Chettinad
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Department of CSE
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Question Bank

Year/Semester:III/ VI **Subject Code/Title :CCS365 –Software Defined Networks**
Faculty Name:Mrs.C.Sangeetha **Unit: I/II/III/IV/V**

UNIT I
Part A

1. What is software-defined networking?

Software-defined networking (SDN) is a network architecture that uses software to manage and control a network. SDN allows network operators to manage the network as a whole, regardless of the underlying network technology. SDN uses software-based controllers or APIs to communicate with the underlying hardware. SDN centralizes management by separating the control plane from the data forwarding function SDN makes packet forwarding decisions based on network topology, network policies, and routing protocols.

2. What is control plane?

Control plane is a component for network in SDN which it can carry traffics and it can focus on how individual package will interacts with its neighbors during state exchange.

3. What is SDN device?

An SDN device is composed of an API for communication with the controller, an abstraction layer and a packet-processing function.

4. What is south-bound interface?

The southbound interface is a collection of drivers that handles communication to all data-plane elements in the network.

5. What is northbound interface?

A northbound interface is an interface that allows a particular component of a network to communicate with a higher-level component.

6. Define data plane.

Data plane refers to the tasks that a networking device does to forward a message. The data plane handles incoming datagrams through a series of link-level operations that collect the datagram and perform basic checks.

7. List the components of SDN.

SDN components are: Data plane, control planE, soundbound interface, northbound interface and application plane.

8. List the functions of control plane.

Control plane functions are :(a) Topology discovery and maintenance(b) Packet route selection and instantiation(c) Path failover mechanism

9. What is network device?

A network device is an entity that receives packets on its ports and performs one or more network functions on them. Network devices can be implemented in hardware or software and can be either a physical or virtual network element.

10.What are the trends that used to evolve network requirements?

- Demand Is Increasing
- Supply Is Increasing
- Traffic Patterns Are More Complex

11. Difference between SDN and Traditional Networking.

Software Defined Networking	Traditional Networking
Software Defined Network is a virtual networking approach.	A traditional network is the old conventional networking approach.
Software Defined Network is centralized control.	Traditional Network is distributed control.
This network is programmable.	This network is nonprogrammable.
Software Defined Network is the open interface.	A traditional network is a closed interface.
In Software Defined Network data plane and control, the plane is decoupled by software.	In a traditional network data plane and control plane are mounted on the same plane.

12. List the types of plane in SDN.

- Data plane
- Control plane
- Application Plane

13. What are the functions of data plane?

- Forwarding of packets.
- Segmentation and reassembly of data.
- Replication of packets for multicasting.

Additional Questions

- List of requirements suggested by ODCA.
- Draw the SDN architecture diagram.
- What are the functions of data plane?
- Define Open flow.
- Define RFC and I2RS
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Part B &C-16 marks & 8 marks

1. Define Network, Switch, Router Repeater, Bridge and Hub with diagram.
2. Definition , diagram of Network, Switch, Router Repeater, Bridge and Hub
3. List the requirements suggested by ODCA.
4. Discuss about SDN approach and architecture with neat diagram in detail.
5. Explain about different models of SDN.
6. Explain the process of Evolving Network Requirements.

UNIT II
Part A

1 What is SDN controller?

An SDN controller is an application in a software-defined networking architecture that manages flow control for improved network management and application performance.

2 Define overlay networking.

Overlay networking is a method of using software to create layers of network abstraction that can be used to run multiple separate, discrete virtualized network layers on top of the physical network, often providing new applications or security benefits.

3 What is logical ports ?

Logical ports are switch-defined ports that do not correspond directly to hardware interfaces on the switch.

4 What is asynchronous communication?

Asynchronous communication is initiated by the OpenFlow-compliant switch without any solicitation from the controller. It is used to inform the controller about packet arrivals, state changes at the switch and errors.

5 Define OpenFlow.

OpenFlow is a control protocol. It is used to communicate policies and traffic management information between a controller and a switch.

6. Explain proactive rules.

Proactive rules are relatively static, controller places rules in switch before they are required. The controller can populate the flow tables ahead of time, similar to typical routing. By pre-defining all of your flows and actions ahead of time in the switches flow tables, the packet-in event never occurs. The result is all packets forwarded at line rate

7.Explain reactive rules.

Reactive rules are dynamic. Packets which have no match are sent to the controller (packet in). Controller creates appropriate rule and sends packet back to switch (packet out) for processing. The problem with this approach is that there can many CPU hits.

8.What is use of SDN API?

SDN Application Program Interfaces (APIs) provide both open and proprietary communication between the SDN controller and the routers of the network.

9. What are the functions offered by control plane?

- Shortest Path forwarding
- Notification Manager
- Security Mechanisms
- Topology Manager
- Statistics

10. Define Ryu and OpenDayLight

Ryu Controller is an open, software-defined networking (SDN) Controller designed to increase the agility of the network by making it easy to manage and adapt how traffic is handled.

The OpenDaylight project is an open source platform for Software Defined Networking (SDN) that uses open protocols to provide centralized, programmatic control and network device monitoring.

11. List the constraints in REST.

- Client-Server
- Stateless
- Cacheable
- Uniform Interface
- Layered System
- Code On Demand (Optional)

12.Define flow table and meter table

A data structure within OpenFlow switches that contains entries for managing packets based on defined rules or flows. Meter tables are data structures used in OpenFlow to manage and store metering information for network flows.

13.What is egress and ingress processing

The data egress and ingress is the direction of data flow and ingress refers to data entering a system or network, while egress refers to data leaving a system or network.

14. What is meant by High Availability Cluster?

High-availability clusters (also known as HA clusters, fail-over clusters) are groups of computers that support server applications that can be reliably utilized with a minimum amount of down-time. They operate by using high availability software to harness redundant computers in groups or clusters that provide continued service when system components fail. Without clustering, if a server running a particular application crashes, the application will be unavailable until the crashed server is fixed.

15define OVSDB and ForCES
16.what is protocol oblivious forwarding
17.Define BGP. List what information types it exchanges.
18. What is federated SDN.
19.What are the match fields component?
20.List the types available in group.
21.Define fast failover type.
22.List the types of messages in openflow protocol.
23.Define REST.
24. Define beacon, onix, POX
25.Difference between ERP and IRP
26.What is meant by POF?
27.Expand OSPF and EIGRP
28.Write about Openday Light Helium
29.List the modules in Opendaylight
30.What are the reasons for using SDN domains in controllers?

Part B & C (16 marks & 8 marks)

1. Explain about Data plane with its functions
2. Discuss about OpenFLow Protocol
3. Elaborate flow table structure with neat diagram
4. Discuss about Control Plane Functions
5. Differentiate Southbound Interface and Northbound Interface
6. Define SDN Controllers and explain about Ryu, Open Daylight,
7. What is ONOS? Explain about Distributed Controllers in detail

UNIT III
Part A

1 What is data center orchestration?

Data center orchestration is a process-driven workflow that helps make datacenters more efficient. Repetitive, slow and error-prone manual tasks are replaced by the automation of tasks and the orchestration of processes.

2. List the functions of data center orchestration.

1. Scheduling and coordination of data services.
2. Leveraging of distributed data repository for large data sets.
3. Tracking and publishing APIs for automatic updates of metadata management.
4. Updating policy enforcement and providing alerts for corrupted data.
5. Integrating data services with cloud services

3. What is data center ?

A data center is any location, accessible by members of an enterprise, that houses collected hardware and ancillary devices that can run internal networks, host digital systems and applications, or store data.

4. List core elements of data center.

Data center uses five core elements for processing. These elements are application, database, network, storage array, operating system and server.

5. **Define Abstraction and it types.**
Abstraction refers to the amount detail about lower levels of the model that is visible to higher levels. More abstraction means less detail and Less abstraction means more detail. The types of abstraction are
1.forwarding abstraction
2.distribution abstraction
3.specification abstraction

6. What is PolicyCop? List its services.

Policycop is an automated QoS Policy enforcement framework. It leverages the programmability offered by SDN and openflow for

- Dynamic traffic steering
- Flexible flow level control
- Dynamic traffic classes
- Custom flow aggregation levels

7.What is Frenetic ?
Frenetic is a domain-specific language for programming OpenFlow networks .This domain-specific programming language allows network operators, rather than manually configuring each connected network device, to program the network as a whole.

8.Define PNs and POs
9.Draw the defense4all architecture diagram
10. What is communication matrix?
11. List the modules in defense4all.
12. List application plane functions and interfaces.
13. List the interfaces in specification abstraction.
14. What is traffic engineering?
15. What is the role of policy checker and validator?

16. Justify the level of abstraction for network architecture.
17.Define Policy Adaptation.
18.Draw the architecture of PolicyCop
19.Draw the PolicyCop Workflow.
20.Define DDoS.
21.What is the use of Logging and flight recorder services?

Part B & C (16 marks & 8 marks)

1. Discuss about SDN Application Plane Architecture
2. Define Network Services Abstraction Layer and explain in detail
3. What is Traffic Engineering and explain how traffic is handled in SDN with an example
4. What is Measurement and Monitoring and explain Security concepts by incorporating defense4all.
5. Discuss about Data Center Networking
6. Explain about frenetic.
7. Discuss about defense4all software architecture in detail.

UNIT IV
Part A

1 What is Network Functions Virtualization ?

Network Functions Virtualization (NFV) abstracts network functions, allowing them to be installed, controlled and manipulated by software running on standardized compute nodes. NFV incorporates cloud and virtualization technologies to drive rapid development of new network services with elastic scale and automation. These technologies are often grouped as NFV and SDN.

2. Define Virtual Machine.

Virtual machine (VM) is a computing environment that functions as an isolated system with its own CPU, memory, network interface, and storage, created from a pool of hardware resources. Software called a hypervisor isolates the necessary computing resources and enables the creation and management of VMs.

3 What is Northbound API ?

Northbound API presents a network abstraction interface to the applications andthe management systems at the top of the SDN stack.

4 Explain Management Interface.

Management interfaces allow network operators to manage network devices in their networks. These interfaces generally provide the operator with a consistent operational view of a device, including its configuration and operational status.

5 What do you mean network Orchestration?

Network Orchestration, also known as Software-defined networking Orchestration is the process of automatically programming the behavior of the network, so that the network smoothly coordinates with the hardware and the software elements to further support applications and services.

6 What are the difference between automation and orchestration ?

Automation refers to a single task, orchestration arranges tasks to optimize a Workflow

7 What are the goals of NFV ?

NFV goals are to define requirements, identify best practices, identify gaps incurrent standards and make recommendations on how to fill those gaps. NFV has a main organizational body, a Technical Steering Committee (TSC) and several subgroups with specific areas of focus

8 What are functions of management and Orchestration?

Management and Orchestration (MANO) defines a framework that can be used for the provisioning, configuration and operation of virtualized network functions essentially defining an orchestrator that controls all the VNFs.

9 What is Data Plane Development Kit (DPDK) ?

DPDK is open source software that provides libraries and drivers for fast packet processing. It allows an application to bypass the kernel and Linux network stack and directly access packets on the NIC.

10 Explain Representational State Transfer APIs.

Representational State Transfer (REST) Application Programming Interfaces(APIs) enable you to securely connect to systems, execute remote procedure calls (RPCs)and use a variety of formatting and display options, including JavaScript Object Notation(JSON)

11 What is virtualization?

Virtualization is an abstraction layer that decouples the physical hardware from the operating system to deliver greater IT resource utilization and flexibility. It allows multiple virtual machines, with heterogeneous operating systems to run in isolation, side-by-side on the same physical machine. Virtualization means running multiple machines on a single hardware.

12. What are key capabilities of NVGRE?

Key capabilities of the NVGRE standard include identifying a 24-bit Tenant Network Identifier (TNI) to address problems associated with the multi - tenant network

13. List functions supported by data centers.

Data centers support the following things
1. Processing of users business transactions
2. Hosting of company website
3. Process and store intellectual property
4. Maintain financial records
5. Route electronic mails.

14. What is VLAN?

A VLAN is a switched network that is logically segmented on an organizational basis, by function, project teams or applications rather than on a physical or geographical basis.

15. What is VxLAN ?

VxLAN is an encapsulation protocol that provides data center connectivity using tunneling to stretch Layer 2 connections over an underlying Layer 3 network.

16. Explain EVPN.

An Ethernet VPN (EVPN) enables you to connect dispersed customer sites using a Layer 2 virtual bridge. EVPN augments the data plane MAC learning paradigm with a control plane solution for automated MAC learning between data centers. EVPN creates a new address family for BGP by converting MAC addresses into routable addresses and

then uses this to distribute MAC learning information between PEs in the network.

17.List the applications of SDN

- Data Centers
- Cloud Environments
- Enterprise Networks
- Service Provider Networks

18.Difference between CapEx and OpEx
19.Define LAN switch and MAC frame.
20. How do you define membership in VLAN?
21. Draw Tagged IEEE 802.3 MAC frame format.
22.define VMM(virtual machine monitor)
23.what is consolidation ratio and container virtualization
24.define OSS and BSS
25. What is Os-Ma and Se-Ma?
26.list the NFV principles.
27.Define point of presence(PoPs)

Part B & C (16 marks & 8 marks)

1. Discuss about Network Virtualization
2. What is Virtual LANs and explain in detail
3. How OpenFlow VLAN Support in established
4. Explain about NFV Concepts
5. Discuss about NFV Benefits and Requirements
6. Explain about NFV Reference Architecture in detail.

UNIT V
Part A

1 what is data center orchestration?

Data center orchestration is a process-driven workflow that helps make data Centers more efficient. Repetitive, slow and error-prone manual tasks are replaced by the Automation of tasks and the orchestration of processes

2 Explain bandwidth calendaring.

Bandwidth calendaring allows network operators to reserve resources up-front or For a dedicated period of time. It enables highly accurate usage-based charging for Bandwidth. Reduces the need for on-side configuration at customer premises, for example When upgrading bandwidth

3 what is service abstraction layer?

A Service Abstraction Layer (SAL) maps both internal and external service Requests to the appropriate southbound plug-in and provides basic service abstractions that Higher-level services are built upon, depending on the capabilities of the plug-in(s).

4 Explain about Juniper network.

Juniper Networks is an open-source software-defined networking solution that automates and orchestrates the creation of highly scalable virtual networks.

Juniper Networks demonstrated a Java-based framework with a RESTful API that served as a rapid prototyping environment to aid in the development of new and useful network applications

Q.5 What is Qfabric?

Juniper Networks produces switches using a proprietary multipath Layer 2/3architecture and encapsulation protocol called Qfabric. It allows multiple distributed physical devices in the network to share a common control plane and a separate, common management plane, thereby behaving as if they were a single large switch entity.

6 Explain about Floodlight.

Floodlight is based on Beacon from Stanford University. Floodlight is an Apache licensed ,Java-based OpenFlow controller

Additional Questions

1. Define Container Interface.
2. What is the role of virtual function manager?
3. Expand and define NFVIaaS.
4. What are the architectural usecases?
5. Draw the logical structure of NFVI Domains.
6. Difference between L2 versus L3 virtual Networks.
7. Define VNF.
8. List the components in NFV Management and Orchestration
9. What is VNF Scaling?

Part B & C (16 marks & 8 marks)

1. Elaborate the NFV Infrastructure in detail.
2. Virtualized Network Functions
3. Discuss about NFV Management and Orchestration
4. Explain about NFV Use cases in detail with diagrams.
5. Elaborate the process of mapping SDN components with NFV architecture
6. Draw the diagrams for VNFC to VNFC communication for various scenarios.

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