

# 14

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## *Virtual machines*

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**William W.-Y. Hsu**

*Department of Computer Science and Engineering*

*Department of Environmental Biology and Fisheries Science*

*National Taiwan Ocean University*

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### 14.1 Introduction

We have studied how to buy and assemble (maybe) a PC in the last assignment. However, you only have one PC at your disposal. During your studies in the computer science department, you may need to come across many operating systems. There are two options which you can take. The first is to assemble another PC (which will cost you another fortune). The second is to install a multi-boot system. But this approach will require a reboot each time you want to switch an OS. Is there a third option? Yes, using a virtual machine: Install another OS under the current OS. In this lab, you will learn how to do so.

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### 14.2 Lab Procedures

#### 14.2.1 VirtualBox Virtual Machine

There are several virtual machine softwares. For example, `VirtualBox`, `VMWare Workstation/Player`, and `WINE`. We will be using `VMWare Player` because it is free.

`VirtualBox` is a general-purpose full virtualizer for x86 hardware, targeted at server, desktop and embedded use. It installs on your existing Intel or AMD-based computers,

whether they are running Windows, Mac, Linux or Solaris operating systems. Secondly, it extends the capabilities of your existing computer so that it can run multiple operating systems (inside multiple virtual machines) at the same time. So, for example, you can run Windows and Linux on your Mac, run Windows Server 2008 on your Linux server, run Linux on your Windows PC, and so on, all alongside your existing applications. You can install and run as many virtual machines as you like – the only practical limits are disk space and memory.

VirtualBox is deceptively simple yet also very powerful. It can run everywhere from small embedded systems or desktop class machines all the way up to datacenter deployments and even Cloud environments. The following screenshot shows you how VirtualBox, installed on a Mac computer, is running Windows 7 in a virtual machine window:



You can download virtual box from: <https://www.virtualbox.org>, under the download section. Take a brief moment and observe the download page, you will find that VirtualBox is available not only for windows, but also for Linux, OS X, and Solaris. However, VirtualBox is problematic with Phantosys installed in the lab.

## 14.2.2 VMWare Player Virtual Machine

VMware Player is the easiest way to run multiple operating systems at the same time on your PC. With its user-friendly interface, VMware Player makes it effortless for anyone to try out Windows 10, Windows 8, Windows 7, Android, the latest Linux releases, or create isolated virtual machines to safely test new software. VMware Player is free for personal use.

VMware Player is now available for commercial use with support offerings as a component of VMware Fusion Professional.

VMware Player takes advantage of the latest hardware to create virtual machines with up to 4 virtual processors, 2 TB virtual disks and up to 64 GB of memory per virtual machines. And with support for DirectX 9.0c Shader Model 3 and OpenGL 2.1 3D graphics in a Windows and Linux virtual machine, VMware Player can easily handle your most demanding applications.

You can download VMware Player from: <http://www.vmware.com/products/player/>.

### 14.2.3 The Client OS

You will be installing 2 client OS in this lab. The first one is Ubuntu 16, a common Linux distribution (or you may choose CentOS instead). The second one is either Windows 98, Windows XP, Windows Vista, Windows 8, or the most recent OS Windows 10. We will be providing the CD image files for these OS, but you can also get them at the school computer center website. You may configure your machine to any reasonable spec: the CPU, the amount of memory, the HD size, and the network model (NAT or bridged).

Ubuntu can be acquired from <http://www.ubuntu.com/download>. Please try to be proficient with creating a Linux virtual machine. Please install the server version and we do not need GUI desktop yet. (You can preserve the virtual machine by COPYING the files associated with it). Linux systems will be required in the following weeks laboratory.

### 14.2.4 Advanced Section

If you have extra time and want to experience Android 4.0, you can ask the TAs for the image file. A series of installation method can be found at <http://www.vladan.fr/how-to-install-android-in-vmware-workstation/>. This exercise will require you to manually create partitions and modify configurations to enable networking. If you are very interesting in getting this done after class, you may ask your TAs or your instructor.

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## 14.3 Lab Questions

You should setup your virtual machine and install the required OS.

The TA will be checking the following:

- Is your OS installed completely? (A windows based and a Linux based)
- Does your guest OS provide network capability? (Connected to the internet, can be testing by typing `ping 140.121.196.254`)
- Can you guest OS provide sound? (Windows media player)
- Can you install other softwares into your guest OS? (e.g., install MS office into your guest OS)

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## 14.4 Lab Report

Demonstration to the TAs is done in class.