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**Assignment Module -11: Module 11 CCNA -Automation and Programmability**

1. **Explain How Automation Impacts Network Management**

**Ans:** Automation in network management helps in the sense that tasks are repeated through software and scripts, saving a great amount of time and preventing lots of errors. Devices help the IT team to configure and repair issues without IT needing to do everything themselves, it also helps the system monitor security without too much human intervention. Such systems make networks more dependable and easier to scale while the network grows. Systems automatically respond faster to potential threats or issues and continue things secure and running. Though that is done with a need to spend some time making certain configuration and gaining required knowledge, automation will prove as something that helps get around big complex networks.

**2- Compare Traditional network with Controller based networking.**

**Ans: Traditional Network:**

In traditional networking, every device is managed separately; thus configurations, updates, and updates, and troubleshooting are carried out one at a time. This set up is slow and cumbersome to scale with increasing networks.

**Controller Based Networking:**

In controller-based networking, such as in SDN, all devices are controlled by a central controller. It is very easy to make changes that would have an instantaneous effect on the network. Its more flexible and quicker to adapt, which makes security management easier. Even though it is probably going to cost more in terms of investment, it’s probably going to be more efficient and easier to manage over time.

**3. Explain Virtualization**

**Ans:** Virtualization is a technology that lets you run “multiple virtual” computers on one physical machine. Instead of needing a separate device of each server or application, virtualization allows one computer to handle many tasks at once by creating virtual machines (VMs) that share the same hardware.

It’s useful:

**Save money:** fewer physical machines mean lower hardware and energy costs.

**Flexible and scalable:** you can easily add or adjust virtual machines as needed.

**Better Backup and Recovery:** VMs can be backed up and restored quickly, making data recovery easier.

**4. Describe Characteristics of REST-based API.**

**Ans:** A REST-based API is a set of rules that guide the development of lightweight, flexible web applications. The most important features are:

1. Statelessness: The server will receive all information needed to process each client requrest. The server stores no session information about the client between requests. Therefore, each request is self-contained, which simplifies scalability.
2. Client-server Architecture: REST separates the client, which is the user interface, from the server, which is the data storage. This way, they can change independently. The client manages the front-end while the server manages data and resources, making it flexible and reusable.
3. Uniform interface: REST APIs use standard HTTP methods: GET, POST, PUT, DELETE to interact with resources in a uniform way. Each method has its specific purpose.

GET: retrieve data.

POST: create new data.

PUT: update existing data.

Delete: Remove data

Standardized simplifies interaction with API, and it becomes better in predictability.

1. Resource-Based: In REST every item is treated as if it were a “resource”. Be it users, be it products, or for instance, orders. Through URIs (Uniform resource identifiers) every resource can always be accessed. Resources turn to be easy to refer or administer.
2. Layered system: REST also supports intermediary layers of load balancers, proxies or gateways between the client and the server for security, caching and scalability purposes, and each layer works independently without affecting others.
3. Cacheability: REST APIs are cached. Clients can store responses so that they do not always need to contact the server for every request. In this way the server can reduce its load, thereby increasing response times.
4. Representation of Resources: the resources are represented on forms like JSON, XML, OR HTML. This can make it easier for a client to interact with such resources in a way most suited to their needs. Most often, JSON is utilized since it is lightweight and highly supported.

**5. Explain methods of Automation**

**Ans:** There are several main types of automation:

1. **Scripting:** Writing code (like python or bash) to automate simple tasks, such as organizing files or generating reports.
2. **Workflow Automation:**  Using tools to create step by step workflows for things like on boarding or customer service, often triggered by specific events.
3. **Robotic Process Automation (RPA):** “Bots” that mimic human actions to automate repetitive tasks, like data entry or form filling.
4. **Configuration Management:** Automate IT deployments which hold systems in an idempotent state using utilities such as Ansible or puppet.
5. **CI/CD Pipelines:** Automation of testing and rolling out of software, making quick, yet safe, releases applications that include the decisions like the chatbot, the recommendation application or such algorithms utilize AI and ML.
6. **Scheduling:**  The cron utility automates a job that runs, like a batch job, once in every twenty four hours

**7. Orchestration:** High end workflow that governs other workflows over system, including but not limited to Kubernetes managing a set of distributed resources.

**6. Explain SDN**

**Ans:** Recent advancement involves separating control form SDN software and centralizing the entire thing within a control framework. As a result, networks become easier to administer, much more agile and faster in terms of scale.

Main points.

**Control Centralized:** it would be an all-control from a single place by way of a controller. End.

**Flexibility:** SDN allows network administrators to configure the network behavior within an easy span of software in a dynamic environment within minutes.

**Scalability:** Adding devices and scaling the network is easier less error prone.

**SDN** is employed mostly in data centers, cloud networks, and big organizations for improved efficiency and security.

**7. Explain DNA Center.**

**Ans:** Cisco DNA Center is the tool that helps to make networks easier to manage. It can set up, monitor, and automatically fix network devices in one place, saving time and preventing errors. Using DNA center, you can automate tasks such as adding devices or updating settings, so you don’t have to do it manually.

Automate tasks: Like adding devices or updating settings, so you don’t have to do it manually.

Get insights: It employs AI to identify issues and recommend solutions before problems multiply.

Set security policies: Define who and what may be allowed access to your network to further enhance security.

Basically, its like a smart command center that helps keep your network running smoothly and securely.

1. **Explain SD-Access and SD-WAN**

**Ans:** SD-Access and SD-WAN are Cisco tools that simplify and improve network management but serve different purposes.

* SD-Access: Used inside office buildings or campuses. It lets you control who has access to what, set security policies, and automate setups—all from one place. It’s ideal for large, secure networks with lots of devices, like universities or hospitals.
* SD-WAN: Used to connect multiple sites, like branch offices in different locations. It chooses the best path for data to travel (over the internet or private lines), balancing speed, reliability, and cost. It’s perfect for companies needing strong connections between locations.

In short:

* SD-Access is for managing local networks.
* SD-WAN is for connecting remote offices across distances.