

Installing and Managing Virtual Networked
Systems
Computer Systems (M4X01500)

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1 Introduction

The task was to create 4 virtual machines using Oracle Virtualbox on a windows pc. The task was split into several sections comprising of

1. Create 4 virtual PCs in Virtualbox, initially 1 server and 1 client then using VB's tools clone each to create the 4 PC's (2 servers and 2 clients).
2. Installing Windows Server 2008r2 on both servers and Windows 7 on both clients.
3. Configure static IP addresses for each PC then verify by using command-prompt tools.
4. Setup a server and domain then join a client to the domain.
5. Create a DHCP server and allow a client PC to acquire its IP address automatically from the server.

2 Part 1

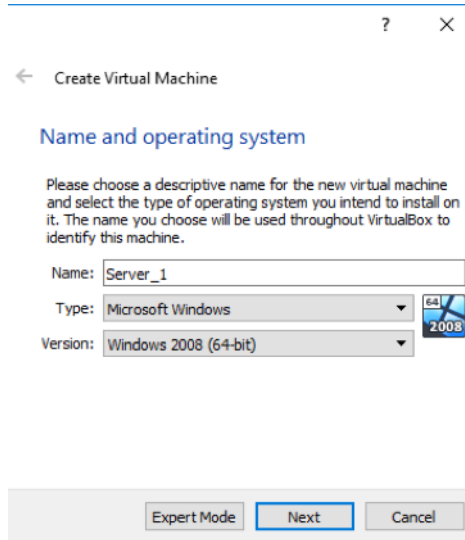


Figure 1: Creating a virtual machine using Oracle Virtualbox.

“VirtualBox is a Type 2 hypervisor. That is to say that it is virtualization host software that runs as an application on an established operating system. Alternatively, a Type 1 hypervisor is host software that runs on what’s now known as “bare metal,” a term that means onto a computer without an operating system. Type 1 hypervisors examples are Hyper-V, ESX/ESXi, Xen, XenServer, KVM and OpenVZ.” [1]

Figure 2 shows the creation of Server_1 in Oracle Virtualbox. Installing Windows 2008 (64bit) and Windows Server 2008 r2 was a standard / routine procedure so not documented here for cleanliness. Server_1 was actually named Server_1(Brian) and the other virtual PCs and domains that followed were named after characters from the Monty Python film ‘life of Brian’ Brian.com for example. Figure 2 shows Server_1(Brian) setup details with 4096mb base memory and running Windows server 2008 r2 (service pack 1). Also visible are Client_1 and Server_2(Brian) during the build stages. Further down the window are the network details, both as internal networks with Adapter 1 being ‘Publicnet’ and Adapter 2 being ‘PublicNet1’.

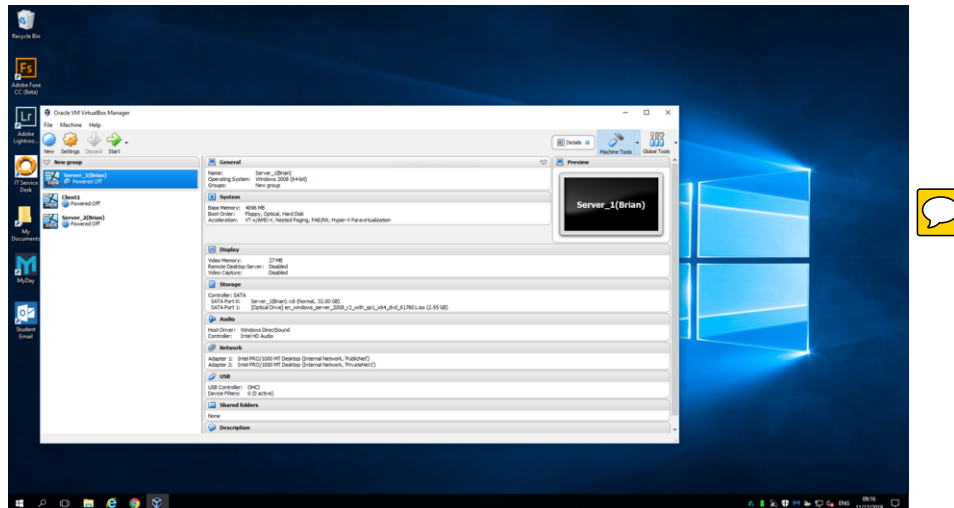


Figure 2: Server_1(Brian) setup details.

Figure 2 shows the Oracle VB window with 4 virtual machines of which there are 2 servers & 2 clients. Also visible is Server_1(Brian) start up.

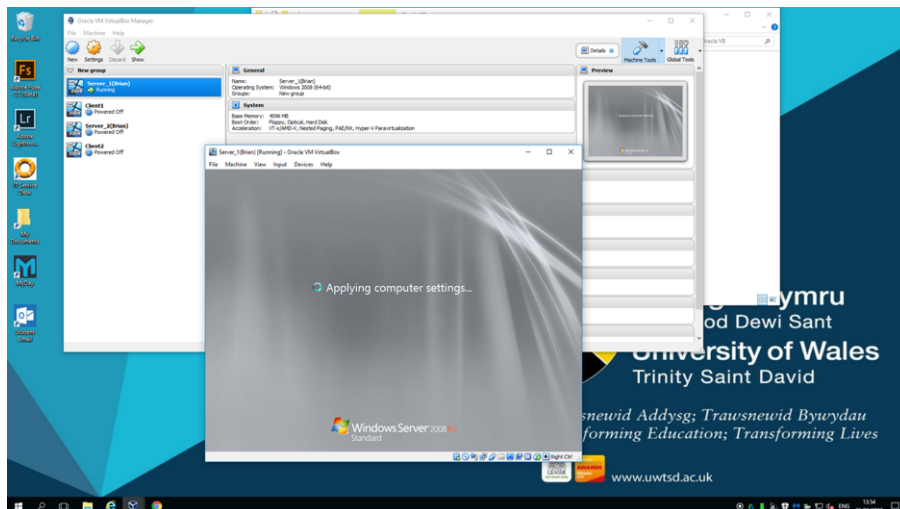


Figure 3: Shows 4 virtual machines of which there are 2 servers. Also shows Server_1(Brian) start up.

3 Part 2

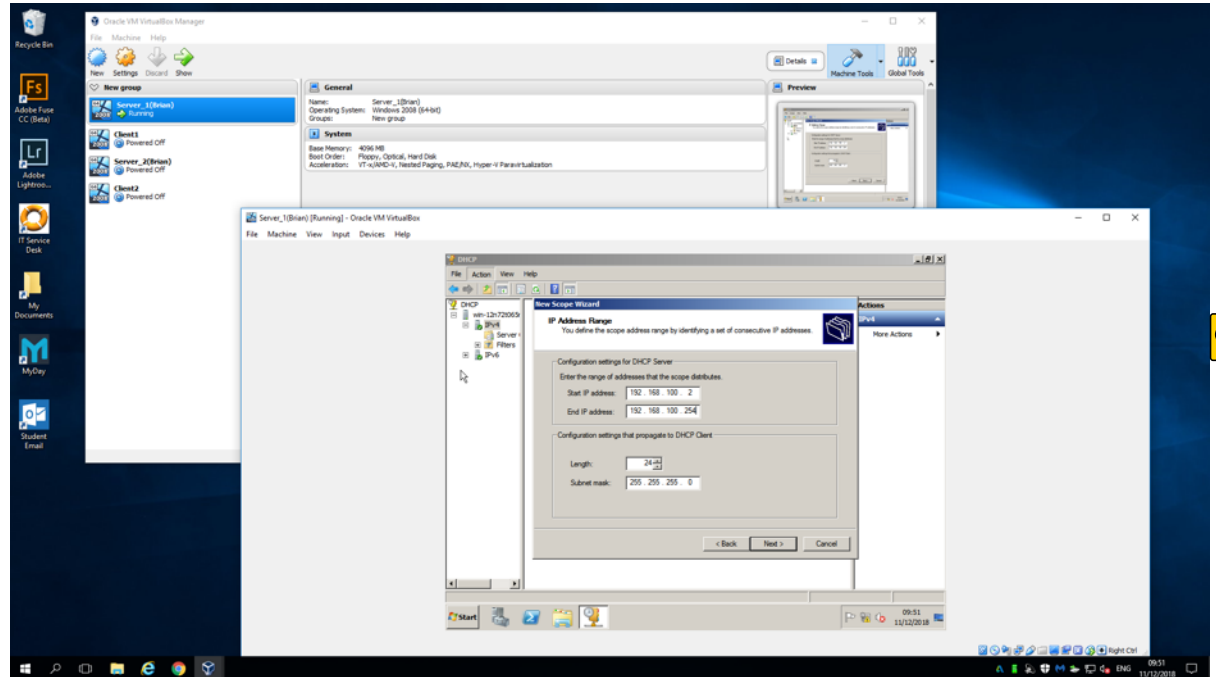


Figure 4: Shows the creation of the IP address range in Server_1(Brian).

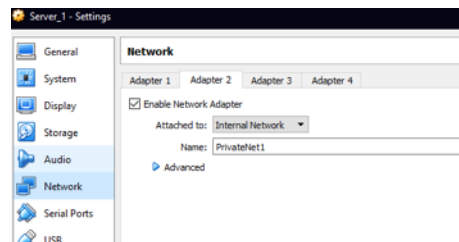


Figure 5: Shows PrivateNet1 as an internal network (snip taken during Oracle VB setup).

Once the 4 Virtual PCs were created they were supplied with individual IP addresses, Server_1(Brian) allocated 192.168.1.100 for the Publicnet and 192.168.100.1 for PrivateNet1. Client_1 allocated 192.168.100.2. For individuality, Server_2(Brian) had 192.168.1.101 for the Publicnet and 192.168.101.1 for PrivateNet2. Client_2 was allocated 192.168.101.2

Figure 3 shows the creation of the IP address range in Server_1(Brian). Once the above was completed the system was checked by using the command prompt (*cmd*) then ping with the relevant IP address. First attempt was unsuccessful so the firewalls were disabled and the ping-test was retried (successfully).

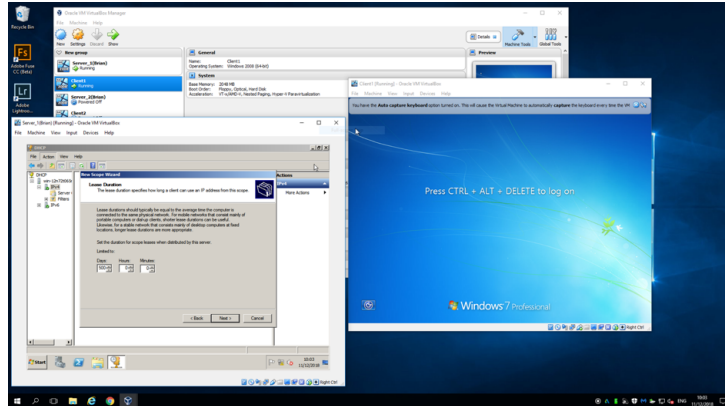


Figure 6: Shows the client lease duration, set as 500 days.

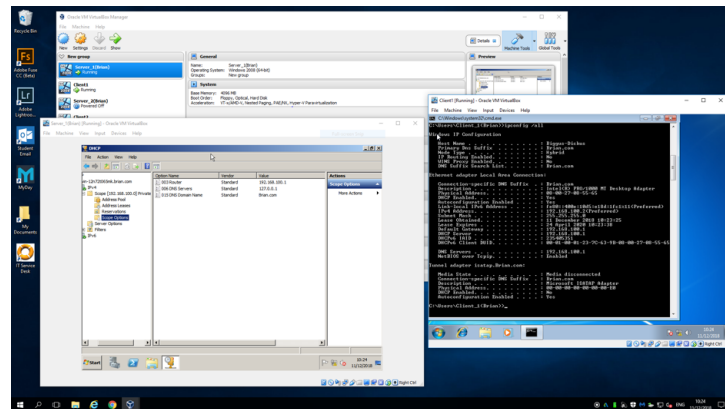


Figure 7: Server_1 DHCP details and Client_1 IP config details, also domain names shown.

4 Part 3

Server_1(Brian) was upgraded to be the Domain Controller, this was to allow internal LAN connection for the virtual PCs.

Dcpromo.exe was used to create and install the new Active Directory service.

Server_1(Brian) was also enabled to become the DNS server (thus controlling the User and Computer objects). 

5 Part 4

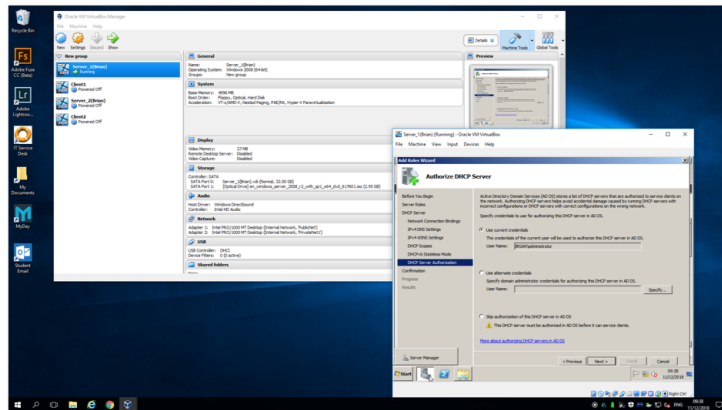


Figure 8: Server_1(Brian) DHCP setup.

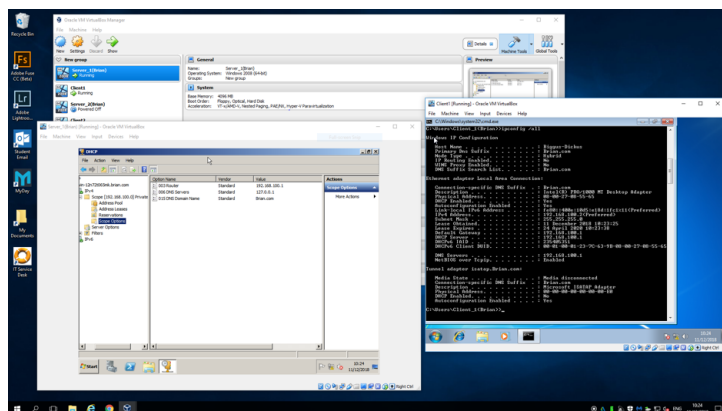


Figure 9: example of cmd - ipconfig/all

Client and server connected with DHCP enabled.

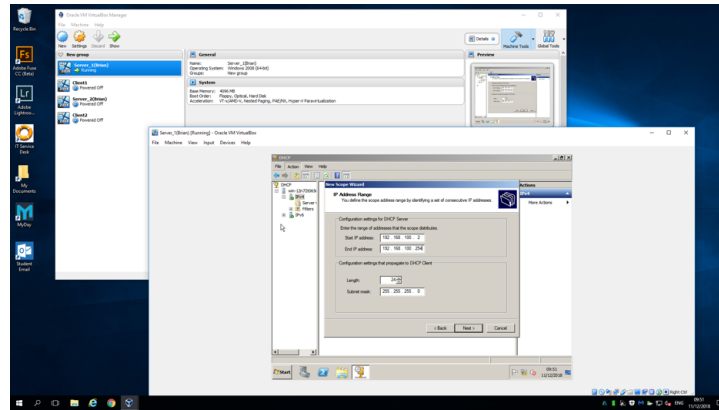


Figure 10: IP address ranges.

DHCP was installed using the server manager and the network was configured to suit.

6 Observational Tasks

6.1 Task A

“Why would anyone use a Type 2 hypervisor if Type 1 hypervisors exist? The answer is simple: convenience. It’s convenient for me to fire up a Linux VM, when I need to perform some task, test a script, write an article using something other than Ubuntu, use Windows or to expand my knowledge of another Linux distribution.

I don’t have to reboot my current system to an alternate operating system installation, I don’t have to maintain expensive Type 1 hypervisor systems nor do I have to keep a dozen different computer systems in my garage. VirtualBox is convenient. It’s fast. It’s free. It is as the Mac people frequently state, “It just works.” And, that, my friends, is a good thing.” [1]

6.2 Task B

A Forest “A forest is a collection of multiple trees that share a common global catalog, directory schema, logical structure, and directory configuration. Forest has automatic two way transitive trust relationships. The very first domain created in the forest is called the forest root domain.

Forests allow organizations to group their divisions that use different naming schemes and may need to operate independently. But as an organization, they want to communicate with the entire organization via transitive trusts and share the same schema and configuration container.” [2]

A Tree “Trees are collections of one or more domains that allow global resource sharing. A tree may consist of a single domain or multiple domains in a contiguous namespace. A domain added to a tree becomes a child of the tree root domain. The domain to which a child domain is attached is called a parent domain. A child domain can also have its multiple child domains. Child domain uses the name then its parent domain name and gets a unique Domain Name System (DNS).” [2]

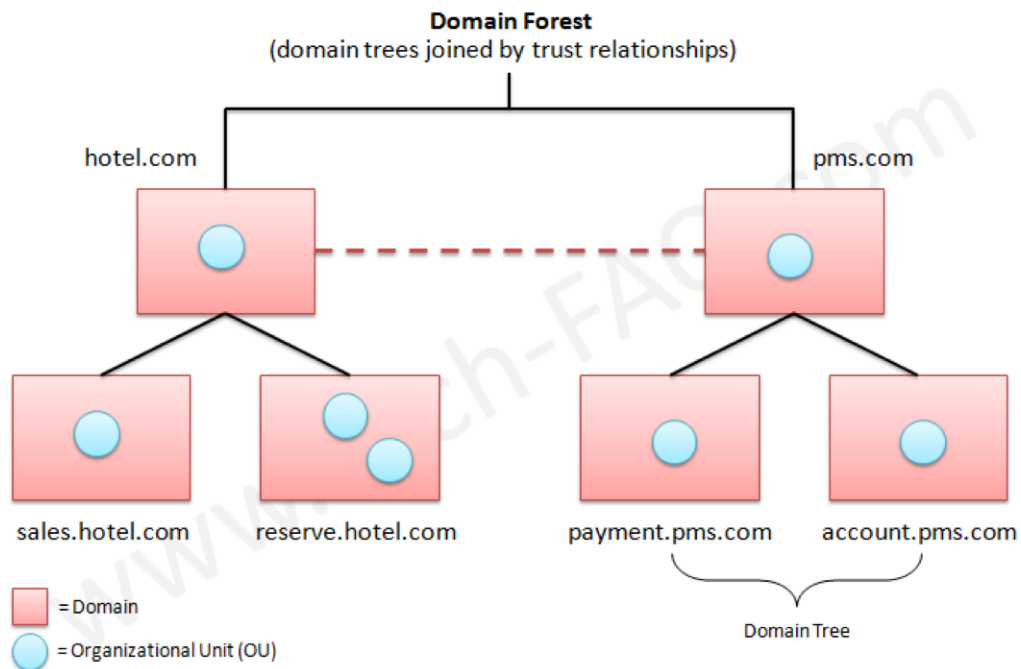


Figure 11: [2]

6.3 Task C

“Active directory (AD) Domain Controllers (DC) discovery includes determining the topology of the network, such as the nodes and connections in the network. For example, synthetic data may be transferred within the network and traced to determine the presence and relationships of the various network components. Alternatively, other mapping techniques are based upon mapping a known set of nodes to determine the relationship of the nodes. Next, Lightweight Directory Access Protocol (LDAP) commands are forwarded to the various nodes to identify the AD DC within a range of IP addresses discovered during the mapping of to the topology of the network.” [3]

6.4 Task D

What actions could we take in the event of a Domain Controller becoming unavailable?

There are many but starting with the simple options is always best, like

ping tests (need to disable the firewalls for this) and checking the network configuration, a further step of resetting the Router, Domain Controller and  clients.

If the above prove ineffective then Microsoft Support (webpages) have Symptom and Resolution information.

References

- [1] K. Hess, “What Sucks Worse than Oracle’s VirtualBox?” [Online]. Available: <https://www.zdnet.com/article/what-sucks-worse-than-oracles-virtualbox/>
- [2] “Tree and Forest in Active Directory.” [Online]. Available: <http://www.tech-faq.com/tree-and-forest-in-active-directory.html>
- [3] MicrosoftGuyJFlo, “Active Directory Domain Services Overview.” [Online]. Available: <https://docs.microsoft.com/en-us/windows-server/identity/ad-ds/get-started/virtual-dc/active-directory-domain-services-overview>