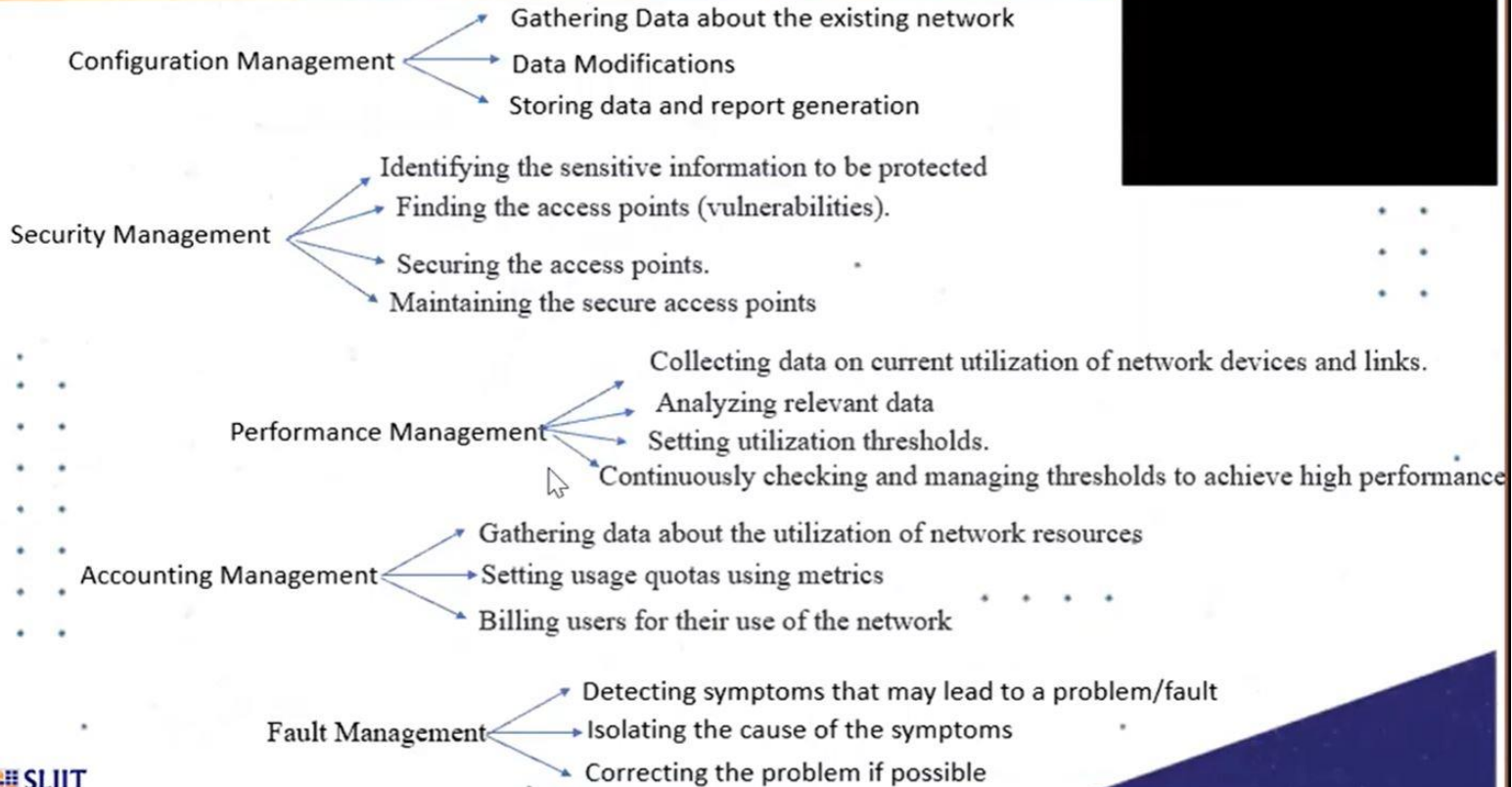Network Design and Management

Information Technology

3$^{rd}$ Year – 1$^{st}$ Semester

1. Read the case Audi Case Study and drive the information relevant to the five ISO Management Principles.

2. Two areas of network management according to the ISO management framework are **Accounting Management** and **Configuration Management**. Compare and contrast these two Network Management processes. Give a detailed explanation about the goals and benefits of each. Explain how these can be used together to help facilitate effective network management.

| Configuration Management | Accounting Management |
|---|---|
| Gathering information about the current network environment. | Gathering data about the utilization of network resources. |
| Control & operation of the network | Maintain customer requirments |
| Maintain system reliability | Ensure fair share of resources among users. Understand individual resourse utilization. |
| Collected data is stored Maintain upto date inventory about the network | Based on the data certain decision can be taken. |

**Configuration Management – Benefits**
- Automaticaly gather and update data on network devices. Eg. NMS(Network Management System)
- Allows devices to be configured remotely.
- Provides central storage location for configuration data.
- Facilities the production of network inventory and other reports

**Accounting Management – Benefits**
- Allows effective measurement and reporting of accounting information.
- Increase the engineers understanding of user utilization.
- Helps the network engineer make informed decisions about the allocation of network resources.

3. Name the phases of ISO Framework for Network Management.

- Configuaration Management
- Security Mangement
- Performance Management
- Accounting Management
- Fault Management

4. Briefly explain what is configuration management and its main phases.

Configuration Management is a process of
- Gathering information about the current network environment.

- Using that data to modify the configuration network devices.
- Storing the data, maintaining an up-to-date inventory of all network components and producing various reports.

| Bridge Configuration Management Information | |
|---|---|
| Name | Software Version |
| Payroll Mainframe Subnet | A |
| Terminal Server Subnet | B |
| Engineering Computer Subnet | A |

**Data Collection / Gathering**

❖ Manual Collection
  ➢ Tedious, error prone, time consuming
❖ Auto-Discovery/Auto-Mapping
  ➢ ICMP(ping, traceroute)
  ➢ Network Management Protocol

**Data Modification**

❖ Once Configuration management information has been obtained, it will usualy need to be updated.
❖ Network devices usually contain many pecies of modifiable parameters.
  ▪ E.g – Routers(routing table, network interfaces), Servers (application services, operating systems)

**Storing Information**

❖ Structured (e.g. DBMS)
  ▪ Advantages:
    ➢ Stores data efficiently.
    ➢ Enables users to relate various types of information to one another.
    ➢ Versioning
  ▪ Disadvantage:
    ➢ Need to learn query language to access data (e.g. SQL).

5.  Briefly explain the significant advantages of configuration management.

- Automaticaly gather and update data on network devices.
- Allows devices to be configures remotely
- Provides central storage location for configyration data.
- Facilities the production of network inventory and other reports.
- It will reduce the risk of outages and security breaches.
- Reduce cost

- Reduce downtime
- Increase performance

6. Explain two scenarios where configuration management is highly appealing.
7. What are the possible ways of collecting data for configuration management?

**Data Collection / Gathering**

- ❖ Manual Collection
  - ➢ Tedious, error prone, time consuming
- ❖ Auto-Discovery/Auto-Mapping
  - ➢ ICMP(ping, traceroute)
  - ➢ Network Management Protocol

8. What are the two main components of a NMS?

- Architecture
- Applications

9. What are the three types of network management architectures?

- Centralized
  - Features : Single location of a centralized architecture is used as follows:
    - ➢ For all network alerts and events.
    - ➢ For all network information.
    - ➢ To access all management applications.
  - Advantages : Convenience, Accessability and Security
  - Disadvantages : Lacks scalability, Low fault tolarence
- Hierachial
  - Features :
    - ➢ Not dependent on a single system.
    - ➢ Distribution of network management task.
    - ➢ Distributed monitoring.
    - ➢ Centralized information storage.
  - Advantages : Convenience, Accessability and Security
  - Disadvantage : Complex setup, Misconfiguration

- Distributed
  - Features :
    - ➢ Combines centralized and hierachial approaches.
    - ➢ Multiple peer platform
  - Advantages :

- Location independent access to all network information, alert, events and management applications.
- Not dependent on a single system.
- Disadvantages : Require complex setup.

# IE3010-Network Design and Management

## Tutorial 02

1)List down basic network server types and compare and contrast their advantages and disadvantages.

**iterative server**

**Con-current server**

SLIIT
FACULTY OF COMPUTING

| Iterative server | Con-current server |
|---|---|
| 1. Simple | Complex |
| 2. Queues for connection requests | No queues of connection requests |
| 3. Handles only one process at a time | Can handle many processes at a time |
| 4. Severely limits concurrent access | Concurrent access |
| 5. Less CPU intensive | More CPU and resource intensive |

SLIIT
FACULTY OF COMPUTING

# 2. What is the Transmission Protocol used for Domain Name Systems? What is the port number? Briefly explain

**User Datagram Protocol** (**UDP**)

Port number = 53

# 3. Why only 13 root servers are available in the world?

**\*\*\*\*\*This is your Homework**

SLIIT
FACULTY OF COMPUTING

# 4. What is the difference between a master server and a slave server with respect to DNS?

SLIIT
FACULTY OF COMPUTING

| Master DNS server (Primary DNS Server) | Slave DNS Server (secondary DNS Server) |
|---|---|
| Master DNS server **reads data related to the domain zone and communicates** with the slave DNS server | Slave DNS server is a server that **obtains zone data from the master DNS server** immediately after being set up |
| Each zone can only have a single master DNS server | But a zone can can have multiple slave DNS servers |
| Master server gets information directly from the local files and has **read/write copy** of the zone data | slave server contains **read only copies** of the zone file, and it gets data by communicating with the master server |
| Master DNS server hosts the controlling zone file, which contains all the authoritative information for a domain. | slave DNS server provides redundancy when the master goes down. It also reduces the request load on the master DNS server. |

**5.** A student who has logged into the *abc.lk* domain is trying to request a web page www.webina.aus via Firefox web browser. The domain *abc* has its own local domain name server and due to security issues in the LAN environment, caching is disabled. Write the steps for resolving [www.webina.aus](www.webina.aus).
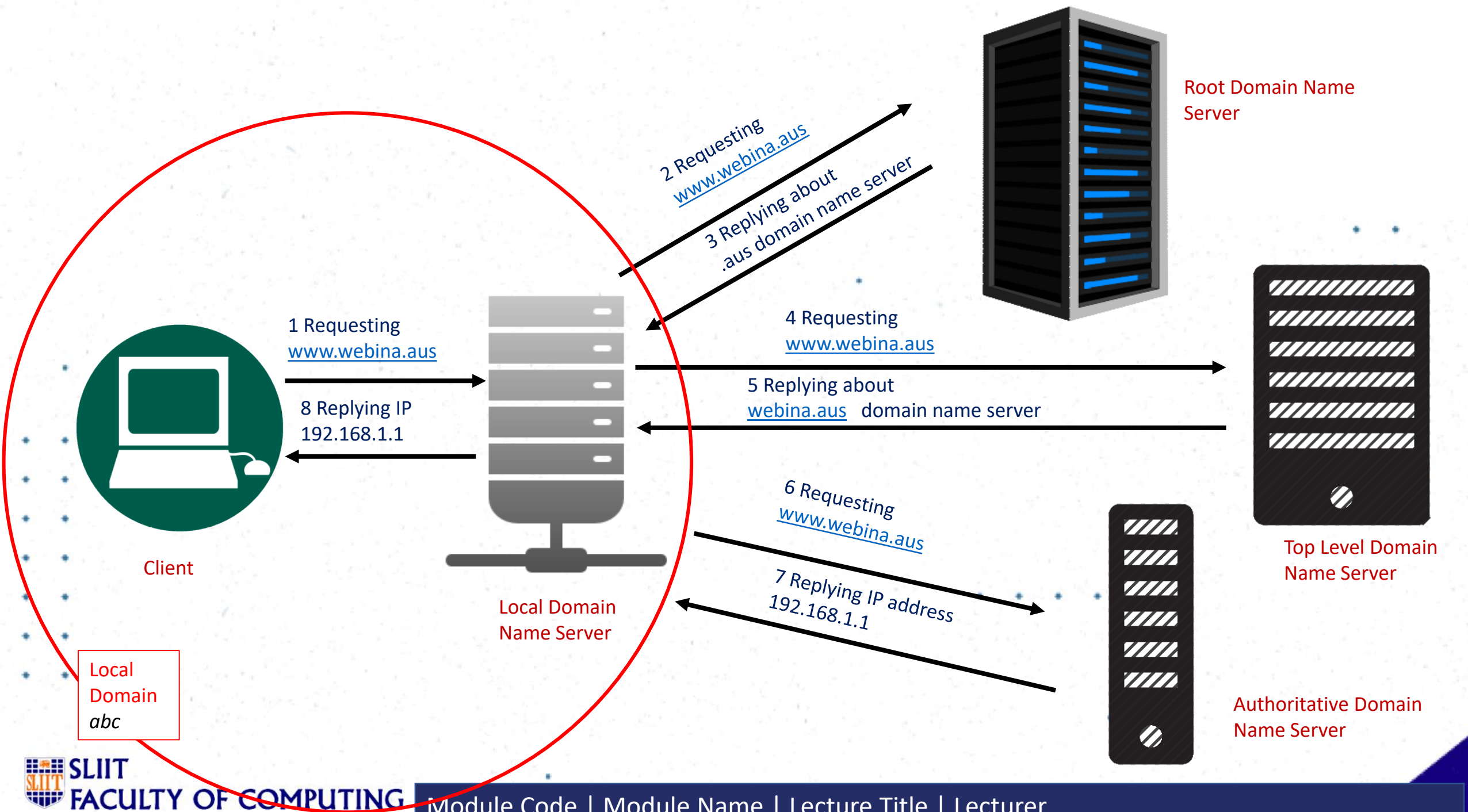
# 6. What type of query methods are used in the following servers?

    a. Root domain name server :     Iterative

    b. Local domain name server :     Recursive

    c. Top level domain name server :    Iterative

    d. Authoritative domain name server

    if out of its own domain then Iterative, if from its own domain then recursive

SLIIT
FACULTY OF COMPUTING

# 7. Why cached data is periodically refreshed or removed?

- To prevent the data in a cache from becoming out of date

8. What is the Transmission Protocol used in a DHCP server? What are the server side and client side port numbers used? Briefly explain.

**UDP – 67(server), 68(client)**

# 9. DHCP messages are always uses the broadcasting method in communication. Why?

- **Because until the last step there is no specific IP assigned to the new PC.**

# 10. Briefly explain the LAMP Web Service Solution Stack.

**************** Home work

SLIIT
FACULTY OF COMPUTING

# 11. Why the name PROXY is used for the proxy server?

- *The term proxy is a contraction of middle English word "**Procuracy**" it's a term that means act on behalf of another*

# 12. Caching is one of the main features in a proxy server. What is the purpose of using a cache?

- Cache mechanism allows saving some cacheable requests for later recall by any user and thus reduce both latency and Internet traffic.

---

1. A **network map** is a useful tool to a Network Manager, and each layer of the OSI reference model should be documented. Describe at least seven elements that should be documented at the network layer.

   - IP addresses
   - Host Names
   - Policies
   - WAN
   - LAN
   - VPN
   - Internet

2. Describe eight (8) pieces of non-network data that should be collected when mapping a network.

   - Network purpose statement.
   - Network overview documentation
   - Physical location
   - Vendors
   - Signatories
   - Resources
   - Managers contact name and phone number
   - Floor plans

3. When should an administrator establish a network baseline?

   - Administrator should establish a baseline at the beginning of a network.

4. Discuss three (3) reasons why a network manager should create a baseline for a network.

   - To determine normal operating conditions.
   - To identify and forecast problems and Troubleshooting.
   - Predict network operations.

5. You are the newly appointed Network Engineer for ABC Company. The company is in the process of large scale network expansion. Briefly discuss why, when and how you would perform 'Baselining' in your network management process.

6. What are the rules/guidelines for creating network documentation?
   1. Create official network documentation policies.
   2. Create a network topology map.
   3. Document application details and networking hardware.
   4. Keep things clear and simple.
   5. Ensure ongoing management of documentation.

7. How long must you monitor to set a network performance baseline?

   Network performance baselines you set today are only good until something changes. Network equipment upgrades, new servers and new applications will have an impact on today's baselines and will require some care and feeding of the monitoring solution on an ongoing basis.

8. "Network Baseline Information Key To Detecting Anomalies."

   i.   Do you agree to this statement or not?

        Yes

   ii.  Justify your answer.

        When the network performance is going to drop. We can compare the real-time data which is collected by the analysis with historical baseline data. Then we can spot where these anomalies are.

9. Which two of the following would be the minimum required and most important components of a network topology diagram?
   a) Devices
   b) **Contact information – Least Important**
   c) Loaded firmware
   d) **Connections between devices – Most Important**
   e) Interface spanning tree configuration

10. Which of the following is not one of the guidelines for creating useful network configuration table must document about each networking device?
    a) Device name
    b) Data link layer addresses and implemented features
    c) Network layer addresses and implemented features
    d) **Size (number of entries) of its routing table**
    e) Important information about the physical aspects of the device

11. Which of the following is not one of the guidelines for creating useful network configuration documentation?
    a) Use consistent symbols, terminology, and styles
    b) Know the scope of the documentation.
    c) **Update the documentation at least once a year**
    d) Store the documents in a logical location.