# Network and System Administration Group Assignments

**Total Weight: 20%**

## Group 1: Linux File System Hierarchy Mastery

## Objective:

Design and implement a comprehensive file system structure for a software development company.

## Scenario:

Your group represents the infrastructure team at "TechInnovate Solutions." Design and implement a standardized file system structure that will be deployed across all company servers.

## Tasks:

1. **Design Phase:**
    - Create a detailed directory structure following FHS standards
    - Design separate areas for:
        - Web applications (`/srv/www/`)
        - Database files (`/var/lib/db/`)
        - Application logs (`/var/log/apps/`)
        - Configuration files (`/etc/company/`)
        - Temporary processing (`/opt/processing/`)
        - Backup staging (`/var/backups/staging/`)
2. **Implementation Phase:**
    - Create the entire directory structure with proper ownership
    - Set up symbolic links for commonly accessed paths
    - Implement consistent naming conventions
    - Create mount points for additional storage
3. **Documentation:**
    - Create a file system standards document
    - Develop a permission scheme matrix
    - Write a deployment guide for new servers

## Deliverables:

- Complete directory tree diagram
- Script to automate the directory structure creation
- File system standards document (3-4 pages)
- Permission matrix spreadsheet

- Verification script that checks structure compliance

## Group 2: Advanced User Management System

### Objective:

Implement a comprehensive user management system for a university department.

### Scenario:

Your group is responsible for managing user accounts for the Computer Science Department with 200+ students, faculty, and staff.

### Tasks:

1. **User Classification:**
    - Create groups for: professors, lecturers, undergraduate students, graduate students, staff
    - Implement different home directory structures for each user type
    - Set up course-specific groups for lab work
2. **Account Lifecycle Management:**
    - Create onboarding scripts for new users
    - Develop offboarding procedures for graduating students
    - Implement password policies based on user roles
    - Set account expiration for temporary accounts (exchange students)
3. **Monitoring and Reporting:**
    - Create scripts to monitor user activity
    - Generate monthly user reports
    - Develop alert system for suspicious activities

### Deliverables:

- User creation and management scripts
- Account lifecycle documentation
- Password policy implementation
- Monitoring dashboard (command-line based)
- User management procedure manual

## Group 3: Permission Security Framework

### Objective:

Design and implement a robust permission security framework for a financial institution.

### Scenario:

Your group must create a secure file permission system for "SecureBank Ltd." that prevents data leakage while maintaining productivity.

### Tasks:

1. **Security Model Design:**
    - Implement DAC with RBAC principles
    - Design permission schemes for:
        - Confidential documents (executive team only)
        - Department shared files
        - Public information
        - Audit logs
2. **Special Permissions Implementation:**
    - Set up SGID for collaborative project directories
    - Implement sticky bit for shared temporary spaces
    - Use SUID judiciously for essential system utilities
3. **Access Control Lists:**
    - Implement complex permission scenarios using ACLs
    - Create inheritance rules for directory structures
    - Develop ACL backup and restoration procedures

### Deliverables:

- Security policy document
- Permission implementation scripts
- ACL management tools
- Security audit checklist
- Incident response procedure for permission breaches

## Group 4: Disk Quota Management System

### Objective:

Implement an enterprise-grade disk quota system for a media company.

### Scenario:

Your group must manage storage resources for "MediaWorks Creative Agency" where employees work with large video and design files.

### Tasks:

1. **Quota Architecture:**
    - Design quota system for multiple departments with different needs
    - Implement user and group quotas simultaneously
    - Set up project-based quota allocations
    - Create emergency quota override procedures
2. **Monitoring and Enforcement:**
    - Develop real-time quota monitoring tools
    - Create automated warning system for users approaching limits
    - Implement grace period management
    - Set up quota usage reporting
3. **Optimization:**
    - Design archive and purge policies
    - Implement compression guidelines for different file types
    - Create storage efficiency best practices

### Deliverables:

- Quota configuration and management scripts
- Monitoring and alert system
- Storage policy document
- User education materials about quota system
- Quarterly storage report template

## Group 5: Security Audit and Compliance Framework

### Objective:

Develop a comprehensive security audit framework and compliance monitoring system.

### Scenario:

Your group is the security compliance team at "FinancialTrust Bank" responsible for ensuring all systems meet regulatory requirements and security standards.

### Tasks:

1. **Security Audit Framework:**
    - Develop automated security scanning scripts
    - Create compliance checklists for different regulations
    - Implement vulnerability assessment tools
    - Design security scoring methodology
2. **User Account Security:**
    - Create scripts to audit user account security
    - Implement password policy compliance checking

    - Develop inactive account identification and handling
    - Create privilege escalation monitoring
3. **File System Security:**
    - Develop permission violation detection systems
    - Create sensitive file monitoring
    - Implement file integrity checking
    - Design security incident reporting

### Deliverables:

- Security audit framework document
- Automated security scanning scripts
- Compliance checklists and templates
- Security scoring dashboard
- Incident response procedures
- Regulatory compliance report template

## Group 6: Enterprise Backup and Disaster Recovery System

### Objective:

Design and implement a comprehensive backup and disaster recovery solution for a medium-sized enterprise.

### Scenario:

Your group is the disaster recovery team at "GlobalManufacturing Inc." tasked with ensuring business continuity through robust backup strategies.

### Tasks:

1. **Backup Strategy Design:**
    - Design full, incremental, and differential backup schedules
    - Create retention policies for different data types
    - Implement backup verification procedures
    - Design off-site and cloud backup strategies
2. **Recovery Procedures:**
    - Develop system recovery procedures
    - Create database backup and restoration scripts
    - Implement file-level recovery mechanisms
    - Design disaster recovery testing scenarios
3. **Automation and Monitoring:**
    - Create automated backup scripts with error handling

- Develop backup success/failure monitoring
- Implement alerting for backup failures
- Create recovery time objective (RTO) and recovery point objective (RPO) tracking

### Deliverables:

- Backup strategy document
- Automated backup scripts
- Disaster recovery runbooks
- Recovery testing scenarios and results
- Monitoring and alerting implementation
- RTO/RPO compliance reporting

## Group 7: System Administration Automation Toolkit

### Objective:

Develop a comprehensive automation toolkit for routine system administration tasks using shell scripting.

### Scenario:

Your group is the DevOps automation team at "CloudScale Enterprises" tasked with reducing manual administrative work through scripting.

### Tasks:

1. **User Management Automation:**
   - Create bulk user creation/removal scripts
   - Develop automated group membership management
   - Implement password reset automation
   - Create user account auditing tools
2. **File System Automation:**
   - Develop permission audit and correction scripts
   - Create disk usage analysis and cleanup tools
   - Implement automated log rotation and management
   - Build file system health monitoring scripts
3. **System Monitoring Automation:**
   - Create service status monitoring and auto-restart scripts
   - Develop resource usage tracking and alerting
   - Implement system health dashboards
   - Create automated reporting tools

### Deliverables:

- Complete automation toolkit (all scripts)
- User and administrator documentation
- Installation and configuration guide
- Use case examples and tutorials
- Performance optimization recommendations
- Error handling and logging implementation

# Assignment Requirements for All Groups:

### Technical Requirements:

- All implementations must be tested on Linux systems
- Documentation must be professionally formatted
- All code must be thoroughly commented

### Submission Requirements:

- **Source Code:** All scripts and configuration files in organized directories
- **Documentation:** PDF format, professionally laid out with table of contents

**Grading Rubric (per group):**

- **Technical Implementation (5%)**: Functionality, efficiency, robustness, error handling
- **Documentation Quality (10)**: Clarity, completeness, professionalism, organization
- **Configuration Quality (15%)**: Readability, comments, structure, best practices

### Timeline:

- **November 28, 2025**