



Mid Term Submission

SUBJECT: CLOUD PERFORMANCE TUNING

SUBJECT CODE: CSEG3015

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Difference Between AWS and Microsoft Azure

Both Amazon Web Services (AWS) and Microsoft Azure are leading cloud service providers, and they offer various services and tools for cloud performance tuning. While the specific differences between them can change over time as they introduce new features and updates, here are some key points to consider when comparing AWS and Azure in terms of cloud performance tuning:

1. **Cost:** The choice between AWS and Microsoft Azure in terms of cost depends on your specific needs. Both cloud providers have competitive pricing, but the most cost-effective option for you will depend on the services you use, where you use them, and how you use them. It's like comparing prices at different stores – it depends on what you're buying and where you're buying it. To find the best fit, you'll need to analyze your usage, consider any long-term commitments, and keep an eye on data transfer costs according to me Azure is costly as here if use AMI's the using cost is high here and give less memory for using in free tier as compare to AWS.
2. **Storage:** AWS and Microsoft Azure both offer robust storage solutions. AWS provides Amazon S3, EBS, and Glacier, while Azure offers Blob Storage and Azure Files. The choice depends on your specific storage needs and preferences. Consider factors like performance, scalability, and pricing to determine the best fit for your use case. Largest instance AWS offer 256 GB Ram + 16v CPU while Azure offers 224 GB + 16 vCPU's.
3. **Availability Zone:** Availability Zone: Aws was the first on of its kind which means Aws is hosting in hosting in multiple locations worldwide and of course it's true for Azure as well but differences occur's in the numbers of regions and availability zones talking of numbers Aws has 55 availability zones worldwide with eight more on its weight whereas Azure is having 44 availability zones with a whopping numbers.
4. **Services:** Aws and Azure both covers 100 plus services like compute, Database, Storage, Security, Networking and many more Some of the services that Aws covers(Ec2, AWS RDS S3, IAM,VPC, cloudwatch and cloud9 Similarly in Azure covers Vm, SQL, blob Storage, virtual network and Azure monitor and visual studio and many more.
5. **Open Source Integeration:** Aws has quite better relations with open source communities leading to more open integration with Aws which includes open source tools like Jenkins Docker, ansible, Github and its very friendly when it comes to linux servers while in Azure it offers native Integrations for windows development tools such as VBS,SQL and more as you all know Microsoft hasn't always embraced this model but recently they have been catching with it and organization can run on RedHat and Hadoop clusters in azure

Difference between x64 and AMD.

x64: This term generally refers to a type of computer architecture based on the x86 instruction set. It's an extension of the x86 architecture that adds support for 64-bit computing. It's used by both Intel and AMD processors and supports 64-bit software, allowing the processor to handle larger amounts of memory and perform more complex tasks compared to older 32-bit architectures.

AMD: This refers to Advanced Micro Devices, Inc., a company that designs and produces computer processors (CPUs), GPUs, and related technology. AMD manufactures processors that use the x86 and x64 architecture, similar to Intel. AMD processors have been known for providing competitive performance, particularly in terms of multi-core processing and value for the price compared to Intel processors.

When choosing between x64 architectures (usually found in both AMD and Intel processors), there are a few factors to consider for tuning performance:

Usage: Consider the specific tasks or software you'll be using. Some applications or tasks might perform better on AMD processors due to their architecture, while others might be optimized for Intel. For example, some software might be optimized for Intel's specific instruction sets like AVX (Advanced Vector Extensions) or AMD's equivalent.

Budget: AMD processors have been known to offer competitive performance at a lower price point compared to their Intel counterparts. Depending on your budget, you might find an AMD processor that provides better performance for the price you're willing to pay.

Multitasking and Multithreading: AMD processors typically offer more cores and threads at various price points compared to Intel, which can be beneficial for tasks that can leverage parallel processing. If you're dealing with heavily multi-threaded applications or multitasking, an AMD processor might offer better performance.

Project Name:- Language Translator

Language translation, or simply translation, is the process of converting text or spoken language from one language (the source language) into another language (the target language). This practice plays a significant role in our increasingly globalized world, where communication between people who speak different languages is a common occurrence..

Deploying a Language Translator website on Azure, on windows and ubuntu Virtual machine and analyzing performance metrics, CPU, and memory utilization on Windows and Ubuntu Virtual Machines in OS-specific tools like Task Manager (Windows) or top/htop (Ubuntu).

Deploying on Windows VM:-

Creating windows virtual machine

The screenshot displays the Microsoft Azure portal interface for a Windows Virtual Machine. The left sidebar contains navigation options such as Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Connect, Bastion, Windows Admin Center, Networking, Network settings, Load balancing, Application security groups, Network manager, Settings, Disks, and Extensions + applications. The main content area is divided into two sections: Essentials and Properties.

Essentials

Property	Value
Resource group (move)	test-rg
Status	Running
Location	West US 3 (Zone 1)
Subscription (move)	Azure for Students
Subscription ID	ca77c18c-f198-4b78-91c6-21fe10fb81fe
Availability zone	1
Tags (edit)	Add tags
Operating system	Windows (Windows Server 2022 Datacenter Azure Editio...
Size	Standard D2s v3 (2 vcpus, 8 GiB memory)
Public IP address	20.163.57.41
Virtual network/subnet	windows-vnet/default
DNS name	Not configured
Health state	-

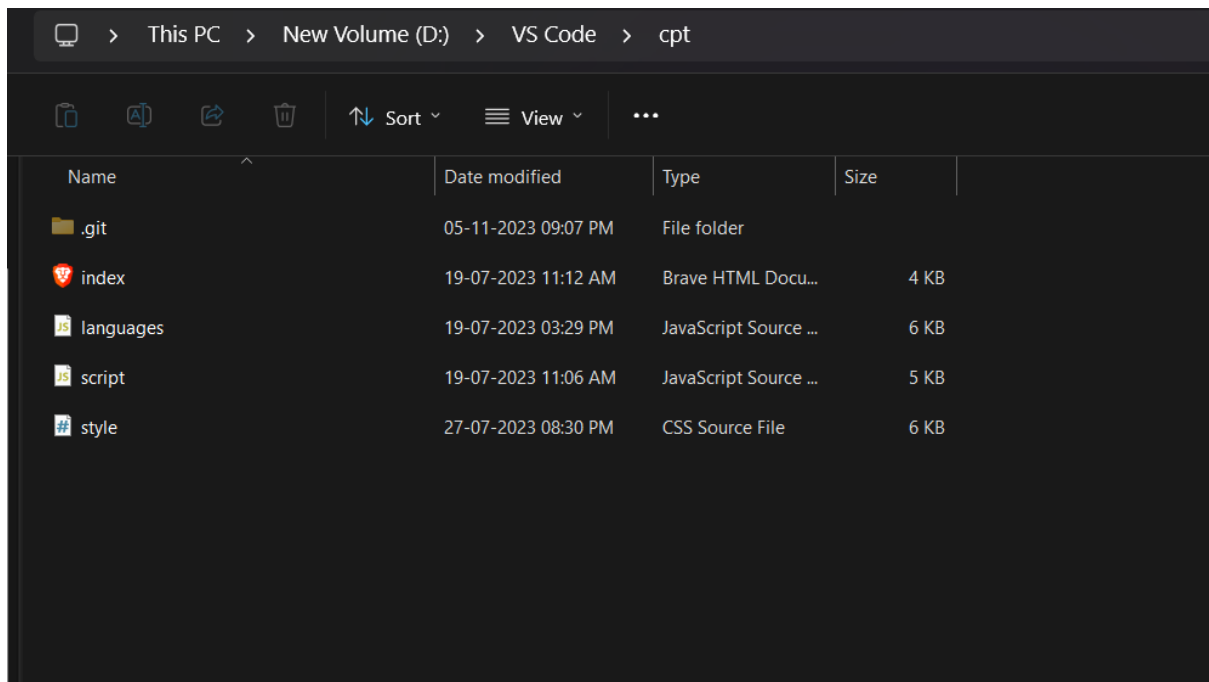
Properties

Property	Value
Computer name	windows
Operating system	Windows (Windows Server 2022 Datacenter Azure Edition)
Image publisher	MicrosoftWindowsServer
Image offer	WindowsServer
Image plan	2022-datacenter-azure-edition-hotpatch
VM generation	V2
VM architecture	x64

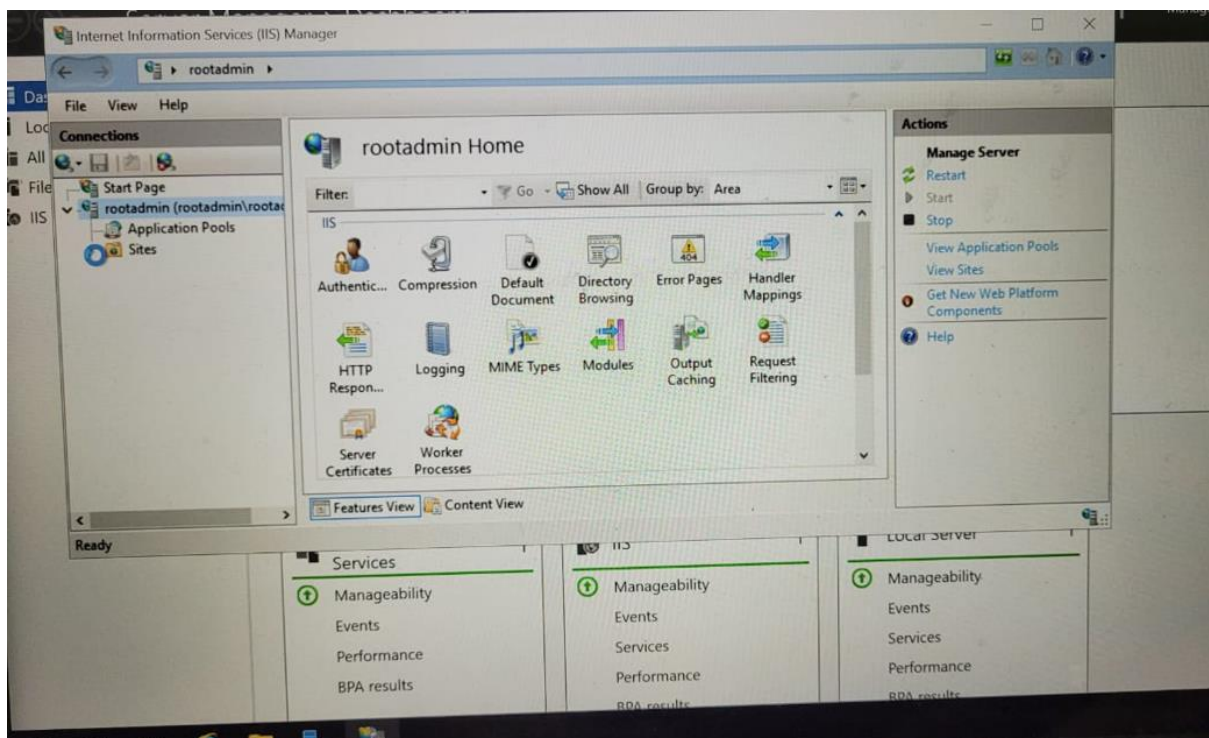
Networking

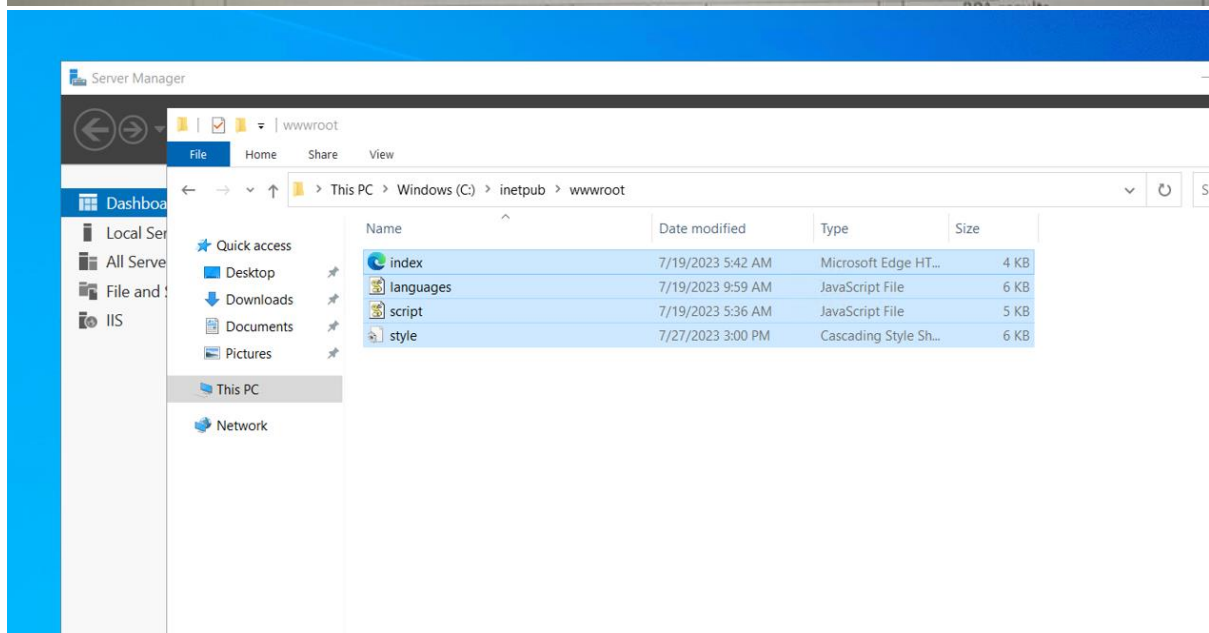
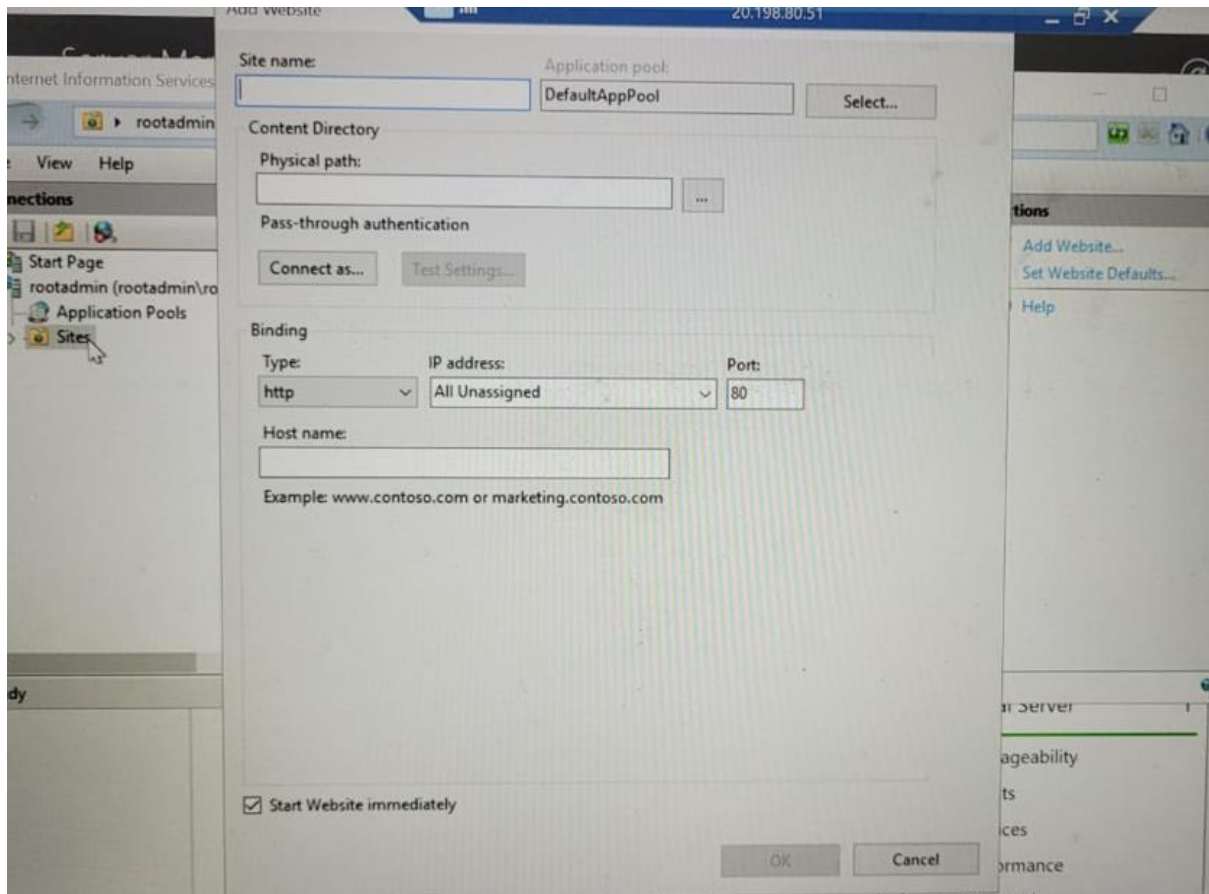
Property	Value
Public IP address	20.163.57.41 (Network interface windows442_z1)
Public IP address (IPv6)	-
Private IP address	10.0.0.4
Private IP address (IPv6)	-
Virtual network/subnet	windows-vnet/default
DNS name	Configure

Copied files from host OS to Windows VM in C Drive



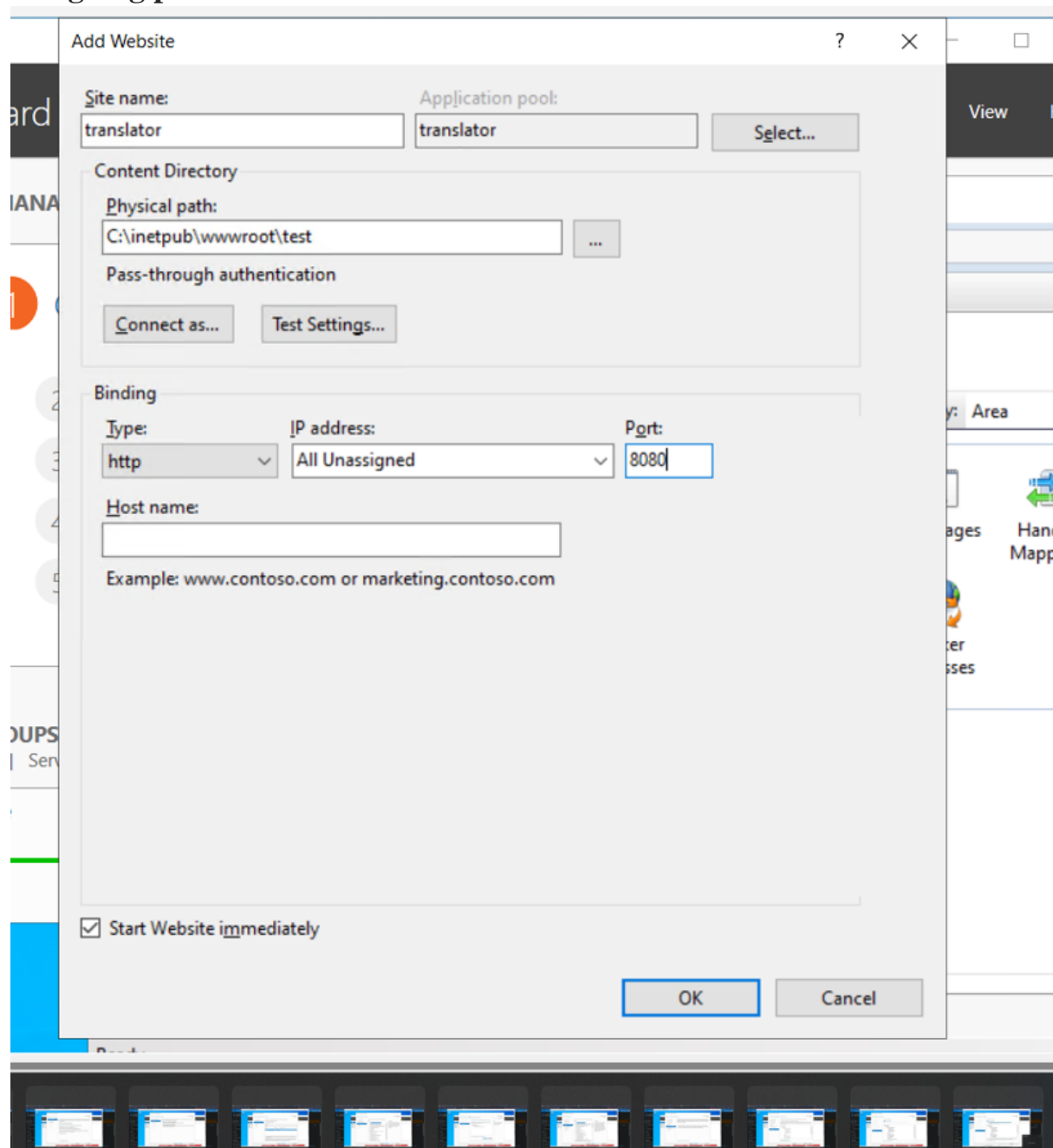
In IIS manager we are adding the website



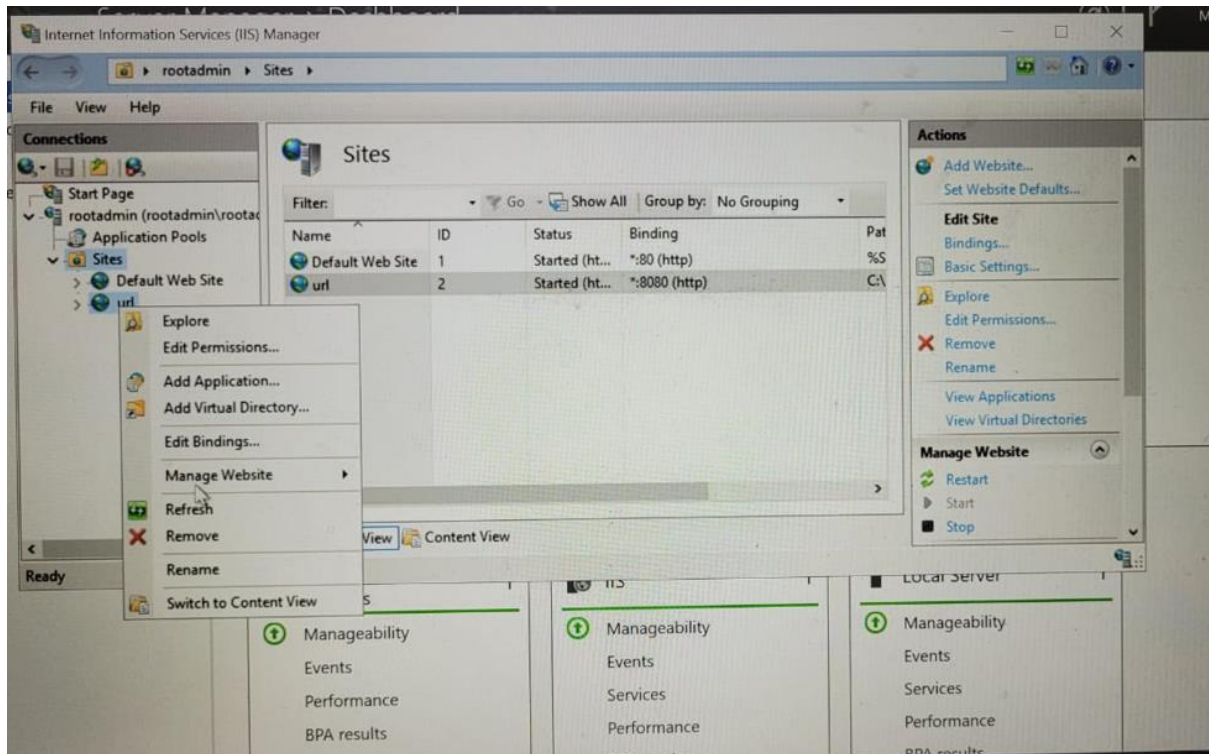


Giving name and adding website

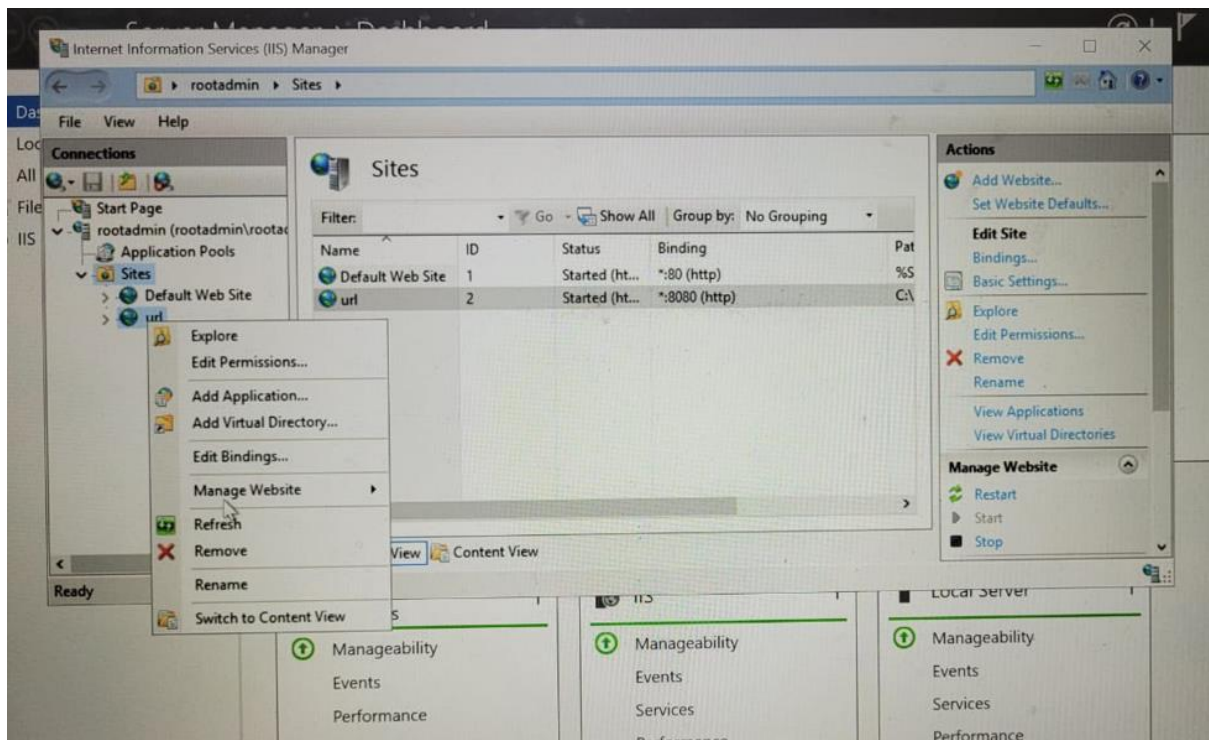
Assigning port number

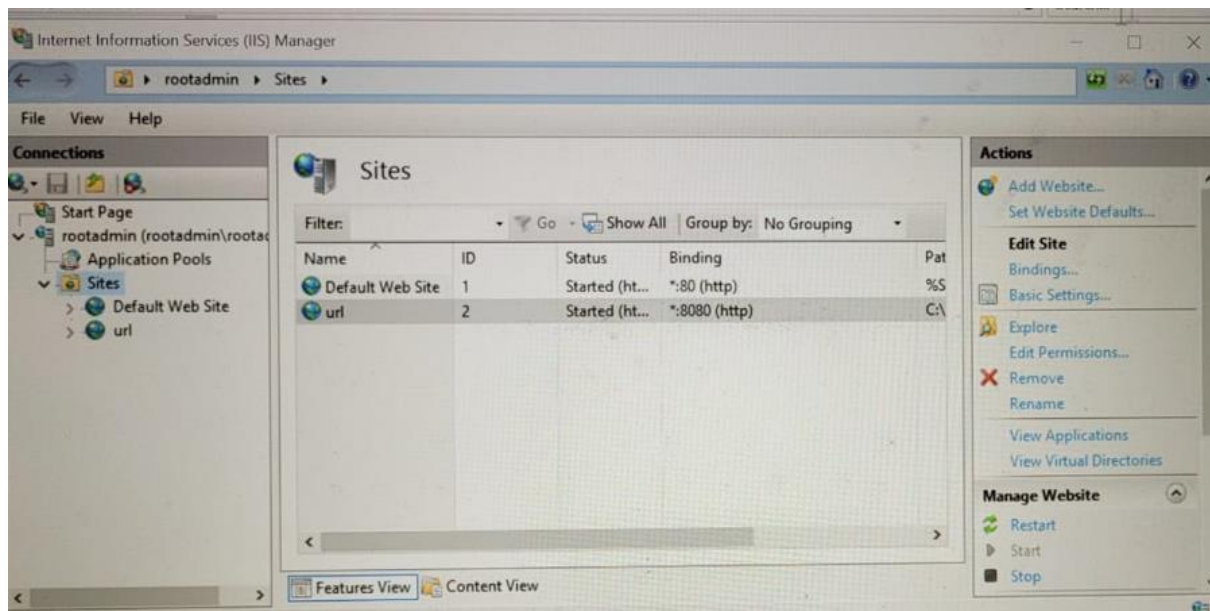
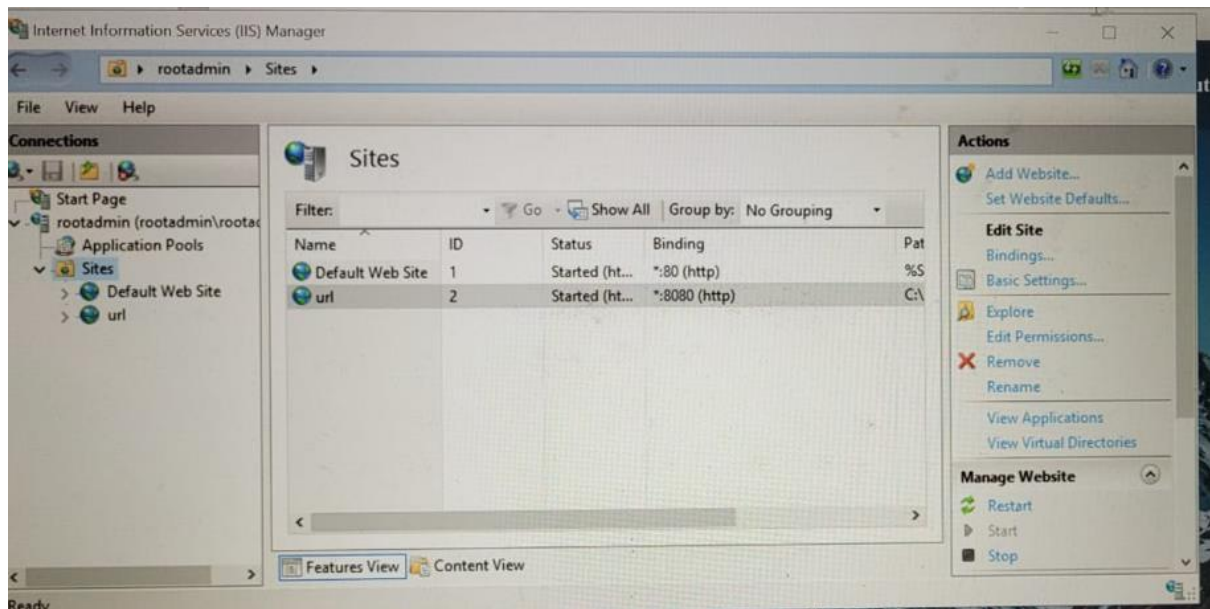


Going to manage website

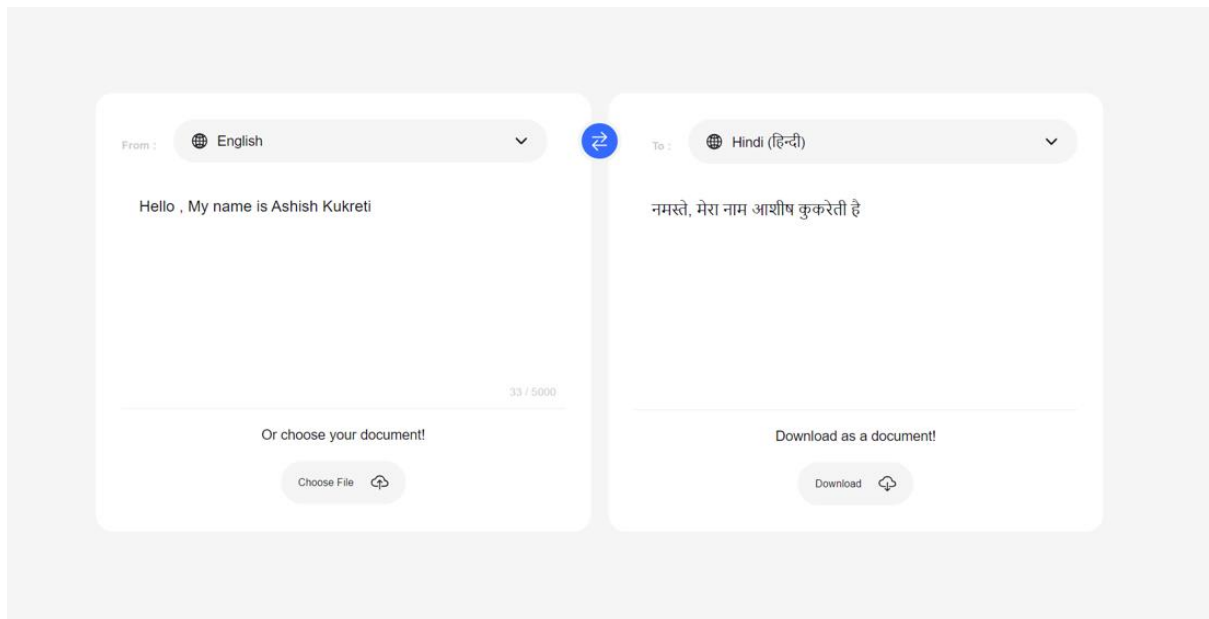


Selecting browse to open the website

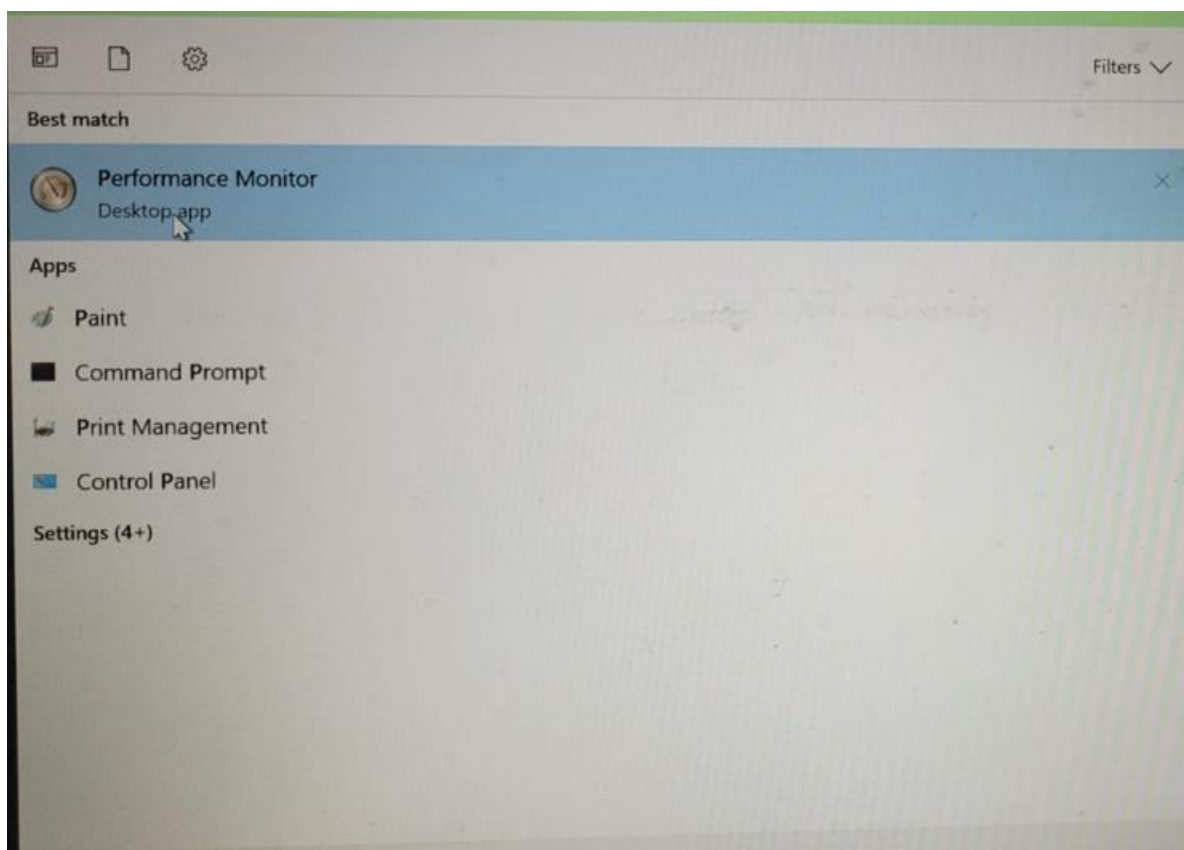




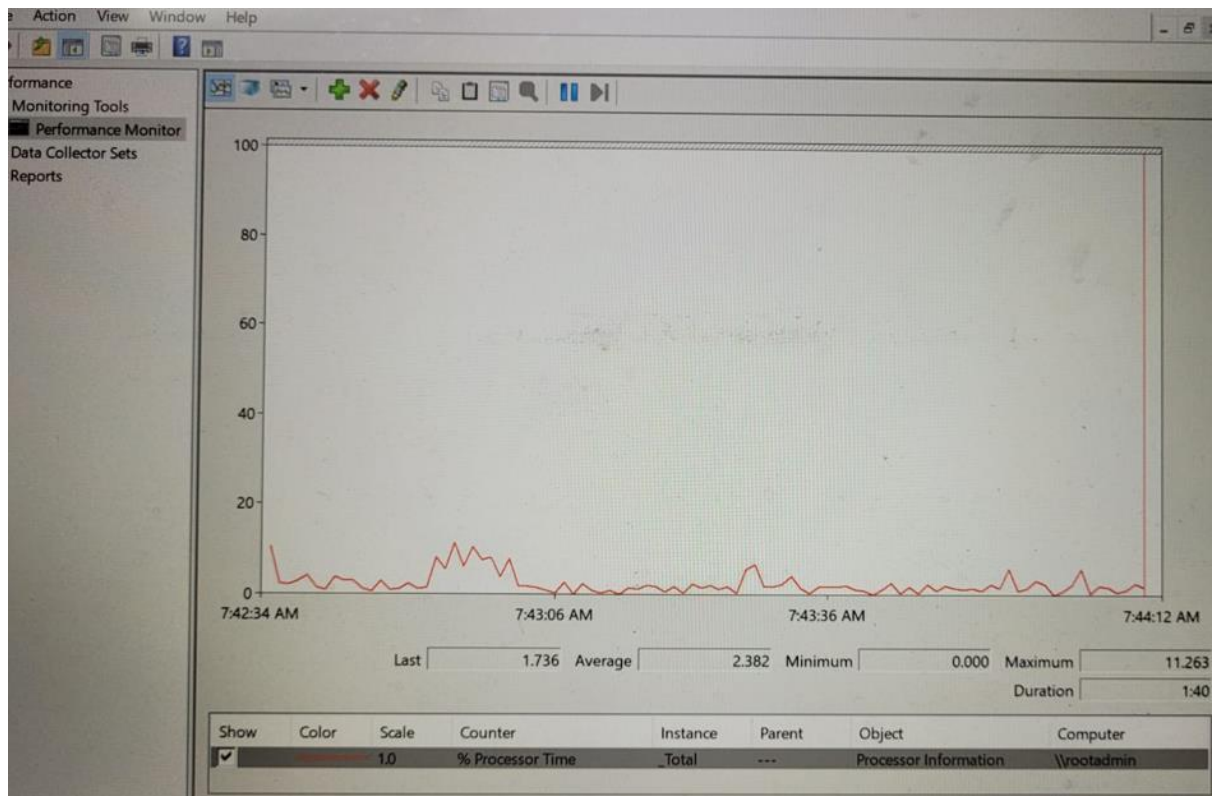
Website opened



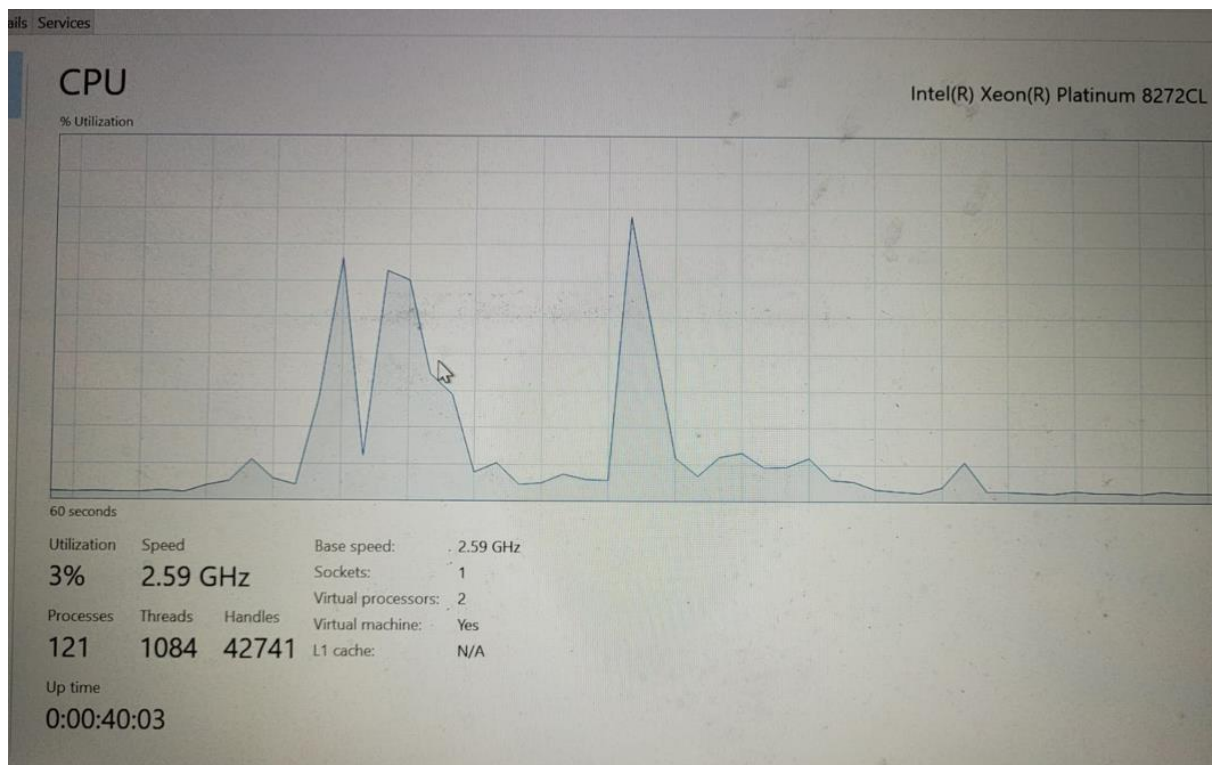
Checking Performance



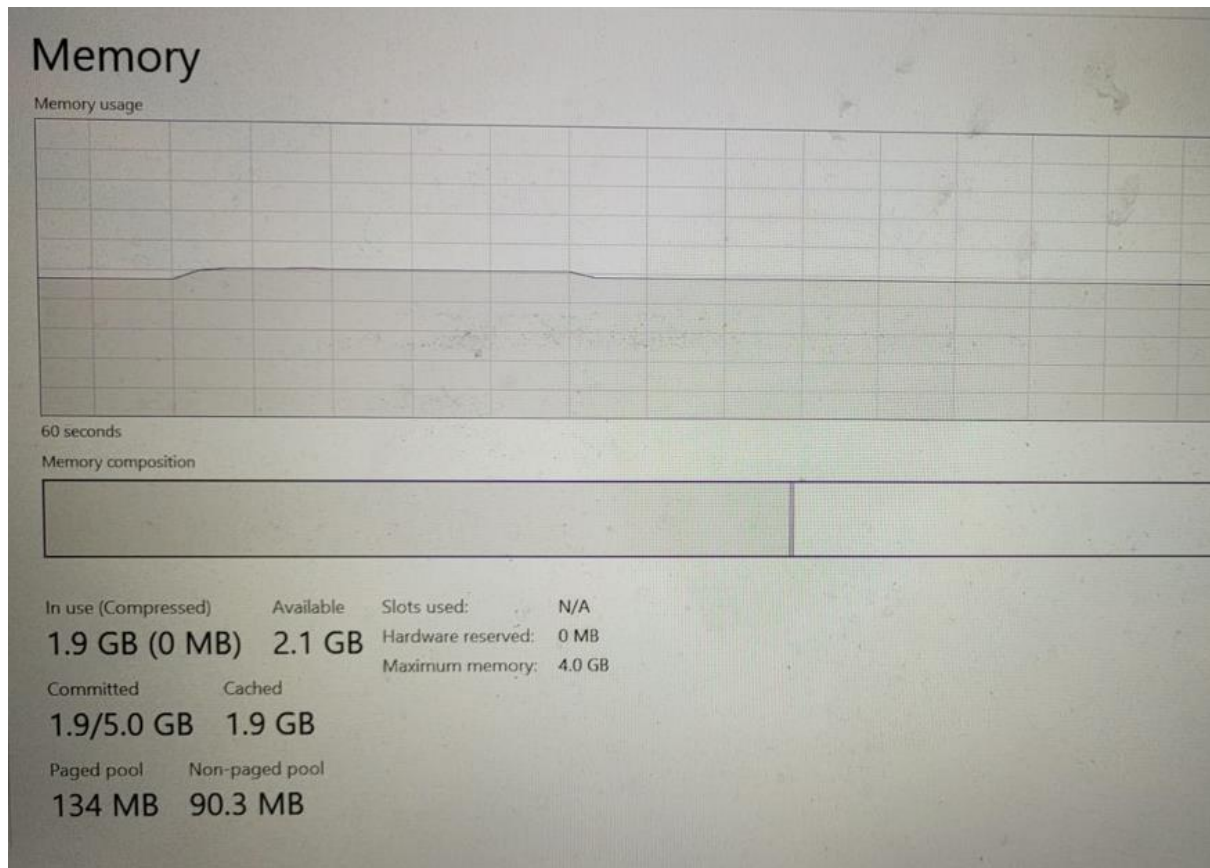
Performance



CPU Utilization



Memory Utilization



Other metrics:

Task Manager

File Options View

Processes Performance **Users** Details Services

User	Status	1% CPU	48% Memory
> ■ rootadmin (24)		0%	262.5 MB


Processes Performance Users Details Services			
Name	Status	1% CPU	48% Memory
> Antimalware Service Executable		0%	206.1 MB
> Service Host: Remote Desktop S...		0%	67.4 MB
> Server Manager		0%	61.3 MB
> Windows Explorer		0%	45.0 MB
> Microsoft AzureÂ®		0%	35.7 MB
Desktop Window Manager		0%	34.1 MB
> IIS Manager		0%	21.2 MB
> Search (2)		0%	19.7 MB
> Service Host: UtcSvc		0%	19.1 MB
> Task Manager		0%	17.8 MB
> WindowsAzureGuestAgent		0%	17.7 MB
> Internet Explorer		0%	15.5 MB
> Service Host: Windows Event Log		0%	11.1 MB
> Microsoft Text Input Application		0%	10.2 MB
> Service Host: Windows Manage...		0%	9.6 MB
> Local Security Authority Process...		0%	6.6 MB
> Spooler SubSystem App		0%	6.3 MB
> LocalServiceNoNetworkFirewall (...)		0%	6.3 MB

⬆ Fewer details

Response Time: 13 minutes and 30 seconds.

Deploying on ubuntu VM

Creating Ubuntu virtual machine

Subscription *	<div>Azure for Students</div>
Resource group *	<div>(New) test-rg</div> <div>Create new</div>
Instance details	
Virtual machine name *	<div>linux01</div>
Region *	<div>(US) East US</div>
Availability options	<div>Availability zone</div>
Availability zone *	<div>Zones 1</div> <div>You can now select multiple zones. Selecting multiple zones will create one VM per zone. Learn more</div>
Security type	<div>Trusted launch virtual machines</div> <div>Configure security features</div>
Image *	<div> Ubuntu Server 20.04 LTS - x64 Gen2</div> <div>See all images Configure VM generation</div>
VM architecture	<div><input type="radio"/> Arm64</div> <div><input checked="" type="radio"/> x64</div>
Run with Azure Spot discount	<div><input type="checkbox"/></div>
Size *	<div>Standard_D2s_v3 - 2 vcpus, 8 GiB memory (₹5,503.70/month)</div> <div>See all sizes</div>
Administrator account	
Authentication type	<div><input type="radio"/> SSH public key</div> <div><input checked="" type="radio"/> Password</div>
Username *	<div>ashish</div>

Administrator account

Authentication type ⓘ

- ☐ SSH public key
- ☒ Password

Username * ⓘ

ashish ✓

Password * ⓘ

..... ✓

Confirm password * ⓘ

..... ✓

Inbound port rules

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

Public inbound ports * ⓘ

- ☐ None
- ☒ Allow selected ports

Select inbound ports *

SSH (22) ✓

i All traffic from the internet will be blocked by default. You will be able to change inbound port rules in the VM > Networking page.

Microsoft Azure

Search resources, services, and docs (G+/I)

500096132@stu.upes.ac...
UPES (STU.UPES.AC.IN)

Home >

CreateVm-canonical.0001-com-ubuntu-server-focal-2-20231105193613 | Overview

Deployment

Delete Cancel Redeploy Download Refresh

Overview

Inputs

Outputs

Template

● Your deployment is complete

Deployment name: CreateVm-canonical.0001-com-ubuntu-server-f... Start time: 11/5/2023, 8:06:14 PM
Subscription: Azure for Students Correlation ID: 0154cca0-9dcf-4fd4-8c92-c7db48c20d52

Deployment details

Next steps

Setup auto-shutdown Recommended
Monitor VM health, performance and network dependencies Recommended
Run a script inside the virtual machine Recommended

Go to resource

Create another VM

Give feedback
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Opened SSH terminal and running commands.

```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\Ashish> ssh ashish@74.235.95.4
The authenticity of host '74.235.95.4 (74.235.95.4)' can't be established.
ED25519 key fingerprint is SHA256:Sxi0x+Q58qJOAw8ncOELJOFTvefEH5zODqlalmM+hVg.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '74.235.95.4' (ED25519) to the list of known hosts.
ashish@74.235.95.4's password:
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1050-azure x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Sun Nov  5 15:27:48 UTC 2023

System load:  0.42                Processes:           130
Usage of /:   5.2% of 28.89GB      Users logged in:    0
Memory usage: 4%                  IPv4 address for eth0: 10.1.0.4
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ashish@linux01:~$ |
ashish@linux01:~$ sudo apt update
Hit:1 http://azure.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://azure.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:4 http://azure.archive.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 http://azure.archive.ubuntu.com/ubuntu focal/universe amd64 Packages [8628 kB]
Get:6 http://azure.archive.ubuntu.com/ubuntu focal/universe Translation-en [5124 kB]
Get:7 http://azure.archive.ubuntu.com/ubuntu focal/universe amd64 c-n-f Metadata [265 kB]
Get:8 http://azure.archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [144 kB]
Get:9 http://azure.archive.ubuntu.com/ubuntu focal/multiverse Translation-en [104 kB]
Get:10 http://azure.archive.ubuntu.com/ubuntu focal/multiverse amd64 c-n-f Metadata [9136 B]
Get:11 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [2973 kB]
Get:12 http://azure.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [481 kB]
Get:13 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [17.2 kB]
Get:14 http://azure.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [2479 kB]
Get:15 http://azure.archive.ubuntu.com/ubuntu focal-updates/restricted Translation-en [346 kB]
Get:16 http://azure.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 c-n-f Metadata [552 B]
Get:17 http://azure.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1130 kB]
Get:18 http://azure.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [269 kB]
Get:19 http://azure.archive.ubuntu.com/ubuntu focal-updates/universe amd64 c-n-f Metadata [25.7 kB]
Get:20 http://azure.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Packages [25.8 kB]
Get:21 http://azure.archive.ubuntu.com/ubuntu focal-updates/multiverse Translation-en [7484 B]
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Get:23 http://azure.archive.ubuntu.com/ubuntu focal-backports/main amd64 Packages [45.7 kB]
Get:24 http://azure.archive.ubuntu.com/ubuntu focal-backports/main Translation-en [16.3 kB]
Get:25 http://azure.archive.ubuntu.com/ubuntu focal-backports/main amd64 c-n-f Metadata [1420 B]
Get:26 http://azure.archive.ubuntu.com/ubuntu focal-backports/restricted amd64 c-n-f Metadata [116 B]
Get:27 http://azure.archive.ubuntu.com/ubuntu focal-backports/universe amd64 Packages [25.0 kB]
Get:28 http://azure.archive.ubuntu.com/ubuntu focal-backports/universe Translation-en [16.3 kB]
```

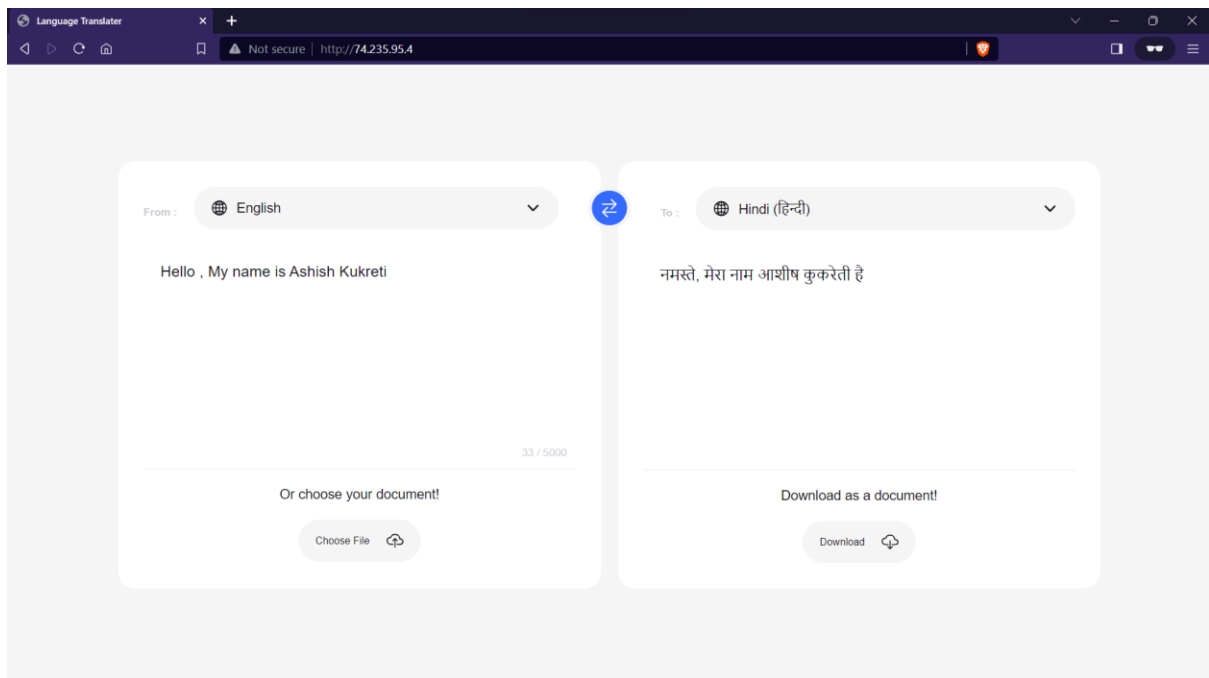
```

Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service
Processing triggers for ufw (0.36-6ubuntu1.1) ...
Processing triggers for systemd (245.4-4ubuntu3.22) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.12) ...
ashish@linux01:~$ sudo apt install -y apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
apache2 is already the newest version (2.4.41-4ubuntu3.14).
0 upgraded, 0 newly installed, 0 to remove and 8 not upgraded.
ashish@linux01:~$ |

Nov 05 15:29:18 linux01 systemd[1]: Started The Apache HTTP Server.
ashish@linux01:~$ git clone https://github.com/AshishKukreti2003/Cloud_Performance_Tuning
Cloning into 'Cloud_Performance_Tuning'...
remote: Enumerating objects: 6, done.
remote: Counting objects: 100% (6/6), done.
remote: Compressing objects: 100% (6/6), done.
remote: Total 6 (delta 0), reused 6 (delta 0), pack-reused 0
Unpacking objects: 100% (6/6), 5.04 KiB | 5.04 MiB/s, done.
ashish@linux01:~$ cd web
-bash: cd: web: No such file or directory
ashish@linux01:~$ ls
Cloud_Performance_Tuning
ashish@linux01:~$ cd Cloud_Performance_Tuning/
ashish@linux01:~/Cloud_Performance_Tuning$ ls
index.html languages.js script.js style.css
ashish@linux01:~/Cloud_Performance_Tuning$ sudo rm /var/www/html/index.html
ashish@linux01:~/Cloud_Performance_Tuning$ sudo cp -r * /var/www/html/
ashish@linux01:~/Cloud_Performance_Tuning$ ls
index.html languages.js script.js style.css
ashish@linux01:~/Cloud_Performance_Tuning$ sudo systemctl restart apache2
ashish@linux01:~/Cloud_Performance_Tuning$ |

```

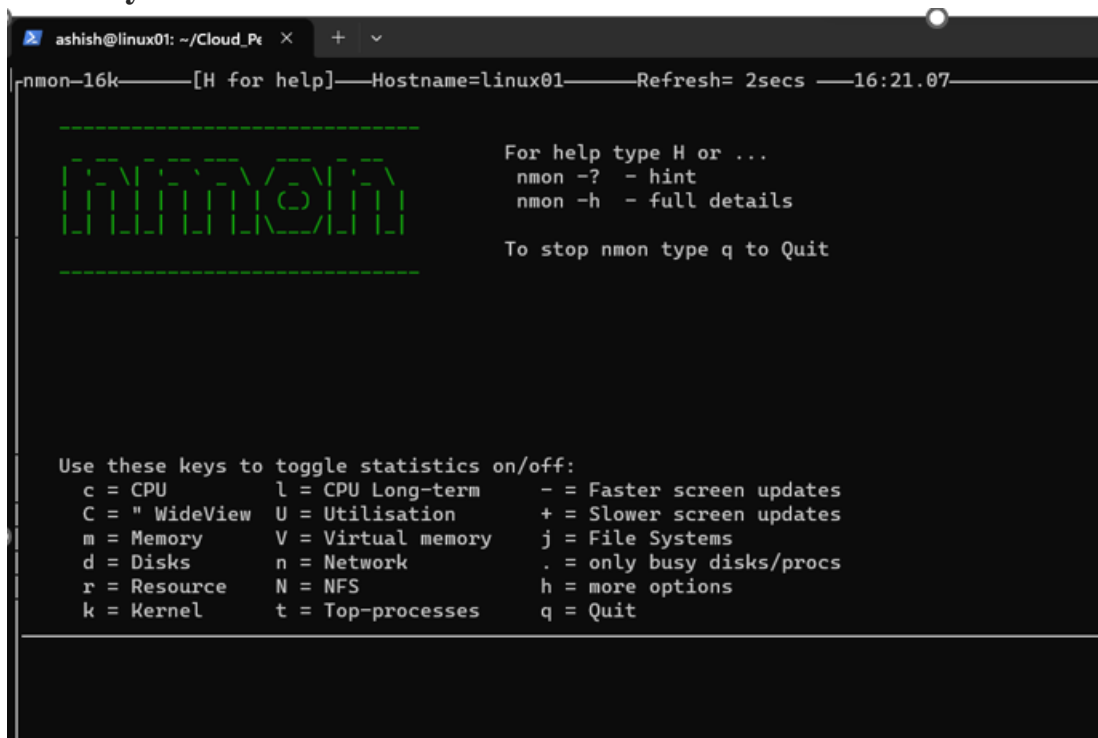
Website opened



Using NMON and HTOP commands to check performance, CPU utilization, memory utilization.

```
Reading package lists... Done
ashish@linux01:~/Cloud_Performance_Tuning$ sudo apt-get install nmon
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  nmon
0 upgraded, 1 newly installed, 0 to remove and 8 not upgraded.
Need to get 68.8 kB of archives.
After this operation, 187 kB of additional disk space will be used.
Get:1 http://azure.archive.ubuntu.com/ubuntu focal/universe amd64 nmon amd64 16m+debian-1 [68.8 kB]
Fetched 68.8 kB in 0s (2261 kB/s)
Selecting previously unselected package nmon.
(Reading database ... 59632 files and directories currently installed.)
Preparing to unpack ../nmon_16m+debian-1_amd64.deb ...
Unpacking nmon (16m+debian-1) ...
Setting up nmon (16m+debian-1) ...
Processing triggers for man-db (2.9.1-1) ...
```

Memory utilization

The image shows a terminal window with the nmon utility running. At the top, a status bar displays 'nmon-16k', '[H for help]', 'Hostname=linux01', 'Refresh= 2secs', and the time '16:21.07'. Below this, the word 'nmon' is rendered in a large, green, blocky font. To the right of the logo, instructions are provided: 'For help type H or ...', 'nmon -? - hint', 'nmon -h - full details', and 'To stop nmon type q to Quit'. At the bottom, a section titled 'Use these keys to toggle statistics on/off:' lists various system metrics and their corresponding toggle keys: 'c = CPU', 'C = " WideView', 'm = Memory', 'd = Disks', 'r = Resource', 'k = Kernel', 'l = CPU Long-term', 'U = Utilisation', 'V = Virtual memory', 'n = Network', 'N = NFS', 't = Top-processes', '- = Faster screen updates', '+ = Slower screen updates', 'j = File Systems', '. = only busy disks/procs', 'h = more options', and 'q = Quit'.

```
ashish@linux01: ~/Cloud_Pt x + v
1 [ 0.0%] Tasks: 39, 88 thr; 1 running
2 [ 0.7%] Load average: 0.00 0.00 0.00
Mem[|||||] 335M/7.76G Uptime: 02:02:19
Swp[ 0K/0K]

PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
16251 ashish 20 0 8536 3928 3820 R 0.7 0.0 0:00.03 htop
1924 ashish 20 0 13968 6000 4524 S 0.0 0.1 0:00.16 sshd: ashish@pts/0
1 root 20 0 1638 16676 2472 S 0.0 0.2 0:05.26 /sbin/init
176 root 19 -1 52160 11068 9936 S 0.0 0.1 0:00.45 /lib/systemd/systemd-journald
214 root 20 0 9936 5692 2708 S 0.0 0.1 0:00.24 /lib/systemd/systemd-udev
284 root 20 0 4252 2896 1944 S 0.0 0.0 0:02.79 /usr/lib/linux-tools/5.15.0-1050-azure/hv_kvp_daemon -n
427 root RT 0 273M 17996 8212 S 0.0 0.2 0:00.04 /sbin/multipathd -d -s
428 root RT 0 273M 17996 8212 S 0.0 0.2 0:00.00 /sbin/multipathd -d -s
429 root RT 0 273M 17996 8212 S 0.0 0.2 0:00.00 /sbin/multipathd -d -s
430 root RT 0 273M 17996 8212 S 0.0 0.2 0:00.40 /sbin/multipathd -d -s
431 root RT 0 273M 17996 8212 S 0.0 0.2 0:00.00 /sbin/multipathd -d -s
432 root RT 0 273M 17996 8212 S 0.0 0.2 0:00.00 /sbin/multipathd -d -s
426 root RT 0 273M 17996 8212 S 0.0 0.2 0:00.61 /sbin/multipathd -d -s
620 systemd-n 20 0 27412 7564 6696 S 0.0 0.1 0:00.04 /lib/systemd/systemd-networkd
623 systemd-r 20 0 24692 12320 8260 S 0.0 0.2 0:00.09 /lib/systemd/systemd-resolved
829 root 20 0 235M 9376 8420 S 0.0 0.1 0:00.09 /usr/lib/accounts-service/accounts-daemon
851 root 20 0 235M 9376 8420 S 0.0 0.1 0:00.00 /usr/lib/accounts-service/accounts-daemon
823 root 20 0 235M 9376 8420 S 0.0 0.1 0:00.11 /usr/lib/accounts-service/accounts-daemon
831 root 20 0 8548 2908 2692 S 0.0 0.0 0:00.00 /usr/sbin/cron -f
832 messagebu 20 0 7712 4092 3976 S 0.0 0.1 0:00.55 /usr/sbin/rsabalance --system --address=systemd: --nofork --nopidfile --systemd-activation
854 root 20 0 81836 3536 3248 S 0.0 0.0 0:00.00 /usr/sbin/rsabalance --foreground
839 root 20 0 81836 3536 3248 S 0.0 0.0 0:00.00 /usr/sbin/rsabalance --foreground
842 root 20 0 29880 18268 16172 S 0.0 0.2 0:00.11 /usr/bin/python3 /usr/bin/networkd-dispatcher --run-startup-triggers
848 root 20 0 230M 9044 8132 S 0.0 0.1 0:00.00 /usr/lib/policykit-1/polkitd --no-debug
852 root 20 0 230M 9044 8132 S 0.0 0.1 0:00.00 /usr/lib/policykit-1/polkitd --no-debug
843 root 20 0 230M 9044 8132 S 0.0 0.1 0:00.01 /usr/lib/policykit-1/polkitd --no-debug
845 _chrony 20 0 4828 2164 2000 S 0.0 0.0 0:00.04 /usr/sbin/chronyd -F -l
846 _chrony 20 0 4696 180 0 S 0.0 0.0 0:00.00 /usr/sbin/chronyd -F -l
873 syslog 20 0 219M 7284 3920 S 0.0 0.1 0:00.03 /usr/sbin/rsyslogd -n -iNONE
874 syslog 20 0 219M 7284 3920 S 0.0 0.1 0:00.00 /usr/sbin/rsyslogd -n -iNONE
875 syslog 20 0 219M 7284 3920 S 0.0 0.1 0:00.02 /usr/sbin/rsyslogd -n -iNONE
850 syslog 20 0 219M 7284 3920 S 0.0 0.1 0:00.06 /usr/sbin/rsyslogd -n -iNONE
989 root 20 0 1432M 43764 19356 S 0.0 0.5 0:00.04 /usr/lib/napd/napd
991 root 20 0 1432M 43764 19356 S 0.0 0.5 0:00.00 /usr/lib/napd/napd
F1Help F2Setup F3Search F4Filter F5Tree F6SortBy F7Nice F8Nice F9Kill F10Quit

ashish@linux01: ~/Cloud_Pt x + v
1 [ 0.5%] Tasks: 39, 88 thr; 1 running
2 [ 0.6%] Load average: 0.00 0.00 0.00
Mem[|||||] 316M/7.76G Uptime: 02:06:10
Swp[ 0K/0K]

PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
1007 root 20 0 1432M 43764 19356 S 0.0 0.5 0:00.24 /usr/lib/napd/napd
1008 root 20 0 1432M 43764 19356 S 0.0 0.5 0:00.06 /usr/lib/napd/napd
1009 root 20 0 1432M 43764 19356 S 0.0 0.5 0:00.18 /usr/lib/napd/napd
1059 root 20 0 1432M 43764 19356 S 0.0 0.5 0:00.09 /usr/lib/napd/napd
1061 root 20 0 1432M 43764 19356 S 0.0 0.5 0:00.00 /usr/lib/napd/napd
1062 root 20 0 1432M 43764 19356 S 0.0 0.5 0:00.14 /usr/lib/napd/napd
855 root 20 0 1432M 43764 19356 S 0.0 0.5 0:01.59 /usr/lib/napd/napd
856 root 20 0 17316 7928 7028 S 0.0 0.1 0:00.18 /lib/systemd/systemd-logind
868 root 20 0 386M 16064 11964 S 0.0 0.2 0:00.00 /usr/lib/udisks2/udisksd
870 root 20 0 386M 16064 11964 S 0.0 0.2 0:00.00 /usr/lib/udisks2/udisksd
932 root 20 0 386M 16064 11964 S 0.0 0.2 0:00.00 /usr/lib/udisks2/udisksd
967 root 20 0 386M 16064 11964 S 0.0 0.2 0:00.00 /usr/lib/udisks2/udisksd
858 root 20 0 386M 16064 11964 S 0.0 0.2 0:00.07 /usr/lib/udisks2/udisksd
860 root 20 0 29492 2232 9380 S 0.0 0.3 0:00.29 /usr/bin/python3 -u /usr/sbin/waagent -daemon
861 daemon 20 0 3804 2136 1956 S 0.0 0.0 0:00.00 /usr/sbin/atd -f
931 root 20 0 311M 15632 11676 S 0.0 0.2 0:00.00 /usr/sbin/ModemManager
943 root 20 0 311M 15632 11676 S 0.0 0.2 0:00.00 /usr/sbin/ModemManager
876 root 20 0 311M 15632 11676 S 0.0 0.2 0:00.06 /usr/sbin/ModemManager
968 root 20 0 105M 20596 12932 S 0.0 0.3 0:00.00 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-for-sign
902 root 20 0 105M 20596 12932 S 0.0 0.3 0:00.09 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-for-sign
1091 root 20 0 2496 512 448 S 0.0 0.0 0:00.00 bpfilter_umh
1713 root 20 0 393M 28732 10608 S 0.0 0.4 0:00.32 python3 -u bin/WALinuxAgent-2.9.1.1-py3.8.egg -run-exthandlers
1714 root 20 0 393M 28732 10608 S 0.0 0.4 0:00.15 python3 -u bin/WALinuxAgent-2.9.1.1-py3.8.egg -run-exthandlers
1716 root 20 0 393M 28732 10608 S 0.0 0.4 0:00.12 python3 -u bin/WALinuxAgent-2.9.1.1-py3.8.egg -run-exthandlers
1717 root 20 0 393M 28732 10608 S 0.0 0.4 0:00.05 python3 -u bin/WALinuxAgent-2.9.1.1-py3.8.egg -run-exthandlers
1718 root 20 0 393M 28732 10608 S 0.0 0.4 0:00.01 python3 -u bin/WALinuxAgent-2.9.1.1-py3.8.egg -run-exthandlers
1264 root 20 0 393M 28732 10608 S 0.0 0.4 0:00.04 python3 -u bin/WALinuxAgent-2.9.1.1-py3.8.egg -run-exthandlers
1746 root 20 0 12192 7496 6568 S 0.0 0.1 0:00.01 sshd: /usr/sbin/ssh -D [listener] 0 of 10-100 startups
1768 root 20 0 7360 1208 2080 S 0.0 0.0 0:00.00 /sbin/agetty -o -p -- \u --keep-baud 115200,38400,9600 ttyS0 vt220
1770 root 20 0 5836 1816 1700 S 0.0 0.0 0:00.00 /sbin/agetty -o -p -- \u --noclear tty1 linux
1802 root 20 0 13968 9168 7700 S 0.0 0.1 0:00.02 sshd: ashish [priv]
1805 ashish 20 0 19204 9808 8216 S 0.0 0.1 0:00.07 /lib/systemd/systemd --user
1806 ashish 20 0 102M 6856 4 S 0.0 0.1 0:00.00 (sd-pam)
1924 ashish 20 0 13968 6000 4524 S 0.0 0.1 0:00.21 sshd: ashish@pts/0
F1Help F2Setup F3Search F4Filter F5Tree F6SortBy F7Nice F8Nice F9Kill F10Quit
```

```
ashish@linux01: ~/Cloud_Pt
1 [ 0.0%] Tasks: 39, 88 thr; 1 running
2 [ 0.7%] Load average: 0.00 0.00 0.00
Mem[|||||] 315M/7.76G Uptime: 02:06:21
Swp[ 0K/0K]

PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
15395 www-data 20 0 1183M 7944 3692 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15397 www-data 20 0 1183M 7944 3692 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15399 www-data 20 0 1183M 7944 3692 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15401 www-data 20 0 1183M 7944 3692 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15346 www-data 20 0 1183M 7944 3692 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15351 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15353 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15355 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15357 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15359 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15361 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15363 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15365 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15367 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15369 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15371 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15372 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15374 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15376 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15378 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15380 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15382 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15384 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15386 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15388 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15390 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15392 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15394 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15396 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15398 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15400 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.00 /usr/sbin/apache2 -k start
15347 www-data 20 0 1183M 8156 3688 S 0.0 0.1 0:00.01 /usr/sbin/apache2 -k start
16028 ashish 20 0 6484 1412 1124 S 0.0 0.0 0:00.00 nmon -f -s 60 -c 20
16096 ashish 20 0 6484 1492 1204 S 0.0 0.0 0:00.00 nmon -f -s 60 -c 60
F1Help F2Setup F3Search F4Filter F5Tree F6SortBy F7Nice F8Nice F9Kill F10Quit
```

CPU Utilization

```
ashish@linux01: ~/Cloud_Pt
nmon-16k Hostname=linux01 Refresh= 2secs 16:23.05

Memory and Swap
PageSize:4KB RAM-Memory Swap-Space High-Memory Low-Memory
Total (MB) 7889.3 0.0 - not in use - not in use
Free (MB) 6819.7 0.0
Free Percent 86.4% 0.0%
Linux Kernel Internal Memory (MB)
Cached= 656.2 Active= 462.5
Buffers= 34.8 Swpcached= 0.0 Inactive = 357.4
Dirty = 0.0 Writeback = 0.0 Mapped = 70.3
Slab = 97.9 Commit_AS = 976.2 PageTables= 3.0

CPU Utilisation
CPU User% Sys% Wait% Idle|0 |25 |50 |75 |100|
1 0.0 0.0 0.0 100.0|>
2 0.0 0.0 0.0 100.0|>
Avg 0.0 0.0 0.0 100.0|>

Resources Linux & Processor
Linux: Linux version 5.15.0-1050-azure (build@lcy02-amd64-032)
Build: (gcc (Ubuntu 9.4.0-1ubuntu1~20.04.2) 9.4.0, GNU ld (GNU Binutils for Ubuntu) 2.34)
Release : 5.15.0-1050-azure
Version : #57-20.04.1-Ubuntu SMP Wed Oct 4 17:09:16 UTC 2023

# of CPUs: 2
Machine : x86_64
Nodename : linux01
/etc/issue[1]: DISTRIB_ID=Ubuntu
/etc/issue[2]: DISTRIB_RELEASE=20.04
/etc/issue[3]: DISTRIB_CODENAME=focal
/etc/issue[4]: DISTRIB_DESCRIPTION="Ubuntu 20.04.6 LTS"
lsb_release: Distributor ID: Ubuntu
lsb_release: Description: Ubuntu 20.04.6 LTS
lsb_release: Release: 20.04
Warning: Some Statistics may not shown
```

ashish@linux01: ~/Cloud_Pv X + -

nmmon-16k [H for help] Hostname=linux01 Refresh= 2secs 16:34.34

Top Processes Procs=127 mode=3-1=Base 3=Perf 4=Size 5=I/O[RootOnly] u=Args

PID	%CPU	Size	Res	Res	Res	Res	Shared	Faults	Faults	Command
	Used	KB	Set	Text	Data	Lib	KB	Min	Max	
1	0.0	106076	16076	760	22776	0	0472	0	0	systemd
2	0.0	0	0	0	0	0	0	0	0	kthreadd
3	0.0	0	0	0	0	0	0	0	0	rcu_gp
4	0.0	0	0	0	0	0	0	0	0	rcu_par_gp
5	0.0	0	0	0	0	0	0	0	0	slub_flushwq
6	0.0	0	0	0	0	0	0	0	0	netns
7	0.0	0	0	0	0	0	0	0	0	kworker/0:0-events
8	0.0	0	0	0	0	0	0	0	0	kworker/0:0H-events_highpri
10	0.0	0	0	0	0	0	0	0	0	mm_percpu_wq
11	0.0	0	0	0	0	0	0	0	0	rcu_tasks_rude
12	0.0	0	0	0	0	0	0	0	0	rcu_tasks_trace
13	0.0	0	0	0	0	0	0	0	0	ksoftirqd/0
14	0.0	0	0	0	0	0	0	0	0	rcu_sched
15	0.0	0	0	0	0	0	0	0	0	migration/0
17	0.0	0	0	0	0	0	0	0	0	cpuhp/0
18	0.0	0	0	0	0	0	0	0	0	cpuhp/1
19	0.0	0	0	0	0	0	0	0	0	migration/1
20	0.0	0	0	0	0	0	0	0	0	ksoftirqd/1
22	0.0	0	0	0	0	0	0	0	0	kworker/1:0H-events_highpri
23	0.0	0	0	0	0	0	0	0	0	kdevtmpfs
24	0.0	0	0	0	0	0	0	0	0	inet_frag_wq
25	0.0	0	0	0	0	0	0	0	0	kauditd
27	0.0	0	0	0	0	0	0	0	0	khungtaskd
28	0.0	0	0	0	0	0	0	0	0	oom_reaper
29	0.0	0	0	0	0	0	0	0	0	writeback
30	0.0	0	0	0	0	0	0	0	0	kcompactd0
31	0.0	0	0	0	0	0	0	0	0	ksmd
32	0.0	0	0	0	0	0	0	0	0	khugepaged
78	0.0	0	0	0	0	0	0	0	0	kintegrityd
79	0.0	0	0	0	0	0	0	0	0	kblockd
80	0.0	0	0	0	0	0	0	0	0	blkcg_punt_bio
81	0.0	0	0	0	0	0	0	0	0	tpm_dev_wq
82	0.0	0	0	0	0	0	0	0	0	ata_sff
83	0.0	0	0	0	0	0	0	0	0	md
84	0.0	0	0	0	0	0	0	0	0	edac-poller
85	0.0	0	0	0	0	0	0	0	0	hv_vmbus_con
86	0.0	0	0	0	0	0	0	0	0	hv_prn_chan

Warning: Some Statistics may not shown

```
ashish@linux01: ~/Cloud_Pt
nmmon-16k Hostname=linux01 Refresh= 2secs 16:35.07
Virtual Memory
nr_dirty = 47 pgpgin = 0 High Normal DMA
nr_writeback= 0 pgpgout = 28 alloc 0 408 0
nr_unstable = 0 pgpswpin = 0 refill 0 0 0
nr_table_pgs= 752 pgpswpout = 0 steal 0 0 0
nr_mapped = 17123 pgfree = 402 scan_kswapd 0 0 0
slab_reclaim= 13138 pgactivate = 0 scan_direct 0 0 0
slab_unreclm= 12041 pgdeactivate= 0
allocstall = 0 pgfault = 671 kswpd_steal = 0
pageoutrun = 0 pgmajfault = 0 kswpd_inodestall= 0
slabs_scanned= 0 pgrotated = 0 pginodestall = 0
```

nmmon-16k [H for help] Hostname=linux01 Refresh= 2secs 16:35.30										
CPU Utilisation Stats										
ALL	0.0	0.0	0.0	199.0	0.5	0.0	0.0	0.0	0.0	0.0
CPU	User%	Nice%	Sys%	Idle%	Wait%	HWirq%	SWirq%	Steal%	Guest%	GuestNice%
1	0.0	0.0	0.0	99.5	0.0	0.0	0.0	0.0	0.0	0.0
2	0.5	0.0	0.0	99.0	0.5	0.0	0.0	0.0	0.0	0.0

nmmon-16k [H for help] Hostname=linux01 Refresh= 2secs 16:35.51										
Kernel and Load Average										
Global-CPU-Stats----				0.0% user	Load Average	CPU use since boottime				
/proc/stat line 1				0.0% user_nice	1 mins	0.00	Uptime	Days	Hours	Mins
100 ticks per second				0.0% system	5 mins	0.00	Uptime	0	2	8
100%=1 CPUcoreThread				199.8% idle	15 mins	0.00	Idle	0	2	67
1	RunQueue	0.0%	iowait	Uptime has overflowed						
0	Blocked	0.0%	irq							
166.3	Context	0.0%	softirq	2 CPU core threads						
	Switch	0.0%	steal							
0.0	Forks	0.0%	guest	Boot time 1699194427						
43.4	Interrupts	0.0%	guest_nice	02:27 PM 05-Nov-2023						

Response Time: 10 minutes and 18 seconds.

Conclusion:-

Response Time:

Both Linux and Windows can provide good response times. but Linux, due to its efficiency and minimal resource usage, we have seen in this case linux have less response time compared to windows.

Response Time: 10 minutes and 18 seconds.

Response Time: 13 minutes and 30 seconds.

Fast OS Performance:

Linux ubuntu are often known for their fast performance due to their lightweight nature and efficient resource handling. They generally have lower overhead and tend to be very responsive, making them favorable in terms of quick performance.

CPU Utilization:

As we have seen in both the cases, the CPU utilization is less in ubuntu in comparison to windows.

Windows might tend to use more CPU resources for its background services and GUI, potentially leading to slightly higher CPU utilization in some cases.

Memory Utilization:

Ubuntu generally has a reputation for efficient memory management. It tends to use less memory for the operating system itself, leaving more available for applications and services.