CNT 4603: System Administration Spring 2011

Virtualization Cost/Benefit Analysis – Preparing The Spreadsheets

Instructor :   Dr. Mark Llewellyn
                    markl@cs.ucf.edu
                    HEC 236, 4078-823-2790
                    http://www.cs.ucf.edu/courses/cnt4603/spr2011

Department of Electrical Engineering and Computer Science
University of Central Florida

Preparation Of The Spreadsheets

- This set of notes is a continuation of the previous set of notes in which we discussed how to perform the basic steps in a cost/benefit analysis.

- We'll continue to focus on a financial analysis of a virtualization project scenario.

- Keep in mind that there may be several different versions of the spreadsheets that we develop here in play at any point in time that relate to different project deployment scenarios.

- We'll focus on only one set of these spreadsheets as they will all be similar in nature in any case. But the assumption here is that we have only one deployment scenario to consider in our analysis.

Preparation Of The Spreadsheets

- In the previous set of notes, we covered how to determine the current cost structure in place in your organization.

- Since the creation of the necessary spreadsheets is based on the analysis you've previously done for your organizations infrastructure, the spreadsheets won't make much since unless we put them into some sort of context.

- We'll generate a set of three spreadsheets:

  1. Current Cost Structure spreadsheet

  2. Virtualized Cost Structure spreadsheet

  3. A summary project cost spreadsheet

Preparation Of The Spreadsheets

- Since the spreadsheet's need a context, let's describe a hypothetical organizational infrastructure on which we can do the cost/benefit analysis that would allow us to generate the necessary spreadsheets.

- Let's assume the current infrastructure has 20 physical servers. Let's assume that each server cost $1000/year in power consumption and that each server has a server maintenance contract that costs $300/year. The organization does not employ any outside vendor for any activity related to the servers.

- Each of the servers requires an estimated 1 week/year of administrative time and backup operations are estimated to be 15 minutes/day/server. Administrative costs are $150,000/year.

Preparation Of The Spreadsheets

- The proposed virtualization project will replace the 20 current servers with 3 state of the art virtualization enabled servers. These servers will cost $21K each, and the software licenses to place VMware on these servers will cost $4000/server. The software maintenance contract will be 20% of the license cost for each year except the first which is $0. The new servers will require only $600/year in power costs. The server maintenance agreements will be $2100/server/year. Training of new employees will be limited to 2 the first year and 1/year every year after the first and will cost $1500/employee. No other outside vendors will be utilized.

- We'll assume that machine administration costs and efforts are the same/server as they are in the current infrastructure (albeit, there are fewer machines to administer).

Current Cost Structure Spreadsheet

- Let's also assume that there will be a 2% increase in the cost to power each server in year 3 as well as a 3% increase in the server maintenance contract in year 4.

- With this hypothetical scenario in place, let's layout the current cost structure spreadsheet.

- We'll assume that our cost/benefit analysis is to be performed over a 5 year time frame.

- In our spreadsheet we'll want to differentiate between the hard and soft costs that are incurred in the current cost structure.

- The following page illustrates a blank version of the current cost spreadsheet.

	A	B	C	D	E	F	G	H
1	**Current Yearly Costs**							
2								
3	Category	Cost						Notes
4		Year 1	Year 2	Year 3	Year 4	Year 5		
5	**Hard Costs**							
6	Power							20 servers X $1000/year
7	Server Maintenance							20 servers x $300/year
8	Outside Services							all operations handled by staff
9								
10	Total Yearly Hard Costs	0.00	0.00	0.00	0.00	0.00		
11								
12	Total Five Year Hard Costs =	0.00						
13								
14	**Soft Costs**							
15	Machine Administration							assume 1 week/server/year
16	Backup							assume 15 min/day/server
17								assume $150,000/yr administrative cost
18	Total Yearly Soft Costs	0.00	0.00	0.00	0.00	0.00		
19								
20	Total Five Year Soft Costs =	0.00						
21								
22	Total Yearly Current Costs =	0.00	0.00	0.00	0.00	0.00		
23								
24								
25								

Current Cost Structure / Virtualized Cost Structure / Project Cost Summary

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Current Cost Structure Spreadsheet

- Now let's use this spreadsheet to enter the numbers we've determined for our organization.

- The spreadsheet on the next page illustrates the completed entry for the numbers of our hypothetical organization. Notice that the increases for the power and server maintenance hard costs increase in their corresponding years as per the scenario.

- We've tracked the cost by year for each of the hard and soft cost items of our organization over a five year life time.

- Yearly hard and soft cost totals are calculated as well as a five year total for hard and soft costs. In addition, a total yearly cost is calculated.

	A	B	C	D	E	F	G	H
1	**Current Yearly Costs**							
2								
3	Category	Cost						Notes
4		Year 1	Year 2	Year 3	Year 4	Year 5		
5	**Hard Costs**							
6	Power	20,000.00	20,000.00	20,400.00	20,400.00	20,400.00		20 servers X $1000/year
7	Server Maintenance	6,000.00	6,000.00	6,000.00	6,180.00	6,180.00		20 servers x $300/year
8	Outside Services	0.00	0.00	0.00	0.00	0.00		all operations handled by staff
9								
10	Total Yearly Hard Costs	26,000.00	26,000.00	26,400.00	26,580.00	26,580.00		
11								
12	Total Five Year Hard Costs =	131,560.00						
13								
14	**Soft Costs**							
15	Machine Administration	57,692.31	57,692.31	57,692.31	57,692.31	57,692.31		assume 1 week/server/year
16	Backup	93,750.00	93,750.00	93,750.00	93,750.00	93,750.00		assume 15 min/day/server
17								assume $150,000/yr administrative cost
18	Total Yearly Soft Costs	151,442.31	151,442.31	151,442.31	151,442.31	151,442.31		
19								
20	Total Five Year Soft Costs =	757,211.54						
21								
22	Total Yearly Current Costs =	177,442.31	177,442.31	177,842.31	178,022.31	178,022.31		
23								
24								
25								

Current Cost Structure / Virtualized Cost Structure / Project Cost Summary

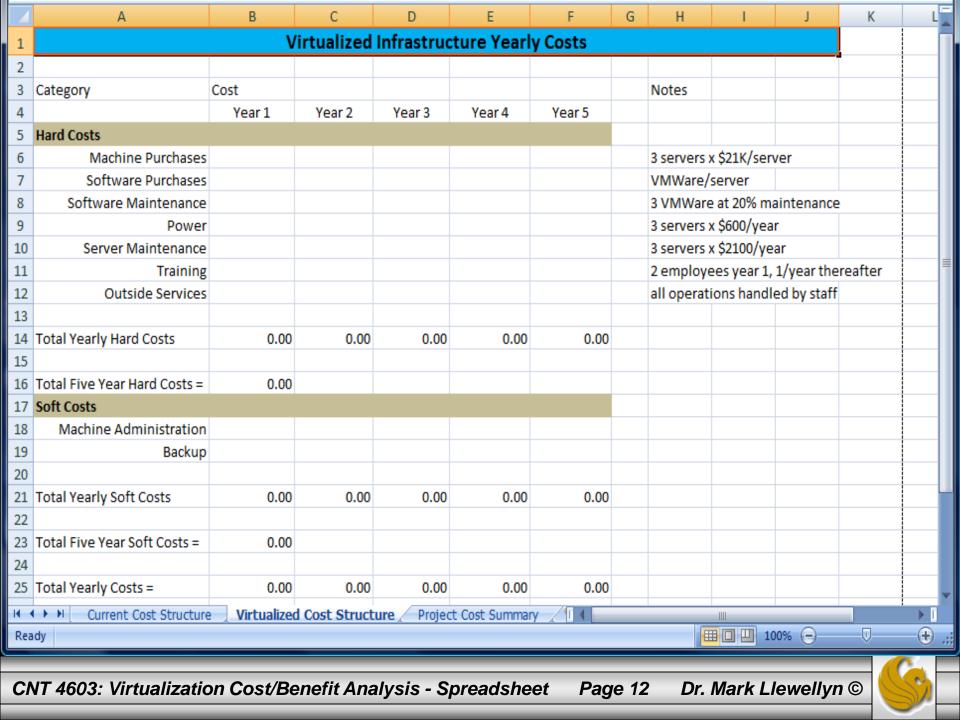Ready   100%

Virtualized Cost Structure Spreadsheet

- The next thing to construct is the spreadsheet that illustrates how the proposed project's costs will be structured.

- Based on our hypothetical organization, we'll build a spreadsheet that is similar in nature to that of the current cost structure spreadsheet.

- Notice, however, that there are some differences between the two spreadsheets.

- For our scenario, these differences are in the hard costs section of the spreadsheet. These differences are reflected in the start-up costs associated with the proposed project that are not present in the current cost structure.

Virtualized Cost Structure Spreadsheet

- The next page illustrates a blank version of the virtualized cost structure spreadsheet.

- Notice the new hard costs in year 1 related to purchasing the new servers as well as the software and software maintenance agreements that are projected for the virtualization project.

- As with the current cost structure spreadsheet, yearly totals for both hard and soft costs are calculated as are five year lifetime totals for both hard and soft costs.
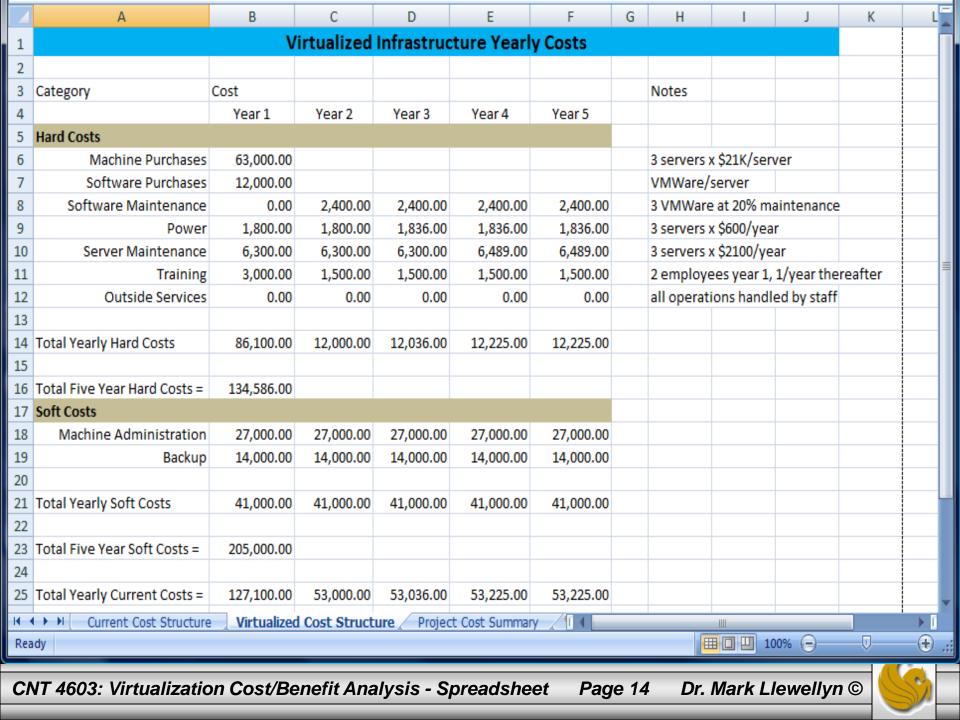
	Virtualized Infrastructure Yearly Costs							
	A	B	C	D	E	F	G	H
3	Category	Cost						Notes
4		Year 1	Year 2	Year 3	Year 4	Year 5		
5	**Hard Costs**							
6	Machine Purchases							3 servers x $21K/server
7	Software Purchases							VMWare/server
8	Software Maintenance							3 VMWare at 20% maintenance
9	Power							3 servers x $600/year
10	Server Maintenance							3 servers x $2100/year
11	Training							2 employees year 1, 1/year thereafter
12	Outside Services							all operations handled by staff
13								
14	Total Yearly Hard Costs	0.00	0.00	0.00	0.00	0.00		
15								
16	Total Five Year Hard Costs =	0.00						
17	**Soft Costs**							
18	Machine Administration							
19	Backup							
20								
21	Total Yearly Soft Costs	0.00	0.00	0.00	0.00	0.00		
22								
23	Total Five Year Soft Costs =	0.00						
24								
25	Total Yearly Costs =	0.00	0.00	0.00	0.00	0.00		

Current Cost Structure | **Virtualized Cost Structure** | Project Cost Summary

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Virtualized Cost Structure Spreadsheet

- Now let's use this spreadsheet to enter the numbers we've determined for our organization.

- The spreadsheet on the next page illustrates the completed entry for the numbers of our hypothetical organization. Notice that the increases for the power and server maintenance hard costs increase in their corresponding years as per the scenario.

- We've tracked the cost by year for each of the hard and soft cost items of our organization over a five year life time.

- Yearly hard and soft cost totals are calculated as well as a five year total for hard and soft costs. In addition, a total yearly cost is calculated.

Virtualized Infrastructure Yearly Costs

Category	Cost						Notes
	Year 1	Year 2	Year 3	Year 4	Year 5		
Hard Costs							
Machine Purchases	63,000.00						3 servers x $21K/server
Software Purchases	12,000.00						VMWare/server
Software Maintenance	0.00	2,400.00	2,400.00	2,400.00	2,400.00		3 VMWare at 20% maintenance
Power	1,800.00	1,800.00	1,836.00	1,836.00	1,836.00		3 servers x $600/year
Server Maintenance	6,300.00	6,300.00	6,300.00	6,489.00	6,489.00		3 servers x $2100/year
Training	3,000.00	1,500.00	1,500.00	1,500.00	1,500.00		2 employees year 1, 1/year thereafter
Outside Services	0.00	0.00	0.00	0.00	0.00		all operations handled by staff
Total Yearly Hard Costs	86,100.00	12,000.00	12,036.00	12,225.00	12,225.00		
Total Five Year Hard Costs =	134,586.00						
Soft Costs							
Machine Administration	27,000.00	27,000.00	27,000.00	27,000.00	27,000.00		
Backup	14,000.00	14,000.00	14,000.00	14,000.00	14,000.00		
Total Yearly Soft Costs	41,000.00	41,000.00	41,000.00	41,000.00	41,000.00		
Total Five Year Soft Costs =	205,000.00						
Total Yearly Current Costs =	127,100.00	53,000.00	53,036.00	53,225.00	53,225.00		

Current Cost Structure | Virtualized Cost Structure | Project Cost Summary
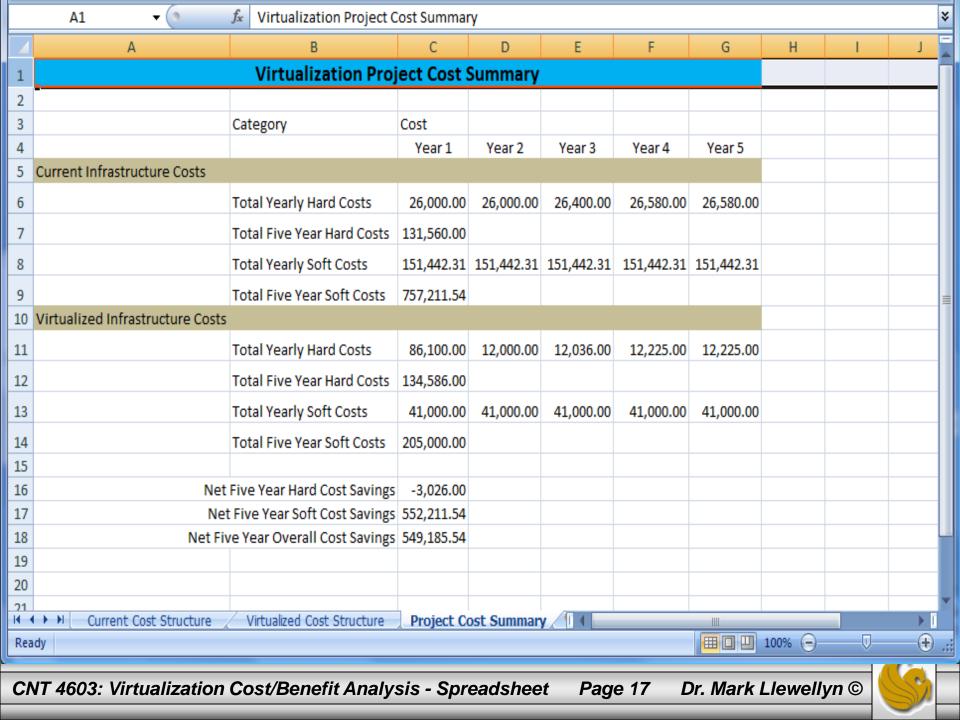
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Project Cost Summary Spreadsheet

- The final step in our virtualization project cost/benefit analysis is to create a summary spreadsheet that will, hopefully, illustrate the cost benefit of the proposed virtualization project.

- This part is probably the simplest step, in that we only need to gather the summary numbers from the current cost structure and the virtualized cost structure spreadsheets.

- For ease of reference, I included the total yearly and five year lifetime hard and soft costs for both the current and the proposed project in the summary sheet.

- The main numbers of concern in the summary are the net five year hard, soft and overall cost savings predicted to be gained through implementation of the proposed project.

Project Cost Summary Spreadsheet

- The next page illustrates the summary spreadsheet for our hypothetical organization and virtualization project.

- Notice, as we had hoped, the proposed project should provide a significant return to the company over its projected five year life time.

- The net overall cost savings based on our scenario is just over one-half million dollars, or about $110,000 per year.

| | A1 | ▾ | f_x | Virtualization Project Cost Summary | | | | |

	A	B	C	D	E	F	G	H	I	J
1			Virtualization Project Cost Summary							
2										
3		Category	Cost							
4			Year 1	Year 2	Year 3	Year 4	Year 5			
5	Current Infrastructure Costs									
6		Total Yearly Hard Costs	26,000.00	26,000.00	26,400.00	26,580.00	26,580.00			
7		Total Five Year Hard Costs	131,560.00							
8		Total Yearly Soft Costs	151,442.31	151,442.31	151,442.31	151,442.31	151,442.31			
9		Total Five Year Soft Costs	757,211.54							
10	Virtualized Infrastructure Costs									
11		Total Yearly Hard Costs	86,100.00	12,000.00	12,036.00	12,225.00	12,225.00			
12		Total Five Year Hard Costs	134,586.00							
13		Total Yearly Soft Costs	41,000.00	41,000.00	41,000.00	41,000.00	41,000.00			
14		Total Five Year Soft Costs	205,000.00							
15										
16		Net Five Year Hard Cost Savings	-3,026.00							
17		Net Five Year Soft Cost Savings	552,211.54							
18		Net Five Year Overall Cost Savings	549,185.54							
19										
20										
21										

Current Cost Structure / Virtualized Cost Structure / **Project Cost Summary**

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General Comments on Cost/Benefit Analysis

- Whenever a cost/benefit analysis is done as a means to justify or not justify pursuing some corporate project, the financial analysis does not make since when considering only the immediate costs of the project.

- Typically, some longer time horizon needs to be considered. Some projects may have some explicit lifetime associated with them, but if not a five-year projection is quite commonly used.

- Always separate hard and soft costs within your analysis (spreadsheet). Since hard costs are often easier to identify – and are thus somehow more "real" – list them first in your spreadsheet.

General Comments on Cost/Benefit Analysis

- In our analysis example, we assumed that each existing server was the same and incurred the same cost of operation. This may not always be the case. In a situation where the current servers have different costs associated with them, it would make sense to break down the hard costs by server, with each server having its own line in the spreadsheet.

- Regardless of how many entities are present in your hard cost analysis, you should provide a yearly summary which totals all hard costs. If there are many different types of hard costs, then additional summary lines by year should be considered.

General Comments on Cost/Benefit Analysis

- The summary spreadsheet should present an easy-to-understand, high-level picture of the pre-project and post-project .

- The summary should also be broken down year by year as well as an overall summary. This will help illustrate where "break-even" points occur and where/when the financial benefits of the project will be realized.

- A well designed spreadsheet can shorten the decision making process about a potential project considerably.

General Comments on Cost/Benefit Analysis

- Be prepared to justify every one of the assumptions that you make in your financial analysis of the proposed project. For example, how do you know that the software maintenance agreement is 20% of the license cost for each year of the project's lifetime?

- Being able to document the current cost structure and for example, the projected virtual server loads, is an excellent way to raise everyone's confidence in your project; conversely, not be able to back up your numbers is a quick route to project cancellation!

General Comments on Cost/Benefit Analysis

- If you look at the final three numbers in our example summary spreadsheet, it should be clear that much of the benefit of the example virtualization project results from reduced administration tasks based on fewer servers to operate.

- If you were presenting this analysis, it would be important for you to be able to back up your assumptions about increased administrative efficiency because that's where most of the savings will occur. Here is where being able to cite internal experience or external authorities would make justification easier.

General Comments on Cost/Benefit Analysis

- There are other things to consider in such a financial analysis as well.

- For example, is it reasonable to assume that all the current physical servers will remain in place as is for the next five years? Many organizations will replace servers on a three-year refresh cycle for hardware. This of course, would significantly increase the current cost infrastructure hard costs.

- In the other direction, our deployment scenario calls for needing three new servers. Would it be possible to reduce this to two? Same capabilities? More capabilities? There is a potential tradeoff here. Fewer new servers potentially means less initial cost and less power consumed.   However, if fewer but more powerful servers are required, then higher cost? More power?