Network Management

Lecture Outline

- Network Management.
  - Operation
  - Administration
  - Maintenance
  - Provisioning
- Network Documentation.
- Guidelines for creating effective network documentation.
- Network Administration
- Roles and Responsibilities of Network Administrators.

Network Management

- **Network management** refers to the activities, methods, procedures, and tools that pertain to the operation, administration, maintenance, and provisioning of networked systems.

Network Management – *cont'd*

- ***Operation*** deals with keeping the network (and the services that the network provides) up and running smoothly. It includes monitoring the network to spot problems as soon as possible, ideally before users are affected.
- ***Administration*** deals with keeping track of resources in the network and how they are assigned. It includes all the "housekeeping" that is necessary to keep the network under control.

Network Management – *cont'd*

- ***Maintenance*** is concerned with performing repairs and upgrades—for example, when equipment must be replaced, when a router needs a patch for an operating system image, when a new switch is added to a network. Maintenance also involves corrective and preventive measures to make the managed network run "better", such as adjusting device configuration parameters.
- ***Provisioning*** is concerned with configuring resources in the network to support a given service. For example, this might include setting up the network so that a new customer can receive voice service.

Network Management – *cont'd*

- A common way of characterizing network management functions is **FCAPS**—Fault, Configuration, Accounting, Performance and Security.
- Functions that are performed as part of network management accordingly include controlling, planning, allocating, deploying, coordinating, and monitoring the resources of a network, network planning

Network Management – *Summary*

Network Management includes the following duties:

- Monitoring network availability
- Improving automation
- Monitoring response time
- Providing security features
- Rerouting traffic
- Restoring capabilities
- Registering users

Network Documentation

Network Documentation

- System and network documentation is one small part of IT documentation. Good system documentation enhances and validates security by documenting the configuration details and procedures that support a security policy.
- System documentation also serves as an important part of backup and disaster recovery documentation.
- Good documentation must be thorough and must be kept current. Thus, updating documentation is a part of change management and many daily administration activities.

Network Documentation – *cont'd*

- Producing quality documentation is often neglected due to higher priority work. Conversely, good documentation can also help in creating a more efficient work environment and a more stable and secure computing environment.
- Some of the uses for system documentation include repeating standardized configurations, training new staff, and maintaining quality assurance.

Network Documentation – *cont'd*

Why should one make the effort to create and maintain documentation?

- In the security area, creating a secure infrastructure requires known, standard configurations.
- Repeatability – Documentation is necessary to repeat tasks that are done well.
- Documentation can also help to identify tasks that need improvement.
- Audits – Documentation will be required for external or internal audits.

Network Documentation – *cont'd*

Why should one make the effort to create and maintain documentation?

- Review – An independent review of system procedures is easier to do by reading documentation than by examining a system or conducting an interview. A review may be focused on security, efficiency, or any other aspect of system administration.
- Documentation provides the system details that are necessary in planning upgrades. Most hardware inventories do not contain information about the expandability or upgrade restrictions for any server.

Network Documentation – *cont'd*

Why should one make the effort to create and maintain documentation?

- Actively protecting a system requires knowing what the system is, what the system does, how the system works, and the potential system weaknesses.
- Documentation provides the details of the implementation of security policies and procedures.
- Documentation is necessary for daily administration, during service events, and recovery procedures.
- Documentation provides a portion of disaster recovery documentation.

Network Documentation – *cont'd*

Why should one make the effort to create and maintain documentation?

- Automation is used to increase our efficiency in many tasks. However, automation also reduces our familiarity with the tasks. Thus, the documentation serves to preserve knowledge.
- There are many system procedures that are only performed on rare occasions.
- Quickly and accurately performing many of these procedures requires good documentation. Two examples are restoring a compromised service and restoring from a redundant configuration.

Network Documentation – *cont'd*

Why should one make the effort to create and maintain documentation?

- Documentation provides knowledge of what software is security sensitive and needs to be updated regularly. This information is needed to improve system security. Details on installing updates are important since the procedures vary by package.
- Backup and recovery procedures must be documented so that multiple staff members may perform this task.
- Documentation provides guidance on maintaining networks and the restoration of network services.
- The task is not complete until it is documented.

Guidelines for Creating Effective Network Documentation

- ***Determine the scope:*** Know which end systems are part of the domain to determine the scope of the end-system network documentation
- ***Know your objective:*** Only collect data that is relevant to the objective and provide sufficient detail for those relative pieces. Extra layers of information will only make the documentation more difficult to use.
- ***Be consistent:*** Use consistent terminology, abbreviations, and style. Use templates and keep a library of symbols and graphic icons that can be reused.

Guidelines for Creating Effective Network Documentation

- ***Keep the documents accessible:*** Store the network documentation in a location where it is readily available on the job. A copy of the documentation should also be kept in a secure off-site location.
- ***Maintain the documentation:*** Modify the network documentation as conditions and devices in the network change.

Network Administration

Network Administration

- Network and Systems Administrators have privileges and duties that may bring them into contact with sensitive, restricted or personal information during the course of their work.
- The privileges they have with respect to system access, operation and maintenance are for the express purpose of ensuring maximum availability, integrity and security for the systems they are responsible for.

Network Administration

- Network administration is an arduous task. The administrator's responsibilities often involve many different aspects and may include such tasks as network design, management, troubleshooting, backup and storage, documentation, security and virus prevention as well as managing users.

Responsibilities of the Network Administrator

- As a network administrator, your tasks generally fall into the following areas:
  - Designing and planning the network
  - Setting up the network
  - Maintaining the network
  - Expanding the network

Responsibilities of the Network Administrator

- Each task area corresponds to a phase in the continuing life cycle of a network. You might be responsible for all the phases, or you might ultimately specialize in a particular area, for example, network maintenance.

Designing the Network

- The first phase in the life cycle of a network involves creating its design, a task not usually performed by new network administrators. Designing a network involves making decisions about the type of network that best suits the needs of your organization. In larger sites this task is performed by a senior network architect: an experienced network administrator familiar with both network software and hardware.
- The network administrator is responsible for planning, designing, installing, and evaluating networks and workstations. Very often the administrator is also involved in researching purchasing information on hardware and software acquisitions.

Setting Up the Network

- After the new network is designed, the second phase of network administration begins, which involves setting up and configuring the network. This consists of installing the hardware that makes up the physical part of the network, and configuring the files or databases, hosts, routers, and network configuration servers.
- The tasks involved in this phase are a major responsibility for network administrators. You should expect to perform these tasks unless your organization is very large, with an adequate network structure already in place.

Maintaining the Network

- The third phase of network administration consists of ongoing tasks that typically constitute the bulk of your responsibilities. They might include:
  - Adding new host machines to the network
  - Administering network security
  - Administering network services, name services, and electronic mail
  - Troubleshooting network problems

Expanding the Network

- The longer a network is in place and functioning properly, the more your organization might want to expand its features and services. Initially, you can increase network population by adding new hosts and expanding network services by providing additional shared software.
- But eventually, a single network will expand to the point where it can no longer operate efficiently.
- That is when it must enter the fourth phase of the network administration cycle: expansion.

Expanding the Network – *cont'd*

- Several options are available for expanding your network:
  - Setting up a new network and connecting it to the existing network using a machine functioning as a router, thus creating an internetwork.
  - Configuring machines in users' homes or in remote office sites and enabling these machines to connect over telephone lines to your network.
  - Connecting your network to the Internet, thus enabling users on your network to retrieve information from other systems throughout the world.
  - Configuring UUCP communications, enabling users to exchange files and electronic mail with remote machines.

Network Management

End