IT6204 Systems & Network Administration

(Optional)

INTRODUCTION

This is one of the Optional courses designed for Semester 6 of the Bachelor of Information Technology Degree program. This course on Systems & Network Administration focuses on to provide theoretical & practical knowledge required to perform administration of computer systems and networks.

CREDITS: 04

LEARNING OUTCOMES

After successful completion of this course students will be able to:

- Describe the role/scope of a system and network administrator
- Install various operating systems
- Manage computer systems and undertake operational tasks
- Provide network services to users
- Apply scripting tools for automating system administration
- Describe the virtualization

MINOR MODIFICATIONS

When minor modifications are made to this syllabus, those will be reflected in the Virtual Learning Environment (VLE) and the latest version can be downloaded from the relevant course page of VLE. Please inform your suggestions and comments through the VLE. http://vle.bit.lk

ONLINE LEARNING MATERIALS AND ACTIVITIES

You can access all learning materials and this syllabus in the VLE: http://vle.bit.lk, if you are a registered student of BIT degree program. It is very important to participate in learning activities given in the VLE to learn this subject.

FINAL EXAMINATION

Final exam of the course will be held at the end of the semester. Each course in the semester 6 is evaluated using a two hour question paper.

OUTLINE OF SYLLABUS

Topic	Hours
1- Introduction to System & Network Administration	03
2- Installing an Operating System	08*
3- Host Management	18*
4- Network Administration	20*
5- Automating System Administration	06*
6- Virtualization	05
Total for the subject	**60**

Students are expected to have practical work to complete their learning in these topics.

The operating system that should use for this module is Centos 5 or above.

REQUIRED MATERIALS

Main Reading

Ref 1: Evi Nemeth, Garth Snyder, Trent R. Hein, Trent R. Hein and Ben Whaley "UNIX and Linux System Administration Handbook " (4th Edition), Pearson Education, Inc., 2011.

Ref 2: http://www.sage.org/ethics/

Ref 3: http://www.linuxjournal.com/article/5826

Ref 4: http://wiki.squid-cache.org/SquidFaq/ConfiguringSquid

DETAILED SYLLABUS:

Section 1 : Introduction to System & Network Administration (03hrs)

Instructional Objectives

- Describe the essential duties of a system and network administrator
- Identify similarities and differences among Linux Distributions
- Find the required information using Man/info pages and other documents

1.1. Essential duties of the system administrator [Ref 1: pg. 4-6]

    1.1.1. Adding/Removing Hardware

    1.1.2. Monitoring & troubleshooting of the system

    1.1.3. Maintain Local Documentation

    1.1.4. Fire fighting

1.2. Unix and Linux Distributions [Ref 1: pg. 7-9]

1.3. Ethics [Ref 2:]

1.4. Man pages and online documentation [Ref 1: pg. 16-18]

1.5. RFCs and Other Documents [Ref 1: pg. 18-20]

Section 2: Installing an Operating System (08 hrs)

Instructional Objectives

- Describe operating system concepts and installation procedures

- Identify the role of a boot loader used in dual boot system

Material /Sub Topics

2.1. Boot Process [Ref 1: pg. 78-82]

    2.1.1. Boot Process Steps

    2.1.2. Kernel Initialization

    2.1.3. Hardware Configuration

    2.1.4. Recovery Mode

    2.1.5. Activation of Start up Scripts

2.2. Dual booting (Grub)* [Ref 1: pg. 83-85]

2.3. Single User Mode* [Ref 1: pg.86]

2.4. Rebooting & shutting down* [Ref 1: pg. 100-101]

Section 3: Host Management (18 hrs)

Instructional Objectives

- Plan and execute system management procedures

- Describe the user management

- Installing additional packages using tools

- Characterize different disk storages

- Describe controlling processes

- Characterize different file system formats and its attributes

- Use file related commands

Material /Sub Topics

3.1. Root Privileges* [Ref 1: pg. 110-117]

    3.1.1. su

    3.1.2. sudo

3.2. User Management* [Ref 1: pg. 174-200]

    3.2.1. passwd file

    3.2.2. group file

    3.2.3. Home Directory

    3.2.4. Setting permission and ownership

    3.2.5. Adding/deleting users

    3.2.6. Disabling logins

3.3. Software Installation and Management (rpm, yum, apt)* [Ref 1: pg. 381-391]

    3.3.1. Managing packages with rpm and yum

    3.3.2. Apt tool

    3.3.3. Local repository

3.4. Disk Storage [Ref 1: pg. 206-264]

    3.4.1. Storage Hardware Interfaces

    3.4.2. Low level Management of Drives

    3.4.3. Disk Partitioning, RAID, LVM

    3.4.4. File Systems and Mounting*

3.5. Controlling Processes* [Ref 1: pg. 120-138]

    3.5.1. Process Attributes

    3.5.2. Signals & States

    3.5.3. Nice

    3.5.4. top

    3.5.5. proc

3.6. File System [Ref 1: pg. 140-158]

    3.6.1. Path Names

    3.6.2. File Names

    3.6.3. File Tree

    3.6.4. File Types & Attributes*

    3.6.5. File commands: chmod, chown, chgrp, umask*

Section 4 : Network Administration (20 hrs)

Instructional Objectives

- Plan and execute network management procedures
- Identify user requirements and plan for deployment/ configuring of network services

Material /Sub Topics

4.1. Network Configuration [Ref 1: pg. 469-472, 476-483]

   4.1.1. Host Name & IP configuration

   4.1.2. Configuration of the Basic Routing and Default Gateway

   4.1.3. Name Resolution

   4.1.4. Dynamic Host configuration (DHCP)

4.2. Configuration of a Linux Box as a router* [Ref 3:]

4.3. Configuring a Web Server (Apache)* [Ref 1: pg. 956-958, 963-971]

4.4. Configuring a DNS Server (Bind)* [Ref 1: pg. 552-596]

4.5. Configuring a Mail Server (Postfix) [Ref 1: pg. 742-761, 828-839]

4.6. Configuring a Caching/Proxy Server (Squid)* [Ref 1: pg. 974-976, Ref 4:]

Section 5: Automating System Administration (06 hrs)

Instructional Objectives

- Use appropriate scripting tools to automate periodic processes

Material /Sub Topics

5.1. Shell Basics [Ref 1: pg. 29-36]

5.2. Bash Scripting* [Ref 1: pg. 37-52]

5.3. Periodic Processes* [Ref 1: pg. 283-287]

Section 6 : Virtualization (05 hrs)

Instructional Objectives

- Identify different types of Virtualization
- Describe the given types of Virtualization
- Identify available tools for Virtualization

Material /Sub Topics

6.1. Virtualization [Ref 1: pg. 983-997]

    6.1.1. Full virtualization

    6.1.2.   Para virtualization

    6.1.3. Native virtualization

    6.1.4. Cloud Computing

    6.1.5. Virtualization with Linux

    6.1.6.   Introduction to Xen

    6.1.7.   Introduction to KVM

* Students are recommended to do some practical in these topics.