## Ex.11

## VirtualBox - Hardware virtualization

*Hardware virtualization* or *platform virtualization* refers to the creation of a virtual machine that acts like a real computer with an operating system. Software executed on these virtual machines is separated from the underlying hardware resources. For example, a computer that is running Microsoft Windows may host a virtual machine that looks like a computer with the Ubuntu Linux operating system; Ubuntu-based software can be run on the virtual machine.

In hardware virtualization, the *host machine* is the actual machine on which the virtualization takes place, and the *guest machine* is the virtual machine (computer in your computer). The words *host* and *guest* are used to distinguish the software that runs on the physical machine from the software that runs on the virtual machine. The software or firmware that creates a virtual machine on the host hardware is called a *hypervisor* or *Virtual Machine Manager*.

The job of the hypervisor is to control processor, memory and other firmware resources. The hypervisor acts like a traffic cop, allowing multiple operating systems to run on the same device without requiring source code or binary changes. Each operating system appears to have the processor, memory, and other firmware resources all to itself -- but in reality, the hypervisor is controlling the processor and its resources, allocating what is needed to each operating system in turn.

VirtualBox allows software in the virtual machine to run directly on the processor of the host, but an array of complex techniques is employed to intercept operations that would interfere with your host. Whenever the guest attempts to do something that could be harmful to your computer and its data, VirtualBox steps in and takes action. In particular, for lots of hardware that the guest believes to be accessing, VirtualBox simulates a certain "virtual" environment (computer in your computer) according to how you have configured a virtual machine. For example, when the guest attempts to access a hard disk, VirtualBox redirects these requests to whatever you have configured to be the virtual machine's virtual hard disk -- normally, an image file on your host.

As opposed to other virtualization software, for many usage scenarios, VirtualBox does not require hardware virtualization features to be present. Through sophisticated techniques, VirtualBox virtualizes many guest operating systems entirely in **software**. This means that you can run virtual machines even on older processors which do not support hardware virtualization.

**Ex.13**

**Screenshots: on next page ☺**

