COMPUTER NETWORK ARCHITECTS

A DEEP DIVE FOR SKILLS-BASED HIRING

SKILLFUL
A MARKLE INITIATIVE

Occupation Overview: Computer Network Architects

Foundational Competencies

- **Systems Analysis:** Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
- **Operations Analysis:** Analyzing needs and product requirements to create a design.
- **Complex Problem Solving:** Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- **Active Learning:** Understanding the implications of new information for both current and future problem solving and decision making.
- **Critical Thinking:** Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
- **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.
- **Monitoring:** Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- **Coordination:** Adjusting actions in relation to others' actions.
- **Technology Design:** Generating or adapting equipment and technology to serve user needs.
- **Operation Monitoring**: Watching gauges, dials, or other indicators to make sure a machine is working properly.

Occupation-Specific Competencies

- **Intermediate General Networking Tools and Concepts:** Demonstrated ability to provide network support with commonly-used tools/devices, including: routers, switches, Ethernet, firewalls, frame relay, LAN, VPN and WAN; demonstrated ability to set-up IP Addresses and run cabling.
- **Intermediate Systems Design and Implementation:** Demonstrated ability to assist customers in the gathering of requirements and design, implement, and support very complex technology solutions to existing business problems.
- **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.
- **Advanced Network Protocols:** Demonstrated ability for enterprise-wide leadership to facilitate communications across DNS, DHCP, SMTP, SNMP, TCP/IP, and other common network protocols.
- **Intermediate Telecommunications:** Demonstrated ability with installing and maintaining telecommunications over many common audio and video channels like AURA, Avaya, and VoIP; demonstrated ability with telecommunications vectoring and video conferencing.
- **Basic Software Development:** Familiarity with the use of object oriented techniques, user experience and responsive design, web mobility, back-end processes, communication tools (such as AJAX), web services (including REST), a web framework, version control, and a development lifecycle methodology (such as Agile).
- **Basic General Database:** Demonstrated proficiency with SQL basics (e.g., selecting, inserting, updating, deleting records), at least one database management software application, and database fundamentals such as normalization, schemas, and relationships.
- **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.
- **Intermediate Testing:** Demonstrated ability to design tests, create test scripts, ensure that test cases mimic user usage, and execute and validate unit, system, and performance test routines for a team; demonstrated ability to use appropriate test tools.
- **Intermediate General Information Security:** Demonstrated ability to install, configure, troubleshoot, test, and maintain in a secure manner the portion of the IT environment under their responsibility (networks, communication, hardware, software, and other devices) to ensure their confidentiality, integrity, and availability.

Job Description (Example)

Design and implement computer and information networks such as local area networks (LAN), wide area networks (WAN), intranets, extranets, and other data communications networks. Perform network modeling, analysis, and planning. Design network and computer security measures. May research and recommend network and data communications hardware and software.

- Manage technical projects including involvement from local and global application, infrastructure, governance, and client teams.
- Serve as a point of contact for coordination with IT on all technical topics, including strategic infrastructure/toolkit initiatives.
- Work closely with clients, business analysts, and team members to understand the business requirements that drive the analysis and design of quality technical solutions.
- Validate design proposals for new solutions and coordinate technical reviews of existing systems.
- Manage out of business hours network on call support and change management.

Activities (Example List)

- Design, build or maintain web sites, using authoring or scripting languages, content creation tools, management tools, and digital media.
- Adjust network sizes to meet volume or capacity demands.
- Communicate with customers, sales staff, or marketing staff to determine customer needs.
- Communicate with system users to ensure accounts are set up properly or to diagnose and solve operational problems.
- Coordinate installation of new equipment.
- Coordinate network operations, maintenance, repairs, or upgrades.
- Coordinate network or design activities with designers of associated networks.
- Design, build, or operate equipment configuration prototypes, including network hardware, software, servers, or server operation systems.
- Design, organize, and deliver product awareness, skills transfer, or product education sessions for staff or suppliers.
- Develop disaster recovery plans.
- Develop network-related documentation.

Prioritized Foundational Competencies: Computer Network Architects

Most Common Required Competencies

1	**Active Learning:** Interested and able to gather needed information and insights to handle new or novel systems requests (e.g., cloud applications) that reflect business needs (e.g., adding applications requires infrastructure change); identifying and thinking about future business needs and infrastructure solutions for those needs; learning about new technologies and how they can be useful.
2	**Coordination:** Work with and coordinate stakeholders (e.g., business, IT, database, applications, systems, security) to develop optimal, workable solutions to business needs; develop holistic designs that accommodate all key group's needs; keep stakeholders up-to-date (e.g., meetings, white board sessions, e-mails) and engaged; ensure alignment from beginning to end.
3	**Operations Analysis:** Analyzing needs and product requirements to create a design; gathering input from all key stakeholders and creating a design that meets stakeholders' and business needs (cost, time to develop, risk profile); able to analyze current infrastructure and current and future business needs to identify current or future infrastructure gaps and how those gaps can be closed over time.

Most Common Break Point Competencies

1	**Coordination:** *See previous.*
2	**Active Learning:** *See previous.*
3	**Complex Problem Solving**: Able to think about multiple systems (data, databases, applications, infrastructure) and how they interact when solving problems, addressing needs, and developing capabilities; meeting needs without causing problems (bringing network down); considering people, process, technology, and risks when making decisions and tradeoffs; being mindful of risks.

Most Preferred Competencies

1	**Systems Analysis:** Understanding how systems work including key elements such as data, databases, applications, and infrastructure; understanding the current system and how the system should work in the future given the businesses needs and technological options; understanding the major systems (databases, infrastructure) both individually and holistically.
2	**Critical Thinking:** Using logic and reasoning to identify the best decision in a given situation by considering all the key issues at stake (cost, time, complexity, stability, supportability); identifying key risks, both of the current system and of potential changes, and managing and mitigating those risks, particularly those that can impact the business as a whole.
3	**Complex Problem Solving**: *See previous.*

Most Hard-to-Find Competencies

1	**Systems Evaluation:** Identifying and then tracking key measures (capacity planning, uptime, TCO, ROI) to measure system performance over time (applications, infrastructure); identify actions that can improve or correct performance given key goals (decrease cost, improve uptime); evaluate current system and envision desired future state given business needs.
2	**Coordination:** *See previous.*
3	**Critical Thinking:** *See previous.*

Most Evolving Competencies

1	**Technology Design:** Evolution driven by increasing business pressure to be efficient and competitive and large-scale changes in the technology landscape (cloud computing, automation, virtualization); changes make it more important to finding more efficient and effective ways to use technology to serve the businesses' needs.
2	**Active Learning:** Evolution driven by changing technology and increasing business pressure; changes make it more important to really understand business needs (not technical ones) and to independently create technological solutions to improve key business measures (cost, productivity).
3	**Complex Problem Solving:** Evolution driven by business pressures (competition, need for efficiency) and technology changes (cloud, automation, virtualization); changes make it more important to think outside the box and creatively about how to deploy new technologies to solve old problems and capture new opportunities.

Prioritized Occupation-Specific Competencies: Computer Network Architects

Most Common Required Competencies

1	**Intermediate General Networking Tools and Concepts:** Demonstrated ability to provide network support with commonly-used tools/devices, including routers, switches, Ethernet, firewalls, frame relay, LAN, VPN, and WAN.
2	**Advanced Network Protocols:** Demonstrated ability for enterprise-wide leadership to facilitate communications across DNS, DHCP, SMTP, SNMP, TCP/IP, and other common network protocols.
3	**Intermediate General Information Security:** Demonstrated ability to design, install, configure, troubleshoot, test, and maintain in a secure manner the portion of the IT environment under one's responsibility (networks, communication, hardware, software, and other devices) to ensure their confidentiality, integrity, and availability.

Most Common Break Point Competencies

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

Most Preferred Competencies

1	**Intermediate General Networking Tools and Concepts:** *See previous.*
2	**Advanced Network Protocols:** *See previous.*
3	**Intermediate System Design and Implementation:** Demonstrated ability to assist customers in the gathering of requirements and design, implement, and support moderately complex technology solutions to existing business problems.

Most Hard-to-Find Competencies

1	**Intermediate General Information Security:** *See previous.*
2	**Intermediate System Design and Implementation:** *See previous.*
3	**Advanced Network Protocols:** *See previous.*

Most Evolving Competencies

1	**Intermediate General Information Security:** Evolution driven by increasing business focus on security as more attackers pose greater risk combined with an increasing number of tools companies can use to protect themselves; change makes it more valuable to have an enterprise-wide view of security and able to identify key risks and best ways to mitigate those risks.
2	**Intermediate Telecommunications:** Evolution driven by technology convergence (voice, video and internet all increasingly serviced by the internet), need for cost savings and increasing technological options; changes makes it more valuable to know how to deploy new technology to expand organization's capabilities and to reduce costs.
3	**Advanced Network Protocols:** Evolution driven by technology convergence, cloud computing, new more powerful protocols, virtualization, wireless; changes make it more valuable to know current technology solutions and how old business needs (servers) can be better served, in some instances, by new solutions (off-premise servers).

Occupation Deep Dive: Computer Network Architects

Job Titles Within This Occupation

- Network Architect
- Information Technology Specialist
- Cisco Engineer
- Network Engineer
- Enterprise Architect
- Network Specialist
- Network Operations Center (NOC) Engineer
- Technical Architect
- Citrix Administrator
- Desktop Support Engineer
- IP Network Engineering

Certification and Education Preferences (Example)

- Cisco Certified Network Professional (CCNP)
- Cisco Certified Network Associate (CCNA)
- Cisco Certified Internetwork Expert (CCIE)
- Certified Information Systems Security Professional (CISSP)
- Security +
- GIAC Security Essentials

Tools Used (Example List)

- Cisco
- LINUX / UNIX
- OSPF
- Oracle
- JAVA
- SQL

Other Relevant Foundational Competencies

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

Other Relevant Occupation-Specific Competencies

#	
1	IT/Hardware
2	Core Coding Languages
3	General Data Techniques
4	Network Administration
5	Basic Web Development Languages
6	Server Administration
7	Business Process and Analysis
8	Microsoft Office
9	Microsoft Project Management Tools
10	System Administration
11	Product Administration
12	Sales and Business Development
13	Advanced JAVA for Web Development
14	Strategizing
15	Microsoft Stack
16	Scripting
17	Database Administration
18	Operations Analysis
19	Mathematics
20	Technical Sales
21	People Management
22	Administrative Support
23	Employee Training
24	Software Quality Assurance
25	Validation