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# Module 11 CCNA -Automation and Programmability

# 1. Explain How Automation Impacts Network Management Compare Traditional network with Controller based networking?

Ans: Automation has significantly transformed network management, particularly with the advent of Software-Defined Networking (SDN) and controller-based approaches. In traditional networking, tasks such as device configuration, scalability, and troubleshooting are predominantly manual and can be complex, time-consuming, and prone to human error. Each device requires individual configuration, and managing a growing network becomes increasingly challenging.

# 2. Explain Virtualization

Ans: Virtualization is a technology that transforms traditional computing by abstracting physical hardware into virtual environments. It allows multiple virtual machines (VMs) to run simultaneously on a single physical server, each operating independently with its own operating system and applications. At the core of virtualization is the hypervisor, which manages and allocates physical resources such as CPU, memory, and storage to VMs, ensuring efficient utilization of hardware. This capability not only reduces the need for multiple physical servers but also enhances flexibility, scalability, and resource efficiency. Virtualization finds widespread use in server consolidation, cloud computing, development and testing environments, and desktop virtualization, offering benefits such as cost savings, improved security through isolation, simplified disaster recovery, and enhanced operational flexibility.

# 3. Describe Characteristics of REST-based API?

Ans : APIs adhere to the principles of Representational State Transfer, offering a scalable and efficient approach to designing web services. Key characteristics include statelessness, where each request contains all necessary information; a client-server architecture for independent evolution; a uniform interface using standard HTTP methods and URIs; hypermedia-driven navigation (HATEOAS) for dynamic API interaction; support for caching and layered system architectures; and emphasis on transferring representations of resource state. These features collectively promote simplicity, scalability, and interoperability, making REST APIs a popular choice for modern web development.

# 4. Explain methods of Automation?

Ans : Automation encompasses various methods aimed at reducing manual effort and streamlining processes across IT and business operations. Key methods include scripting (using languages like Python or PowerShell), configuration management tools (such as Ansible or Chef), CI/CD pipelines for automated software delivery, monitoring tools for proactive management, robotic process automation (RPA) for automating repetitive tasks, task scheduling tools for orchestrating workflows, AI/ML for data-driven automation, and network automation tools for managing network infrastructure efficiently. These approaches collectively enhance efficiency, scalability, and reliability in modern organizations, enabling faster response times and freeing up resources for strategic initiatives.

# 5. Explain SDN?

Ans : SDN (Software-Defined Networking) is an architecture that separates the control plane from the data plane in network devices. It centralizes network management and control through software-based controllers, enabling programmable and agile networks. SDN allows for dynamic configuration, automation of network tasks, and easier deployment of services. By promoting open APIs and standards, SDN fosters interoperability and innovation across different network components. Overall, SDN improves network agility, scalability, and efficiency, making it a cornerstone of modern networking technologies.

# 6. Explain DNA Center ?

Ans : Cisco DNA Center is a centralized network management platform designed to streamline and automate the management of Cisco DNA enabled networks. It provides a unified dashboard for managing network devices, automates provisioning and configuration tasks, enhances network visibility and security through advanced analytics, supports intent-based networking principles for policy-driven operations, integrates with third-party applications via open APIs, and enables the deployment of custom applications. Overall, DNA Center simplifies network operations, improves security posture, and enhances network agility for organizations.

# 7. Explain SD-Access and SD-WAN?

Ans : SD-Access (Software-Defined Access) and SD-WAN (Software-Defined Wide Area Network) are technologies within Cisco's SDN portfolio aimed at transforming network management and connectivity:

SD-Access: Simplifies network segmentation and policy enforcement in campus and branch networks through centralized management and automation, enhancing security and scalability.

SD-WAN: Improves WAN connectivity by optimizing traffic routing based on real-time conditions, prioritizing critical applications, enhancing security, and providing seamless connectivity to cloud services.

Both technologies leverage software-defined principles to streamline network operations, enhance agility, and improve overall performance and security across enterprise networks.