**Topic 105: Shells and Shell Scripting**

**105.1 Customize and use the shell environment**

**Weight**: 4

**Description:** Candidates should be able to customize shell environments to meet users' needs. Candidates should be able to modify global and user profiles.

**Key Knowledge Areas:**

* Set environment variables (e.g. PATH) at login or when spawning a new shell.
* Write Bash functions for frequently used sequences of commands.
* Maintain skeleton directories for new user accounts.
* Set command search path with the proper directory.

**105.2 Customize or write simple scripts**

**Weight:**4

**Description:**Candidates should be able to customize existing scripts, or write simple new Bash scripts.

**Key Knowledge Areas:**

* Use standard sh syntax (loops, tests).
* Use command substitution.
* Test return values for success or failure or other information provided by a command.
* Execute chained commands.
* Perform conditional mailing to the superuser.
* Correctly select the script interpreter through the shebang (#!) line.
* Manage the location, ownership, execution and suid-rights of scripts.

**Topic 106: User Interfaces and Desktops**

**106.1 Install and configure X11**

**Weight:** 2

**Description:**Candidates should be able to install and configure X11.

**Key Knowledge Areas:**

* Understanding of the X11 architecture.
* Basic understanding and knowledge of the X Window configuration file.
* Overwrite specific aspects of Xorg configuration, such as keyboard layout.
* Understand the components of desktop environments, such as display managers and window managers.
* Manage access to the X server and display applications on remote X servers.
* Awareness of Wayland.

**106.2 Graphical Desktops**

**Weight:**1

**Description:**Candidates should be aware of major Linux desktops. Furthermore, candidates should be aware of protocols used to access remote desktop sessions.

**Key Knowledge Areas**:

* Awareness of major desktop environments
* Awareness of protocols to access remote desktop sessions

**106.3 Accessibility**

**Weight:** 1

**Description:** Demonstrate knowledge and awareness of accessibility technologies.

**Key Knowledge Areas:**

* Basic knowledge of visual settings and themes.
* Basic knowledge of assistive technology.

**Topic 107: Administrative Tasks**

**107.1 Manage user and group accounts and related system files**

**Weight:** 5

**Description:**Candidates should be able to add, remove, suspend and change user accounts.

**Key Knowledge Areas:**

* Add, modify and remove users and groups.
* Manage user/group info in password/group databases.
* Create and manage special purpose and limited accounts.

**107.2 Automate system administration tasks by scheduling jobs**

**Weight:** 4

**Description:**Candidates should be able to use cron and systemd timers to run jobs at regular intervals and to use at to run jobs at a specific time.

**Key Knowledge Areas:**

* Manage cron and at jobs.
* Configure user access to cron and at services.
* Understand systemd timer units.

**107.3 Localisation and internationalisation**

**Weight:** 3

**Description:** Candidates should be able to localize a system in a different language than English. As well, an understanding of why LANG=C is useful when scripting.

**Key Knowledge Areas:**

* Configure locale settings and environment variables.
* Configure timezone settings and environment variables.

**Topic 108: Essential System Services**

**108.1 Maintain system time**

**Weight:**3

**Description:**Candidates should be able to properly maintain the system time and synchronize the clock via NTP.

**Key Knowledge Areas:**

* Set the system date and time.
* Set the hardware clock to the correct time in UTC.
* Configure the correct timezone.
* Basic NTP configuration using ntpd and chrony.
* Knowledge of using the pool.ntp.org service.
* Awareness of the ntpq command.

**108.2 System logging**

**Weight:**4

**Description:** Candidates should be able to configure rsyslog. This objective also includes configuring the logging daemon to send log output to a central log server or accept log output as a central log server. Use of the systemd journal subsystem is covered. Also, awareness of syslog and syslog-ng as alternative logging systems is included.

**Key Knowledge Areas:**

* Basic configuration of rsyslog.
* Understanding of standard facilities, priorities and actions.
* Query the systemd journal.
* Filter systemd journal data by criteria such as date, service or priority.
* Configure persistent systemd journal storage and journal size.
* Delete old systemd journal data.
* Retrieve systemd journal data from a rescue system or file system copy.
* Understand interaction of rsyslog with systemd-journald.
* Configuration of logrotate.
* Awareness of syslog and syslog-ng.

**108.3 Mail Transfer Agent (MTA) basics**

**Weight:** 3

**Description:**Candidates should be aware of the commonly available MTA programs and be able to perform basic forward and alias configuration on a client host. Other configuration files are not covered.

**Key Knowledge Areas:**

* Create e-mail aliases.  
  Configure e-mail forwarding.  
  Knowledge of commonly available MTA programs (postfix, sendmail, exim) (no configuration).

**108.4 Manage printers and printing**

**Weight:** 2

**Description:** Candidates should be able to manage print queues and user print jobs using CUPS and the LPD compatibility interface.

**Key Knowledge Areas:**

* Basic CUPS configuration (for local and remote printers).
* Manage user print queues.
* Troubleshoot general printing problems.
* Add and remove jobs from configured printer queues.

**Topic 109: Networking Fundamentals**

**109.1 Fundamentals of internet protocols**

**Weight:** 4

**Description:**Candidates should demonstrate a proper understanding of TCP/IP network fundamentals.

**Key Knowledge Areas:**

* Demonstrate an understanding of network masks and CIDR notation.
* Knowledge of the differences between private and public "dotted quad" IP addresses.
* Knowledge about common TCP and UDP ports and services (20, 21, 22, 23, 25, 53, 80, 110, 123, 139, 143, 161, 162, 389, 443, 465, 514, 636, 993, 995).
* Knowledge about the differences and major features of UDP, TCP and ICMP.
* Knowledge of the major differences between IPv4 and IPv6.
* Knowledge of the basic features of IPv6.

**109.2 Persistent network configuration**

**Weight:** 4

**Description:** Candidates should be able to manage the persistent network configuration of a Linux host.

**Key Knowledge Areas:**

* Understand basic TCP/IP host configuration.
* Configure ethernet and wi-fi network configuration using NetworkManager.
* Awareness of systemd-networkd.

**109.3 Basic network troubleshooting**

**Weight:** 4

**Description:** Candidates should be able to troubleshoot networking issues on client hosts.

**Key Knowledge Areas:**

* Manually configure network interfaces, including viewing and changing the configuration of network interfaces using iproute2.
* Manually configure routing, including viewing and changing routing tables and setting the default route using iproute2.
* Debug problems associated with the network configuration.
* Awareness of legacy net-tools commands.

**109.4 Configure client side DNS**

**Weight**: 2

**Description:** Candidates should be able to configure DNS on a client host.

**Key Knowledge Areas:**

* Query remote DNS servers.
* Configure local name resolution and use remote DNS servers.
* Modify the order in which name resolution is done.
* Debug errors related to name resolution.
* Awareness of systemd-resolved.

**Topic 110: Security**

**110.1 Perform security administration tasks**

**Weight:** 3

**Description:**Candidates should know how to review system configuration to ensure host security in accordance with local security policies.

**Key Knowledge Areas:**

* Audit a system to find files with the suid/sgid bit set.
* Set or change user passwords and password aging information.
* Being able to use nmap and netstat to discover open ports on a system.
* Set up limits on user logins, processes and memory usage.
* Determine which users have logged in to the system or are currently logged in.
* Basic sudo configuration and usage.

**110.2 Setup host security**

**Weight:**3

**Description:**Candidates should know how to set up a basic level of host security.

**Key Knowledge Areas:**

* Awareness of shadow passwords and how they work.
* Turn off network services not in use.
* Understand the role of TCP wrappers.

**110.3 Securing data with encryption**

**Weight:** 4

**Description:** The candidate should be able to use public key techniques to secure data and communication.

**Key Knowledge Areas:**

* Perform basic OpenSSH 2 client configuration and usage.
* Understand the role of OpenSSH 2 server host keys.
* Perform basic GnuPG configuration, usage and revocation.
* Use GPG to encrypt, decrypt, sign and verify files.
* Understand SSH port tunnels (including X11 tunnels).