

An Analysis of Systems Administration with Microsoft SCCM

By

Zach Taylor

Submitted to
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the Degree of Bachelor of Science
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Zachary Taylor

4/16/2013

Date

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Abstract

A business's needs are dynamic; as the market changes so does the business. Users need reliability and speed, and administrators must be able to keep users working smoothly. In recent years, a new and growing market has emerged for systems management tools. This new software market provides the IT department augmented power to better manage and control their network. This project centers around an excellent systems management product; Microsoft Systems Center Configuration Manager (SCCM).

Microsoft's SCCM is a large suite of management tools for enterprise systems. Implementation can be costly and time consuming. This project focuses on creation of cost estimates and return on investment analysis, as well as providing a working demonstration for prospective organizations. Data was gathered through members of a local professional organization as well as through personal connections of the author. These results created a baseline organization to study. The project also includes analysis of a migration from a previous version of SCCM to the most recent. This analysis has helped to show organizations an area of tools that can be undervalued, especially while IT support teams are doing more with less.

Introduction

Problem

In today's infrastructure administrators need a way to quickly locate and distribute software and patches to their organization. There are many third party suites that allow for this, but they can be expensive; licensing costs and annual fees. Without software like this, desktop support teams and administrators need to physically go to the machine in question to work on it. Inventory of devices and updates also will need to be done on a manual basis, either relying on the user(s) of the machine or a person dedicated to doing this.

When security or law is top priority, how does an administrator know that all of their machines are in compliance with software updates and patches? There are scripts that can be run to gather this information, but what if certain departments require different versions of software?

There is a need for companies to centrally manage all devices to check both compliance with software, updates, operating systems, and endpoint security, but without the added expenses of third party solutions.

When discussing need for these automated deployment solutions, it is also important to note the amount of automation that these systems make possible. Many mundane and daily tasks can be eliminated; allowing for your desktop support and administrative teams to focus on more important or pressing issues. In the face of budget cuts, many of these solutions can allow for

much quicker and reliable service to all users of the network, even small support teams can provide excellent support to their users with automation software.

Solution

This project investigates a Microsoft System Center Configuration Manager (SCCM). SCCM allows for automated network deployment of software, operating systems, Windows updates, and device drives. It has the ability to heterogeneously manage a multitude of operating systems and mobile devices. SCCM is also very expansive and scalable, so that it can change and grow with your infrastructure or as needs grow. “The elasticity that Systems Center supports will help streamline operations down the road.”(Greene, 2012)

Without automated tools like SCCM, administrators and desktop support teams need to physically go to the machine in question in order to perform updates or installation tasks. “IT admins generally have a lot on their proverbial plate. Anything that can be done to streamline monitoring and management of IT resources makes IT admins lives easier, and frees them up to focus on more crucial matters.”(Bradley, 2012) Through the use of SCCM, administrators will be able to locate and deploy everything they need from one location, or can schedule the operations to happen at a later time. SCCM also allows for custom applications and operating systems to be packaged for deployment, this means that when a fresh install is necessary, the desktop support team can plug the machine into the network, and have the machine download and run through an automated installation of Windows with predetermined configurations set in SCCM. Software can also be prepackaged to include all of the necessary registration data so that a typical user has

no need to have private licensing information. "The power is in the hands of the people that need to solve the problem." (Greene, 2012)

Reporting and auditing is also an important aspect of today's IT environment. While trying to cut costs for licensing a company can utilize SCCM's built in Asset Intelligence suite allowing them to track how many and what computers are using volume licensing, and what software is currently licensed. This feature can allow for licensing to be quickly analyzed and allow for a company to utilize budget that was otherwise misplaced. "We built to augment [SCCM] so that Systems Management tasks do not compete with business applications and so that customers can save valuable IT time and budget" (Investment Weekly News)

Another important aspect of these studies is the incorporation of business goals. Not only by demonstrating potential uses of SCCM, but by also providing a cost analysis and business case for prospective companies of multiple sizes, as SCCM is a powerful suite for any level of business: "The Optimized Deployment services leverage Dell's patented approach and technology to reduce the amount of technician labor and complex logistics required for PC and OS deployments."(Technology Business Journal). This analysis will help to enforce the viability of a solution like SCCM in the IT infrastructure. The end result of this project will not only be a running and configured installation of SCCM, but will include financial evidence to show business need.

Project Goals

This project entailed creation of a fully functional Windows domain that implements the use of SCCM for systems management, as well as budgeting and cost analysis for prospective

businesses. A portion of the project also involved assisting the University of Cincinnati Lindner College of Business's (LCB) staff with their migration to SCCM 2012.

Overview

The remainder of this report outlines how the project was completed. The report contains the following sections: project concept, design objectives, technical approach, project budgeting, project schedule, problem analysis, and recommendations.

Discussion:

Project Concept:

This project's concept is to provide demonstrations of the abilities of SCCM, while providing a cost analysis for prospective users and organizations. The idea behind this project stems from interest in automation and customization of software along with network-wide automated deployment.

Design Objectives:

The design objective of this project was to create a fully functional prototype environment that implements a single site implementation of Microsoft's System Center Configuration Manager 2012. The prototype network was designed to deploy operating systems, application, provide endpoint security, and to manage policies and configurations for client machines. Goals such as a CAS (multi site) hierarchy had to be abandoned due to hardware limitations, and Mac/Phone support, mainly due to cost of devices and budgeting and software limitations.

Methodology/ Technical Approach:

The prototype environment that has been created for this project is fully capable of supporting up to 50,000 clients. It has also been configured from scratch and could theoretically be adapted to slide in to any enterprise's racks as a production machine. While the prototype is not in a working environment, the author previously implemented almost the exact same system while working with the University of Cincinnati's Lindner College of Business IT staff. The LCB supports nearly 600 machines, along with students, faculty, and staff. They chose to migrate from SCCM 2007 to 2012 because of the changes made to the latest version. Namely the following: endpoint protection integration, automatic Windows Update pushing, the application catalog allows users to request software, a much improved user interface, applications are targeted to a user rather than a device, remote control has been re-introduced, and software distribution optimizations. With the LCB utilizing many features of the SCCM suite it is quite clear that this software has a place in many organizations today. With the recent addition of SCCM 2012 SP1, Windows 8 and Windows Server 2012 have also been added to the support list, to the delight of the LCB IT team.

Sample Cost Analysis:

To create sample cost data, members of a local IT professional's organization were contacted with a survey. This survey asked basic questions about their organization and network needs. The findings of the survey follow:

Based on survey data, the average organization contains:

- Between 250-500 users.
- Located at one primary site.
- Devices are largely Windows 7, or are planned to be phased out.

- Average IT staff of 3.

This organization utilizes SCCM to:

- Deploy operating systems.
- Force Windows updates for user devices.
- Keep applications up to date.
- Provide endpoint security.

Cost/Benefits Summary (software to purchase)

- 1 Windows Server 2012 License
- 375 Client Licenses
- Open license agreement (5 year analysis)

Microsoft's License Advisor cost calculation for sample organization

	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	Year 5 Total	Year 6 Total	Total
Open License	\$29,160.00	0.00	9,720.00	0.00	9,720.00	0.00	\$48,600.00

For the complete MLA evaluation please reference attached document Microsoft MLA.

Though the following ROI analysis shows a 2 year payoff, this does not directly correlate to financial gain. The savings lie in time spent manually manifesting operations that SCCM automates, eg. virus removal, operating system installation, or application installation. For instance, assuming that a fully manual operation system installation takes 34 minutes, this means that an employee or consultant is being paid to install the operating system, and can only do that during the time. If the installation is automated, they will spend significantly less time waiting, and will be able to focus on other pending tasks. In the end, SCCM's automation allows for

quicker end user support not only because of automation, but because your IT teams are more available. The savings may tie to factors such as user downtime as well. Instead of users waiting on a support technician to assist with an application installation, it can be completed with the click of a button, they are not required to have any access to the installer or licensing information, it has already been configured for them.

Many of the features of SCCM can be utilized in a smaller scale environment with little or no cost. For example, Windows Deployment Services is a built in role for deployment of operating systems. The endpoint protection component can also be acquired free of charge from a number of external vendors, including Comodo, Immundet, and NANO antivirus, Microsoft Security Essentials is also free to use in a corporate environment as long as the number of devices is less than 10. Application packaging and deployment can also be implemented free of cost, but is much more difficult.

A scenario where SCCM is utilized best is a multi-site implementation, especially when the IT staff is only based out of one facility. In this case, SCCM allows for significant savings due to the fact that no outside contractors would need to be hired, or the in house IT team would not have to go to the location. A number of the surveyed area professionals agreed that this was a key implementation reason. The survey revealed that average small and medium businesses in this area only operate out of one location, so they do not fall into this category.

Rollout times for prospective companies also vary, depending on their current distribution methods. If an organization already deploys applications and operating systems using manual methods such as scripting or imaging, their transition into SCCM will be much quicker than an organization that does not.

Sample Company's Financial ROI Analysis

Sample data was compiled and averaged. Through using Alinean's Systems Center Business Value Analyst, the survey data was compiled and entered into their ROI calculator. A full summary of the ROI analysis can be viewed in the supplementary document, titled Sr Project Alinean ROI summary. The following data summarizes their analysis and findings based on this project's sample company licensing and use data.

Figure 1 (below): A breakeven analysis chart for the sample company.

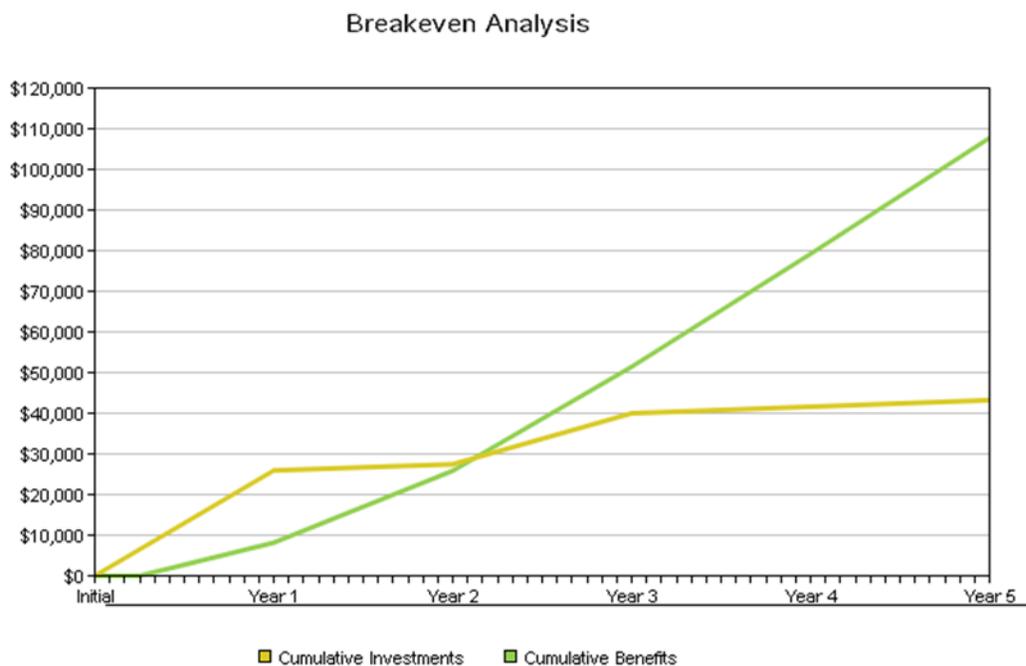


Figure 2 (below): Total cost of ownership net savings

System Center ROI Analysis	
Net TCO savings (over Five Years)	\$55,755
System Center investment and change costs	\$51,963
Return on investment (ROI = Net TCO savings / total investment)	107%
NPV Savings (discount rate = 10.0%)	\$36,148
Internal rate of return (IRR)	88%
Payback Period (months)	0

Figure 3 (below): Total cost of ownership saving annually

System Center TCO Savings	
TCO savings per Year	\$11,151
TCO savings (over Five Years)	\$55,755
TCO savings from current costs	9.3%
Direct IT savings (over Five Years)	(\$10,468)
Indirect (soft) savings (over Five Years)	\$66,223

Figure 4 (below): Investment vs. Benefit over term discussion.

Cash Flow	Initial	Year 1	Year 2	Year 3	Year 4	Year 5
Benefits	\$0	\$8,149	\$17,682	\$25,590	\$27,784	\$28,513
Cumulative Benefits	\$0	\$8,149	\$25,831	\$51,421	\$79,205	\$107,718
Investment	\$0	\$25,911	\$1,532	\$12,531	\$1,620	\$10,369
Cumulative Investment	\$0	\$25,911	\$27,443	\$39,974	\$41,594	\$51,963
Net Benefits	\$0	(\$17,762)	\$16,150	\$13,059	\$26,164	\$18,144
Cumulative Net Benefits	\$0	(\$17,762)	(\$1,612)	\$11,447	\$37,611	\$55,755

Unit Testing:

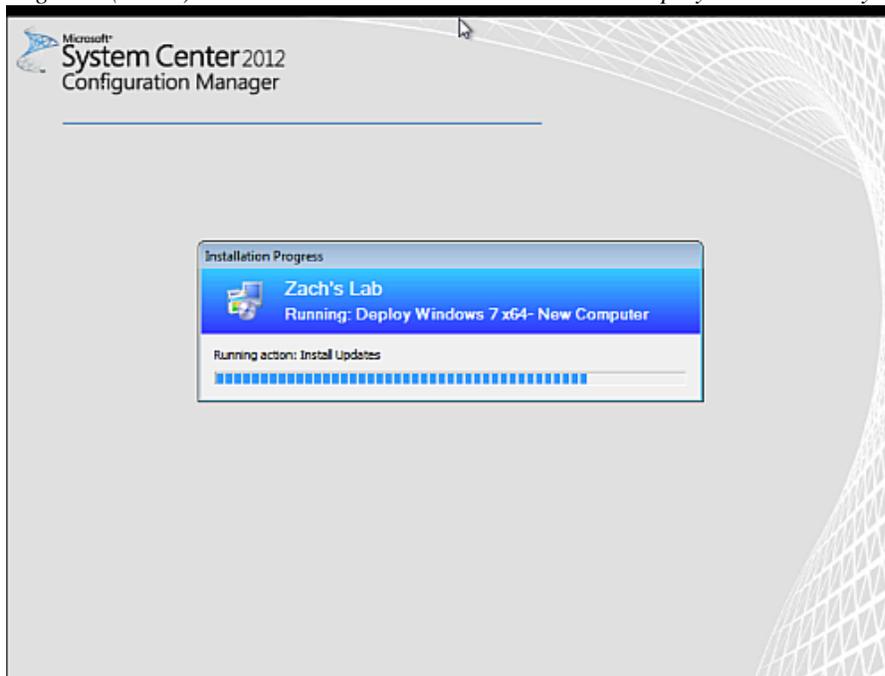
- The first test includes operating system deployment time, and analyzes both a manual installation from CD and the exact same version being installed over the network by SCCM.
- The second test analyzes Microsoft Windows Update, and the time it takes for updates to be downloaded and installed to a new machine. The first method is by utilizing updates

after a fresh Windows installation is complete, this is all done manually by a user. The second method is done by prepackaging all of the updates into the Windows 7 installation. The installation image is then pushed to the machine, and when the setup is complete Windows is up to date. Each procedure below will note the variables and results of the tests.

- The third test includes application installation, as demonstrated by the installation of Mozilla Firefox. One method is an automatic push installation, where the user is not prompted or notified. The alternative solution is for a user to manually install Firefox, but with SCCM providing the user with an approved version.

Windows Installation:

Figure 5 (below): An unattended Windows 7 installation as deployed over PXE by SCCM



The importance of this test is the verification that SCCM provides not only unattended installation of Windows, but it is also more efficient than installing alternate ways.

Installation time of Windows 7 from a CD: 34 minutes fully attended.

Installation time of Windows 7 via SCCM: 27 minutes unattended.

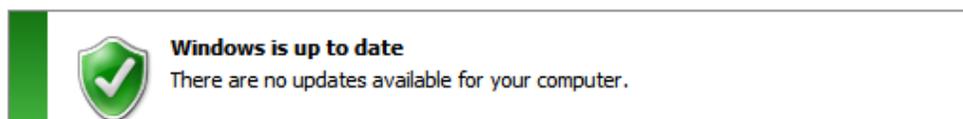
*note that the SCCM installation is also preconfigured to both join the new computer to the domain as well as naming the computer. From a CD installation both of these tasks would be done manually.

When considering the seven minute time difference, one may also note that the SCCM installation can be sent out to hundreds of computers at once, with little to no human interaction. SCCM will also allow for Windows Updates to be prepacked with the installation or to be completed after the installation is finished, both require no user or administrator interaction.

Windows Updates:

Figure 6 (below): A sample user's Windows Update menu, note that updates are managed by the system administrator.

Windows Update



Most recent check for updates: Today at 3:08 PM
Updates were installed: 1/13/2013 at 1:07 PM. [View update history](#)
You receive updates: Managed by your system administrator
[Check online for updates from Windows Update](#)

As mentioned previously, Windows updates were both prepackaged into a Windows installation, and downloaded and installed manually. I also have compiled the total time to

package all of the updates into the aforementioned SCCM package. All tests applied 87 updates to the exact same Windows 7 installation media.

Windows 7 updates manually required 2 restarts and multiple agreements to install the updates, taking a total time of 58 attended minutes.

Windows 7 updates that were prepackaged took 38 minutes unattended to install, and were installed with no user interaction. Also saving internet bandwidth because they had already been downloaded to a local distribution server.

One may also note that the total time to do a full update cycle to the SCCM package took a mere 45 minutes, making it actually quicker than an online update. Once finished repacking, this image was fully prepared to be sent out over the network. See figure 3 for an example log file.

Figure 7 (below): SCCM's Offline Servicing log displays status and updates applied to the Windows 7 image.

Log Text	Component	Date/Time	Thread
Copying(25% complete)...	SMS_OFFLINE_SERVICING_	2/3/2013 4:22:01 PM	4376 (0x1118)
Copying(50% complete)...	SMS_OFFLINE_SERVICING_	2/3/2013 4:22:35 PM	4376 (0x1118)
Copying(75% complete)...	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:11 PM	4376 (0x1118)
Copying(100% complete)...	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:44 PM	4376 (0x1118)
A backup copy of the original image is created:	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:44 PM	4376 (0x1118)
original file "\\sccm\sources\os\Windows 7 Images\Windows7_x64image.wim" is backed up at "\\sccm\sources\os\Windows 7 Images...	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:44 PM	4376 (0x1118)
STATMSG: ID=7905 SEV=I LEV=M SOURCE="SMS Server" COMP="SMS_OFFLINE_SERVICING_MANAGER" SYS=SCCM.project.I...	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:44 PM	4376 (0x1118)
Updated history for image package P010000B in the database	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:45 PM	4376 (0x1118)
Schedule processing succeeded	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:45 PM	4376 (0x1118)
Processing completed for Schedule with ID 16777217 (Schedule Name =)	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:45 PM	4376 (0x1118)
STATMSG: ID=7901 SEV=I LEV=M SOURCE="SMS Server" COMP="SMS_OFFLINE_SERVICING_MANAGER" SYS=SCCM.project.I...	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:45 PM	4376 (0x1118)
Schedule processing thread stopped	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:45 PM	4376 (0x1118)
Checking if there are schedule(s) which need to be run at this time.	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:45 PM	2284 (0x8EC)
This Schedule with ID 16777217 does not have a next run time	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:45 PM	2284 (0x8EC)
No more schedules are found to be run at this time or in the future. Will sleep till a new schedule is created.	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:45 PM	2284 (0x8EC)
No schedule exists which needs to be run anytime in future.	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:45 PM	2284 (0x8EC)
Offline Servicing Manager thread is exiting.	SMS_OFFLINE_SERVICING_	2/3/2013 4:23:45 PM	2284 (0x8EC)

Application Deployment:

Another benefit of using SCCM in a corporate environment is the ability to push and install applications directly to users without any action on their part. Firefox, being a very

prominent web browser is an important example. Every user needs the application, so the administrators will make it available for everyone. Installation of Firefox took an average time of 1:30 from start to finish with a T1 (1.54 mbps) connection. While that time isn't extreme, the bandwidth necessary for hundreds of users to download and install Firefox is immense and unnecessary.

Sending the package remotely with SCCM not only allowed an administrator to choose what settings are correct for their users, but ensured that Firefox installed properly. SCCM will also allow for a user to manually choose to install the software if it was not automatically installed for them.

The LCB team also expanded on this functionality by coupling a software suite named Ninite Pro with SCCM. Ninite pro allows for nearly 100 software packages to be installed or updated silently. By using Ninite, the administrators were able to choose what applications should be mandatory for their users, and are able to set those applications to be automatically updated.

Technical Areas Required:

This project would be classified as primarily networking and system administration, as well as some database query design.

Networking:

Virtual network setup, routing, VLANs, and firewall configurations.

System Administration:

Configuring domain controller, extending AD for SCCM, user control and rights management, log analysis, server hardware research, cost analysis, virtualization of servers and workstations.

Database:

Using LDAP queries in SCCM, misc. SQL Server 2008 general usage.

Resources and Logistics:**Project Costs:**

The costs of configuring this project are relatively low. This is largely due to software being provided by Dreamspark, and the use of used hardware. Majority of this project's cost is hardware. In a business environment however, licensing costs will apply for servers and clients.

Figure 8 (below): Project's utilized software costs.

Software	Budgeted Cost	Final Cost
Microsoft Windows Server 2008 (2)	\$0.00 (MSDN)	\$0.00 (MSDN)
Microsoft SQL Server 2008	0.00 (MSDN)	0.00 (MSDN)
Microsoft Systems Center Configuration Manager	0.00 (MSDN)	0.00 (MSDN)
Microsoft Windows 7	0.00 (MSDN)	0.00 (MSDN)
Microsoft Windows Vista	0.00 (MSDN)	0.00 (MSDN)
Microsoft Windows XP	0.00 (MSDN)	0.00 (MSDN)
Microsoft Windows Server 2003	0.00 (MSDN)	0.00 (MSDN)
Microsoft Windows Automated Installation Kit	0.00 (MSDN)	0.00 (MSDN)

VMWare ESX	\$0.00 (evaluation)	\$0.00 (evaluation)
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Figure 9 (below): Project's hardware costs

Hardware	Budgeted Cost	Final Cost
Dell PowerEdge 2950 Server (or similar)	\$350.00 Source	\$260+\$300 parts
Dell PowerEdge 2850 Server	0.00	75+ \$100 parts
10/100/1000 Switch	100.00 Source	35.00
Laptop	0.00 (Supplied or borrowed)	0.00
Desktops	\$0.00 (Supplied or borrowed)	\$0.00

Project Schedule:

See supplementary document Project Schedule.

Current SCCM feature/task list (all units complete):

- Configure ESX
- Install Server 2008x2
- Configure virtual switching
- Configure physical switch
- AD for domain controller set up
- SQL server install
- IIS role install
- Service Packs/ Updates
- Create and assign rights to user accounts
- Driver repository configuration
- WSUS (Windows Update Services) configuration
- Endpoint security configuration
- Client distribution
- Application packaging using switches
- OS packaging
- Custom OS tweaking
- Configuration of datastores and backup locations

Business viability task list:

- Determine variables to distinguish average business
- Estimate software needs for business
- Calculate licensing costs using Microsoft License Advisor
- ROI calculations (initial, annually, payback time)

Conclusion and Recommendations:

Microsoft's Systems Center Configuration Manager is not for all organizations. Planning, estimating, and research are needed to successfully implement SCCM, as well as budgeting. As discussed in the financial calculations, SCCM is very efficient in medium to large scale companies, but a small business will not see as many benefits. However, when properly implemented SCCM is a powerful augmentation to any IT group. The benefits far outweigh the costs, and SCCM allows for much more control of one's network. This type of software will have a spot in the marketplace for many years to come.

Throughout the course of this project, many skills were tested. As SCCM requires a domain environment with very specific settings utmost care was taken in creating this domain. Many of the complexities overcome in this project are real world examples, budgeting, testing, and planning were developed as a result. This project has also provided a positive learning scenario allowing for practice and development of the aforementioned real world skills.

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JAMF software announces integration between microsoft system center configuration manager (SCCM) and casper suite 8.0. (2010, Dec 16). *Business Wire*

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Sample cost ROI analysis thanks to Alinean:

https://roianalyst.alinean.com/microsoft/system_center/

Appendix A

Design Protocols:

User Profile

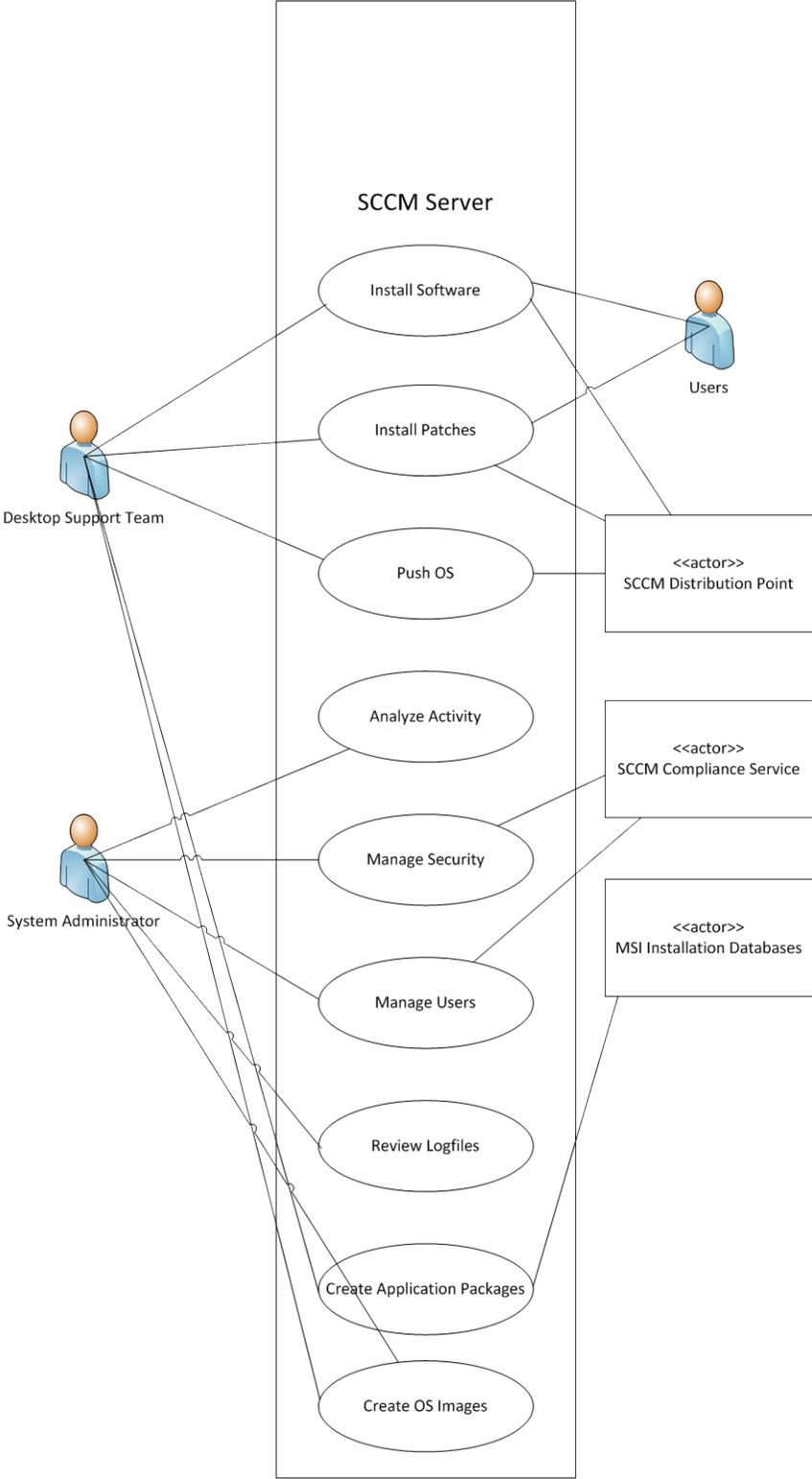
The users of SCCM will fall into one of three categories: Administrators, Desktop Support, and Domain users. All three of the user types have varying interaction with SCCM. In smaller companies, many of the tasks related to SCCM and the domain environment may only be handled by one person, whereas at an enterprise level there may be teams of people to manage these systems.

Administrators: These users are likely Domain level administrators, or specialized users such as developers or systems analysts. Administrators will configure and customize SCCM; this job also includes logging occurrences and reporting financial data/ usage to others. Administrators also oversee development of custom software and operating systems, as well as mandating updates and endpoint security policies.

Desktop Support: Desktop support teams are the main users of SCCM. In any environment, desktop support members will utilize SCCM's deployment tools. They will most likely interact with users, and through using SCCM meet the user's needs in terms of software or operating systems deployment. The varying skills of desktop support members may also allow them the ability to create OS images and prepare applications for deployment.

Domain users: These members are the largest users of SCCM; they also have very limited interaction with SCCM. Through a locally installed client on their machine, they will be prompted to install software and updates, but can also request software that is available to them. The goal of SCCM is to provide the user with only information that they need to know, allowing most of the work to be done in the background, eliminating inconveniences such as contacting desktop support, or locating software on their own.

Use Case Diagram:



Network Diagram:

