SYSTEM ADMINISTRATION CONCEPTS

THE SYSTEM ADMINISTRATOR

- In a small company, the Sysadmin may be a jack of all trades
- In a large company the Sysadmin may be one who manages an aspect of data center operations
- The job of a system administrator is to keep one or more systems in a useful and convenient state for users

Planning	Installation	Monitoring	Trouble-shooting
Backing up	Performance tuning	Customer Relations	And more…

THE DAILY LIFE OF A TYPICAL SYSADMIN

Arrive at Work	Check service desk for new and on-going requests and issues
Morning	Check monitoring system(s) for new incidents and the status of recent incidents and changes Work on service desk request(s) and issue(s) Work on emergency that "suddenly" came up
Lunch Break	
Early Afternoon	Attend meetings (future planning, management reporting) Make vendor and other calls Mentoring
Late Afternoon	Work on service desk requests Self-training and advancement preparation

THE SERVICE DESK

- Application where users, help desk personnel, and system admins can create requests or report issues
- AKA "trouble-ticketing system"
- What requests are normally created here?
  - New employee or employee termination (create / disable IDs)
  - New project (create new website, new database etc.)
  - Upgrade services and software to new versions
  - Upgrade hardware (memory, disks, etc.)
- What about issues?
  - Login/access not working (website, FTP, etc.)
  - Service not working
  - Printing issues
  - Backup and restore requests

THE PHILOSOPHY OF A SYSTEM ADMINISTRATOR

Philosophy 1 : Automate as much as possible (a.k.a. Being lazy is good)

- A system administrator will always be outnumbered by the systems they manage or the users
- To keep up with the work, automate mundane tasks as much as possible. e.g.:
  - Free disk space checking and reporting
  - Backups
  - System performance data collection
  - User account maintenance
  - Business-specific functions (pushing new data to a Web server, generating reports)
- Automation = writing scripts
- Automation also gives users the benefit of greater predictability and consistency of service.

THE PHILOSOPHY OF A SYSTEM ADMINISTRATOR

Philosophy 2: Delegate tasks if they're simple enough

- If possible delegate day-to-day operations to another person
  - Handles user-interruptions
- Escalate only for complicated matters
- Save time by:
  - Informing people how to get help
  - Defining certain responsibilities of SAs
  - Defining what is an emergency to customers / users

THE PHILOSOPHY OF A SYSTEM ADMINISTRATOR

Philosophy 3 : Document everything

- A system administrator will usually choose any other task over documentation, but it's absolutely necessary
  - Helps remind of tasks to do
  - Ensures that someone can take over the work in the system admin's absence
  - Allows other system admins to share the workload
- What should be documented?
  - Policies – Formalize how requests are handled
  - Procedures – Step-by-step instructions on how tasks should be done
  - Changes – For future reference, you must track who, when, and why the change was made
- Ensure that there are standards on the documentation

THE PHILOSOPHY OF A SYSTEM ADMINISTRATOR

Philosophy 4 : Communicate as much as possible

- Avoid confusion among users
- Use whatever communication channel works for the organization
  - What you plan to do
  - What you're doing
  - What you have done
- What details should you give?
  - The nature of the change
  - When it will take place
  - Why it is happening
  - The impact (if any) that the users can expect due to the change
  - Contact information should they have any questions or concerns

THE PHILOSOPHY OF A SYSTEM ADMINISTRATOR

Philosophy 4 : Communicate as much as possible

We have received notification that the servers which are running our Sakai instance are scheduled for maintenance by our cloud service provider on December 9th, 2015.

Start time: December 9th, 2015 at 2:00 PM UTC+8
End time : December 9th, 2015 at 5:00 PM UTC+8

During this time, users will be unable to login to our Sakai instance. Everyone is therefore advised to refrain from scheduling any activity that will require the use of our Sakai instance (mycourses.dlsu.edu.ph) during this 3-hour window.

We apologize for any inconvenience this may cause you.

If you have other concerns, please feel free to call the IT Services Office at local numbers 316 and 466 from Monday to Friday at 0700H to 2000H and Saturday at 0800H to 1700H, or send us an email at ITServices@dlsu.edu.ph.

THE PHILOSOPHY OF A SYSTEM ADMINISTRATOR

Philosophy 5 : Know your users; know your business

- Understanding who your users are and what they do allows you to know what resources they need

- Understanding the business operations and the purpose of the systems you administer allows you to know
  - What applications need to run at what times
  - When backups and maintenance can be scheduled
  - What new technologies can possibly solve business problems

THE PHILOSOPHY OF A SYSTEM ADMINISTRATOR

Philosophy 6 : Security cannot be an afterthought

- Threats can come in different forms
  - Internal and external
  - From the Internet, from people, from software, etc
- It is important for the system administrator to be aware of security implications of systems they manage:
  - Potential sources and nature of threats
  - Type and value of data on the system
  - Potential vulnerabilities of the system
  - What is considered normal access to the system

THE PHILOSOPHY OF A SYSTEM ADMINISTRATOR

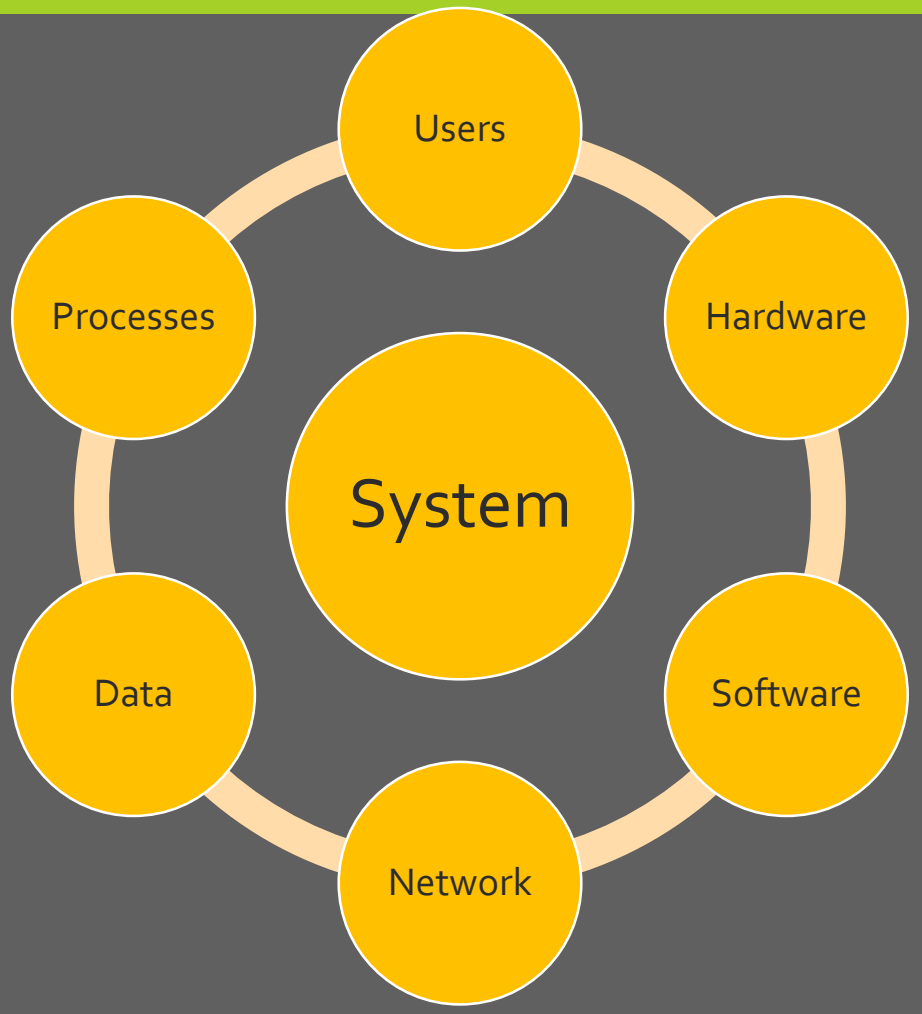
Philosophy 7 : Plan ahead, but expect the unexpected

- System admins need to be aware of what's going on in the organization to be able to prepare for future work

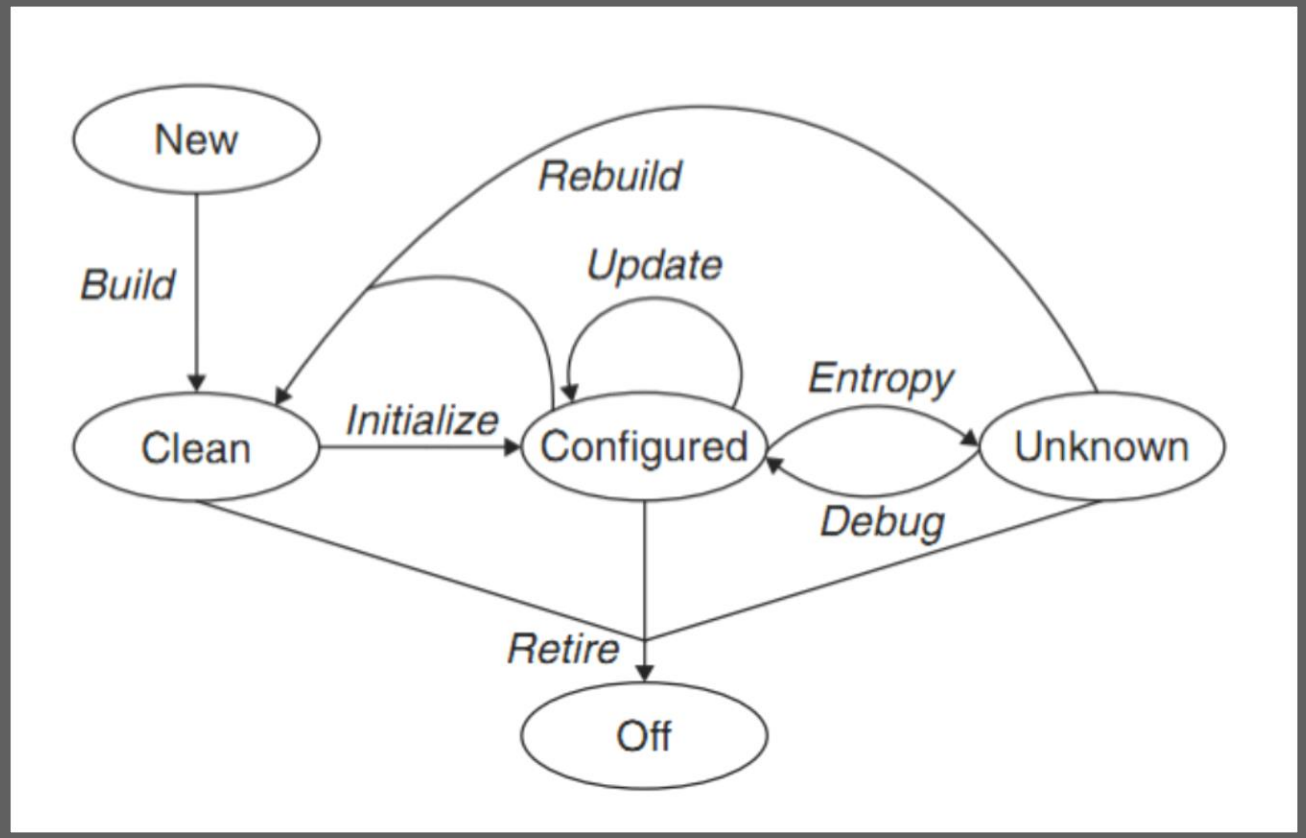
- Anticipate problems before they occur and make necessary preparations ahead of time so that you can respond quickly if issues come up
  - Keeping stock of spare parts
  - Making the necessary configurations that allow quick changes to be performed
  - Having ready access to the technical documentations of systems
  - Etc

RECALL: THE ELEMENTS OF AN IT SYSTEM

- An administrator may have to manage one or more elements of the system



EVARD'S LIFE CYCLE OF A MACHINE AND ITS OS



- **New** refers to a completely new machine
- **Clean** refers to a machine on which the OS has been installed but no localizations performed
- **Configured** means a correctly configured and operational environment
- **Unknown** is a computer that has been misconfigured or has become out of date
- **Off** refers to a machine that has been retired and powered off

WORKSTATIONS

- Workstations are computer hardware dedicated to a single customer's work
- Usually deployed in large quantities and have long life cycles
  - Management is often blind to computer life-cycle management
  - Asset depreciation should be aligned with the expected life cycle of the asset - usually three years for workstations
- Three critical issues are involved in maintaining workstation operating systems:
  1. Loading the system software and applications initially
  2. Updating the system software and applications
  3. Configuring network parameters

WORKSTATIONS

- OS installation and configuration
  - Candidate for task automation to resolve mistakes, misconfiguration and non-uniformity
  - Different OS have different tools for automation
  - Types of automation: Full / Partial / Cloning
  - Make an installation checklist
- Network Configuration
  - Use DHCP services to automate a lot of configuration
  - Know when to use dynamic leases and lease time
  - Avoid Dynamic DNS with DHCP

WORKSTATIONS

- Updating the system
  - After the PC has been installed, remember that the host
    - Is already stable
    - Is in an office
    - No physical access required
    - May have live "users"
  - Use the "One, some, many approach"
    - Patch one machine first
    - Try to patch on a few other machines
    - When you are already confident, update as larger groups of users
  - Must be well-defined, communicated, and have a process for reverting in case of disastrous results

SERVERS

- Hardware sold for use as a server is qualitatively different from hardware sold for use as an individual workstation; hence is more expensive
  - Has different features and is engineered to a different economic model
  - Special procedures are used to install and support servers
- Features:
  - Extensibility
  - More CPU performance
  - High-performance I/O
  - Upgrade options
  - Rack mountable
  - High availability options - Redundant power supplies, Hot swap components
  - Maintenance contracts
  - Maintenance options
  - Disk-backup systems,
  - Better remote access – usually separate networks for administrative functions

SERVERS

- Alternative to Expensive Servers – Many Inexpensive Servers
- Use of commodity components
- Must be able to manage many servers
- Other strategies
  - Blade server
  - Virtual server

Blade server front

Blade server back

SERVICES

- Servers are useless without the service that it should perform
- Building a solid, reliable service is a key role of an SA
- Fundamental services include DNS, email, authentication services, network connectivity, and printing
- Others: remote access methods, network license service, software depots, backup services, Internet access, DHCP, and file service
- Business-specific services that serve the company or organization: accounting, manufacturing, and other business processes

WHEN IMPLEMENTING A SERVICE

Focus on customer needs and requirements:

- Talk to the customers to gather customer requirements
  - Finding out how customers intend to use the new service
  - Features they need and would like
  - How critical the service will be to them
  - What levels of availability and support they will need for the service
- Service Level Agreements(SLA) enumerates the services that will be provided and the level of support the user / customer receives
  - Typically categorizes problems by severity and commits to response times for each category
  - Defines an escalation process that increases the severity of a problem if it has not been resolved after a specified time

WHEN IMPLEMENTING A SERVICE

But don't forget operational requirements

- What are the administrative and budget requirements of a new service?
  - Services should be built on server-class machines that are kept in a suitable environment
  - Services should reach reasonable levels of reliability and performance
  - The service and the machines that it relies on should be monitored
- Administrative interface of the new service
  - Does it interoperate with existing services and integrate with central services, such as authentication or directory services?
- How the service scales - Upgrade path if demand for a service grows
- How latency affects the services being created
  - SAs should also look at how they can monitor the service in terms of availability and performance

DATA CENTER

- The place where you keep machines that are shared resources
- Typically has systems for cooling, humidity control, power, and fire suppression
- Important in data centers
  - Room size
  - Racks
  - Network (Equipment and cabling)
  - Power and cooling
  - Fire suppression
  - Security
  - Location and physical access

NETWORKS

- Basic goal in building networks is to provide a reliable, well documented, easy-to-maintain network that has plenty of capacity and room for growth
- A network architecture should be as clean and simple to understand
  - A clean architecture makes debugging network problems much easier
  - You can quickly tell what path traffic should take from point A to point B
  - You can tell which links affect which networks

NETWORKS

- To organize network cabling use structured cabling
- Intermediate Distribution Facility
  - A fancy name for wiring closet
  - Set of network closets and wiring that brings network connectivity out to the desktops
  - Each floor normally has one or more IDFs
  - Should be protected physically – by locking and providing adequate cooling
- Main Distribution Facility
  - A central location for interconnecting IDFs

ETHICS

- The USENIX / LISA / LOPSA Code of ethics for System Administrators

Professionalism	Personal Integrity	Privacy	Laws and Policies
Communication	System Integrity	Education	Responsibility to Computing Community
	Social Responsibility	Ethical Responsibility	

https://lopsa.org/CodeOfEthics