The ongoing costs for data center power of the two server configurations being compared.
Facilities - HVAC/Cooling	-	1,334	2,446	3,335	3,558	3,558	14,231	The ongoing costs for data center cooling of the two server configurations being compared.
Server Administration Labor	-	281	267	220	80	33	881	The labor costs for setup and installation of the specified server configuration. Includes initial and ongoing cost (growth) for server administration, LAN administration, SAN administration, and switch management required in setting up and maintaining the network for server deployment.
Totals	\$ 108,927	\$ 32,195	\$ 76,571	\$ 63,928	\$ 21,675	\$ 7,460	\$ 310,755	



Blade vs. Rack Server Costs



Estimated Savings with Blades

Cost of Category	Difference (Savings with Blades)						
	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	5 Year Total
Server Hardware Acquisition	\$ 10,683	\$ 5,448	\$ 13,621	\$ 10,897	\$ 2,724	\$ -	\$ 43,373
Network and Cabeling Costs	(50,523)	29,851	20,230	16,184	4,046	-	19,787
Implementation Professional Services	-	-	-	-	-	-	-
Server and Cable Setup and Installation Labor	-	1,422	1,185	948	237	-	3,791
Server and Cables Moves and Changes Labor	-	798	798	798	798	798	3,990
Facilities - Space	-	-	676	676	676	676	2,703
Facilities - Power	-	564	1,034	1,409	1,503	1,503	6,013
Facilities - HVAC/Cooling	-	733	1,343	1,832	1,953	1,953	7,814
Server Administration Labor	-	1,257	1,209	1,069	647	507	4,689
	<u>\$ (39,840)</u>	<u>\$ 40,074</u>	<u>\$ 40,095</u>	<u>\$ 33,812</u>	<u>\$ 12,584</u>	<u>\$ 5,437</u>	<u>\$ 92,160</u>
NPV of Savings	\$ 67,100						
Payback period (months)	12						
Return on Net Investment	231.3%	(based on difference between initila Rack and Blade investments)					
Discount Rate Used for NPV	10.0%						

STA has a long history of responding to a customer's business needs using technology as the tool. We continue this history as we enter and celebrate 2010 as our 15th year as a provider of focused business solutions to companies in the Western United States.

For over a decade STA has focused on understanding and addressing the unique needs and requirements of our customers. Over the years we've found that our customers are agile and disciplined, competing head to head with industry giants. It is critical your Technology Partner understand the market conditions under which you operate and acknowledge that your decisions are based on many criteria that differ significantly from the industry behemoths.

To promote a clear understanding of STA's role as your partner, and to ensure we honor our commitment to add value to your business, we established quality assurance programs so that customers can easily understand and identify where we can benefit your business. These STA solution set principles are structured to ensure we support our mission with all of our customers.