Complete Study Guide: Linux Containers & Cloud-Native Administration

This PDF consolidates learning material from all 20 completed labs in this module. It serves as a revision and reference guide covering Linux fundamentals, containerization, security, networking, storage, logging, and Kubernetes integration.

Linux & System Fundamentals

- User and group management, file permissions, and ownership concepts
- System services management using systemd and service units
- Package management with dnf/yum
- System monitoring basics (top, ps, free, df)

Networking & Connectivity

- IP addressing and hostname configuration using nmcli and hostnamectl
- Network troubleshooting with ping, traceroute, ss, and nslookup
- Firewall management using firewalld and zones
- Persistent network configuration and verification

Logging & Monitoring

- Understanding systemd journal architecture
- Using journalctl for filtering by time, unit, and priority
- Persistent logging configuration
- Log-based troubleshooting techniques

Security & SELinux

- SELinux modes: enforcing, permissive, disabled
- Contexts, types, users, and roles
- Managing SELinux policies with semanage
- Troubleshooting denials using audit logs and audit2allow

Container Fundamentals with Podman

- Container vs VM concepts
- Installing and configuring Podman
- Image lifecycle: pull, list, inspect, remove

- Container lifecycle management
- Rootless containers and security benefits

Container Networking & Storage

- Port mapping and container networking basics
- Volume mounts and persistent storage
- Bind mounts vs named volumes
- Inspecting container networks

Advanced Container Operations

- Running multi-container applications
- Container logs and debugging
- Auto-restart policies
- Podman pods and Kubernetes compatibility

Network File System (NFS)

- NFS architecture and use cases
- Configuring NFS server and exports
- Client-side mounting and persistence
- Security considerations with NFS

Distributed Storage with Ceph

- Ceph architecture: MON, OSD, MDS
- Block storage concepts (RBD)
- High availability and fault tolerance
- Ceph vs traditional NAS comparison

Kubernetes Storage Integration

- Persistent Volumes (PV) and Persistent Volume Claims (PVC)
- Using NFS-backed persistent volumes
- Ceph-backed block storage in Kubernetes
- Storage classes and dynamic provisioning

Kubernetes Fundamentals

- Pods, deployments, and services

- Container orchestration basics
- Declarative configuration with YAML
- kubectl core commands

Troubleshooting Methodology

- Layered troubleshooting approach
- Logs, networking, permissions, and SELinux checks
- Common container and Kubernetes issues
- Best practices for root-cause analysis

Best Practices & Production Readiness

- Least privilege and security hardening
- Resource limits and quotas
- Backup and recovery considerations
- Monitoring and observability basics

How to Use This Guide

- Use this document for exam preparation and interviews.
- Revisit individual lab environments to practice commands.
- Focus on understanding concepts rather than memorizing commands.
- Relate labs to real-world DevOps, SRE, and Cloud Administrator roles.