NETWORK AND COMPUTER SYSTEMS ADMINISTRATORS

A DEEP DIVE FOR SKILLS-BASED HIRING

SKILLFUL
A MARKLE INITIATIVE

Occupation Overview: Network and Computer Systems Administrators

Foundational Competencies

- **Systems Analysis:** Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
- **Critical Thinking:** Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
- **Complex Problem Solving:** Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- **Judgment and Decision Making:** Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- **Monitoring:** Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- **Systems Evaluation:** Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.
- **Operation Monitoring**: Watching gauges, dials, or other indicators to make sure a machine is working properly.
- **Troubleshooting:** Determining causes of operating errors and deciding what to do about it.
- **Programming**: Writing computer programs for various purposes.
- **Quality Control Analysis**: Conducting tests and inspections of products, services, or processes to evaluate quality or performance.

Occupation-Specific Competencies

- **Basic Systems Administration:** Basic proficiency with the installation and maintenance of system configurations; familiarity with server-based systems, security devices, distributed applications, network storage, and messaging components; some knowledge of managing and maintaining existing computer systems and networks.
- **Basic Core Operating Systems:** Familiarity with the use of multiple operating systems (e.g., Apple, Microsoft, Android, Linux/Unix) for computer and mobile devices and some knowledge of how to install, configure, and maintain one of those operating systems.
- **Basic Tech Support:** Familiarity with the use of some components of commonly-used computer hardware, software, applications and a basic ability to diagnose problems and provide troubleshooting and resolution support.
- **Intermediate Server Administration:** Demonstrated ability to install, configure, troubleshoot, and maintain server configurations to ensure their confidentiality, integrity, and availability as well as maintain servers utilizing operating systems such as Windows, Linux, or Solaris.
- **Basic General Networking Tools and Concepts:** Familiarity with commonly-used networking tools/devices, including: routers, Ethernet, firewalls, frame relay, LAN, VPN, and WAN.
- **Basic Systems Design and Implementation:** Demonstrated ability to assist customers in the gathering of requirements and design, implement, and support simple technology solutions to existing business problems.
- **Intermediate Network Protocols:** Demonstrated ability to facilitate communications across DNS, DHCP, SMTP, SNMP, TCP/IP, and other common network protocols.
- **Basic Network Administration:** Basic proficiency with the operation and maintenance of network devices, including hardware, software and operating systems; able to perform basic network monitoring and analysis on NAS, NFS, or RAID.
- **Basic IT/Hardware:** Familiarity with the use of multiple computer and device hardware and IT systems and some knowledge of how to assemble, configure, install, maintain, and repair some of the hardware/systems.
- **Basic Information Security:** Familiarity with software assurance practices and their use in software development.

Job Description (Example)

Install, configure, and support an organization's local area network (LAN), wide area network (WAN), and internet systems or a segment of a network system. Monitor network and computer systems to ensure availability to all users and may perform necessary maintenance to support availability. May monitor and test web site performance to ensure web sites operate correctly and without interruption. May assist in network and computer systems modeling, analysis, planning, and coordination between network and data communications hardware and software. May administer network and computer systems security measures.

- Setup, configure, and support internal and/or external networks and maintain all systems, applications, security, and network configurations.
- Research, analyze, design, test, and implement networks and computer systems.
- Perform network and computer systems design upgrades and hardware reconfigurations.
- Provide technical support to network service desk or customer operations if requested.
- Assist with network studies, traffic analyses, and the preparation of forecasts.
- Recommend modifications to the network and computer systems configurations that reduce costs or improve service.

Activities (Example List)

- Maintain and administer computer devices/networks and related computing environments including computer hardware, systems software, applications software, and all configurations.
- Perform data backups and disaster recovery operations.
- Diagnose, troubleshoot, and resolve hardware, software, or other network and system problems, and replace defective components when necessary.
- Plan, coordinate, and implement network security measures to protect data, software, and hardware.
- Configure, monitor, and maintain e-mail applications or virus protection software.
- Monitor the performance of computer systems and networks, and coordinate computer network access and use.
- Design, configure, and test computer hardware, networking software and operating system software.

Prioritized Foundational Competencies: Network and Computer Systems Administrators

Most Common Required Competencies

1	**Troubleshooting:** Determining causes of operating errors and deciding what to do about it; resolving incidents caused by technical or operator errors; able to quickly identify and compile relevant information and use to solve various problems.
2	**Monitoring:** Monitoring/assessing the performance of systems, processes, hardware, and software to take corrective actions and make improvements; validating that a system confirms with key operating parameters.
3	**Critical Thinking:** Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to successfully address various challenges, situations, and opportunities.

Most Common Break Point Competencies

1	**Judgment and Decision Making:** Considering the relative impacts, repercussions, and benefits of potential actions to choose the most appropriate one.
2	**Systems Analysis:** Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes; ideally, able to demonstrate some understanding of the relevant system as a whole; thinking through how a change may impact the system as a whole; seeking out appropriate expertise to get help when needed.
3	**Critical Thinking:** *See previous.*

Most Preferred Competencies

1	**Systems Analysis:** *See previous.*
2	**Troubleshooting:** *See previous.*
3	**Active Learning:** Understanding the implications of new information for both current and future problem solving and decision making; showing interest and motivation to learn new material; able to gather new information whether formally presented, shared by others, or personally observed.

Most Hard-to-Find Competencies

1	**Complex Problem Solving:** Able to identify, frame, and then handle complex challenges by seeking out input from others and reviewing relevant information to develop and evaluate options and implement solutions.
2	**Critical Thinking:** *See previous.*
3	**Troubleshooting:** *See previous.*

Most Evolving Competencies

1	**Systems Analysis:** Evolution due to combination of cloud and on-premise systems, device diversity and complexity; changes increase value of determining how systems should work and how changes in conditions, operations, and the environment affect outcomes; ideally, able to understand systems holistically; considers how changes impact the system as a whole; seeks appropriate expertise when needed.
2	**Programming:** Evolution due to provision of new systems both in the cloud and on premise; changes make it more important to learn new methods of writing scripts, batching files, automating provisioning, defining networks, and automating processes in light of new and changing systems.
3	**Systems Evaluation:** Evolution driven by combination of cloud and on-premise systems, device diversity, and complexity; changes increase value of being able to identify new measures or indicators of system performance and devise actions needed to improve or correct performance, relative to system goals; also important to be able to plan for new and unforeseen complications.

Prioritized Occupation-Specific Competencies: Network and Computer Systems Administrators

Most Common Required Competencies

1	**Basic General Networking Tools and Concepts:** Familiarity with commonly-used networking tools/devices, including routers, Ethernet, firewalls, frame relay, LAN, VPN, and WAN.
2	**Intermediate Server Administration:** Demonstrated ability to install, configure, troubleshoot, and maintain server configurations to ensure their confidentiality, integrity, and availability as well as maintain servers utilizing operating systems such as Windows, Linux, or Solaris.
3	**Basic Network Administration:** Basic proficiency with the operation and maintenance of network devices, including hardware, software and operating systems; able to perform basic network monitoring and analysis on NAS, NFS, or RAID.

Most Common Break Point Competencies

1	**Basic General Networking Tools and Concepts:** *See previous.*
2	**Basic Network Administration:** *See previous.*
3	**Basic Information Security:** Familiarity with software assurance best practices and their use in software development.

Most Preferred Competencies

1	**Basic Information Security:** *See previous.*
2	**Basic General Networking Tools and Concepts:** *See previous.*
3	**Intermediate Network Protocols:** Demonstrated ability to facilitate communications across DNS, SMTP, SNMP, OSPF, EIGRP, BGP, TCP/IP, and other common network protocols.

Most Hard-to-Find Competencies

1	**Intermediate Network Protocols:** *See previous.*
2	**Basic General Networking Tools and Concepts:** *See previous.*
3	**Basic Information Security:** *See previous*

Most Evolving Competencies

1	**Basic Information Security:** Evolution driven by numerous factors including increasingly complex software, off-premise cloud services, smarter and sophisticated attackers and the emergence of new security threats; changes increase the value of being able to recognize security risks, implement effective defenses, anticipate complications, and limiting possible data losses.
2	**Basic Systems Administration:** Evolution due to the cloud and increasingly complex, diverse devices; changes increase value of being able to seek out new information and learn basic proficiency of installing and maintaining configurations of new device systems; also important to be familiar with server-based systems, security devices, distributed applications, network storage, and messaging components.
3	**Intermediate Network Protocols:** Evolution due to increasingly complex systems (e.g., IPv6 versus IPv4), the creation of new, increasingly complex protocols and working across numerous systems; changes make it more important to be able to facilitate communications across standard network protocols (DNS, SMTP, SNMP, OSPF, EIGRP, BGP, and TCP/IP) and new technologies.

Occupation Deep Dive: Network and Computer Systems Administrators

Job Titles Within This Occupation

- Systems Administrator
- Network Administrator
- Senior Systems Administrator
- Linux Systems Administrator
- Windows System Administrator
- Linux Administrator
- Information Technology Specialist
- Network Technician
- SharePoint Administrator
- Network Manager
- Server Administrator
- Unix Systems Administrator

- Information Technology Administrator
- Network Engineer
- LAN Technician
- Infrastructure Engineer
- Collaboration Engineer
- Messaging Engineer
- Storage Engineer
- Server Engineer
- Storage Architect
- Network Architect
- Server Architect
- Senior Network Engineer

Certification and Education Preferences (Example)

- Security +
- Microsoft Certified Systems Engineer (MCSE)
- Cisco Certified Network Associate (CCNA)
- Certified Information Systems Security Professional (CISSP)
- Microsoft Certified Systems Administrator (MCSA)
- Microsoft Certified IT Professional (MCITP)
- Cisco Certified Network Professional (CCNP)
- Cisco Certified Information Expert (CCIE)
- Fortinet NSE 4
- Network+

Tools Used (Example List)

- LINUX
- UNIX
- Domain Name System (DNS)
- Red Hat Linux
- Cisco
- Oracle
- TCP/IP
- Solarwinds Orion
- N-Able

- Packet Capture
- PowerShell
- Command Prompt
- SQL Server
- Telnet
- SSH
- Solarwinds
- HP Openview
- Wireshark
- Aruba Networks

- Palo Alto
- Juniper Networks
- SDN (Software Defined Networking)

Other Relevant Foundational Competencies

#	Competency
1	Reading Comprehension
2	Active Listening
3	Speaking
4	Active Learning
5	Time Management
6	Writing
7	Operations Analysis
8	Social Perceptiveness
9	Coordination
10	Equipment Selection
11	Operation and Control
12	Equipment Maintenance
13	Mathematics
14	Repairing
15	Management of Personnel Resources
16	Service Orientation
17	Instructing
18	Technology Design
19	Persuasion
20	Learning Strategies
21	Management of Material Resources
22	Negotiation
23	Installation
24	Management of Financial Resources
25	Science

Other Relevant Occupation-Specific Competencies

#	Competency
1	IT/Hardware
2	Software Administration
3	Microsoft Office
4	Information Security
5	Scripting
6	Office Machines
7	Telecommunications
8	Advanced JAVA for Web Development
9	General Data Techniques
10	Microsoft Project Management Tools
11	Software Development
12	Microsoft Stack
13	Core Coding Languages
14	Back-end Web Tools and Frameworks
15	Business Process and Analysis
16	Administrative Support
17	Database Administration
18	Web Development Concepts
19	Software Quality Assurance
20	Web Front-end
21	Engineering Activities
22	Business Management
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