

A thick dark blue vertical bar runs down the left side of the page. A blue arrow-shaped banner points to the right from this bar, containing the date. In the bottom left corner, several thin, curved lines in dark blue and light grey sweep upwards and to the right.

11/27/2022

LAB JOURNAL

TNE10005 – Network Administration

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Introduction and reflection

The introduction of this documentation is written at the end of TNE10005 – Network administration. There were so much to learn about network, project management and risk/quality monitor. The labs were also interesting, although I spent most of the time fixing bug and complaining about the internet quality in the school. As there was no computer whatsoever, we had to do our lab on personal computer/laptop and Azure. The process of configuring labs were a nightmare, not because it was hard, but because it was tedious as a ton of bug or misconfiguration happens on our PC/laptop and Azure.

Although part of the devil inside me want to see other suffers, I do believe that a “candle loses nothing by lighting another candle”, therefore, in this document I will discuss the key concepts that are important in this course, key configuration, commands, design planning during the lab ,and last but not least all the difficulties and bugs that I have been through for future me or future readers of this document to avoid. My reflections of how all the knowledge can be applied to a business context will also be included as well as how I have further my study outside of the provided material.

It comes as no surprise that I want to achieve the highest mark for this lab (and hopefully achieve High Distinction for the course), however, even more chivalrously, if my document is up to the standard or appropriate, I hope that it will be shared to students of later generations so that they can learn what I have done and avoid the mistakes and I have made. As documentation is a form of sharing knowledge, it would be a pity if the only readers of this journal are me and the lecturer.

Table of Content

Introduction.....	Page 1
Table of Content.....	Page 2
Week 1 Lab Journal.....	Page 3
Week 2 Lab Journal.....	Page 3
Week 3 Lab Journal.....	Page 9
Week 4 Lab Journal.....	Page 11
Week 5 Lab Journal.....	Page 19
Week 6 Lab Journal.....	Page 22
Week 7 Lab Journal.....	Page 24
Week 8 Lab Journal.....	Page 28
Week 9 Lab Journal.....	Page 31
Week 10 Lab Journal.....	Page 35
Week 11 Lab Journal.....	Page 37
Reference.....	Page 38

Week 1 Lab Journal – 5th September 2022

Intro, Network Component & PC Components

The first week of the semester was straightforward and comfortable, as it only introduced the unit outlines, outcomes, syllabus, and expectations. Our unit convenor and lecturer, Mr. Brandon Huynh gave us an amazing introduction about what this course would expect from us and how to succeed in this course. The information in the Unit Outlines provided by this course is also a big plus to me as it consists of every basic knowledge that I need to know about the course, and according to it, I will need to achieve a minimum score of 50% to pass the unit. There are various assessments that I will need to get used to including Skills Journal, Skills Assessment, Theory Assessment, and weekly quizzes. The recommended hours to study throughout the semester is 12 hours or more. Realizing that this course will need a lot of time in order to complete and succeed, I quickly started to study the material for Week 1.

Key concepts and further study

The knowledge provided in Week 1 was not so difficult to me personally, as I had had prior experience with computer setups and hardware. However, the topic about network basic and network devices were particularly interesting to me, before this lecture I could never distinguish between network devices like repeater, bridge, hub and so on. Moreover, the OSI or Open System Interconnection was also extremely fascinating, and the understanding of how data is transmitted between devices would be incredibly helpful to my future studying and career.

Although the knowledge in Week 1 was not new to me, I still have to review the lesson as I still made some mistakes in the revision quiz of Week 1. Extra studying will be required before I can confidently use this knowledge in a business context. To prepare better for this course, I decide to read **“TCP/IP illustrated. Volume 1, The Protocol” by W. Richard Stevens** to review the old knowledge as well as acquire new one.

In general, Week 1 has given me a great opportunity to get myself started for the course and provided me with new, helpful knowledge and I am more than excited to go the next week lab.

Week 2 Lab Journal – 12th September 2022

OSI, Network Infrastructure & PMI

Key concepts and further study

The second week starts with new knowledge about Topology, or the way in which devices are connected but I found the information about Network Addressing most interesting as I can now dive deeper into how devices actually transmit data among themselves. IP addresses and Hierarchy addressing were also immensely interesting, with the current knowledge I can now set up a small network at my house and play around with it. Another key point of this week is knowledge regarding project management, as I have had experience in team working and project management in ICT10001 – Problem Solving with ICT and COS20001 – User-Centre Design, I thought I would have known everything about project management.

However, there are so much more about project management that I still need more time to fully grasp their power. Below is the summary of the key concepts:

IP Addresses

- + represented using 32 bits

i.e. 11111111111111111111111111111111

- + This gives 4,294,967,296 (over 4 billion) different possibilities.

- + For ease of view, we break it down to 4 octets

i.e. 1111 1111. 1111 1111. 1111 1111. 1111 1111

- + We generally represent each octet as a decimal number

- > This gives us the range of addresses:

0. 0. 0. 0 to 255. 255. 255. 255

- + IP Addresses are hierarchical.

Subnetting

- + Subnetting enables the hierarchy

- + Administrators use Subnet Masks to configure devices to place in the hierarchy.

Subnet mask

- + The subnet mask is all 1's on the left and 0's on the right

e.g., In binary: 1111 1111 1111 1111 1111 1111 0000 0000

As decimal: 255 255 255 0

As CIDR: /24 (count of 1's, expressed at the end of address)

- + This mask is used to determine the Network, Sub-Network and Host portions of the IP address.

- + As they begin at the significant end of the byte, decimal subnet masks can only contain the numbers:

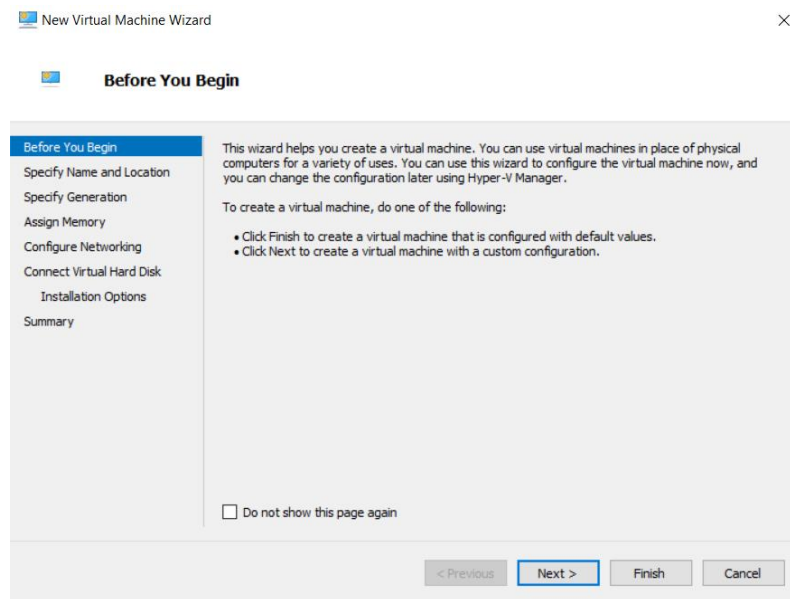
0, 128, 192, 224, 240, 248, 252, 254, and 255

4The topic about Link Layer (Wright, p.21) and Internet Protocol (Wright, p.33) as well as ARP (Wright, p.53) would be amazing for those who wants to understand deeper about these knowledges.

Apart from the knowledge that I have studied there are also lab work that are essential to the studying of this course.

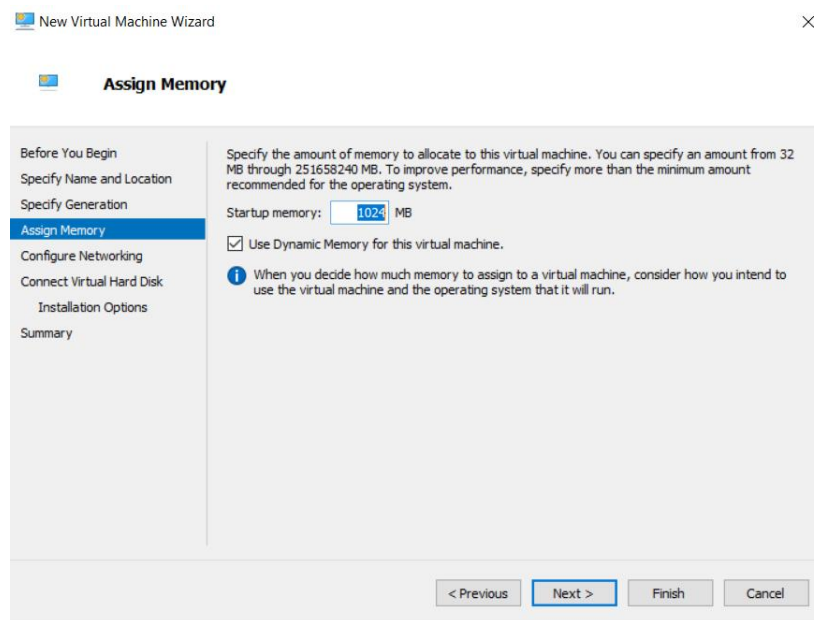
Lab 1 Intro Lab – Hyper V, Virtual Machines ,and initial setup

Week 2's lab work requires a virtualization platform that we can create a virtual machine, although the course recommend Hyper-V. Although I have been using VMware Workstation for creating and managing virtual machine, learning a new software would broaden my knowledge. The following is the process of setting up a Window 10 computer on Virtual Machine:



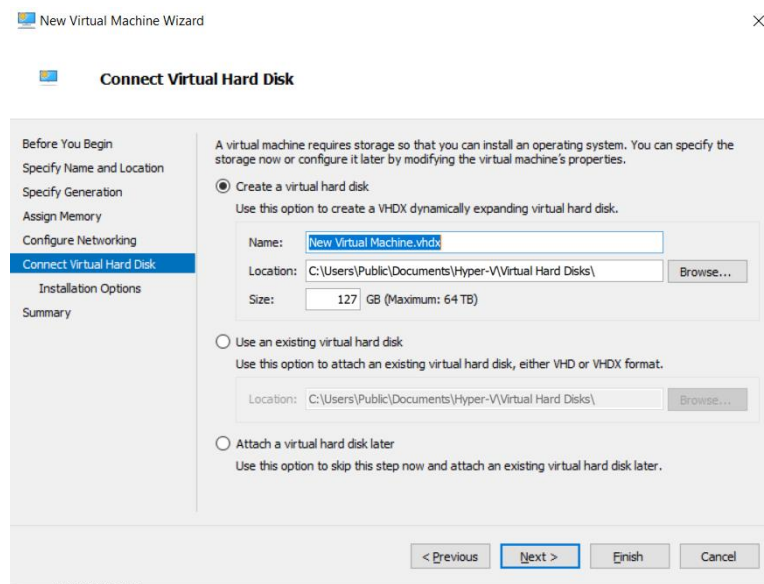
Picture 1: Hyper-V Virtual Machine Wizard panel

After setting up the initial steps for Virtual Machine (hereinafter refer to as VM) creation including Name, Generation, we will need to allocate start up memory for our VM. However, for those who have an insufficient memory in their computer, it is advised to remove the “Dynamic Memory” option as well as giving just the right amount of start up memory for each VM. This will prove crucial ,as with insufficient memory, Hyper V will not be able to sustain multiple VMs at the same time.

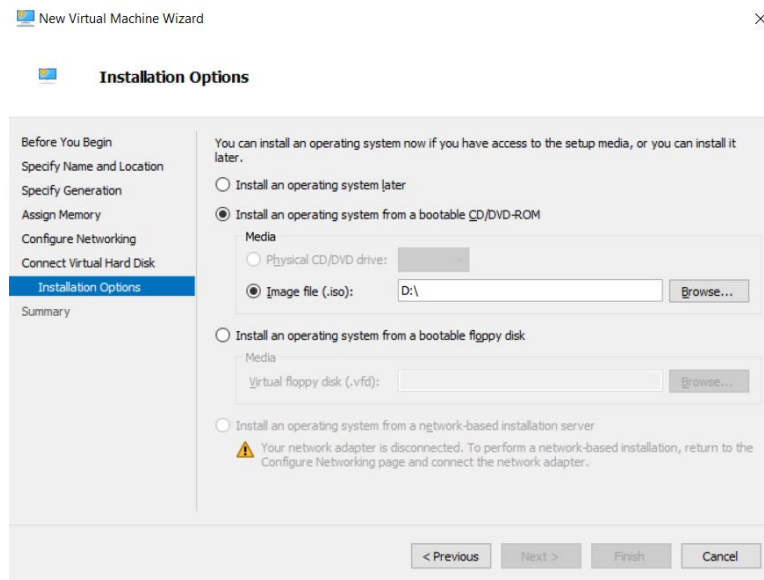


Picture 2: Memory allocation

The next steps is fairly simple as we only need to set up connection (we will spare this part in this week), installation options for our VMs



Picture 3: Installation options



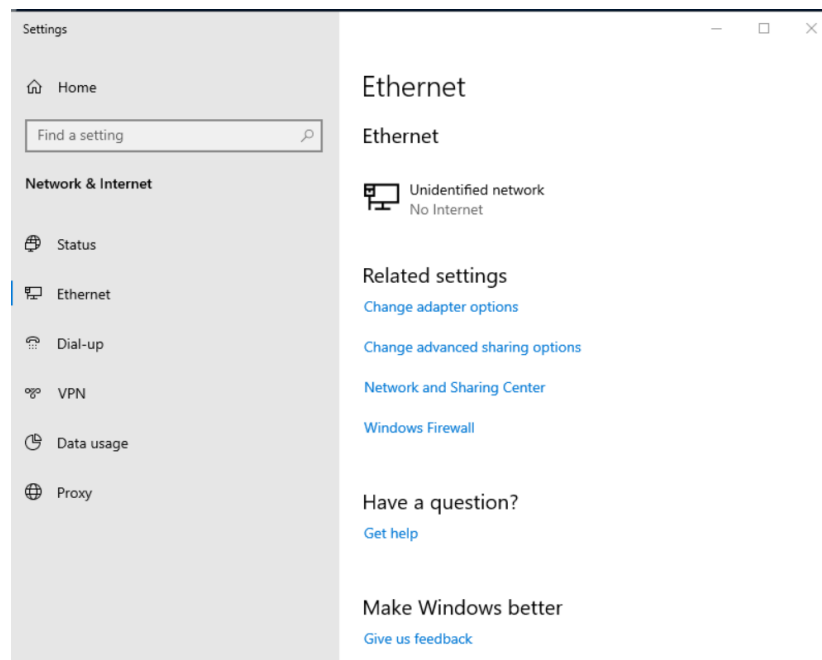
Picture 4: Installation options

We will install our operating system from an image file for both the Window 10 and Window Server 16 in the future. After this step we only need to wait for the installation process to take place and press some simple buttons to finish our installation.



Picture 5: Window Server 16 Virtual Machine

After setting up the VM, we will need to configure this computer for future use. To configure the network of the VM, open Ethernet in the Network section, locate and press the “Change adapter option”



Picture 6: Network Configuration

Locate the Internet Protocol Version 4 and configure the IP Address as well as the DNS server address according to given topology



Picture 7: Configured network

We can use PowerShell or cmd (command) for this task. The following commands will be used extensively throughout this course for configuring and setting up network connection:

- Ipconfig or Ipconfig/all: Displays part of or all current TCP/IP network configuration values.
- Ping: Allows a user to test and verify if a particular destination IP address exists and can accept requests in computer network administration.
- arp -a: display arp table
- arp -d: clear table

```

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\luan> ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::4df:c7f:2fda:919b%7
    IPv4 Address. . . . . : 172.16.32.101
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 172.16.32.1
PS C:\Users\luan> ping 172.16.32.101

Pinging 172.16.32.101 with 32 bytes of data:
Reply from 172.16.32.101: bytes=32 time<1ms TTL=128
Reply from 172.16.32.101: bytes=32 time<1ms TTL=128
Reply from 172.16.32.101: bytes=32 time<1ms TTL=128
Reply from 172.16.32.101: bytes=32 time<1ms TTL=128

Ping statistics for 172.16.32.101:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
PS C:\Users\luan>

```

Picture 8: Network display and verification

After verifying the validity of the network configuration, we can see that our network is successfully set up. With the technique provided in Week 2, I know how to set up VM as well as configuring its

connection. However, there are still countless possibilities with this knowledge, and I still need more to master all the command and features of the IP configuration.

Reflection

The material and lab exercise in Week 2 shows us how a network in a business or a company can be configured, with the level of hierarchy we can subnetting different departments or devices and apply restriction on them. The lab work, furthermore, allow us to do practical exercise on how to configure a small network. The revision quiz was quite hard as I hadn't prepared good enough and still confused between different layers of the OSI model as well as subnetting. However, I found a great YouTube channel that supplement me with consolidated knowledge about such topic. For those who still feel strange about OSI model our subnetting, do pay a visit to **Neso Academy** on YouTube and watch the lecture about Computer Networks.



Neso Academy Videos on Computer Network

Week 3 Lab Journal – 19th September 2022

PM2 & IPv4 Addressing

Week 3 introduce more content regarding project management and key features of it, I particularly interested in the lecture about risk management as it is my lacking throughout every project that I have done. After the lecture, I have equipped myself with more knowledge and experience for my future project. The other features such as HR management and Communication are equally important, but I wish there were more case studies or example to clearly demonstrate the important of these points.

The lecture also provides me with more information about TCP/IP subnetting presentation, the sheer amount of information and techniques are a little bit overwhelming and there are still room for me to improve in order to perfect myself in this course.

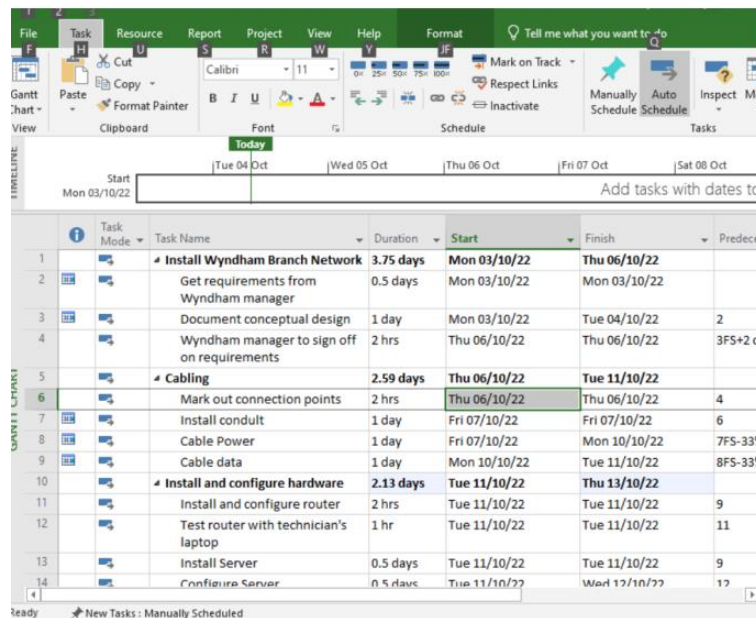
Key concepts and further study

Apart from layers and ports, week 3 deepen our understanding about IPv4 addressing and subnetting, I had quite a hard time figuring out what subnetting is and how to do it as fast and as convenient as possible. While doing research on the internet, I came across a video from **Sunny Classroom on YouTube** which blows my mind on how simple subnetting is. After watching the video, I finally

understand and can do subnetting quite easy. I also spent a long time standardize my approach in doing subnetting.

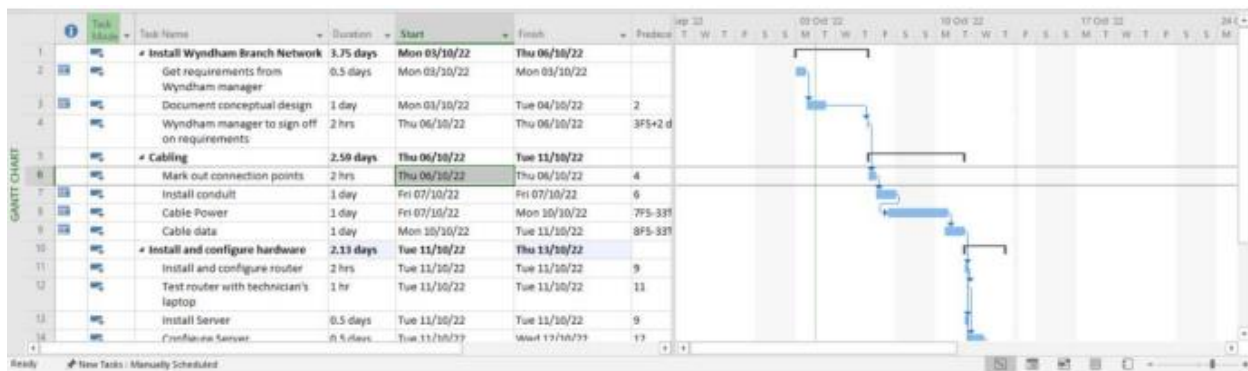
Lab 2 MS Project 2016 Lab

We also have chances to get our hand dirty by doing project management on Microsoft Project, this application is extremely helpful as I have always been looking for an application to manage my project. Swinburne Cloud also facilitates online version of Microsoft Project, and I did not need to download the app.



Task ID	Task Name	Duration	Start	Finish	Predecessors
1	Install Wyndham Branch Network	3.75 days	Mon 03/10/22	Thu 06/10/22	
2	Get requirements from Wyndham manager	0.5 days	Mon 03/10/22	Mon 03/10/22	
3	Document conceptual design	1 day	Mon 03/10/22	Tue 04/10/22	2
4	Wyndham manager to sign off on requirements	2 hrs	Thu 06/10/22	Thu 06/10/22	3FS+2 d
5	Cabling	2.59 days	Thu 06/10/22	Tue 11/10/22	
6	Mark out connection points	2 hrs	Thu 06/10/22	Thu 06/10/22	4
7	Install conduit	1 day	Fri 07/10/22	Fri 07/10/22	6
8	Cable Power	1 day	Fri 07/10/22	Mon 10/10/22	7FS-33h
9	Cable data	1 day	Mon 10/10/22	Tue 11/10/22	8FS-33h
10	Install and configure hardware	2.13 days	Tue 11/10/22	Thu 13/10/22	
11	Install and configure router	2 hrs	Tue 11/10/22	Tue 11/10/22	9
12	Test router with technician's laptop	1 hr	Tue 11/10/22	Tue 11/10/22	11
13	Install Server	0.5 days	Tue 11/10/22	Tue 11/10/22	9
14	Configure Server	0.5 days	Tue 11/10/22	Wed 12/10/22	13

Picture 9: Input Data



Picture 10: Gantt chart of the input data

Initially, all the start and end date of the tasks are at the same day which is impractical and impossible. To fix this we need to implement predecessors for each task. After that we were asked to manage resources via the Resource Sheet. We then process to input the name, and details of the resources.

	Resource Name	Type	Material	Initials	Group	Max.	Std. Rate	Ovt.	Cost/Usr	Accrue	Base	Code	Add New Column
1	Dang Vi Luan	Work		NNN		100%	\$100.00/hr	\$150.00/hr	\$0.00	Prorated	Standard		
2	Cat 6 Cable	Material	metres	C6c			\$0.40		\$0.00	Prorated			
3	Wyndham Branch Manager	Work		WBM		100%	\$0.00/hr	\$0.00/hr	\$0.00	Prorated	Standard		
4	John Chamber	Work		JCh		100%	\$100.00/hr	\$150.00/hr	\$0.00	Prorated	Standard		
5	William Gates	Work		WGa		100%	\$100.00/hr	\$150.00/hr	\$0.00	Prorated	Standard		
6	Craig's Crazy Cablers	Work		CCC		100%	\$90.00/hr	\$135.00/hr	\$0.00	Prorated	Standard		
7	MF Printer	Material	units	MPr			\$600.00		\$0.00	Prorated			
8	Server	Material	units	SVR			\$4,000.00		\$0.00	Prorated			
9	Branch Workstations	Material	units	BPC			\$1,250.00		\$0.00	Prorated			
10	Router	Material	units	Rtr			\$1,550.00		\$0.00	Prorated			
11	Swinburne IBL Student	Work		S		100%	\$50.00/hr	\$75.00/hr	\$0.00	Prorated	Standard		

Picture 11: Resource sheet for the project

Microsoft Project has introduced to me a new way to manage my project in the future with more tools and convenience. The concept introduced in the lab also help me to practice proper time management and ensure that all the resources are allocated to the right place at the right time.

Reflection

It would not be an exaggeration to say that I learn the most from this course in Week 3, from project management to subnetting. Project management using Window Project can be immensely convenient for network administrator and subnetting combined with connection devices can establish connection between different computers in different networks. This will prove crucial for organizational network in business and companies. Quiz 3 was not very hard, but I find it difficult to remember all the port and terminologies by heart, it might take me a little bit longer to be familiar with it.

Week 4 Lab Journal – 26th September 2022

Subnetting & DHCP

Key concepts and further study

Week 4 provide us with more material regarding subnet configuration and design, The following were discussed in this week:

Network design, including host calculation, subnet calculation and ranges of each subnet:

- + The formula that we will use to calculate the number of hosts: 2^n (with n is the host bit)
- + The formula that we will use to calculate the usable number of hosts: $2^n - 2$ (with n is the host bit) as the first and last IP address are spared for default gateway and Broadcast address.
- + The formula that we will use to calculate the number of subnets: 2^n (with n is the subnet bit)
- + The formula that we will use to calculate the range of our subnet: 256 – the octet that is not 255 or 0.

That seems a little bit mouthful, however, let's consider this example. Let's say we have our subnet mask as 255.255.255.192 which is the equivalent of 11111111.11111111.11111111.11000000 and the IPv4 address as 192.128.64.0

=> The number of hosts from this subnet mask is 2^6 or 64 hosts.

=> The number of usable hosts must decrease by 2 which is 62 hosts.

=> The number of subnets is 2^2 or 4 hosts

=> As our subnet octet is 192, we have our range as 256 – 192 which is 64.

Let's verify our calculation, we have 4 host with each host ranges within 64 host, therefore, 256 host which is the 0-255. To further illustrated this idea, we will have 4 subnets as follow:

- Subnet 1 ranges from 192.128.64.0 to 192.128.64.63
- Subnet 2 ranges from 192.128.64.64 to 192.128.64.127
- Subnet 3 ranges from 192.128.64.128 to 192.128.64.191
- Subnet 4 ranges from 192.128.64.192 to 192.128.64.255

Calculating the default gateway address and broadcast IP address

+ The default gateway address and host address are the first and last IP address of each subnet, let's take subnet 1 above as our example

=> The default gateway is 192.128.64.0 and the broadcast IP address is 192.128.64.63

This is also the reason why when we calculate the usable host bit it is the number of hosts minus by 2, as the default gateway and broadcast IP address are spared.

Using this knowledge, we can create subnet design with any given topology.

We were also introduced with DHCP – Dynamic Host Configuration Protocol. The understanding about the process by which DHCP is established will be crucial for our studying, the steps are as follows:

- Once DHCP option is configured, the computer will send a DHCPDISCOVER packet to all computer on the lane to ask for DHCP server on its network.
- DHCP server after receiving the packet will reply with a DHCPOFFER packet which contains the IP address. Note that this packet will be broadcasted to every device as the sending computer is yet to acquire its own IP address.
- The client computer needs to broadcast back with a DHCPREQUEST packet, as there might be several DHCP server in its network and all of them might have replied with the DHCPOFFER packet. Therefore, the client needs to request the particular IP address it wants to accept.
- Finally, the DHCP server broadcast a DHCPACK packet that acknowledge the requested IP address. When the client's device receives this packet, it will be automatically configured with the provide IP configuration.

=> It is also noteworthy that the IP address from DHCP server is not “given” but rather “leased” as there exists situation when the devices might be removed from the network, in that case, if the IP address were

given then we will lose that IP address forever. To prevent this from happening the IP address provided by DHCP server will expire after a certain amount of time.

Apart from the process of establishing the DHCP, there are also other aspects that we need to remember.

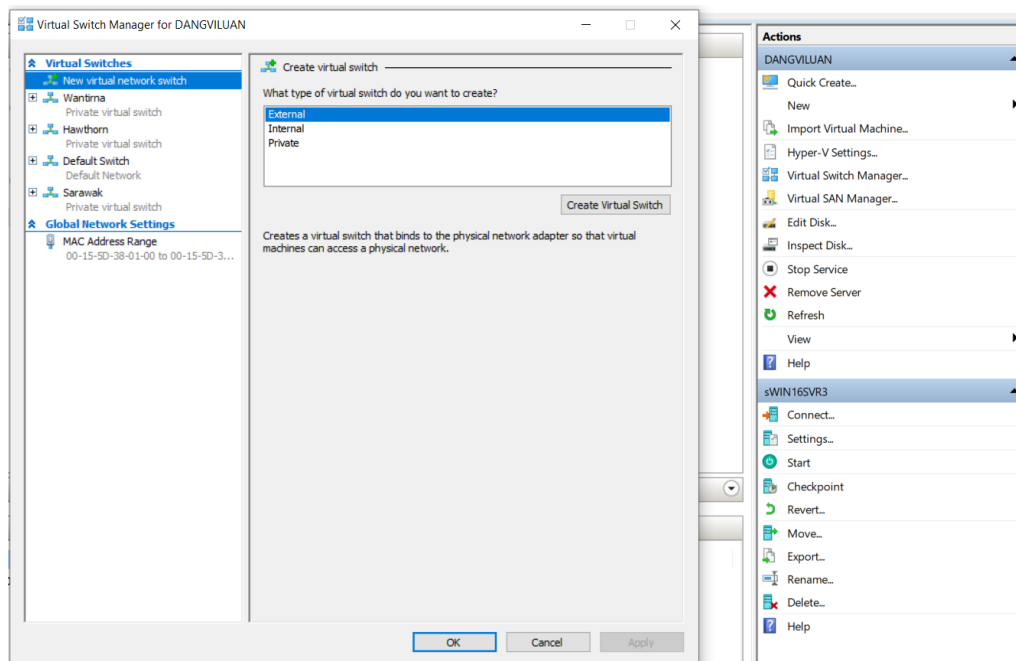
+ DHCP scopes, which can be defined as the administrating pool of address and IP configuration of our DHCP server. A server may have many scopes and a scope can have numerous pools of addresses, though it is rare.

+ DHCP reservations, DHCP reservation ensure a device is allocated the same IP address because the IP address allocation is based on its MAC address.

=> We can apply DHCP options at various levels, which includes server, scope, reserved client.

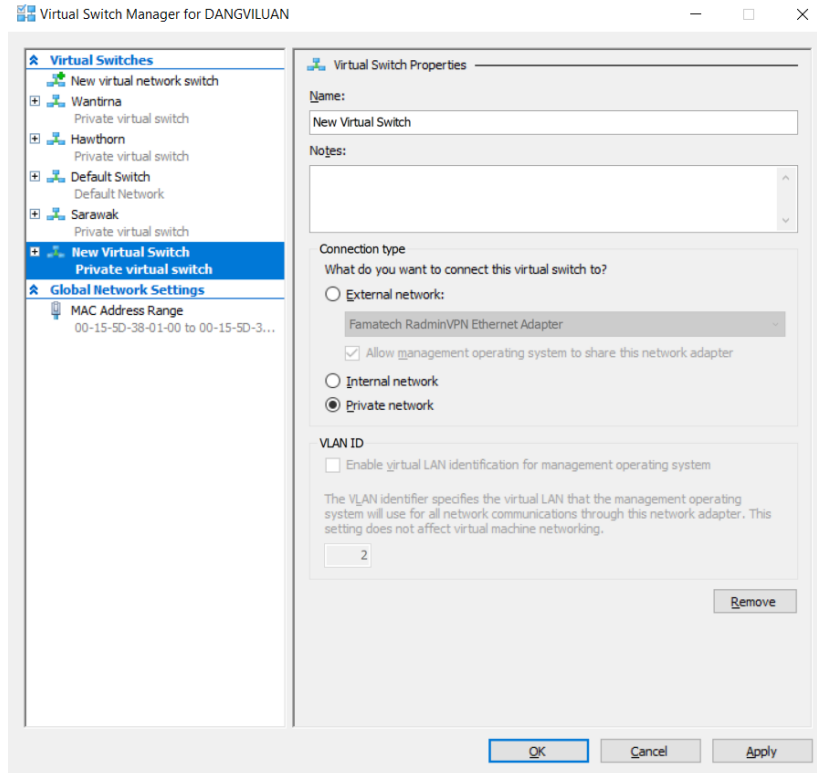
Lab 4 Implement IPv4 and Subnetting Exercises

Locate **Virtual Switch Manager** on the **Action** panel to the right of **Hyper V Manager**, once it is pressed a panel will pop up and we will do most of our switch-related business here.



Picture 12: Virtual Switch Manager

Then choose the **Private** type and create the **Switch**, after that we can type in the name we want.



Picture 13: Virtual Switch Properties

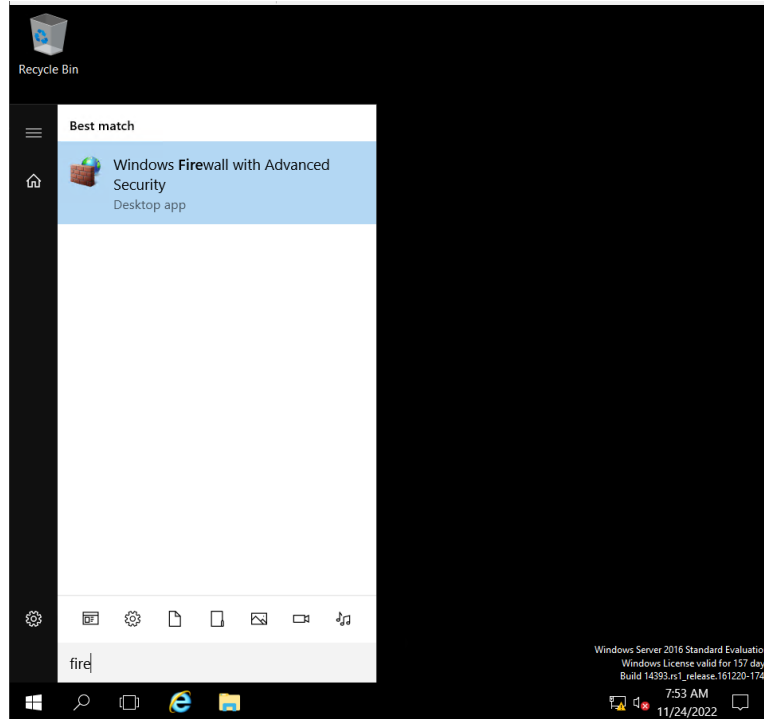
As we already set up the Hawthorn switch, we only need to create Wantirna this time. After that we need to configure all the computer in this topology, which includes sWin10PC201, sWin16SVR1, sWin16SVR2. The following need to be configured so that these computers can connect to each other:

- Turn off the firewall of each VM.
- Configure the IPv4 Properties.
- Set up the Router.
- Verify the connection to the router and to the computer or server in another network.

We will go through each step to set up the whole topology.

Turn off the firewall

VM firewall can be located in the search bar of the VM. It is advised that Window Firewall with Advanced Security to turn off the firewall faster. Domain Profile, Private Profile and Public Profile all need to be turned off. We will do this for the rest of our VMs



Picture 14: Find the Firewall in the search bar



Picture 15: Window Firewall is turned off

Configure the IPv4 Properties

Similar to the first lab we need to configure the IP address of our VMs in accordance with the provided topology.

Topology

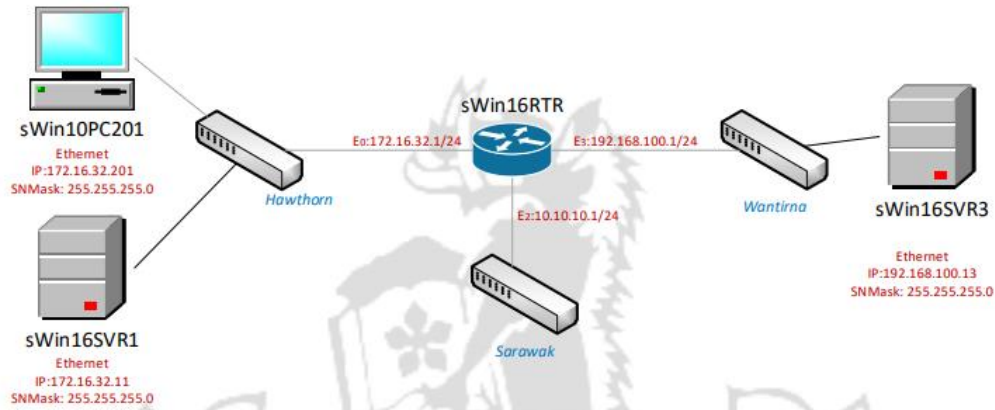
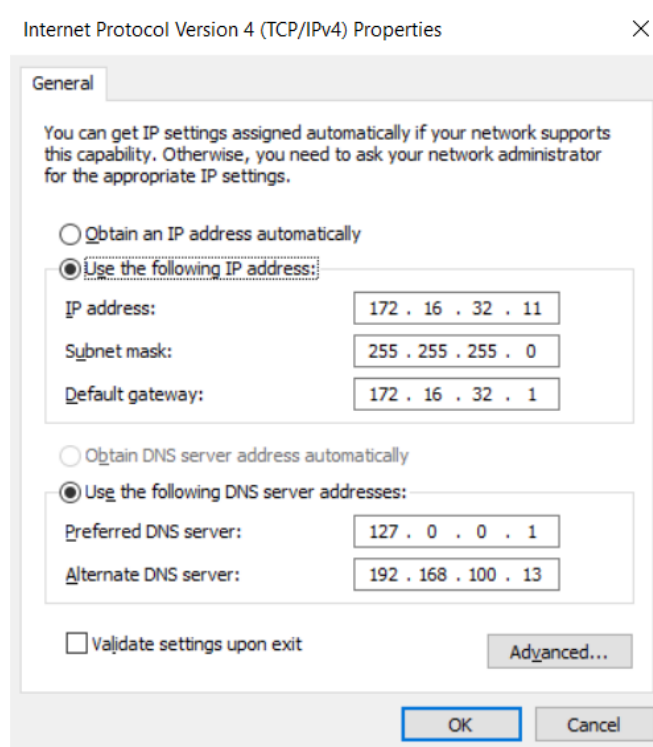


Figure 1 – Network Topology diagram for Lab 3

Picture 16: Network Topology for Lab 3

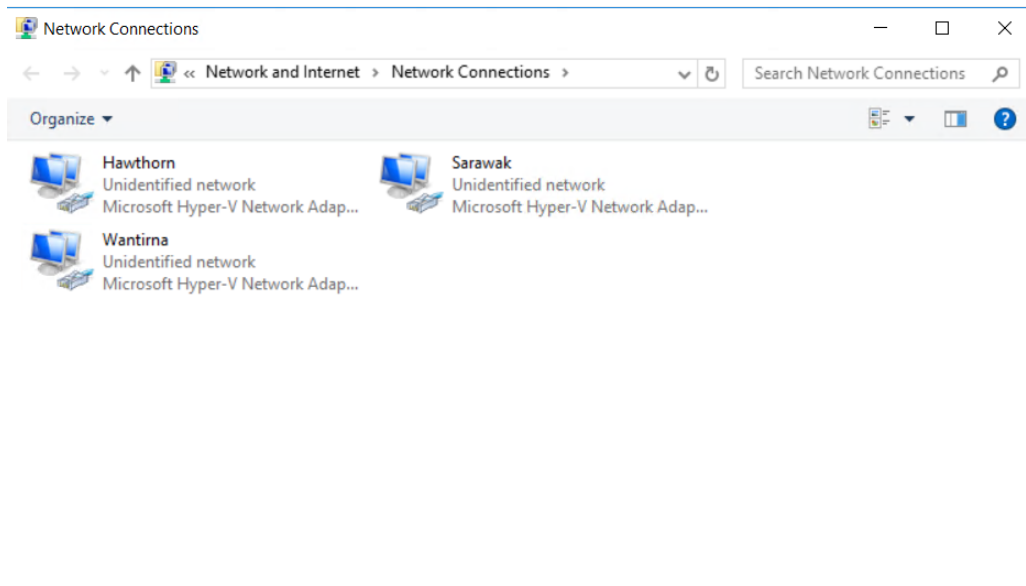


Picture 17: IPv4 Properties configuration

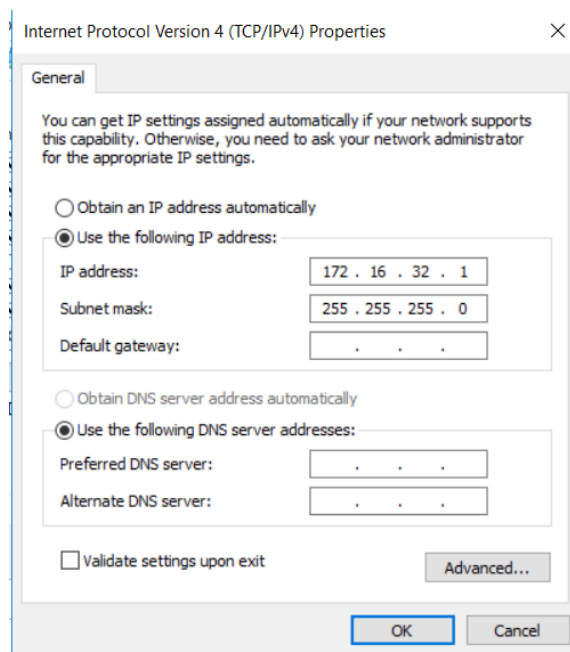
We will also configure the above IPv4 Properties for all the VMs in this lab

Set up the router

Similar to the setup of other machines in this lab, we will set up the router in Network and Sharing Center. The IPv4 Properties in the router, however, only need the IP address and the subnet mask as it is the default gateway for other VMs in the network.



Picture 18: Network Configuration for router



Picture 19: IPv4 Properties for router

We will need to set up Hawthorn Switch and Wantirna Switch for this router according to the given topology.

Verify the connection to the router and to the computer or server in another network

To check that the connection between VM and the router is successfully established, we will ping the default gateway of each VM

```
Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::a865:650c:1b01:aba5%2
    IPv4 Address. . . . . : 172.16.32.11
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 172.16.32.1

Tunnel adapter isatap.{0B70CA6B-F0FC-4009-A808-5EBF7C6EE117}:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 
PS C:\Users\Administrator> ping 172.16.32.1

Pinging 172.16.32.1 with 32 bytes of data:
Reply from 172.16.32.1: bytes=32 time<1ms TTL=128
Reply from 172.16.32.1: bytes=32 time<1ms TTL=128
Reply from 172.16.32.1: bytes=32 time<1ms TTL=128
Reply from 172.16.32.1: bytes=32 time<1ms TTL=128

Ping statistics for 172.16.32.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
PS C:\Users\Administrator>
```

Picture 20: Connection verification between VM and router

If the packet is successfully sent and received, it means that the connection between VM and router is established. Do this for the rest of the VMs to ensure nothing would be out of place.

After the connection between VM and Router is configured, we will verify the connection between a VM in Hawthorn with a VM in Wantirna. This can be done via the ping command, particularly, we will ping the IP address of the computer in Wantirna if we are using a computer in Hawthorn and vice versa.

```
Connection-specific DNS Suffix  . : 
Link-local IPv6 Address . . . . . : fe80::a865:650c:1b01:aba5%2
IPv4 Address. . . . . : 172.16.32.11
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 172.16.32.1

Tunnel adapter isatap.{0B70CA6B-F0FC-4009-A808-5EBF7C6EE117}:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 
PS C:\Users\Administrator> ping 172.16.32.1

Pinging 172.16.32.1 with 32 bytes of data:
Reply from 172.16.32.1: bytes=32 time<1ms TTL=128
Reply from 172.16.32.1: bytes=32 time<1ms TTL=128
Reply from 172.16.32.1: bytes=32 time<1ms TTL=128
Reply from 172.16.32.1: bytes=32 time<1ms TTL=128

Ping statistics for 172.16.32.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
PS C:\Users\Administrator> ping 192.168.100.13

Pinging 192.168.100.13 with 32 bytes of data:
Reply from 192.168.100.13: bytes=32 time<1ms TTL=127
Reply from 192.168.100.13: bytes=32 time<1ms TTL=127
Reply from 192.168.100.13: bytes=32 time<1ms TTL=127
Reply from 192.168.100.13: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.100.13:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
PS C:\Users\Administrator>
```

Picture 21: Connection verification between VMs from different networks

If the packet is successfully sent and received, it means that the connection between VMs in different networks is established. Do this for the rest of the VMs to ensure nothing would be out of place.

After setting up all the VMs and ensuring all of them can “talk” to each other, the lab is done.

The router VM sometimes has a weird glitch of disabling the switches when we reset it, so if your connection is not established, take a look at the connection of the router in the Hyper V networking section.

Reflection

Through the knowledge in this lab and week, I have gained a lot of knowledge regarding Subnetting and their role in connecting devices from different network, this would prove crucial in configuring companies’ network and infrastructure. The revision quiz was a little bit difficult as I still haven’t been familiar enough with subnetting and switching.

Week 5 Lab Journal – 26th September 2022

DNS, File & Print services

Key concepts and further study

Up till this point, we already know that computer understanding nothing but numbers, particularly, binary number. Everything from programming, display, network connection is done via numbers and its variation. However, let’s say when we are browsing the internet, we want to access Facebook.com. How can our computer understand Facebook.com, or in other words, how can it translate Facebook.com to numbers?

This is done via DNS or Domain Name System; this is a technology to resolves domain names to IP addresses. Or specifically, it will resolve Fully Qualified Domain Name (FQDN) to IP addresses. DNS can also locate domain controllers and global catalog servers. The translation is also reversible as DNS can also resolve IP address to host names.

In order to understand the functionalities of DNS, we need to grasp a solid knowledge about DNS Zones and DNS Records. DNS Records is a table of record which hold the name of all the IP addresses of all relevant devices in a particular network. DNS zone, on the other hand, is a specific portion of DNS namespace that contains DNS records. DNS zones can have the following characteristics:

- + Zone focus: Forward lookup zone or Reverse lookup zone

- + Zone type: Primary – RW, Secondary – RO, Stub – RO subset, it is noteworthy that all records must first be created in a Primary zone, the secondary zone is a full copy of the Primary zone and Stub zone is a partial copy. Secondary and Stub zone are read-only copy and we can’t create new record here.

There is also Dynamic Updates for DNS, as DHCP server might change the IP address of the computer, however, due to some cyber security concerns, only secure dynamic update should be allowed. This will require Active Directory and AD-integrated DNS zones.

After configuring and exploring about DNS on server side, DNS queries are sent between client and server to establish connection between the two side. DNS queries can be recursive or iterative. Iterative

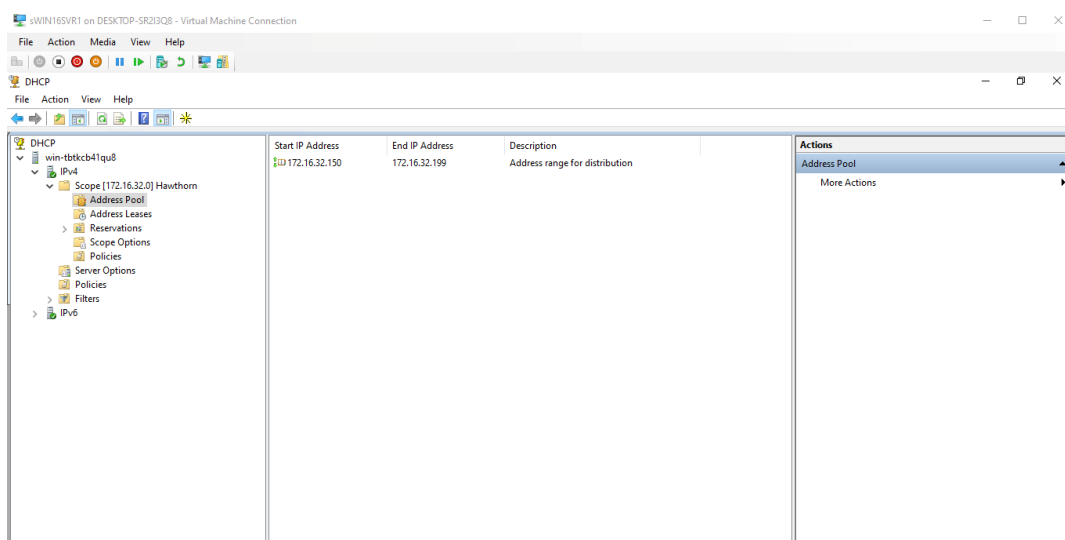
queries will either return the required result or transfer the request to another server. Recursive queries, on the other hand, will return the required result or return an error.

Server roles can be diverse, consisting of several roles:

- + File server, a system that help manage the storage, shared folders, replication between distributed file servers, fast file searching and access from other NOS's.
- + Print server which allows printers to be shared/managed
- + Web server (IIS) or Internet Information Services, this is Microsoft's web server that allows the distribution of documents via the HTTP protocol. This platform relies on DNS to translate URL into IP address.
- + Application server which allow the configuration of dynamic content to web page and connection of web pages to database

Lab 4 DHCP intermediate subnetting

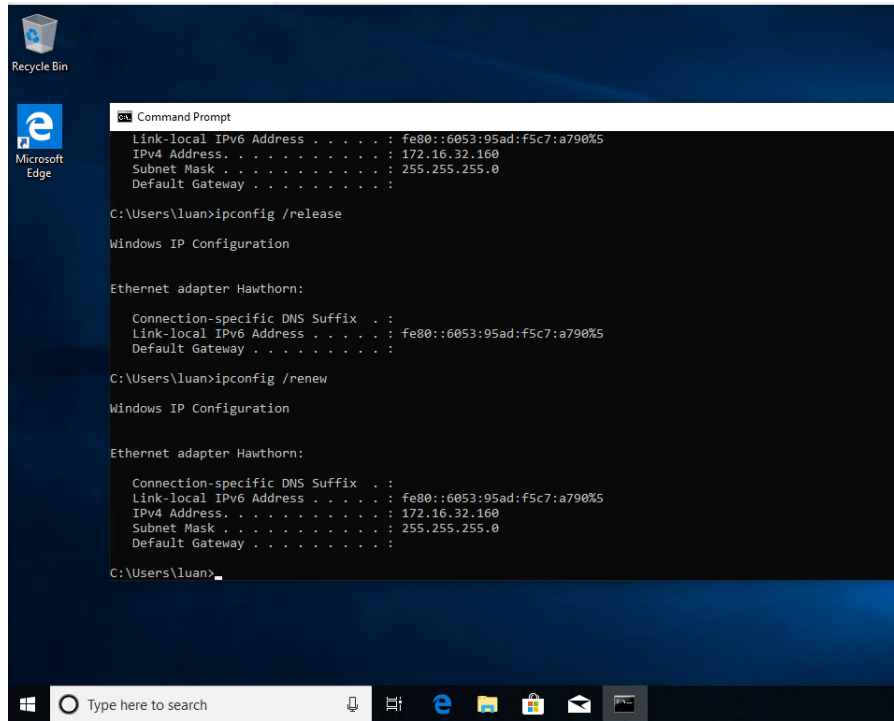
The lab for this week is all about DHCP and various things we can do with its configuration.



Picture 22: DHCP successfully configured

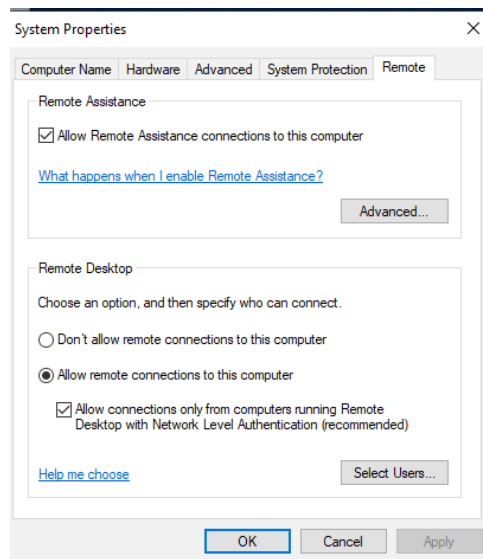
The following commands are quite important to remember:

- ipconfig /release: abandon the current IP address
- ipconfig /renew: asking for another IP address



Picture 23: DHCP commands

For the convenient of future lab, do make an extra step in changing the computer name from the gibberish name in picture 22 to a more recognizable name (sWin16SVR1 for example), this can be done in Computer Name/Domain Changes of System Properties



Picture 24: Computer Name changes

Do this to all the VMs in the lab as it might be important because I have experienced some bugs of incompatibility between the name of different VMs.

Reflection

With the new provided technology – DHCP, we don't need to manually assign IP address to our VMs. I can imagine how convenient it would be for business network administrator to use this tool for assigning IP, DHCP also provides a wide range of other option such as reservation, exclusion and so on. The revision quiz in Week 5 was a little bit challenging as there was so much new knowledge that I need to remember, especially the new technology and method of which the company need to use to configure its network and the DHCP packets. DHCP option code is also very hard to learn by heart.

Week 6 Lab Journal – 03rd October 2022

Manage ADDS

Week 6 reviews the material in the previous week and provides us with Active Directory. Before setting up Active Directory, let's have a look at some key concepts.

Key concepts and further study

Active Directory: An Object-Oriented Database. Examples of objects in this database are Users, Computers, Printers, Sites ,and Volumes.

+ Active Directory (hereinafter AD or ADDS) can be used to control the authorization of accessing and managing the objects.

- Domain terminology:

+ A forest is a collection of ADDS domains that are bound by automatically created two-way trust relationships

+ A domain is a logical administrative unit that is home for the users, computers, and other objects.

+ A tree is a collection of ADDS domains that share a common root domain and have contiguous namespace.

+ An organization Unit (OU) is a container within a domain that organizes users, computers ,and other OUs.

Group Scopes:

+ Local: used by 'non-administrator' to share resources on a local computer in a workgroup or a domain.

+ Global: used to group user and computer account from the local domain

+ Domain Local: used to provide access to resources in the local domain

+ Universal: used to group Global groups from multiple domains

A rule of thumb is to apply groups using 'I > G > DL < A' strategy:

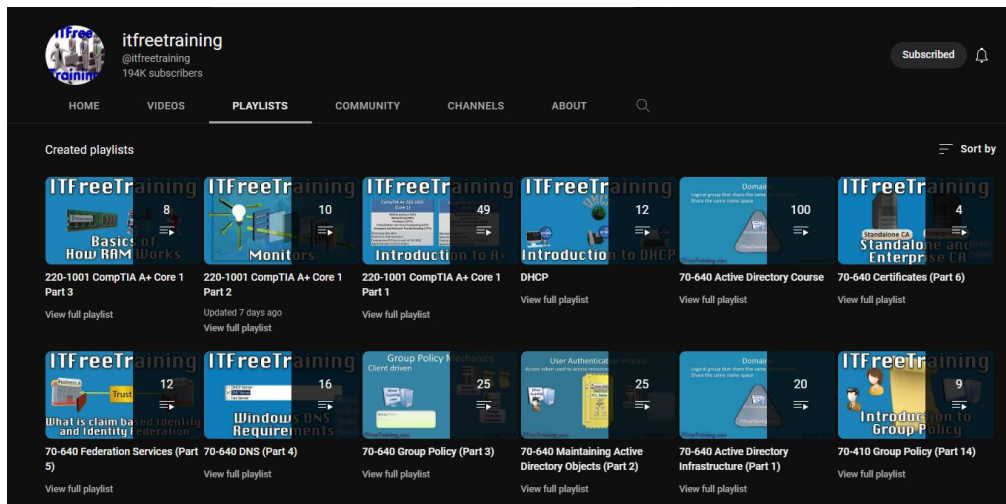
- Identities will be a member of Group.

- Group will be a member of Domain Local.

- Access will also be a member of Domain Local.

More illustration, examples, and cases need to be reviewed before we can understand fully how ADDS and grouping of user work. And once again, I came across a really cool YouTube channel that gives you just that.

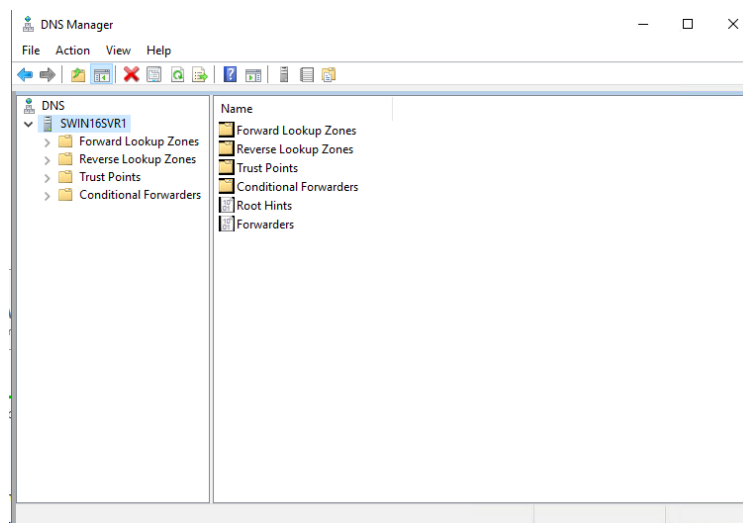
The playlist about Group Policy and ADDS from itfreetraining really helped me out in understanding all the theoretical knowledge and consolidate it.



Picture 27: itfreetraining channel

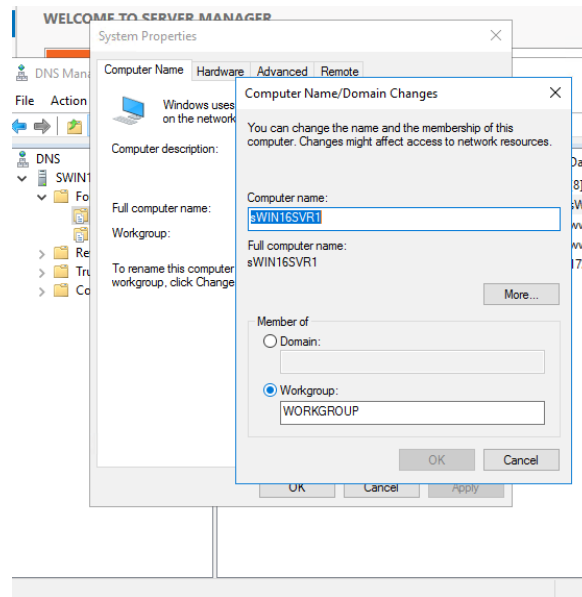
Lab 5 DNS and IIS

The actual steps of DNS set up was fairly easy, so I will spend the time talking about the difficulties in configuring Hyper V for DNS.



Picture 25: DNS successfully configured

Similar to DHCP in Lab 4, we need to change all the machine name to its corresponding name in order for DNS to work correctly



Picture 26: Domain Name and Computer name changes

This is an extra step to ensure that nothing goes wrong with our DNS, as the file server (which is sWin16DC1 in my case) may have different name and will not allow access to the wanted file.

This has caused me some headache as , although I follow every steps in the tutorial, the connection is still not established.

If you, however, have made a mistake with DNS record, you may need to type the following command to clear DNS record:

- ipconfig/flushdns

Reflection

I spend most of my time in week 6 fixing the problem when configuring DNS, I could not access the shared file via DNS, and neither could I access the simple HTML file create in wwwroot. After doing some research about how DNS works and watch a ton of video online (especially from Sunny Classroom and Neso Academy) I was finally able to fix the problem. Although the provided slide and material was great on its own, it only applies to already-existing-IT-lab in Australia and for the moment being, we have to do with our own laptop/PC or Azure(although there are limited times to work on Azure), therefore a lot of problem tend to appear.

However, afterwards, I realize that DNS is a great tool in managing accessibility and create convenience for users, I still need to study more about the zones of DNS to better grasp the understanding of this topic. The revision quiz in week 6 was not hard and all the questions have been discussed in the material.

Week 7 Lab Journal – 17th October 2022

Group and Permissions

We will dive deeper into group and permission in this week.

Key concept:

Second Level Account Groups - Global

$I > G > G > DL < A$

- + Use when grouping Global groups from the same Domain.
- + e.g. A department is made up of many teams. Sometimes access needs to be based on department membership other times team membership.

Second Level Account Groups - Universal

$I > G > U > DL < A$

- + Global groups cannot have members from other Domains, so Universal groups must be used when grouping teams from different domains.
- + e.g. The IT technicians in each domain need to have the same access.

***Universal group don't belong to any domain, they belong to the forest**

Special Identities

There are some groups whose membership are automatically generated:

- + Everyone - all user accounts and the guest account
- + authenticated users - all user accounts
- + Anonymous Logon - all users even those without accounts
- + interactive - users logged on locally
- + Network - users accessing resources from a remote computer
- + Creator Owner - the user account that created the file or the user or group allocated ownership.

***Creator Owner automatically have FC permissions for the files they create**

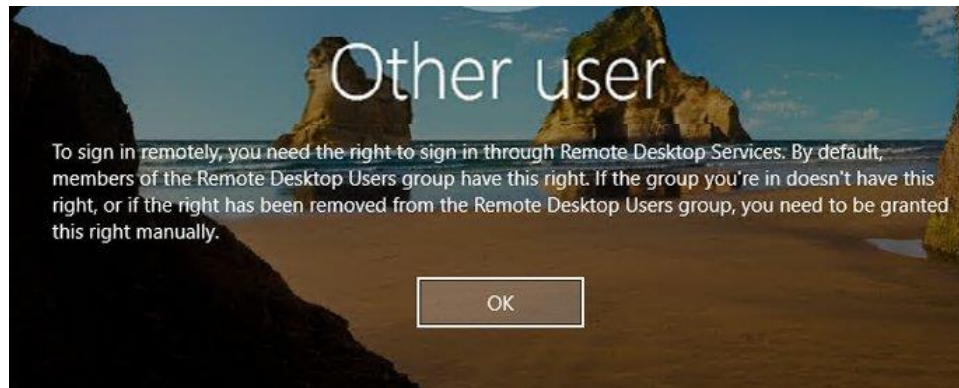
When combining permission, the most restrictive will be applied. This will work for both Share and NTFS permissions. The rule of combining permission are as follows:

- + If accessing the resource locally - combine NTFS Allow permissions from all ACL groups the account is a 'member' of, remembering that deny overrides other permissions.
- + If accessing locally, the share permission is not applied, and the NTFS permissions cumulates.

+ If accessing via the network, both permissions are applied and only then does their cumulation cumulates into the most restrictive.

Lab 6 Configuring a Windows Server 2016 Domain, ADDS

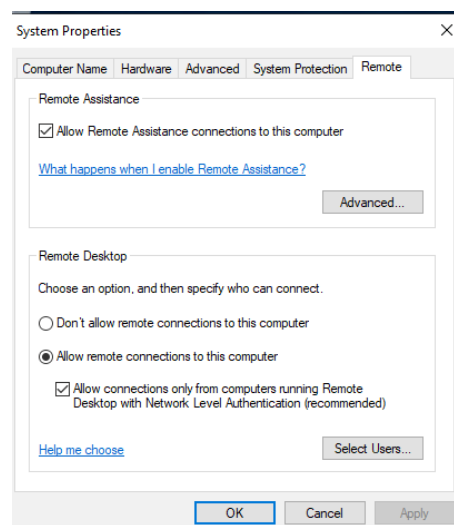
There is nothing noteworthy to say about the setting of ADDS as it is already there in the tutorial and I quite remember all the step, however, yet again, the bug strikes and this time it drives me almost insane fixing it.



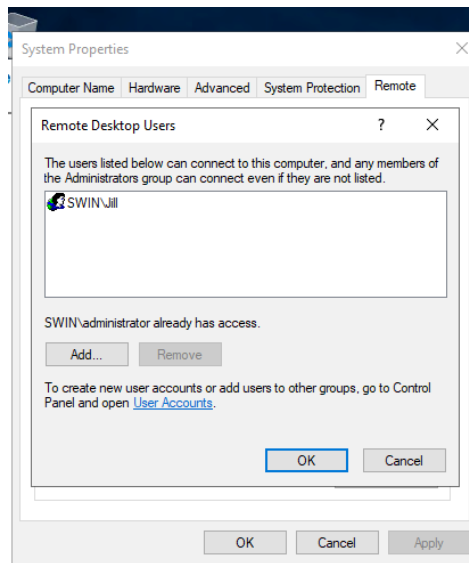
Picture 28: The error

After finished the configuration of ADDS and created the user, I proceeded to log in onto sWin10PC203 using the new User account, however, I was meet with this problem. After researching I have tried every method possible from editing Remote Desktop User, Local Group Policy Editor to creating new GPO, nothing seems to work.

Finally, after a certain time of suffering, I finally fixed it using System Properties. We need to ,first of all, “allow remote connections to this computer” and then “select user” to enable remote connection.

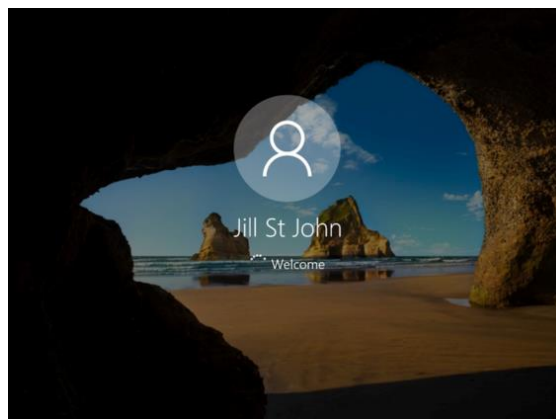


Picture 28: System Properties



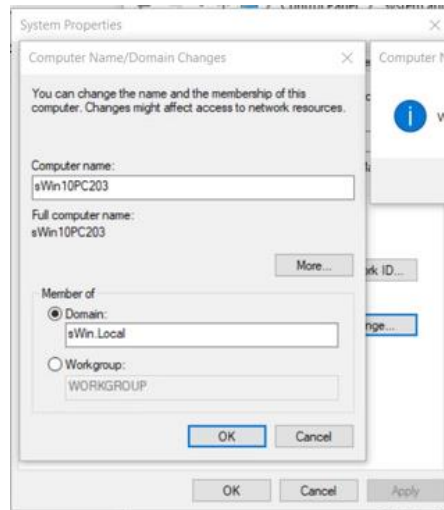
Picture 29: Select User

Only then could I connect using the newly created User Account



Picture 30: Logging in using Jill account

After that I successfully connect Jill into sWin.Local.



Picture 31: Joining domain

Reflection

By the end of this lab, I have gained more knowledge about NTFS permission as well as ADDS configuration. This is extremely important for the establishing hierarchy of access for the personnel in a company.

Week 8 Lab Journal – 24th October 2022

Group Policy Objects

We had a chance to learn more about restriction that can be apply to VMs in a network in week8, the provided material was extremely helpful in supporting us to complete lab 8, here are some noteworthy bullet points:

Key concepts:

Some key points regarding GPO:

+ When GPOs apply:

- Computer configuration settings will apply at start up, User configuration settings will apply at sign in.
- DC linked will apply at every 5 minutes but non-DC linked will apply every 90 minutes.

+ GPO linking:

- GPO must be linked to Site, Domain, OU. GPO can not be linked to Groups, Users, Computers, Users or Computer container in AD
- A container can have multiple GPOs linked
- A GPO can be linked to many containers

+ GPO Link Precedence:

The scenario happens when two or more GPOs configure the same setting differently, the order will be as follows:

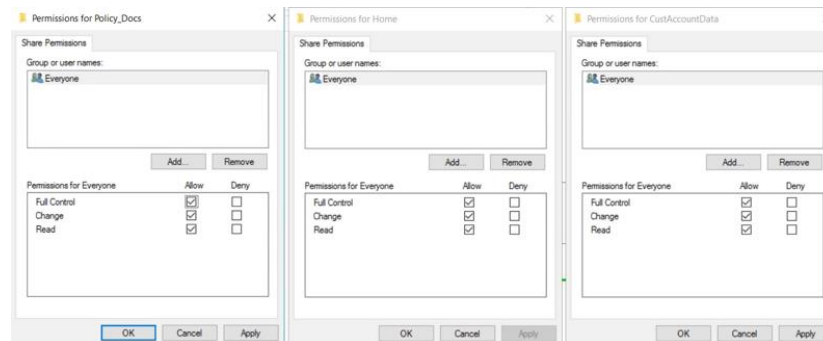
Local > Site > Domain > Parent OU > Child OU.

The last linked applied first and the first linked will be applied last. When GPOs are configuring different setting

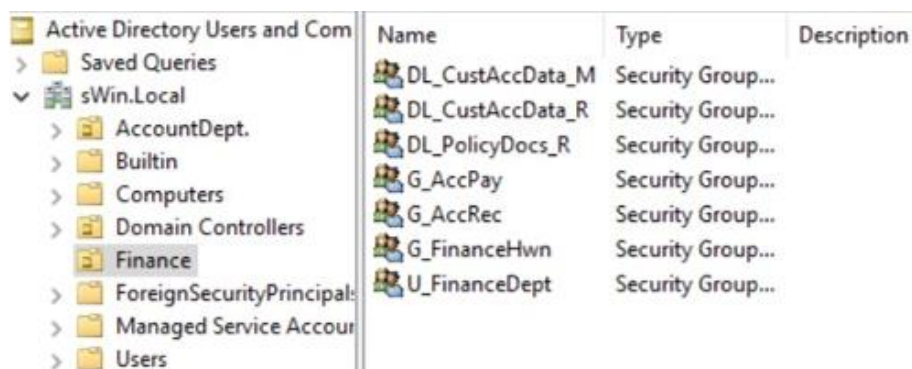
Lab 7 Securing Resources in a multi-domain forest

Before this lab, I have spent quite some time checking and reconfiguring all the VMs in Hyper V to change them to their correct names, as well as allow every single VMs to be able to connect remotely. Therefore, nothing really happened out of place during Lab 7

After finishing adding the new sub domain I proceeded to create the permission setting for three following folders.

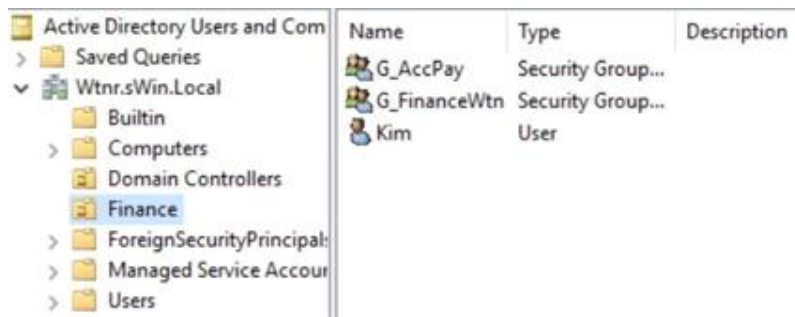


Picture 32: Permission for three folders



Picture 33: Groups created in Finance OU

After that I created a new User and redirect the default location using redircmp.

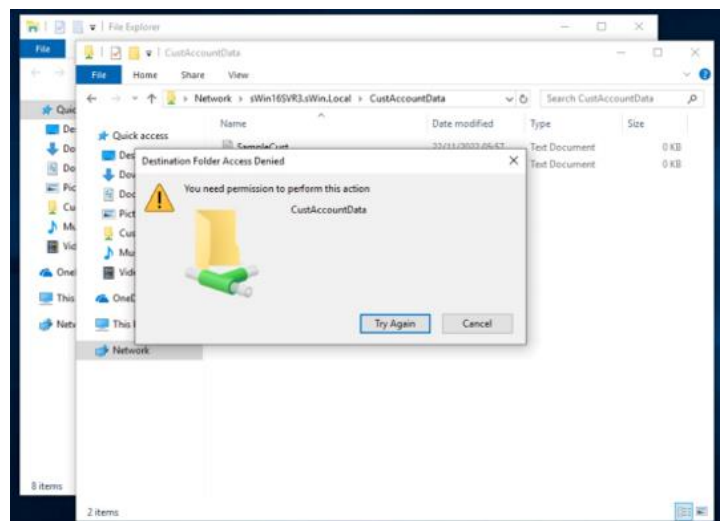


Picture 34: The child domain in Wtnr.sWin.Local

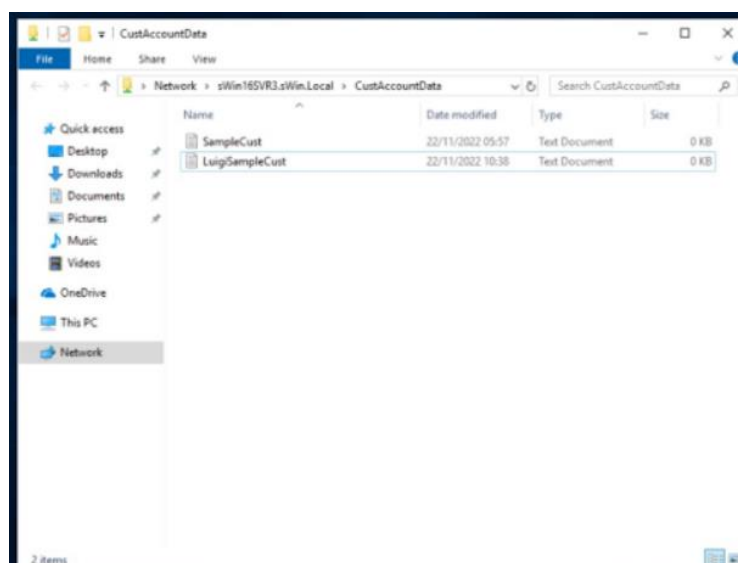
```
PS C:\Users\Administrator> redircmp "ou=Finance,dc=Wtnr,dc=swin,dc=local"
Redirection was successful.
```

Picture 35: Redirection succeeded

We then do similarly with Luigi and test if our permission was successfully applied



Picture 35: Kim is not able to create or delete files in CustAccountData



Picture 36: Luigi is able to create files in CustAccountData

Reflection

The lab work in this week is fairly simple as nothing out of place really happened, I learned so much about how restriction can be applied to User Account and multiple way of doing it. The NTFS permission and domain level can be really useful in restricting user from accessing files without permission. The revision quiz is also easy, but it will take me sometime to remember all the GPO-related knowledge.

Week 9 Lab Journal – 31st October 2022

Managing Security in a Windows Network

Risk management is a big part not just in the context of network administration, but it can also be applied in so many scenarios throughout project time life as well as overall management of a business. The knowledge that we were provided with in Week 9 really deepen or understanding regarding risk management and security enhancement, below are some of the noteworthy key concepts:

Best practices for increasing security

- + When Security goes up, Usability goes down
- + Follow the principle of least privilege
- + Use separated administrative accounts
- + Restrict administration console sign-in
- + Restrict physical access
- + Apply all available security updates quickly
- + Apply defense-in-depth, which use a layered approach, to enhance security. This will, consequently, reduce attackers' chance of success and increase their risk of detection

Some method in enhancing security in each context:

- + Policies, procedure, and awareness : Security documents, user education
- + Physical security : Guards, Locks, tracking devices
- + Perimeter : Firewalls, network access quarantine control
- + Networks : Network segments, IPsec
- + Host : Hardening, authentication, update management
- + Application : Application hardening, antivirus

+ Data : ACLs, EFS (Encrypted File System), Bitlocker, backup/restore procedures

Account Policy Settings

Account policies mitigate the threat of brute force hacking

As Domain Accounts reside on DCs, Account Policies must apply to DCs

Policies Default settings

Password Controls complexity and lifetime of passwords

- + Max password age
- + Min password age
- + Min password length
- + Complex Password
- + Store password using reversible encryption: disabled

Account lockout

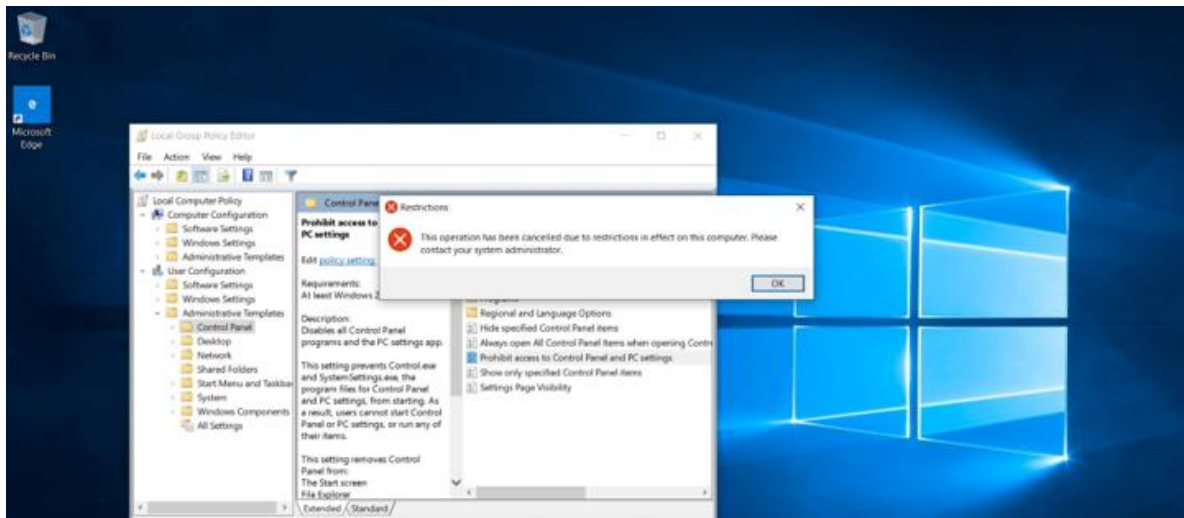
Controls how many incorrect attempts can be made

- + Lockout duration: not defined
- + Lockout threshold: 0 invalid logon attempts
- + Reset account lockout after not defined

Lab 8 Configuring Group Policies in a Windows 2016 Domain

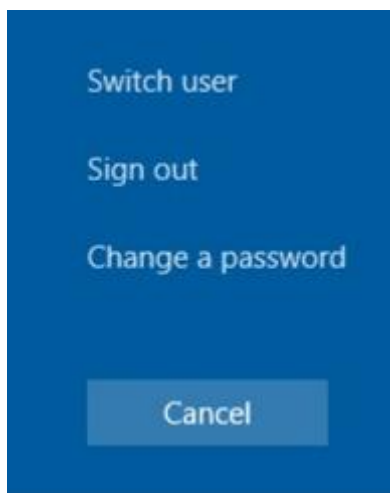
This lab seems like the most time-consuming lab throughout this course as there are 65 steps in total, we start this lab by opening Local Group Policy Editor via gpedit.msc command.

Then we restricted user access to control panel via Prohibit access to the Control Panel and PC settings.



Picture 37: User is restricted from accessing Control Panel

We then limit user's Ctrl + Alt + Del options in Ctrl + Alt + Del Options.



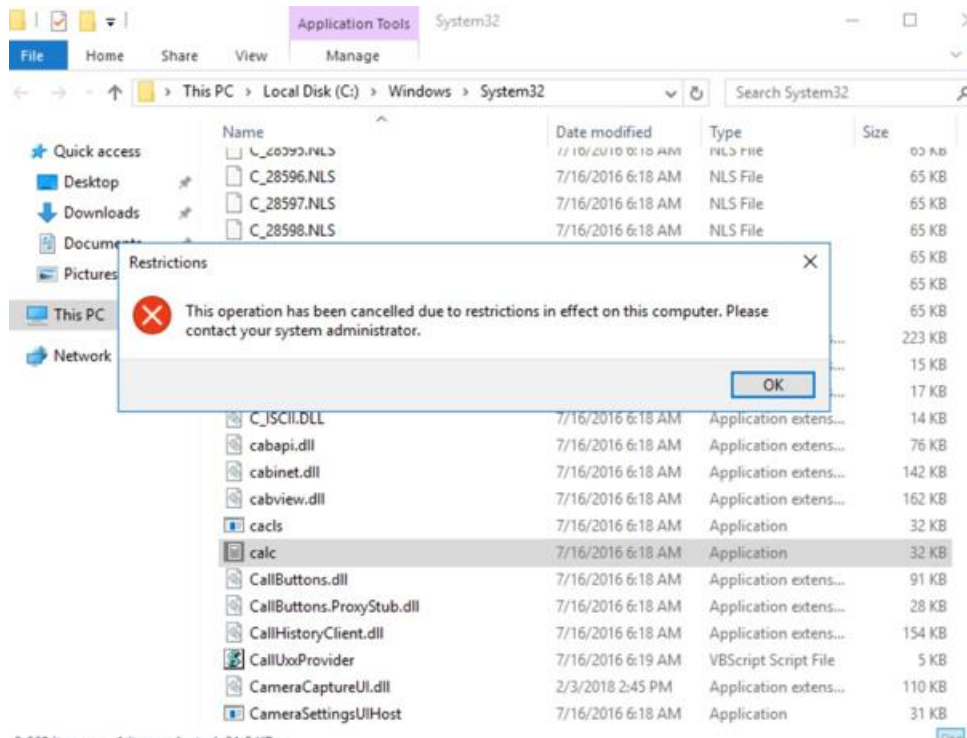
Picture 38: Ctrl + Alt + Del limited

We can also delegate what task can the user perform through this wizard



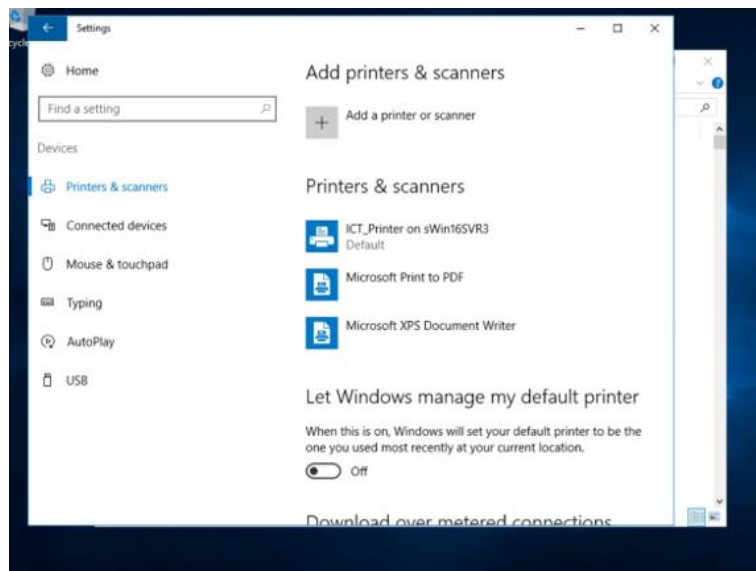
Picture 39: Delegated control

We can also create Policy through GPO container and configure the policy via gpedit and use `gpupdate /force` command to update policy changes. With that in mind, we can create more GPOs, such as that of preventing users from opening calc. exe



Picture 40: User's access to calc.exe denied

Finally, we are tasked with deploying a printer using GPOs.



Picture 41: Printer successfully deployed

Reflection

The revision quiz of this week is not really difficult, however, Defense – in – depth related quizzes still baffled me a lot as I kind of forget what they do. Apart from that the practical lab 8 proves how powerful GPOs is in term of restricting users' permission especially in a company

context. It is also versatile and configurable when we can apply it to certain, wanted groups of users.

Week 10 Lab Journal – 07th November 2022

Managing Quality in a Windows Network

System quality and network quality is also a big bullet point in the Unit Learning Outcomes of this course, week 10 provide us with various method in enhancing the quality of Windows Network.

The Rule of Five Nines

Industry standard for Telecommunications

+ Servers should be available 99.999% of the time.

i.e., only 5 min 15 seconds down per year

+ Network device (routers, switches) should be available 99.99999% (Seven Nines) of the time.

i.e., only 3.15 seconds a year

Performance Objects

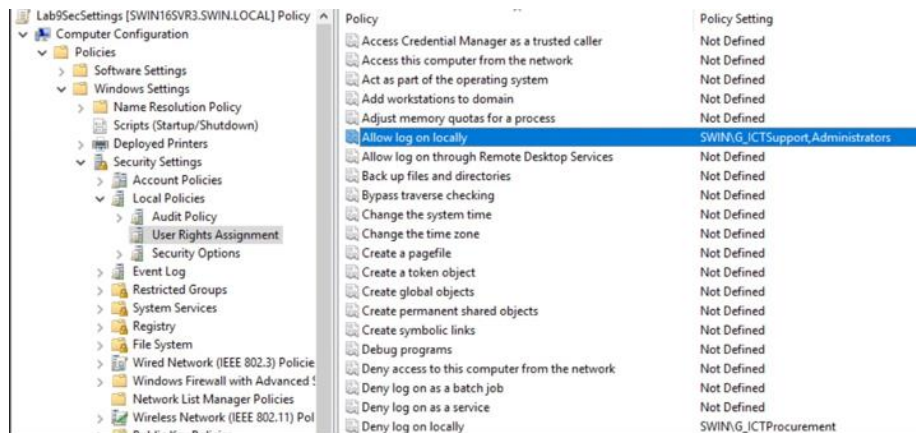
Processor	Monitors processor usage both individual and collective (for multi-processor systems)
Memory	Monitors memory performance: usage and paging
Physical Disk	Monitors disk performance for the whole disk (i.e., all volumes on disk collectively)
Logical Disk	Monitors disk performance for individual volumes (includes disk space counters)
Network Interface	Monitors network adapter performance

Lab 9 Managing Security in a Domain

In this lab we will further enhancing the security aspect of our domain, we will start by configuring account policies such as password, account lockout and user rights.



Picture 42: Password policies



Picture 43: User right assignment

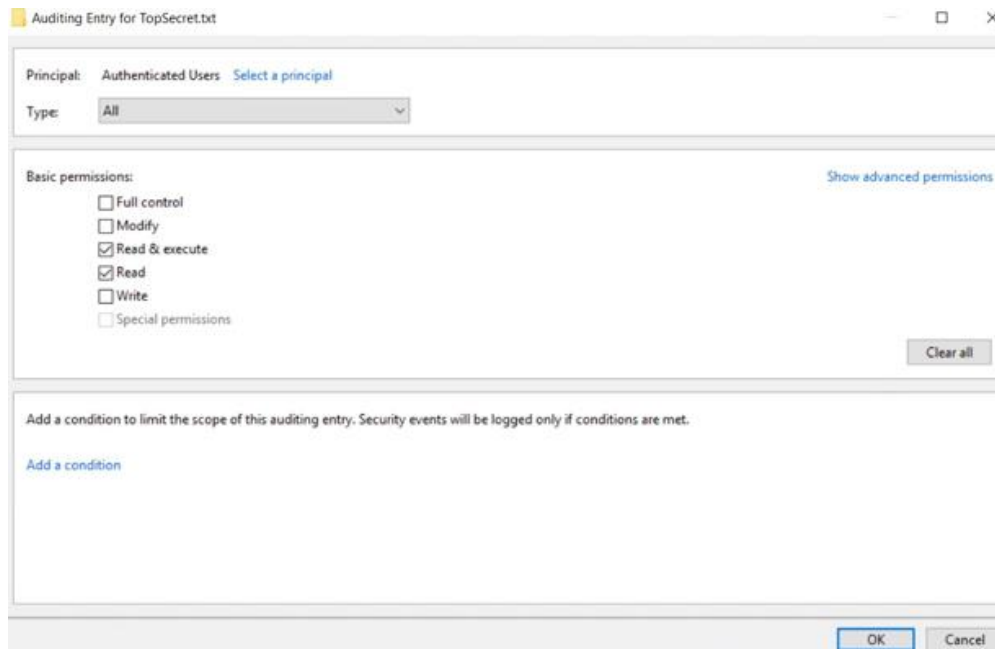
We can also review which policies have been applied by using the following command:

- gpresult /user IPuser /h CL101GpoSettings.htm: this will allow us to review GPOs applied to CL101.



Picture 44: GPOs applied to CL101

Finally, we use auditing entry to view the record of event that had happened such as logging history and editing history for our record.



Picture 45: Auditing entry

Reflection

Quality management and Security monitoring are big parts of network administration for any company or organization, and during this week, we had our chance to deepen our knowledge in a business context as well as cases in which GPOs can be applied. This will prove useful for not just our studying but the career in the future. The revision quiz for Week 10 focus particularly on security and disaster recovery aspect of a network. I still need to review the counter with its threshold for future tests.

Week 11 Lab Journal – 14th November 2022

This is the last week of the course before we will take our test, most of the key concepts in this week revolves around IPv6, Local and Cloud Storage and Azure. However, I spent most of the time preparing for the final test and the online test 2 that covers knowledge from week 1 to week 11. The practical test was also quite tough, and I will need to prepare better for the final skill assessment.

Reference

- (1) Amazon 2019, 'What is DNS? – Introduction to DNS - AWS', Amazon Web Services, Inc., Available at: <https://aws.amazon.com/route53/what-is-dns/> (Accessed 11/11/2022)
- (2). Wright, GR & Stevens, WR 1995, TCP/IP Illustrated: The Implementation., Addison Wesley Professional, Boston.

(3) Gerend, J 2021, 'Dynamic Host Configuration Protocol (DHCP)', learn.microsoft.com, Available at: <https://learn.microsoft.com/en-us/windows-server/networking/technologies/dhcp/dhcp-top> (Accessed 11/12/2022)

(4) Sunny Classroom 2019, Subnetting is simple, Available at: <https://www.youtube.com/watch?v=ecCuyq-Wprc> (Accessed 11/12/2022)

(5) Neso Academy 2019, Introduction to Computer Networks, Available at: <https://www.youtube.com/watch?v=VwN91x5i25g&list=PLBlnK6fEyqRgMCUAG0XRw78UA8qnv6jEx> (Accessed 10/12/2022)