What is The Role Of the System Administrator?
Can you explain the role of the system administrator? The person who is responsible for setting up and maintaining the system or server is called as the system administrator. System administrators may be members of an information technology department. Most of the following discussion also applies to network and Windows system admins.

Duties of a system administrator
The duties of a system administrator are wide-ranging, and vary widely from one organization to another. Sysadmins are usually charged with installing, supporting, and maintaining servers or other computer systems, and planning for and responding to service outages and other problems. Other duties may include scripting or light programming, project management for systems-related projects.

The system administrator is responsible for following things:

1. User administration (setup and maintaining account)

2. Maintaining system

3. Verify that peripherals are working properly

4. Quickly arrange repair for hardware in occasion of hardware failure

5. Monitor system performance

6. Create file systems

7. Install software

8. Create a backup and recovery policy

9. Monitor network communication

10. Update system as soon as new version of OS and application software comes out

11. Implement the policies for the use of the computer system and network

12. Setup security policies for users. A sysadmin must have a strong grasp of computer security (e.g. firewalls and intrusion detection systems)

13. Documentation in form of internal wiki

14. Password and identity management

Cloud computing and sysadmin

Cloud computing is nothing but a large number of computers connected through the Internet/Wan. Cloud computing is now part of technology and sysadmin must lean:

1. Automation software such as puppet, chef, etc.

2. Cloud infrastructure such as AWS, Openstack etc.

3. Network services in cloud such as Content delivery networks (Akamai, CloudFront etc) and DNS servers.

4. Source control

5. Designing best practices for backups, and whole infrastructure.

What is so special about the system administrator account?

The root account has full (unrestricted) access, so he/she can do anything with system. For example, root can remove critical system

files. In addition, there is no way you can recover file except using tape backup or disk based backup systems.

Many tasks for system administration can be automated using Perl/Python or shell scripts. For example:

- Create new users

- Resetting user passwords

- Lock/unlock user accounts

- Monitor server security

- Monitor special services etc

Most important skill to a system administrator
Problem solving, period. This can some time lead into all sorts of constraints and stress. When workstation or server goes down, you are called to solve the problem. You should able to quickly and correctly diagnose the problem. You must figure out what is wrong and how best it can be fixed in small amount of time.

System administrators are not...
- Cookie cutting software engineers.

- Developers.

- It is not usually within your duties to design new applications software.

- But, you must understand the behavior of software in order to deploy it and to troubleshoot problems, and generally should be good at several programming languages used for scripting or automation of routine tasks such as shell, awk, perl, python etc.

System administrator responsibilities: 9 critical tasks

Sysadmins are responsible for a wide range of duties, but these are the most essential.

System administrators are critical to the reliable and successful operation of an organization and its network operations center and data center. A sysadmin must have expertise with the system's underlying platform (i.e., Windows, Linux) as well as be familiar with multiple areas including networking, backup, data restoration, IT security, database operations, middleware basics, load balancing, and more. Sysadmin tasks are not limited to server management, maintenance, and repair, but also any functions that support a smoothly running production environment with minimal (or no) complaints from customers and end users.

Although sysadmins have a seemingly endless list of responsibilities, some are more critical than others. If you work in a sysadmin role (or hope to one day), make sure you are ready to follow these best practices.

Documentation

Documentation is how sysadmins keep records of assets, including hardware and software types, counts, and licenses. Should there be any issues in the production environment, documentation helps identify the hardware, virtual machine, appliance, software, etc., that may be involved.

Hardware inventory

Maintain lists of all your physical and virtual servers with the following details:

- **OS:** Linux or Windows, hypervisor with versions
- **RAM:** DIMM slots in physical servers

- **CPU:** Logical and virtual CPUs
- **HDD:** Type and size of hard disks
- **External storage (SAN/NAS):** Make and model of storage with management IP address and interface IP address
- **Open ports:** Ports opened at the server end for incoming traffic
- **IP address:** Management and interface IP address with VLANs
- **Engineering appliances:** e.g., Exalogic, PureApp, etc.

Software Inventory

- **Configured applications:** e.g., Oracle WebLogic, IBM WebSphere Application Server, Apache Tomcat, Red Hat JBoss, etc.
- **Third-party software:** Any software not shipped with the installed OS

License details

Maintain license counts and details for physical servers and virtual servers (VMs), including licenses for Windows, subscriptions for Linux OS, and the license limit of hypervisor host.

Server health checkup

- **Running processes:** Check for processes that are consuming more resources than expected, and take action to fine-tune the applications (with the help of the application team).
- **CPU utilization:** Consistently monitor and check the CPU utilization of the critical process like "java", "http", "mysql" etc. to ensure that these are not consuming the CPU resources more than expected. If it is so, then coordinate with the application team to check it at application level and fine tune the same. Parallely analyse the OS parameters like "Ulimits".

- **Memory utilization:** Check memory utilization and clear the cache, if required.
- **Zombie processes:** Check for processes where the PID still exists in the process table after it is terminated. Zombie processes degrade server performance, so find and kill any that exist.
- **Load average:** If you're having performance issues, check the load average and tune the server for performance.
- **Disk/SAN/NAS utilization:** Check the I/O reports for externally attached storage to track and check the speed of read/write operations. If you find any issues, coordinate with the storage and network teams immediately to correct them.

Backup and disaster recovery planning

Communicate with the backup team and provide them the data and client priorities for backup. The recommended backup criteria for production servers is:

- **Incremental backups:** Daily, Monday to Friday
- **Full backup:** Saturday and Sunday
- **Disaster recovery drills:** Perform restoration mock drills once a month (preferably, or quarterly if necessary) with the backup team to ensure the data can be restored in case of an issue.

Verifying the application behavior and implications of data loss and/or the disruption that failover involves is a good engineering practice. It is also a requirement by most industry standards as part of **business continuity** certification. Performing a **disaster recovery drill** consists of: Simulating data tier outage.

Why DR drill is important?
How Frequently Do You Perform **DR Drill** Tests? Without a Disaster Recovery (**DR**) plan, your organization is at exceptional risk of loss of business, hacking, cyber-attacks, loss of confidential data, and more. Your **DR** plan can prolong your business

continuity potential until the disaster has been appropriately handled.

Patching

Operating system patches for known vulnerabilities must be implemented promptly. There are many types and levels of patches, including:

- Security
- Critical
- Moderate

When a patch is released, check the bug or vulnerability details to see how it applies to your system (e.g., does the vulnerability affect the hardware in your system?), and take any necessary actions to apply the patches when required. Make sure to cross-verify applications' compatibility with patches or upgrades.

Server hardening

Linux:

- **Set a BIOS password:** This prevents users from altering BIOS settings.
- **Set a GRUB password:** This stops users from altering the GRUB bootloader.
- **Deny root access:** Rejecting root access minimizes the probability of intrusions.
- **Sudo users:** Make sudo users and assign limited privileges to invoke commands.
- **TCP wrappers:** This is the weapon to protect a server from hackers. Apply a rule for the SSH daemon to allow only trusted hosts to access the server, and deny all others. Apply

similar rules for other services like FTP, SSH File Transfer Protocol, etc.

- **Firewalld/iptables:** Configure firewalld and iptables rules for incoming traffic to the server. Include the particular port, source IP, and destination IP and allow, reject, deny ICMP requests, etc. for the public zone and private zone.
- **Antivirus:** Install antivirus software and update virus definitions regularly.
- **Secure and audit logs:** Check the logs regularly and when required.
- **Rotate the logs:** Keep the logs for limited period of time like "for 7 days", to keep the sufficient disk space for flawless operation.

Windows:

- **Set a BIOS password:** This prevents users from altering BIOS settings.
- **Antivirus:** Install antivirus software and update virus definitions regularly.
- **Configure firewall rules:** Prevent unauthorized parties from accessing your systems.
- **Deny administrator login:** Limit users' ability to make changes that could increase your systems' vulnerabilities.

Use a syslog server

By configuring a syslog server in the environment to keep records of system and application logs, in the event of an intrusion or issue, the sysadmin can check previous and real-time logs to diagnose and resolve the problem.

Automation

Many sysadmin tasks (such as server health checkups, resource utilization, backup triggers, transfer files and logs, etc.) must be done at specific times. Therefore, the sysadmin must write scripts or use external tools and configure them as cron jobs to do the tasks automatically at the proper time.

Monitoring tools

Install and configure live monitoring tools like Nagios, HP, etc., to monitor your IT infrastructure and issue alerts about potential problems.

Conclusion

While these are the most important tasks a sysadmin is responsible for, there is much more to the role than the duties on this list.

For example, the sysadmin must coordinate with multiple teams to resolve issues, communicate with and update customers, maintain 100% uptime, hold discussions with the audit team, prepare weekly/monthly/quarterly reports, do continuous monitoring of servers and services using appropriate tools, and maintain the hardware console and respond to any triggered alarms.

The sysadmin is always a single point of content (SPOC) in the data center or network operations center for issues related to web hosting, application and server outages, and other critical IT operations problems.

An Introduction to Microsoft Server and Client Licensing

Understanding and choosing the right licenses for your Microsoft server products

If choosing licenses for your Microsoft server products is making your head spin, our guide to Microsoft server and client licensing is here to help.

Editor's Note: *This article was adapted from an article authored by Chris Peters in March 2009.*

Microsoft's server licensing can be complicated. Do you need a client access license (CAL)? If so, should it be a user CAL or a device CAL? And should your CAL operate in per-server or per-seat mode? If choosing licenses for your Microsoft products is making your head spin, our guide to Microsoft server and client licensing is here to help.

We'll cover licenses for server software, licenses for clients, and some advanced Microsoft licensing scenarios. And while this article focuses on Microsoft server applications, similar issues can arise with other server applications.

Licenses for Server Software

The license required to install and run most server applications usually comes bundled with the software itself. So you can install and run most applications "out of the box," as long as you have the right number of client licenses and meet the server licensing requirements. More detail on client licensing is provided below.

In some cases, though, you may need additional licenses in order to run your server software:

- Every time you install server software (on a physical server or a virtual one), you create an "instance" of that application. The number of "instances" of a particular application that you can run using a single license varies from product to product.

- With "per processor" or "per core" or licensing, the amount of server licenses needed depends on the number of processors or processor cores on which the server software runs. In some cases, only physical processors or cores need to be licensed, while virtual processors or cores must be licensed for certain products.

For more information about server licensing, read TechSoup's Guide to Microsoft Server Licensing, which contains links to guides on licensing specific Microsoft server products.

Licenses for Clients

Depending on the licensing scenario, "clients" can be either the end users themselves (employees, contractors, clients, and anyone else who uses the software in question) or their computing devices (for example, laptops, desktop computers, smartphones, tablets, etc.).

There are a few things to think about when you're planning for client licenses.

User CALs or Device CALs?

- **User CALs** allow each user access to all the instances of a particular server product in an organization, no matter which device they use to gain access. This means each user can access the server software from as many devices as they want (for example, from a desktop, laptop, or smartphone). User CALs are the more common licensing option.

- **Device CALs** allow access to all instances of a particular server product from a single device (a laptop or a desktop computer, for example), regardless of how many people use that device. Device CALs are less common that user CALs, but they do make sense when multiple employees use the same computer. For example, in 24-hour call centers, different employees on different shifts often use the same machine, so device CALs make sense in that situation.

Per User/Per Device or Per Server Licensing Mode?

With Windows Server, you use a CAL in one of two licensing modes: per user/per device (sometimes referred to as "per seat") or per server. You make this decision when you're installing your Windows Server products, not when you acquire the CALs. The CALs themselves don't have any mode designation, so you can use either kind of CAL in either licensing mode.

- **Per user/per device** or "per seat" mode is the default mode, and the one used most frequently. In this mode, you need one CAL per user or device that will be accessing the server software, regardless of the number of servers being accessed.

- In **per server** mode, you are allowed a specified maximum number of simultaneous connections to the server. In other words, if you have 40 CALs, Windows will let 40 authenticated users have access. The 41st user will be denied access. Per server mode works for some small charities and organizations with one or two servers and limited access requirements.

Some Key Points About Client Licensing

- **Do your reading** — Make sure you read the product descriptions and any other available documentation carefully to make sure you understand all the details about licensing a particular application.

- **You don't always need CALs** — Not all server-based software requires CALs. Although many Microsoft products — including Windows Server — do require CALs, SQL Server and other products don't require any client licenses. Software licensed with a processor license usually doesn't require CALs either.

- **You need only User CALs or Device CALs**, not both — For example, you don't need to get a user CAL for yourself and a device CAL for your computer. And while legally you can use a mix of the two different types of licenses, it's not recommended in most situations.

- **You often get a few administrative client licenses** — Microsoft server products always include one or two client licenses for administrative use so you or your IT staff can access, configure, and troubleshoot the software.

- **Client apps don't come with client licenses** — Client licenses aren't bundled with the standard Microsoft client applications. They have to be obtained separately, even when there seems to be a natural connection between two types of software. For example, Microsoft Outlook (an email client application) doesn't come with a client license for Microsoft Exchange (an email server application).

- **Consider CAL suites** — If you need CALs for several different Microsoft products, see if there are CAL suites available. For example, Microsoft [Core User CAL Suites](#) and [Core Device CAL Suites](#) are available through TechSoup products. These suites bundle together CALs and other licenses for several Microsoft server technologies.

- **You often need multiple licenses per client** — A single client (either a person or machine) often needs multiple licenses when accessing one physical server. For example, if

you use your desktop computer to access a SharePoint Server on a Windows Server machine, you have to have a client license for both products.

Advanced Microsoft Licensing Scenarios

The licensing scenarios described in this section are less common, so we'll cover them only briefly. The Additional Resources section provides more information on these advanced scenarios.

- **Client licenses for external users** — If you have any authenticated external users who need to access services on your Windows-based servers, you have several options: You can obtain CALs for each user who needs to access your servers. Or you can acquire a single External Connector License (ECL) that covers the server they will be accessing. The ECL covers use of that server by all authenticated external users, but it's a lot more expensive than a CAL, so only get one if you'll have a lot of external users. If only a handful of external users access your Windows servers, you're better off acquiring user CALs.

- **Windows Remote Desktop Services (RDS) licensing** — Windows Remote Desktop Services (formerly known as Windows Terminal Services) is built into Windows Server, but you will still need to get a separate [Windows RDS User CAL](#) for each client that will access Terminal Services in your charity or organization. The RDS CAL replaces the older Terminal Services (TS) CAL.

- **Standard CALs and Enterprise CALs** — Some Microsoft server products have two client licensing modes, standard and enterprise. An Enterprise CAL grants access to more advanced features of a product. With some products, a user needs both a Standard CAL and an Enterprise CAL in order to access the advanced features.

- **Licenses for System Center products** — Microsoft's System Center products (a line of enterprise-level administrative software packages) generally use a special type of license known as a management license (ML). Any desktop or workstation managed by one of these applications needs a client management license. Any server managed by one of these applications requires a server management license. For more information, see TechSoup's [Guide to System Center Products and Licensing](#).

Additional Resources

- **Microsoft server basics** — Microsoft's [Client Access License](#) page provides a clear summary of available license types and why you might choose a particular type of license. TechSoup's [Guide to Microsoft Server Licensing](#) is another good introduction to the topic.

- **Microsoft Volume Licensing** — Microsoft's [Volume Licensing Home Page](#) can help you find answers to both basic and advanced questions. The [Volume Licensing Reference Guide](#) is a well-organized, well-written introduction to a wide variety of Microsoft licensing topics, and [Volume Licensing Briefs](#) are especially useful for complicated scenarios such as licensing in virtualized environments.

- **For licensing in virtualized environments** — See [Microsoft Licensing for Virtualization](#).

Guide to Microsoft Server Licensing

The basics of Microsoft server licensing, models, and operating system environments.

Learn the basics of Microsoft server licensing, including licensing models and licensing operating system environments.

This page provides an overview of Microsoft server licensing. You can also visit Microsoft's Product Licensing Search page for detailed licensing information on individual products and product families, including current Product Use Rights (PUR) documents.

Licensing Models

Understanding licensing requirements will help you plan your server implementation. This section provides a brief overview of the four basic licensing models.

Per Core/CAL

The Per Core/CAL model includes core-based server licenses and client access licenses (CALs) for users or devices with connections to the servers. Windows Server Standard and Datacenter are examples of products that use this model.

The Windows Server products also offer optional external connector licenses for connecting people who are not employees or onsite contractors (usually through the Internet).

The core-based server license products in this model are valid for two processor cores. For these products, most organizations will need to request enough server license products to meet Microsoft's minimum requirements and to cover all the cores on their server.

Server/CAL

The Server/CAL models include server licenses and client access licenses (CALs) for users or devices with connections to the servers. Exchange Server Standard and Enterprise and SQL Server (Server/CAL) are examples of products that use this model.

The server license products in this model provide one license for an entire server. For these products, most organizations will need to only request one server license product as well as any CALs they might need.

Per Core

The Per Core model includes only core-based server licenses. Client access licenses (CALs) aren't required. BizTalk Server and SQL Server (Core-Based) are examples of products that use this model.

The core-based server license products in this model are valid for two processor cores. For these products, most organizations will need to request enough server license products to meet Microsoft's minimum requirements and to cover all the cores on their server.

Some server products, like SQL Server, can be licensed in either the Server/CAL or Per Core (Core-Based) models. You can determine which licensing model TechSoup products use by examining the server product name and by checking whether TechSoup offers CALs for that server.

Management Servers

The Management Servers model includes server management licenses (MLs) for the servers that are being managed and client MLs for the nonserver operating system environments that are being managed. Licenses to run the server software are included with the MLs. System Center products use this model.

Similar to the core-based server license products, the server ML products in this model are valid for two processor cores. For these products, most organizations will need to request enough server ML products to meet Microsoft's minimum requirements and to cover all the cores on the server being managed.

The client MLs in this model provide one license for a client device operating system environment (OSE) or user and are not core-based. For these products, most organizations will need to only request one client ML product for each managed OSE or user on the client device.

Licensing Operating System Environments

Server operating systems and server applications can run in either physical or virtual operating system environments (OSEs). When your servers or other devices have multiple OSEs, you should check the OSE licensing requirements carefully.

For example, many Microsoft server licenses can be used for only a single operating system environment. When this is the case, if the server operating system or application is installed in more than one environment on a single server computer, a separate license is required for each environment. However, other Microsoft server licenses can be used in both the physical operating system environment and in one or more virtual environments.

Visit Microsoft's Product Licensing Search page for detailed licensing information on individual products and product families.