Course Title	Network +
Project Code	NWPO v5-0 Project 1
Project Title	Montreal Combo Special
Pages	14 (plus cover sheet)
Released	December 21, 2011
Revised	March 10, 2022

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Student ID#:	5113858
Date given:	
Date due:	

WHAT TO SUBMIT

When submitting your project for correction it must contain the following:

- A **project title page** (student name, student ID, date and course title)
- This document **must be returned since it includes the write-in sections**
- Command prompt and print-screen outputs

TIME REQUIRED

You have **5 hours** to complete the project.

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Network +

Project 1: Montreal Combo Special

INTRODUCTION

This project will test your ability to use a variety of skills you acquired throughout the course. You will be using many of the procedures you learned to implement a solution in a typical business setting.

It is assumed that you have used the Test-out lab simulator effectively.

The experiences that you will acquire working on the simulator will facilitate your efforts and allow you to benefit from this project.

OBJECTIVES

The objectives of this project are to have the students address the following issues:

- How clients and servers can participate in a network
- How resources are shared, accessed and protected.
- Considerations that must be weighed when designing a network
- Become familiar with the utilities required to test the network

MATERIALS REQUIRED

To complete this project, you require:

- Windows Server 2016 (pre-configured) domain controller.
- A Windows 10 client
- Cables (patch and cross-over), a hub (or switch)
- A functional network

PROJECT SPECIFICATIONS

As specified in each of the four phases of the project. Each phase is a prerequisite for the others that follow

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Phase 1: Participating in the network

Phase 1 – 25%

Before you begin

You must ensure that certain things are in place before you begin this section of the project.

The network has to be set up as per the accompanying illustration.

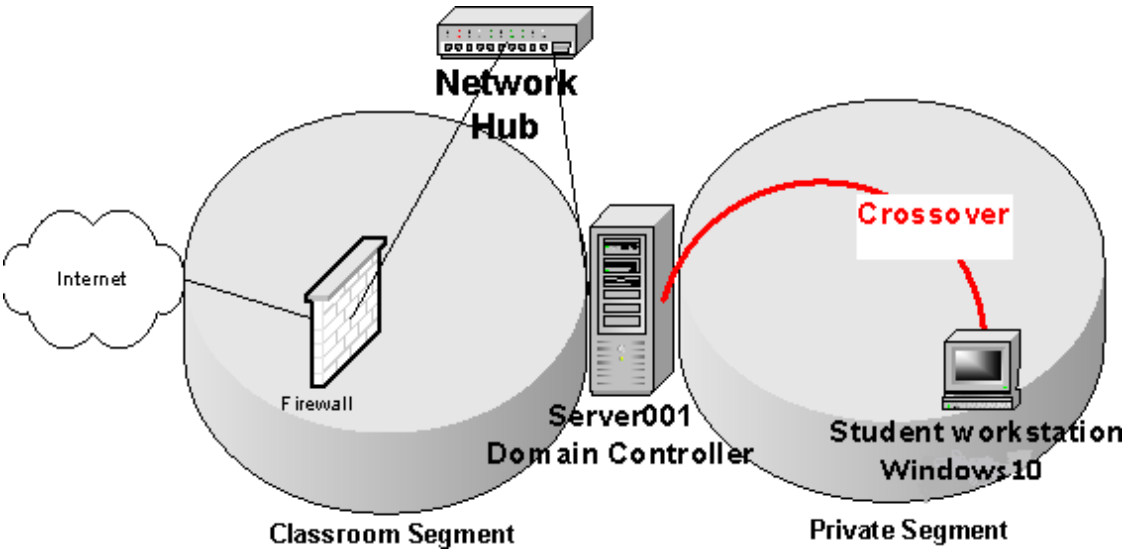
Your instructor will ensure that **Windows Server 2016** which will take part in the project will be accordingly prepared as per the specifications (that follow).

The student will be responsible for the proper cabling and connectivity to the network.

The student additionally will be responsible for the preparation of the student workstation as per the specifications (that follow).

> **When asked to submit output using the command prompt: the answers should be presented in copied command-prompt output (command prompt / edit select all / edit copy, then paste to saved and properly labelled word document). This way you avoid large file sizes as well as unnecessary use of printer resources**

Illustration of the NetProject Network



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Network Server - Windows Server 2016

The instructor is responsible for setting up the server to meet the following specifications.

- ✓ The NIC connecting the ***Classroom Segment*** should be acquiring a dynamic IP address lease permitting access to the network as well as the Internet. Rename the associated NIC "***Classroom Segment".***
- ✓ The other NIC supporting the ***Private Segment*** should be configured with a ***static IP address of 172.16.0.1/16.*** Rename the associated NIC "***Private Segment"***
- ✓ Routing should be engaged to route the two segments using ***RIP2***
- ✓ An Active Directory domain should be created named ***NetProject.com***. The server should be named ***Server001***and be the preferred DNS for the zone.
- ✓ The zone should be integrated with Active Directory and allowing dynamic updates.
- ✓ The domain administrator's account name should be ***Administrator*** using the password ***ADPa55word***

Student workstation – Windows 10

Step 1: Preparing your computer

The account that you will be using (local administrator's account) to manage the Windows 10 workstation should be A***dministrator*** using the password ***Win10Pa55word.***

The computer name should be ***Client001.***

Step 2: Installing and configuring the network adapter card.

Choosing the Right NIC-

Identify the most important factor involved in choosing a NIC

Installing and Configuring NIC Hardware-
In the case where you have not performed hardware installations on a computer before, you should be aware of the safety precautions that should be employed when working inside of a computer. Static electricity can cause damage to the computer and its components therefore the use of anti-static paraphernalia, such as wrist-guards, anti-static bags, and ground mats is required.
Installing and Configuring NIC Software-

Install and configure NIC drivers.

Assign a static address to the NIC.

Ensure that you select an appropriate IP address since your computer must belong to the same network segment (Private Segment) as the ***Server001*** computer**.**

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Step 3: Testing network communications.

Ping the three interfaces from the Client001 computer.

Ensure that you are receiving successful responses from your computer s interface, from the near as well as the far side of the router.

✓ Submit the above print screen for project correction

Step 4: Identify protocols and services

Identify the services, clients and protocols that are available by default.

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Step 5: Joining the domain

Join the ***NetProject.com*** domain (don't forget to use the appropriate account information when prompted to join the domain)

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Phase 2: Sharing, protecting and accessing resources.

Phase 2 - 30%

After having completed Phase 1 of the project you are now in a position to select between local and domain-wide network and resource access.

Following the specifications in step 1 the student computer Client001 was made a member of the ***NetProject.com*** domain, enabling you to select between a local computer logon (where you are the administrator of the local – "this computer" from the drop-down selection menu) and the ***NetProject.com*** domain (appearing with its NetBIOS equivalent name - "**NetProject").**

The possibilities here are very interesting because you actually have two different account databases to deal with (and manage).

On one hand you are responsible for (Administrator account in the Administrators group using the account with the password ***Win10Pa55word)*** the local SAM database of the Windows 10 computer Client001 as it participates in its default networking environment (member of the workgroup: Workgroup) and on the other hand you are responsible for the Active Directory account database for the domain NetProject.com (for which you are the domain administrator using the account with the password ***ADPa55word)***.

Step 1: Local account and group creation

On the local machine (Client001) create the following:

Local user accounts	Local groups
Jim Rex Hope	JETS
Tom Bill Mary	RAMS

You are making the new accounts that you created members of the new local groups.

(from the properties of each user account, click member of and then add the user to the group)

Hint: Give each user the same password so that things are easy manage (not recommended in your later studies). Make sure that the password doesn't expire and the users should not need to change password at first logon.

Submit the above print screen for project correction

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Step 2: Identify the built-in accounts and the built-in local groups

Creating new local groups is an administrative privilege that is used when the members of the group are to be granted access to a resource like a shared folder or file.

Groups that are created during the installation of an operating system are called built-in groups and are created in order to permit the administrator to decide who can perform which task.

As in the case of groups some accounts are also created during the installation process.

It is your responsibility to identify the built-in local accounts, the built-in local groups as well as a description of the tasks that they perform.

Submit the above print screen for project correction

Step 3: Folder creation and resource sharing

On the local machine (Client001) create and share two folders (East and West)

Access:

JETS group to access the East folder with "full control" permission.

JETS group to access the West folder with "Read only" permission.

Rams group to access the West folder with "full control" permission.

Rams group to access the East folder with "Read only" permission.

Note: Make sure that you test these access rights by logging in a member of both groups.

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Step 4: Domain account and group creation

On the domain controller (Server001 of domain NetProject.com) create the following:

Domain user accounts	Domain Local groups
Judy Ryan Harry	Backup operators **(built-in group)**
Tess Barbie Dom	My Managers (global group)

Hint: Give each user the same password so that things are easy to manage (not recommended in your later studies). Make sure that the password doesn't expire and the users should not need to change password at first logon.

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Step 5: Testing account privileges.

From the domain controller (Server001 of domain NetProject.com) complete the following exercises:

Log on as Judy, then as Harry and then as Tess.

Why is Tess unable to log on?

Tess is unable to log on to Server001 since by default members of a custom global group like **"My Managers"** do not necessarily have log on rights to servers unless explicitly granted. Whereas, Judy and Harry should be able to log on as they are members of the "Backup operators" which is a built-in domain local group that has specific privileges to log on locally and perform back-up operations.

Step 6: Testing domain accounts

Using the Windows 10 computer as a domain member (Client001 as a member of the domain NetProject.com)

Log on as Judy, then as Harry and then as Tess.

Why are these accounts logging-on successfully?

Basically, Server001 is the domain controller for "NetProject.local" responsible managing authentication and authorization; and Client001 is a member of the domain. In this case, when users Judy, Harry, and Tess log on to Client 001, Server001 verifies their credentials. Since Client001 is part of the domain, it trusts Server001 to authenticate users. Therefore, the domain controller grants an authentication token to Judy, Harry, and Tess, allowing them access to Client001

Step 7: Testing local accounts

Using the Windows 10 computer (Client001 as a member of the workgroup Workgroup).

Log on as Judy, then as Harry and then as Tess.

Why are these accounts **not** logging-on successfully?

When Client001 is a member of a workgroup, it uses local accounts for authentication. This means only users with accounts created locally on Client001, or another member of the workgroup can log in. As Tess, Judy, and Harry are domain users, their credentials and permission are managed by the domain controller for NetProject.local. For them to log in successfully, Client001 would need to be a part of the domain so that it can communicate with the domain controller to authenticate these users.

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Step 8: Testing domain accounts

Using the domain controller (Server001 of domain NetProject.com)

Log on as Jim and then log on as Tom (using the accounts that you created in Step 1)

Why are these accounts **not** logging-on successfully?

Jim and Tom were created as local users on Client001. Unless, they have been created as domain users in Active directory on Server001, they will not be able to log in using their local credentials. They must be created as domain users.

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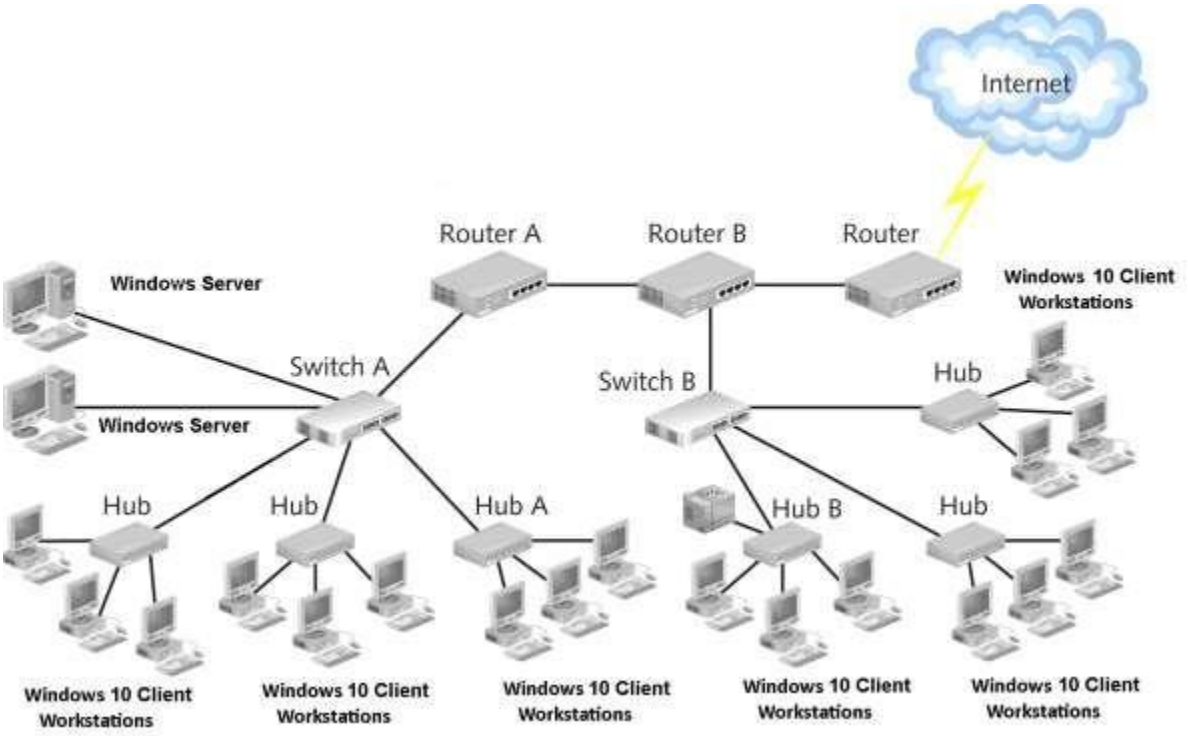
Phase 3: Designing and implementing a network

Ten questions answered in the space provided (3 points for each)	30%



Description and specifications

- You have been contracted to set up a LAN as illustrated in the figure above.
- All the computers have been purchased (thus not to be considered in your analysis)
- All the workstations and connectivity devices will be placed in the work space in such a way that no network segment length will exceed 25 feet.
- All the computers are running Windows 10 (except for two that are running Windows Server 2016).
- Network adaptor cards need to be installed.

Considerations

- When designing and implementing a network, cost is always an issue.
- Therefore you must be well informed and have researched accordingly.
- When proposing the adoption of networking equipment we should always keep in mind decision-making factors such as cost, performance, reliability and availability (amongst others).

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Requirements

1. Identify the type(s) of hubs that you would use on this network (provide a brief justification).

Active hub can re generate and amplify the signal, ensuring that the data can travel longer distances without degradation. Thus, suitable for maintaining signal integrity across the connected Windows 10 client workstations and network nodes.

2. Identify the type(s) of switches that you would use on this network (provide a brief justification).

Managed Switch for the core switches (such as Switch A and Switch B). These switches offer advanced features such as Quality of Service, network monitoring, and security configuration --- connecting different segments and managed heavy traffic efficiently. Also, **Unmanaged Switch** connected to hubs, workstations, printers, and other networking devices (basic connectivity).

3. Identify the type(s) of network adaptor cards that you would install (provide a brief justification).

Gigabit Ethernet NICs (10/100/1000 Mbps speeds) provides high-speed wired connectivity essential for windows servers and clients workstations on the network. Also, **Fiber Optic NICs** can also be good alternative adaptor for routers, switches and windows servers, especially those require high-bandwidth and long-distance connections.

4. Identify the type of cabling to be used (provide a brief justification).

Cat6 Ethernet Cable for connecting hubs to windows 10 client workstations for sufficient bandwidth and reliable connectivity. **Cat6a Ethernet Cable** for switches to routers for higher data rates and reduce crosstalk. And, **Fiber Optic Cable** connecting for long significant distance devices and internet --- where high bandwidth is required.

5. What kind of name-resolution solution would you implement for the network? (Provide a brief justification).

Domain Name System (DNS) provide centralized name resolution from domain to IP addresses. Associates and maintains domain names and translate them to IP addresses, reducing the need for end users to remember complex numerical addresses.

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6. What kind of IP addressing solution would you implement for the network? (Provide a brief justification).

Dynamic Host Configuration Protocol (DHCP) automatically assigns IP addresses to the devices on the network, reducing administrative overhead and ensuring efficient IP address management on the network.

7. Would the introduction of Active Directory be considered a must in this network? (Provide a brief justification).

Introducing **Active Directory (AD)** into the network is highly recommended for centralized management to the users, computers, and other resources in the network. Also, it can simplify administrative tasks, such as creating user accounts, setting permissions and managing group policies. Also, it can handle increasing number of objects without significant reconfiguration, scalability from small to very large network.

8. How many broadcast domains can you identify on this network? (Provide a brief description).

The network illustration depicts three (3) broadcast domains. **Broadcast Domain 1**, all devices connected to Router A through Switch A. **Broadcast Domain 2**, all devices connected to Router B through Switch B. And, **Broadcast Domain 3**, connection from the Router to the internet.

9. How many collision domains can you identify on this network? (Provide a brief description).

The network illustration depicts thirteen (13) collision domains. 1 collision to all ports connected to the Hubs, so, **6 collisions** on this network. 1 collision each port connected to the switches and routers, so, **7 collisions** on this network. In total of 7+7 =, **13 collision domains on the network.**

10. What improvement would you recommend for this network? (Provide a brief description).

Implement **redundant links and devices**, such as additional switches or routers to prevent single point of failure and maintain uptime in case of hardware failure. Additionally, **implement VLANs** to enhance security and reduce broadcast traffic; and, **upgrade devices/workstations, modern NICs, and/or overall network infrastructure.**

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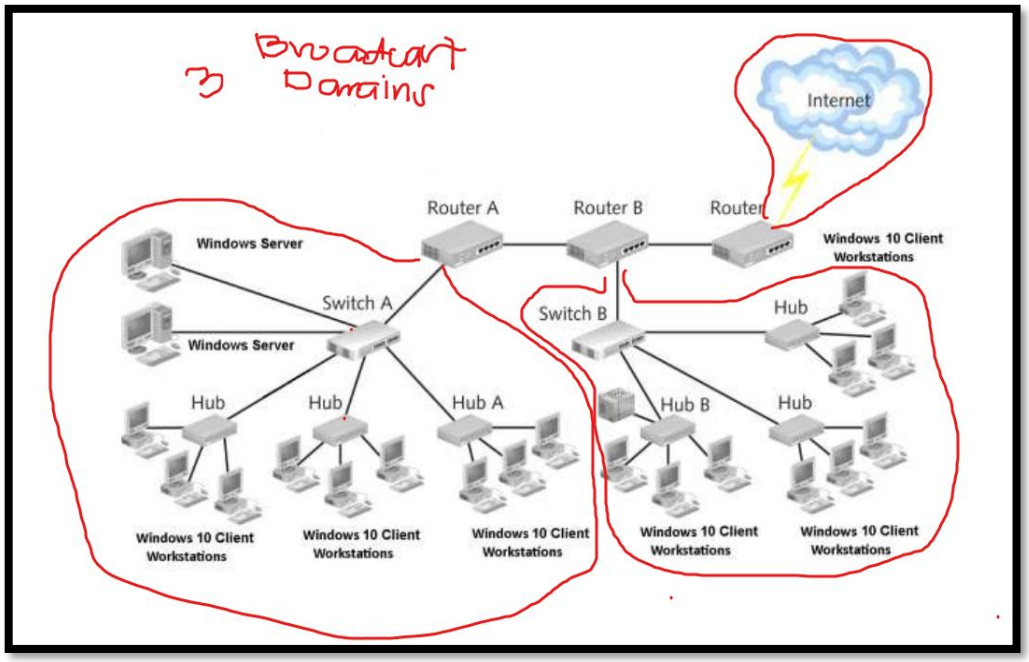

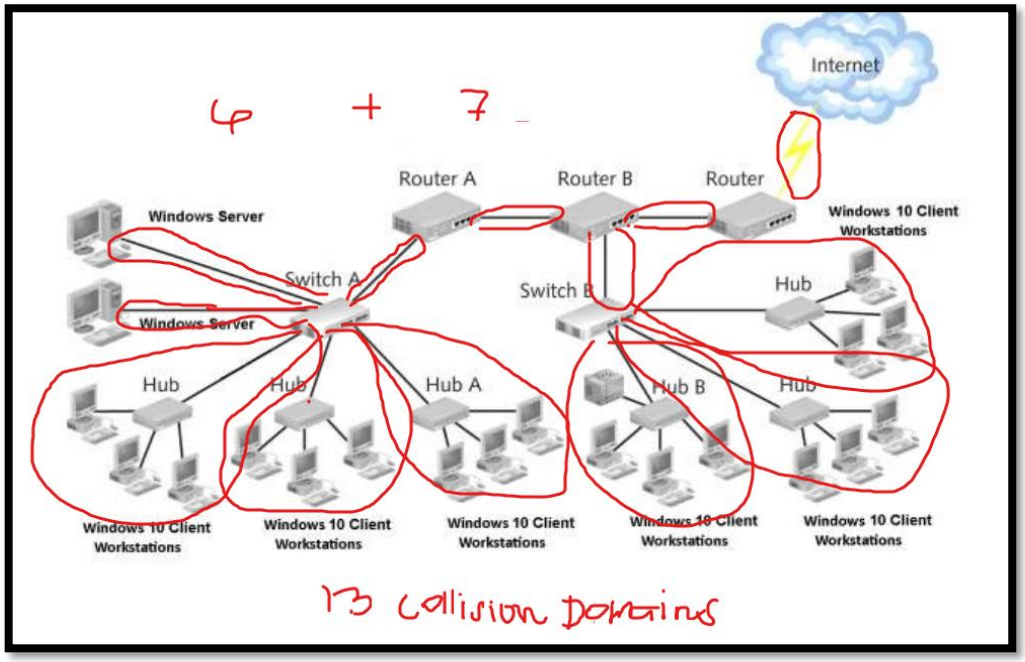

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Phase 4: Testing your Network

Five questions answered using **command prompt output** (3 points for each)	15%

Using TCP/IP utilities to gather information about and troubleshoot a network and networking equipment.

Hands-on task

- Use both computers (server1 and workstation1 as required) to test the appropriate utilities that would best answer the following questions.
- In some cases you might need to ensure that your computers are connected to the network.
- The answers should be presented in copied command prompt output (command prompt / edit select all / edit copy, then paste to saved and properly labeled word document).

Question 1: Use the troubleshooting tool for discovering the identity of a machine whose IP address you know (also used for identifying the problem of two machines trying to use the same IP address).

Question 2: Use the troubleshooting tool which will display a list of all the active TCP/IP connections on your machine, including the Transport layer protocol used (UDP or TCP), packets sent and received, IP address, and the state of those connections

Question 3: Use the troubleshooting tool which will can provide information about NetBIOS statistics and resolve NetBIOS names to their IP addresses

Question 4: Use the troubleshooting tool which allows you to query the DNS database from any computer on the network and find the host name of a device by specifying its IP address

Question 5: Use the troubleshooting tool which allows you to trace the path from one networked node to another, identifying all intermediate hops between the two nodes. Take note that due to certain network restrictions this utility may fail (discuss with your instructor)

✓ Print and submit all of the above for project correction

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MARKING SCHEME

You will be graded using the following marking scheme :

Project components	Points
Phase 1 – 25%	
Step 1: Preparing your computer	5
Step 2. Installing and configuring the network adapter card.	5
Step 3. Testing network communications **(print screen)**	5
Step 4. Identify protocols and services **(print screen)**	5
Step 5. Joining the domain.	5
Phase 2 - 30%	
Step 1: Local account and group creation **(print screen)**	3
Step 2: Identify the built-in accounts and the built-in local groups **(print screen)**	3
Step 3: Folder creation and resource sharing **(print screen)**	4
Step 4: Domain account and group creation **(print screen)**	4
Step 5: Testing account privileges.	4
Step 6: Testing domain accounts	4
Step 7: Testing local accounts	4
Step 8: Testing domain accounts	4
Phase 3 - 30%	
Ten questions answered in the space provided (3 points for each)	30
Phase 4 - 15%	
Five questions answered using **command prompt output** (3 points for each)	15
The total number of possible points is :	100%

PENALTIES

- For each day that a project is late, 5% will be deducted.
- Projects that are more than three days late will earn a maximum score of 60%.

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