Section 16: Virtualization and Cloud Computing

129. Virtualization Basics

Virtualization is different from emulation

Emulation uses software to emulate hardware
Virualization uses a systems actual hardware

Benefits:
-Virtualization saves power
-Virtualization consolidates hardware
-Virtualization makes system recovery easy
-Virtualization makes duplication easy
-Virtualization is handy for IT research

Hypervisor - Virtual Machine Monitor (VMM)
Two kinds:
Type 2 hypervisor - Runs on top of host OS
Type 1 hypervisor - Runs directly on top of hardware independent of host OS

Review:

*Don't confuse virtualization with emulation
*Recognize the benefits of virtualization
*There are two types of hypervisors Type 1 - (bare metal) and Type 2 - (hosted)

---

130. Cloud Ownership

1. Private Cloud - only within your organization
2. Public Cloud - Open to the public for a fee
3. Hybrid Cloud - Some is private, Some is Public
4. Community Cloud - Businesses team up and chip in money for a "'members only' type club"

Review:
*Know all these terms for the net+

*private clouds allow access to members only
*Public clouds are available to anyone
*A private cloud with contracted management is considered a hybrid cloud
*Four clouds to remember: Public, Private, Community, and Hybrid

---

131. Cloud Implementation

Goal: Make a webserver and then we are going to access it.

Amazon Web Services (AWS) Example: (AWS is Free)

VPC - Virtual Private Cloud (In our network we have a virtual server, our virtual router (public IP), and our virtual firewall (security).

Elastic Beanstalk - Sets up your server easily

Review:

- VPC (Virtual Private Cloud) depends on the services requested, including IaaS (Infrastructure as a Service) and PaaS (Platform as a Service)
- VPC Services are very flexible, expandable and can provide many types of services
- Building web servers on cloud applications is very easy, but there can be costs associated with the service

---

132. Your First Virtual Machine

*Newly Created Virtual machine requires an OS
*Most Hypervisors can read an ISO image or Optical Disc

Taking a snapshot - stores the current state of the machine (super helpful)

You can change hardware on the fly

---

133. NAS and SAN

*Network Attached Storage (NAS):

-File based sharing protocol
-Runs over a standard network
-Shows up as normal shares on the network

Tool: FreeNAS - allows you to create volumes and share them

Box Example:

*Storage Area Networks(SANs):

-Works at the block-level storage
-the best SANs ran on Fiber Channel (FC)
-Host bus adaptor (HBA) runs into a FC Switch which runs to a FC Controller

-iSCSI - uses your existing network and allows you to interconnect to existing devices on your existing network and allows you to work at the block level.

- In any iSCSI network you have is a intitiator and a target. Create on freeNAS a Target, then go into your OS and set up the iSCSI initiator (an iSCSI initiator is built into pretty much any OS).

Tool: FreeNAS - Also works for SANs

For the exam remember

*NAS is file level - Network shares (SAMBA more than anything else)
*SANs runs at the block level - will use either Fiber Channel or iSCSI

---

134. Platform as Service (PaaS)

In a nutshell Developers can make things (e.g. web applications) and they can press a button and all the servers and everything is set up for them.

Tool: Heroku
-The code is uploaded
-It is given a URL
-It is deployed

Heroku has a GUI, but you can also install CMD Prompt tools to do everything from the command prompt.

Review:

*PaaS enables access to software development platform without the need to personally host it.
*Heroku is a great example of PaaS
*A PaaS allows very quick access to software running live on the internet.

---

135. Software as a Service (SaaS)

-Instead of having a CD and installing software, you instead buy a subscription. so, SaaS does away with optical media.

Review:

- SaaS enables access to applications via subscription
- Microsoft office 365 is a great example of SaaS
- other SaaS examples included Dropbox and Google Docs

---

136. Infrastructure as a service (IaaS)

Means that someone far away will set us up a virtual infrastructure to do tons of stuff that would normally cost lost of money as you would need to bring in servers and other various hardware and maintenance of that hardware.

Example: AWS (Amazon Web Services)

Review:

- IaaS enables quick configuration of network resources hosted by someone else
- Amazon Web Services is a great example of IaaS
- AWS, like most IaaS providers, only charges for the time a server is actually running

---

QUIZ

1. Which statement is true about emulation?

   a. Emulation uses software to act like hardware that does not actually exist within the host computer

   b. Emulation can run an operating system within an operating system by emulating the hardware that is already in the host computer.

   c. Emulators run within virtual machines

   d. Virtual machines run within emulators

2. Which element does not need to be configured when installing a virtual machine on a host?

   a. The number of CPU cores

   b. The type and size of storage system

   c. The input voltage of the power supply

   d. The amount of RAM

3. Which statement is not true of network storage?

   a. NAS is a file-based network storage solution

   b. SAN is a block-level network storage solution

   c. A SAN hosts files that are shared using protocols such as SAMBA and Apple File Share

   d. NAS is a single box solution

4. Which cloud model provides a software development environment?

   a. PaaS

   b. SaaS

   c. IaaS

   d. BaaS

5. Which cloud model provides a method for keeping software up to date?

   a. PaaS

   b. SaaS

   c. IaaS

   d. Baas

6. Which cloud model provides a virtualized hardware environment that includes elements such as servers, switches, routers, and load balancers?

   a. PaaS

   b. SaaS

   c. IaaS

   d. Baas