## Lab 11: Network Troubleshooting Tools

### Case Study

Since its inception, Kurkcell has introduced the latest telecommunications and technology innovations to the public. It was the first to establish mobile phone services within the country and has continuously expanded the scope and technological sophistication of its offerings. Evolving from a provider of consumer communications to a leader in enterprise cloud and colocation services, Kurkcell now operates the largest data center environment in the United States.

Following years of subscriber growth and service innovation, managing its technology infrastructure had become increasingly complex. To enhance service quality and operational efficiency, the company aimed to implement modern network automation methodologies across its nationwide data centers.

### Business Challenge

To address this challenge, Kurkcell set out to establish a “zero-touch” data center network, one that delivers the highest levels of visibility, automation, and control. This capability is intended not only for the core network team but also for internal engineers and enterprise customers.

To automate the pre-deployed networks within the data center, the company has appointed you as a Certified DevNet Associate. The network administrator has tasked you with troubleshooting the data center network to extract specific insights that will assist in configuring automation in the future.

### Solution

The new network has significantly enhanced Kurkcell’s data center operations. Infrastructure and service deployments that previously required three to four days can now be completed in less than an hour. Maintenance tasks can be performed at any time without affecting network availability.

As a Certified DevNet Associate, it is essential to understand how to resolve network connectivity issues. Developers must be proficient in using basic network troubleshooting tools, which are critical in identifying the root causes of connection problems.

Owing largely to the simplicity and automation of the new network and the introduction of a self-service portal, Kurkcell’s operations and engineering teams are now more aligned and coordinated than ever before. Furthermore, the company’s engineering team is undergoing training and certification in Cisco NSO, Python, and other technologies through Cisco DevNet.

1. Explore the ifconfig troubleshooting tool.
2. Explore the ping troubleshooting tool.
3. Explore the traceroute troubleshooting tool.
4. Explore the nslookup troubleshooting tool.

|  |
| --- |
| **// Explore Ifconfig Troubleshooting Tool**  1. Turn on the **Ubuntu VM** and **Windows** **PC** and open the **Terminal** window. Execute the following command: **ifconfig** --**help** to see all the options that are available for a command.   * **add or** **del**: This option enables the addition or deletion of IP addresses and their subnet mask (prefix length). * **hw ether**: This is used to update the physical MAC address. This might be handy for troubleshooting purposes, such as changing it to a more identifiable name that sticks out in logs. * **up** **and** **down**: Interfaces are enabled and disabled using these options. Choose carefully which interface you are turning off. That one will disconnect you if it is the one you are using to connect to a device remotely.     2. Execute the following command: **ip addr** to show the status of all the network interfaces in use.   * There are three network interfaces: the loopback interface **(lo)**, **enp0s3**, and **dummy0** * The **ether** field displays the MAC address, indicating that the interface uses Ethernet as the link-layer protocol * The **inet** field represents the assigned IP address, with the subnet mask expressed in CIDR (slash) notation, and **brd** denotes the broadcast address * The **UP** status signifies that the interface is active and operational * The Maximum Transmission Unit (**mtu)** defines the largest packet size, in bytes, that can be transmitted over the interface without fragmentation |

|  |
| --- |
| **// Explore Ping Troubleshooting Tool**  1. The ping utility is an application for testing the network connection between devices. Ping utilizes the Internet Control Message Protocol (ICMP) to send packets to a network device and wait for a response. Ping, among other information, reports network faults, packet loss, and Time-To-Live (TTL).  2. Execute the following command: **ping --help** to see all the options available for the command.    3. Execute the following command: **ping -c 5 www.cisco.com** to see if it is reachable.    The ping tool performs DNS resolution and provides metrics such as TTL, round-trip time, and packet loss statistics. A lack of replies may not indicate an unreachable host, as ICMP traffic could be blocked by a firewall. For IPv6 networks, a similar utility called ping6 is commonly available across most operating systems. |

|  |
| --- |
| **// Explore Traceroute Troubleshooting Tool**  1. The **traceroute** tool shows the path that packets follow on their journey to a destination. **tracert** is a Microsoft Windows alternative. Observing the path that network traffic travels from source to destination is useful for troubleshooting since routing loops and non-optimal pathways may be identified and addressed.  2. Execute the following command: **traceroute --help** to see all of the available options for the command.    3. Switch to Windows PC and open the Command Prompt. Then execute the following command: **tracert www.netacad.com** to see how many hops and how much time it takes to reach it. Your output will be different. |

|  |
| --- |
| **// Explore Nslookup Troubleshooting Tool**  1. The **nslookup** utility is used to query the Domain Name System (DNS) and retrieve domain name to IP address mappings. This tool is useful for determining whether the DNS server setup on a certain host is resolving hostnames to IP addresses.  2. Switch back to Ubuntu VM and execute the following command: **nslookup www.cisco.com** to determine the IP address of the domain.    The command returns the non-authoritative response, as well as the IPv4 and IPv6 names and addresses. The non-authoritative answer indicates that the server does not hold the domain's zone's original records, but rather those generated by prior DNS lookups.  3. Execute the following command: **nslookup 8.8.8.8** to look up the IP address to discover the domain associated with it.    4. Execute the following command: **nslookup www.cisco.com 8.8.8.8** to determine the IP address of the domain according to Google’s DNS.    Notice that by utilizing this strategy, the server resolved the address to three separate IP addresses, all of which differed from the previous DNS query. These servers have a different cache of DNS requests than www.cisco.com. |