CNT 4603: System Administration Spring 2011

Project Three

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Project Three: Overview

- **Title:** "Project Three: Virtualization Cost/Benefit Analysis"

- **Points:** 50 points

- **Due Date: Friday February 25th by 11:55 pm (WebCourses time)**

- **Objective:** To practice conducting a financial feasibility cost benefit analysis for a virtualization-based project.

Project Three: The Scenario

- What you are going to do in this project is pretend that you are the system administrator for an organization that is attempting to determine if virtualizing its computing infrastructure would be beneficial to the organization from a financial perspective.

- As the system administrator you are in charge of conducting the cost/benefit analysis for the proposed virtualization project.

- This will include creating financial spreadsheets using a 5 year projection and writing a brief report summarizing your findings.

- The next few pages describe the current infrastructure of the organization and the proposed virtualization project. Let's call the organization the ITCorp.

Project Three: The Scenario

- Currently ITCorp is running 30 physical servers which support various applications and several different operating systems.

- Each of these servers is of the same type and at their average workload consume 3000W of power.

- The maintenance contract on the current physical servers currently costs $300.00/server/year.

- You estimate that the server administration effort amounts to 1 week/server/year currently and that the effort required to do system backups requires 15 minutes/day/server currently.

- ITCorp employs no other external vendors (hard costs) other than those already mentioned.

Project Three: The Scenario

- The virtualization project proposed for the ITCorp would reduce its current number of servers from 30 to 4. [You'll be asked later to comment on whether this is a realistic goal/assumption based on the servers that have been chosen.]

- The virtualization software of choice will be VMware and this will cost $4000/server. The maintenance contract on this software will be priced at 20% of the original cost and will remain in effect at this rate for the duration of the study.

- Each new server will be under a server maintenance contract that will cost 5% of the server's original sale price. This contract price will remain in effect throughout the duration of the study.

- Its estimated that the new servers will require 3 weeks/server/year of administrative effort with backup effort still assumed to be 15 min/server/day.

Project Three: The Scenario

- Sun Fire X4800 servers have been selected to host the virtualized environments. This is one of Sun's latest and leading edge x86 servers. This is a 5 rack unit (5U) server that supports 2 or 4 CMODs (configuration modifications) providing 4 or 8 CPU configurations. Up to 128 DIMMs (Dual In Line Memory Module) (32/CMOD) providing a maximum of 1TB main memory.

- Information on Sun x86 Systems can be found at: http://www.oracle.com/us/products/servers-storage/servers/x86/index.html

- Information on the X4800 model specifically can be found at: http://www.oracle.com/us/products/servers-storage/servers/x86/sun-fire-x4800-server-077287.html

Project Three: The Scenario

- We're interested in fairly high-end configuration of the X4800 server.

- The power calculator for this server is available at: http://www.oracle.com/us/products/servers-storage/servers/x86/sun-fire-x4800-server-077287.html

- To determine the power consumption for one of our proposed servers, we'll assume the following server configuration:

  – Processor = X7560, 2.27 GHz, 130W
  – CPUs = 8
  – Memory (8 GB DIMM)= 32 DIMMs
  – Hard Disk Drives = 8HDDs
  – PCIe Express Modules = 8
  – Network EM = 2 (default case is only option)
  – FEM = 4 FEMs (FEM = Fibre Express Module)
  – Workload = 80%

> If everyone uses this same server configuration, you should all get the same results for the power consumption for our server.
>
> For grading purposes, I'm assuming this configuration for the server. Feel free to play around with the numbers a bit, but your submitted spreadsheet should use this configuration.

Project Three: The Scenario

- The Sun Fire X4800 is a very scalable x86 server. It is intended for use with memory-intensive applications, in-memory databases, scalable database workloads, workload consolidation leveraging virtualization software to improve onboard resource utilization, and business application consolidation.

- This server offers a broad set of configurations and capabilities in hardware and software, including support for multiple operating systems and virtualization technologies. These systems can be assembled into arrays, grids, or clusters of x86 servers . allowing workloads to scale up when used in conjunction with Oracle system-level infrastructure software and systems management software.

- With eight Intel Xeon 7500 processors each supporting six or eight cores per processor this server supports up to 64 processor cores.

- It is also outfitted with up to 1TB of memory and eight 2.5in. hard drives. It supports up to eight hot-swappable PCIe I/O modules.

Project Three: The Scenario

- To determine the cost of the new servers go to the following page: https://shop.sun.com/store/product/a0967cd3-cb2c-11de-9e65-080020a9ed93

  and chose "Config 3". Use this as the price for your new servers. While this configuration is not exactly the same as that which we configured for the power calculator, its pretty close and will give us an accurate enough value for inclusion in our analysis.

Project Three: The Scenario

- Some basic assumptions about ITCorp and the future as it pertains to your cost/benefit analysis:

  - The cost of 1kwH of power is currently 13 cents. Assume that the cost of power will increase 3%/year over the duration of the study.

  - Assume that server maintenance costs will increase 1%/year over the duration of the study.

  - Administrative costs are currently $175,000/year. Assume that administrative costs will increase at the rate of 1%/year over the duration of the study.

  - Assume that administrative workload is equally distributed across all servers in both the current and proposed environments.

  - 1 administrative day is 8 hours long. 1 server day is 24 hours long.

Project Three: Your Task

- Your first task for this project is to construct spreadsheets like the ones we discussed in class that will illustrate the current and proposed infrastructure costs for the ITCorp given this proposed virtualization project.

- You should create (1) a current infrastructure cost spreadsheet, (2) a virtualization projected cost spreadsheet, and (3) a summary spreadsheet that highlights the major costs and benefits of the project.

IMPORTANT ! ! !

You should create your spreadsheet using variables to identify the various costs that are being tracked. In other words, don't hard code in all the numbers into the formulas in your spreadsheets. The following page illustrates the page in my spreadsheet where I defined the variables used in all the spreadsheets. You should include a similar page in your spreadsheet.

	A	B	C	D
1	**Hard Costs**			
2		Value	Variable Name	Variable Description
3			maintenanceCostYear1	cost of server maintenance contract year 1 - curre
4			costKwHYear1	cost of 1 kwH of power in year 1
5			currentServerPower	number of watts of power consumed by old serv
6			newServerPower	number of watts of power consumed by new ser
7			VMwareCost	cost of Vmware software for virtual machines
8			serverMaintenanceContract	cost of server maintenance contract year 1 for ne
9			averageLoad	typical load factor of the servers (2400W for old,
10			newServerCost	cost of one new server for the virtualized enviro
11			softwareMaintenanceContract	software maintenance contract (% of Vmware co
12				
13	**Soft Costs**			
14			administrativeCostYear1	cost of administrative time in year 1 of project lif
15				
16	**Infrastructure**			
17			currentNumServers	current number of servers
18			newNumServers	number of servers after virtualization
19				
20	**Constants**			
21			hoursInADay	number of hours in 1 administrative day
22			hoursInYear	number of hours in 1 year (24 hrs/day * 365 days/

Variables | Current Cost Structure | Virtualized Cost Structure

Project Three: Your Task

- Once your spreadsheets are completed, you'll construct a 1 page summary report of your findings.

- This report should address the feasibility of the proposed project and its financial impact on the ITCorp.

- As mentioned on page 5, you should address the question of whether consolidating the 30 current servers into 4 servers is a valid assumption. Do some research on the Internet to see what type of numbers would be typical. Cite one source in your report that provides justification for this level of consolidation.

Project Three: Deliverables

- On or before 11:55 pm (WebCourses time) Friday February 25, 2011 submit the following items via WebCourses:

    1. A spreadsheet (similar to that we developed in class) with variable definitions and worksheets covering current cost infrastructure, proposed project cost infrastructure, and summary.

    2. A one page report summarizing your findings with respect to the feasibility of this project for the ITCorp. Be sure to include one citation to work that confirms in some manner the server consolidation ratio that is being proposed in this project.