FINAL ASSIGNMENT WHITE PAPER

Sunny Scoop Shop: A Case Study in Common System Administration and Security Practices

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Sunny Scoop Shop: A Case Study in Common System Administration and Security

Practices

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Part I. Introduction

In promoting successful operation, it is important that a business establish standards for system administration and security. While customers may be drawn to a business due to reputation, store front, or product, weaknesses in system administration and security can easily affect customer loyalty. Customers need to feel that their information is confidential, and businesses need to ensure that data is accessible and maintains integrity. In an effort to evaluate the importance of standards, I have conducted a thorough study of system administration and security practices from the perspective of a system administrator at Sunny Scoop Shop, an ice cream shop headquartered in San Diego. This documentation touches on some of the tasks required of system administrators, such as creating policies, building, monitoring, and centralizing a service, documenting the security architecture of a service, assigning permissions, evaluating company roles and providing access to resources, and establishing processes for change and configuration management.

Part II. How Technology Affects the Sunny Scoop Shop

The Sunny Scoop Shop has come a long way since its original establishment as a single mom-and-pop ice cream joint in San Diego, CA. When the store first opened, it served only two flavors of ice cream: chocolate and vanilla. It was a small business with outdated technology. For example, the business maintained paper records for payroll and accounting. There was little technology implemented, other than that which provided assistance in the ice cream-making process, as well as processing customer payments. At the time of opening, the store had no website, servers, or database, and no way of digitally tracking employees, customer orders, or making data-driven business decisions. However, the charm of the little mom-and-pop shop allowed the small business to grow. That growth has prompted changes in technology, data

management, marketing strategies, and customer service. However, as the business continues to grow, it is important that additional technological implementations are considered.

As of today, Sunny Scoop Shop has ten different locations across ten different states. The employee base now consists of over 200 employees, and the company is still growing. Due to this rapid growth, Sunny Scoop Shop has implemented a variety of technologies to streamline processes and improve efficiency. For example, they now have a website (hosted by a third party), which provides information on daily flavors, store locations, and contact information. The need to advertise daily flavors arose when they made the business decision to offer two new flavors each day, aside from the classic chocolate and vanilla flavors. They also now utilize a Windows Active Directory domain, which can authenticate users logging into the system. In addition, Sunny Scoop Shop utilizes a MySQL database to track and manipulate data. They acquired an email server, as well as several other servers for varying purposes. Their main servers are all located in San Diego, where data is aggregated each day to generate reports. In addition, they maintain payroll and accounting records digitally. Sunny Scoop Shop currently employs the Yellow Pages for advertising purposes, but plans on hiring some new employees to expand their marketing avenues and help grow the business.

Moving into the future, Sunny Scoop Shop aims to maintain growth. According to *5 Best New Technologies for Your Business* (n.d.), "If technology is well implemented, small scale businesses have the chance to scale up." With the correct plan and timeline, additional technological improvements at Sunny Scoop Shop will support their ability to open new locations. While some businesses fear the immediate issues often associated with changes in technology (cost, training, installation of hardware, etc.), it is important to recognize that, "the benefits often outweigh the short-lived challenges of the transitional process, once new systems

are in place" (Gregory, 2019). With this being said, there are some changes that should be implemented at Sunny Scoop Shop more immediately than others.

One of the first changes that should be implemented at Sunny Scoop Shop is acquiring software that performs tracking. According to Kevin Kelly, "We're in the period now where the huge dimensions of data and their variables in real time needed for capturing, moving, processing, enhancing, managing, and rearranging it, are becoming the fundamental elements for making wealth," (Shontell, 2014). Tracking data across Sunny Scoop Shop's locations will have many benefits, including the ability to make data-driven business decisions. For example, Sunny Scoop Shop will be able to track data related to which flavors are the most popular. In addition, the shop can implement real-time inventory tracking to expedite inventory processing and communication across locations. According to Kayla Matthews (2017), "Traditional methods of tracking inventory can slow down a company if they engage in constant manual follow-ups with each location." Software platforms, such as Square, provide solutions to inventory-based challenges by sending automated notifications to the correct party when inventory for an item is low or out of stock (Matthews, 2017).

A second technological implementation that should be considered immediately is e-marketing. It is important that Sunny Scoop Shop establish an online presence to remain competitive with other businesses. Once new employees are hired to address the need for better advertising approaches, accounts for Sunny Scoop Shop should be created on Yelp, Facebook, Instagram, and Twitter. A Yelp account is important, since many consumers use the service to read reviews. Yelp reviews will also provide Sunny Scoop Shop owners with feedback concerning their products and services, so that they can direct improvements in the business. The Sunny Scoop Shop Facebook page can contain information such as daily flavors, locations,

and contact information, but it can also be used to promote community involvement. For example, the page can have surveys and questionnaires, and encourage customers to submit recommendations for new ice cream flavors. Instagram can be used to post photos of Sunny Scoop Shop's ice cream creations, and the company can incentivize customers with a drawing for free ice cream if they post pictures of their purchases with the tag #SunnyScoopShop. Twitter can be employed to post the daily flavors, as well as current news or events related to the shops in each location. Since posting to each of these platforms can be time consuming, Sunny Scoop Shop should invest in social media management software, which allows a user to post to multiple platforms at once, as well as schedule automated posts for later dates (Matthews, 2017). Other possible ideas for e-marketing include an e-mail campaign that incentivizes customers for signing up, a blog that highlights Sunny Scoop Shop customers in the local community, and a Sunny Scoop Mobile app.

Aside from data tracking and e-marketing implementations, technology can also be utilized to improve communication, collaboration, and efficiency across the organization. These implementations may require more time to implement, and may occur further down the time line. It may be useful to implement small, wireless conference rooms at each shop (Babar, n.d.). This would allow for video conferencing across locations to increase collaboration and consistency. In addition, Sunny Scoop Shop will want to utilize cloud services for file sharing across locations. Another means of streamlining workflow and communication is to establish an intranet (Gregory, 2019). Regarding customer concerns, it is recommended to integrate a ticketing system on the Sunny Scoop Shop website, which allows customers to electronically submit requests and issues (Limoncelli, Hogan, & Chalup, 2017). This will allow tickets to be prioritized, assigned, and tracked, in order to ensure that all requests are addressed in a timely

manner. The website can also be used to generate additional revenue through an online store that offers Sunny Scoop Shop merchandise, such as t-shirt, mugs, hats, etc. Since Sunny Scoop Shop already has multiple servers in San Diego, it may be financially beneficial to host and maintain the website on its own servers. Real-time website monitoring software such as Pingdom can be used to monitor the website's performance and detect issues (Matthews, 2017). Other changes that may improve hiring and onboarding include job postings on LinkedIn, and offering online training modules for new employees. A final consideration that will affect Sunny Scoop Shop's success is technology that provides data privacy, security, and integrity. Since the company is growing quickly, it is important that data is backed up regularly, and that vulnerabilities are prevented through authentication procedures, permissions, and the safe transmission of data.

While most of the technological implementations mentioned above will bring the operations of Sunny Scoop Shop up-to-date, while supporting scaling and increasing revenue, there are a few other technological changes that will aim to set Sunny Scoop Shop apart from other ice cream shops. One change that should be considered to attract new customers and generate growth is the implementation of robots in the stores themselves. The robots can fulfill the need to scoop ice cream and place it in bowls or cones, while providing entertainment for customers. Since most other ice cream shops do not employ robots in their daily activities, this is a feature that will make Sunny Scoop Shop locations unique, and draw in new customers. Drawing on the "old-fashioned charm" that caused Sunny Scoop Shop to grow in the first place, the shops can also host events, such as swing nights or silent discos to draw in community members and generate additional revenue. Even if these events are offered once per week, or once per month, they may create additional revenue and add to the ambience that Sunny Scoop Shop aims to provide. As Kayla Matthews (2017) states, "A company that finds itself lagging

behind competition can transform to greatness with specific tech changes, especially in software,

marketing technology, and digital data." Therefore, with a few technological changes, Sunny

Scoop Shop can not only be a lead competitor, but also a lead innovator in the ice cream

industry.

Part III. Concept Map
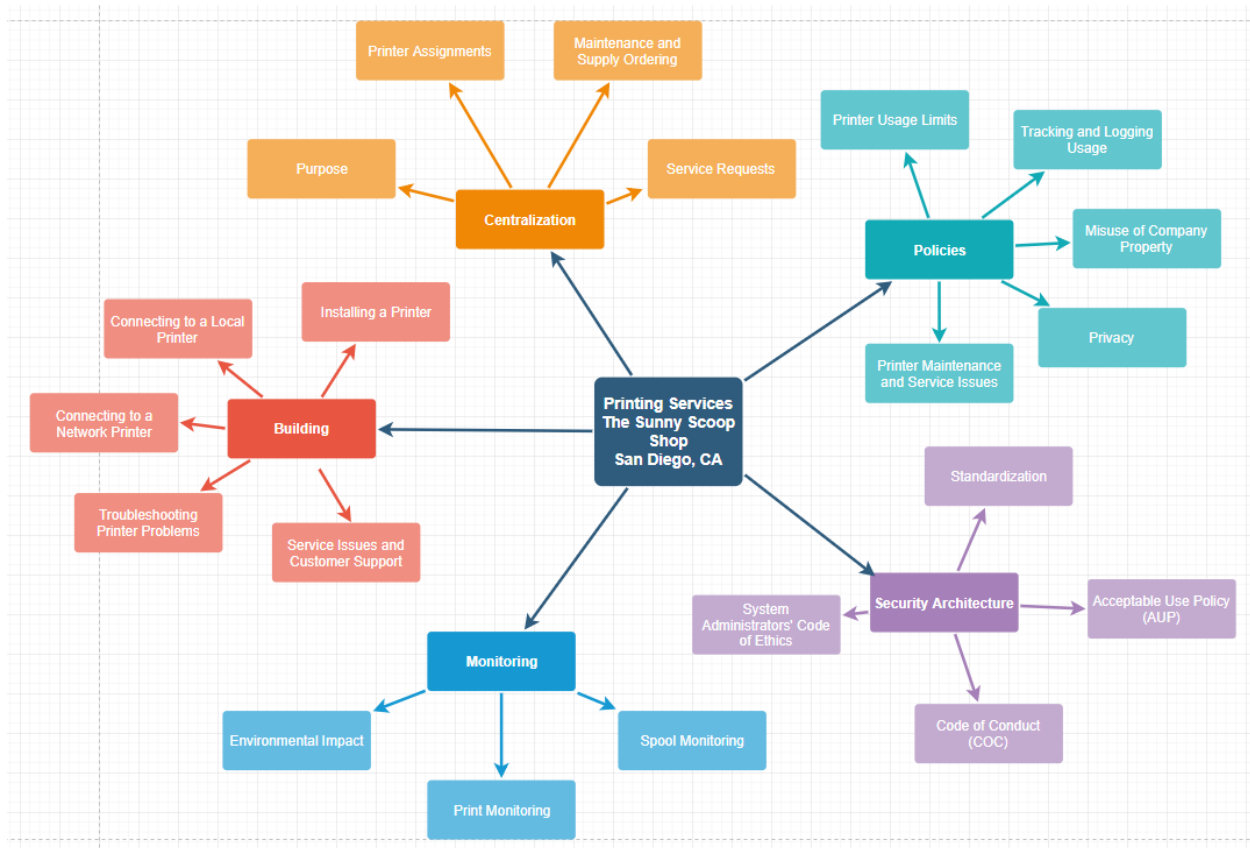
Click here to view the map in your browser.

Part IV. Policies

Last Updated On: April 29, 2019

Summary: This guide defines Sunny Scoop Shop's printing policies. Printing policies are

important because, "Not only do they help protect the business, but they also set clear guidelines

and expectations for staff and customers" (Sedlak, 2016). They also help minimize issues with staff and customers.

Authority:

This guide was approved by the CIO of Sunny Scoop Shop.

Applicability:

This guide applies to all employees and executives of Sunny Scoop Shop.

1. Printer Usage Limits

All employees must swipe employee badges at company printers/copiers before documents will be released. All employees may print black and white documents to both wired and wireless printers without supervisor permission. However, if printing a document in color is necessary, authorization will be required from a supervisor. The same is applicable to making copies.

Employees may print documents that are directly related to business functions. Copies are unlimited (within reason). However, employees should consider environmental impacts when deciding whether or not to print a document. Wasteful printing is highly discouraged. Employees may not print personal documents without supervisor approval. Doing so without supervisor approval may result in disciplinary action.

2. Tracking and Logging Usage

All employee print accounts will be tracked in an SQL database through a third-party app. Once an employee badge is swiped at a printer/copier, the job will be tracked. Data regarding number of pages, whether documents are printed in black and white or color, and any printer issues

encountered during a job will be tracked. In addition, images of all documents being printed will be cached. Furthermore, printer features utilized (print, copy, scan) will be recorded.

3. Misuse of Company Property

Sunny Scoop Shop takes a firm stand against criminal activity. All employees should refrain from using company property, including printers, copiers, and scanners, for illegal activities. If illegal activity is detected, employees will be subject to disciplinary action up to and including termination, if necessary. Personal copies are only permitted with supervisor approval. Doing so without supervisor approval may result in disciplinary action. All other Sunny Scoop Shop company policies apply when using company printing services.

4. Privacy

All employees should consider employee and customer confidentiality when printing documents. Printed documents containing employee and customer information should not be left out for the public eye. All printed items should be disposed of properly using the company-provided paper shredders. Failure to dispose of company property properly, or removing documents with employee and/or customer data from the company premises may result in disciplinary action.

5. Printer Maintenance and Service Issues

All employees are responsible for refilling paper trays when the paper supply runs out during a print job the employee has initiated. Toner changes will be handled by the IT team. For printer supply requests and service issues, please place a ticket with the Help Desk. For immediate assistance, please call 800-123-4567.

Part V. Building

Last Updated On: April 29, 2019

Summary: This guide defines how to add a new local or network printer in any of the ten Sunny Scoop Shop's locations. The guide also walks through steps to connect clients to local and network printers on the Windows 10 System that Sunny Scoop Shop employs. All steps in this guide are revised from Microsoft's Windows Support documentation, and can be found at https://support.microsoft.com.

Authority:

This guide was approved by the CIO of Sunny Scoop Shop.

Applicability:

This guide applies to all employees and executives of Sunny Scoop Shop, but especially to the system administrators.

1. Installing a Printer

If installing a local printer with a wired connection, plug the printer into the nearest wall outlet to supply power to the printer, and connect the USB cable from the printer to the computer. For more detailed instructions on set-up and installation, refer to the manual that came with the printer. If installing a wireless network printer, software may be required in order to connect devices to the printer. Read the instruction manual that cam with the printer and check the vendor's website for the most up-to-date software.

2. Connecting to a Local Printer (Microsoft, n.d.)

- Type **Settings** into the search box at the bottom left of the screen

- Hit **Enter**

- Click on **Devices**

- Click on **Printers and Scanners** in the left side bar

- Click **Add a printer or scanner**.

- Windows will search for printers and scanners

- If the desired printed is listed, choose the one you want and select **Add device**

- If your printer isn't in the list, select **The printer that I want isn't listed**, and then follow the instructions to add it manually using one of the options.

- If none are available and you have the installation CD, click Have Disk, and then browse to the folder where the printer driver is located. (For additional help, consult the printer manual.)

3. Connecting to a Network Printer (Microsoft, n.d.) (

- Type **Settings** into the search box at the bottom left of the screen

- Hit **Enter**

- Click on **Devices**

- Click on **Printers and Scanners** in the left side bar

- Click **Add a printer or scanner**.

- Windows will search for printers and scanners

- If the desired printed is listed, choose the one you want and select **Add device**

- If your printer isn't in the list, select **The printer that I want isn't listed**

- In the **Add Printer** window, select **Add a printer using a TCP/IP address or hostname** and then click **Next**. (Note: Your printer's IP address should be available on the printer.)

- In the next window, select **TCP/IP Device** from the **Device type** drop-down list, and then enter the printer's IP address in the **Hostname or IP address** text box. Then click **Next**. (Note: Your printer's IP address should be available on the printer.)

- In the next window, enter a descriptive name for your printer (the format for naming printers is "Sunny_(geographic location of shop)_number of printer"), and then click **Next**. **The printer name should also be printed out on a label and fixed to the physical printer for reference.

- In the next window, select the option **Do not share this printer** and then click **Next**.

- If the printer was added successfully, you should see a confirmation message. Click **Print a test page** to confirm that you can print to the printer.

4. Troubleshooting Printer Problems

General steps for troubleshooting include, but are not limited to, checking the hardware, using an automated troubleshooter, and updating drivers. If none of those steps resolve the issue, continue to "Service Issues and Customer Support".

5. Service Issues and Customer Support

For set-up and installation questions, please contact HP Customer Support at https://support.hp.com/us-en/contact-hp. For printer supply requests and service issues, please place a ticket with the Help Desk. For immediate assistance, please call 800-123-4567.

Part VI. Monitoring

Last Updated On: April 29, 2019

Summary: This guide defines the monitoring processes for printing services across Sunny Scoop Shop's ten locations. Print monitoring supports business efficiency and prevents unexpected delays due to depletion of printing supplies or service-related issues.

Authority:

This guide was approved by the CIO of Sunny Scoop Shop.

Applicability:

This guide applies to all employees and executives of Sunny Scoop Shop, but especially to the system administrators and technicians.

1. Spool Monitoring

Spooling is the process of scheduling print jobs from multiple devices connected to the same network printer. When a client sends a job to a printer, it is added to a queue. Spooling is controlled through designated software, and is utilized to organize print jobs.

Important characteristics of spooling that need to be monitored include ensuring the queue has not stalled, making sure the spool disk has not filled, ensuring that logs are being recycled, making sure the CPU has not become overloaded, and making sure the spool disk hasn't died. System administrators should configure the software to send out notifications from the system when there are issues related to spooling.

2. Print Monitoring

System administrators should be aware of alerts from the monitoring system that communicate printers are jammed, low on paper, or out of toner. These alerts need to be addressed within 24 hours. Aside from automated alerts, system administrators or site managers should check the status of network printers at each location daily.

Employees are responsible for refilling paper trays in printers when they are low. In addition, employees are responsible for submitting tickets to the Help Desk when paper supplies are low or a printer notifies the user that the toner cartridge is low.

3. Environmental Impact

As stated in the Sunny Scoop Shop Printing Policies, printer use is tracked in a SQL database. As such, and as Sunny Scoop Shop aims to be an environmentally friendly business, employees should be aware of the environment impacts of printing.

Employees should print only as needed and use the provided recycle bins to dispose of paper waste. In addition, employees should use the Print Preview feature before sending a print job to the queue. Site managers should recycle toner cartridges, and submit tickets to the Help Desk when recycling needs to be collected. System administrators should set the printing default to double-sided printing.

Part VII. Centralization

Last Updated On: April 29, 2019

Summary: This guide defines the purpose and plan for centralized printing across all Sunny Scoop Shop locations. Print centralization is an important feature of business operations that aims to reduce cost and increase efficiency.

Authority:

This guide was approved by the CIO of Sunny Scoop Shop.

Applicability:

This guide applies to all employees and executives of Sunny Scoop Shop, but especially to the system administrators and technicians.

1. Purpose

Print centralization reduces business costs. By implementing network printers and reducing the number of personal printers, Sunny Scoop Shop can invest in higher quality printing equipment that employees can share. In addition, as Sunny Scoop Shop is part of the Food and Service industry, printing requirements are limited to business operations.

2. Printer Assignments

Rather than maintaining a one-to-one computer/printer relationship, each Sunny Scoop Shop location will have a single network printer, which connects to all devices in the shop. Other, smaller printers may be requested for executives who require access to personal printers for confidentiality purposes. Service requests should be submitted to the Help Desk through the ticketing feature.

3. Maintenance and Supply Ordering

All printing services will be centralized through the original San Diego site. System administrators in the San Diego office should maintain a list of all printers with service logs. This document is available through the intranet, so that store managers across sites can view the information as well. All supply ordering related to printing services will also be initiated through the San Diego offices, based on tickets submitted through the Help Desk.

In addition, System administrators should maintain a list containing basic information related to all printers across sites. Information on this list should include printer names, locations, features, and who to contact with service issues. These lists should be posted on the wall next to all network printers, and should be updated regularly.

4. Service Requests

In the occasion an employee desires additional printing services, the employee should go through the store manager first. If additional services are deemed necessary, the store manager should submit a ticket to the Help Desk requesting the new service. Orders for new printing equipment will be initiated in San Diego to promote consistency across vendors and reduce costs.

Part VIII. Security Architecture

Last Updated On: April 29, 2019

Summary: This guide defines Sunny Scoop Shop's security architecture for printing services. Maintaining the security of Sunny Scoop Shop's proprietary data, as well as customer data, is of utmost importance in ensuring the future success and integrity of the business.

Authority:

This guide was approved by the CIO of Sunny Scoop Shop.

Applicability:

This guide applies to all employees and executives of Sunny Scoop Shop.

1. Standardization of Workstations

While computer access at Sunny Scoop Shop locations will be limited, it is important that workstations are standardized and that SA's or store managers follow standardization protocols when installing new printers or computers. Only SA's or store managers are permitted to install printer driver software. This ensures that all software is installed directly from the vendor's website, and that all software is current. Employees other than store managers or SA's (unless otherwise approved by a supervisor) are prohibited from downloading software onto company computers. Limiting the download of software to SA's and managers will reduce the risk of installing incorrect or pirated software, and introducing viruses to the Sunny Scoop Shop computer system.

2. Acceptable Use Policy (AUP)

Upon hiring, all new employees are required to read and sign the *Acceptable Use Policy* (AUP) attached. This policy discusses the acceptable use of printing services across all Sunny Scoop Shop locations, including those housed within the business offices at Sunny Scoop Shop headquarters in San Diego.

3. Code of Conduct (COC)

Upon hiring, all Sunny Scoop Shop employees with privileged access (SA's, store managers, and the CTO) are required to read and sign the *Code of Conduct* (COC) attached. This policy discusses the code of conduct that privileged users must adhere to in order to protect both themselves, as well as the Sunny Scoop Shop, from liability issues. The policy also addresses the protocol for dealing with law enforcement regarding technology issues.

4. System Administrators' Code of Ethics

Upon hiring, all Sunny Scoop Shop system administrators and other employees in technology roles are required to read and sign the *System Administrators' Code of Ethics* attached. This code is a framework for how SA's are to conduct themselves on a day-to-day basis to promote professionalism and integrity within the organization.

Sunny Scoop Shop Acceptable Use Policy (Printing Services)

This Acceptable Use Policy is intended for all employees of Sunny Scoop Shop, across all locations. Proper use of company equipment and printing services is expected of all employees. Violation of this agreement may result in disciplinary action up to and including termination.

As an employee of Sunny Scoop Shop, I agree that:

- I must swipe my company badge at print/copy machines in order to release a print/copy job. I am not to borrow a badge from another employee for printing purposes.

- I am limited to printing/copying in black and white, unless otherwise approved by a supervisor.

- I am only to print documents that are business-related, unless otherwise approved by a supervisor.

- I am to be aware of the environmental impacts of printing and copying, and I will limit the number of copies to the minimum amount necessary.

- My print/copy account will be monitored. Everything I print or copy will be tracked, including the number of pages, the type of job (print, copy, scan, etc.), a cached image of the documents, as well as whether they were printed in black and white or color.

- I am not to print anything that would be considered illegal or against company policy.

- I am responsible for maintaining confidentiality. I will not leave documents in plain sight that contain sensitive information, and I will dispose of paper waste properly.

First and Last Name _____ Date _____

Signature _____

Sunny Scoop Shop Code of Conduct

This Code of Conduct is intended for all employees of Sunny Scoop Shop that have privileged access (SA's, store managers, and the CTO), across all locations. Privileged access comes with responsibility, and has the potential to introduce vulnerabilities in the organization. Violation of this agreement may result in disciplinary action up to and including termination.

As an employee of Sunny Scoop Shop with privileged access, I agree that:

- I will use my privileged access responsibly, and only for purposes directly related to my role in the company.

- I will notify my supervisor immediately and fully if a mistake has been made, for the purpose of minimizing damage. I will not be punished for reporting my mistake if it is reported immediately and completely.

- If activities related to my role will put me in danger of seeing private information, I will have a witness watch me perform the activity, to verify that my actions do not violate privacy policies.

- If I unintentionally witness illegal activity, I will make myself aware of whistleblowing laws and consider reporting the issue. I may also seek legal advice if necessary.

- If I am asked to do something illegal or unethical by a supervisor, I will ask the supervisor to verify the request again both verbally and in writing. If the request remains the same, I will check to see if the request is against company policy. If the request is against policy, I will politely refuse the request. If the supervisor persists, I will escalate

the issue to a higher authority. I will also log everything that occurred throughout the incident.

- If I am directly contacted by law enforcement about an issue concerning the company, I will:

  o Relax and stay calm

  o Respond politely to the individual (I am still a representative of Sunny Scoop Shop), but do not provide them with any information

  o Verify the identity of the individual by asking for their first and last name, the name of the agency, and number to call them back

  o Validate that the information they provided is correct

  o Do not provide the individual with information that could be used for social engineering purposes (i.e. the name and contact information of my manager)

  o Refer the issue to management (let the individual know your supervisor will call them back)

  o Log all communication and requests

  o Managers: contact the Legal Department

  o Legal Department/Store Manager: verify that a warrant exists

  o Legal Department/Store Manager: hand over the minimum amount of information required to satisfy the request (challenge requests that are broad)

First and Last Name _____ Date _____

Signature _____

System Administrators' Code of Ethics (USINEX, 2003)

Professionalism

▪ I will maintain professional conduct in the workplace and will not allow personal feelings or

beliefs to cause me to treat people unfairly or unprofessionally.

Personal Integrity

▪ I will be honest in my professional dealings and forthcoming about my competence and the

impact of my mistakes. I will seek assistance from others when required.

▪ I will avoid conflicts of interest and biases whenever possible. When my advice is sought, if

I have a conflict of interest or bias, I will declare it if appropriate, and recuse myself if

necessary.

Privacy

▪ I will access private information on computer systems only when it is necessary in the course

of my technical duties. I will maintain and protect the confidentiality of any information to

which I may have access, regardless of the method by which I came into knowledge of it.

Laws and Policies

▪ I will educate myself and others on relevant laws, regulations, and policies regarding the

performance of my duties.

Communication

▪ I will communicate with management, users, and colleagues about computer matters of

mutual interest. I will strive to listen to and understand the needs of all parties.

System Integrity

▪ I will strive to ensure the necessary integrity, reliability, and availability of the systems for

which I am responsible.

- I will design and maintain each system in a manner to support the purpose of the system to the organization.

Education

- I will continue to update and enhance my technical knowledge and other work-related skills. I will share my knowledge and experience with others.

Responsibility to Computing Community

- I will cooperate with the larger computing community to maintain the integrity of network and computing resources.

Social Responsibility

- As an informed professional, I will encourage the writing and adoption of relevant policies and laws consistent with these ethical principles.

Ethical Responsibility

- I will strive to build and maintain a safe, healthy, and productive workplace.

- I will do my best to make decisions consistent with the safety, privacy, and well-being of my community and the public, and to disclose promptly factors that might pose unexamined risks or dangers.

- I will accept and offer honest criticism of technical work as appropriate and will credit properly the contributions of others.

- I will lead by example, maintaining a high ethical standard and degree of professionalism in the performance of all my duties. I will support colleagues and co-workers in following this code of ethics.

First and Last Name _____ Date _____

Signature _____

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THE ADVANCED
COMPUTING SYSTEMS
ASSOCIATION

usenix
LISA

LOPSA
the league of professional system administrators

Part IX. Access Control Standard

The access control standard for Sunny Scoop Shop will be founded on a role-based access control (RBAC) model. This model is an ideal hybrid between the hierarchical and compartmentalized versions of mandatory access control. The reason for this choice is that the model allows for centralized access control, while allowing for flexibility in permissions (Stewart, Chapple, & Gibson, 2012). In other words, an employee of Sunny Scoop Shop may be assigned a role upon onboarding with the organization. This role employs the compartmentalization feature of mandatory access control. However, permissions for individuals can be further customized by employing the hierarchical feature of mandatory access control as well. For example, the Lead Warehouse Receiver (Bill) might fall into the general category of warehouse employees, however, he might require more privileged access than shippers like Stew and Tom. This privileged access can be granted through utilization of the hierarchy component of mandatory access.

Permissions should be assigned to resources carefully, keeping the principles of need to know and least privilege in mind (Ferraiolo, Kuhn, & Chandramouli, 2007). When a new employee is onboarded, Human Resources will assign them a company role with Sunny Scoop Shop. This assignment will be forwarded to the IT department, who will create an account for the employee. When the account is created, the user will be granted privileges based on pre-determined rules associated with their company role. Every new employee is required to receive training in the security policies and procedures provided in the documentation for Sunny Scoop Shop. They are also required to read and sign the Acceptable Use Policy, Code of Conduct, and System Administrators' Code of Ethics, as appropriate for their role. When an employee is terminated from the organization, the account must be disabled immediately following

termination. The employee account should then be deleted after 30 days. Throughout the employee lifecycle, access should be monitored and revised to prevent excessive privilege and creeping privileges (Stewart, Chapple, & Gibson, 2012).

A significant point of concern at the present time is evaluating the current roles and responsibilities of employees at The Scoop. For example, Julie currently exhibits two roles at the shop—she works in sales during the day, and in the evenings, she works as an accounts payable clerk. In the original employee access control matrix for Sunny Scoop Shop, Julie has access to files for all departments including accounts payable, accounts receivable, general accounting, and sales. In her accounts payable position, she has permissions to correct customer orders. This may be a conflict of interest, since she is also in sales. Furthermore, the shop has noticed unusually low profits despite recent improvements in efficiency, and they suspect that someone may be stealing from the company. In order to rule out Julie as the source of the problem, and promote ethical operations within the company, Julie should be reassigned to a role that is fully in the sales department, and she will no longer have access to accounts payable.

In evaluating other roles at The Scoop, many positions have excessive privileges (based on the original access control matrix). The access control matrix needs to be modified to reflect the principles of least privilege and need to know so that employees are limited to the resources directly related to tasks required for their positions (Ferraiolo, Kuhn, & Chandramouli, 2007). Employing role-based access control will also prevent future conflicts of interest. In the original access control matrix, Mom and Pop have access to all department files and data. After incorporating feedback from peers, I recommend providing Mom and Pop read-only access to everything except for the executive department, which they shall have full access to. This should promote ethical practices and deter fraud (Rouse, n.d.). Chelsea, Bill, Julie, Michael, Stew, and

Tom also have full access to every department. I find this troubling, since these employees have permissions to departments well outside of their scope of employment, especially Stew and Tom, who are shippers in the warehouse. All in all, I recommend that no role in the company have exclusive access, as that would be considered excess privilege (Stewart, Chapple, & Gibson, 2012). Furthermore, no new roles need to be created or removed from the company. The only change of role recommended is placing Julie in a solely sales position.

Original Access Control Matrix:

The following matrix outlines the users with their current rights and permissions:
A = Assigned to the user
JB = Assigned By Job
RO = Read Only
N = No permissions assigned

| | | | | | | | | | Segregation of Duties Matrix | | | |
| | | | | | | | | | (System User–Rights and Permissio | | | |
Department	MOM	POP	Chelsea	Bill	Julie	Michael	Stew	Tom	Sarah	Beth	Susan	Mary
Receiving	A	A	A	A	A	A	A	A	RO	RO	RO	RO
Shipping	A	A	A	A	A	A	A	A	RO	RO	RO	RO
Sales	A	A	A	A	A	A	A	A	RO	RO	RO	RO
Executive	A	A	A	A	A	A	A	A	RO	RO	RO	RO
Scoopers	A	A	A	A	A	A	A	A	RO	RO	RO	RO
R&D	A	A	A	A	A	A	A	A	RO	RO	RO	RO
Payroll	A	A	A	A	A	A	A	A	RO	A	A	A
Human Resouces	A	A	A	A	A	A	A	A	RO	A	A	A
Accounts Payable	A	A	A	A	A	A	A	A	RO	A	A	A
Accounts Receiveable	A	A	A	A	A	A	A	A	RO	A	A	A
Accounting - General	A	A	A	A	A	A	A	A	RO	A	A	A

Department	Josh	Jane	Big Scoopers	Assistant Big Scoopers	Scoopers	Extra	Guests	IT	System Administrator (You)
Receiving	RO	RO	A	A	JB	RO	RO	A	A
Shipping	RO	RO	A	A	JB	RO	RO	A	A
Sales	RO	RO	A	A	JB	RO	RO	A	A
Executive	RO	RO	A	A	JB	RO	RO	A	A
Scoopers	RO	RO	A	A	JB	RO	RO	A	A
R&D	RO	RO	A	A	JB	RO	RO	A	A
Payroll	RO	RO	A	A	JB	RO	RO	A	A
Human Resouces	RO	RO	A	A	JB	RO	RO	A	A
Accounts Payable	RO	RO	A	A	JB	RO	RO	A	A
Accounts Receiveable	RO	RO	A	A	JB	RO	RO	A	A
Accounting - General	RO	RO	A	A	JB	RO	RO	A	A

Revised Access Control Matrix:

Use the following matrix, to provide the users with the appropriate rights and permissions:												
The matrix may be revised to assign the apprpriate rights and permissions.												
A = Assigned to the user												
JB = Assigned By Job												
RO = Read Only												
N = No permissions assigned												

| | | | | | | | | | | | | **Segregation of Duties Matrix** |
| | | | | | | | | | | | | (System User–Rights and Permissio... |
Department	MOM	POP	Chelsea	Bill	Julie	Michael	Stew	Tom	Sarah	Beth	Susan	Mary
Receiving	RO	RO	RO	JB	N	JB	RO	RO	JB	RO	N	N
Shipping	RO	RO	RO	JB	N	JB	JB	JB	JB	RO	N	N
Sales	RO	RO	RO	RO	JB	RO	N	N	RO	N	N	N
Executive	A	A	JB	N	N	N	N	N	N	RO	RO	N
Scoopers	RO	RO	RO	N	N	N	N	N	RO	N	N	N
R&D	RO	RO	RO	N	N	N	N	N	RO	N	N	N
Payroll	RO	RO	N	RO	N	RO	N	N	N	RO	JB	JB
Human Resouces	RO	RO	RO	RO	N	RO	N	N	RO	JB	RO	RO
Accounts Payable	RO	RO	RO	RO	RO	RO	N	N	RO	N	JB	RO
Accounts Receiveable	RO	RO	RO	RO	RO	RO	N	N	RO	N	RO	N
Accounting - General	RO	RO	RO	RO	N	RO	N	N	RO	N	RO	RO

Department	Josh	Jane	Big Scoopers	Assistant Big Scoopers	Scoopers	Extra	Guests	IT	System Administrator (You)
Receiving	N	N	N	N	N	N	N	JB	JB
Shipping	N	N	N	N	N	N	N	JB	JB
Sales	RO	RO	JB	RO	N	N	N	JB	JB
Executive	N	N	N	N	N	N	N	N	JB
Scoopers	RO	RO	JB	JB	JB	N	N	JB	JB
R&D	JB	JB	RO	RO	N	N	N	RO	JB
Payroll	N	N	N	N	N	N	N	N	JB
Human Resouces	N	N	RO	RO	N	N	N	N	JB
Accounts Payable	N	N	RO	N	N	N	N	N	JB
Accounts Receiveable	N	N	RO	N	N	N	N	N	JB
Accounting - General	N	N	RO	N	N	N	N	N	JB

Part X. Change Management

Sunny Scoop Shop Change Management Process
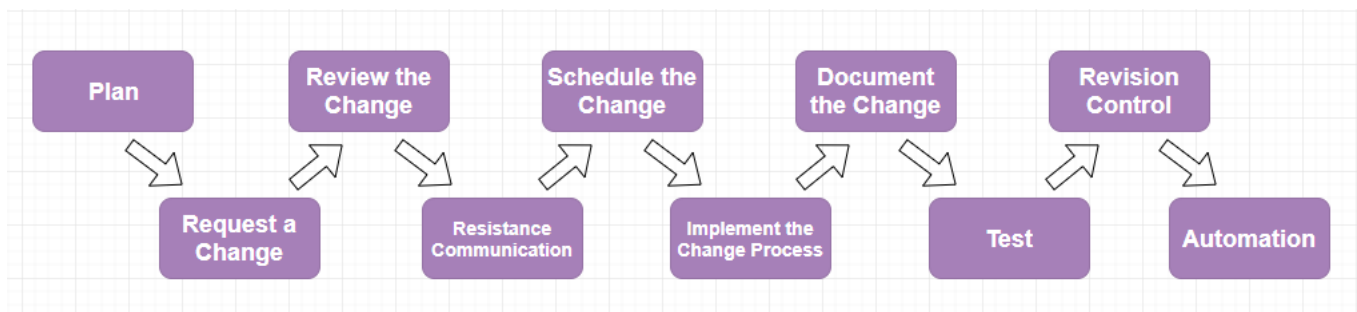
1. Plan

The SA must come up with a detailed plan outlining the changes that will be made, the systems and services affected, reasons for the change, risks, how tests will be performed, a backout plan, how long the implementation will take, and how long the backout plan implementation will take (Limoncelli, Hogan, & Chalup, 2017).

2. Request a Change

Proposed changes shall be submitted to the change review board, which reviews requests to ensure that they will benefit the organization as a whole (Limoncelli, Hogan, & Chalup, 2017). In addition, the change review board prevents unnecessary changes from occurring and defines how changes will be implemented.

3. Review the Change

The change review board will either approve or deny a change request depending on how the proposed change will affect the organization (Limoncelli, Hogan, & Chalup, 2017). The change request board evaluates possible impacts, risks, and side effects of the change before approving or denying requests.

4. Change Management Resistance Communication

It is important to consider communication that goes out to users and the IT team before the change process is implemented. Customers should be aware of the date and time that the change will occur, whether or not they need to take action before the change, and what to expect afterwards (Limoncelli, Hogan, & Chalup, 2017). Education promotes buy-in from users and business executives. Communicating the why, along with the what, will help prevent resistance

throughout the process (Faucheux, 2015). The IT team should have exact details of the change implementation process, as well as the backout plan.

5. Schedule the Change

The goal of scheduling the change should be minimal impact (Limoncelli, Hogan, & Chalup, 2017). Sensitive changes should be executed during non-peak hours. The specific type of change, change classification, impact to customers, and involvement of SA's should all be considered when scheduling the change.

6. Implement the Change Process

The change process should be repeatable and should be carried out in a test environment first to evaluate impact. Once the process is ready for deployment, steps should be carried out according to the approved plan.

7. Document the Change

All aspects of the change should be documented, including any necessary changes to configuration management. This allows all parties to be aware of the change and have updated resources (Stewart, Chapple, & Gibson, 2012).

8. Testing

Once the change process has been fully implemented, the system should be tested to determine whether or not the change meets success criteria. Success criteria is not only used to determine whether or not the change worked, but also whether or not the intended results were achieved, and whether or not there are any unintended results (Limoncelli, Hogan, & Chalup, 2017). If the

results are not as intended, or debugging will not resolve issues, the backout plan should be considered.

9. Revision Control

A version control system should be used to track changes and maintain a version history. This allows source code to be stored, modified, and pushed to production, while logging changes. A recommended version control system is Git (Limoncelli, Hogan, & Chalup, 2017).

10. Automation

All steps in the process that are standardized should be automated to reduce error and promote consistency. Automation also increases productivity, allowing more time for other projects.

Part XI. Configuration Management

Sunny Scoop Shop Configuration Management Process

1. Version Control

Establish a version control system to store legacy code, log changes, and maintain version history (Prakash, n.d.). This will allow administrators to debug more easily, restore data if necessary, and see who made changes when.

2. Create a Baseline

Design a baseline system, and install all desired software and applications on a single client (Stewart, Chapple, & Gibson, 2012). Ensure that the system meets the basic needs of the entire organization. Perform testing to confirm that everything operates as expected.

3. Capture an Image of the System

Use imaging software to capture an image of the baseline system. Store the image in multiple locations such as servers, as well as on external hard drives or DVD's (Stewart, Chapple, & Gibson, 2012).

4. Deployment

Deploy the baseline image on new clients as necessary. Once the baseline is established, perform additional configuration as necessary (Stewart, Chapple, & Gibson, 2012). For example, if the accounting department requires a unique application for accounting purposes, further configure clients in accounting after the baseline system has been deployed.

5. Audits & Review

Audit the configuration management process to ensure that the documentation is being followed consistently (Prakash, n.d.). Modify documentation for the configuration management process as needed.

6. Automation

Reduce error and promote consistency by automating where possible. Build, integrate, and deploy scripts to automate the configuration management process (Prakash, n.d.). This will improve standardization.

Part XII. Conclusion

     System administrators play a complex role in managing the technology that an organization relies upon. There are a large number of tasks that they perform in order to maintain systems. The League of Professional System Administrators (n.d.) mentions that system administrators set up and maintain computer systems, work on hardware, take part in complex programming, develop configuration management protocols, take advantage of technological advances, perform virtualization of servers and networks, move systems to hosted services, open and set up new devices, look at the code of the software, fix problems, explain why changes are necessary, design temporary fixes, communicate to customers and management the benefits and limitations of technology, make recommendations on technology, educate others, and maintain confidentiality, in addition to other tasks. System administration is a unique role in that it requires technical expertise, along with a slew of soft skills including adaptability, passion, the ability to admit and learn from mistakes, being open to new ideas, being helpful, the ability to problem solve, taking ownership, perseverance, good communication, and strong ethics. These qualities allow system administrators to support customers and employees by providing services in a productive way.

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