

*TP1 Report*

# VIRTUAL MACHINES



## Azure Cloud Service

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## Introduction:

The Azure Cloud is Microsoft's public cloud platform. Azure cloud platform includes more than 200 cloud products and services including platform as a service (PaaS), and infrastructure as a service (IaaS), designed to help you bring innovative solutions to life to solve today's challenges. Azure Cloud is one of the most comprehensive platforms available. It offers companies a full range of services that are easy to access and user-friendly, whether you want to set up a website, create a database, maintain and administer projects, or even develop, deploy and support your own applications. With that you can build, operate and deploy applications across multiple clouds, on-premises and off-premises, using the tools and frameworks of your choice.

One of the most powerful services Azure offers is the Virtual Machines service, designed for building virtual machines which are one of several types of on-demand, scalable computing resources that Azure offers. This helps in many ways to improve operational efficiency.

## Azure virtual machines:

### Quick explanation of what is a Virtual machine:

Virtual machines or VMs for short are the most common infrastructure component. A virtual machine is a computer file that runs on a server and replicates a computer environment. It acts as if it is a real computer and is not aware of its virtual nature. A virtual machine isn't tangible but can be used to run software and processes just like a real machine, this is called "virtualization"

You can run multiple virtual machines on the same physical server without them affecting one another or the real computer they're running on; a virtual machine is isolated from the rest of the system, so that anything you do there doesn't leave that environment, which can make them near perfect sandbox for testing and running applications.

Every VM has its own virtual hardware, like CPUs, memory, hard drives, and network interfaces. You don't need any particular hardware to run virtual machines, but you do need to have more bandwidth and processing power than if you were running a standard computer.

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## Virtual machines in Azure:

With Azure Virtual Machines (VMs), you can create and use VMs in the cloud. VMs provide infrastructure as a service (IaaS) in the form of a virtualized server and can be used in many ways. An Azure VM gives you the flexibility of virtualization without having to buy and maintain the physical hardware that runs the VM. However, as an IaaS offering, you still need to configure, update, and maintain the software that runs on the VM.

You can even create or use an already created image to rapidly provision VMs. You can even select a preconfigured VM image. An image is a template used to create a VM and may already include an OS and other software, like development tools or web hosting environments.

## **Questions:**

1- We create a virtual network with the following settings (we leave the others to default values):

- Resource group: tp1rg
- Name: vnet1
- Region: North Europe

Virtual network: A virtual network (VNet) in Azure is a representation of the network in the cloud. It is a logical isolation of the Azure cloud dedicated to a subscription. You can use VNets to deploy and manage virtual private networks (VPNs) in Azure, and optionally link the VNets to other VNets in Azure or to on-premises IT infrastructure to create hybrid or cross-premises solutions.

Each VNet you create has its own CIDR block (Classless Inter-Domain Routing is a method for allocating IP addresses and for IP routing) and can be associated with other VNets and on-premises networks as long as the CIDR blocks (groups of addresses that share the same prefix and contain the same number of bits) don't overlap. You also have control over DNS server settings for VNets and the segmentation of the VNet into subnets.

**2- We deploy a virtual machine as a part of the newly created virtual network resource “tp1rg” with the following settings (we leave the others to default values):**

- Resource group: tp1rg
- Name: vm1
- Region: North Europe (the same region as vnet1)
- Image: Windows server 2019
- We provide a username and a secure password.
- Allow select port: RDP

The VM will be automatically associated with vnet1 since they share the same resource group and Location.

Properties		Networking	
Computer name	vm1	Public IP address	4.231.172.229
Health state	-	Public IP address (IPv6)	-
Operating system	Windows (Windows Server 2019 Datacenter)	Private IP address	10.0.0.5
Publisher	MicrosoftWindowsServer	Private IP address (IPv6)	-
Offer	WindowsServer	Virtual network/subnet	vnet1/default
Plan	2019-datacenter-gensecond	DNS name	Configure

3- We need to connect to the machine using the RDP option.

RDP(Remote Desktop Protocol) is a secure network communication protocol offered by Microsoft, which allows users to execute remote operations on other computers. It facilitates secure information exchange between remotely connected machines over an encrypted communication channel.

To connect to the machine using RDP, we first need to download the RDP file located on the “connect” blade of the virtual machine VM1, when you open the file after downloading it, you’ll be asked to provide the username and the password of the VM to connect.

The screenshot shows the Microsoft Azure portal interface. On the left, there's a sidebar with various settings like Overview, Activity log, Access control (IAM), Tags, and Connect. Under Connect, the 'Windows Admin Center' option is selected. The main content area is titled 'vm1 | Connect' and shows the 'Virtual machine' details. At the top, there's a search bar and a warning message: 'To improve security, enable just-in-time access on this VM.' Below that, there are tabs for RDP, SSH, and Bastion, with RDP being the active tab. Under 'Connect with RDP', it says 'Suggested method for connecting'. A callout box indicates that Azure has checked prerequisites for this method. It lists three items: 'Checking network security group for inbound access from your client's IP address.', 'The VM's network interface has a Public IP address.', and 'The VM is running.' Below this, instructions say 'To connect to your virtual machine via RDP, select an IP address, optionally change the port number, and download the RDP file.' There are fields for 'IP address \*' (set to 'Public IP address (4.231.172.229)') and 'Port number \*' (set to '3389'). At the bottom, a blue button is highlighted with a red border, labeled 'Download RDP File'.

Another way to do it is to open the Remote Desktop Protocol app from windows and provide the public IP address of the virtual machine. After entering it you will also be asked to provide the username and the password of the VM in order to get remote access.

Once connected, we were asked to install the Internet Information Services (IIS) web server. For that, we access the server manager (The VM is a Windows 2019 server), and locate the add roles and features and in the server roles, choose the IIS web server option.

The screenshot shows the Server Manager dashboard. On the left, there's a navigation bar with 'Dashboard', 'Local Server', and 'All Servers'. The main area is titled 'WELCOME TO SERVER MANAGER' and features a 'QUICK START' section with five numbered steps: 1. Configure this local server, 2. Add roles and features, 3. Add other servers to manage, 4. Create a server group, and 5. Connect this server to cloud services. Below this, there's a 'ROLES AND SERVER GROUPS' section showing 'Local Server' and 'All Servers' both with 1 role: 'Manageability'. Each server also lists 'Events', 'Services', 'Performance', and 'BPA results'. A 'WHAT'S NEW' and 'LEARN MORE' button are also present.

This screenshot shows the 'Add Roles and Features Wizard' window, specifically the 'Results' step. The title bar says 'Add Roles and Features Wizard' and 'Installation progress'. The left pane shows the 'Before You Begin' and 'Installation Type' steps, while the right pane displays the 'View installation progress' section. It shows a progress bar for 'Feature installation' starting on 'vm1'. Under 'Web Server (IIS)', several features are listed: Management Tools, IIS Management Console, Web Server, Common HTTP Features (Default Document, Directory Browsing, HTTP Errors, Static Content), and Health and Diagnostics (HTTP Logging). A note at the bottom says: 'You can close this wizard without interrupting running tasks. View task progress or open this page again by clicking Notifications in the command bar, and then Task Details.' At the bottom are 'Previous', 'Next >', 'Install', and 'Cancel' buttons.

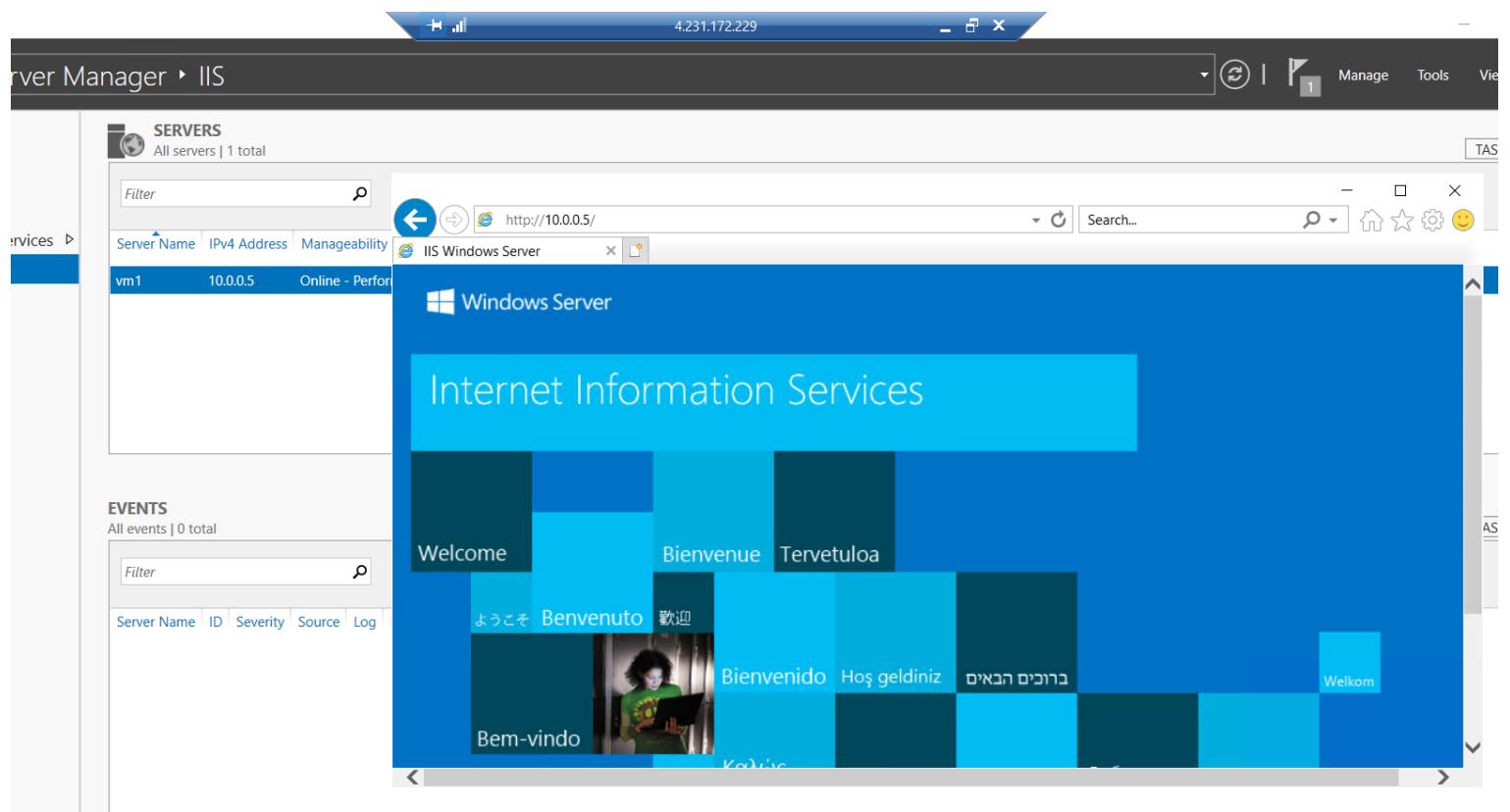
All good, server installed !

The screenshot shows the Windows Server Manager interface. The left sidebar has links for Dashboard, Local Server, All Servers, File and Storage Services, and IIS. The main area has tabs for SERVERS, EVENTS, and SERVICES. The SERVERS tab shows one server named 'vm1' with details: IP 10.0.0.5, Status Online - Performance counters not started, Last Update 2/13/2023 2:43:23 PM, and Windows Activation 00430-00000-00000-AA449 (Activated). The EVENTS tab shows no events. The SERVICES tab shows 3 services.

Internet Information Services server (IIS server) is a Windows Server-based web application used to deliver website content over the internet to an end user. Internet Information Services is an installable server role, and it is bundled with all Microsoft Windows Server products.

4- On the virtual machine, we open Internet Explorer and type the private address of this machine vm1 itself (we can see it in the server manager on the previous screenshot).

The IIS server works perfectly ! we can see the home page with no problem.



5- To access that same web server from the outside world, on the virtual machine blade, in the Networking section (Settings), we add an inbound port rule to the Network Security Group (NSG) to allow traffic on port 80 for any sort of requests on HTTP.

A Network Security Group (NSG) in Azure is the way to activate a rule or access control list (ACL), which will allow or deny network traffic to your virtual machine instances in a virtual network. NSGs can be associated with subnets or individual virtual machine instances within that subnet. When an NSG is associated with a subnet, the ACL rules apply to all Virtual Machine instances of that subnet. In addition, you can further restrict traffic to an individual virtual machine by associating an NSG directly to that virtual machine.

Inbound port rules in general protect the network against incoming traffic, such as disallowed connections, malware, and denial-of-service (DoS) attacks. Specifying the inbound port rules gives the permission to receive requests on specific ports only, otherwise, any access will be denied.

Microsoft Azure

Home > vm1

**vm1 | Networking**

Virtual machine

Search

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Networking

Connect

Windows Admin Center

Disks

Size

Microsoft Defender for Cloud

Advisor recommendations

Extensions + applications

Continuous delivery

Availability + scaling

Configuration

Attach network interface

Detach network interface

Feedback

vm137\_z1

IP configuration: ipconfig1 (Primary)

Network Interface: vm137\_z1 Effective security rules Troubleshoot VM connection issues

Virtual network/subnet: vnet1/default NIC Public IP: 4.231.172.229 NIC Private IP: 10.0.0.5 Accelerator

Inbound port rules Outbound port rules Application security groups Load balancing

Network security group vm1nsg710 (attached to network interface: vm137\_z1)  
Impacts 0 subnets, 1 network interfaces

Priority	Name	Port	Protocol
300	RDP	3389	TCP
65000	AllowVnetInBound	Any	Any
65001	AllowAzureLoadBalancerInBound	Any	Any
65500	DenyAllInBound	Any	Any

Need help?  
Understand Azure load balancing

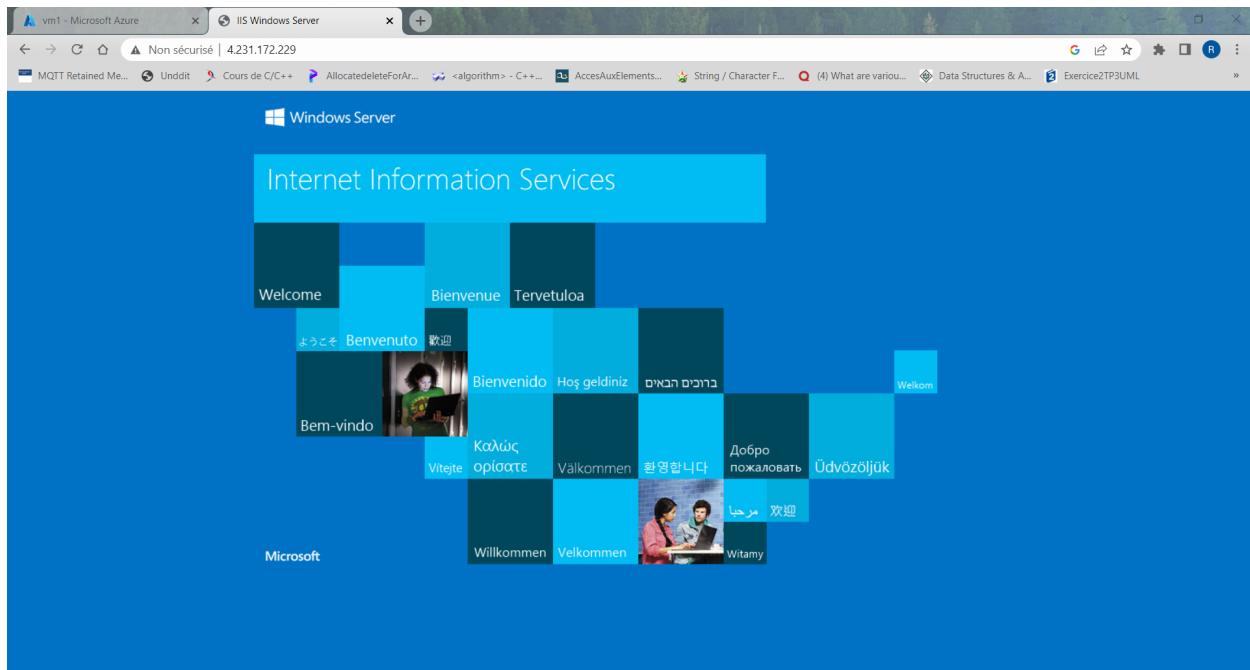
Add Cancel Give feedback

All set!

310	AllowAnyCustom80Inbound	80	Any	Any	Any	Allow	...
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6- We can access the IIS server through the public IP address of the virtual machine. The request to the VM from the outside world will be accepted since we have allowed traffic (any sort of HTTP requests) on port 80.

The VM is only visible to other networks through its public IP address.



7- On the virtual machine blade, in the Overview section click on Public IP address and then in configuration section (Settings), we give the DNS name label (DNSnamelabel.northeurope.cloudapp.azure.com), save and then paste it in the web browser to see the homepage of the web server to test the machine with a domain name.

DNS (Domain Name System) is a hierarchical and distributed naming system for computers, services, and other resources in the Internet or other Internet Protocol (IP) networks. It associates various information with domain names assigned to each of the associated entities. Most prominently, it translates readily memorized domain names to the numerical IP addresses needed for locating and identifying computer services and devices with the underlying network protocols.

The screenshot shows the 'Virtual machine settings' section of the Azure portal. It includes fields for IP address (4.231.172.229), idle timeout (4 minutes), and a DNS name label (dnsnamelabel). A note indicates that the suggested label is already in use. The URL .northeurope.cloudapp.azure.com is shown at the bottom.

IP address ⓘ  
4.231.172.229

Idle timeout (minutes) ⓘ  
4

DNS name label (optional) ⓘ  
dnsnamelabel

✖ DNS name label not available. Try using a different label.

.northeurope.cloudapp.azure.com

The dns name label suggested is already used ! 😞 We had to suggest a new one:  
dnsnamelabel1.northeurope.cloudapp.azure.com

The screenshot shows the 'Virtual machine settings' section of the Azure portal after changing the DNS name label to dnsnamelabel1. A green checkmark indicates success. The URL .northeurope.cloudapp.azure.com is shown at the bottom.

IP address ⓘ  
4.231.172.229

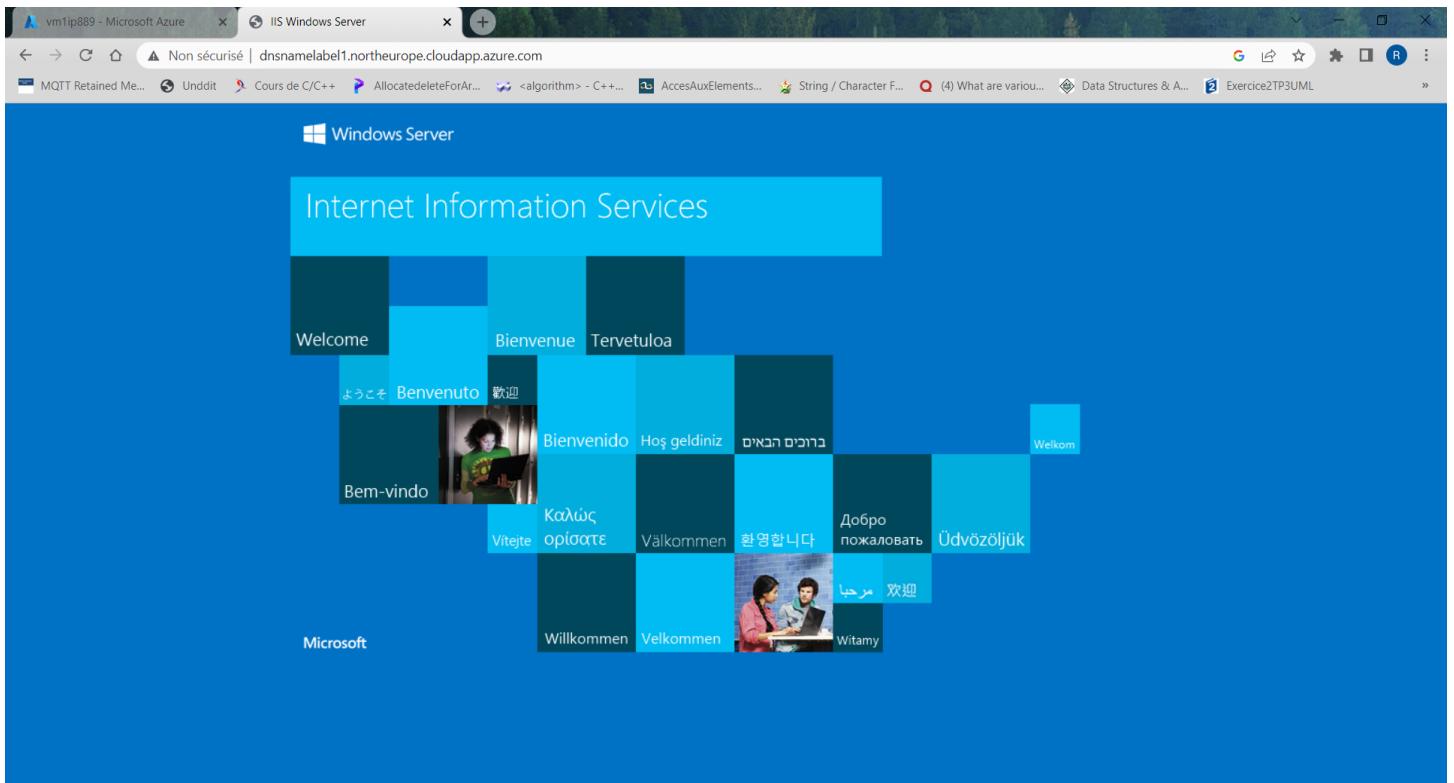
Idle timeout (minutes) ⓘ  
4

DNS name label (optional) ⓘ  
dnsnamelabel1

✓ You can use the IP address as your 'A' DNS record or DNS label as your 'CNAME' record. [Learn more about adding a custom domain to this IP address](#)

.northeurope.cloudapp.azure.com

The IIS server is now accessible through the DNS name label.



8- Now we have to deploy a new subnet with the name “SubnetA” on the virtual network “vnet1”. The address subnet range is 10.0.1.0/24.

### Subnets:

A subnet, or subnetwork, is a segmented piece of a larger network. More specifically, subnets are a logical partition of an IP network into multiple, smaller network segments. Routers are used to communicate between subnets.

One goal of a subnet is to split a large network into a grouping of smaller, interconnected networks to help minimize traffic. This way, traffic doesn't have to flow through unnecessary routes, increasing network speeds. A data center subnet might be designed to connect many more devices.

To create a subnet on “vnet1”, we go to the Subnets blade under “vnet1”, and add a new subnet.

Search resources, services, and docs (G+)

## vnet1 | Subnets

Virtual network

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Subnets**
- Bastion
- DDoS protection
- Firewall
- Microsoft Defender for Cloud
- Network manager
- DNS servers
- Peerings
- Service endpoints

+ Subnet + Gateway subnet Refresh

Name	IPv4	IPv6
default	10.0.0.0/24	-

Add subnet

Name \* SubnetA

Subnet address range \* 10.0.1.0/24  
10.0.1.0 - 10.0.1.255 (251 + 5 Azure reserved addresses)

Add IPv6 address space

NAT gateway

Network security group Loading...

Route table

**SERVICE ENDPOINTS**

Create service endpoint policies to allow traffic to specific Azure resources from your virtual network over service endpoints. [Learn more](#)

Services 0 selected

Save Cancel

Microsoft Azure

Search resources, services, and docs (G+)

Home > Virtual networks > vnet1

## Virtual networks

Ministère de l'Enseignement Supérieur et de la Recherche

- + Create
- Manage view
- ...

Filter for any field...

Name	...
tp1rg-vnet	...
tp1rgvnet553	...
vnet1	...

- Subnets
- Bastion
- DDoS protection
- Firewall
- Microsoft Defender for Cloud
- Network manager
- DNS servers
- Peerings
- Service endpoints

Page 1 of 1

+ Subnet + Gateway subnet Refresh Manage users Delete

Name	IPv4	IPv6	Available IPs	Delegated to	Security group	Route
default	10.0.0.0/24	-	249	-	-	-
SubnetA	10.0.1.0/24	-	251	-	-	-

Successfully added subnet SubnetA to virtual network 'vnet1'.

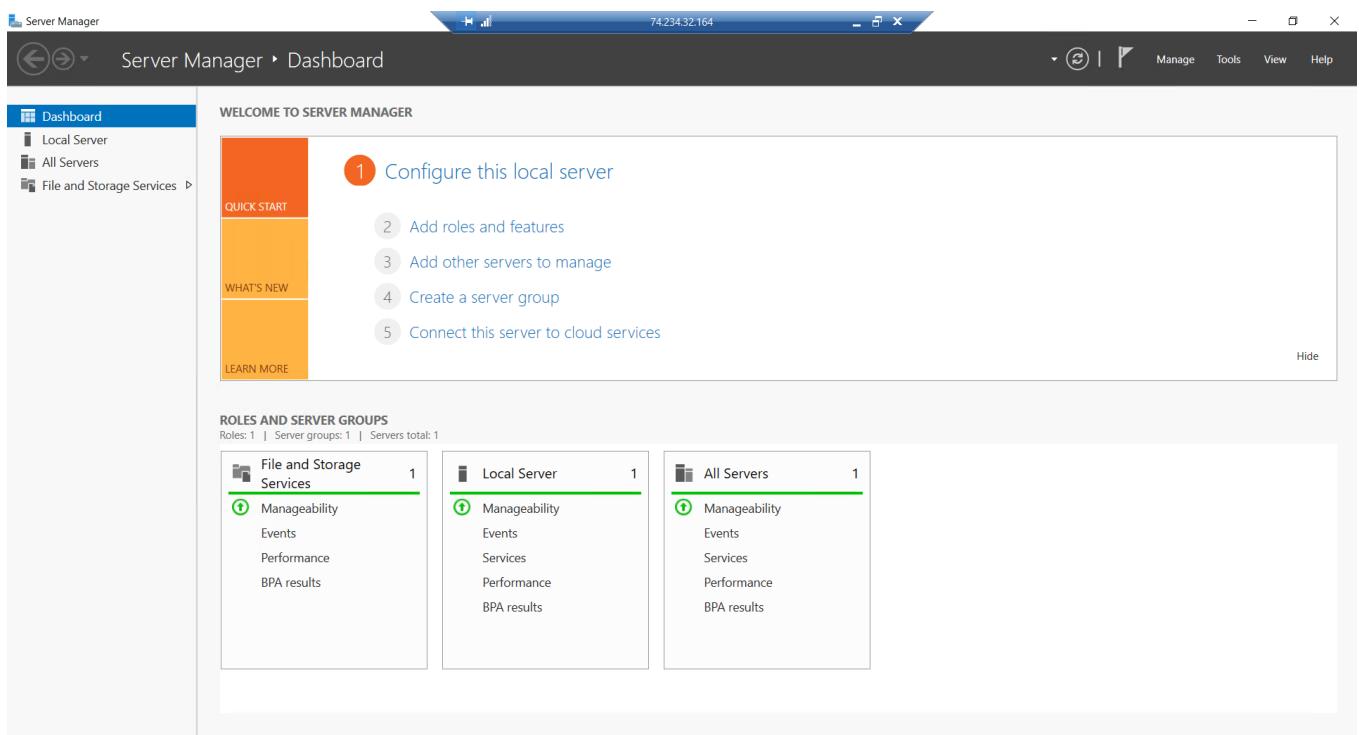
9- We create a new virtual machine as a part of vnet1 and that uses SubnetA with the following settings (we leave the others to default values):

- Resource group: tp1rg
- Name: vm2
- Region: North Europe
- Image: Windows server 2019

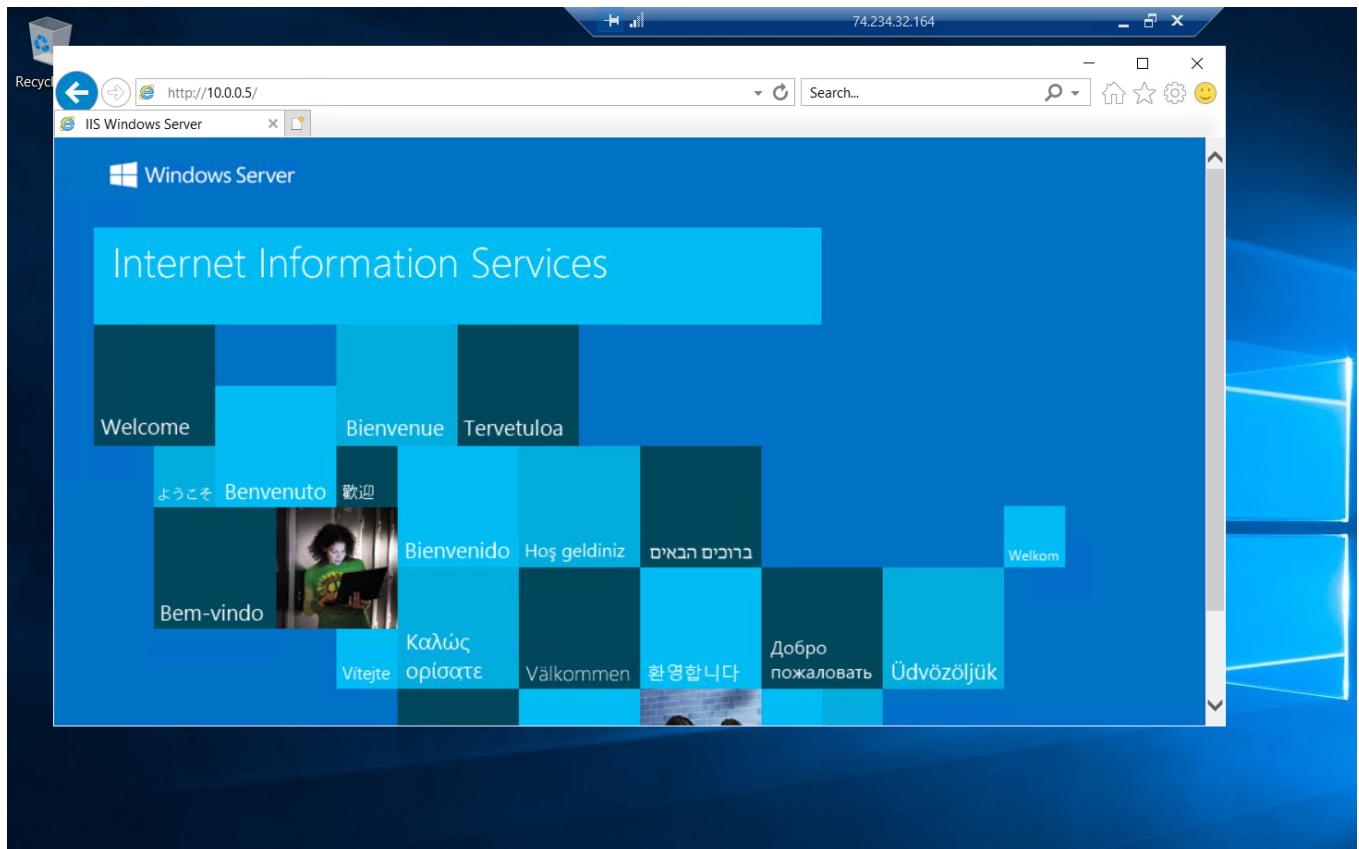
The screenshot shows the Microsoft Azure portal interface for managing virtual machines. The left sidebar lists 'Virtual machines' with two items: 'vm1' and 'vm2'. The main content area is focused on 'vm2', which is highlighted with a blue border. The top navigation bar includes search, resource groups, and account information. Below the search bar, there are buttons for 'Connect', 'Start', 'Stop', 'Capture', 'Delete', 'Refresh', 'Open in mobile', 'CLI / PS', and 'Feedback'. A warning message states: 'vm2 virtual machine agent status is not ready. Troubleshoot the issue →'. The 'Properties' tab is selected, displaying detailed configuration information:

Virtual machine		Networking	
Computer name	vm2	Public IP address	74.234.32.164
Health state	-	Public IP address (IPv6)	-
Operating system	Windows	Private IP address	10.0.1.4
Publisher	MicrosoftWindowsServer	Private IP address (IPv6)	-
Offer	WindowsServer	Virtual network/subnet	vnet1/SubnetA
Plan	2019-datacenter-gensecond	DNS name	Configure
VM generation	V2		
VM architecture	x64		
Agent status	Not Ready	Size	
Agent version	Unknown	Size	Standard B2s
Host group	None	vCPUs	2
Host	-	RAM	4 GiB
Proximity placement group	-	Disk	
Colocation status	N/A	OS disk	vm2_OsDisk_1_f2bd3928e7542cc9372b325048438b1
Capacity reservation	-	Encryption at host	Disabled

10- Now we connect onto the second virtual machine vm2, open Internet Explorer and type the private address of vm1 and you can see the default homepage of Internet Information Services

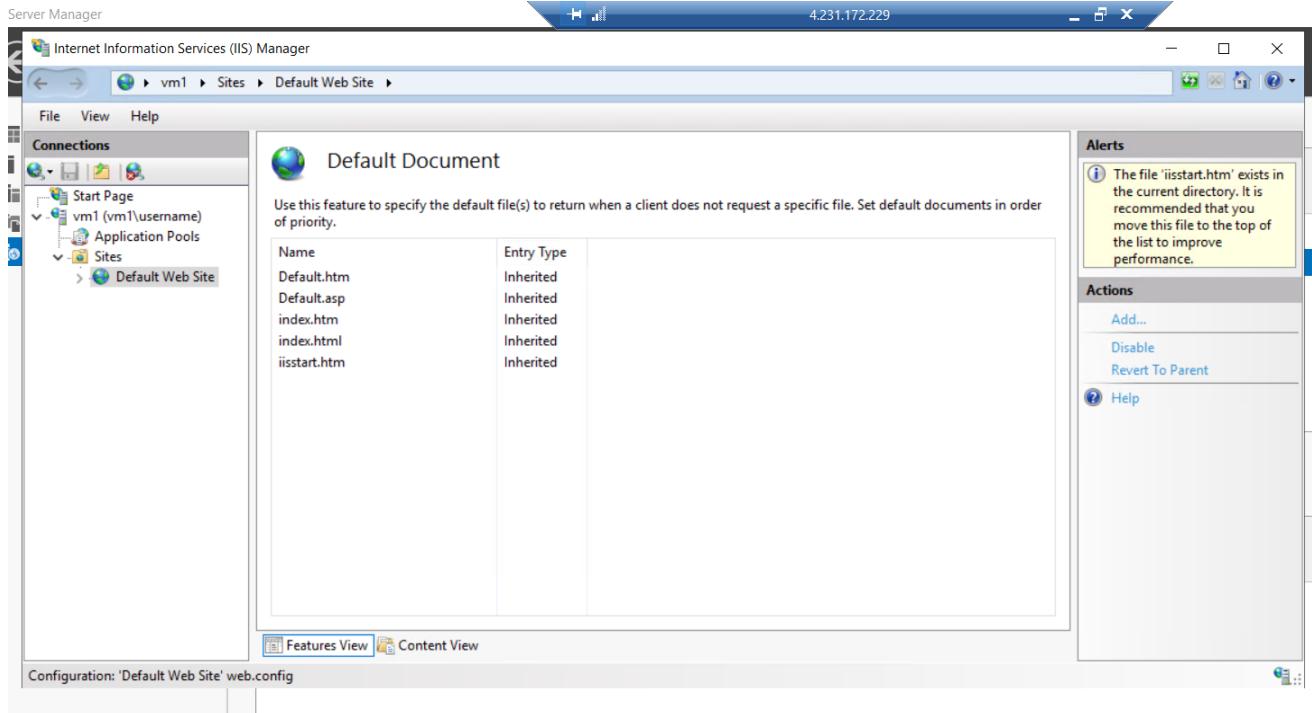


This time, we can access VM1 through its private IP address since we're on the same network.

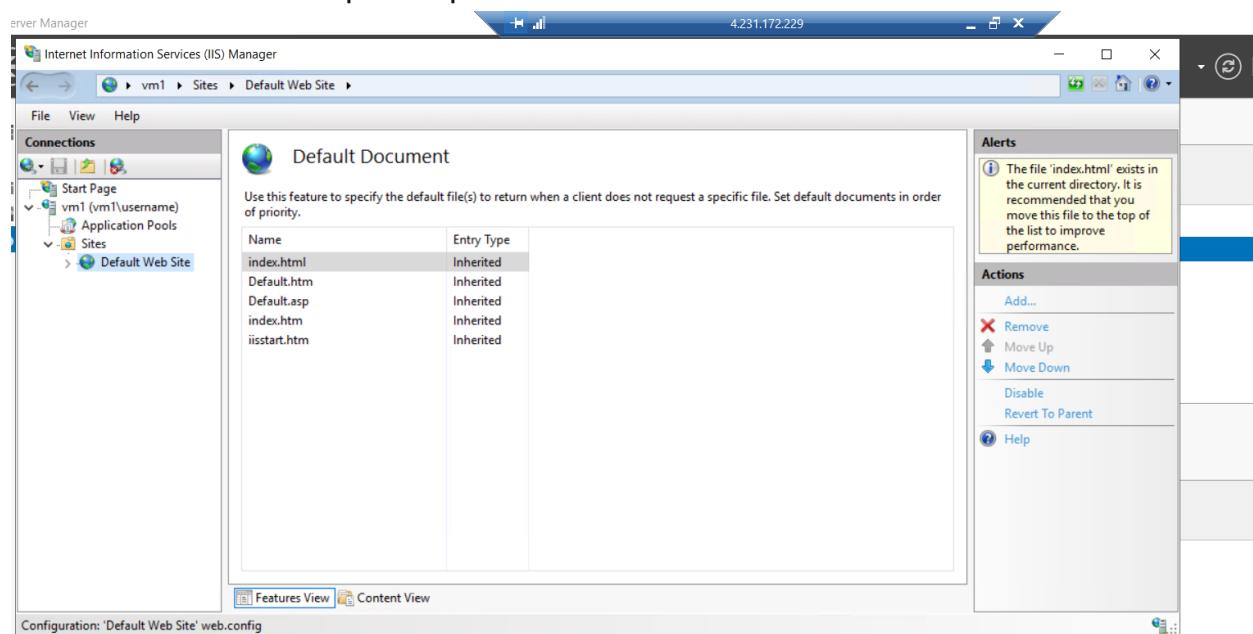


11- We change the default web page of the first virtual machine vm1, it must display now the “This is the web server” message,

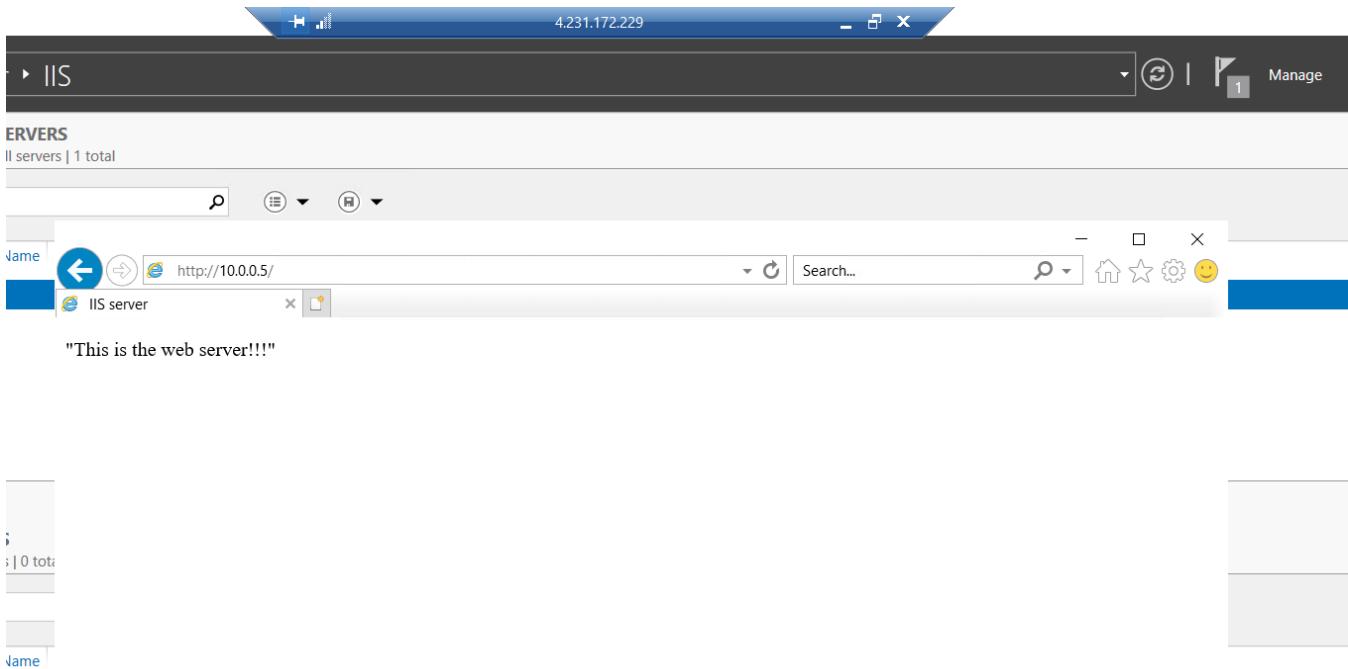
First we create a file “index.html” in the C:\inetpub\www which is the document root. We then navigate to tools, and we select the Internet Information Systems (IIS) manager. In the “Default Web Site” we double-click on “Default Document” to get this window:



The index.html file should be put on top of the list to be seen.



We then open the internet explorer and see the result.



12- We need to connect onto the second virtual machine vm2. First thing to do is install the DNS server by using the Server Manager. For this we will directly install the Active Directory Domain Services and the DNS software will be automatically installed on the server itself.

Active Directory (AD) is a directory service developed by Microsoft. It is a basis of distributed hierarchical data where all asset information is stored information such as users, computers and other resources in your fleet computer science. This directory also includes services that allow users to access and manipulate these resources.

Thus, Active Directory makes it possible to manage all the elements of the domain: the users, the groups, computers but also security policies and other objects defined by the users. It is in this context that he uses the LDAP protocol as well as the domain name (DNS) to locate and access all resources.

Active Directory Domain Services (AD DS) are the core functions in Active Directory that manage users and computers and allow storing information about objects on the network in a hierarchical structure.

AD DS stores information about user accounts, such as names, passwords, phone numbers, and so on, and enables other authorized users on the same network to access this information.

AD DS uses Domain Name System (DNS) name resolution services to make it possible for clients to locate domain controllers and for the domain controllers that host the directory service to communicate with each other.

The screenshot displays two windows from the Server Manager interface.

**Top Window: Installation progress**

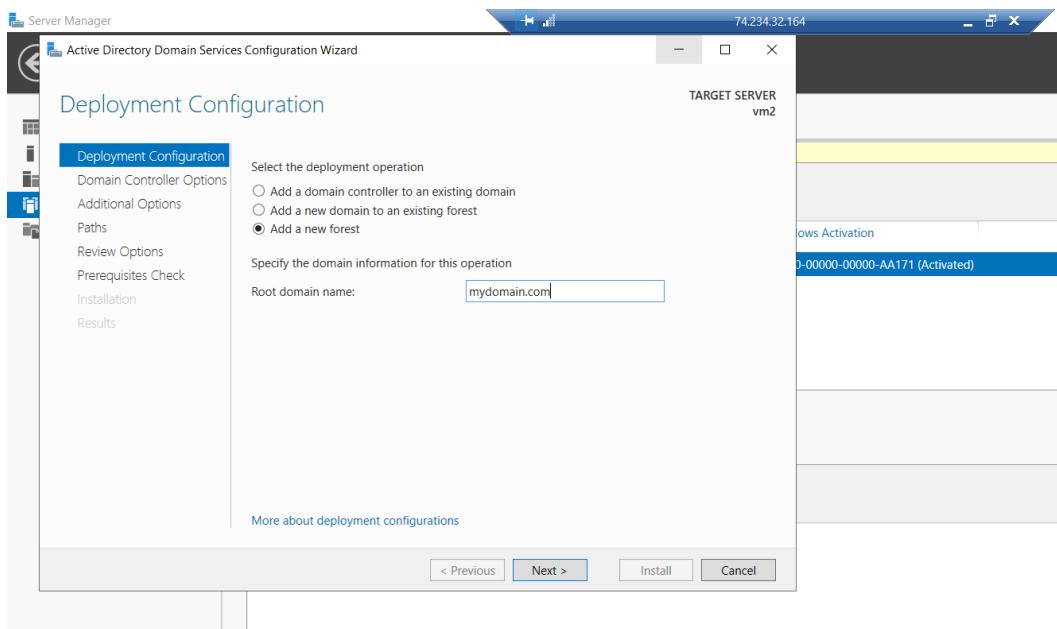
- Left pane:** Shows the "Before You Begin" section of the "Add Roles and Features Wizard". The "AD DS" role is selected.
- Right pane:** Shows the "View installation progress" section. It displays a progress bar labeled "Starting installation" and a list of installed components:
  - Active Directory Domain Services
  - Group Policy Management
  - Remote Server Administration Tools
  - Role Administration Tools
    - AD DS and AD LDS Tools
      - Active Directory module for Windows PowerShell
      - AD DS Tools
        - Active Directory Administrative Center
        - AD DS Snap-Ins and Command-Line Tools
    - DNS Server Tools

**Bottom pane:** Shows "BPA results" and "Performance" tabs. The "Performance" tab is selected.

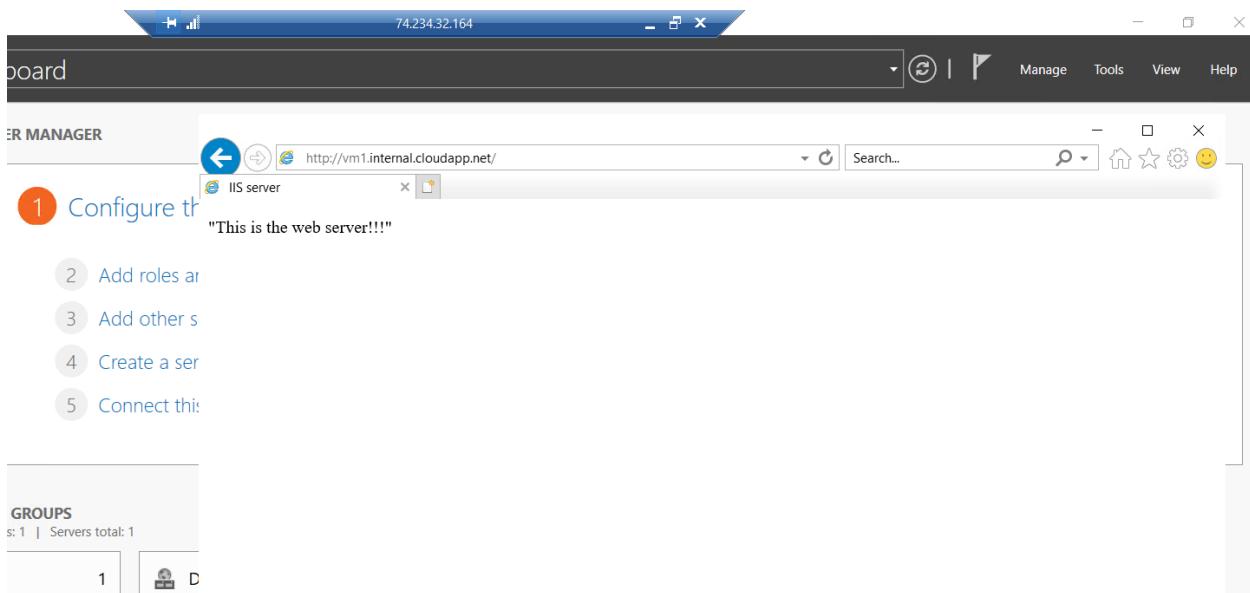
**Bottom Window: AD DS Status**

  - Left pane:** Shows the "AD DS" section of the Server Manager navigation menu.
  - Right pane:** Shows the "SUSPECT" status for Active Directory Domain Services on the server "vm2".
    - Servers:** All servers | 1 total. A warning icon indicates configuration required.
    - Events:** All events | 1 total. One event is listed: "vm2 1202 Error DFSR DFS Replication 2/13/2023 3:29:34 PM".
    - Services:** All services | 12 total.

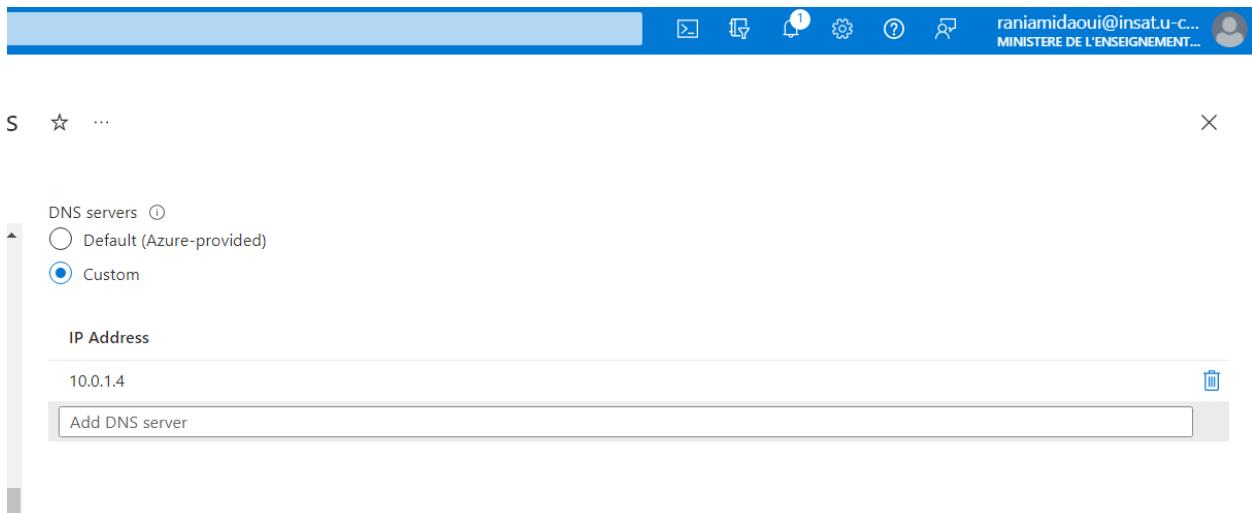
13- Once the installation is complete, we go into the notification in the dashboard of the Server Manager and click on Promote this server to a domain controller. We choose Add a new forest as a deployment operation and give the name to the root domain “mydomain.com”, and then give a strong password.



14- On the virtual machine vm2, we open Internet Explorer. When typing “vm1.internal.cloudapp.net” the domain name will be directly resolved to the IP address of vm1 and we will have access directly to the web server.



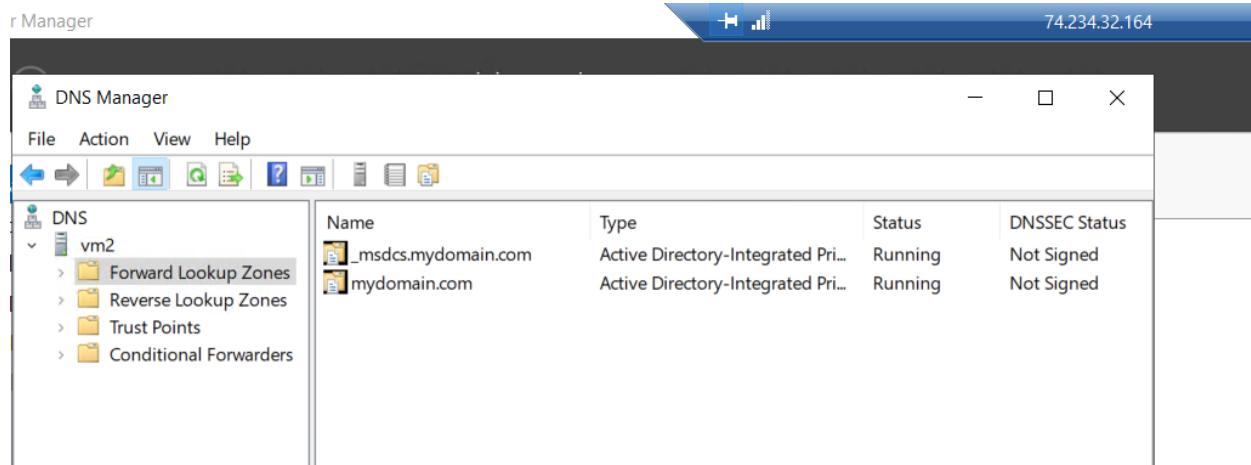
15- To use the created private domain, that is going to be available as a part of the Azure virtual network. We go on the virtual network blade, in the DNS servers section, we choose the option of custom and put the private address of the virtual machine vm2.



To make use of the internal DNS server, we have to restart the virtual machines that are part of the virtual network.



16- We connect onto the second virtual machine vm2, which is our DNS server, and go to tools in the dashboard of the Server Manager, and choose DNS. In the Forward lookup zones folder, we can see our domain “mydomain.com”.

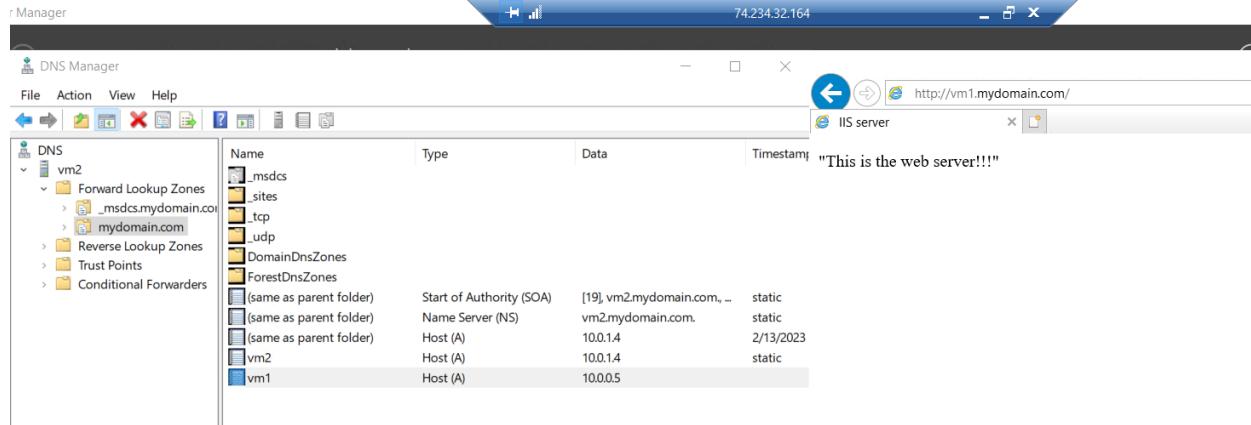


When we click on the “mydomain.com” folder we can see a list of registered records on the server. we have now to create a record that maps a name for your web server onto its IP address.

A DNS record, also known as a resource record (RR), maps a domain to an IP address. DNS records contain important information about the domain’s IP address and request handling, thus serving as DNS servers’ instructions.

An Address record (A Record), also known as a DNS host record, maps a domain to the physical IPv4 address of the computer hosting that domain’s services.

We created a new host record (A record), gave it the name “vm1” and give the private IP address of vm1.



17- On the virtual network blade, in the DNS servers' section, we change the option to default, save and reset the virtual machines again.

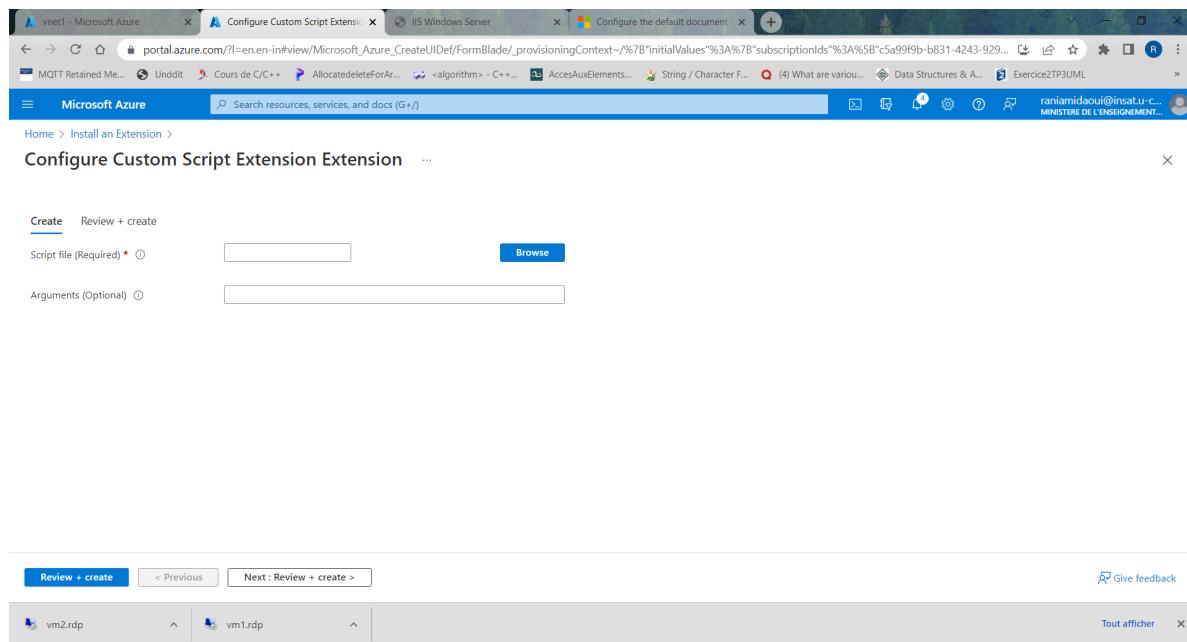
The screenshot shows the Microsoft Azure Virtual Networks blade. A search bar at the top right contains the text "Search resources, services, and docs (G+)" and a user profile icon for "raniamidaoui@insatu-c... MINISTÈRE DE L'ENSEIGNEMENT..." is on the far right. The main area displays a list of virtual networks: "vnet1 | DNS servers" (selected), "tp1rg-vnet", "tp1rgvnet553", and "vnet1". A sidebar on the left lists options like "Create", "Manage view", "Search", "Microsoft Defender for Cloud", "Network manager", "DNS servers" (which is selected and highlighted in blue), "Peering", "Service endpoints", "Private endpoints", "Properties", "Locks", "Monitoring" (with sub-options: Alerts, Metrics, Diagnostic settings, Logs, Connection monitor (classic), Diagram), and "Save" and "Cancel" buttons at the bottom. A status message in the top right says "Saving virtual network" and "Saving virtual network 'vnet1'." Below the main blade, two smaller windows show progress messages: one for "Restarting virtual machine" (Restarting the virtual machine 'vm1') and another for "Restarting virtual machine" (Restarting the virtual machine 'vm2').

18- We create a Custom Script Extension for vm2 which will install the IIS Server and change its default page to a new one containing only the string “vm”.

Azure virtual machine (VM) extensions are small applications that provide post-deployment configuration and automation tasks on Azure VMs.

The Custom Script Extension downloads and runs scripts on Azure virtual machines (VMs). This extension is useful for post-deployment configuration, software installation, or any other configuration or management task. You can download scripts from Azure Storage or GitHub, or provide them to the Azure portal at extension runtime.

To accomplish the task we go to the vm2 virtual machine blade, in the Settings section, we click on “Extensions + applications”, and then click “+ Add”. On the Install an Extension blade, we click on Custom Script Extension and then click Next.



Before browsing any script, we need to have one stored in a storage account in order to use it.

An Azure storage account contains all of your Azure Storage data objects, including blobs, file shares, queues, tables, and disks. The storage account provides a unique namespace for your Azure Storage data that's accessible from anywhere in the world over HTTP or HTTPS.

As it is a new Azure account, we don't have yet any storage account so we create one to into which we upload the following “install\_IIS.ps1” script :

```
powershell.exe Install-WindowsFeature -name Web-Server -IncludeManagementTools  
powershell.exe Remove-Item -Path 'C:\inetpub\wwwroot\iisstart.htm'  
powershell.exe Add-Content -Path 'C:\inetpub\wwwroot\iisstart.htm' -Value "$env:computername"
```

In the storage account we must create a container, which organizes a set of blobs, similar to a directory in a file system. A storage account can include an unlimited number of containers, and a container can store an unlimited number of blobs.

After creating the container, we can upload our script into it.

Everything is now set, we can use the script in the Custom Script Extension.  
We click "Browse" and choose the script from the storage account and finally we click create.

Microsoft Azure

Search resources, services, and docs (G+)

Home > Configure Custom Script Extension Extension

Create Review + create

Script file (Required) \* "install\_IIS.ps1"

Arguments (Optional)

< Previous Next : Review + create > Give feedback

Microsoft Azure

Search resources, services, and docs (G+)

Home > Microsoft.CustomScriptExtension-20230213170224 | Overview

Deployment

Search Delete Cancel Redeploy Download Refresh

Overview Inputs Outputs Template

Deployment is in progress

Deployment name: Microsoft.CustomScriptExtension-20230213170... Start time: 13/2/2023, 5:03:17 pm  
Subscription: Azure pour les étudiants Correlation ID: 8c03e03d-a0c1-4f03-b3be-b2f459f26c41

Deployment details

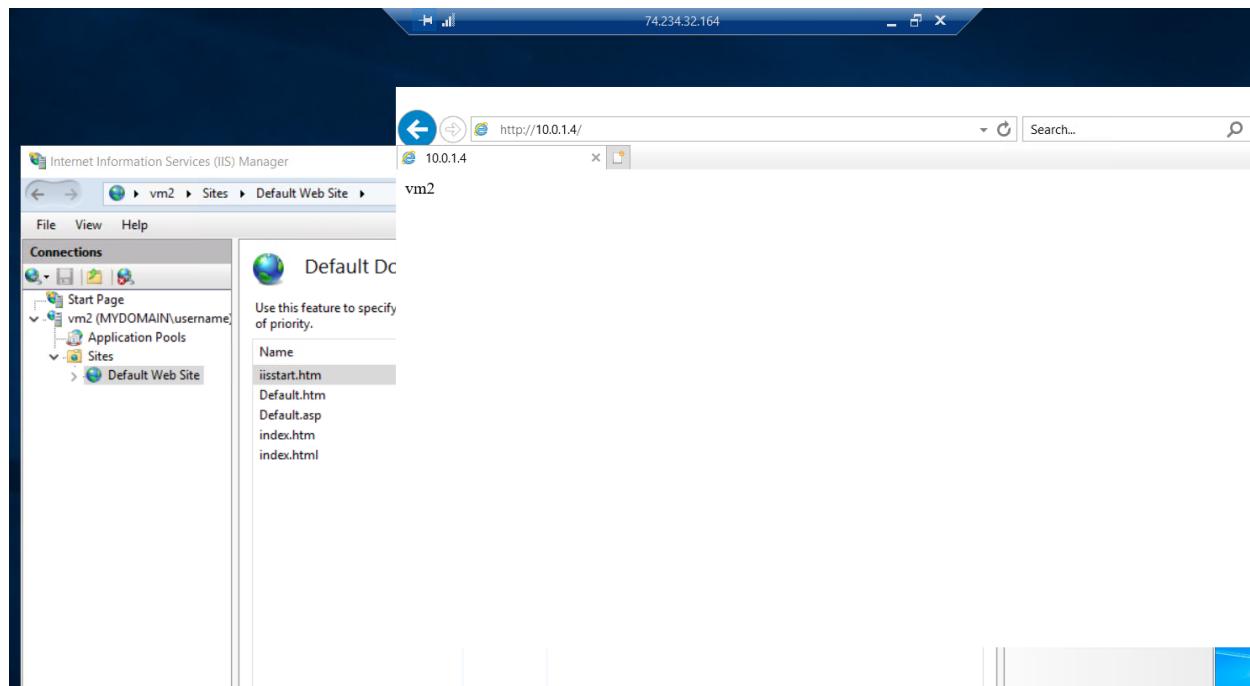
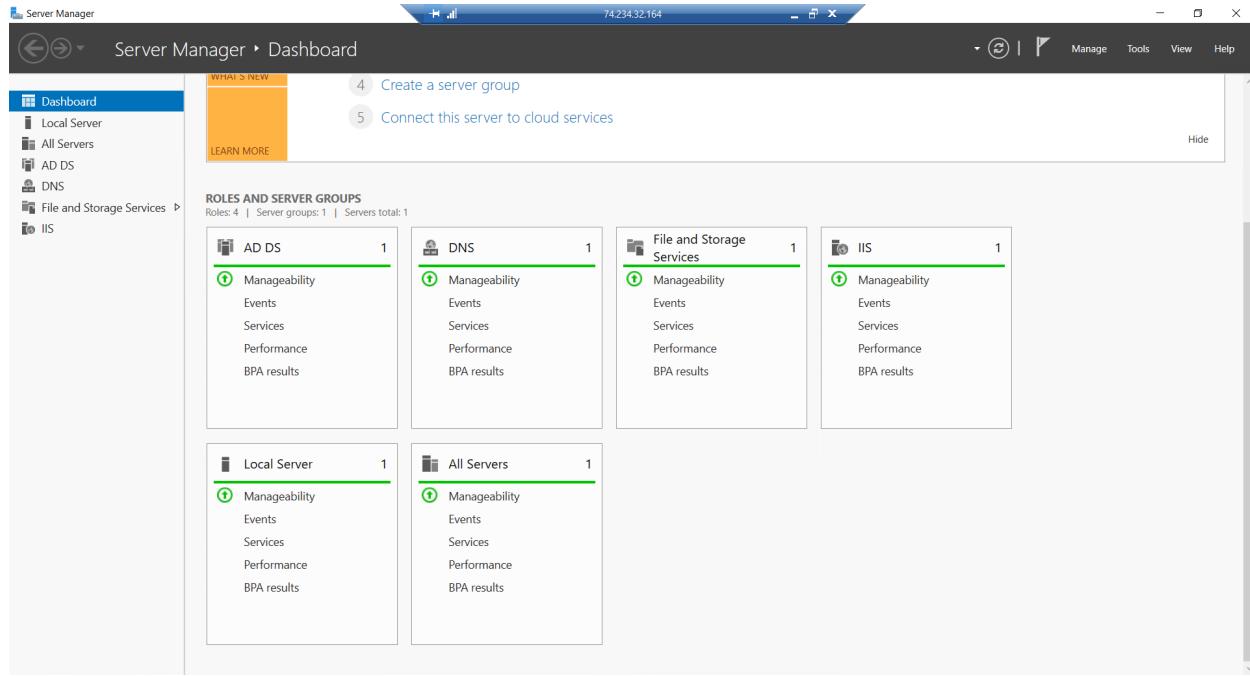
Resource	Type	Status	Operation details
vm2/CustomScriptExtension	Microsoft.Compute/virtualMachin...	Created	<a href="#">Operation details</a>

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When we open the virtual machine vm2, we can see that the script did its job, it installed IIS and changed its default page as desired.



19- We do repeat all the steps followed in 11) for vm2

The screenshot shows the IIS Manager interface. The left pane displays the 'Connections' tree, which includes the Start Page, the 'vm2 (MYDOMAIN\username)' node, Application Pools, and the 'Sites' node, under which the 'Default Web Site' is selected. The right pane is titled 'Default Document' and contains a table for specifying default files. The table has two columns: 'Name' and 'Entry Type'. The entries are:

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

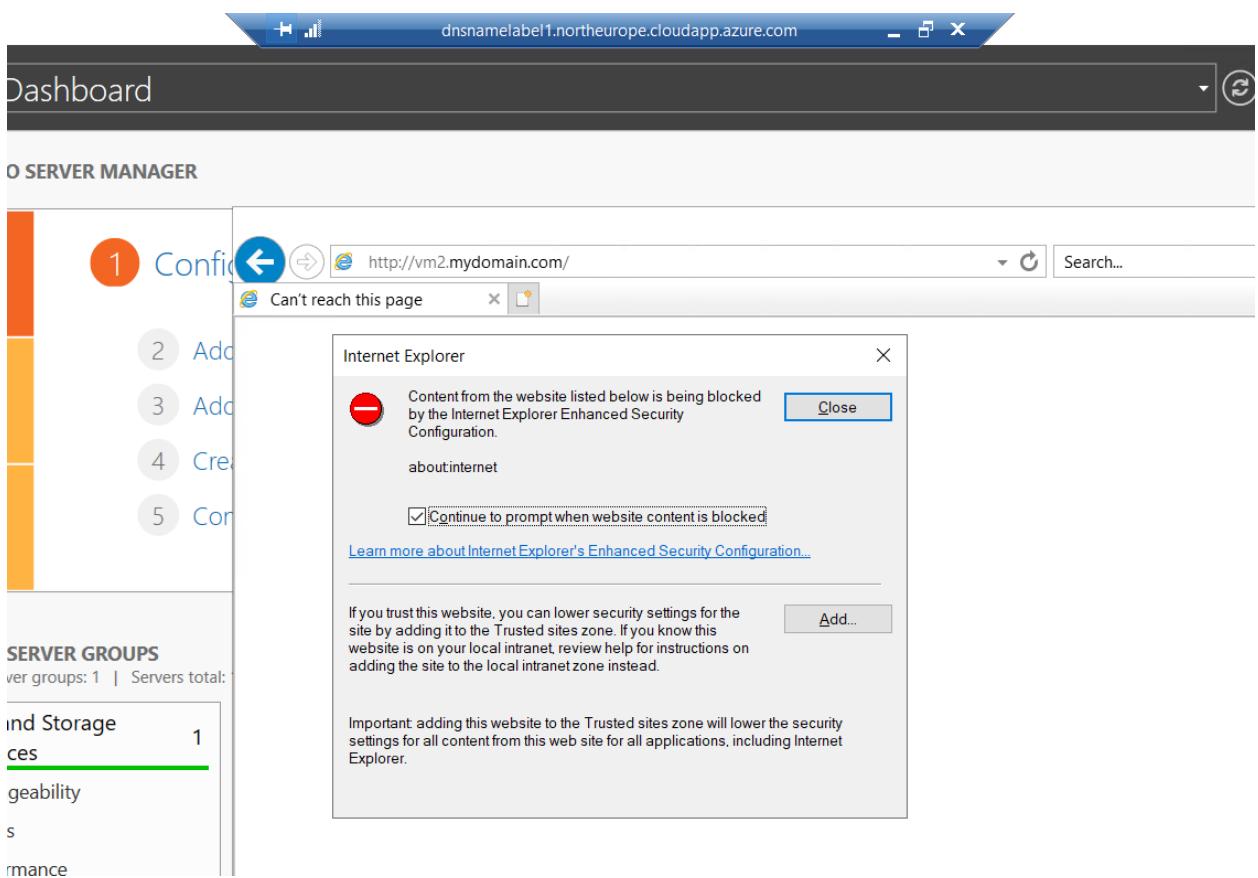
20- We repeat the same steps followed in 16)

The new host name is “vm2-dnsserver” and has the ip address of vm2.

Inbounders		
ForestDnsZones		
(same as parent folder)	Start of Authority (SOA)	[20], vm2.mydomain.com., -
(same as parent folder)	Name Server (NS)	vm2.mydomain.com.
(same as parent folder)	Host (A)	10.0.1.4
vm1	Host (A)	10.0.0.5
vm2-dnsserver	Host (A)	10.0.1.4

21- After connecting to vm1, we paste the FQDN of the DNS server in our browser expecting to find the server default page. But instead, we were facing an error.

In fact the VM couldn't resolve the domain name to an IP address of the server, therefore we were not able to reach the page.



22- To resolve the problem we had in 21), we implement the service of the Azure Private DNS.

**Private DNS Zone** : provides a reliable, secure DNS service to manage and resolve domain names in a virtual network without the need to add a custom DNS solution.

You can link a private DNS zone to one or more virtual networks by creating virtual network links. You can also enable the auto registration feature to automatically manage the life cycle of the DNS records for the virtual machines that get deployed in a virtual network.

To do that, in the Azure portal, we search for Private DNS Zone and then click on create. We choose the same resource group and give the name “mydomain.com” and leave others with their default values.

**Create Private DNS zone**

**Project details**

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription \* Azure pour les étudiants

Resource group \* tp1rg

Instance details

Name \* mydomain.com

Resource group location North Europe

You can link virtual networks to this Private DNS zone after zone has been created.

**Review + create** Previous Next : Tags Download a template for automation

23- We have to ensure that it is linked to your virtual network. For that we have to add a virtual network link.

By adding a virtual network link, our vnet1 will be directly linked to the private DNS zone. All the VMs in the virtual network will be registered to the zone and will be able to resolve the domain name defined in the private DNS zone.

On the private DNS zone blade, in the Virtual network links section, we add a link. Give a name, choose your virtual network “vnet1” and enable auto registration.

**Add virtual network link**

mydomain.com

Link name \* private\_tp1rg\_link

Virtual network details

Only virtual networks with Resource Manager deployment model are supported for linking with Private DNS zones.  
Virtual networks with Classic deployment model are not supported.

I know the resource ID of virtual network

Subscription \* Azure pour les étudiants

Virtual network \* vnet1 (tp1rg)

Configuration

Enable auto registration

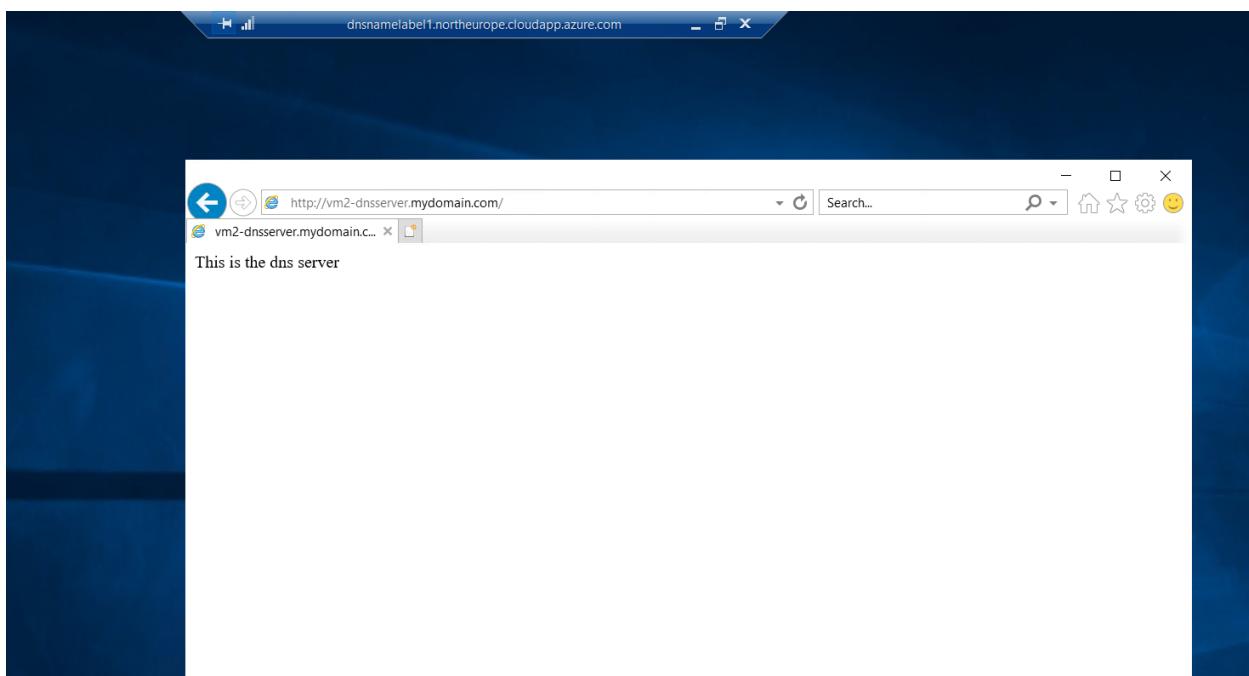
OK

We then go to the overview section, and scroll down. We notice that we now have A records for both virtual machines (vm1 and vm2). We add add the record that we created in 20) named “vm2-dnsserver”.

**A Records**, as stated before, are the simplest type of DNS records, and one of the primary records used in DNS servers. An A record maps a domain name to the IP address (Version 4) of the computer hosting the domain. An A record uses a domain name to find the IP address of a computer connected to the internet.

Name	Type	TTL	Value	Auto registered	...
@	SOA	3600	Email: azureprivatedns-host.microsoft.com Host: azureprivatedns.net Refresh: 3600 Retry: 300 Expire: 2419200 Minimum TTL: 10 Serial number: 1	False	...
vm1	A	10	10.0.0.5	True	...
vm2	A	10	10.0.1.4	True	...
vm2-dnsserver	A	3600	10.0.1.4	False	...

24- Now, vm1 can resolve the domain name and will redirect the user to the DNS server default page.



25- In this question, we're going to scale the storage of vm1 by attaching and configuring their data disks.

**Scaling in Azure:** Scalability is the ability of a system to handle increased load. Two main ways an application can scale include **vertical scaling** and **horizontal scaling**. Vertical scaling (scaling up) increases the capacity of a resource, for example, by using a larger virtual machine (VM) size. Horizontal scaling (scaling out) adds new instances of a resource, such as VMs or database replicas.

In this task, we will automate the vertical scaling of our VM.

To do that, on the vm1 blade, in the Automation section, we click export template, we click deploy and then edit template.

In the section displaying the content of the template, we replace line ("dataDisks": [] line) by the code in the picture bellow:

```

    {
      "parameters": {
        "virtualMachines_vm1": {
          "type": "Microsoft.Compute/virtualMachines"
        }
      },
      "resources": [
        {
          "type": "Microsoft.Compute/virtualMachines/extensions",
          "apiVersion": "2022-08-01",
          "name": "[concat(parameters('virtualMachines_vm1_name'), '/enablevmaccess')]",
          "location": "northeurope",
          "dependsOn": [
            "[resourceId('Microsoft.Compute/virtualMachines', parameters('virtualMachines_vm1_name'))]"
          ],
          "properties": {
            "autoUpgradeMinorVersion": true,
            "publisher": "Microsoft.Compute",
            "type": "VMAccessAgent",
            "typeHandlerVersion": "2.0",
            "settings": {
              "UserName": "username"
            },
            "protectedSettings": {}
          }
        }
      ]
    }
  
```

We also encountered an error saying that the admin password should not be empty when username in the "/enablevmaccess" section so modified the default template code to look like that, no admin username is stated because we already stated it earlier, and it overlapped with this one, so the password error was resolved.

```

    {
      "parameters": {
        "virtualMachines_vm1": {
          "type": "Microsoft.Compute/virtualMachines"
        }
      },
      "resources": [
        {
          "type": "Microsoft.Compute/virtualMachines/extensions",
          "apiVersion": "2022-08-01",
          "name": "[concat(parameters('virtualMachines_vm1_name'), '/enablevmaccess')]",
          "location": "northeurope",
          "dependsOn": [
            "[resourceId('Microsoft.Compute/virtualMachines', parameters('virtualMachines_vm1_name'))]"
          ],
          "properties": {
            "autoUpgradeMinorVersion": true,
            "publisher": "Microsoft.Compute",
            "type": "VMAccessAgent",
            "typeHandlerVersion": "2.0",
            "settings": {
              "UserName": "username"
            },
            "protectedSettings": {}
          }
        }
      ]
    }
  
```

26- We now will create a drive Z: consisting of the two newly attached disks with the simple layout and fixed provisioning using Powershell commands:

On the vm1 blade, in the Operations section, we click Run command, and, in the list of commands, we click RunPowerShellScript. On the Run Command Script blade, we type the following and run it.

The screenshot shows the Microsoft Azure portal interface. On the left, the 'Virtual machines' blade is open, displaying two VMs: 'vm1' and 'vm2'. In the center, a 'Run command' dialog is open for 'vm1'. The 'Run Command Script' tab is selected. A PowerShell script is pasted into the 'PowerShell Script' area:

```

1 New-StoragePool -FriendlyName storagepool1 -StorageSubsystemFriendlyName "Windows Storage" -Ph
2 New-VirtualDisk -StoragePoolFriendlyName storagepool1 -FriendlyName virtualdisk1 -Size 2046GB -
3 Initialize-Disk -VirtualDisk (Get-VirtualDisk -FriendlyName virtualdisk1)
4 New-Partition -DiskNumber 4 -UseMaximumSize -DriveLetter Z

```

The 'Run' button is highlighted in blue. Below the script, the 'Output' window shows the results of the command execution:

```

DiskNumber : 4
DriveLetter : Z
GptType : {ebd0a0a2-b9e5-4433-87c0-68b6b72699c7}
Guid : {1013e7a2-9216-4927-b500-34370e0ad0c3}
IsActive : False
IsBoot : False
IsDAX : False
IsHidden : False
IsOffline : False
IsReadOnly : False
IsShadowCopy : False
IsSystem : False
MbrType :
NoDefaultDriveLetter : False
Offset : 16777216
OperationalStatus : Online
PartitionNumber : 2
Size : 2196857946112
TransitionState : 1
PSCoputerName :
Type : Basic
DiskPath : \\?\storage#disk#{53918d9c-e4ff-45b7-9504-cbfea0a467e9}#{53f56307-b6bf-11d0-94f2-00a0c91efb8b}

```

The command ran successfully and we can see its output on the output window on the bottom right:

```

DiskNumber : 4
DriveLetter : Z
GptType : {ebd0a0a2-b9e5-4433-87c0-68b6b72699c7}
Guid : {1013e7a2-9216-4927-b500-34370e0ad0c3}
IsActive : False
IsBoot : False
IsDAX : False
IsHidden : False
IsOffline : False
IsReadOnly : False
IsShadowCopy : False
IsSystem : False
MbrType :
NoDefaultDriveLetter : False
Offset : 16777216
OperationalStatus : Online
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DiskPath : \\?\storage#disk#{53918d9c-e4ff-45b7-9504-cbfea0a467e9}#{53f56307-b6bf-11d0-94f2-00a0c91efb8b}

```

---

## Conclusion:

This TP shows some great aspects of Azure virtual machines. It helped us get some hand-on experience by manipulating two virtual machines and some related services.

An Azure virtual machine, besides giving us the flexibility of virtualization without having to buy and maintain the physical hardware that runs it, can interact with a variety of services to facilitate its use and help create more efficient solutions.

As it is the case of many other cloud solutions like AWS, GCP and many more.