

Computer System Design and Administration

Topic 0. Introduction



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Suggested background

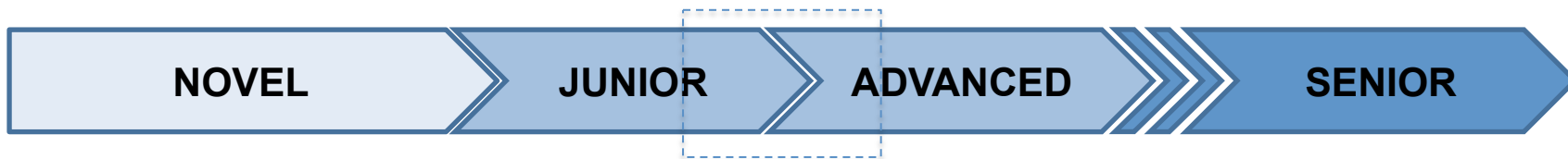
- **Very important:**
 - **G663 – Computer Systems (3rd).**
- **Highly recommended:**
 - G660 – Operating Systems.
 - G662 – Computer Networks and Distributed Systems.
 - G1828 – System and Network Security and Assurance.
- **Recommended:**
 - Advanced UNIX/Linux user skills.
 - UNIX/Linux management basics.
 - Knowledge of programming languages:
 - Python.



ESSENTIAL

Course scope

- To acquire the required skills for performing the typical tasks of an “advanced” **junior system administrator** in computer environments like modern “Data Centers”.



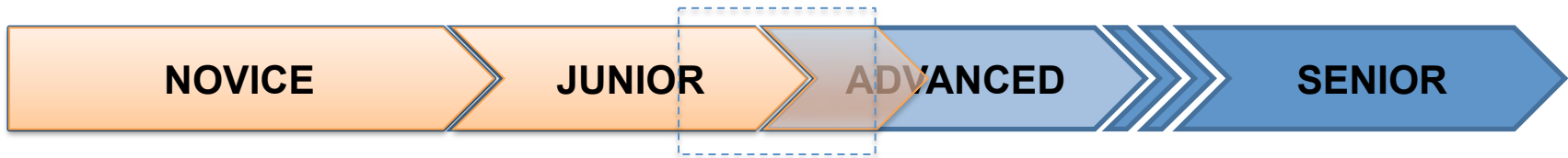
Before CSDA



After CSDA

Course scope

- To acquire the required skills for performing the typical tasks of an “advanced” **junior system administrator** in computer environments like modern “Data Centers”.



Before CSDA



After CSDA

Learning & training objectives

- **“Data center” basics:**
 - Definition of the **“Data center”** concept and **staff organization** in computer environments.
- **Fundamentals about the system administrator:**
 - Definition of the **system administrator** including:
 - Typical tasks, duties and responsibilities.
 - **Good practices.**
 - Ethical code (SAGE).
 - Knowledge and *skill levels* (SAGE).
 - Explanation of the most relevant **resources & information sources and tools** used by the system administrator.

Learning & training objectives

- **Advanced Computer System Administration in enterprise environments:**
 - To learn about and understand the main service in:
 - **INTRAnet** services.
 - **INTERnet** services.
- } To acquire knowledge on advanced computer system administration **for deploying and integrating** systems and global services in enterprise environments.
- **Monitoring and Administration of servers and services:**
 - To master the installation and operation processes of the most popular **configuration** and **monitoring tools**, usually used by system administrators in *Data Centers*.

Course outline

- **Unit 1: introduction to computer system administration:**
 - Basics concerning “Data Centers” and the system administrator.
- **Unit 2: integration of global services** in enterprise environments I:
The INTRANET:
 - Computer systems for deploying **INFORMATION** and **AUTHENTICATION** services.
 - Computer systems for third-party **NETWORKING** services.
 - Computer systems for **network FILE** systems and **RESOURCE** sharing management.
- **Unit 3: integration of global services** in enterprise environments II:
The INTERNET:
 - Computer systems for **WEB** service management.
 - Computer systems for **MAIL** service management.
- **Unit 4: centralized Monitoring & Configuration** tools:
 - Server and service **CONFIGURATION** tools.
 - Server and service **MONITORING** tools.
 - Linux tools.

Course roadmap: lectures

→ **Topic 0:** Introduction.

UI

UII

UIII

UIV

- **Topic 1:** basics concerning “Data Centers” and the system administrator (the **sysadmin**).

- **Topic 2:** active directory secure service: **LDAP** (over **SSL**).
- **Topic 3:** active directory integration mechanisms: **PAM** + **NSS** (*SSSD*).
- **Topic 4:** network configuration service: ISC **DHCP**.
- **Topic 5:** network naming translation service: ISC **DNS**.
- **Topic 6:** network time sync service: ISC **NTP**.
- **Topic 7:** network file system service: **NFSv4**.
- **Topic 8:** multi-platform interoperability and resource sharing service: **SAMBA**.

- **Topic 9:** secure web service: **HTTP Apache2** (over **SSL**).
- **Topic 10:** secure Web Content Management Service: Wordpress (CMS).
- **Topic 11:** secure e-Mail service: **SMTP Postfix**, **IMAP Dovecot** (over **SSL**).

- **Topic 12:** global configuration tool: **Webmin**.
- **Topic 13:** global monitoring tools: **Ganglia** and **Nagios3**.
- **Topic 14:** Linux tools.

Course roadmap: practical classes (Lab)

UII

UIII

UIV

→ **Lab0:** introduction to the LAB environment (**virtualBox**).

- **Lab1:** deployment of a **secure information server I:**

- **Active directory secure service (*Single sign-on*):**

- LDAP (OpenLDAP) over SSL.
 - PAM & NSS (SSS). *Integrating* the authentication service: Single Sing-On.

- **Lab2:** deployment of a **secure information server II:**

- **Networking services (*third-party*) for the Intranet:**

- DNS (ISC BIND9).
 - DHCP (ISC DHCP).
 - NTP (ISC NTP).

- **Lab3:** deployment of a secure **network file system and shared resources server:**

- NFS (NFSv4).
 - SAMBA.

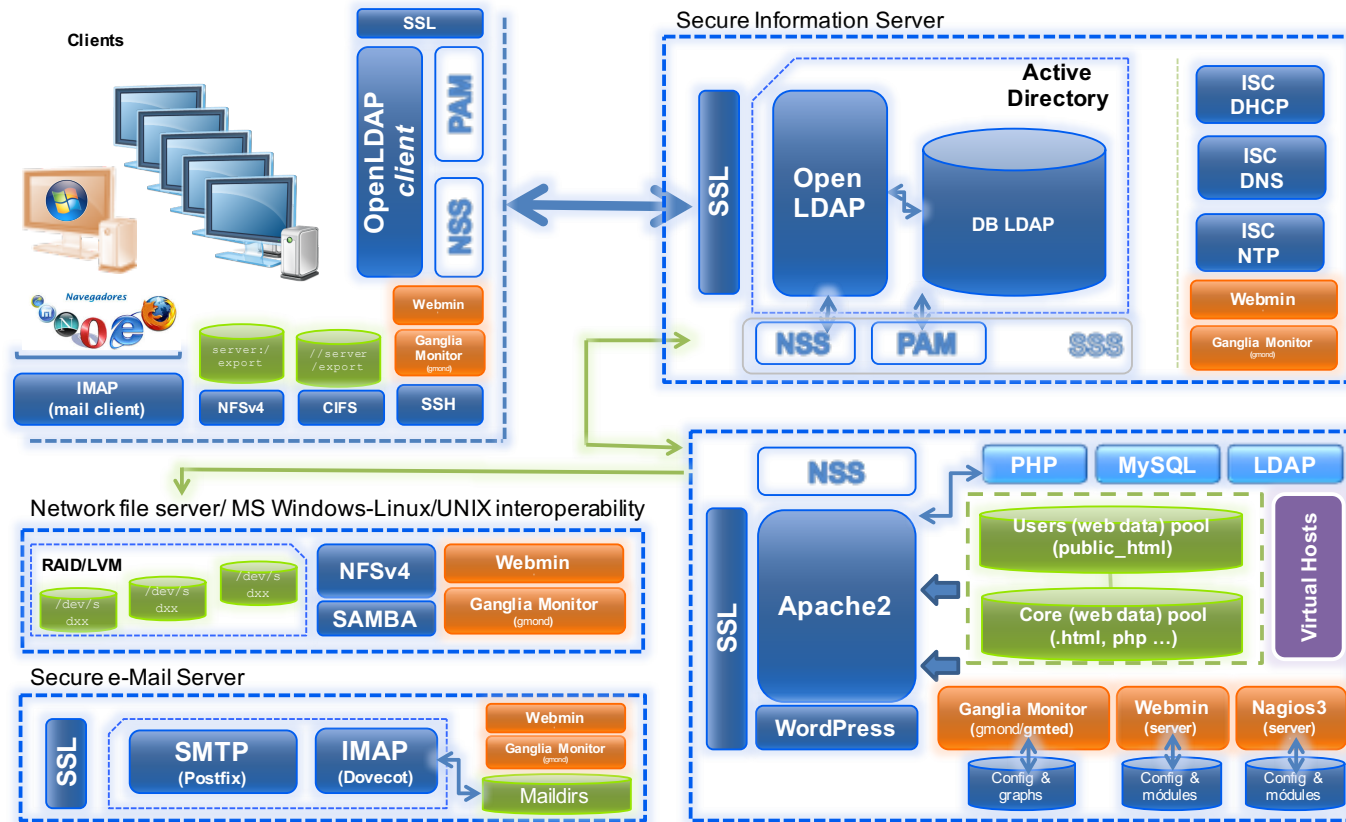
Course roadmap: practical classes (Lab)

- **Lab4:** deployment of a **secure web server** (HTTPs):
 - HTTP (Apache 2) over SSL.
 - CMS.

- **Lab5:** deployment of a **secure mail server** and Webmail service:
 - SMTP (Postfix) over SSL.
 - IMAP (Dovecot) over SSL.
 - Webmail (RoundCube).
 - Mail List Manager:
 - Mailman.

- **Lab6:** **monitoring and configuration tools:**
 - Webmin.
 - Ganglia Monitor & Nagios 3.
 - Linux tools.

The master plan: make a puzzle



- Review the major **administrative systems**.
- Identify the different **pieces** of each one.
- Explain how they **work together**.

Bibliography & resources

Required reading list

- **Google (well used!!)**

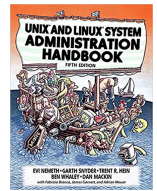
Installation and configuration manuals and procedures for the computer systems described in class.

- **UNIX and Linux system administration handbook (5th Edition):**

Author: Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley & Dan Mackin.

Publisher: Upper Saddle River, NJ. Prentice Hall, 2010.

ISBN-10: 01314277554, ISBN-13: 978-0134277554.



- **Essential System Administration:**

Author: FRISCH, Aeleen.

Publisher: O'Reilly & Associates. Third Edition (August 2002).

ISBN 10: 0-596-00343-9, ISBN 13: 9780596003432.



- **Administración de sistemas Linux: Guía avanzada:**

Author: M. Carling, Stephen Degler & James Dennis.

Publisher: Madrid [etc.]. Prentice Hall (1999).

ISBN: 84-8322-174-8.



- **La biblia de administración de sistemas Linux:**

Author: LeBlanc, Dee-Ann.

Publisher: Madrid. Anaya Multimedia, cop. (2001).

ISBN: 84-415-1126-8.



- <http://whitepapers.datacenterknowledge.com>.

Bibliography & resources

Suggested additional reading

- **LDAP System Administration:**

Author: Gerald Carter.
 Publisher: O'Reilly Media.
 Print ISBN: 978-1-56592-491-8 | ISBN 10: 1-56592-491-6.
 Ebook ISBN: 978-0-596-10335-4 | ISBN 10: 0-596-10335-2.



- **Kerberos: The Definitive Guide:**

Author: Jason Garman.
 Publisher: O'Reilly Media (September 5, 2003).
 ISBN-10: 0596004036. ISBN-13: 978-0596004033.



- **Apache Cookbook: Solutions and Examples for Apache Administration:**

Author: Ken Coar & Rich Bowen.
 Publisher: O'Reilly Media (December 21, 2007).



- **Postfix: The Definitive Guide:**

Author: Kyle D. Dent.
 Publisher: O'Reilly Media (December 18, 2003 – 28).



- **Debian GNU/Linux Desktop Survival Guide:**

Author: Graham J. Williams.
 Publisher: Togaware.
 URL: <http://www.togaware.com/linux/survivor/>.



- **Linux Clustering: Building and Maintaining Linux Cluster:**

Author: Charles Bookman.
 Publisher: New Riders.

