

Constants and Shared Variables WorkSheet			
Constants			
	8760	hoursInAYear	number of hours in 1 year (24 hrs/day * 365 days/yr)
	12	monthsInAYear	number of months in a year
	52	weeksInAYear	number of weeks in a year
	365	daysInAYear	number of days in 1 year
	1000	wattsInAKilowatt	number of watts in one kilowatt
	24	hoursInARealDay	
Shared Variables	These are not constants but are variables which are shared across both scenarios		
	\$100.00	administrativeCostPerHourYear1	cost of administrative time per hour in year 1
	0.02	administrativeRateIncrease	administrative pay increase amount
	\$3,000.00	securityFirmMonthlyCharge	cost per month for security auditing service - outside vendor
	\$5,000.00	dataStorageMonthlyChargeYears1And2	cost per month for storing archival backups - years 1 & 2 - outside vendor
	\$8,000.00	dataStorageMonthlyChargeYears3Thru5	cost per month for storing archival backups - years 3,4 5 - outside vendor
	1.03	serverMaintenanceRateIncrease	assume 3% increase in server maintenance cost each year of study
	\$0.13	costkwhYear1	cost of 1 kWh or power in year 1
	1.02	powerRateIncrease	assume 2% increase in cost of power/year of study
	10	hoursInADay	number of hours in 1 administrative day
	70	hoursInAWeek	number of hours in 1 administrative week

[illegible]

Current Scenario Yearly Costs						
Category	Cost					5 Year Totals
	Year 1	Year 2	Year 3	Year 4	Year 5	
Hard Costs						
Power - Group 1	\$16,227,900.00	\$16,552,458.00	\$16,883,507.16	\$17,221,177.30	\$17,565,600.85	\$84,450,643.31
Power - Group 2	\$4,509,648.00	\$4,599,840.96	\$4,691,837.78	\$4,785,674.53	\$4,881,388.03	\$23,468,389.30
Power - Group 3	\$6,377.28	\$6,504.83	\$6,634.92	\$6,767.62	\$6,902.97	\$33,187.62
Power - Group 4A	\$30,292.08	\$30,897.92	\$31,515.88	\$32,146.20	\$32,789.12	\$157,641.20
Power - Group 4B	\$7,516.08	\$7,666.40	\$7,819.73	\$7,976.12	\$8,135.65	\$39,113.98
Total Power Costs/Year	20,781,733.44	21,197,368.11	21,621,315.47	22,053,741.78	22,494,816.62	\$108,148,975.42
Server Maintenance - Group 1	\$225,000.00	\$231,750.00	\$238,702.50	\$245,863.58	\$253,239.48	\$1,194,555.56
Server Maintenance - Group 2	\$108,000.00	\$111,240.00	\$114,577.20	\$118,014.52	\$121,554.95	\$573,386.67
Server Maintenance - Group 3	\$500.00	\$515.00	\$530.45	\$546.36	\$562.75	\$2,654.57
Server Maintenance - Group 4A	\$770.00	\$793.10	\$816.89	\$841.40	\$866.64	\$4,088.03
Server Maintenance - Group 4B	\$200.00	\$206.00	\$212.18	\$218.55	\$225.10	\$1,061.83
Total Server Maintenance Costs/Year	\$334,470.00	\$344,504.10	\$354,839.22	\$365,484.40	\$376,448.93	\$1,775,746.65
Security Auditing Costs	\$36,000.00	\$36,000.00	\$36,000.00	\$36,000.00	\$36,000.00	\$180,000.00
Archival/Storage Costs	\$60,000.00	\$60,000.00	\$96,000.00	\$96,000.00	\$96,000.00	\$408,000.00
Total Yearly Hard Costs	\$21,212,203.44	\$21,637,872.21	\$22,108,154.69	\$22,551,226.18	\$23,003,265.55	\$110,512,722.07
Total Five Year Hard Costs =	\$110,512,722.07					
Soft Costs						
Server Administration - Group 1	\$402,500,000.00	\$410,550,000.00	\$418,761,000.00	\$427,136,220.00	\$435,678,944.40	\$2,094,626,164.40
Server Administration - Group 2	\$195,300,000.00	\$199,206,000.00	\$203,190,120.00	\$207,253,922.40	\$211,399,000.85	\$1,016,349,043.25
Server Administration - Group 3	\$700,000.00	\$714,000.00	\$728,280.00	\$742,845.60	\$757,702.51	\$3,642,828.11
Server Administration - Group 4A	\$3,430,000.00	\$3,498,600.00	\$3,568,572.00	\$3,639,943.44	\$3,712,742.31	\$17,849,857.75
Server Administration - Group 4B	\$700,000.00	\$714,000.00	\$728,280.00	\$742,845.60	\$757,702.51	\$3,642,828.11
Total Server Administration Costs/Year	\$602,630,000.00	\$614,682,600.00	\$626,976,252.00	\$639,515,777.04	\$652,306,092.58	\$3,136,110,721.62
Server Backup - Group 1	\$6,843,750.00	\$6,980,625.00	\$7,120,237.50	\$7,262,642.25	\$7,407,895.10	\$35,615,149.85
Server Backup - Group 2	\$4,106,250.00	\$4,188,375.00	\$4,272,142.50	\$4,357,585.35	\$4,444,737.06	\$21,369,089.91
Server Backup - Group 3	\$11,700.00	\$11,934.00	\$12,172.68	\$12,416.13	\$12,664.46	\$60,887.27
Server Backup - Group 4A	\$9,100.00	\$9,282.00	\$9,467.64	\$9,656.99	\$9,850.13	\$47,356.77
Server Backup - Group 4B	\$2,600.00	\$2,652.00	\$2,705.04	\$2,759.14	\$2,814.32	\$13,530.50
Total Server Backup Costs/Year	\$10,973,400.00	\$11,192,868.00	\$11,416,725.36	\$11,645,059.87	\$11,877,961.06	\$57,106,014.29
Total Yearly Soft Costs	\$613,603,400.00	\$625,875,468.00	\$638,392,977.36	\$651,160,836.91	\$664,184,053.65	\$3,193,216,735.91
Total Five Year Soft Costs =	\$3,193,216,735.91					
Total Current Cost/Year	\$634,815,603.44	\$647,513,340.21	\$660,501,132.05	\$673,712,063.09	\$687,187,319.19	\$3,303,729,457.98
Total 5 YearCurrent Cost	\$3,303,729,457.98					

Variables Used In The Proposed Scenario Spreadsheet			
Hard Costs			
	Value	Variable Name	Variable Description
	\$45,000.00	costNewGroup1Server	cost of a new group 1 server
	\$5,400.00	year1Group1ServerMaintenance	first year service maintenance cost for server in group 1
	\$40,000.00	costNewGroup2Server	cost of a new group 2 server
	\$4,800.00	year1Group2ServerMaintenance	first year service maintenance cost for server in group 2
	\$20,000.00	costNewGroup3Server	cost of a new group 3 server
	\$2,400.00	year1Group3ServerMaintenance	first year service maintenance cost for server in group 3
	\$23,000.00	costNewGroup4Server	cost of a new group4 server
	\$2,760.00	year1Group4ServerMaintenance	first year service maintenance cost for server in group 4
	2500	numNewServersGroup1	number of new physical servers in Group 1
	10000	numVirtualServersGroup1	number of virtualized servers in Group 1
	940	numNewServersGroup2	number of new physical servers in Group 2
	4000	numVirtualServersGroup2	number of virtualized servers in Group 2
	10	numNewServersGroup3	number of new physical servers in Group 3
	30	numVirtualServersGroup3	number of virtualized servers in Group 3
	50	numNewServersGroup4	number of new physical servers in Group 4
	300	numVirtualServersGroup4	number of virtualized servers in Group 4
	425	newServerPowerGroup1	power in watts of a server in group 1
	300	newServerPowerGroup2	power in watts of a server in group 2
	162	newServerPowerGroup3	power in watts of a server in group 3
	54	newServerPowerGroup4	power in watts of a server in group 4
	\$4,500.00	virtualizationSoftwareCost	cost in dollars for virtualization software for 1 server.
	0.15	virtualizationSoftwareMaintenanceRate	% of original cost to maintain virtualization software
	\$5,500.00	trainingCostPerEmployee	cost per year to train one employee on virtualized system
	4	empsTrainedYears1And2	number of employees trained in years 1 and 2 of the study
	2	empsTrainedYears3Thru5	number of employees trained in years 3 through 5 of the study
Soft Costs			
	Value	Variable Name	Variable Description
	0.4	adminCostOnVirtualServer	percentage of regular admin cost associated with a virtual server
	3	weeksAdminTimeNewServers	
	0.12	year1ServerMaintenanceContractPercentage	
	1	backupTimeGroup1V	hours per backup of physical servers + virtual servers - Group 1
	1	backUpTimeGroup2V	hours per backup of physical servers + virtual servers - Group 2
	1	backUpTimeGroup3V	hours per backup of physical servers + virtual servers - Group 3
	1.5	backupTimeGroup4V	hours per backup of physical servers + virtual servers - Group 4
	365	numberOfBackUpsGroup1V	number of backup of physical servers + virtual servers per year - Group 1
	365	numberOfBackUpsGroup2V	number of backup of physical servers + virtual servers per year - Group 2
	365	numberOfBackUpsGroup3V	number of backup of physical servers + virtual servers per year - Group 3
	52	numberOfBackUpsGroup4V	number of backup of physical servers + virtual servers per year - Group 4

Virtualized Infrastructure Yearly Costs - Proposed Project Costs						
Category	Cost					5 Year Totals
	Year 1	Year 2	Year 3	Year 4	Year 5	
Hard Costs						
Machine Purchases	151,450,000.00					151,450,000.00
Software Purchases	15,750,000.00					15,750,000.00
Software Maintenance	2,362,500.00	2,362,500.00	2,362,500.00	2,362,500.00	2,362,500.00	11,812,500.00
Power - Group 1	1,209,975.00	1,234,174.50	1,258,857.99	1,284,035.15	1,284,035.15	6,271,077.79
Power - Group 2	321,141.60	327,564.43	334,115.72	340,798.04	347,614.00	1,671,233.78
Power - Group 3	1,844.86	1,881.75	1,919.39	1,957.78	1,996.93	9,600.70
Power - Group 4	3,074.76	3,136.26	3,198.98	3,262.96	3,328.22	16,001.17
Server Maintenance - Group 1	13,500,000.00	13,905,000.00	14,322,150.00	14,751,814.50	15,194,368.94	71,673,333.44
Server Maintenance - Group 2	4,512,000.00	4,647,360.00	4,786,780.80	4,930,384.22	5,078,295.75	23,954,820.77
Server Maintenance - Group 3	24,000.00	24,720.00	25,461.60	26,225.45	27,012.21	127,419.26
Server Maintenance - Group 4	138,000.00	142,140.00	146,404.20	150,796.33	155,320.22	732,660.74
Training	22,000.00	22,000.00	11,000.00	11,000.00	11,000.00	77,000.00
Security Auditing Costs	36,000.00	36,000.00	36,000.00	36,000.00	36,000.00	180,000.00
Archival/Storage Costs	60,000.00	60,000.00	96,000.00	96,000.00	96,000.00	408,000.00
Total Yearly Hard Costs	189,390,536.22	22,766,476.94	23,384,388.68	23,994,774.42	24,597,471.41	284,133,647.66
Total Five Year Hard Costs	284,133,647.66					
Soft Costs						
Server Administration Group 1 - Physical	52,500,000.00	53,550,000.00	54,621,000.00	55,713,420.00	56,827,688.40	273,212,108.40
Server Admin Group 1 - Virtual Systems	84,000,000.00	85,680,000.00	87,393,600.00	89,141,472.00	90,924,301.44	437,139,373.44
Server Administration Group 2 - Physical	19,740,000.00	20,134,800.00	20,537,496.00	20,948,245.92	21,367,210.84	102,727,752.76
Server Admin Group 2 - Virtual Systems	33,600,000.00	34,272,000.00	34,957,440.00	35,656,588.80	36,369,720.58	174,855,749.38
ServerAdministration Group 3 - Physical	210,000.00	214,200.00	218,484.00	222,853.68	75,770.25	941,307.93
Server Admin Group 3 - Virtual Systems	252,000.00	257,040.00	262,180.80	267,424.42	272,772.90	1,311,418.12
Server Administration Group 4 - Physical	1,050,000.00	1,071,000.00	1,092,420.00	1,114,268.40	1,136,553.77	5,464,242.17
Server Administration Group 4 - Virtual	2,520,000.00	2,570,400.00	2,621,808.00	2,674,244.16	2,727,729.04	13,114,181.20
Total Administration Cost/Year	193,872,000.00	197,749,440.00	201,704,428.80	205,738,517.38	209,701,747.22	1,008,766,133.40
Group 1 Backup	91,250,000.00	93,075,000.00	94,936,500.00	96,835,230.00	98,771,934.60	474,868,664.60
Group 2 Backup	34,310,000.00	34,996,200.00	35,696,124.00	36,410,046.48	37,138,247.41	178,550,617.89
Group 3 Backup	365,000.00	372,300.00	379,746.00	387,340.92	395,087.74	1,899,474.66
Group 4 Backup	390,000.00	397,800.00	405,756.00	413,871.12	422,148.54	2,029,575.66
Total Backup Cost/Year	126,315,000.00	128,841,300.00	131,418,126.00	134,046,488.52	136,727,418.29	657,348,332.81
Total Yearly Soft Costs	320,187,000.00	326,590,740.00	333,122,554.80	339,785,005.90	346,429,165.51	1,666,114,466.21
Total Five Year Soft Costs =	1,666,114,466.21					
Total Proposed Project Costs/Year	509,577,536.22	349,357,216.94	356,506,943.48	363,779,780.31	371,026,636.92	1,950,248,113.87
Total 5 Year Proposed Project Cost	1,950,248,113.87					

Virtualization Project Cost Summary						
	Category	Cost				
		Year 1	Year 2	Year 3	Year 4	Year 5
Current Infrastructure Costs						
	Total Yearly Hard Costs	21,212,203.44	21,637,872.21	22,108,154.69	22,551,226.18	23,003,265.55
	Total Five Year Hard Costs	110,512,722.07				
	Total Yearly Soft Costs	613,603,400.00	625,875,468.00	638,392,977.36	651,160,836.91	664,184,053.65
	Total Five Year Soft Costs	3,193,216,735.91				
Total 5 Year Cost	3,303,729,457.98					
Virtualized Infrastructure Costs						
	Total Yearly Hard Costs	189,390,536.22	22,766,476.94	23,384,388.68	23,994,774.42	24,597,471.41
	Total Five Year Hard Costs	284,133,647.66				
	Total Yearly Soft Costs	320,187,000.00	326,590,740.00	333,122,554.80	339,785,005.90	346,429,165.51
	Total Five Year Soft Costs	1,666,114,466.21				
Total 5 Year Cost	1,950,248,113.87					
Net Five Year Hard Cost Savings		-173,620,925.59				
Net Five Year Soft Cost Savings		1,527,102,269.71				
Net Five Year Overall Cost Savings		1,353,481,344.11				