

CS- 524 Introduction to Cloud Computing

Assignment-6

Answer 1

The IETF introduced COPS, or Common Open Policy Protocol, as an internet protocol to establish policy control over QOS signaling protocols. COPS has clients who maintain policies on servers to ensure that requests are transferred and updated smoothly. Policy Enforcement Points are the clients, and Policy Decision Points are the enforcement body (PDP).

Motivation-Network managers required a set of policies in order to allocate an element request to the user however SNMP did not complete the purpose. Therefore a protocol for policies was needed in between SNMP and PDP which was COPS. These policies were to be based on the user requesting a service, the service request and the network. This would enable synchronization between network managers.

Goals-

The protocol uses a client/server model, in which the PEP sends requests, updates, and deletions to the remote PDP, and the PDP responds with choices. For a stable exchange of messages between policy clients and a server, the protocol leverages TCP as its transport protocol. As a result, no additional techniques are required for a server and its clients to communicate reliably. The protocol is extendable in that it is meant to rely on self-identifying objects and may include a wide range of client-specific data without requiring changes to the COPS protocol. The protocol was designed to help with policy administration, configuration, and enforcement.

Authentication, replay protection, and message integrity are all provided by COPS at the message level. To authenticate and protect the channel between the PEP and the PDP, COPS can alternatively employ existing security protocols like IPSec (Internet Protocol Security) or TLS (Transport Layer Security).

In two major ways, the protocol is stateful: (1) Client and server exchange request/decision state, and (2) state from different events (Request/Decision pairs) may be linked. (1) We mean that the remote PDP installs or remembers requests from the client PEP until the PEP explicitly deletes them. At the same time, for a currently installed request state, decisions from the remote PDP can be created asynchronously at any time.

Answer 2

- COPS makes use of a stateful client-server model unlike SNMP and CMIP which make use of remote procedure call model. In the stateful client-server model there is a PEP client and a remote PDP server. The PEP client sends a request to the server and the PDP server responds to the request. These decisions are stored on the PDP permanently however if need be, can be deleted by the PEP. These decisions can be different for different requests raised at a different point of time thus showing the difference in state.
- COPS is extensible because it makes use of self-identifying objects. The protocol is extendable in that it is meant to rely on self-identifying objects and may include a wide range of client-specific data without requiring changes to the COPS protocol itself. The protocol was designed to help with policy administration, configuration, and enforcement.

Answer 3

a)

The Management Information Base (MIB) is a database that is used to manage the entities and network elements of a communication network. In the database, it saves all elements as a list. The following scenario demonstrates the complexity of using MIBs with SNMP. 'Not well suited to long-running processes, such as software/data upload/download.'

In this situation, the transactional model will send and receive a large number of transactions until it achieves success or failure. In the event of a failure, the model will revert to its previous stable state. A cli might accomplish this with far less effort and in a single session.

SNMP also necessitates a basic MIB configuration, which is not necessary with CLI because it works out of the box. Finally, because SNMP involves numerous sessions, messages can be lost in transactions.

b)

This occurs because pin-pointing configuration objects is difficult, and any change in a physical device's configuration can result in un-sync, complicating rollback efforts. This occurs as a result of the name system's specificity. As a result, the SNMP protocol lacks capabilities for retrieving configurations quickly.

c)

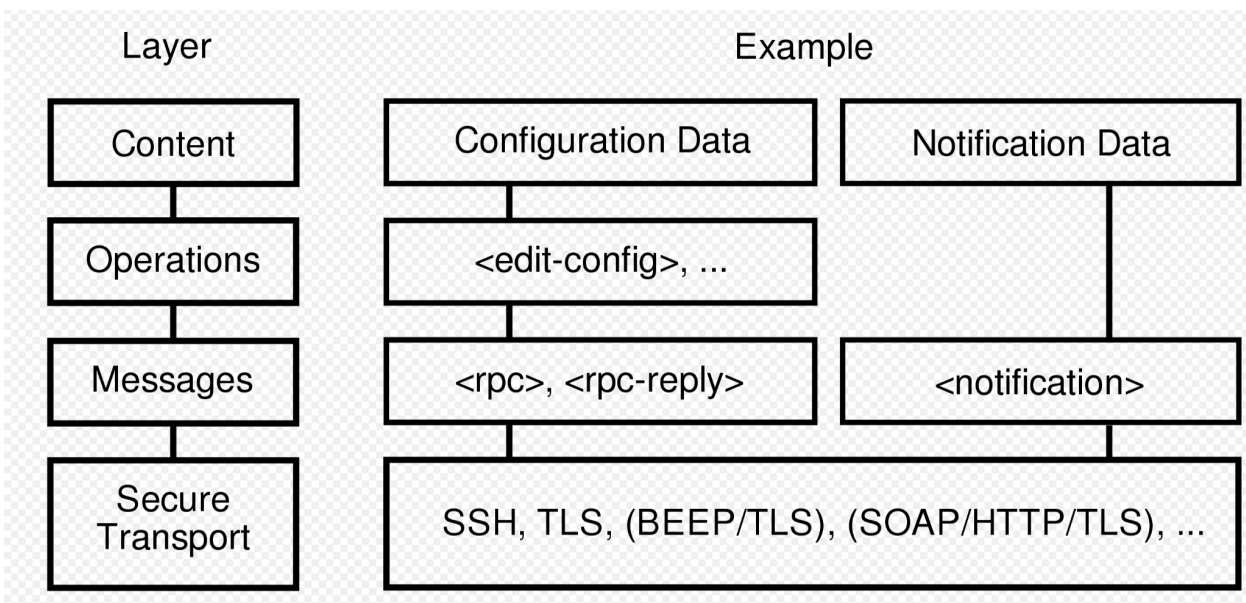
There are a number of requirements for network management which are as follows:-

- One major requirement is ease of use.

- Data must be fetched, which includes configuration data, operational state of device data, statistics of device data, and so on. These states should be viewed as a comprehensive network rather than as a single device. Because some devices make it difficult to discern between data collected from routing protocols and administratively specified configuration data, it is critical to be able to do so. The addition of support for configuration transactions simplifies the network's functionality.
- Because numerous routing protocol configuration changes might cause a cascade of changes throughout the network, it is critical to ensure consistency across all devices. To prevent complexity, it's also critical to go to different configuration phases in as few steps as possible. It should be noted that some changes may result in unstable states, which is why it is a good idea to restore the network or network element to its previous stable configuration. This being said all devices on the network should have the ability to hold multiple configurations.

Answer 4

No, NETCONF's message layer does not use REST API. The Messages layer is responsible for determining what type of NETCONF message is being sent. A message could be a client's rpc or a server's rpc-reply. NETCONF provides techniques for installing, manipulating, and deleting network device configurations. Its functions are implemented using a basic Remote Procedure Call (RPC) layer. For both the configuration data and the protocol messages, the NETCONF protocol use XML-based data encoding. On top of a secure transport protocol, protocol messages are exchanged.



Answer 5

YAML, XML, and JSON are not the same as YANG (Yet Another Next Generation). The data modeling language YANG is used to define data. YANG defines data standards that must be followed by formats such as XML and JSON. A specific XML or JSON encoded message would be regarded as legitimate or incorrect based on YANG models when working with devices that support YANG data storage. While it can be used with other protocols, YANG is most commonly associated with NETCONF. YANG is a modeling language for configurations, and NETCONF is a protocol for changing them. As a result, YANG has become the de-facto modeling language for netconf.

Answer 6

1. Define the workload- A service developer must declare which apps run on which virtual machines, as well as what types of events an orchestrator must handle.
2. Give cloud resources- The service provider is responsible for the resources required to create an account, and they will have an interface to provide the required resources such as server, storage, and so on.
3. Set up a connectivity bridge—a bi-directional network is set up to keep apps connected to the data center before and after they are moved to the cloud.
4. Deploy the workload—now that the connections have been created, the VMs may be moved to the cloud to make room for apps. Other support structures, such as databases and software services, are also included.
5. Ensure smooth two-way access-While some resources will not be migrated to the cloud, there must be a connection between these resources and apps on cloud infrastructure after app migration.
6. Test and validate- Verify that the cloud transfer went off without a hitch.
7. Discontinue the previous service- Once users have been validated, corporate services can be discontinued.

Answer 7

The Cloud service provider, Cloud service developer, and Cloud service consumer are the three parties involved. Assume a Cloud service developer is tasked with building a web services infrastructure, which includes three identical servers, a load balancer, and a back-end database. Writing a software that sends individual requests to the Cloud service provider for the creation of all the instances—and networks—is difficult.

Let's say the instances for a load balancer and two servers have been successfully built, but the virtual machine for the third server fails. Deleting all instances and starting from scratch would not be ideal as it would increase complexity for the developer and it would be a waste of resources for the provider

Second, a service provider must support elasticity once all instances have been established. How can this be (a) specified and (b) effected, is the question. Assume that each of the three servers has surpassed its CPU utilization limit. Then, creating a temporary instance is a simple answer automatically. Therefore just two instances, instead of three, should have been generated in the first place.

The industry's approach is to define a service in more general terms, such that the establishment of a service is an atomic activity carried out by the service provider—this is where orchestration comes in. The orchestrator will then add and delete instances as stated in the service description after the service is deployed.

By adding limits, fees, policies, and SLAs to this template, the service provider produces an offering for a service consumer. When the consumer accepts the offer, the consumer and provider sign a contract that includes the SLA and a set of precise, measurable features of the SLA known as Service-Level Objectives (SLOs).

Answer 8

To that aim, any OpenStack module with the word "API" in its name (for example, nova-api) is a daemon that provides REST services. The Advanced Message Queuing Protocol is used to communicate amongst daemons (AMQP). AMQP can be started from either the beginning or the end of the pipe. An HTTP transaction, on the other hand, can only be started by the client because HTTP is a client/server protocol.

Resources

https://en.wikipedia.org/wiki/Common_Open_Policy_Service

<https://www.informit.com/articles/article.aspx?p=212185&seqNum=4>

<https://www.cb nuggets.com/blog/certifications/cisco/ccnp-enterprise-what-are-yang-netconf-restconf>