



NAME: LARAYA, ALTHEA JOY

SECTION: IDC2

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SYSADM1 PORTFOLIO

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FIRST GRADING ACTIVITIES:

**UNIVERSITY OF
Baguio**
SCHOOL OF INFORMATION AND TECHNOLOGY

SYSADM1 – Managing Services in Windows

Requirement:

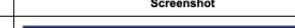
- A virtual machine running Linux and Windows OS

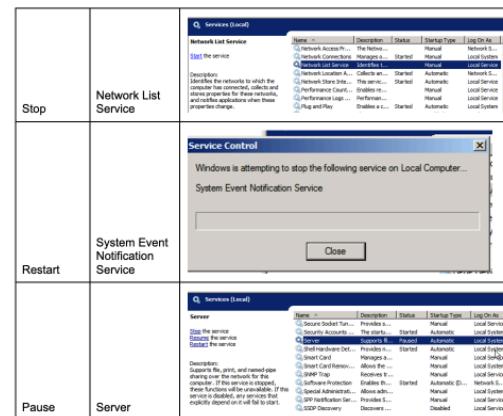
Services are background processes that run independently of user interactions in Windows. They provide essential system functions, such as network connectivity, printing, and time synchronization. This lab will guide you through the process of managing services using the Services app.

Instructions:

1. Open the Start menu and search for "Services".
 2. Familiarize yourself with the columns, including Service Name, Display Name, Status, and Startup type.
 3. Right-click on a service and select "Start", "Stop", or "Restart". Fill out the table below.

WINDOWS 10

Status	Name of Service	Screenshot
Start	Encrypting File System	



4. Select five network services, right-click to view its properties. Modify the startup setting to Manual.

55

	<p>Path to executable: C:\Windows\System32\evhost.exe -k NetworkService</p> <p>Startup type: <input checked="" type="checkbox"/> Manual</p> <table border="1"> <tr> <td><input checked="" type="checkbox"/></td><td>Network Location A...</td><td>Collects an...</td><td>Started</td><td>Manual</td><td>Network S...</td></tr> </table>	<input checked="" type="checkbox"/>	Network Location A...	Collects an...	Started	Manual	Network S...
<input checked="" type="checkbox"/>	Network Location A...	Collects an...	Started	Manual	Network S...		
Network Store Interface service	<p>Path to executable: C:\Windows\system32\evhost.exe -k LocalService</p> <p>Startup type: <input checked="" type="checkbox"/> Manual</p> <table border="1"> <tr> <td><input checked="" type="checkbox"/></td><td>Network Store Inte...</td><td>This servic...</td><td>Started</td><td>Manual</td><td>Local Service</td></tr> </table>	<input checked="" type="checkbox"/>	Network Store Inte...	This servic...	Started	Manual	Local Service
<input checked="" type="checkbox"/>	Network Store Inte...	This servic...	Started	Manual	Local Service		

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TCP/IP NetBIOS Helper Properties	C:\Windows\system32\evchost.exe -k LocalService\NetworkRestricted Startup type: Manual
	TCP/IP NetBIOS He... Provides s... Started Manual Local Service
DHCP Client	Path to executable: C:\Windows\system32\evchost.exe -k LocalService\NetworkRestricted Startup type: Manual
	DHCP Client Registers a... Started Manual Local Service
DNS Client	C:\Windows\system32\evchost.exe -k NetworkService Startup type: Manual Help me configure service startup options.
	DNS Client The DNS Cl... Started Manual Network S...

- Explore the "General", "Recovery", and "Log On" tabs to understand additional service settings.
 - Create a batch file that will be added as a new service later on. Refer to the batch file code.

```
@echo off
set /p seconds=Enter the countdown time in seconds:
:countdown
if %seconds% gtr 0 (
    echo Time remaining: %seconds% seconds
    timeout /t 1 >nul
    set /a seconds=%seconds%-1
    goto countdown
)
echo Timer finished!
```

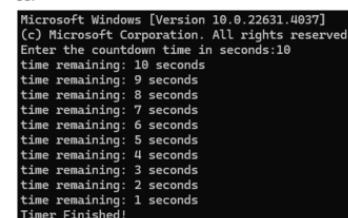
7. Save the batch file in Z:\lastname_timer.bat
 8. Use the sc command to add timer.bat service in the command line interface.
`sc create BatchTimerService binPath= "path_to_your_batch_file.bat" start= auto net start BatchTimerService`
Replace path_to_your_batch_file.bat with the actual path to your batch file.
 9. Verify that BatchTimerService has been added to the services.
SS:

55.



- 10. Testing the Service:** Now, if you open a new command prompt, you should see the timer countdown without requiring your interaction. Once the timer finishes, you'll see the "Time finished!" message.

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Rubri

Criteria	Excellent (10)	Good (7)	Needs Improvement (3)	Unsatisfactory (1)
Understanding of Services	Demonstrates a deep understanding of the concept of services, their roles, and their importance in Windows.	Shows a solid understanding of services, but may lack some depth in specific areas.	Has a basic understanding of services, but may struggle with specific concepts.	Shows little or no understanding of services.
Service Management Skills	Successfully starts, stops, restarts, and configures services using the Services app.	Demonstrates proficiency in managing services, but may encounter minor difficulties.	Can perform basic service management tasks, but may need assistance or guidance.	Struggles to perform even basic service management tasks.

FGE LW3 Managing Services in Windows



SYSADM1 – Managing Services in Linux

Requirement:

- A virtual machine running Linux

Important Commands:

- systemctl start <service_name.service>
- systemctl stop <service_name.service>
- systemctl restart <service_name.service>
- systemctl status <service_name.service>

Complete this lab as follows:

- Use the `service --status-all` command to list all active and inactive services. List down active and inactive services in the table below. Provide five (5) services for each column.

Active	Inactive
alsa-utils	Anacron
apparmor	Bluetooth
apport	Console-setup.sh
Cron	Grub-common
cups	Keyboard-setup.sh

```
SS:
althealaraya@althealaraya-VirtualBox: $ service --status-all
[ + ] alsa-utils
[ + ] anacron
[ + ] apparmor
[ + ] apport
[ + ] bluetooth
[ - ] console-setup.sh
[ + ] cron
[ + ] cups
[ + ] dbus
[ + ] gdm3
[ - ] grub-common
[ + ] kerneloops
[ - ] keyboard-setup.sh
```

- Start the Bluetooth service using the `systemctl` command.

Ex. sudo `systemctl start httpd`

In this command:

- sudo tells Linux you are running the command as the root user.
- systemctl manages system services.
- start tells the systemctl command to start the Apache service.
- httpd is the name of the Apache web server service.

```
althealaraya@althealaraya-VirtualBox: $ sudo systemctl start bluetooth
```

- Check the status of the Bluetooth service. What is its status? Bluetooth needs a wireless connection before I can control its services.

SS:

```
althealaraya@althealaraya-VirtualBox: $ sudo systemctl status bluetooth
● bluetooth.service - Bluetooth service
   Loaded: loaded (/usr/lib/systemd/system/bluetooth.service; enabled; preset: en...
   Active: inactive (dead)
     Docs: man:bluetoothd(8)
```

- Check the status of the cups services. Since when was it running?

- Cups services was running since 09/12/2024 8:47 AM

SS:

```
althealaraya@althealaraya-VirtualBox: $ sudo systemctl status cups
● cups.service - CUPS Scheduler
   Loaded: loaded (/usr/lib/systemd/system/cups.service; enabled; preset: en...
   Active: active (running) since Thu 2024-09-12 08:47:03 PST; 35min ago
     Docs: man:cupsd(8)
TriggeredBy: ● cups.socket
   Main PID: 1017 (cupsd)
   Status: "Scheduler is running..."
      Tasks: 1 (limit: 6153)
     Memory: 5.6M (peak: 5.8M)
        CPU: 13ms
       CGroup: /system.slice/cups.service
              └─1017 /usr/sbin/cupsd -l
```

- Stop cups services.

SS:

```
althealaraya@althealaraya-VirtualBox: $ sudo systemctl stop cups
```

- Verify if the service was stopped.

```
althealaraya@althealaraya-VirtualBox: $ sudo systemctl status cups
● cups.service - CUPS Scheduler
   Loaded: loaded (/usr/lib/systemd/system/cups.service; enabled; preset: en...
   Active: inactive (dead) since Thu 2024-09-12 09:27:58 PST; 41s ago
     Duration: 40msn 54.095s
   TriggeredBy: ● cups.socket
     Main PID: 1017 (cupsd)
     Status: "Scheduler is running..."
        Tasks: 1 (limit: 6153)
       Memory: 1.7M (peak: 1.9M)
          CPU: 4ms
         CGroup: /system.slice/cups.service
                  └─1017 /usr/sbin/cupsd -l
```

- Restart the cups services

SS:

```
althealaraya@althealaraya-VirtualBox: $ sudo systemctl restart cups
```

- Verify if the service was restarted.

SS:

```
althealaraya@althealaraya-VirtualBox: $ sudo systemctl status cups
● cups.service - CUPS Scheduler
   Loaded: loaded (/usr/lib/systemd/system/cups.service; enabled; preset: en...
   Active: active (running) since Thu 2024-09-12 09:35:08 PST; 12s ago
     Docs: man:cupsd(8)
TriggeredBy: ● cups.socket
   Main PID: 5064 (cupsd)
   Status: "Scheduler is running..."
      Tasks: 1 (limit: 6153)
     Memory: 4ms
        CPU: 0ms
       CGroup: /system.slice/cups.service
              └─5064 /usr/sbin/cupsd -l
```

FGE_LW4 Managing Services in Linux

 UNIVERSITY OF Baguio SCHOOL OF INFORMATION AND TECHNOLOGY	
NAME: LARAYA, Althea Joy Y.	DATE PERFORMED: 08/14/2024
Section: IDC2	DATE SUBMITTED: 08/15/2024

Evolution of Systems Administration: From Manual to Automated

SYSADM1

Case study

SysPro Corporation, a mid-sized manufacturing company, began operations in the 1990s. As the company grew, so did its reliance on technology. This case study explores the evolution of SysPro Corporation, from manual operations to a highly automated environment.

SysPro Corporation was primarily focused on hardware maintenance and software installation. The system administrators were responsible for tasks such as installing operating systems, configuring applications, and troubleshooting hardware issues. They experience frequent system downtime, slow response times, and limited scalability because of outdated computing equipment. The corporation used basic scripting for repetitive tasks, but most processes were manual. However, after two years, the corporation expanded rapidly, leading to increased IT infrastructure and complexity. The implementation of a company-wide network enabled better communication and data sharing. The basic automation tools progressed to advanced to manage user accounts and software installations. Managing the growing infrastructure, security threats increased and required more user support.

At present, SysPro Corporation has moved a significant portion of its infrastructure to the cloud, reducing hardware and maintenance costs. The company embraced automation and DevOps practices to improve efficiency and reliability of their day-to-day operations. Configuration management tools were also used to define and manage infrastructure. The stockholders also invested a lot in automated pipelines to implement software development and deployment that later on ensured data security in the cloud, managing cloud costs, and developing new skills for cloud-based operations.

Based on the case study,

1. Describe the role of system administrators at SysPro Corporation in the early years. What were the primary challenges they faced?

The system administrators of SysPro Corporation have been responsible for troubleshooting, hardware maintenance, software installation, and manually installing, configuring, and resolving hardware issues. They encountered frequent system downtime and response times because their equipment was already outdated. Since they performed manual processes, they had operational difficulties.

2. Discuss the limitations of manual system management as experienced by SysPro Corporation. How did these challenges impact the business?

The manual processes performed had a negative effect on the business since it caused delay, reduced productivity, and higher risk of human error. The manual system management led has become ineffective as the company grows since it increases system downtime, slow responses time and becomes a time consuming task. Because of this the business becomes unsustainable and will not grow.

3. Identify the automation tools mentioned in the case study and explain their role in improving efficiency.

The company implemented a company-wide network to enable better communication and sharing of data. It is also mentioned there that a basic automation tool led to an advanced management of user accounts and software installations. It improved the company's efficiency since it reduced manual processes that caused disruptions to other activities due to downtime.

4. Analyze the impact of cloud adoption and DevOps practices on SysPro Corporation's IT operations.

By implementing the use of cloud, the company is now flexible and has a better approach when it comes to managing and securing data and also reduced the hardware and maintenance expenses. By having an automated software the DevOps increased the company's efficiency. This modernized approach also enabled quicker responses to changes and improvements, further enhancing the company's overall performance.

5. Predict potential future trends in system administration and their implications for organizations like SysPro Corporation.

Nowadays AI will most likely be used for everything a person can and cannot do. In terms of services, AI can provide more advanced automation and predictions. Just like the SysPro Corporation, companies and organizations should be updated and use current trends to survive in the industry.

FGE_SW1

MIDTERM ACTIVITIES:

LARRAIA, ALTHEA Joy

SYCADM - IDC2

OCT 10, 2024

31/4

WEB SERVER MONITORING

1. Through the IIS manager in a windows server, I can monitor the web server's statistics such as CPU and memory usage, as well as requests rates and response time. By analyzing these metrics I can monitor how the webserver responds to requests.

2. The following are the key metrics needed to monitor a web server:

<input type="checkbox"/> RESPONSE TIME	<input type="checkbox"/> REQUEST RATE
<input checked="" type="checkbox"/> TRAFFIC	<input type="checkbox"/> ERROR RATE
<input type="checkbox"/> CPU USAGE	<input type="checkbox"/> RESOURCE USAGE
<input type="checkbox"/> MEMORY USAGE	

3. ANALYZING WEB SERVERS STATISTICS:

- A. AVERAGE RESPONSE TIME: 738.89 ms
- B. REQUEST PER SECOND : 1 REQUEST PER SECOND
- C. MEMORY USAGE : 880 mb
- D. ERROR RATE: 22.22%
- E. COMMON ERROR TYPE: 404 NOT FOUND
~~500 INTERNAL SERVER ERROR~~

4. First issue is the 500 error response, this may be caused by errors from the codes of the page or misconfiguration that it took 5 seconds before it responded. And the 404 error indicates that the image source file is not found. These issues may affect user experience.

Web Server Monitoring

 <p>UNIVERSITY OF Baguio SCHOOL OF INFORMATION AND TECHNOLOGY</p>		
NAME: LARAYA, Althea Joy	DATE PERFORMED: Oct 10, 2024	/50
Section: IDC2	DATE SUBMITTED: Oct 10, 2024	

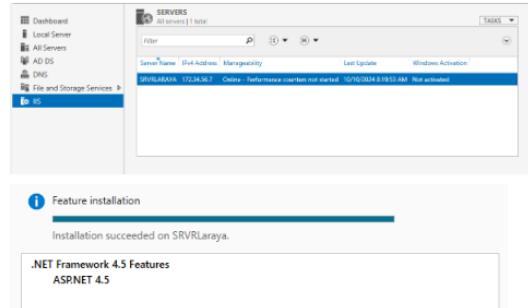
SYSADM1 – Setting Up Webserver

Requirement:

- A virtual machine running Linux and Windows OS

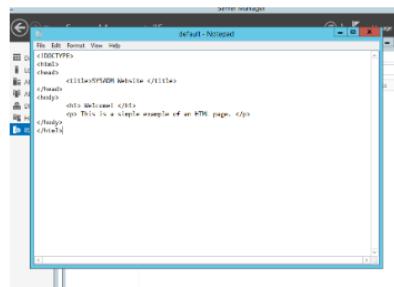
Task Instructions:

- Install IIS by adding it as a role, select necessary features, include monitoring tools



- Create a website by opening IIS Manager

- Right-click on the server's name and select Internet Information Services Manager.
- Right-click on Sites and select Add Website.
- Enter a name, description, physical path (where your website files will reside), IP address, port, and host name.



- Test the Web Server:

- Open a web browser and enter the URL of your website (e.g., <http://localhost>).
- You should see your web page displayed.



Welcome!

This is a simple example of an HTML page.

Edit Site Binding

Type: http	IP address: 172.34.56.7	Port: 80
Host name: srv.laraya		
Example: www.contoso.com or marketing.contoso.com		

(hostname should be the registered domain name)

3. Configure the Website:

- Right-click on your website and select Edit.
- Set the Default Document to the name of your main HTML file >default.html
- Configure other settings as needed (e.g., SSL certificates, authentication)

Default Document

Use this feature to specify the default file(s) to return without requesting a specific file. Set default documents in order of priority.

Name	Entry Type
default.html	Local
Default.htm	Inherited
Default.asp	Inherited
index.htm	Inherited
index.html	Inherited
iisstart.htm	Inherited

4. Create a Web Page:

- Create an HTML file in the physical path you specified.
- ```
<!DOCTYPE html>
<html>
<head>
 <title>SYSADM Website</title>
</head>
<body>
 <h1>Welcome!</h1>
 <p>This is a simple example of an HTML page.</p>
</body>
</html>
```
- Save it as default.html or your preferred name.

#### Grading Rubric

Criteria	Points	Description
Web Server Installation	15	Correctly installs IIS or another web server on the virtual machine.
Website Configuration	15	Successfully configures the website with the correct physical path, IP address, port, and default document.
Successful Access	15	Successfully accesses the web page from the client computer using the correct URL.
Troubleshooting	15	Demonstrates ability to troubleshoot common issues, such as network connectivity problems or configuration errors.
Documentation	10	Provides clear and concise documentation of the installation, configuration, and testing process.
Total	/70	

## M\_LW2 Web Server

LAW/VA ALTHA BY  
M\_SW1 - EULA

SYSADM - IDC2

Accuracy 4  
Complexity - 7  
Clarity - 10  
P/ORG - 10  
G1/40  
NO.  
DATE Oct 4, 2024

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## M\_SW1- EULA



```

larayaserver@larayaserver-VirtualBox:~$ sudo systemctl enable krb5-kdc
Synchronizing state of krb5-kdc.service with SysV service script with /usr/lib/
systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable krb5-kdc
larayaserver@larayaserver-VirtualBox:~$ sudo systemctl enable krb5-admin-server
Synchronizing state of krb5-admin-server.service with SysV service script with /
usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable krb5-admin-server
larayaserver@larayaserver-VirtualBox:~$

```

#### Step 3: Set Up a Kerberos User Principal

1. Create a New User Principal:

- o Run the following command to create a test user in the Kerberos realm:

*bash*

```

sudo kadmin.local -q "addprinc testuser@MYLAB.LOCAL"
o Set a password for testuser.

```

```

larayaserver@larayaserver-VirtualBox:~$ sudo kadmin.local -q "addprinc testuser@MYLAB.LOCAL"
Authenticating as principal root/admin@MYLAB.LOCAL with password.
No policy specified for testuser@MYLAB.LOCAL; defaulting to no policy
Enter password for principal "testuser@MYLAB.LOCAL":
Re-enter password for principal "testuser@MYLAB.LOCAL":
Principal "testuser@MYLAB.LOCAL" created.
larayaserver@larayaserver-VirtualBox:~$

```

2. Verify the User Principal:

- o To confirm the principal is created, list all principals:

*bash*

```

sudo kadmin.local -q "listprincs"

```

```

larayaserver@larayaserver-VirtualBox:~$ sudo kadmin.local -q "listprincs"
Authenticating as principal root/admin@MYLAB.LOCAL with password.
K/M@MYLAB.LOCAL
kadmin/admin@MYLAB.LOCAL
kadmin/changepw@MYLAB.LOCAL
krbtgt/MYLB.LOCAL@MYLAB.LOCAL
testuser@MYLAB.LOCAL

```

#### Step 4: Configure the Kerberos Client (VM2)

1. Edit the Kerberos Configuration File on VM2:

- o Open /etc/krb5.conf for editing on VM2:

*bash*

Page 5 of 7

*sudo nano /etc/krb5.conf*

- o Set the default realm to MYLAB.LOCAL and point to the KDC and admin server on VM1. The configuration should match what you set on VM1.

```

GNU nano 7.2 /etc/krb5.conf
[libdefaults]
Files default_realm = MYLAB.LOCAL

The following krb5.conf variables are only for MIT Kerberos.
 kdc_timesync = 1
 ccache_type = 4
 forwardable = true
 proxiable = true
 rdns = false

The following libdefaults parameters are only for Heimdal Kerberos.
 fcc-mit-ticketflags = true

[realms]
MYLAB.LOCAL = [
 kdc = 172.16.5.4
 admin_server = 172.16.5.4
]
ATHENA/MIT.EDU = [
 ...
]

```

#### Step 5: Test Kerberos Authentication

1. Request a Kerberos Ticket for the User on VM2:

- o In the terminal on VM2, request a ticket for testuser:

*bash*

```

kinit testuser@MYLAB.LOCAL
o Enter the password you set for testuser.

```

```

larayaclient@larayaclient-VirtualBox:~$ kinit testuser@MYLAB.LOCAL
Password for testuser@MYLAB.LOCAL:

```

2. Verify the Ticket:

- o Check if the ticket was issued by listing active Kerberos tickets:

*bash*

*klist*

- o You should see details about the ticket, such as the principal and expiration time, confirming successful Kerberos authentication.

## FLW1\_Kerberos (1)

<div style="border: 1px solid black; padding: 10px; width: 100%; height: 100%;"> <p style="text-align: center;"><b>UNIVERSITY OF Baguio</b> SCHOOL OF INFORMATION AND TECHNOLOGY</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 50%;">NAME: Villena, Aeron Jeff A.   Laraya, Althea Joy Y.</td> <td style="width: 50%;">DATE PERFORMED: Nov. 28, 2024</td> <td style="text-align: right; vertical-align: bottom;">30/30 /50</td> </tr> <tr> <td colspan="2">Section: IDC2</td> <td>DATE SUBMITTED: Nov. 28, 2024</td> </tr> </table> <p><b>SYSADM1 – Capacity Management &amp; Planning</b></p> <p><b>Part 1. A Simulated Dataset for Capacity Planning Exercise</b></p> <p><b>Scenario:</b> A mid-sized e-commerce website is expecting a significant surge in traffic due to an upcoming holiday sale.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th>Date</th> <th>Time</th> <th>CPU Utilization (%)</th> <th>Memory Utilization (%)</th> <th>Network In (Mbps)</th> <th>Network Out (Mbps)</th> <th>Response Time (ms)</th> </tr> </thead> <tbody> <tr> <td>2023-11-20</td> <td>09:00 AM</td> <td>25</td> <td>50</td> <td>100</td> <td>50</td> <td>200</td> </tr> <tr> <td>2023-11-20</td> <td>12:00 PM</td> <td>40</td> <td>60</td> <td>150</td> <td>75</td> <td>250</td> </tr> <tr> <td>2023-11-20</td> <td>03:00 PM</td> <td>60</td> <td>70</td> <td>200</td> <td>100</td> <td>300</td> </tr> <tr> <td>2023-11-20</td> <td>06:00 PM</td> <td>35</td> <td>55</td> <td>125</td> <td>60</td> <td>225</td> </tr> </tbody> </table> <p><b>Projected Traffic Increase</b></p> <ul style="list-style-type: none"> <li>• Expected Peak Traffic: 5x the normal peak traffic</li> <li>• Peak Time: 12:00 PM - 3:00 PM on the sale day</li> </ul> <p><b>System Specifications</b></p> <ul style="list-style-type: none"> <li>• Server Count: 5</li> <li>• CPU Cores per Server: 8</li> <li>• RAM per Server: 32GB</li> <li>• Network Bandwidth per Server: 1Gbps</li> </ul> <p><b>Additional Considerations</b></p> <ul style="list-style-type: none"> <li>• New Product Launch: A highly anticipated product will be released during the sale.</li> <li>• Marketing Campaign: A major marketing campaign will be launched to promote the sale.</li> <li>• Potential Cyber Threats: Increased traffic can attract malicious actors.</li> </ul> </div>	NAME: Villena, Aeron Jeff A.   Laraya, Althea Joy Y.	DATE PERFORMED: Nov. 28, 2024	30/30 /50	Section: IDC2		DATE SUBMITTED: Nov. 28, 2024	Date	Time	CPU Utilization (%)	Memory Utilization (%)	Network In (Mbps)	Network Out (Mbps)	Response Time (ms)	2023-11-20	09:00 AM	25	50	100	50	200	2023-11-20	12:00 PM	40	60	150	75	250	2023-11-20	03:00 PM	60	70	200	100	300	2023-11-20	06:00 PM	35	55	125	60	225	<p><b>Tasks:</b></p> <ol style="list-style-type: none"> <li>1. Review the provided server performance data and identify potential bottlenecks</li> </ol> <p>Based on the server performance data provided, we identified that there could be potential bottlenecks in the following:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th>Key Metric</th> <th>Potential Bottleneck</th> </tr> </thead> <tbody> <tr> <td>CPU Utilization/Cores</td> <td>During the peak hours of 12:00–3:00 PM with the expected heavy traffic, the 8 Core might not be able to handle requests that will result in <u>slower response time</u> and might <u>go beyond the limits of CPU capacity</u>.</td> </tr> <tr> <td>Network Bandwidth</td> <td>There will be a limited network bandwidth across all servers as it will increase 5x than the usual during the peak hour, which causes <u>congestion, slow data transfers</u>, leading to <u>packet drops</u>, and disrupting user sessions.</td> </tr> <tr> <td>Response Time</td> <td>In the current peak hour, the response time is already high but bearable but if the traffic will increase 5x, it will also increase alongside with it which leads to <u>user dissatisfaction</u> because of how slow the platform will be.</td> </tr> <tr> <td>Memory Allocation/Utilization</td> <td>The existing RAM might suffice for the usual traffic but it might cause the server to <u>freeze, lag, slower load times</u>, and might <u>render unable to process additional requests</u> due to the high processing during the heavy peak hour.</td> </tr> </tbody> </table> <p><b>2. Brainstorm possible solutions to address the identified bottlenecks. Propose potential solutions considering hardware and software-based solutions.</b></p> <ul style="list-style-type: none"> <li>○ <b>Add More Servers:</b> Increase the total number of servers in the system to handle the surge in traffic by distributing the workload more effectively.</li> <li>○ <b>Upgrade Server Specifications:</b> Enhance the existing servers with higher-capacity CPUs, more RAM, or faster storage for better performance.</li> <li>○ <b>Upgrade Network Bandwidth:</b> Increase the per-server or overall network bandwidth to reduce congestion and improve data transfer rates.</li> <li>○ <b>Deploy Web Application Firewall (WAF):</b> Protect against malicious traffic, like DDoS attacks, by filtering harmful requests and reducing unnecessary server strain.</li> <li>○ <b>Deploy Content Delivery Network (CDN):</b> To cache and deliver static content from edge servers closer to users, reducing server load and improving response times.</li> <li>○ <b>Using Cloud Services:</b> Offer dynamic, scalable infrastructure that adapts to traffic demands, ensuring optimal resource usage, improved performance, and reduced downtime.</li> </ul>	Key Metric	Potential Bottleneck	CPU Utilization/Cores	During the peak hours of 12:00–3:00 PM with the expected heavy traffic, the 8 Core might not be able to handle requests that will result in <u>slower response time</u> and might <u>go beyond the limits of CPU capacity</u> .	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Grading Rubric:			
Criteria	Excellent   10pts	Good   7pts	Needs Improvement   4pts
Problem Identification	Accurately identifies the primary problem and provides a detailed explanation.	Identifies the main problem and provides a basic explanation.	Identifies a problem but lacks clarity or accuracy.
Solution Proposal	Proposes multiple relevant solutions and provides detailed explanations, including potential drawbacks and benefits.	Proposes one or two relevant solutions but lacks detailed explanation.	Proposes a solution but lacks feasibility or relevance.
Evaluation of Solutions	Provides a thorough evaluation of the proposed solutions, considering factors like cost, complexity, and potential impact.	Provides a basic evaluation of the proposed solutions, but lacks depth.	Does not evaluate the proposed solutions or provides a superficial evaluation.

Score: /30

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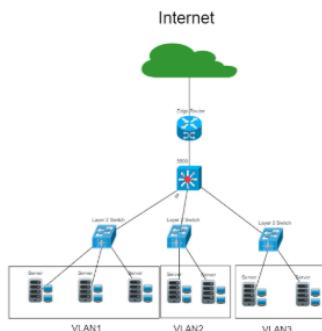
## F\_Capacity Planning\_Part 1

NAME: Villena, Aeron Jeff A.   Laraya, Althea Joy Y.	DATE PERFORMED: Nov. 28, 2024	/50
Section: IDC2	DATE SUBMITTED: Dec 05, 2024	

#### SYSADM1 – Capacity Management & Planning

##### Part 2. Network Scalability Analysis

Recall the e-commerce website scenario we discussed earlier. Given the expected surge in traffic, analyze the provided network topology diagram. Identify potential bottlenecks and areas where scalability might be a concern. Propose specific strategies to improve the network's scalability and performance to ensure a seamless user experience during the peak traffic period. Consider factors such as increased user demand, new applications, and security threats.



allows better load distribution. The setup cost would depend on the provider but is estimated to range from ₱50,000 to ₱100,000, including installation and configuration.

##### Evaluation of Solutions

To meet growing demands and ensure the network can scale effectively, a combination of hardware upgrades, software configurations, and network optimizations is key. Upgrading to high-performance core and distribution switches will boost the network's capacity, while adding advanced firewalls with DDoS protection and threat detection will enhance security. Dynamic routing protocols like OSPF or BGP will improve traffic flow and provide redundancy, ensuring the network adapts to changing needs. Introducing VPN services will support secure remote access for an increasingly mobile workforce, and integrating cloud-based solutions for backup and scalability will offer flexibility, reducing reliance on physical infrastructure. Additionally, setting up Quality of Service (QoS) policies will help prioritize critical traffic, improving performance during peak usage times. With an estimated cost of ₱600,000 to ₱1,000,000, these upgrades will strengthen the network's performance, security, and scalability, providing long-term reliability and positioning the system for future growth.

##### Proposed Design Justification

The proposed network design is well-justified as it incorporates scalability, security, and redundancy to address current and future needs. At the core of the design is a layered architecture that optimizes traffic flow, ensures fault tolerance, and facilitates efficient management. The integration of redundant core switches, dynamic routing protocols such as OSPF or BGP, and VLAN trunking provides the scalability needed to handle traffic surges while maintaining high availability. Security is bolstered with advanced Cisco solutions, including TrustSec for network segmentation, Secure Group Tags (SGTs) for policy enforcement, and Cisco ISE for centralized identity management. The DMZ is enhanced with dual firewalls, load balancers, and intrusion prevention systems (IPS), safeguarding critical services like web and DNS servers.

Additionally, the inclusion of a VPN ensures secure remote access, while cloud services offer flexible scalability and automated backups to mitigate the risks of data loss or downtime. Monitoring tools like SolarWinds or Nagios provide proactive management, ensuring real-time insights and rapid response to potential issues. This design is not only robust but also cost-effective, with an estimated investment of ₱800,000 to ₱1,300,000, offering long-term benefits such as reduced downtime, enhanced security, and seamless scalability. It is a future-proof solution that prioritizes reliability, security, and performance to meet the demands of modern networks effectively.

#### Documented Report: E-Commerce Network Scalability Analysis

##### Network Analysis

The old network topology was a straightforward design that connected a single internet gateway to one router, which served as the central point for all network traffic. This router was linked to a core/distribution switch that handled traffic routing and distribution across the network. From there, the core switch connected to three access switches, each dedicated to a specific VLAN. VLAN 1 hosted three servers, each paired with two PCs, while VLANs 2 and 3 each contained two servers, also paired with two PCs each. However, this design had several limitations. It relied heavily on a single router and core switch, creating a single point of failure that could disrupt the entire network if either device failed. The lack of redundancy made it prone to downtime, while the core switch became a bottleneck for inter-VLAN traffic during high usage periods. Additionally, the absence of firewalls or a DMZ zone left servers exposed to potential security threats. This nonflexible structure, with each switch statically assigned to a VLAN, also limited scalability and efficient resource allocation. Overall, while functional for basic operations, the old topology struggled to meet the demands of scalability, security, and fault tolerance.

##### Scalability Planning

To address these challenges, we propose the following solutions:

- Link Aggregation:** Combine multiple links between core and distribution switches using EtherChannel technology to double or triple the available bandwidth. This solution would cost approximately ₱50,000 to ₱100,000 for additional hardware and configuration.
- Server Load Balancing:** Install hardware or software-based load balancers in the DMZ zone to distribute user requests across multiple servers. This would improve performance and fault tolerance. Estimated cost is ₱200,000 to ₱300,000, depending on the brand and features.
- Firewall Upgrade:** We've added a new, high-performance firewall to enhance security, with capabilities for DDoS mitigation and advanced threat detection. The cost for this installation ranges from ₱150,000 to ₱250,000.
- Cloud Integration:** Offload key services like backups and web hosting to a cloud platform such as AWS or Azure, ensuring elastic scalability. Monthly operational costs would range from ₱10,000 to ₱30,000 depending on usage.
- Quality of Service (QoS):** Configure QoS policies to prioritize critical traffic like database queries and web traffic, ensuring minimal disruption to essential services. This would primarily require technical expertise, costing ₱20,000 to ₱40,000 for setup.
- Triple ISP Connection:** Add two more ISP for improved network scalability, reliability, and redundancy. This solution enhances bandwidth, provides automatic failover during outages, and

##### Proposed Design

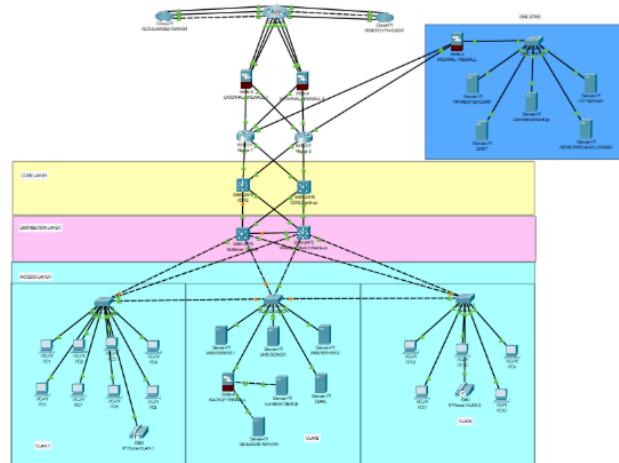


Figure 1. Proposed Network Topology Design

##### 1. Network Enhancements:

- Core Layer:** Introduce redundant core switches to eliminate single points of failure and configure dynamic routing protocols (OSPF or BGP) for better fault tolerance.
- Distribution Layer:** Expand VLAN uplinks using EtherChannel to increase bandwidth and ensure link redundancy.
- DMZ Zone:** Add load balancers to distribute traffic efficiently across web, DNS, and application servers.
- Triple ISP Connection:** Added 2 additional ISP to the network to increase internet bandwidth, improve redundancy, and ensure failover capabilities. This will allow the network to automatically switch to a backup connection in case one ISP experiences an outage, ensuring continuous uptime and a more resilient infrastructure.
- Access Layer:** Upgrade to higher-capacity switches and apply QoS (Quality of Service) policies to prioritize critical services such as payment gateways and remote connections.

- **VPN Integration:** Implement a Virtual Private Network (VPN) to provide secure and encrypted remote access for employees and partners, ensuring data confidentiality over external connections. Estimated cost: ₱100,000 to ₱150,000.
- **Cloud Services:**
  - *Cloud Scalability:* Migrate critical applications to a cloud-based platform to handle peak traffic demands.
  - *Cloud Backup:* Implement a cloud-based backup solution for all essential data, reducing the risk of data loss and ensuring recovery during disasters. Estimated cost for cloud services: ₱200,000 to ₱300,000 annually.

## 2. Implementation Plan:

- **Phase 1:** Upgrade core and distribution switches, and implement *VLAN trunking and Spanning Tree Protocol (STP)* to ensure efficient data flow and prevent network loops. This phase also includes the additional two ISP for enhanced redundancy and failover protection. Estimated cost: ₱300,000 to ₱450,000.
- **Phase 2:** Install *load balancers, VPN, and IPS systems* in the DMZ zone to optimize traffic distribution and secure access to critical services. Estimated cost: ₱350,000 to ₱450,000.
- **Phase 3:** Migrate applications and data to the cloud, configure automated cloud backups, and perform system-wide tests to ensure redundancy and scalability. Estimated cost: ₱200,000 to ₱300,000.

## 3. Security:

Enhancing the network's security and performance involves deploying advanced Cisco technologies that cater to modern needs. Cisco TrustSec offers a practical solution by creating scalable, software-defined segmentation based on user and device identities, ensuring secure and efficient traffic flow across the network. To complement this, Secure Group Tags (SGTs) allow for dynamic segmentation, ensuring that traffic is managed and policies are enforced based on specific roles or devices. Cisco Identity Services Engine (ISE) takes this further by centralizing identity management, giving administrators more control over access and enabling policy enforcement tailored to user roles. For protection against threats, Cisco Firepower Threat Defense (FTD) provides real-time threat intelligence and automated responses, keeping the network secure from potential vulnerabilities. To maintain optimal performance and identify issues before they escalate, tools like SolarWinds or Nagios can provide real-time monitoring and actionable insights. These enhancements are estimated to cost between ₱150,000 and ₱250,000, offering a strong balance between security, reliability, and investment value.

## Evaluation and Justification

The proposed network design effectively addresses the key challenges of scalability, security, and redundancy, creating a robust and future-ready infrastructure. By incorporating Cisco technologies like TrustSec, Secure Group Tags (SGT), and Identity Services Engine (ISE), the design ensures that security is tightened through identity-based access control and dynamic segmentation. This setup ensures that only authorized users and devices can access specific parts of the network, significantly reducing the risk of security breaches. A VPN further strengthens data protection by providing encrypted remote access for employees and partners, safeguarding sensitive information during transit. To handle peak traffic, load balancers distribute workloads efficiently across servers, ensuring smooth and uninterrupted performance.

Migrating critical applications to cloud platforms and implementing automated cloud backup solutions enhance disaster recovery and scalability, which are vital for maintaining continuous service in an e-commerce setting. Real-time monitoring tools like SolarWinds or Nagios add another layer of reliability, enabling proactive management by quickly identifying and addressing potential network issues.

Although the estimated cost of ₱800,000 to ₱1,300,000 represents a significant investment, it is justified by the long-term benefits. These upgrades will minimize downtime, boost operational efficiency, improve user satisfaction, and ensure the network can handle future growth with ease. By integrating advanced Cisco technologies, cloud-based solutions, and reliable redundancy measures, the network will deliver high performance and security, even under heavy traffic conditions. This makes it a strategic investment for sustained business success and customer trust.

## F\_Capacity Planning\_Part 2

## Course Reflection

What were your initial expectations for the course? Did the course meet, exceed, or fall short of these expectations?

From this course, I expected it to have more hands-on activities or using actual devices instead of using virtual machines in order to perform for real-life scenarios. However it is understandable that we have limited resources to perform such activities. Although it did not meet my expectations, I still learned a lot about what a System Administrator does.

What were the main topics or concepts covered in the course? How did these topics contribute to your understanding of the subject matter?

To sum it all up, the course covered all about system and service management and monitoring, deploying services and file recovery. These topics helped me gain more insights about what else aside from networking an IT major can do. Also it enhanced my basic knowledge regarding troubleshooting, monitoring and analysis of systems and services through logs.

Reflecting on your learning process, what were the most effective strategies or techniques that helped you grasp and retain the course material?

Based from my experiences, proper discussions ,step-by-step processes, and analysis of activities helped me understand and keep up with the course.

Were there any particular assignments, projects, or activities that significantly enhanced your learning experience? Why were they effective?

Most of our activities and assignments greatly enhanced my learning as we always have to read, understand and analyze the situations provided for us. They were effective because it practices my mind with critical thinking and providing possible solutions and recommendations that would resolve some issues.

Did you encounter any challenges or difficulties during the course? How did you overcome these obstacles, and what did you learn from them?

One challenge for me is understanding logs and how to analyze issues through results of key metrics when monitoring. It was hard for me to analyze and provide accurate reports regarding the data presented from logs. To overcome this, I tried analyzing the previous scenarios again to recognize patterns . This improved my attention to detailed and careful analysis skills.

Did the course encourage critical thinking and analysis? How did it promote higher-order thinking skills, such as problem-solving or decision-making?

yes, this course encouraged critical thinking and analysis specially with case studies and monitoring activities. These tasks required me to identify the problems, analyze logs and generate a proper report and provide appropriate solutions or improvements. By going through these kinds of activities, it enhanced my ability to evaluate the systems/services based on the data.

Reflecting on your personal growth, what new knowledge, skills, or perspectives did you gain from this course?

This course enhanced my understanding of system administration by introducing me to monitoring, troubleshooting, and deploying services effectively. It also made me realize how much workload ,responsibilities and challenges there is for system administrators.

How do you plan to apply what you have learned in this course to your future studies, career, or personal life?

This course has allowed me to prepare for roles that demand an understanding of both system and service management. Personally, I will keep enhancing my troubleshooting skills, as they are applicable in both technical and everyday situations.