

Centralized Desktop Virtualization Business Case

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Industry:	Education		
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É Approach:

- ó Compare the estimated Total Cost of Ownership (TCO) over 6 years of operating/refreshing 200 full power desktops vs. virtualizing and deploying thin client devices via VMware View software and centralized servers. Desktops deployed 100 initially and 100 in year 2. The following cost categories were explored:
 - É Desktop, server and storage capital acquisition costs
 - É Virtualization software acquisition and support costs
 - É Desktop and server administration costs
 - É Desktop and server power/cooling costs
 - É Desktop user productivity impacts/costs

- ó Costs and factors not quantified in the analysis:
 - É Disaster recovery simplification
 - É Improved data security from centralized storage management

É Desktop Virtualization Key Assumptions:

- ó Convert 200 full power desktops to server based virtual desktops with thin clients over a 2 year period. 100 initial/year 1, 100 in year 2.
- ó Average desktop cost = \$1,000 including support. Average thin client cost = \$400 including support. Utilize existing monitors with thin clients.
- ó Average acquisition cost per server 2CPU/4Core = \$7,750 (including support)
- ó Average desktop useful life = 5 years. Thin client useful life = 6 years. Server useful life = 5 years.
- ó 6 year analysis, 0% desktop count growth, 2% salary growth, 4% energy cost growth.
- ó Cost of SAN switch port = \$250. HBA cost = \$750 (2 per server). SAN storage cost per GB = \$2.
- ó Desktop watts = 102, thin client watts = 14, server watts = 593.
- ó Desktop support labor cost per FTE = \$39,000 (including taxes and benefits).
- ó Server support labor cost per FTE = \$97,000 (including taxes and benefits).
- ó VMware software costs:
 - É License = \$114.25 per virtual desktop
 - É Annual software support = \$26.22 per virtual desktop

É Desktop Virtualization Key Assumptions:

- ó Cost per kwatt = \$0.11
- ó Physical host servers = 2 per 100 virtual desktops. 1 management sever (virtual).
- ó Desktop operating hours per day = 12. Server operating hours per day = 24.
- ó Virtual desktops per processor core = 8. Server RAM per desktop = 1GB.
- ó Estimated SAN storage required to support 200 desktops = 1,100 GBs.
- ó Professional services estimate = \$59,400 for initial implementation and \$4,000 for the 100 desktops in year 2.
- ó User productivity impacts:

User Productivity Impacts	Traditional PC Annual Lost Hours per User	User Productivity Impact During PC Outage	Traditional PC Downtime Hours Impact	Reduction in User Downtime with Virtual Desktops	Virtual Desktop Downtime Hours
Downtime	8.0	50.0%	4.0	68.0%	1.28
Help Desk	4.4	50.0%	2.2	60.0%	0.88
Security	3.6	50.0%	1.8	28.0%	1.296
Start-up	1.4	50.0%	0.7	70.0%	0.21
Totals	17.4		8.7		3.7

É Desktop Virtualization Key Assumptions:

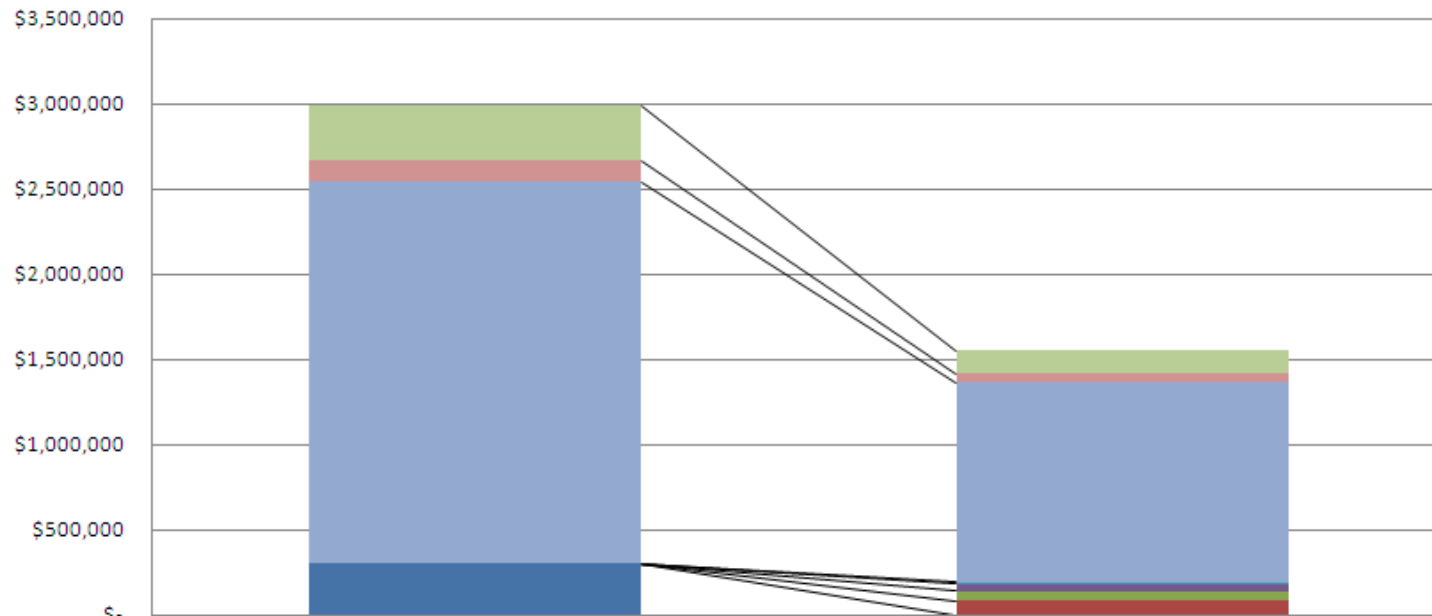
ó Desktop support assumptions:

É 11 FTEs currently supporting all desktops including lab. The numbers below are based on an IDC analysis of 14 VMware View implementations. The IDC numbers were adjusted to more closely match the customer's cost structure. It should be noted that most of the 14 implementations in the IDC study included 500 or more desktops. Economies of scale will reduce the number of FTEs required to manage each desktop.

Annual IT Staff Cost per PC from IDC Survey	with Full Power Desktops	Adjustment to actual FTEs	Adj with Full Power Desktops
IT Staff: Admin	\$ 553	100%	\$ 1,106
IT Staff: Install	\$ 124	100%	\$ 248
IT Staff: Helpdesk	\$ 193	100%	\$ 386
Totals	\$ 870		\$ 1,740
Desktop support FTEs with current approach			9.1

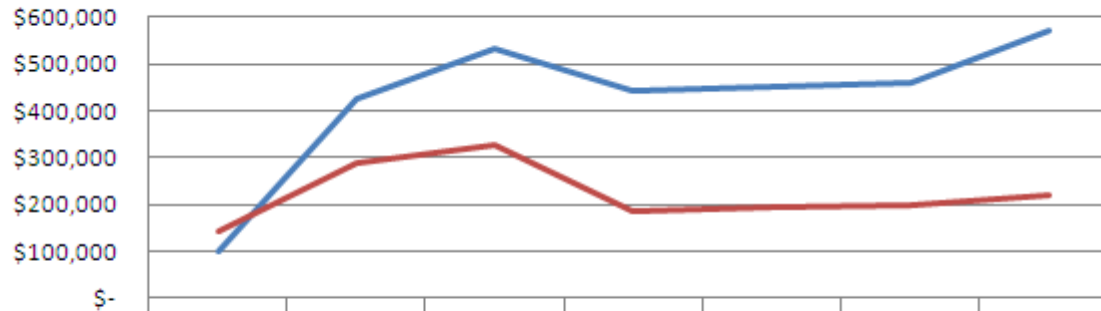
Annual IT Staff Cost per PC from IDC Survey	with VMWare View Premier Edition	Adjustment to actual FTEs	Adj with VMWare View Premier Edition
IT Staff: Admin	\$ 190	100%	\$ 380
IT Staff: Install	\$ 40	100%	\$ 80
IT Staff: Helpdesk	\$ 116	100%	\$ 232
Totals	\$ 346		\$ 692
Desktop support FTEs when VMware View is fully implemented			3.6

Comparison of 6 Year Total Cash Flows



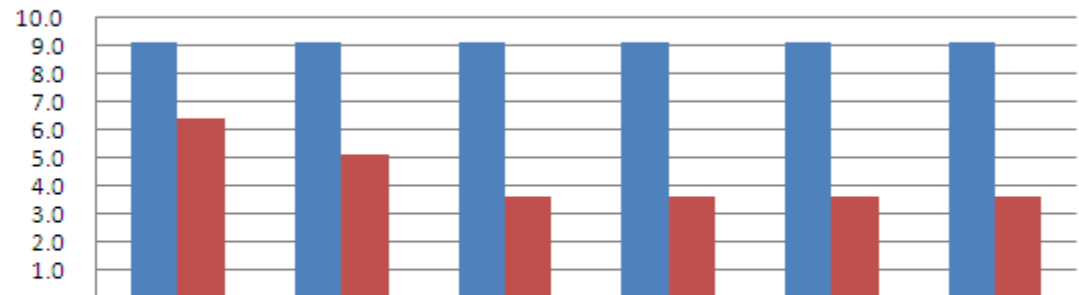
	As-Is with Physical Desktops	with Thin Clients
End User Impact	\$322,950	\$136,082
Power/Cooling	\$125,076	\$49,063
Operations Labor	\$2,238,800	\$1,176,505
HW and SW Maint	\$-	\$10,488
Software	\$-	\$38,580
Servers	\$-	\$59,750
Thin Clients	\$-	\$80,000
Desktops	\$300,000	\$-

Total Annual Cash Flow Comparison



	Initial	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
As-Is with Physical Desktops	\$100,000	\$425,052	\$534,031	\$443,059	\$452,141	\$461,476	\$571,067
with Thin Clients and Virtual Desktops	\$140,540	\$288,521	\$324,740	\$186,427	\$192,814	\$196,600	\$220,825

Desktop Support FTE Comparison



	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Desktop Support FTEs Before	9.1	9.1	9.1	9.1	9.1	9.1
Desktop Support FTEs with Virtualization	6.4	5.1	3.6	3.6	3.6	3.6



Desktop Virtualization Business Case



Option 1: As-Is with Physical Desktops	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Capital Expenditures								
Desktops	\$ 100,000	\$ -	\$ 100,000	\$ -	\$ -	\$ -	\$ 100,000	\$ 300,000
Thin Clients	-	-	-	-	-	-	-	-
Servers	-	-	-	-	-	-	-	-
Software and Other	-	-	-	-	-	-	-	-
	100,000	-	100,000	-	-	-	100,000	300,000
Operating Expenditures								
Hardware and Software Maintenance	-	-	-	-	-	-	-	-
Software, Parts, and Other	-	-	-	-	-	-	-	-
IT Labor and Contract Services	-	355,000	362,200	369,400	376,600	384,000	391,600	2,238,800
Power and Cooling	-	18,857	19,611	20,395	21,211	22,060	22,942	125,076
	-	373,857	381,811	389,795	397,811	406,060	414,542	2,363,876
User Productivity Impact								
PC User Productivity Impact	-	51,195	52,220	53,264	54,330	55,416	56,525	322,950
Totals	\$ 100,000	\$ 425,052	\$ 534,031	\$ 443,059	\$ 452,141	\$ 461,476	\$ 571,067	\$ 2,986,826

Option 2: Desktop Virtualization	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Capital Expenditures								
Desktop/PC	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Thin Clients	40,000	-	40,000	-	-	-	-	80,000
Servers and Storage	21,850	-	20,100	-	-	-	17,800	59,750
Software and Other	11,425	-	11,425	-	-	-	-	22,850
	73,275	-	71,525	-	-	-	17,800	162,600
Operating Expenditures								
Hardware and Software Maintenance	-	2,622	2,622	5,244	5,244	5,244	5,244	26,220
Software, Parts, and Other	-	-	-	-	-	-	-	-
IT Labor and Contract Services	59,400	254,136	212,942	157,694	160,900	164,110	167,324	1,176,505
Power and Cooling	-	12,813	10,404	6,288	6,401	6,518	6,640	49,063
	59,400	269,571	225,968	169,226	172,544	175,871	179,208	1,251,788
User Productivity Impact								
PC User Productivity Impact	-	21,572	22,004	22,446	22,892	23,351	23,817	136,082
Totals	\$ 132,675	\$ 291,143	\$ 319,497	\$ 191,672	\$ 195,436	\$ 199,222	\$ 220,825	\$ 1,550,470



Desktop Virtualization Business Case



Difference Between Options	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Capital Expenditures								
Desktop/PC	\$ 100,000	\$ -	\$ 100,000	\$ -	\$ -	\$ -	\$ 100,000	\$ 300,000
Thin Clients	(40,000)	-	(40,000)	-	-	-	-	(80,000)
Servers and Storage	(21,850)	-	(20,100)	-	-	-	(17,800)	(59,750)
Software and Other	(11,425)	-	(11,425)	-	-	-	-	(22,850)
	26,725	-	28,475	-	-	-	82,200	137,400
Operating Expenditures								
Hardware and Software Maintenance	-	(2,622)	(2,622)	(5,244)	(5,244)	(5,244)	(5,244)	(26,220)
Software, Break fix, and Other	-	-	-	-	-	-	-	-
IT Labor and Contract Services	(59,400)	100,864	149,258	211,706	215,700	219,890	224,276	1,062,295
Power and Cooling	-	6,044	9,207	14,108	14,811	15,542	16,302	76,013
	(59,400)	104,286	155,843	220,570	225,267	230,188	235,334	1,112,088
User Productivity Impact								
PC User Productivity Impact	-	29,623	30,216	30,818	31,438	32,065	32,708	186,868
Totals	\$ (32,675)	\$ 133,909	\$ 214,534	\$ 251,388	\$ 256,705	\$ 262,253	\$ 350,242	\$ 1,436,356
Cumulative Savings	\$ (32,675)	\$ 101,234	\$ 315,767	\$ 567,155	\$ 823,860	\$ 1,086,113	\$ 1,436,356	
Savings %		31.5%	40.2%	56.7%	56.8%	56.8%	61.3%	48.1%

NPV - 6 Years	\$ 1,008,339
NPV - 5 Years	\$ 805,158
NPV - 4 Years	\$ 638,567
NPV - 3 Years	\$ 460,010

Note: The **Net Present Value (NPV)** of a project or investment is defined as the sum of the present values of the annual cash flows minus the initial investment. The annual cash flows are the Net Benefits (revenues minus costs) generated from the investment during its lifetime. These cash flows are discounted or adjusted by incorporating the uncertainty and the time value of money.

ROI - 6 Years	883%
ROI - 5 Years	750%
ROI - 4 Years	569%
ROI - 3 Years	392%

Note: **ROI** is the ratio of the net gain from a proposed project, divided by its total costs. In a formula, this can be represented as: ROI = cumulative net benefits / total costs.