

System Administration 1

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IT391

System Administration 1

Lecture 1





Agenda

- Defining Systems, Components, and Services
- The Importance of System Administration
- Core Responsibilities and Daily Tasks
- Essential Tools and Technologies
- Common Challenges Faced
- Guiding Rules and Best Practices
- Ethical Considerations in System Administration

Defining "System" in an IT Context

•What is an IT System?

- "A system is an organized collection of interconnected components that work together to achieve specific objectives.

Key Characteristics:

- ✓ **Integration:** Components work as unified whole
- ✓ **Purpose:** Designed to accomplish specific goals
- ✓ **Interaction:** Elements communicate and depend on each other
- ✓ **Boundaries:** Clear definition of what's inside vs outside
- ✓ **Environment:** Operates within specific context

Defining "System" in an IT Context

•Types of Systems in IT:

- Operating Systems (Windows, Linux, macOS)
- Network Systems
- Database Systems
- Application Systems
- Security Systems

Core Components of IT Systems : Tangibles

IT Components:

- The building blocks – "***Hardware, software, networks, and services*** that support organizational operations". They form the "foundation of any organization's technology ecosystem".

Core Components of IT Systems

•Hardware:

- **Processors (CPU):** Execute instructions and calculations
- **Memory (RAM):** Temporary data storage and processing
- **Storage:** Permanent data retention (HDDs, SSDs)
- **Network Interfaces:** Communication pathways
- **Input/Output Devices:** User interaction point

Core Components of IT Systems

•Software:

- **Operating System:** Core system management
- **Applications:** User-facing programs
- **Drivers:** Hardware communication interfaces
- **Utilities:** System maintenance tools
- **Firmware:** Low-level hardware control

Core Components of IT Systems

- Networks:**

- Connect devices and facilitate data transmission.
- Examples: Local Area Networks (LANs), Wide Area Networks (WANs), wireless networks.

Understanding IT Services

❑ **Definition:** Services enabled by the IT components, supporting organizational operations and user needs

❑ **Core System Services:**

- **Process Management:** Running and scheduling programs
- **Memory Management:** Allocating and organizing RAM
- **File System:** Organizing and accessing data
- **Security Services:** Authentication and authorization
- **Network Services:** Communication protocols

❑ Infrastructure Services:

- **DNS (Domain Name System):** Name resolution
- **DHCP:** Automatic IP address assignment
- **Web Services:** HTTP/HTTPS protocols
- **Email Services:** SMTP, POP3, IMAP
- **Database Services:** Data storage and retrieval

Understanding IT Services

❑ Application Services:

- **Directory Services:** User and resource management
- **Backup Services:** Data protection and recovery
- **Monitoring Services:** System health tracking
- **Update Services:** Software maintenance
- **Remote Access:** SSH, RDP, VPN

What is System Administration

• System administration refers to **managing** the operation of computer systems in a multi-user environment and encompasses the tasks and responsibilities involved in maintaining, monitoring, and supporting the operation of these systems



Core Areas of System Administration

SYSTEM ADMINISTRATION OVERVIEW

System Management

- Hardware/Software Installation
- OS Management & Updates
- Performance Monitoring
- System Configuration

User Administration

- Account Creation/Management
- Access Control & Permissions
- Authentication Systems
- Security Policies

Security & Backup

- Security Protocol Implementation
- Firewall Management
- Backup & Disaster Recovery
- Threat Detection

Network Administration

- Network Configuration
- Device Management
- Connectivity Maintenance
- Network Troubleshooting

System Administrator

- A system administrator, commonly known as a **sysadmin**, is an information technology professional who supports a multiuser computing environment and ensures continuous, optimal performance of IT services and support systems.
- The system administrator seeks to ensure that the **uptime**, **performance**, **resources**, and **security** of the computers they manage meet the needs of the users, without exceeding a set budget when doing so.



Importance of System Administration

•Why System Administration Matters:

☐ Business Continuity:

- Ensures systems remain operational 24/7
- Minimizes downtime and service interruptions
- Maintains productivity and revenue flow
- Supports business growth and scalability

☐ Data Protection:

- Safeguards critical business information
- Implements backup and disaster recovery
- Ensures data integrity and availability
- Complies with regulatory requirements

Importance of System Administration

•Why System Administration Matters:

☐ Security Assurance:

- Protects against cyber threats and attacks
- Maintains system and network security
- Manages user access and permissions
- Monitors for suspicious activities

☐ Performance Optimization::

- Ensures systems run efficiently
- Manages resource allocation
- Optimizes network performance
- Plans for capacity requirements

Importance of System Administration

- **Why System Administration Matters:**

- ❑ **Cost Management:**

- Reduces operational expenses
 - Prevents costly system failures
 - Optimizes resource utilization
 - Plans strategic technology investments

System Administration Challenges

❑ Technical Challenges:

- **Complexity:** Managing diverse, interconnected systems
- **Scale:** Handling growing data and user volumes
- **Integration:** Connecting different technologies
- **Legacy Systems:** Maintaining older infrastructure
- **Rapid Change:** Keeping up with technology evolution

System Administration Challenges

❑ Security Challenges:

- **Cyber Threats:** Evolving attack methods
- **Compliance:** Meeting regulatory requirements
- **Access Management:** Controlling user permissions
- **Data Privacy:** Protecting sensitive information
- **Incident Response:** Handling security breaches

System Administration Challenges

❑ Operational Challenges:

- **24/7 Availability:** Ensuring continuous operation
- **Resource Constraints:** Limited budget and staff
- **Skills Gap:** Finding qualified personnel
- **Documentation:** Maintaining accurate records
- **Change Management:** Implementing updates safely

System Administration Challenges

❑ Business Challenges:

- **Alignment:** Supporting business objectives
- **Communication:** Translating technical issues
- **Budget Justification:** Proving ROI
- **Risk Management:** Balancing security and usability
- **Vendor Management:** Coordinating with suppliers

System Administration Rules and Best Practices

❑ Fundamental Principles

1. **Document Everything:** Maintain comprehensive records
2. **Test Before Deploy:** Validate changes in safe environments
3. **Backup Before Change:** Always have recovery options
4. **Monitor Continuously:** Watch system health proactively
5. **Plan for Failure:** Assume things will go wrong

System Administration Rules and Best Practices

❑ Change Management Rules:

- **Approval Process:** Get authorization for changes
- **Testing Protocol:** Validate in development environment
- **Rollback Plan:** Always have undo procedures
- **Communication:** Notify stakeholders of changes
- **Documentation:** Record what, when, why, how

System Administration Rules and Best Practices

❑ Security Rules:

- **Principle of Least Privilege:** Minimum necessary access
- **Defense in Depth:** Multiple security layers
- **Regular Updates:** Keep systems patched
- **Access Review:** Periodically audit permissions
- **Incident Reporting:** Document security events

System Administration Rules and Best Practices

❑ Operational Rules:

- **Standardization:** Use consistent configurations
- **Automation:** Reduce manual errors
- **Monitoring:** Implement comprehensive oversight
- **Capacity Planning:** Anticipate growth needs
- **Performance Baseline:** Know normal operations

System Administrator Responsibilities

❑ Core Duties and Expectations

Daily Operations:

- **System Monitoring:** Check system health and performance
- **User Support:** Resolve technical issues and requests
- **Maintenance Tasks:** Apply updates, patches, backups
- **Security Review:** Monitor logs and alerts
- **Documentation:** Update procedures and configurations

System Administrator Responsibilities

❑ Core Duties and Expectations

Strategic Responsibilities:

- **Infrastructure Planning:** Design and upgrade systems
- **Capacity Management:** Plan for growth and resources
- **Risk Assessment:** Identify and mitigate threats
- **Policy Development:** Create IT governance frameworks
- **Vendor Relations:** Manage technology partnerships

System Administrator Responsibilities

❑ Core Duties and Expectations

Technical Responsibilities:

- **Installation:** Deploy new systems and software
- **Configuration:** Set up and optimize systems
- **Troubleshooting:** Diagnose and resolve problems
- **Performance Tuning:** Optimize system efficiency
- **Integration:** Connect different systems and services

System Administrator Responsibilities

❑ Core Duties and Expectations

Administrative Responsibilities:

- **User Management:** Create, modify, delete accounts
- **Access Control:** Manage permissions and security
- **Asset Management:** Track hardware and software
- **Compliance:** Ensure regulatory adherence
- **Training:** Educate users on systems and policies

System Administration Ethics

❑ Professional Standards and Principles

Core Ethical Principles:

- **Integrity:** Honest and truthful in all dealings
- **Confidentiality:** Protect sensitive information
- **Responsibility:** Accountable for actions and decisions
- **Competence:** Maintain professional skills and knowledge
- **Respect:** Treat all stakeholders with dignity

System Administration Ethics

❑ Professional Standards and Principles

Data Ethics:

- **Privacy Protection:** Safeguard personal information
- **Data Minimization:** Collect only necessary data
- **Consent:** Obtain appropriate permissions
- **Transparency:** Clear about data usage
- **Retention:** Store data only as long as needed

System Administration Ethics

❑ Professional Standards and Principles

Professional Conduct:

- **Honesty:** Truthful about capabilities and limitations
- **Continuous Learning:** Stay current with technology
- **Professional Development:** Pursue certifications and training
- **Peer Collaboration:** Share knowledge responsibly
- **Industry Standards:** Follow established best practices

System Administration Ethics

❑ Professional Standards and Principles

Security Ethics:

- **Authorized Access:** Only access systems as permitted
- **Vulnerability Disclosure:** Report issues responsibly
- **No Harm Principle:** Avoid actions that cause damage
- **Legal Compliance:** Follow applicable laws and regulations
- **Whistleblowing:** Report serious ethical violations

Professional Development Path

❑ Building System Administration Career

Entry Level Skills:

- Basic operating system knowledge
- Fundamental networking concepts
- Help desk and user support experience
- Basic scripting and automation
- Understanding of security principles

Professional Development Path

❑ Building System Administration Career

Intermediate Skills:

- Advanced system configuration
- Network administration
- Database management
- Cloud platform experience
- Project management capabilities

Professional Development Path

❑ Building System Administration Career

Advanced Skills:

- Enterprise architecture design
- Strategic planning and leadership
- Advanced security and compliance
- Business process optimization
- Team management and mentoring

Professional Development Path

❑ Building System Administration Career

Certifications to Consider:

- **CompTIA:** A+, Network+, Security+
- **Microsoft:** MCSA, MCSE, Azure certifications
- **Linux:** LPIC, Red Hat certifications
- **Cisco:** CCNA, CCNP for networking
- **Cloud:** AWS, Azure, Google Cloud certifications

Summary and Key Takeaways

❑ Essential Concepts Covered:

- **Systems:** Integrated components working toward common goals
- **Components:** Hardware, software, and data elements
- **Services:** Core functions provided by systems
- **Importance:** Business continuity, security, and efficiency
- **Challenges:** Technical, security, operational, and business complexities

Summary and Key Takeaways

❑ Professional Foundation:

- **Rules:** Best practices for safe and effective administration
- **Responsibilities:** Daily operations and strategic planning
- **Tools:** Essential software for system management
- **Ethics:** Professional conduct and moral principles
- **Development:** Continuous learning and career growth



Thank You