Virtual Network Infrastructure

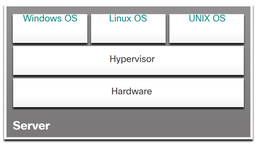
13.3.1

Type 1 Hypervisors

In the previous topic, you learned about virtualization. This topic will cover the virtual network infrastructure.

Type 1 hypervisors are also called the "bare metal" approach because the hypervisor is installed directly on the hardware. Type 1 hypervisors are usually used on enterprise servers and data center networking devices.

With Type 1 hypervisors, the hypervisor is installed directly on the server or networking hardware. Then, instances of an OS are installed on the hypervisor, as shown in the figure. Type 1 hypervisors have direct access to the hardware resources. Therefore, they are more efficient than hosted architectures. Type 1 hypervisors improve scalability, performance, and robustness.

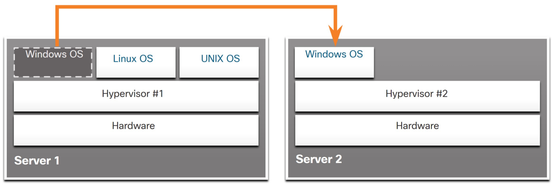


13.3.2

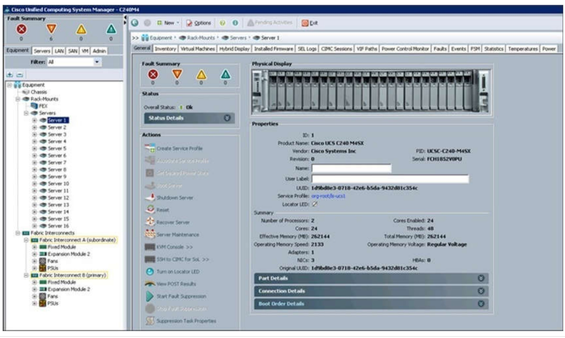
Installing a VM on a Hypervisor

When a Type 1 hypervisor is installed, and the server is rebooted, only basic information is displayed, such as the OS version, the amount of RAM, and the IP address. An OS instance cannot be created from this screen. Type 1 hypervisors require a "management console" to manage the hypervisor. Management software is used to manage multiple servers using the same hypervisor. The management console can automatically consolidate servers and power on or off servers as required.

For example, assume that Server1 in the figure becomes low on resources. To make more resources available, the network administrator uses the management console to move the Windows instance to the hypervisor on Server2. The management console can also be programmed with thresholds that will trigger the move automatically.



The management console provides recovery from hardware failure. If a server component fails, the management console automatically moves the VM to another server. The management console for the Cisco Unified Computing System (UCS) Manager is shown in the figure. Cisco UCS Manager controls multiple servers and manages resources for thousands of VMs.



Some management consoles also allow server over allocation. Over allocation is when multiple OS instances are installed, but their memory allocation exceeds the total amount of memory that a server has. For example, a server has 16 GB of RAM, but the administrator creates four OS instances with 10 GB of RAM allocated to each. This type of over allocation is a common practice because all four OS instances rarely require the full 10 GB of RAM at any one moment.

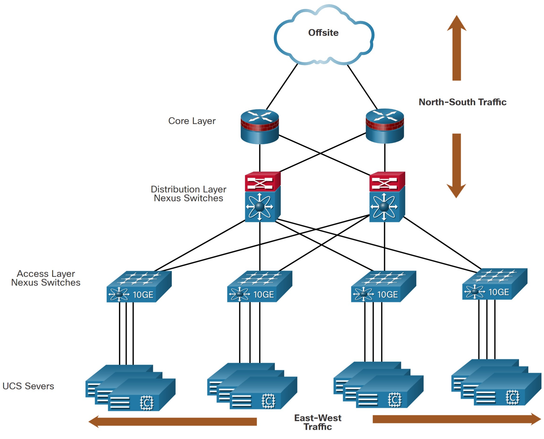
13.3.3

The Complexity of Network Virtualization

Server virtualization hides server resources, such as the number and identity of physical servers, processors, and OSs from server users. This practice can create problems if the data center is using traditional network architectures.

For example, Virtual LANs (VLANs) used by VMs must be assigned to the same switch port as the physical server running the hypervisor. However, VMs are movable, and the network administrator must be able to add, drop, and change network resources and profiles. This process would be manual and time-consuming with traditional network switches.

Another problem is that traffic flows differ substantially from the traditional client-server model. Typically, a data center has a considerable amount of traffic being exchanged between virtual servers, such as the UCS servers shown in the figure. These flows are called East-West traffic and can change in location and intensity over time. North-South traffic occurs between the distribution and core layers and is typically traffic destined for offsite locations such as another data center, other cloud providers, or the Internet.



Dynamic ever-changing traffic requires a flexible approach to network resource management. Existing network infrastructures can respond to changing requirements related to the management of traffic flows by using Quality of Service (QoS) and security level configurations for individual flows. However, in large enterprises using multivendor equipment, each time a new VM is enabled, the necessary reconfiguration can be very time-consuming.

The network infrastructure can also benefit from virtualization. Network functions can be virtualized. Each network device can be segmented into multiple virtual devices that operate as independent devices. Examples include subinterfaces, virtual interfaces, VLANs, and routing tables. Virtualized routing is called virtual routing and forwarding (VRF).

How is the network virtualized? The answer is found in how a networking device operates using a data plane and a control plane, as discussed in the next topic.

13.3.4

Check Your Understanding - Virtual Network Infrastructure

Check your understanding of virtual network infrastructure by choosing the BEST answer to the following questions.

1. True or False. A Type 1 hypervisor is installed on top of the existing OS and is called the hosted approach.

   - True
   - False

2. True of False. A Type 1 hypervisor requires a management console to manage the hypervisor.

   - True
   - False

3. True or False. Management consoles prevent server over allocation.

   - True
   - False

4. True of False. East-West traffic is exchanged between virtual servers in the same data center.

   - True
   - False

Check

Show Me

Reset