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Abstract

Rockwell CACD and CCA divisions merged into Rockwell Avionics & Communications in March, 1997 (now Rockwell Collins), creating support issues for integrating and maintaining several networks that included Banyan, Novell, Microsoft NT and PC-NFS (Hummingbird's Maestro). The combined total PC clients now number about 10,000, which include major sites in Cedar Rapids, Iowa; Dallas, Texas; and Melbourne, Florida. Other Service Centers and off-sites are also included in the total.

Introduction

A Common Network/Desktop planning team was formed in May 1997, to make plans to implement a **Common Network Operating System (CNOS)** and a **Common Desktop**, to be implemented across the 10,000 PC clients by September 30, 1998. The plan included transitioning the above sites, some with their own domains, to one NT Domain (CCANET). This included a mix of UNIX and NT servers providing Authentication, File and Print services, and Security. The plan also included delivering standard applications locally to the PC clients. As of June 1st, 8,000 of the 10,000 clients running Windows 95/NT have been converted to CCANET domain with the CNOS standard in place. In addition, installing the standard applications locally has completed the Standard Desktop requirements.

The CNOS implementation utilizes UNIX and NT servers in the following ways. UNIX home directories are being used for all PC clients. Global applications and data storage are accessed using both NT and UNIX servers. Authentication, printing and Systems Management Server (SMS) services are administrated via NT servers. This strategy allows for maximizing the utilization of current UNIX and NT resources within the company, thereby reducing overall costs. A third party product, Syntax's TAS,

provided the UNIX process to allow transparent mounting of UNIX drives to a PC in the NT environment. The client implementation provides delivery of over 80 common network applications with access via the Start Menu. Also, four highly used applications are loaded locally.

The following discussion centers on the process of delivering the first four applications locally to the 8,000 clients, ensuring a common desktop. The applications are Microsoft's Office 97 Professional, Command Software's F-PROT v3.0, Netscape Communications' Netscape Navigator v3.01, and Adobe's Acrobat Reader v3.0. The distribution of these local applications was done through the use of several tools and methods due to process requirements, unique software configurations and bandwidth limitations.

Strategy

After initial testing and piloting, the distribution of the four applications to the PC clients were to be completed using one of two processes. The distribution processes are labeled Large Application and Small Applications. The Large Application process is mostly driven by bandwidth limitations (i.e. 20 PC clients cannot download Office 97 at the same time on one subnet without adversely affecting network performance). The three other applications were distributed using the Small Applications model. Both processes use the SMS Server model (see next page) to assist in deployment and/or tracking of the Software inventory on the PCs.

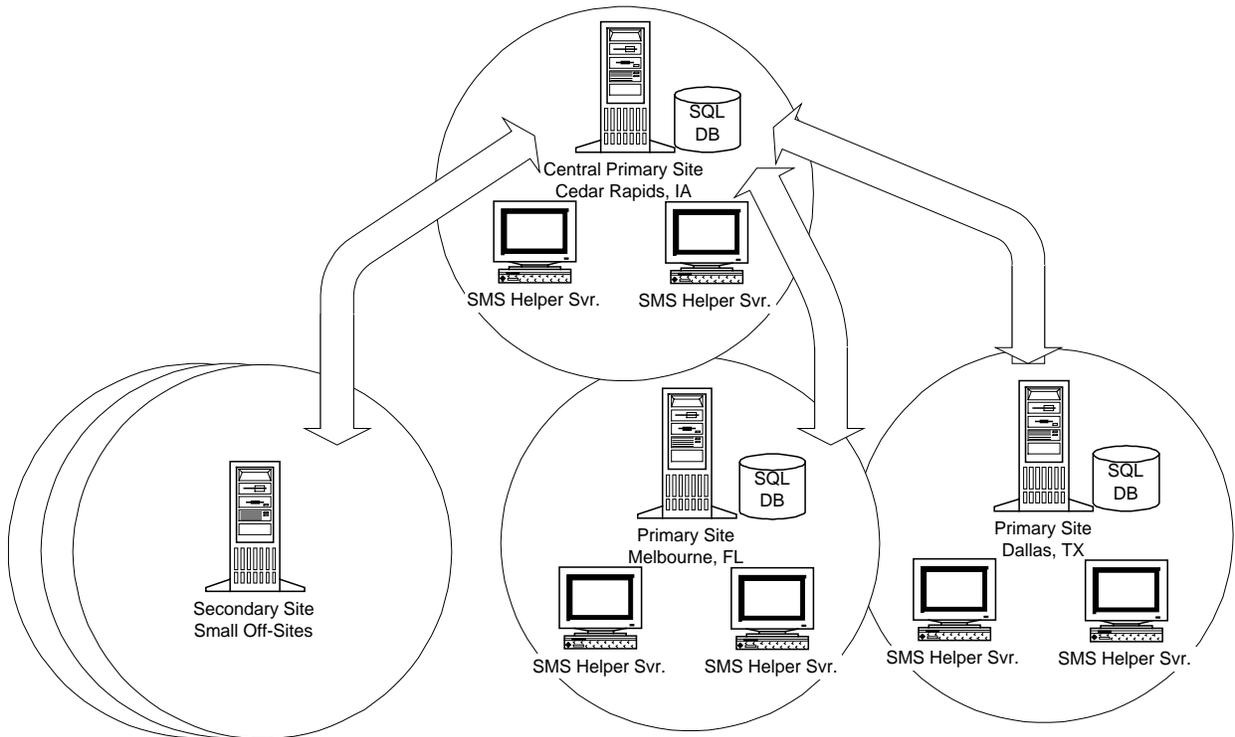
The distributions were also designed to deliver an unattended installation of each software package, reducing the number of personal installations by technical support staff.

SMS Server Model

Software Distribution Vehicle

Microsoft's Systems Management Server v1.2 (SMS) was chosen as the vehicle for small application deployment. SMS features software distribution networks as well as an inventory function that identifies PC's that need the software package and tracks those that have already received it.

The SMS Server model was set up with the Central Primary Site located at the Cedar Rapids, IA facility. Primary sites are established at locations with more than 250 employees while Secondary sites are placed at smaller facilities. Each site was configured to take client hardware and software inventory on a daily basis during the CNOS transition. After the transition was completed, the inventory was then reset to once a week.



SMS Server Hierarchy Diagram

Phase 1: Small Applications

The first wave of software distribution began with the three small applications:

- F-PROT Anti-virus v3.0
- Netscape v3.01
- Adobe Acrobat Reader v3.0.

The SMS Client is the medium in which all small applications are delivered and tracked on the client PCs. The SMS Client was installed during the initial CNOS logon transition process as a normal function of SMS.

Problems & Considerations

Unique to Rockwell Collins are the distributed S: drives (ideal for load balancing) where all software applications reside. To manage software installation points, all installations need to be directed to this common location. A challenge encountered was the SMS installations wanted to map to SMS distribution servers rather than a central drive letter such as S: in Rockwell Collins' case.

Also, on the client side, the Package Command Manager (PCM) maps the next available drive letter to install the delivered software and then removes the drive mapping. The challenge with the vanishing drive mapping comes when uninstalling software or adding additional components. Windows 95/NT requires a user to map to the exact drive letter that was originally used for the initial installation.

Solution

In order to direct all software installations to the central S: drive through SMS, a package was delivered to the user that contained a .PIF file and .BAT file.

Later, the user received a pop-up screen via the PCM. The delivered package was highlighted then executed by the user. Upon execution, the .PIF file was launched. The .PIF called a .BAT file that launched a Perl script. The Perl script started the installation:

1. PCM -> .PIF (PIF called when the Package Command Manager's *Execute* button is clicked)
2. .PIF -> .BAT (PIF file calls the .BAT file)
3. .BAT-> Perl Script (.BAT file calls the Perl Script [i.e. S:\perl\bin\perl.exe S:\scripts\netscape.pl])

The .PIF file was needed to launch the .BAT file because the .BAT file alone would open a window on the desktop that would not close and would hang an installation during any called system restarts.

The .BAT file was called next because a .PIF file would reliably start a Perl script.

The Perl scripts, located on the network S: drive, were used to wrap around the installation processes to provide necessary system modifications such as registry changes specific to Rockwell Collins and to make the installations more unattended than originally intended. No drives are remounted because drive S: is a permanent drive mount received at login and all installs were then received from the S: drive.

Implementation

The distribution of Netscape and Acrobat Reader were done within one Perl script on the first cycle of days as shown below. F-PROT followed the same schedule, starting a week after the initial Netscape push.

- Day 1-3: 100 Users per day
- Day 4-6: 500 Users per Day
- Day 5: 4,000 Users
- Day 10-20: Re-issue rollout to those who did not accept the first time.

Queries were built within SMS to track completions of successful installs and to re-send packages to those who had not installed the software. Typically, a window of 48 hours was given to the user to execute the installation package. If the user missed the window of opportunity then they were re-issued the package on follow-up pushes. These pushes were not mandatory.

The small applications did not present a problem in regards to network bandwidth. Netscape, with a loadset of 24MB, took about 2-5 minutes to install, depending upon the network load and the PC client's hardware configuration.

Phase 2: Large Applications:

The second phase of software distribution was delivering Microsoft Office 97 Professional to 6,000+ users. The strategy required a more varied approach compared to the delivery of small applications.

Considerations regarding the installation of Microsoft Office 97 Professional:

- *Space requirements*
The Rockwell Collins customized installation of Microsoft Office 97 required a minimum of 180MB of available hard disk space.
- *Network bandwidth*
Testing determined that only four installations per sub net could be running at one time before network efficiency was hindered.
- *User-friendly installation*
Once launched, the installation needed to be completely unattended.
- *Installation points to be directed to the central S: drive.*
A common installation point needed to be available for add/remove components, reinstall and uninstall Office 97. All installs needed to be directed to this common point and not to the original installation location.

Based on these considerations a two-tiered approach was implemented. The first step of installations was via CD-ROM, and second step consisted of a metered network installation from an applications folder off the Start menu.

Step 1: CD-ROM

SMS Installer creates a self-expanding executable that repackages one or more software applications into a single package to be distributed and installed automatically. SMS Installer eliminates the need for manual intervention and allows for customizations, including registry modifications. Using SMS Installer, a customized Office 97 installation was created to fit the needs of the Rockwell Collins user community. The executable created by SMS Installer contained over 7,000 registry changes including a few custom registry changes. Some of the customizations and registry modifications in the Rockwell Collins load set included:

- *Common installation point*
This modification changed the registry to reflect the network path where Office 97 resided. This allowed the user to reinstall

add/remove components and uninstall Office 97 without providing the CD-ROM.

- *ClipArt Extra installation point*
This modification placed the ClipArt Extra installation point in the registry and added a ClipArt Extra Install option to the Add/Remove Programs list, allowing the user to easily install additional clipart.
- *Non-Intervention installation*
This option was chosen to provide a user-friendly installation for the user community.

The installation script created with SMS Installer was placed on a CD-ROM and tested on a pilot group. After testing was completed, 1,000 CD-ROMs were created and distributed to points of contact throughout the organization. The points of contact were responsible for distributing the CD-ROMs to users within their workgroups for installation.

To prevent license violations, the CD-ROM installations required two criteria, a network connection check and a "flag" file check. The criteria checks were added to the executable through SMS Installer. If these criteria were not met, the installation was terminated.

The use of CD-ROMs decreased the installation time dramatically and no network resources were used. New Pentiums completed the installation in less than five minutes, while older 486 machines averaged approximately eight minutes. If disk space availability was an issue, the installation notified the installer of the additional disk space that was required to continue the installation. Once the installation was launched, no user intervention was required.

More than 1,000 Windows 95 machines had installed Office 97 after the first full week of the CD-ROM release. The CD-ROMs could only be used on Windows 95 machines. The Common NOS configuration changes for Windows NT machines had not been completed when the CD-ROMs were created. As of June 1st, over 6,000 Windows 95 machines have Office 97 loaded locally.

Step 2: Metered Network Installation

A common installation point was needed to add/remove components, reinstall or uninstall Office 97. In addition, it was needed for those in the user community that did not have a CD-ROM drive. Using the Microsoft Select CD, an administrative installation was placed on the network. A custom setup configuration was created for the administrative

installation using Microsoft Network Installation Wizard. Like SMS Installer, Network Installation Wizard allows for customization and registry modifications.

Because of network bandwidth constraints, the network installation was limited to four per sub net at one time by using a metering utility. When the network installation was initiated, the user's host name and sub net were logged to a file on the network. If the metering log file contained four entries with the same sub net as the user attempting to initiate the installation, the user was notified to try again later. After completion, the metering utility cleared the user's information from the metering log file.

Following the metering log, the network installation checked for available disk space and provided appropriate options based on the space available. The three installation options available are:

- If more than 250 MB of disk space was available, the user received a local installation of Office 97
- If only 200 to 250 MB of disk space was available, the user had the option to clear additional space for the local installation or to install a local version with shared applications running from the network.
- If only 100 to 200 MB of disk space was available, the user had the option to clear additional space, install on an alternative local drive, or run Office 97 from the network.

Disk space values were derived from the amount of space required for Office 97, plus additional space required for Windows efficiency and data storage.

Finally, the Office 97 setup was launched using a custom command line. The command line called the setup executable along with the customized configuration setup file. It also contained the necessary switches to perform an unattended installation.

SMS's primary role in the delivery of Office 97 was for tracking inventory of installations. SMS was tested for delivery of Office 97 but was used only on an occasional basis for delivery because of the lack of a network-metering feature. Furthermore, the .pdf file that was provided with Office 97 did not allow for certain modifications that were needed in the Rockwell Collins load set.

Remote Dial-up Machines

A minimal CNOS configuration exists that mounts limited drives and does not run the SMS clients. This configuration is for users who connect to the Rockwell Collins network via modem connections.

Users, however, can still connect to Drive S: via PPP connectivity and SecureID Tokens and download compressed versions of the Small Applications to the client. Large applications are still distributed via CD-ROM.

Summary

Pros

There are other large-scale solutions that are available to perform software distribution, inventory tracking and other tasks. Many also have the ability to perform from a remote connectivity basis. However, these other solutions have a considerably larger price tag than SMS Server does.

Rockwell Collins chose to implement SMS Server as the baseline for Software Distribution using a local CNOS strategy. This strategy also incorporates critical load balancing techniques in the solution.

Customizing specialized installations are made possible by combining the power of Perl with SMS. Along with this technique, an SMS tracking feature can be used for inventory purposes.

Cons

SMS Software distribution is a push technology. Installs can be mandated, requiring the user to stop all work and install the applications immediately or given a choice for installation within a specified period of time. If the user does not install the application within the specified period, the application must be pushed again by the administrator. For Windows 95 users within a large environment, both choices have downsides.

Also, SMS does not provide metering on a network basis, making Office 97 installations impractical on a large, enterprise network.

For Windows NT, this is not as much of a problem, because the installation can happen in the background.

Rockwell's current setup will inventory a machine once per week. The database is additive, so the burden of cleaning up old or legacy data resides upon the Server Administrator.

Acknowledgements

A successful rollout of applications to thousands of PC Clients cannot happen without successful Network, Server and SMS Server design and implementation strategies.

A large part of this recognition goes to the NT Server (Kevin Sizer, John Cole, Bill Ryder and Bill Hittenmiller) and UNIX Server (Bud Lande, Mark Hunt and Troy Page) teams who were responsible for providing the SMS Server infrastructure and testing and implementing the TAS solution.

John Cole, Danielle Legg and Kathy Kraft made up the original Software Distribution team. This team designed, piloted and rolled out the four, locally installed applications to over 6,000 users within a 5 month window.

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John Cole, after serving on the Desktop Integration team, is now an NT Server administrator within the IT department at Rockwell Collins, Inc.. His current work is leading much farther into the design and maintenance of the SMS Server Software.

Danielle Legg is a Desktop Administrator within the IT department at Rockwell Collins, Inc. Danielle's main work continues to be in the area of Software Distribution.

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