Lenovo

Deployment Guide: On-premises VDI Solution with Azure Virtual Desktop on Lenovo ThinkAgile MX

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Version 1.2

Enhanced Security and Compliance

Optimized End User Experience

Scalability and Flexibility A VDI Managed Service

Unified Virtualization Infrastructure

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1 Introducing Azure Virtual Desktop on Azure Local

Azure Virtual Desktop is a flexible cloud based VDI solution that can be used to deploy and scale Windows desktops and apps on Azure Local in minutes to enable secure, remote work.
Lenovo`s ThinkAgile MX Series with Azure Local unlocks full potential of AVD and offers consistent and stable performance as the hardware plays a critical role on the overall experience. By selecting the right configuration for CPU, RAM and storage the experience can be the same as working locally but with all of the advantages of AVD. Also the solution allows configurations that include GPU`s for professional users that require a graphics hardware acceleration in their workflow.

IT views all components on the same management plane, and it is simple to create and use Azure Virtual Desktop sessions on an Azure Local instance. With the support of Azure Virtual Desktop for Azure Local, Windows 10 and Windows 11 multisession capabilities are available in on premises environments.
IT staff can support multiple users on a single virtual machine (VM).

That greatly reduces the number of VMs and the system-resource overhead costs while still providing the same resources to all end users. Azure Virtual Desktop also simplifies management and user support. Because Azure Virtual Desktop is a managed service, organizations don't need to deploy a VDI themselves or have the burden of upgrading infrastructure. This is a game-changing advantage compared to other VDI solutions.

1.1 Why Azure Virtual Desktop on Azure Local?

The pace of change is accelerating everywhere, especially in the workplace. But two things are clear: flexible work is here to stay, and the talent landscape (workers with in-demand skills) has fundamentally shifted, soon, if not already, millions of employees will be working from home or at another remote site, rather than at a central office.

This new workplace shift is pushing IT administrators to set up VDI with remote connectivity, security, and management capabilities so that employees can remain productive and access necessary apps from wherever they are. Moving to the cloud offers many benefits to enterprises, including scalability, cost efficiencies, and near-limitless data capacity. However, many industries are required to keep their data on premises due to data-sovereignty needs and regulatory requirements.

What if there were a way to bring all the cloud benefits on premises by using familiar tools and applications based on Windows with a fully managed, cloud hosted VDI management plane?
The new Azure Local and Azure Virtual Desktop on Lenovo Systems (Microsoft's VDI solution) can do just that to help companies overcome their remote work challenges in a powerful and efficient manner.

1.2 The key benefits

This section covers the many benefits of AVD on Azure Local.

Cost Efficiency: While cloud services typically involve ongoing costs, deploying Azure Virtual Desktop on Azure Local can provide a more cost-effective solution for organizations with predictable or high-performance computing needs. By utilizing on-premises infrastructure, you may avoid some of the recurring costs associated with cloud usage, especially for long-term or stable workloads.

Data Residency and Compliance: For organizations with stringent data residency requirements due to regulatory reasons, Azure Virtual Desktop on Azure Local allows you to keep sensitive data on-premises while still benefiting from a virtual desktop infrastructure. This hybrid approach ensures compliance with local data regulations and provides greater control over data governance.

GPU Enablement: Certain workloads, especially those requiring graphic power, benefit from GPU acceleration. Azure Virtual Desktop on Azure Local supports GPU enablement, allowing you to run graphics-intensive applications and workloads locally. This is particularly advantageous for scenarios such as design, engineering, or other specialized use cases where high-performance graphics are crucial.

Customized Performance: Azure Local provides flexibility in tailoring the infrastructure to meet specific performance requirements. By deploying Azure Virtual Desktop on-premises, organizations can fine-tune the hardware specifications, including CPU, memory, and storage, to optimize the virtual desktop environment based on the unique demands of their users.

Reduced Latency: For scenarios where low-latency access is critical, on-premises deployment of Azure Virtual Desktop on Azure Local can offer reduced latency compared to accessing virtual desktops from the cloud. This can be particularly beneficial for applications that require real-time responsiveness or for users located in regions with limited network connectivity.

Offline Access: In situations where intermittent or limited connectivity to the cloud is a concern, having Azure Virtual Desktop on-premises provides the capability for offline access. Users can continue to work locally, ensuring productivity even during periods of connectivity challenges.

Optimized Resource Utilization with Single and Multi-Session Scenarios: Azure Virtual Desktop on Azure Local offers flexibility in deploying both single-session and multi-session virtual machines (VMs). Single-session VMs are ideal for resource-intensive tasks that require dedicated resources, while multi-session VMs, powered by Windows 10 multi-session capability, enable efficient sharing of resources among multiple users. This approach optimizes resource utilization, allowing organizations to tailor deployments based on the specific needs of users and workloads, thereby maximizing efficiency and cost-effectiveness.

Enhanced Performance with RDP Shortpath for Low-Latency User Access: Azure Virtual Desktop on Azure Local leverages the advanced capabilities of Remote Desktop Protocol (RDP) Shortpath, a feature designed for low-latency communication between the client and the virtual desktop. By utilizing this technology, users experience accelerated responsiveness and reduced latency, crucial for tasks demanding real-time interactions. Whether accessing virtual desktops locally or remotely, the implementation of RDP Shortpath ensures an efficient and fluid user experience, enhancing productivity and responsiveness across diverse network conditions. This benefit is especially valuable in scenarios where rapid and lag-free access to applications and resources is paramount for user satisfaction and operational efficiency.

It's essential to carefully evaluate your organization's specific requirements, budget considerations, and compliance needs to determine whether an on-premises or cloud-based solution, or a hybrid approach, is the most suitable for your Azure Virtual Desktop deployment.

2 Before you get started

The following summarizes, at a high-level, what you will need to run Azure Virtual Desktop on Azure Local

2.1 Functional prerequisites

- An Azure Local instance deployed and registered with Azure. From a CPU perspective, it's recommended to have at least 16 cores, with 256GB memory, but this is largely determined by your workload requirements. A minimal install of Azure Virtual Desktop with a single VM cluster will likely consume approximately 24-30GB RAM.

- We recommend 1TB storage capacity in your Azure Local storage pool used to store virtual machines. However, again, this will be determined by your workload requirements.

- Active Directory domain, you need a domain account that can join computers to your domain. For Microsoft Entra Domain Services, you would need to be a member of the AAD DC Admin group.

- User Account Requirements. Users must have accounts in the Microsoft Entra ID system. For Azure Virtual Desktop on Azure Local deployments using AD DS - Configure Microsoft Entra Connect for user identity synchronization between AD DS and Microsoft Entra ID.

- External internet connectivity for both the Azure Local nodes, and the Azure Virtual Desktop components.

- Azure subscription for Azure Virtual Desktop Session Host Pool with the appropriate permissions.

- Network Validation for AVD Links - https://docs.microsoft.com/en-us/azure/virtual-desktop/safe-url-list

- Ensure your account is granted the following built-in RBAC roles at the resource group or subscription level. To assign these roles to a resource group, ensure it has been created beforehand.

Table 1 Resource types and roles

Resource type	RBAC role
Host pool, workspace, and application group	Desktop Virtualization Contributor
Session hosts (Azure)	Virtual Machine Contributor
Session hosts (Azure Local)	Azure Stack HCI VM Contributor

2.2 Known limitations

The access to your on-premises or Active Directory domain-joined resources may be impacted by the following known limitations. It is advisable to take these limitations into account when determining the suitability of Microsoft Entra-joined VMs for your environment.

- Azure Virtual Desktop (classic) doesn't support Microsoft Entra joined VMs.
- Microsoft Entra joined VMs don't currently support external identities, such as Microsoft Entra Business-to-Business (B2B) and Microsoft Entra Business-to-Consumer (B2C).

2.3 Hardware configurations for Azure Virtual Desktop on Azure Local

Lenovo certified Azure Local solutions can be found at [ThinkAgile MX.](#)

Lenovo rack systems feature innovative hardware, software and services that solve customer challenges today and deliver an evolutionary fit-for-purpose, modular design approach to address tomorrow's challenges. These servers capitalize on best-in-class, industry-standard technologies coupled with differentiated Lenovo innovations to provide the greatest possible flexibility in x86 servers. Key advantages of deploying Lenovo rack servers include:

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- Expansive storage capacity and flexible storage configurations for optimized workloads
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You can trust Lenovo systems for world-class performance, power-efficient designs and extensive standard features at an affordable price.

The following Lenovo servers have been certified for Microsoft Azure Local and are equipped to support

4 to 64-core processors, up to 4TB of memory and over 100TB of storage making them ideal candidates for Azure Local Virtualized Desktop Infrastructure solutions:

- Lenovo ThinkAgile MX650 V3 validated nodes
- Lenovo ThinkAgile MX630 V3 validated nodes
- Lenovo ThinkAgile MX455 V3 validated nodes
- Lenovo ThinkAgile MX450 validated nodes
- Lenovo ThinkAgile MX3530 Integrated systems / MX3531 validated nodes (based on ThinkSystem SR650 V2)
- Lenovo ThinkAgile MX3330 Integrated systems / MX3331 validated nodes (based on ThinkSystem SR630 V2)

2.4 Supported OS deployment configuration

You can select one of the following 64-bit Operating system using an Image form Azure Marketplace or use a custom image.

- Windows 11 Enterprise multi-session
- Windows 11 Enterprise
- Windows 10 Enterprise multi-session
- Windows 10 Enterprise
- Windows Server 2022
- Windows Server 2019

2.5 High-Level deployment steps overview.

Network Preparation

1. *Choose Network Layout:*

   - Select a pre-defined network configuration that matches your physical server cabling. This will serve as a template for configuring your virtual network settings later.

Domain Preparation

2. *Active Directory*:

   - Verify your Active Directory domain is properly configured to integrate with Azure Local.

Cluster Deployment

3. *Download Installation Media:*

   - Obtain the Azure Local ISO file from the Azure portal.

4. **Install OS on Servers:**

   - Install the downloaded Azure Stack HCI operating system on each server that will be part of the cluster.

5. *Configure Proxy (Optional):*

   - If your network utilizes a proxy server for internet access, configure the proxy settings on all cluster servers.

6. *Register Servers & Assign Permissions:*

   - Run the Azure Arc registration script on each server intended for the cluster.
   - Assign the necessary permissions required for deployment.

7. *Create Azure Local instance:*

You have two options for creating the cluster:

- Azure Portal: Use the Azure portal to select the Arc-registered servers and create the Azure Local cluster.

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- ARM Template (Advanced): Utilize an Azure Resource Manager (ARM) template for automated cluster creation (refer to documentation for details).

Azure Virtual Desktop Deployment (Separate Process):

Note: These steps are for deploying Azure Virtual Desktop on your newly created Azure Local cluster and are not directly part of the Azure Local deployment itself.

8. ***Choose a VM Image***:

   - Azure Marketplace: Browse the Azure Marketplace to find a pre-configured virtual machine image that aligns with your needs. These images often include pre-installed applications and configurations, saving you setup time.
   - Custom Image: Alternatively, if you have specific requirements, you can use a custom image that you've prepared beforehand. This image should contain the desired operating system and any necessary applications.

9. **Create a Virtual Network**:

   - Match Your Network: Design a virtual network that mirrors your existing network layout within Azure Local.

10. **Create a Host Pool**:

    - This is the initial step for setting up your virtual desktops.

11. **Define Your Workspace**:

    - This step involves defining the workspace environment for your virtual desktops.

12. **Designate Application Groups**:

    - Here you will organize your applications into groups for easier management within your virtual desktop environment.

3 Deployment requirements

The deployment process outlined in this guide offers a comprehensive and flexible approach to deploying Azure Virtual Desktop on Azure Local. This section covers some deployment pre-requisite configurations.

3.1 Setup the Image Gallery

1. Sign into the Azure portal.

2. Navigate to the Azure Local resource in the portal and select VM Images in the left pane.
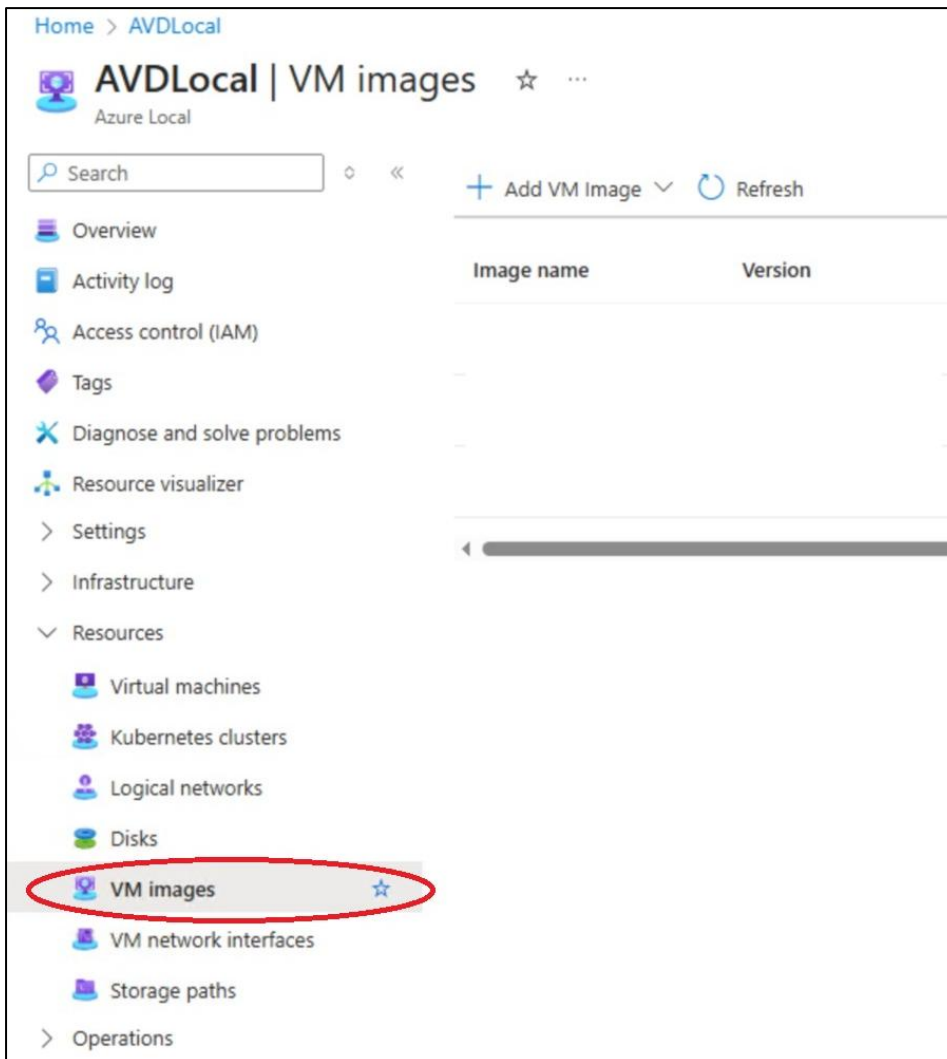
Figure 1 View of VM image page

3.1.1 VM Image Gallery

To prepare a VM image for AVD use on Azure Local instance, follow these steps:

1. Click on VM Images from the Azure Local resource.

2. Choose the image source, selecting Azure Marketplace in this case.
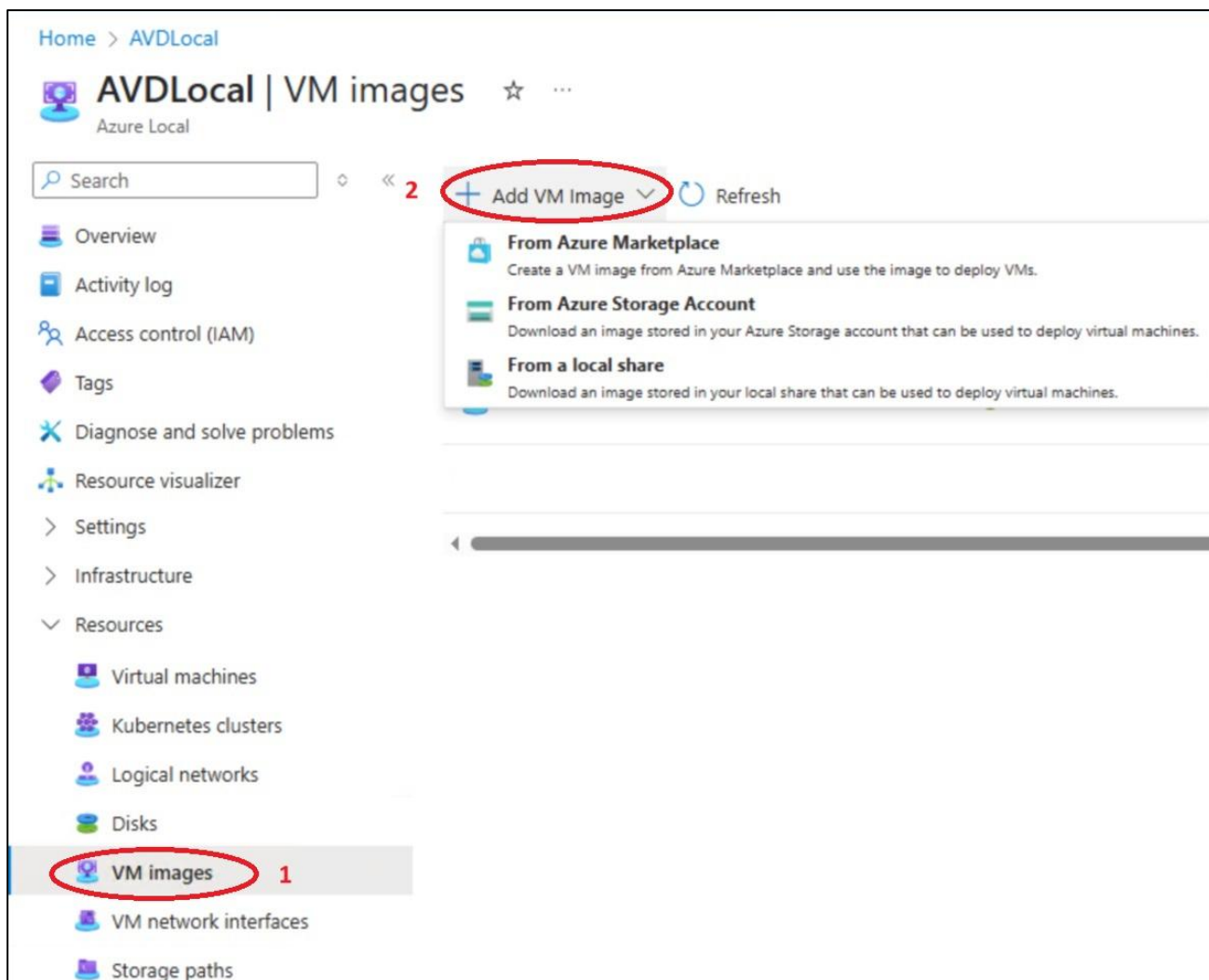
Figure 2 VM image gallery

3. You will be presented with a wizard to select the image, and define name, location etc.

Figure 3 Create a VM image

4. Once the image is downloaded, it will be visible on the VM image Tab, meeting the requirements for AVD deployment.

Figure 4 List of available VM images

3.2 Logical Network

Before starting the AVD deployment, create a Logical Network for use by AVD or simple Virtual Machines.

1. From the Azure Local resource, click on Logical Network.

2. Click on Create Logical Network.
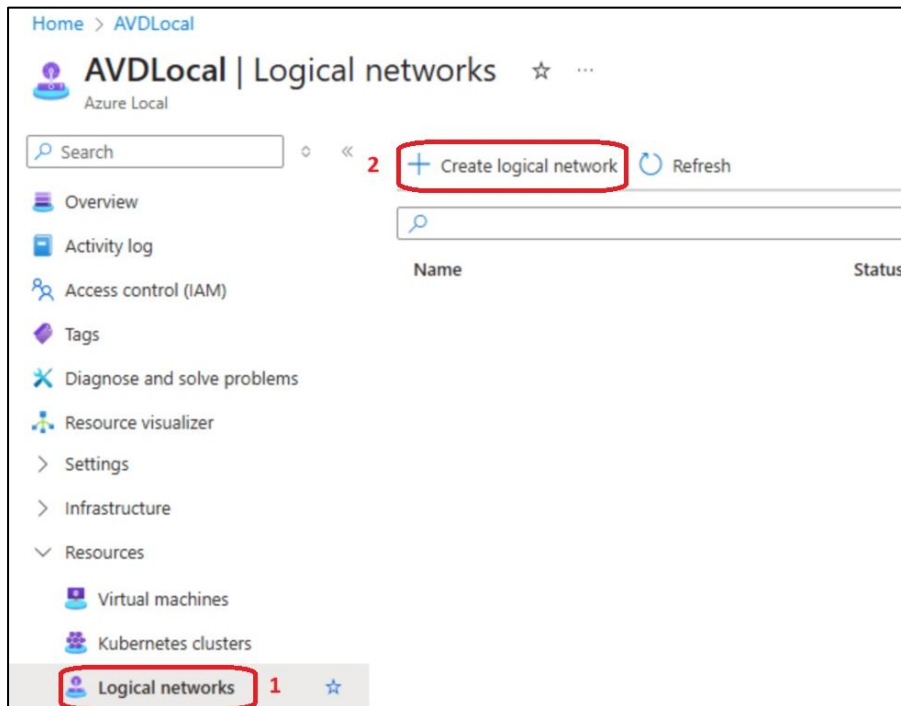
Figure 5 Logical Network configuration

3. Input the Logical Network name and the Virtual switch name.

Figure 6 Create logical network

4. Using the static configuration, we need to provide the address space along with the pool that will be used, the Gateway and DNS.

Figure 7 Complete logical network setup

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5. Now, with the Logical Network created, we can proceed to initiate the AVD deployment.
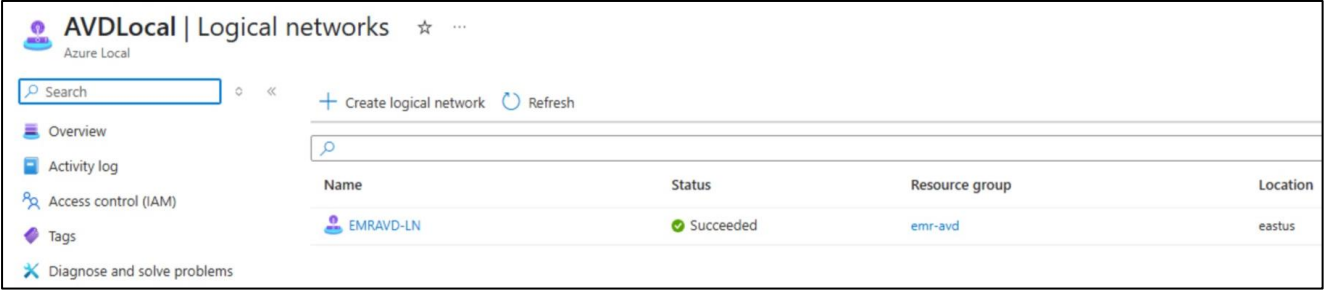
Figure 8 View of completed logical network

4 AVD deployment steps

4.1 Azure Virtual Desktop using Azure Portal on Azure Local

From Azure portal, on the Azure Local instance resource it shows all the requirements have been met.

Follow the steps below to begin deployment.

1. Select deploy from the Azure Virtual Desktop tab.
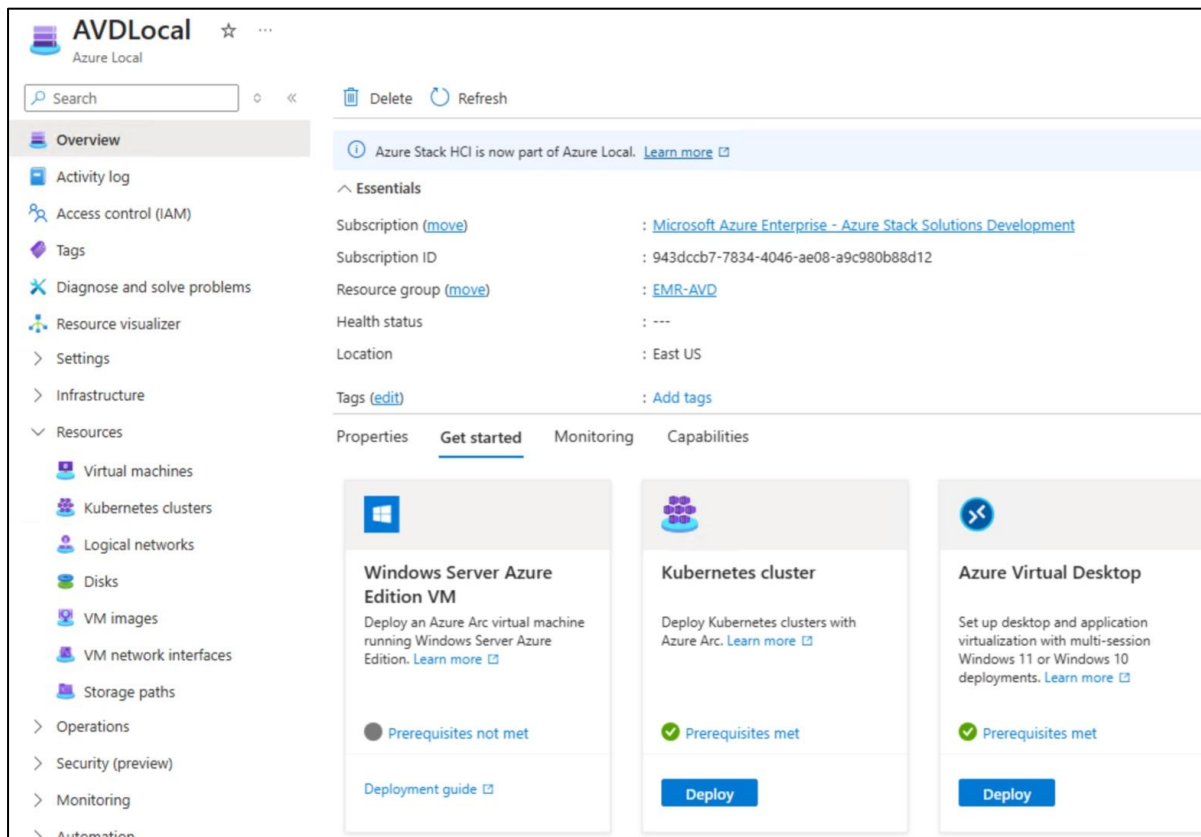
Figure 9 AVD Deployment launch page

2. Create a host pool defining the settings on the basic tab:

- Subscription: Choose the subscription you want to use.
- Resource group: Either select an existing resource group or create a new one.
- Host pool name: Enter a unique name for your host pool.
- Region: Choose the region where you want to deploy your host pool.
- Registration group: Select the registration group associated with your Azure Local deployment.
- Choose the type of desktop you want to deploy. Options include "Pooled" or "Personal" ,in our case it is "Pooled".

Then proceed to the Virtual Machines tab.

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Figure 10 Creating a host pool

3. In this tab select "yes" to Add Virtual machines and set the Virtual machine Type to Azure Local VM and input the required settings

Figure 11 Host pool creation details

Security type * ⓘ	Standard ⌄
Number of VMs *	1 ✓
Virtual processor count * ⓘ	4 ✓
Memory type ⓘ	◉ Static
	○ Dynamic
Memory (GB) * ⓘ	12 ✓

Network and security

Network * ⓘ	EMRAVD-LN ⌄

Domain to join

Select which directory you would like to join	Active Directory ⌄
AD domain join UPN * ⓘ	len4@▬▬▬▬ ✓
Password * ⓘ	•••••••• ✓
Confirm password * ⓘ	•••••••• ✓
Specify domain or unit ⓘ	○ Yes
	◉ No

Virtual machine administrator account

User name * ⓘ	Administrator ✓
Password * ⓘ	••••••••••••••• ✓
Confirm password * ⓘ	••••••••••••••• ✓

[Review + create] [< Previous] [Next: Workspace >]

Figure 12 More host pool configuration details

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4. On the Workspace tab, register the Desktop App group to a workspace

Figure 13 Registering an app group to a workspace

5. Click on Review + create and it will start the deployment.

5 AVD configuration

5.1 Assign users to the application group

This section assigns users to the Application group. Follow the steps below.

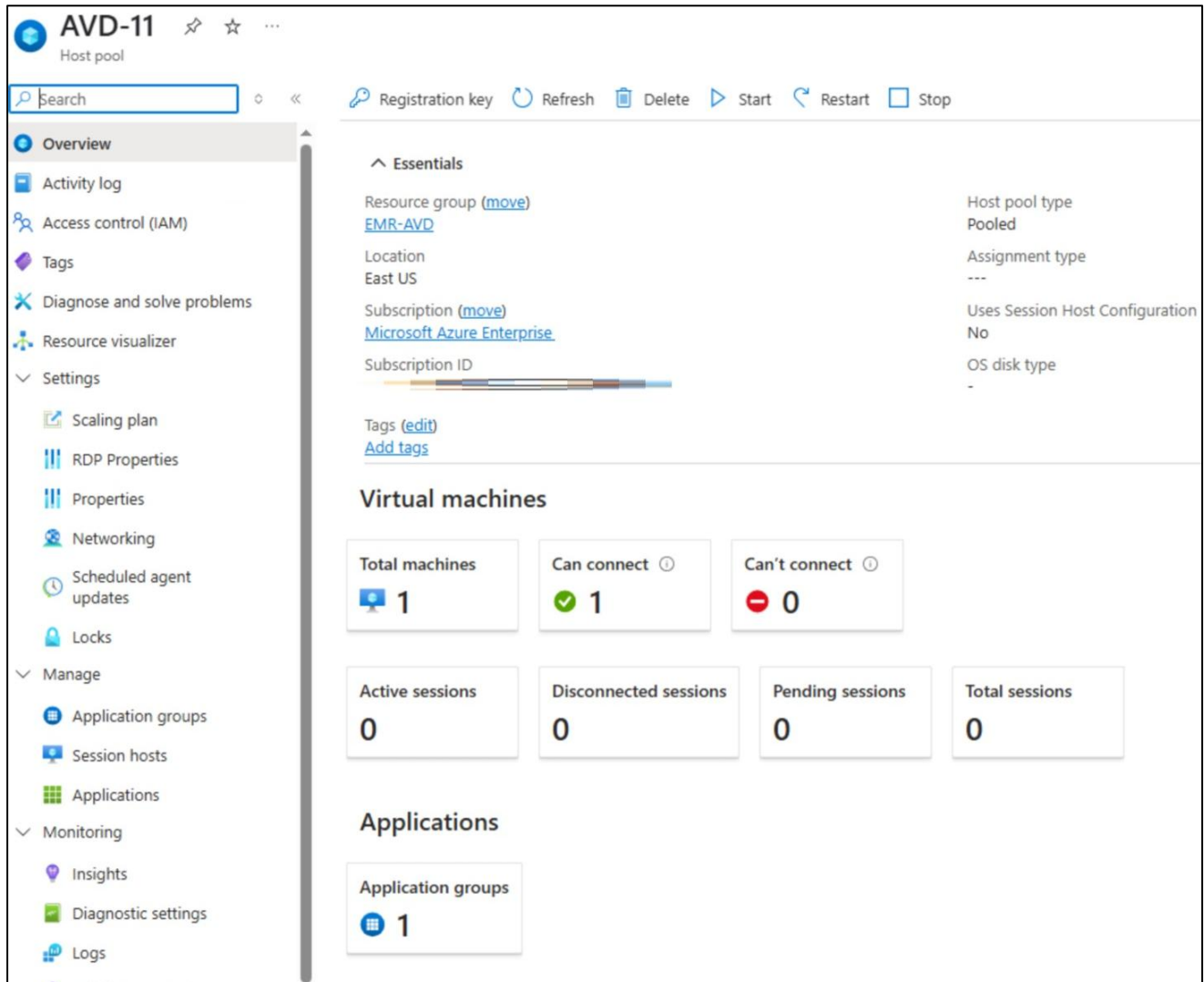1. From Azure Portal go the Host Pool that we created before and select the application group

Figure 14 Application Groups

2. Proceed and select the pool created earlier
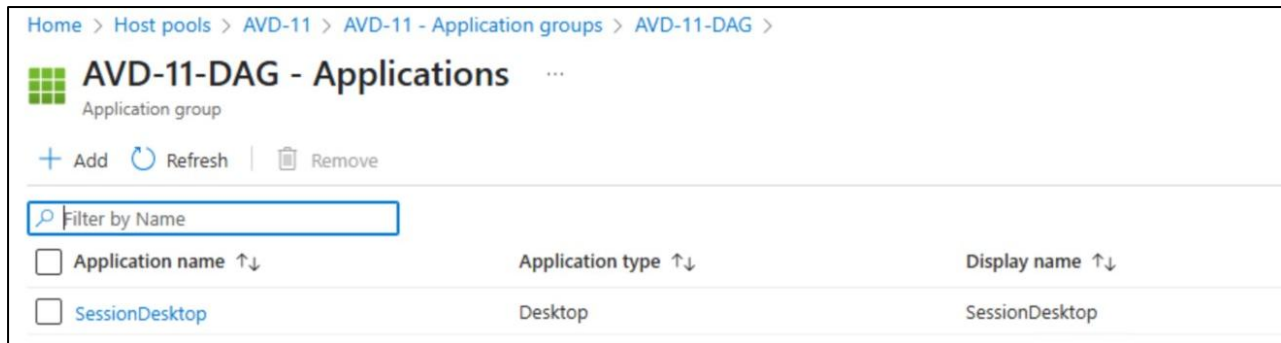
Figure 15 Select the application group

3. Click on Assignments
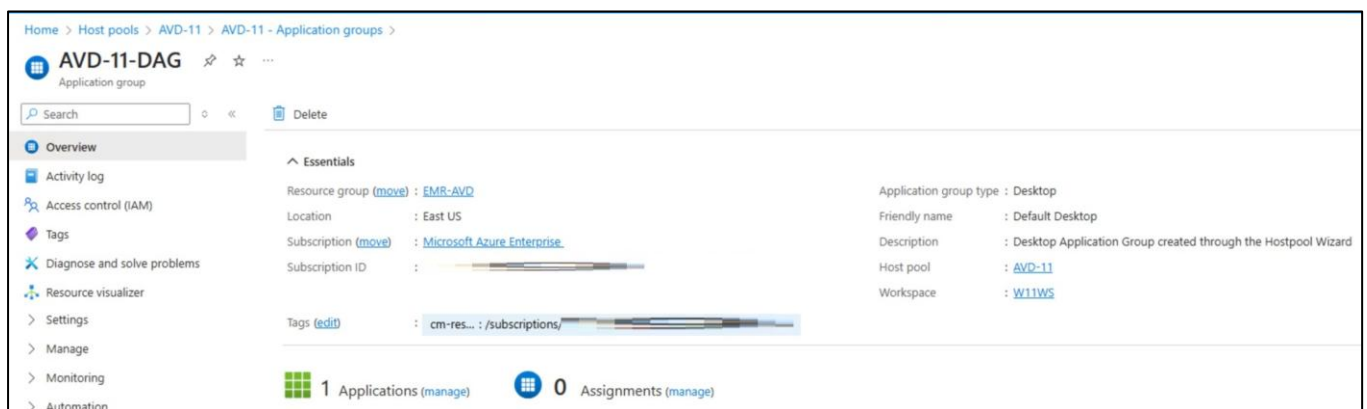
Figure 16 Assignment launch page

4. Select the account to grant the assignment and save it
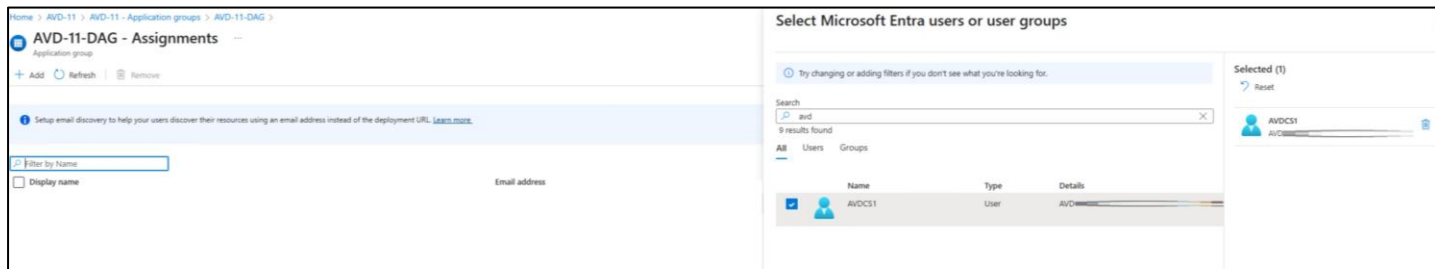
Figure 17 Assigning an account to the group

5.2 Connect from anywhere to AVD

The Microsoft Remote Desktop client simplifies connecting to Azure Virtual Desktop, allowing access without requiring access to Azure Local hosts. Follow these steps:

Prerequisites:

- Internet connectivity.

A device operating on one of the following compatible versions of Windows:

- Windows 11
- Windows 11 IoT Enterprise
- Windows 10
- Windows 10 IoT Enterprise
- Windows Server 2019
- Windows Server 2016

Download the installer for the Remote Desktop client, ensuring to select the appropriate version for your

device:

- [Windows 64 bit](#)
- [Windows 32 bit](#)
- [Windows ARM64](#)

Once the Remote Desktop client is installed, you can subscribe to the workspace using the account that we

assigned to this resource.
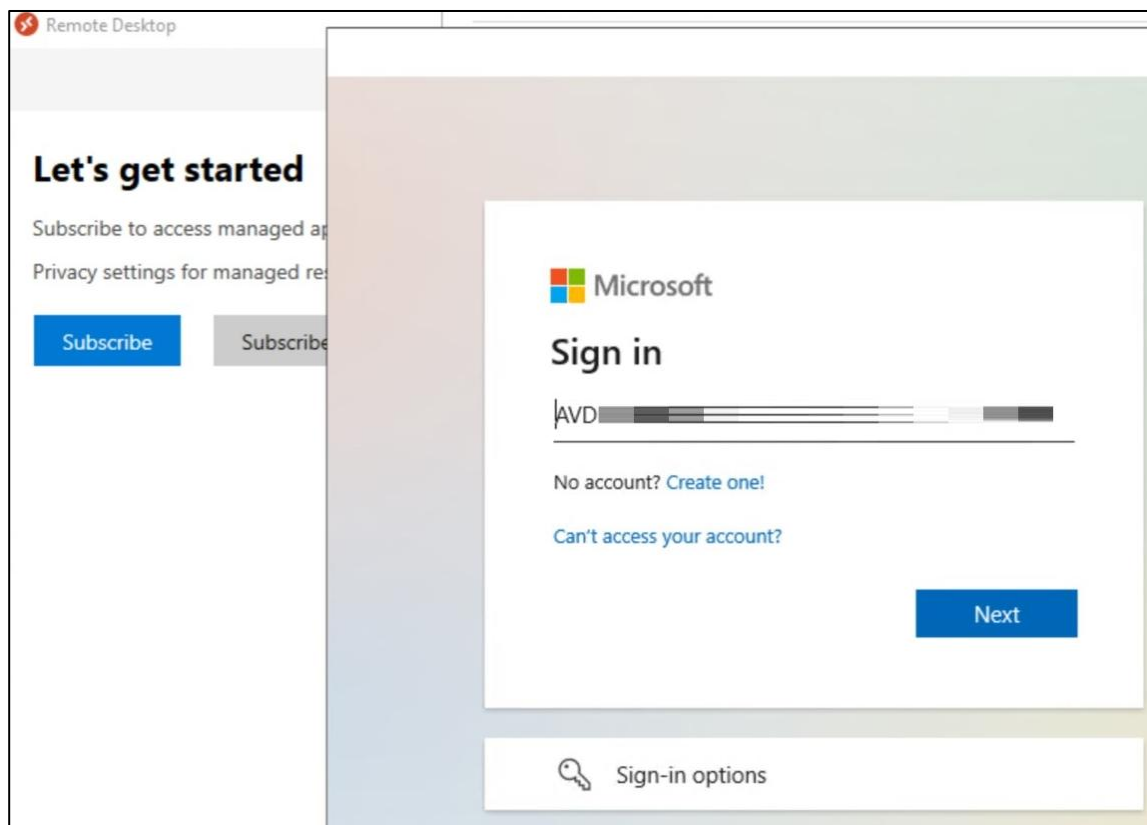
Figure 18 Login and subscribe to assigned workspace

After logging in with the Remote Desktop client, you will see your AVD workspace and you can connect to it.

Figure 19 View of assigned workspace ready to launch

6 Conclusion

Microsoft Azure Virtual Desktop solutions on Lenovo ThinkAgile MX servers are a great option to offer virtualized desktop and applications, moving the management part to the Azure Portal. While AVD offers a unified management portal and scalability option, the underlying hardware, that hosts the VM`s are the main factor that influences the end user experience and overall performance.

Lenovo`s MX series are thoroughly tested to provide the best experience while using and updating the Azure Local instance and they come with a broad options of configurations for CPU, RAM and storage that are able to respond to even the most demanding requirements. By choosing an appropriate storage configuration, there are clear performance benefits for the users and also keeping in line with data governance policies that are set in place by certain organizations. For graphics intensive workloads the MX series can be configured with Nvidia GPU`s and this allows creating VM`s with a dedicated graphics adapter.

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