Module 11 CCNA -Automation and Programmability-

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

ANS: - Automation significantly transforms network management by enabling tasks to be performed with minimal human intervention. Key impacts include:

1. Increased Efficiency: Repetitive tasks like configuration, monitoring, and troubleshooting are automated, saving time and reducing errors.
2. Reduced Operational Costs: Automation reduces the need for manual labor, streamlining network operations.
3. Enhanced Scalability: Automated processes allow networks to scale quickly to accommodate growth.
4. Improved Reliability: Automation ensures consistent configurations and reduces the likelihood of human error.
5. Proactive Management: Automation tools enable real-time monitoring, predictive analytics, and issue resolution before problems escalate

2-What is Virtualization?

ANS- Virtualization is the process of creating virtual instances of physical resources, such as servers, storage, and networks. It involves abstracting physical hardware

and running multiple virtual machines (VMs) or virtual network functions (VNFs) on the same physical hardware.

Key Benefits:

1. **Resource Optimization**: Maximizes utilization of physical hardware.
2. **Cost Efficiency**: Reduces the need for additional hardware.
3. **Flexibility**: Enables quick deployment and scalability.
4. **Isolation**: Provides security by separating virtual environments.

3- Characteristics of REST-based API?

ANS - REST (Representational State Transfer) is a widely used architectural style for designing networked applications. Key characteristics include:

1. **Stateless**: Each request from the client to the server must contain all necessary information. No session state is stored on the server.
2. **Client-Server Architecture**: Separation of concerns allows clients and servers to evolve independently.
3. **Cacheable**: Responses can be cached to improve performance.
4. **Uniform Interface**: Consistent URIs and use of standard HTTP methods (GET, POST, PUT, DELETE).

5. **Layered System**: Components like intermediaries can operate independently.
6. **Scalability**: Suitable for large-scale distributed systems.
7. **JSON/XML Support**: Data exchange is typically in JSON or XML format.

4 – Explain Methods of Automation?

ANS -

1. **Script-Based Automation**:
    - Uses scripting languages like Python or Bash to automate repetitive tasks.
    - Suitable for simple tasks but lacks scalability for large networks.
2. **Configuration Management Tools**:
    - Tools like Ansible, Puppet, and Chef automate configuration and deployment.
    - Focuses on consistency and scalability.
3. **Orchestration**:
    - Coordinates multiple automated tasks across systems.
    - Tools like Kubernetes or OpenStack are common.
4. **API-Driven Automation**:
    - Uses RESTful or gRPC APIs to interact with network devices and controllers.

    - Facilitates integration with other tools and systems.
5. **AI/ML-Based Automation**:
    - Employs artificial intelligence for predictive analysis, anomaly detection, and autonomous decision-making.

5 - What is SDN (Software-Defined Networking)?

ANS - SDN is an architecture that separates the network's control plane from the data plane, providing centralized management and programmability.

Key Components:

1. **Control Plane**: Centralized controller manages network logic and policies.
2. **Data Plane**: Network devices (switches, routers) handle packet forwarding.
3. **Northbound APIs**: Interface between applications and the controller.
4. **Southbound APIs**: Interface between the controller and network devices.

Benefits:

- Centralized management
- Enhanced scalability
- Rapid deployment of services
- Simplified network configuration

6 - What is DNA Center?

ANS - Cisco DNA Center (Digital Network Architecture Center) is a centralized network management and automation platform. It provides:

1. **Network Automation**: Simplifies provisioning and configuration.
2. **Analytics**: Delivers real-time insights into network performance.
3. **Policy Management**: Enables intent-based networking (IBN) through policy-driven approaches.
4. **AI/ML Integration**: Uses AI for predictive analytics and problem resolution.
5. **Integration**: Supports APIs for seamless integration with third-party tools.

7 - What is SD-Access and SD-WAN?

ANS -SD-Access (Software-Defined Access):

- Cisco's SD-Access is an SDN solution for enterprise campus networks.
- Uses a centralized controller to automate network segmentation and policy enforcement.
- Key Features:
    - Intent-based networking

- Simplified segmentation (e.g., VLANs, VRFs)
- Secure onboarding of devices and users
- Centralized policy management

8 - SD-WAN (Software-Defined Wide Area Networking):

ANS -

- A WAN architecture that uses software-defined principles to manage and optimize wide-area networks.
- Key Features:
  - Centralized management
  - Dynamic path selection (e.g., MPLS, broadband, LTE)
  - Enhanced security (encryption, firewalls)
  - Application performance optimization
  - Cost-effective connectivity for branch offices