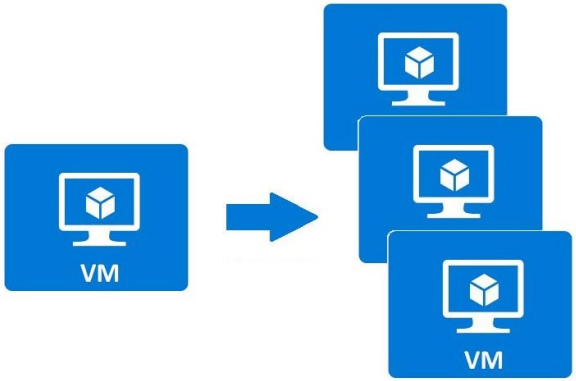
Cloning of Virtual Machines

Asst. Prof. Ashwini Mathur



Concept of cloning VM

#VMware Workstation 5.0

Cloning of virtual machine from existing VM

Cloning a virtual machine creates a virtual machine that is a copy of the original.

The new virtual machine is configured with the same virtual hardware, installed software, and other properties that were configured for the original virtual machine.

OR

A clone is a copy of an existing virtual machine. The existing virtual machine is called the parent of the clone. When the cloning operation is complete, the clone is a separate virtual machine — though it may share virtual disks with the parent virtual machine

Changes made to a clone do not affect the parent virtual machine. Changes made to the parent virtual machine do not appear in a clone.

A clone's MAC address and UUID are different from those of the parent virtual machine.

Why Make a Clone?

Installing a guest operating system and applications can be time consuming. With clones, you can make many copies of a virtual machine from a single installation and configuration process.

Clones are useful when you must **deploy many identical virtual machines to a group**. For example:

1. An MIS department can clone a virtual machine for each employee, with a suite of preconfigured office applications.
2. A virtual machine can be configured with a complete development environment and then cloned repeatedly as a baseline configuration for software testing.
3. A teacher can clone a virtual machine for each student, with all the lessons and labs required for the term.

Full and Linked Clones

There are two types of clone:

A full clone is an independent copy of a virtual machine that shares nothing with the parent virtual machine after the cloning operation. Ongoing operation of a full clone is entirely separate from the parent virtual machine.

A linked clone is a copy of a virtual machine that shares virtual disks with the parent virtual machine in an ongoing manner. This conserves disk space, and allows multiple virtual machines to use the same software installation

VM Template

Overview

A **VM template** is a master copy image of a **virtual machine** that includes **VM** disks, virtual devices, and settings. A **VM template** can be used many times over for the purposes of **VM** cloning. You cannot power on and edit the **template** once it has been created

Difference between clone and template VM

Clone	Template
• Clone is a copy of the virtual machine • You cannot convert back the cloned Virtual Machine • A clone of a virtual machine can be made when the virtual machine is powered on • A full clone is independent from parent virtual machines and does not share anything with virtual machines.	• A template is a master copy of a virtual machine; it can be used to make many clones • Template can be converted back to the virtual machine to update the base template • Template cannot be edited or powered on, and are more difficult to change than ordinary virtual machine • When you clone a virtual machine from the template, the resulting cloned virtual machine is free of the original virtual machine
• A linked clone shares virtual disks with the parent virtual machine. It enables multiple virtual machines to use the same software installation	————
————	• When virtual machine is powered on, it cannot convert virtual machine to template, but can convert clone to template

Virtual Machine files

File	Usage	Description
`.vmx`	*vmname*`.vmx`	Virtual machine configuration file
`.vmxf`	*vmname*`.vmxf`	Additional virtual machine configuration files
`.vmdk`	*vmname*`.vmdk`	Virtual disk characteristics
`-flat.vmdk`	*vmname*`-flat.vmdk`	Virtual machine data disk
`.nvram`	*vmname*`.nvram` or `nvram`	Virtual machine BIOS or EFI configuration
`.vmsd`	*vmname*`.vmsd`	Virtual machine snapshots
`.vmsn`	*vmname*`.vmsn`	Virtual machine snapshot data file
`.vswp`	*vmname*`.vswp`	Virtual machine swap file
`.vmss`	*vmname*`.vmss`	Virtual machine suspend file
`.log`	`vmware.log`	Current virtual machine log file
`-#.log`	`vmware-#.log` (where # is a number starting with 1)	Old virtual machine log files

MEMORY GROWTH IN CONSUMER DEVICES

Overview

The initial commercial personal computers in the 1980s came with 64 KB of memory. One popular model was named the Commodore 64 because that amount of RAM came configured with the system.

Like in era of beginning of digitization initial limitations in memory size were due to cost, the ability of the chip (CPU) to manage large amounts of memory, and the ability of operating systems to address large amounts of memory. The Apple iPad 2 offers 512 MB of memory, which is eight thousand times larger than the memory offered in a Commodore 64.

Today its become almost limitless : supercomputers

Scientists in Japan simulated one per cent of the neuronal network in the brain using the K computer, the fourth most powerful supercomputer in the world.

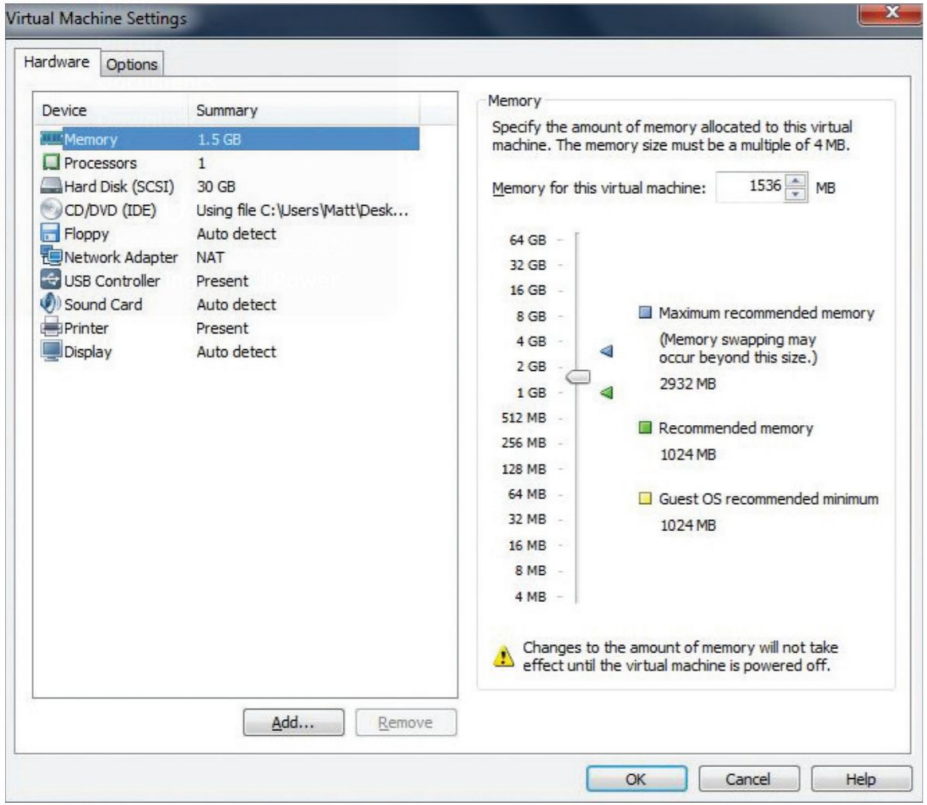
With 705,024 processor cores and 1.4 million GB of RAM at its disposal, the K computer took 40 minutes to model the data in a project designed to test the ability of the supercomputer and gauge the limits of brain simulation.

Memory is a computer’s workspace. When an operating system boots up, certain regularly used routines are loaded into memory and stay there

As programs are executed, programs work on information, that data is also moved into memory so all of the calculations various parts and pieces can be quickly transferred to the CPU for processing and then written back to memory after whatever transformations the CPU has performed

Same holds true in Virtualization !!

virtual machine, and by the operating system in the virtual machine, is only aware of the 1.5 GB that is allocated.

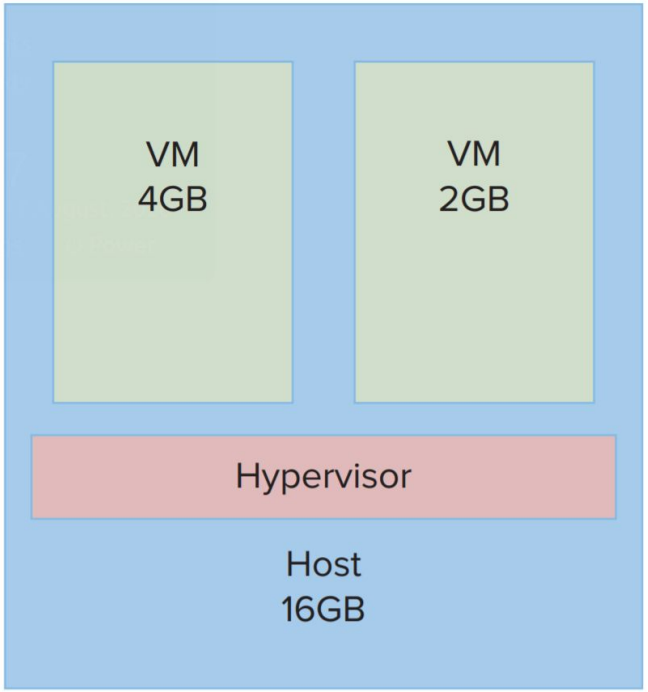


Tuning Practice for VM Memory

The amount of memory that has been allocated to the virtual machine is what it can use. The physical host it resides on may have hundreds of gigabytes available but each individual virtual machine is unaware of the greater resources.

The two virtual machines have been allocated 4GB and 2GB of memory, respectively, and that is all the memory that the guest operating systems in those virtual machines are aware of. The physical host actually has 16GB of physical memory. With 6 GB of memory already spoken for by the two virtual machines, there are still 10 GB of memory available on the host for use—but that isn't entirely accurate.

Memory in virtual machine and their Host



Calculating Memory Overhead

The hypervisor itself needs to reserve some portion of the memory for its own processes much as an operating system reserves memory.

For each virtual machine running on the host, a small portion of memory is also reserved, in addition to the memory allocated for the use of the virtual machine. This additional memory is used for operational functions such as memory mapping tables—connecting the virtual machine memory addresses to the physical memory addresses.

For this discussion, we can use the round number of 1 GB of memory to cover both the hypervisor overhead as well as the virtual machine overhead and be comfortable that we've allocated enough memory whatever parameters we change.

Instead of having a fixed amount of memory, what if you could vary memory up and down depending on the workload?