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THE GEEK INSTITUTE OF CYBER SECURITY

Regd. By: E-Max India
Centre Code: EMAX/EK80606
(Recognized By Govt. Of India)

(Building Futures Through Digital Knowledge and Innovation)

Linux Server Administration (1 Month)

Syllabus

01: Introduction to Linux & Server Administration

- ✓ History and evolution of Linux
- ✓ Linux distributions for servers (Ubuntu Server, CentOS, RHEL, Debian)
- ✓ Role of a Linux system administrator
- ✓ Linux installation (bare metal & virtualization)
- ✓ System architecture and boot process

02: Command Line Basics & File System Navigation

- ✓ Introduction to the terminal and shell (bash, zsh)
- ✓ Navigating directories and files (cd, ls, pwd, etc.)
- ✓ Understanding absolute vs. relative paths
- ✓ File and directory manipulation (cp, mv, rm, mkdir, touch)
- ✓ Using wildcards and tab completion
- ✓ File permissions and ownership (chmod, chown, umask)

03: Working with Text and Files

- ✓ Viewing files (cat, less, more, head, tail)
- ✓ Searching files (grep, find, locate)
- ✓ Editing text files (nano, vim, vi)
- ✓ File compression and archiving (tar, gzip, bzip2, xz)
- ✓ Comparing files and checksum validation (diff, cmp, md5sum, sha256sum)

04: User and Group Administration

- ✓ Understanding /etc/passwd, /etc/shadow, /etc/group
- ✓ Creating, modifying, and deleting users and groups
- ✓ Setting password policies and expiration (passwd, chage)
- ✓ Managing user environments and login scripts
- ✓ User permissions and sudo access control (visudo, /etc/sudoers)

05: File Permissions and Access Control

- ✓ Traditional Unix permissions (rwx)
- ✓ Special permissions: SUID, SGID, sticky bit
- ✓ Access Control Lists (ACLs)
- ✓ File and directory security best practices

06: Process and Job Management

- ✓ Understanding Linux processes and PIDs
- ✓ Viewing and managing processes (ps, top, htop, kill, nice, renice)
- ✓ Background and foreground jobs (&, jobs, fg, bg)
- ✓ Process monitoring and signals

07: Managing Software Packages

- ✓ RPM-based systems (yum, dnf)
- ✓ Debian-based systems (apt, dpkg)
- ✓ Adding and managing repositories
- ✓ Building packages from source
- ✓ Updating and patching systems securely

08: Managing System Services (init & systemd)

- ✓ Understanding init vs systemd
- ✓ Managing services (systemctl, service)
- ✓ Enabling/disabling services at boot
- ✓ Checking service logs (journalctl)
- ✓ Troubleshooting failed services

09: Disk Management and File Systems

- ✓ Disk partitions and layout (fdisk, parted, lsblk)
- ✓ File system types (ext4, XFS, Btrfs, etc.)
- ✓ Mounting and unmounting devices
- ✓ Working with fstab for persistent mounts
- ✓ Checking disk usage (df, du)
- ✓ File system integrity checks (fsck)
- ✓ Disk quotas for users and groups

10: Logical Volume Management (LVM)

- ✓ Concepts of Physical Volume, Volume Group, Logical Volume
- ✓ Creating and managing LVM partitions
- ✓ Resizing and removing LVM volumes
- ✓ Snapshots and backup strategies using LVM

11: Networking in Linux

- ✓ Understanding IP, netmask, gateway, DNS
- ✓ Configuring static and dynamic IPs
- ✓ Network interface management (ip, ifconfig, nmcli)
- ✓ Network diagnostics (ping, netstat, ss, traceroute, mtr, nmap)
- ✓ Managing hostnames and DNS resolution
- ✓ Configuring hosts, resolv.conf, and nsswitch.conf

12: Secure Shell (SSH) Configuration

- ✓ Installing and configuring OpenSSH server
- ✓ Key-based authentication and security hardening
- ✓ Configuring sshd_config for best practices
- ✓ File and command transfers using scp, rsync, sftp
- ✓ SSH port forwarding and tunneling

13: Firewall and Security Basics

- ✓ Introduction to Linux firewall concepts
- ✓ Managing firewall with iptables and nftables
- ✓ Using ufw and firewalld for simplified firewall management
- ✓ Port scanning and blocking suspicious IPs
- ✓ Fail2Ban configuration for SSH and service brute-force protection

14: Web Server Configuration

- ✓ Installing and configuring Apache (apache2, httpd)
- ✓ Virtual Hosts setup (name-based and IP-based)
- ✓ Hosting multiple websites on one server
- ✓ Enabling and managing SSL with Let's Encrypt
- ✓ Configuring Nginx as a web server or reverse proxy
- ✓ Performance tuning and security

15: Database Server Administration

- ✓ Installing and configuring MySQL/MariaDB and PostgreSQL
- ✓ Secure installation and hardening
- ✓ Creating databases, users, and setting permissions
- ✓ Backing up and restoring databases (mysqldump, pg_dump)
- ✓ Remote database access and firewalls

16: Mail Server Basics

- ✓ Installing and configuring Postfix and Dovecot
- ✓ Setting up basic SMTP and IMAP
- ✓ Configuring email forwarding and aliases
- ✓ Spam filtering and security (SpamAssassin, SPF, DKIM, DMARC)

17: DNS Server Configuration

- ✓ Installing and configuring BIND9
- ✓ Understanding zones, records (A, CNAME, MX, TXT, PTR)
- ✓ Forward and reverse DNS configuration
- ✓ DNS troubleshooting and diagnostics

18: FTP, NFS, and Samba Server

- ✓ Configuring and securing vsftpd or ProFTPd
- ✓ NFS server for Linux-to-Linux file sharing
- ✓ Samba for Linux-to-Windows file sharing
- ✓ Managing shared access, permissions, and authentication

19: Scheduled Jobs and Automation

- Working with cron and crontab
- Automating tasks using at and batch
- Writing shell scripts for automation
- Logging and monitoring cron job output

20: Log Management and Monitoring

- ✓ System logs (/var/log, syslog, rsyslog, journald)
- ✓ Configuring logrotate
- ✓ Real-time monitoring tools (top, htop, iotop, dstat, glances)
- ✓ Installing and configuring monitoring tools (Nagios, Zabbix, Prometheus + Grafana basics)

21: Backup and Recovery

- ✓ Backup strategies and planning (full, incremental, differential)
- ✓ Using rsync, tar, dd for backup and recovery
- ✓ Creating disk images
- ✓ Disaster recovery plan and documentation

22: Virtualization and Containers

- ✓ Introduction to KVM, QEMU, and libvirt
- ✓ Managing virtual machines using virt-manager
- ✓ LXD/LXC basics
- ✓ Introduction to Docker and container lifecycle
- ✓ Docker Compose and containerized app deployment

23: Kernel Tuning and Performance Optimization

- ✓ Managing kernel modules
- ✓ Configuring kernel parameters (sysctl)
- ✓ Tuning system for performance and security
- ✓ Understanding and managing system limits (ulimit, limits.conf)

24: System Hardening & Auditing

- ✓ Disabling unused services
- ✓ Securing system files and permissions
- ✓ Installing and configuring SELinux or AppArmor
- ✓ Auditing system activity with auditd
- ✓ Security best practices checklist

25: Troubleshooting and Disaster Recovery

- ✓ Boot issues and recovery (GRUB rescue, initramfs)
- ✓ Network troubleshooting
- ✓ Service failure diagnosis
- ✓ Kernel panic and recovery
- ✓ Using Live CD for data recovery

26: Cloud and Remote Linux Administration

- ✓ Connecting to remote Linux servers securely
- ✓ Administering Linux servers on AWS, Azure, or DigitalOcean
- ✓ Using Ansible for remote configuration management
- ✓ Cloud-init basics for automation in cloud platforms

Capstone Project and Practical Exam

- ✓ Design and deploy a secure multi-service Linux server
- ✓ Set up web, database, and file sharing services
- ✓ Configure backups, firewall, and monitoring