Microsoft Azure

Azure webinar series

Windows Virtual Desktop

Deployment Recommendations and Best Practices

Welcome

How do I ask a question?

If you have a technical or content-related question, please use the Q&A window

We will address the questions as they come in

Can I view this presentation after the webinar?

Yes, this presentation is being recorded

A link to the recorded presentation will be sent to the email address you used to register

Meet our speaker

Christiaan Brinkhoff

Principal Program Manager, at Microsoft

Brinkhoff_C

ln/christiaanbrinkhoff

Agenda

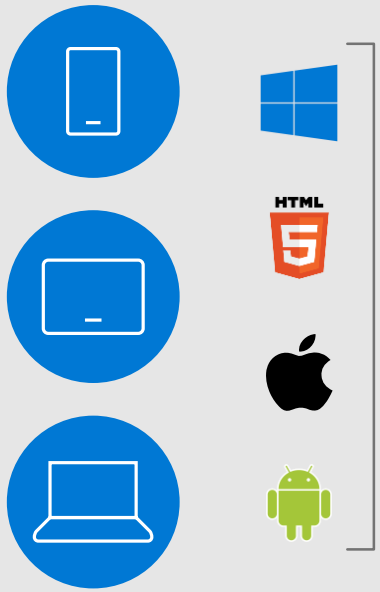
- Architecture
- Service limits
- Image management
- VM sizing
- Virtual Desktop Optimization tool
- FSLogix best practices
- Teams best practices
- Tips for Troubleshooting
- Call to action

Architecture

Windows Virtual Desktop Architecture

3 layers

Clients
Customer/Partner-managed



FIREWALL

Windows Virtual Desktop
Microsoft-managed

- Web Access
- Diagnostics
- Gateway
- Broker
- Azure SQL DB

FIREWALL

Azure VMs & Services
Customer/Partner-managed

VMs

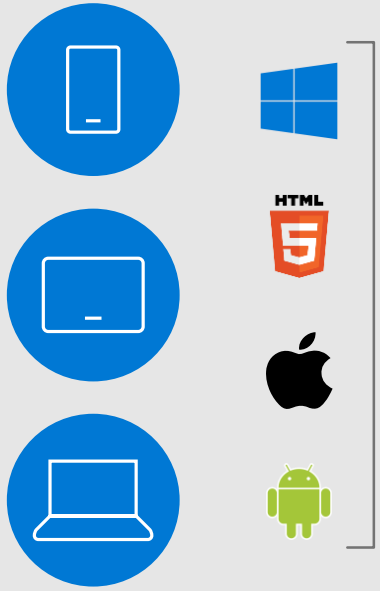
- Desktops
- Apps
- Azure & legacy Active Directory
- FSLogix User Profile File Server

Microsoft Azure

Windows Virtual Desktop Enterprise Architecture

3 layers

Clients
Customer/Partner-managed



FIREWALL

Windows Virtual Desktop
Microsoft-managed

- Web Access
- Diagnostics
- Gateway
- Broker
- Azure SQL DB

FIREWALL

Azure VMs & Services
Azure subscription 1

- Desktops
- Apps
- VMs
- Azure & legacy Active Directory
- FSLogix User Profile File Server

**Azure subscription 2*

- Desktops
- Apps
- VMs
- FSLogix User Profile File Server

** When you use over 5000 VMs/hosts in the same region we recommend to create another Subscription to increase the level of API ARM throttling CALs.*

5000 VMs means 16.000 (medium workload) concurrent sessions per Azure subscription with Windows 10 multi-session.

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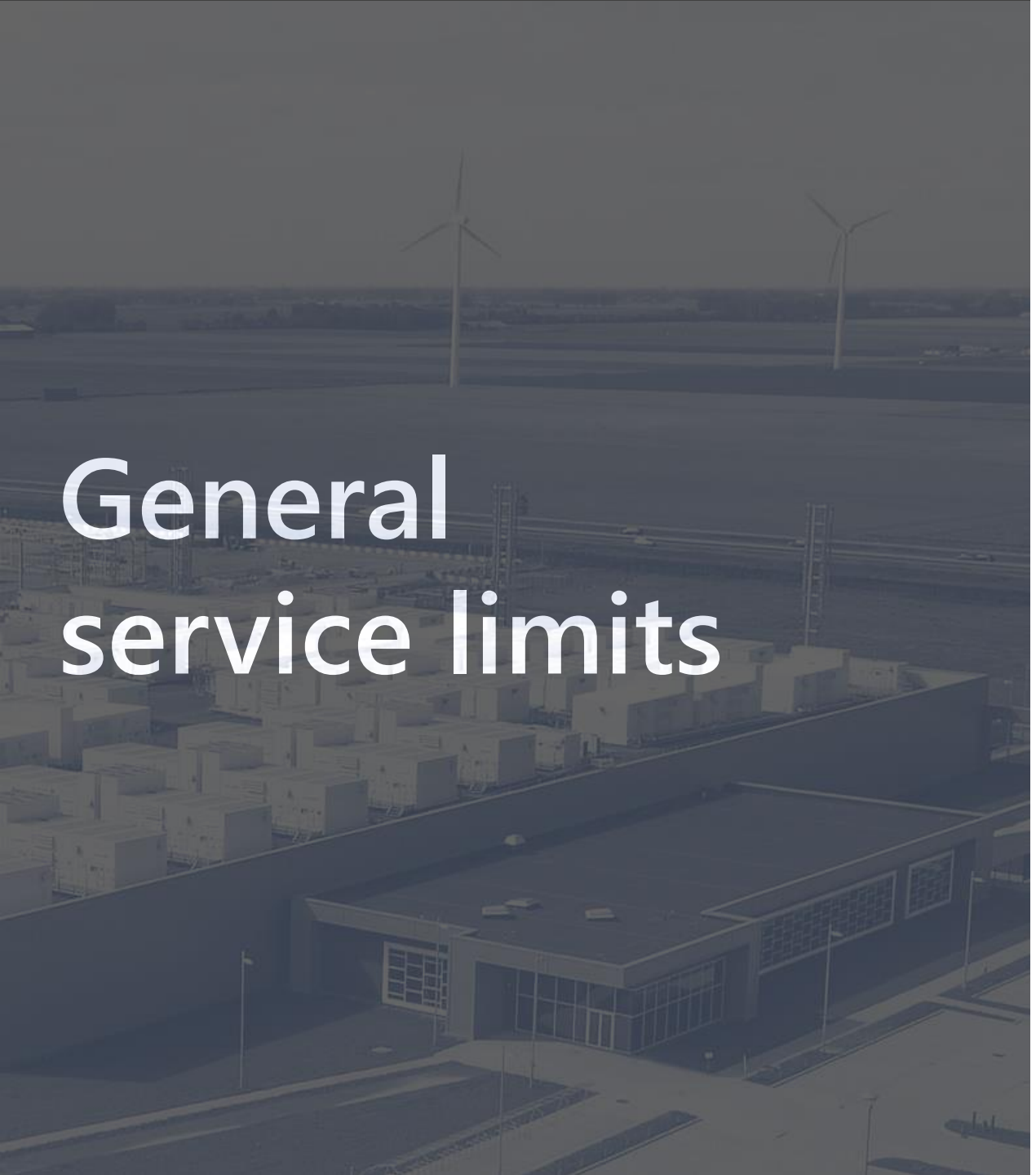
Windows Virtual Desktop Service Limits

Microsoft Azure



General service limits

1. **400 host pools** per workspace
2. **10.000 VMs per host** pool
3. You can't create more than **50 application groups** per single Azure AD tenant.
4. We recommend that you **don't publish more than 50** applications per application group.
5. Azure VMs – session host names prefix **cannot exceed 11 characters**.

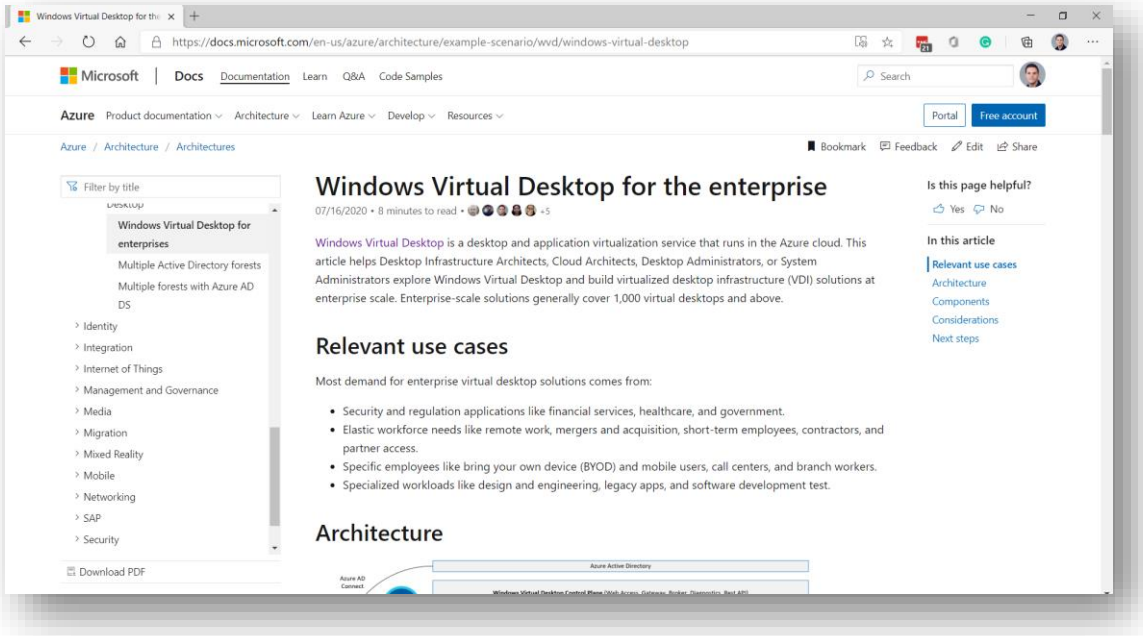
Azure ARM limits

1. We recommend to deploy **not more** than **5,000 VMs** per **Azure subscription** per region.
2. **To manage enterprise environments** with more than **5,000 VMs per Azure subscription** in the same region, you can create multiple Azure subscriptions in a hub-spoke architecture.
3. By default, you can deploy up to 800 instances of most resource types in a resource group. **Azure Compute doesn't have this limit.**

Azure ARM limits

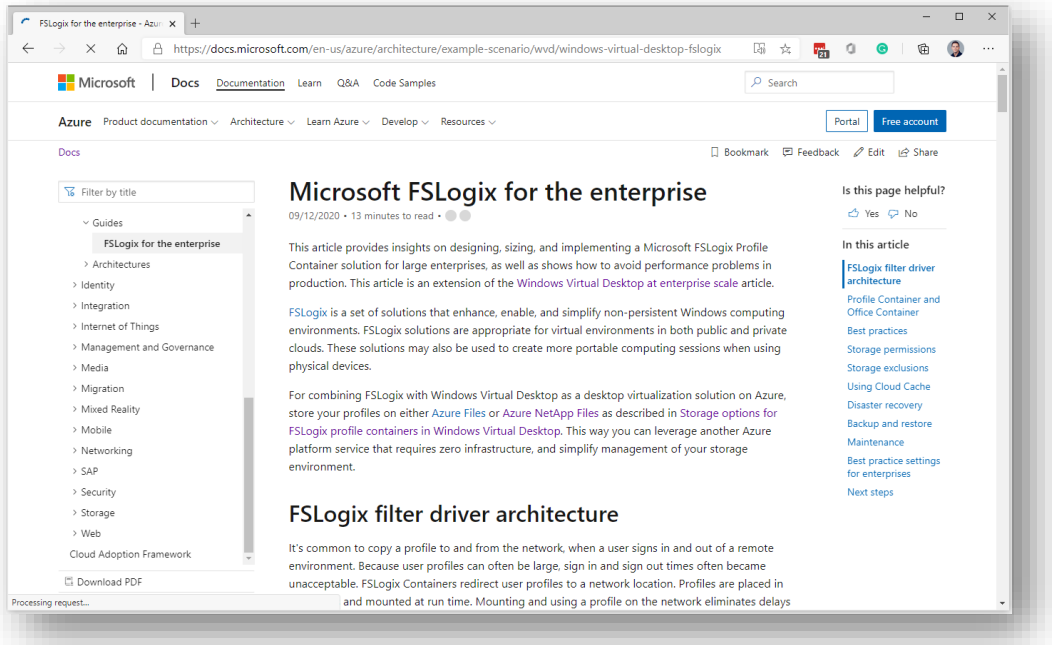
1. Limitations are active on the virtual machines per Azure subscription. You could **increase** the **resources** of your **individual** VMs in your Azure subscription to **accommodate more user session** without hitting the maximum limit of virtual machines per Azure subscription as described above.
2. Availability set 200 session hosts limit work around per deployment
    1. Availability set is not connected to the same amount of host pools
3. We suggest you **deploy** your session hosts in a **separate resource group** (RG). This leaves you in a better position to remove all your virtual machines at once in case of an update

Azure Solutions Center – WVD for the Enterprise documentation



- Learn more about service limits and deployment best practices

Go to aka.ms/wvdbestpractices



- How to use FSLogix at larger scale.

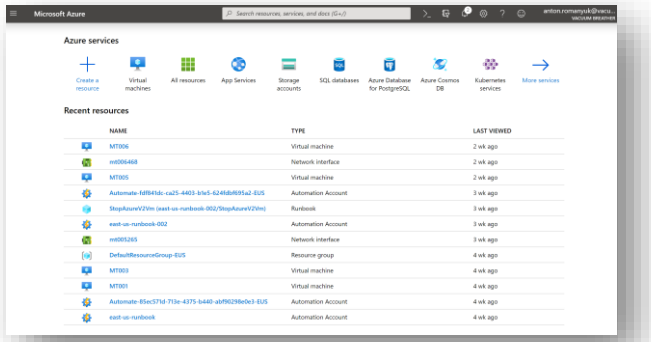
Go to aka.ms/fslogixbestpractices

Microsoft Azure

Deploy Windows Virtual Desktop

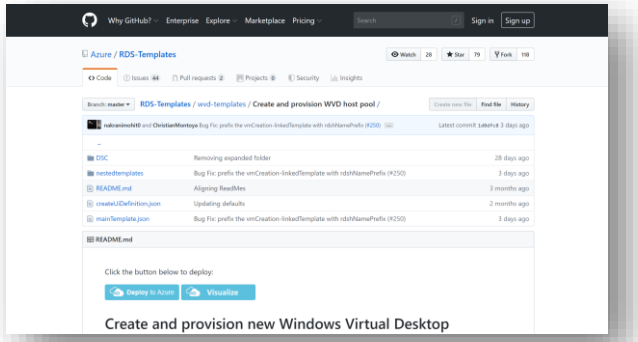
Microsoft Azure

Deployment Options // Overview



Azure Portal

- Use the Azure Portal to provision a new host pool via a wizard-based process



ARM Template

- Use the Azure Resource Manager template for provisioning a new host pool

PowerShell / REST API / …

- Use your PowerShell client or REST API calls to create a host pool

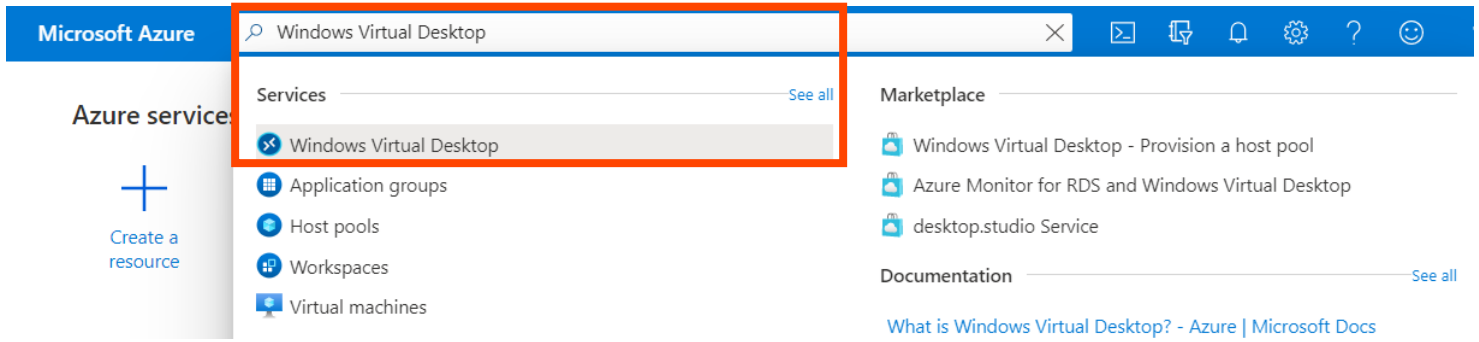
Windows Virtual Desktop Deployment

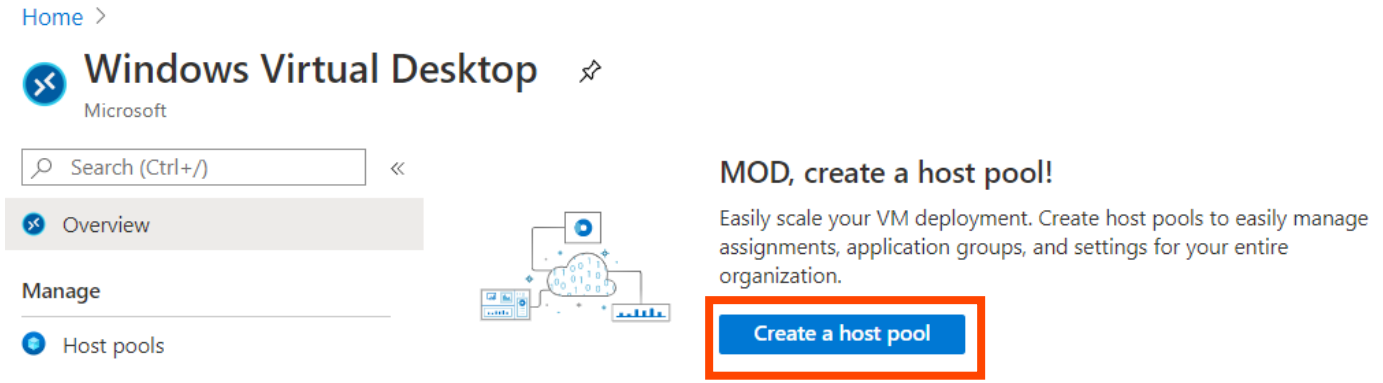
Prerequisites (Hybrid Model):

1. An Azure Active Directory
2. An Active Directory
3. Azure Active Directory Connect
4. An Azure Virtual Network updated with your DNS server, with line of sight of your AD DC's
5. An Azure subscription and its associated ID
6. Application group with users in Azure Active Directory

Deploy your first host pool

Select the Azure Portal service:

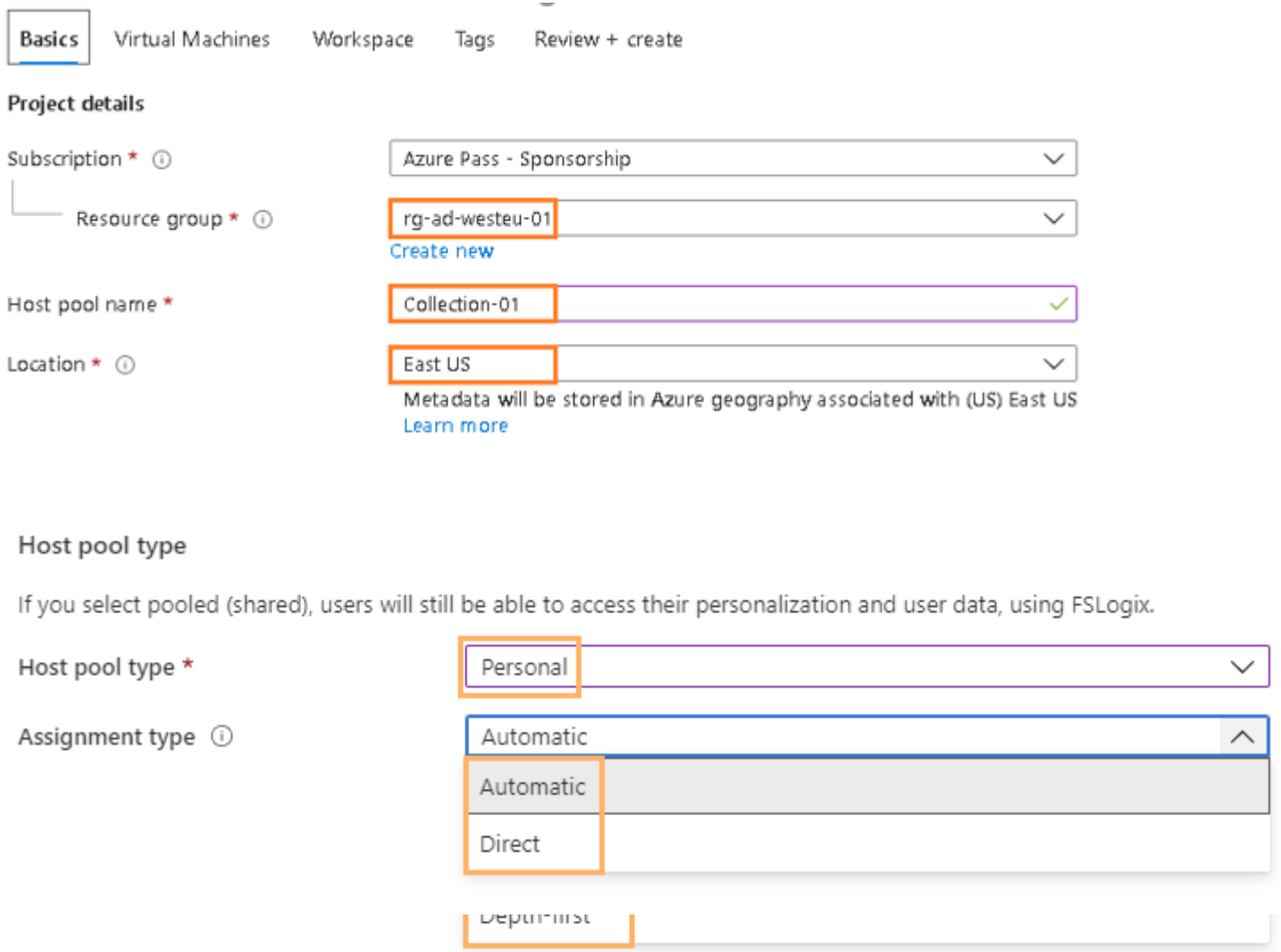




Deploy your first host pool using marketplace

Configure Basics:

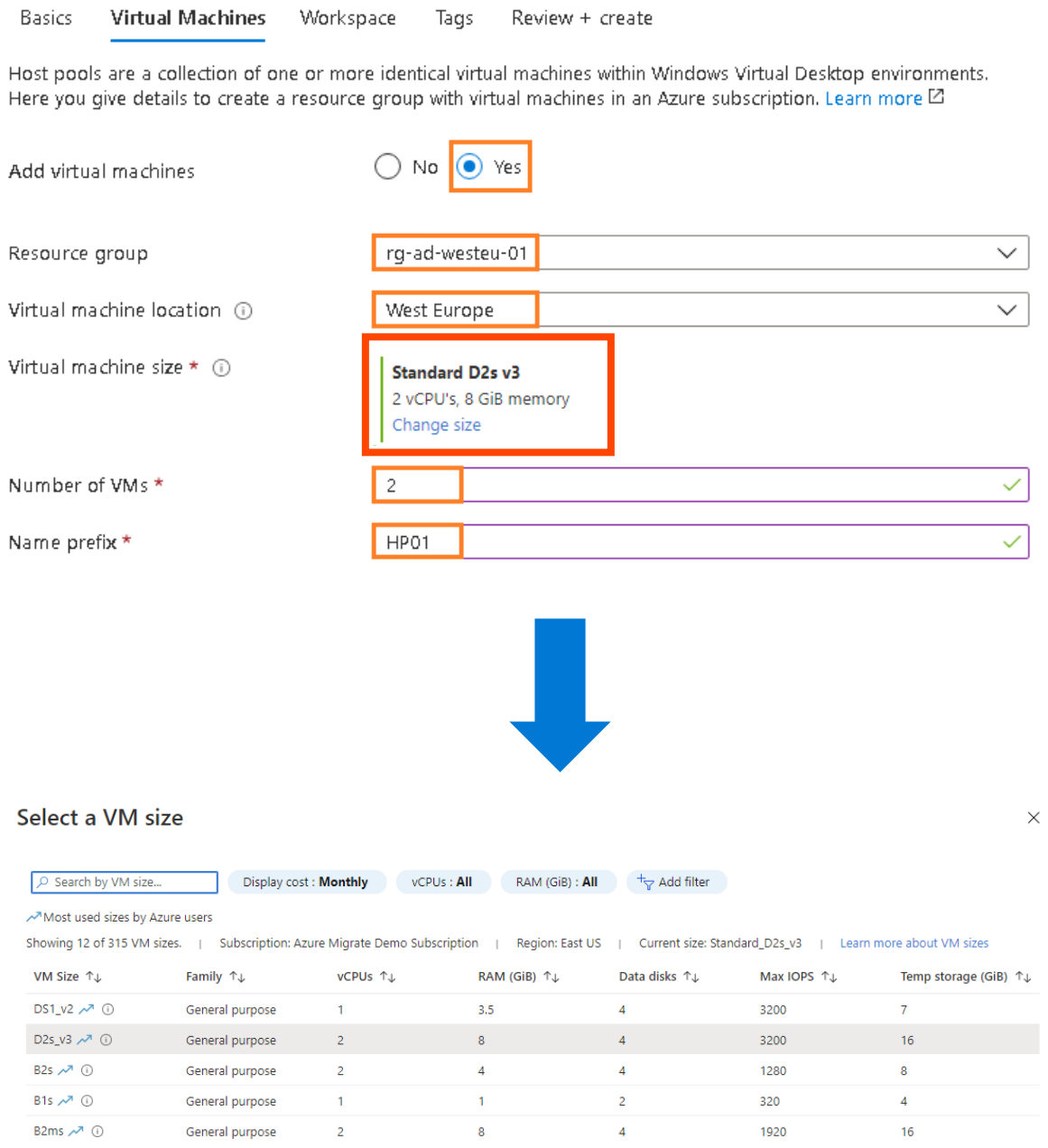
- Subscription
- Resource group
- Host pool name
- Location (Azure Region)
- Host pool type
  - Pooled
    - Max Session Limit
    - Load Balancing Algorithm
  - Personal
    - Assignment type



Deploy your first host pool

Configure virtual machines:

- Resource group
- VM Location
- VM size
  - VM Config (min recommended): 2 vCPU, 8 GB RAM
    (e.g. D2s v3), Managed OS Disk 64 GB Premium SSD
- Number of VMs
- VM name prefix

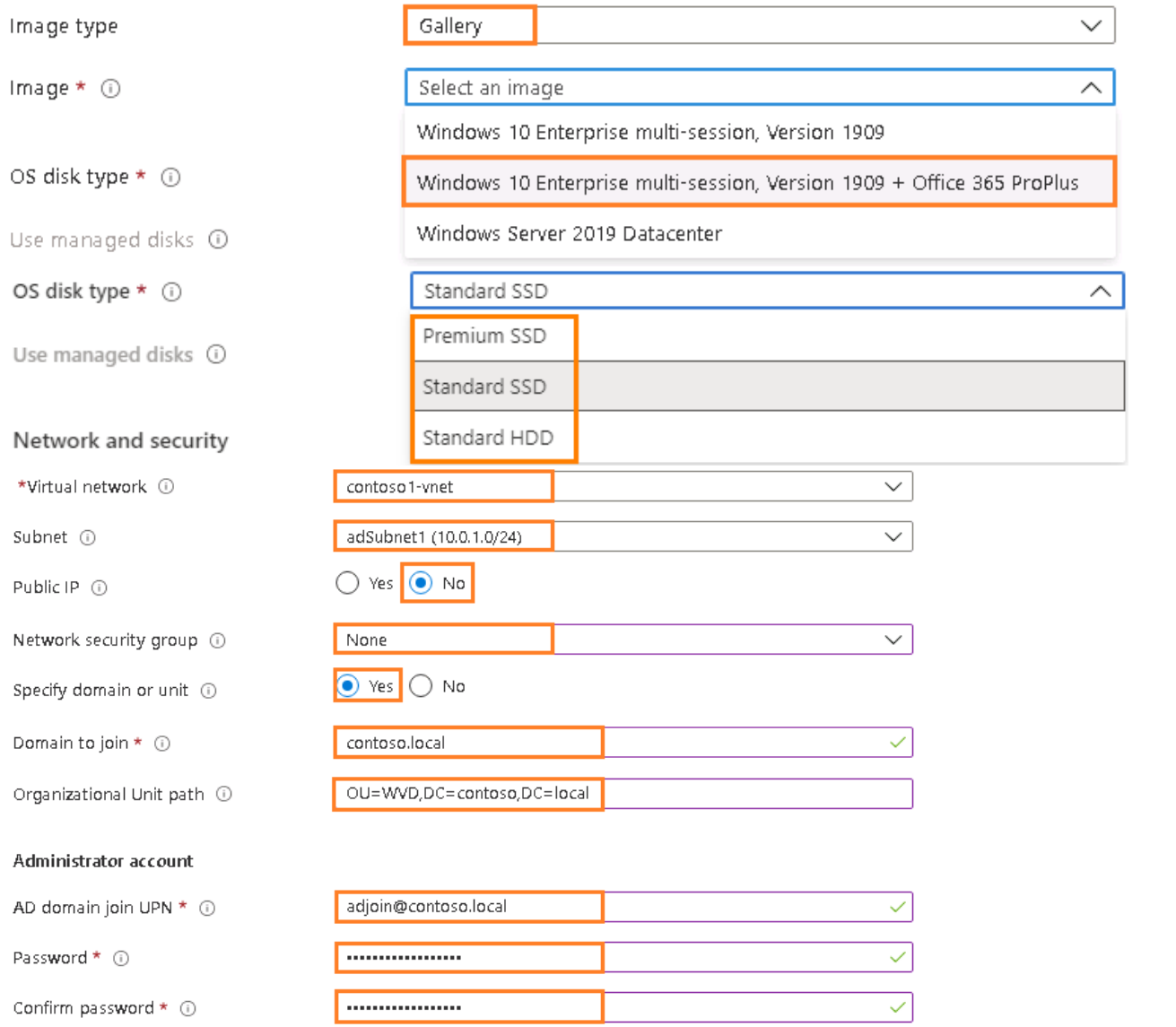


Microsoft Azure

Deploy your first host pool

Configure virtual machine settings:

- Image source
- Image OS version
- Disk Type
- AD domain join UPN & password
- (optional) Domain or OU
- Virtual Network & vmSubnet

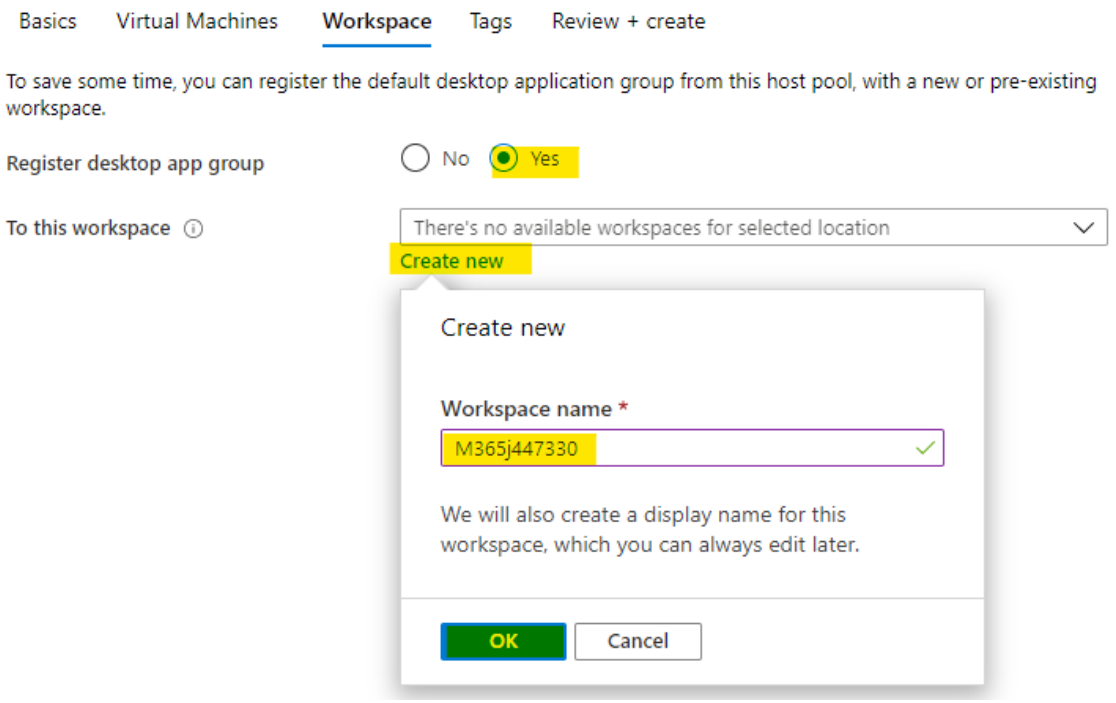


Microsoft Azure

Deploy your first host pool

Configure Workspace:

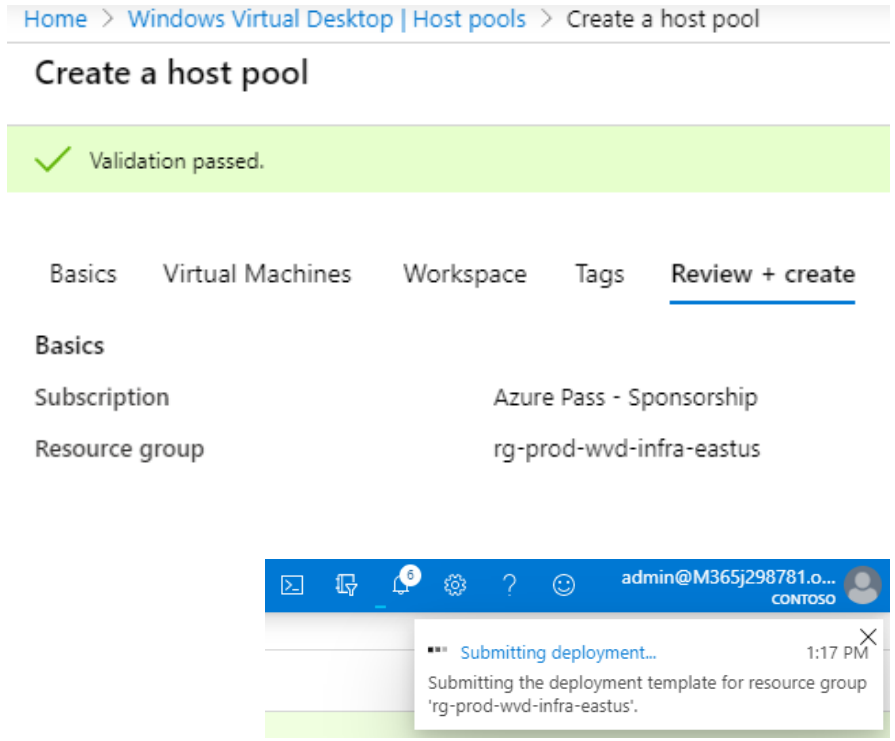
- Create a workspace
- Select an existing workspace

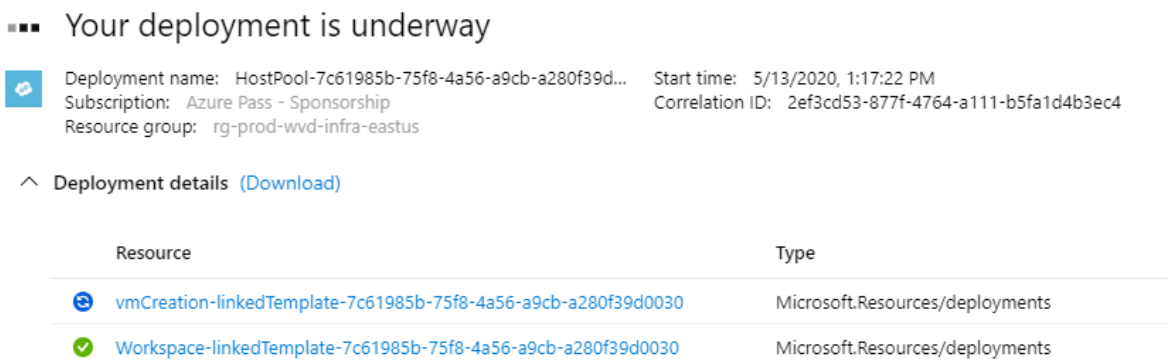


Deploy your first host pool

Review your settings:

- Make sure information you entered is correct – Azure Portal does not validate the information fully
- (optional) Save the ARM template for automation
- Hit “Create”





Microsoft Azure

Deploy your first host pool

Assign user identities to your host pool:

- After the deployment process is complete, assign individual users or user groups to the default application group.
- The default app group created for a new host pool publishes the full desktop.

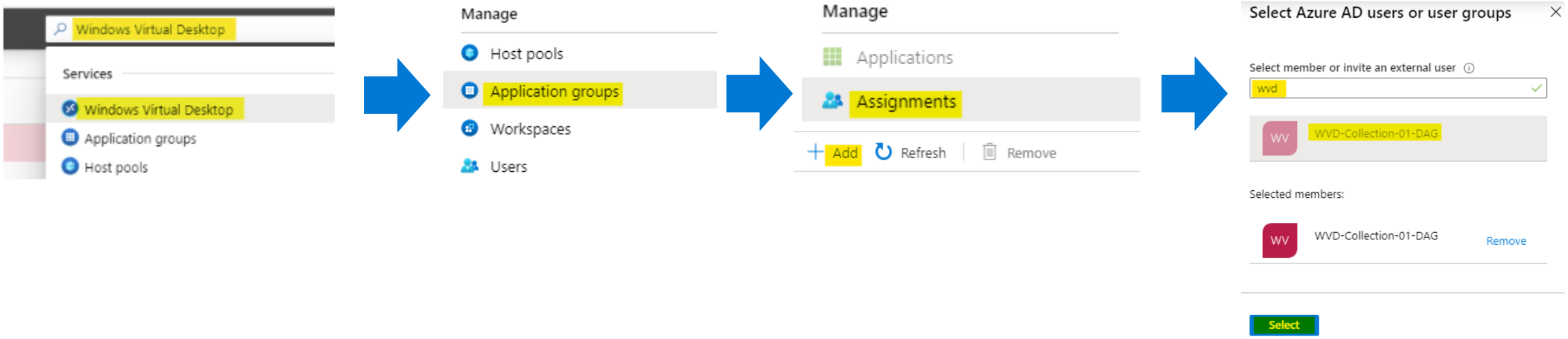


Image Management

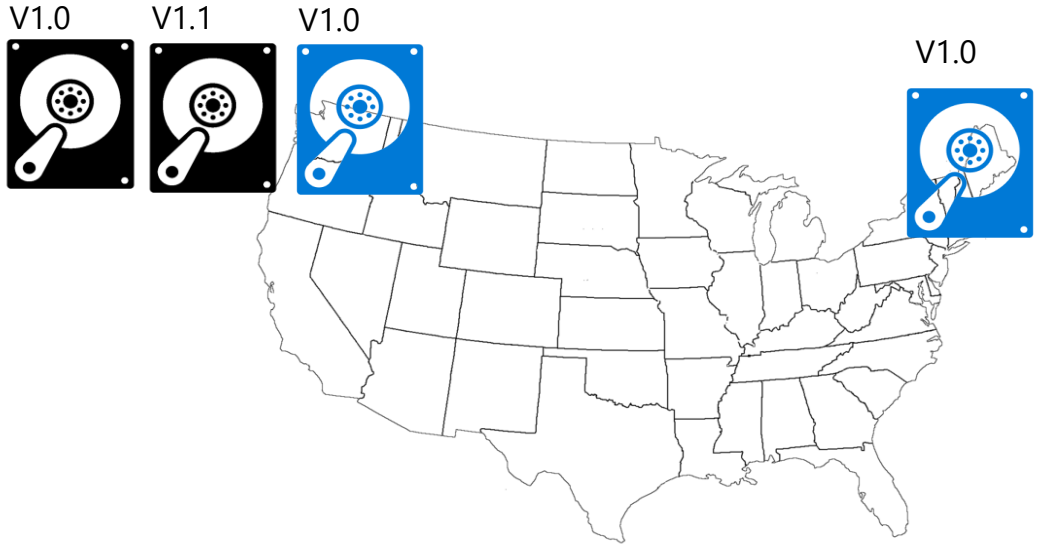
Master Image Management

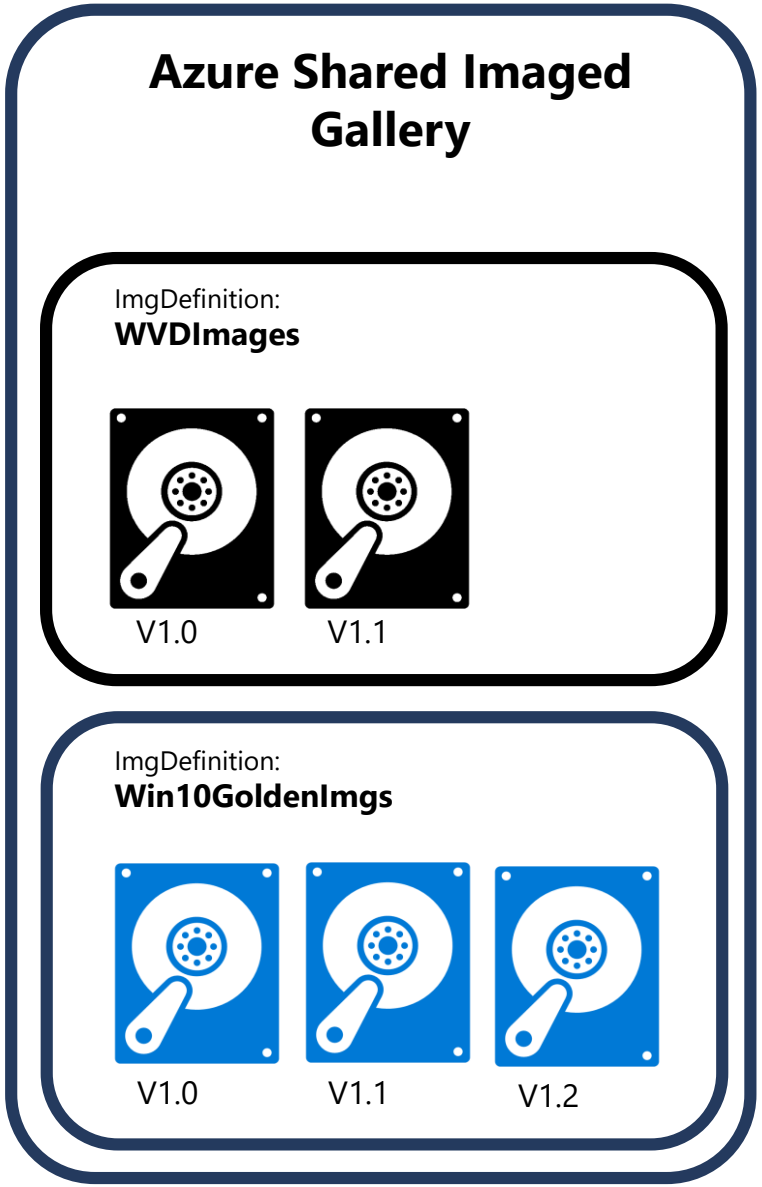
Can be managed by any already existing process and technologies including

- Azure Update Management
- Microsoft Endpoint Configuration Manager (SCCM)
- Shared image gallery
- Azure Image Builder (GA soon…)
- 3rd party

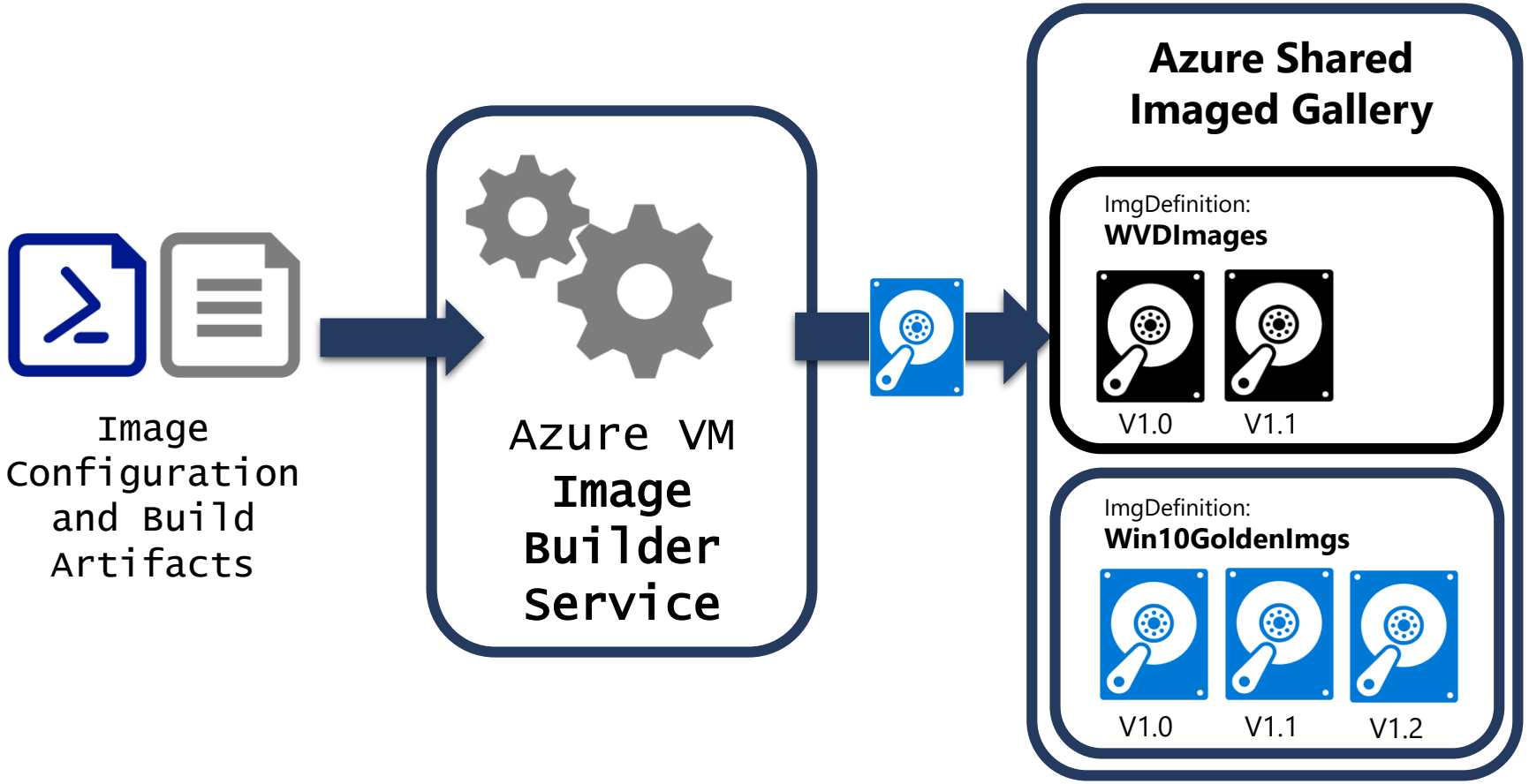
Shared Image Gallery

- Management of images
- Sharing of images
- Global distribution
- Scaling
- High-availability

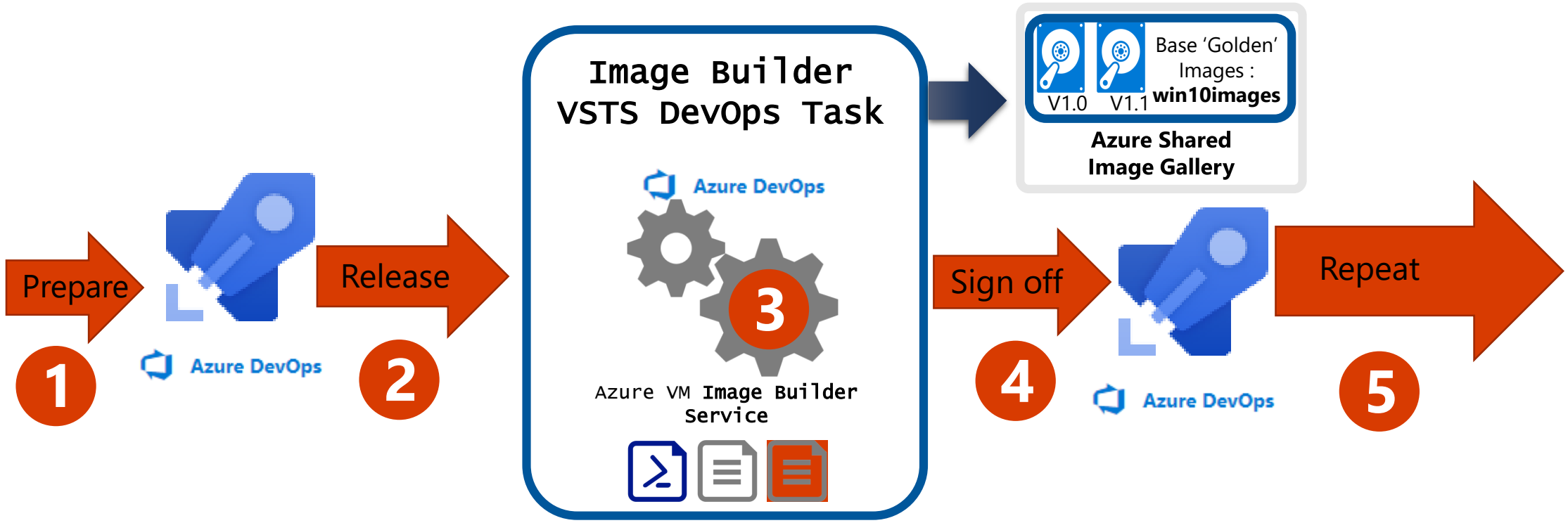




Azure VM Image Builder



Azure VM Image Builder Automation



Windows Virtual Desktop QuickStart

Overview | How It Works | Getting Started | Customize | Troubleshoot

How To Use The WVD QuickStart With an Empty Subscription

On this page, the process of using the WVD QuickStart with an empty Azure subscription is laid out from start to finish. If you don't have an Azure subscription yet, you can start a 30-day free trial here. The QuickStart will configure Windows Virtual Desktop as well as Azure Active Directory Domain Services for you. All that is required is an empty Azure subscription as listed below, and after clicking one button, WVD will be ready for use within 2 hours. The video below shows a walkthrough of the entire deployment process.

Microsoft Azure

VM Sizing Recommendations

Multi-session sizing recommendations

Workload type	Maximum users per vCPU	vCPU/RAM/OS storage minimum	Example Azure instances	Profile container storage minimum
Light	6	2 vCPUs, 8 GB RAM, 16 GB storage	D2s_v3, F2s_v2	30 GB
Medium	**4 – 16 users p/ host**	**4 vCPUs, 16 GB RAM, 32 GB storage**	**D4s_v3, F4s_v2**	**30 GB**
Heavy	2	4 vCPUs, 16 GB RAM, 32 GB storage	D4s_v3, F4s_v2	30 GB
Power	1	6 vCPUs, 56 GB RAM, 340 GB storage	D4s_v3, F4s_v2, NV6	30 GB

aka.ms/wvdsizingrecommendations

Single-session sizing recommendations

For VM sizing recommendations for single-session scenarios, we recommend at least **two physical CPU cores** per VM (**typically four vCPUs with hyperthreading**). *For RAM we see that 8 GB becomes the standard in virtual desktop environments. D2s_v3 could be a good start.*

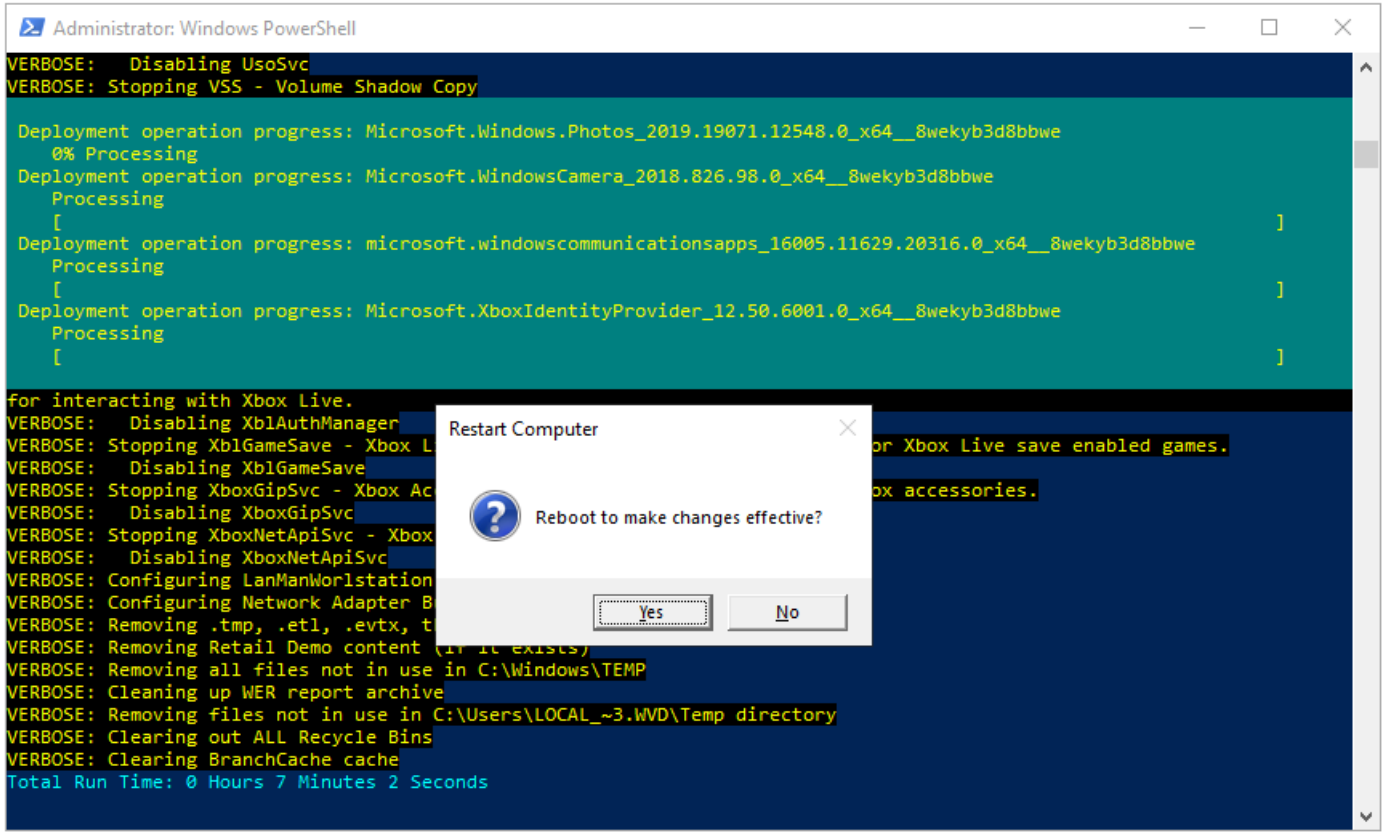
If you need more specific VM sizing recommendations for single-session scenarios, ask the software vendors e.g. ***LoginVSI*** *specific to your workload. VM sizing for single-session VMs will likely align with physical device guidelines.*

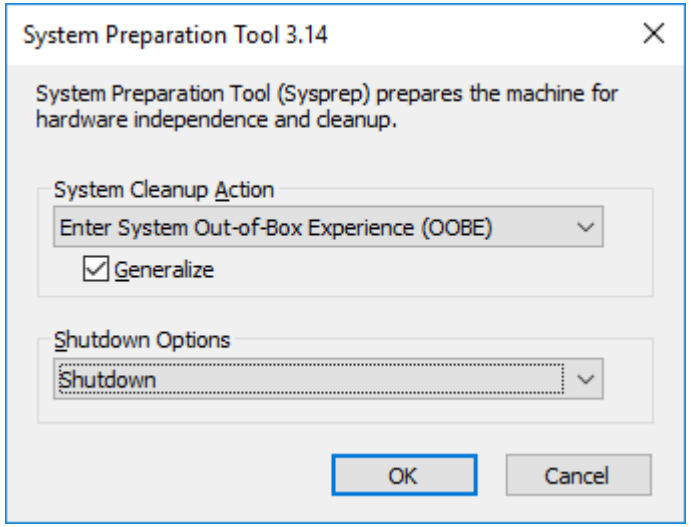
Virtual Desktop Optimization Tool

The Virtual Desktop Team

Microsoft Azure

Virtual Desktop Optimization Tool (community tool)





(Windows) Virtual Desktop Optimization Tool now available

Christiaan_Brinkhoff MICROSOFT 07-31-2020 07:45 AM - edited 08-31-2020 12:59 AM

(Windows) Virtual Desktop Optimization Tool now available

Virtual Desktop Optimization Tool

Optimizing images has always been an important component of preparing images as part of a traditional Remote Desktop Services (RDS) infrastructure or virtual desktop infrastructure (VDI). Optimizing session hosts, in particular, can increase user density and eventually lower costs. With the Virtual Desktop Optimization Tool, you can optimize your Windows 10, version 2004 multi- and single-session deployments in Windows Virtual Desktop.

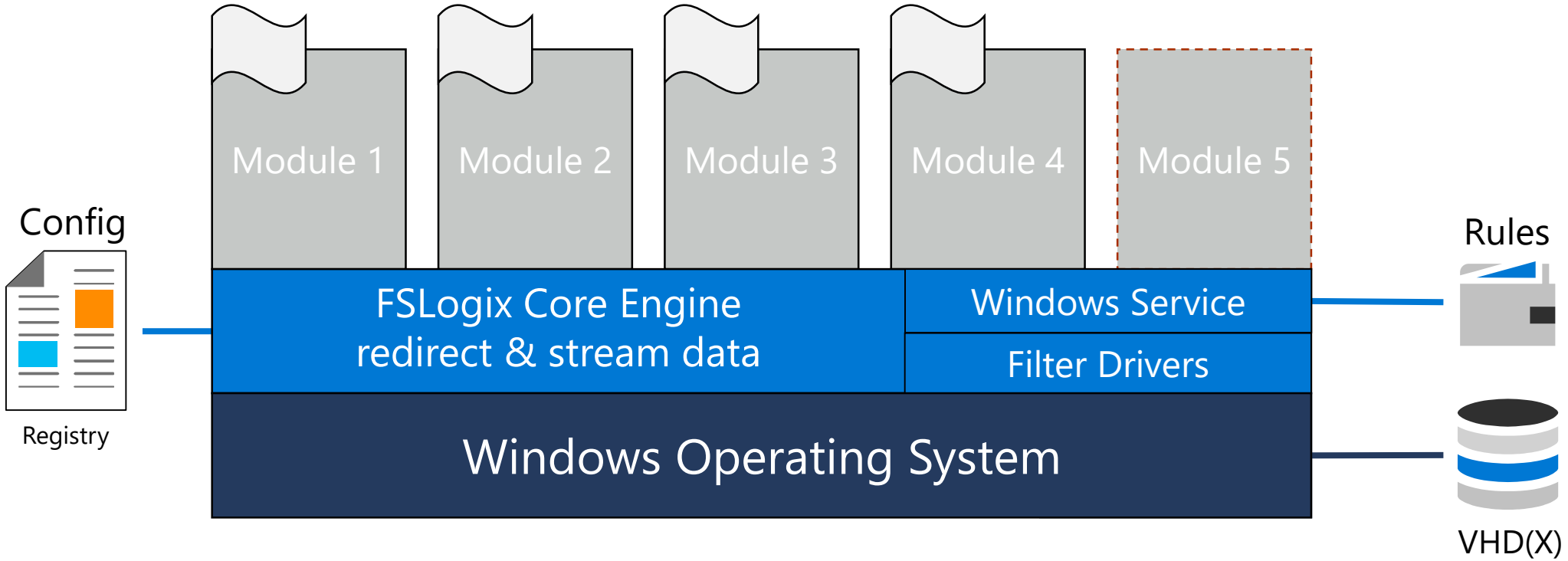
Note: *The information in this post is community-driven; nothing has yet been officially launched by the Windows Virtual Desktop product team. Credit goes to Robert M. Smith and Tim Muessig from Microsoft, previously known as the VDIGuys, for creating this tool and make it available for free for the community.*

Go to aka.ms/optimizewvd

FSLogix Best Practices

Microsoft Azure

FSlogix Agent Architecture

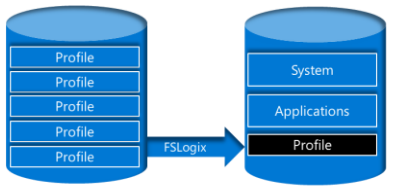


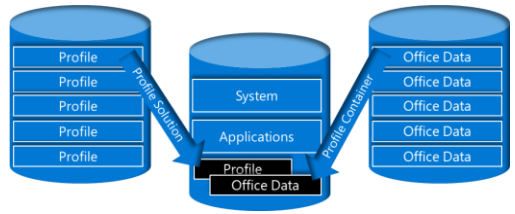
To the operating system, FSLogix Containers attach as in-guest VHD(X)s and they are indistinguishable from local folders

Managed Storage options for FSLogix

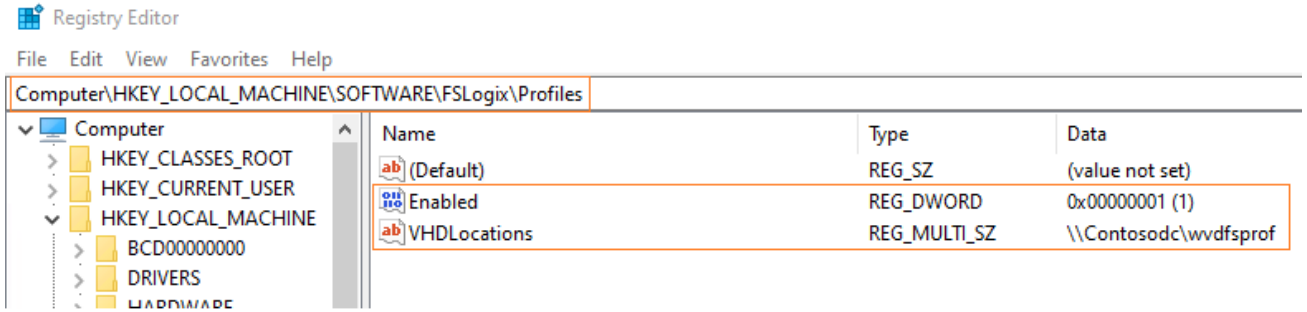
Features	Azure Files	Azure NetApp Files	Storage Spaces Direct
Use case	General purpose	Ultra performance or migration from NetApp on-premises	Cross-platform
Platform service	Yes, Azure-native solution	Yes, Azure-native solution	No, self-managed
Regional availability	All regions	Select regions	All regions
Redundancy	Locally redundant/zone-redundant/geo-redundant	Locally redundant	Locally redundant/zone-redundant/geo-redundant
Tiers and performance	Standard Premium **Up to max 100k** IOPS per share with 5 GBps per share at about 3 ms latency	Standard Premium Ultra **Up to 320k** (16K) IOPS with 4.5 GBps per volume at about 1 ms latency	Standard HDD: up to 500 IOPS per-disk limits Standard SSD: up to 4k IOPS per-disk limits Premium SSD: up to 20k IOPS per-disk limits We recommend Premium disks for Storage Spaces Direct
Capacity	100 TiB per share	100 TiB per volume, up to 12.5 PiB per subscription	Maximum 32 TiB per disk
Azure networking limits	**None**	**1000 Routable IPs per vNet**	**None**
Required infrastructure	Minimum share size 1 GiB	**Minimum capacity pool 4 TiB, min volume size 100 GiB**	Two VMs on Azure IaaS (+ Cloud Witness) or at least three VMs without and costs for disks
Protocols	SMB 2.1/3. and REST	NFSv3, NFSv4.1 (preview), SMB 3.x/2.x	NFSv3, NFSv4.1, SMB 3.1
Azure Active Directory integration	Native Active Directory and Azure Active Directory Domain Services	Azure Active Directory Domain Services and Native Active Directory	Native Active Directory or Azure Active Directory Domain Services support only

Required configuration options





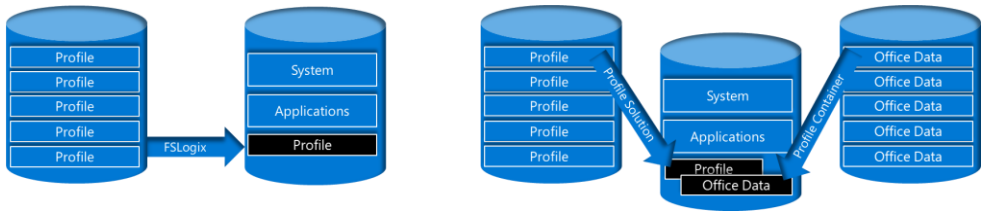
- The configuration is accomplished through:
  - Registry settings (can be managed manually)
  - GPOs



- **Enabled**
  - 1 is on, 0 is off
- **VHDLocations**
  - 1 or more SMB Locations
  - These will be accessed in order, the first available location will be used

More info at aka.ms/fslogix

Important configuration options



- **DeleteLocalProfileWhenVHDShouldApply**
  - This setting will cause a local profile, if it exists, to be deleted and an FSLogix container be created and used. The local profile is NOT copied to the FSLogix profile.
- **SizeInMBs**
  - Change the max. size of the container
- **FlipFlopProfileDirectoryName**
  - Change the SMB folder structure to username_SID for better searching
- **VolumeType**
  - Change the format to VHDx

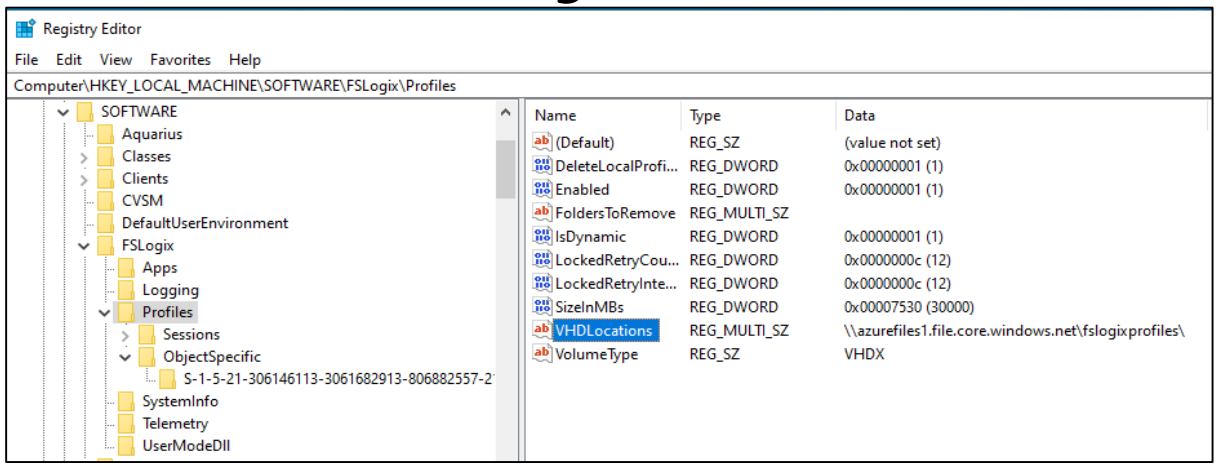
Azure Files – sizing recommendations

- Storage account name cannot be larger than 15 characters (AD/NETBIOS limit)
- Azure Files standard and Premium operate different
  - *Azure Files standard >> 10,000 IOPs*
  - *Premium Files >> based on size - consumption – max. 100,000 IOPs*
- The (internal) rule of the thumb is that one user consumes **10 IOPS in Steady state** and **50 IOPS** Sign in/sign out IOPS (depending on the type of workload)

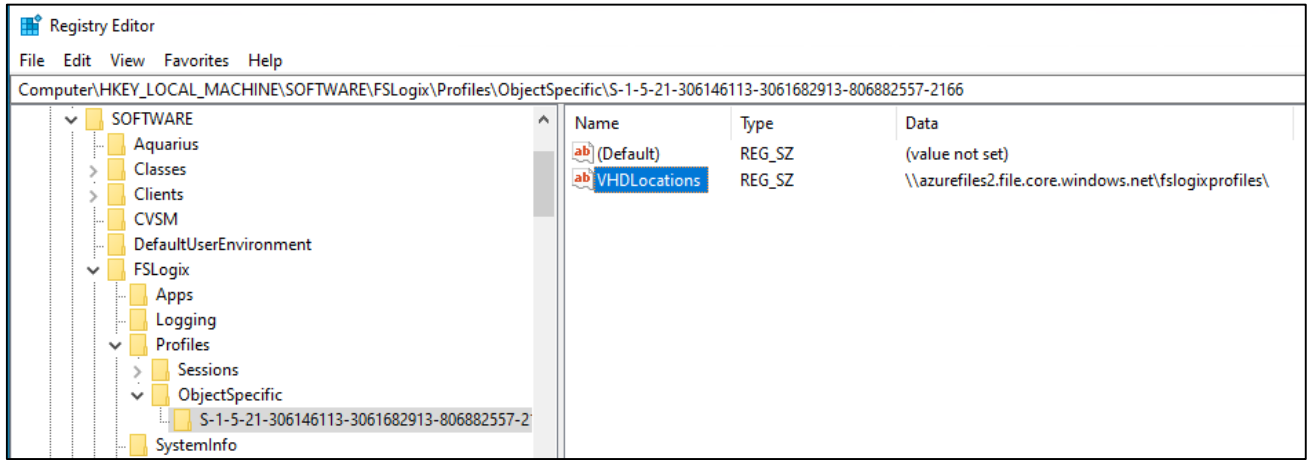
Workload type	**File Tiers**
Light	Standard file shares
Medium	Standard file shares Premium file shares
Heavy	Premium file shares
Power	Premium file shares

FSlogix and Azure Files - stack

Azure Files – storage account 1 (10k IOPs)



Azure Files – storage account 2 (+10k IOPs)



Registry configuration	Resultant message in log file
Setting specific to user or group	Configuration Read (REG_SZ): SOFTWARE\FSLogix\Profiles\ObjectSpecific\S-1-5-21-306146113-3061682913-806882557-2166\VHDLocations. Data: VHD

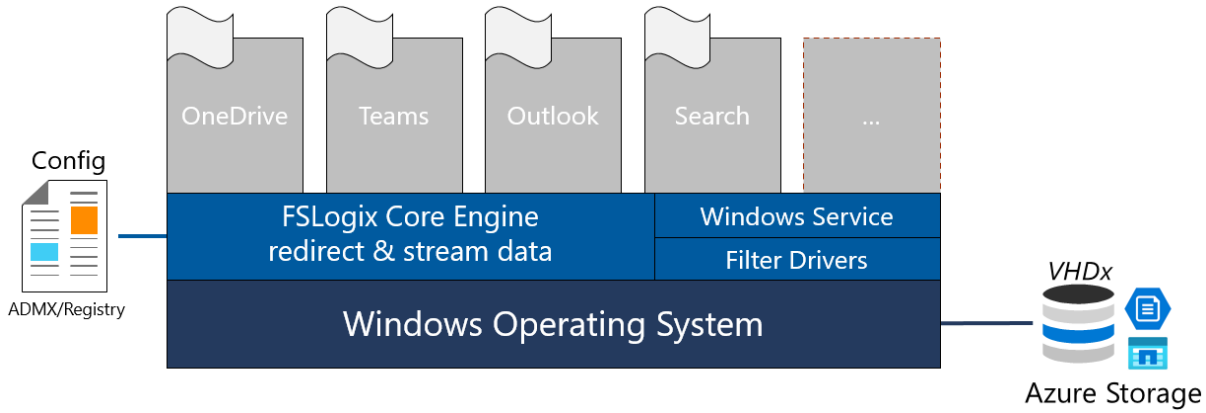
More info at aka.ms/fslogix

Microsoft Azure

FSLogix AV Exclusions

Make sure to configure the following Antivirus exclusions for FSLogix Profile Container – virtual hard drives. *Make sure to pass the following information against your security team.*

- **Exclude Files:**
  - %ProgramFiles%\FSLogix\Apps\frxdrv.sys
  - %ProgramFiles%\FSLogix\Apps\frxdrvvt.sys
  - %ProgramFiles%\FSLogix\Apps\frxccd.sys
  - %TEMP%*.VHD
  - %TEMP%*.VHDX
  - %Windir%\TEMP*.VHD
  - %Windir%\TEMP*.VHDX
  - \\storageaccount.file.core.windows.net\share**.VHD
  - \\storageaccount.file.core.windows.net\share**.VHDX
- **Exclude Processes**
  - %ProgramFiles%\FSLogix\Apps\frxccd.exe
  - %ProgramFiles%\FSLogix\Apps\frxccds.exe
  - %ProgramFiles%\FSLogix\Apps\frxsvc.exe



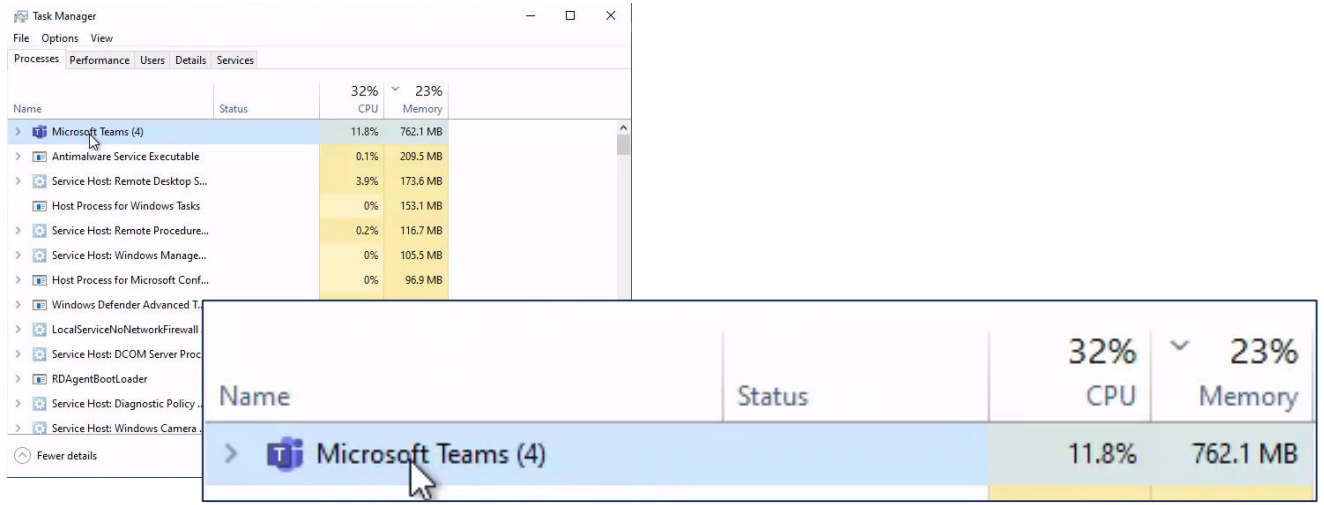
Teams Best Practices

Microsoft Azure

Microsoft Teams and Windows Virtual Desktop

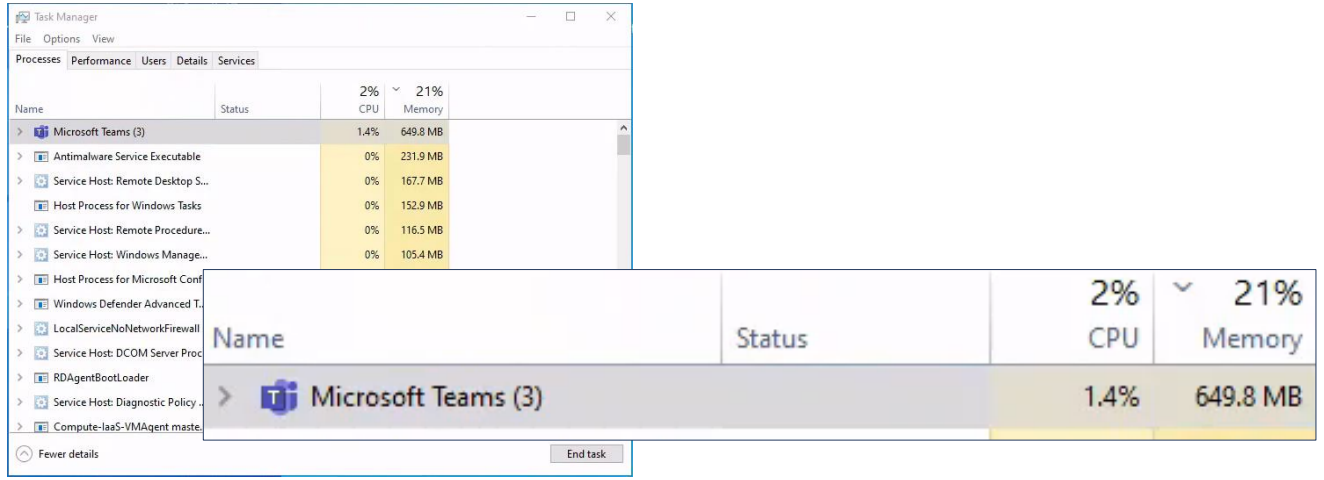
Before Teams Optimizations:

~12% CPU



With Teams Optimizations:

~1.5% CPU



Prepare network

Teams is designed to give the best audio, video, and content sharing experience regardless of your network conditions. That said, when bandwidth is insufficient, Teams prioritizes audio quality over video quality.

Bandwidth(up/down)	**Scenarios**
30 kbps	Peer-to-peer audio calling
130 kbps	Peer-to-peer audio calling and screen sharing
500 kbps	Peer-to-peer quality video calling 360p at 30fps
1.2 Mbps	Peer-to-peer HD quality video calling with resolution of HD 720p at 30fps
1.5 Mbps	Peer-to-peer HD quality video calling with resolution of HD 1080p at 30fps
500kbps/1Mbps	Group Video calling
1Mbps/2Mbps	HD Group video calling (540p videos on 1080p screen)

aka.ms/prepareteams

Teams exclusions

Make sure data in these two folders are synced:

- C:\Users\username\AppData\Local\Microsoft\IdentityCache (%localAppdata%\Microsoft\IdentityCache)
- C:\Users\username\AppData\Roaming\Microsoft\Teams (%appdata%\Microsoft\Teams)

Exclude the following from the Teams caching folder, %appdata%/Microsoft/Teams. Excluding these items helps reduce the user caching size to further optimize your non-persistent setup.

- .txt files
- Media-stack folder
- meeting-addin\Cache (%appdata%\Microsoft\Teams\meeting-addin\Cache)

aka.ms/fslogixexclusions

Tips for Troubleshooting

Domain join errors

1. **Verify the AD permissions** for the domain account. In some enterprises the account being used to join the domain is not a domain admin and only has limited rights to a specific OU for create and delete of objects

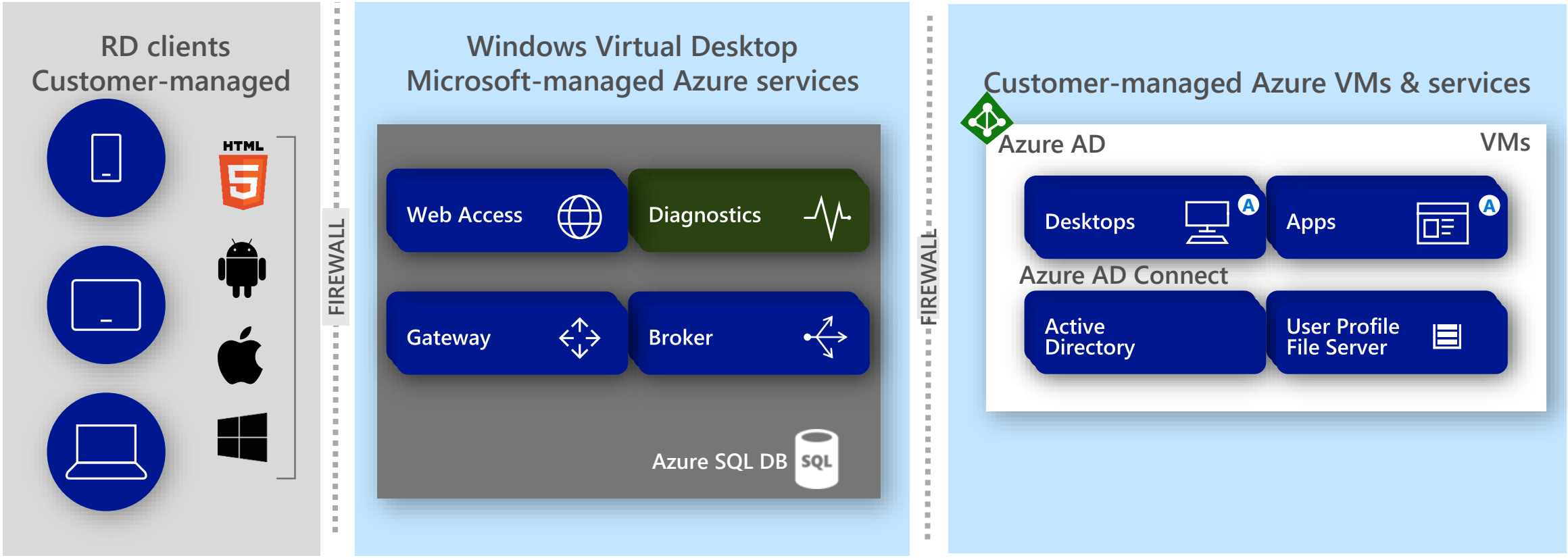
2. If you receive a domain join failure, ensure that credentials are correct. **Try to join the VM directly to the domain from within the VM to verify rights.**

3. **Attempt to provision a new windows machine** with just the Azure portal and manually domain join the machine in the exact OU that the admin states he/she has permissions to.

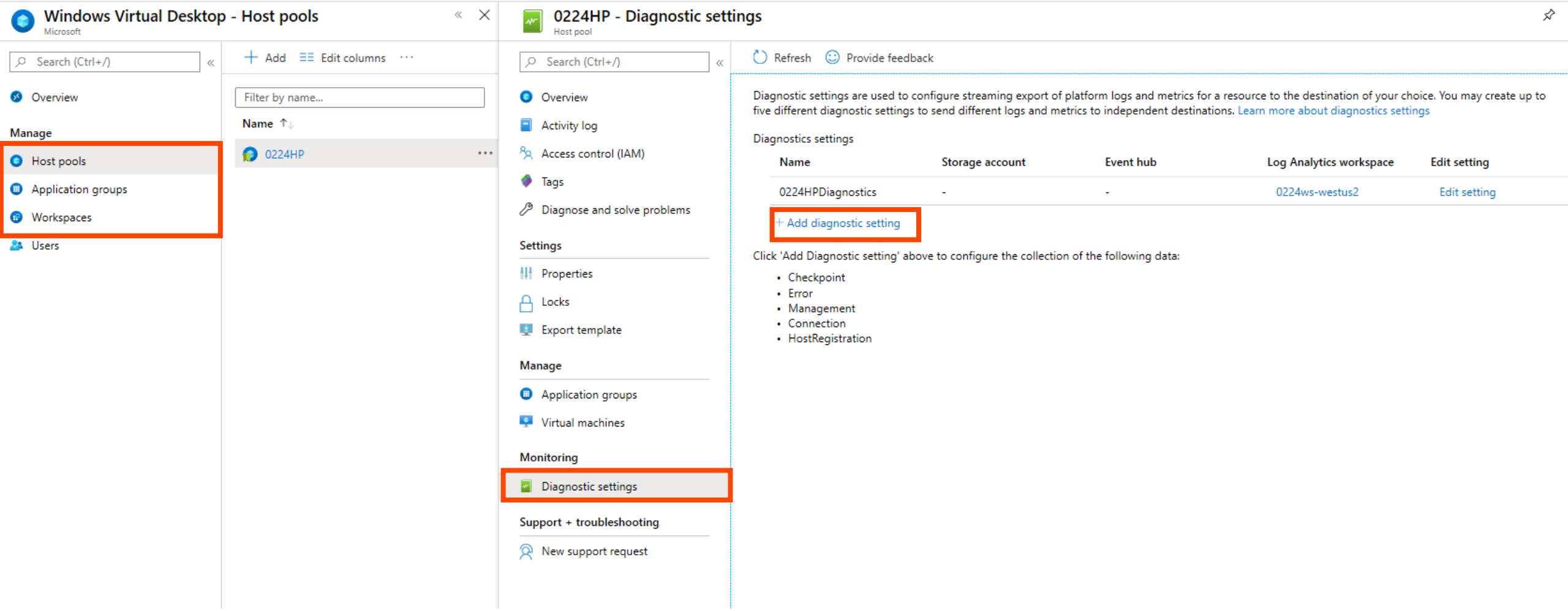
4. **Attempt to use another elevated account** from an IT person that has rights with other OU

Diagnostics within the service architectural diagram

Diagnostics is a feature of the managed Azure Service



Enable Diagnostics



Microsoft Azure

WVD Monitoring

Azure Workbook | Directory: Microsoft

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Access control (IAM)
Tags
Workbook

Settings

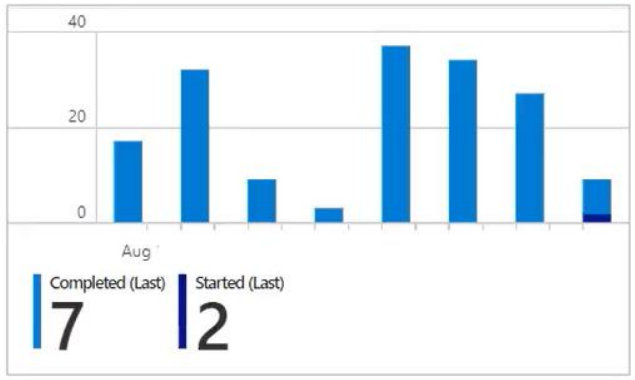
Locks

Support + troubleshooting

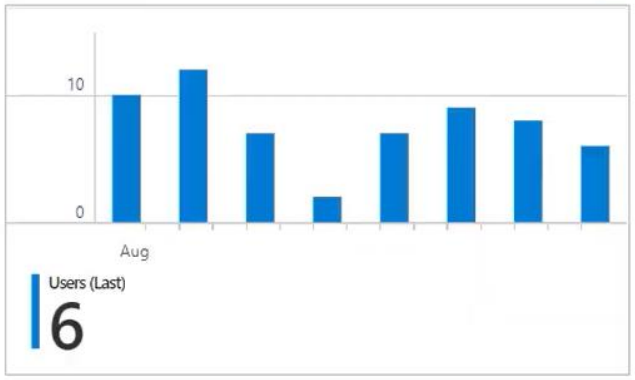
New support request

Trends

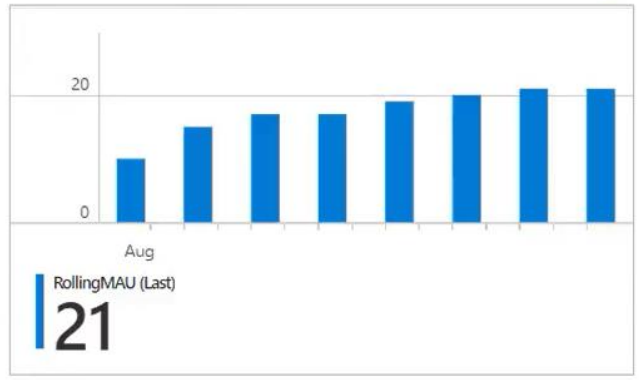
Daily Sessions



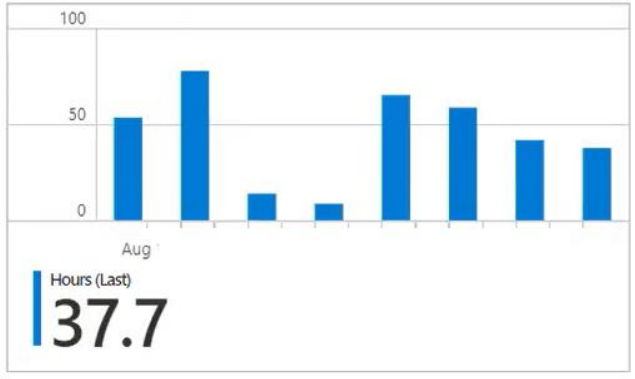
Daily Users (DAU)



Monthly Users (MAU)



Daily Connected Hours



Pool Health Overview

HostPoolType	MaxSessionLimit
Shared	99999

wvdwesteuM365j536930 | Logs

Log Analytics workspace

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Workbooks
Logs
Solutions
Saved searches
Pricing tier
Usage and estimated costs
Properties

New Query 1

Example queries | Query explorer

wvdwesteuM365j536930 | Select scope | Run | Time range : Last 24 hours | Save | Copy link | New alert rule | Export | Pin to dashbo... | Format qu

Tables | Queries | Filter

Search

Group by: Solution Filters: not selected

Favorites

You can add favorites by clicking on the ☆ icon

- LogManagement
- VMInsights
- Custom Logs

```
WVDConnections
| project-away TenantId,SourceSystem
| summarize arg_max(TimeGenerated, *), StartTime =  min(iff(State== 'Started', TimeGenerated , datetime(null) )), ConnectTime =
| join kind=leftouter (
    WVDErrors
    |summarize Errors=makelist(pack('Code', Code, 'CodeSymbolic', CodeSymbolic, 'Time', TimeGenerated, 'Message', Message ,'Ser
    ) on CorrelationId
| join kind=leftouter (
   WVDCheckpoints
   | summarize Checkpoints=makelist(pack('Time', TimeGenerated, 'Name', Name, 'Parameters', Parameters, 'Source', Source)) by C
   | mv-apply Checkpoints on
    (
        order by todatetime(Checkpoints['Time']) asc
        | summarize Checkpoints=makelist(Checkpoints)
    )
   ) on CorrelationId
| project-away CorrelationId1, CorrelationId2
| order by  TimeGenerated desc
```

Results | Chart | Columns | Display time (UTC+00:00) | Group columns

Completed. Showing results from the last 24 hours. 00:00:00.466 | 20 records

TimeGenerated [UTC]	CorrelationId	UserName	State	ClientOS	Cl
6/10/2020, 7:55:48.538 AM	2eed3681-6404-4c20-b144-0e95b5a91500	Bill.Smith@M365j536930.onmicrosoft.com	Completed	Windows 10 Chrome 83.0.4103.97	1.0
6/10/2020, 7:45:01.531 AM	2eed3681-6404-4c20-b144-0e95b5a91400	Bill.Smith@M365j536930.onmicrosoft.com	Completed	Windows 10 Chrome 83.0.4103.97	1.0
6/10/2020, 7:40:33.532 AM	2eed3681-6404-4c20-b144-0e95b5a91300	Bill.Smith@M365j536930.onmicrosoft.com	Completed	Windows 10 Chrome 83.0.4103.97	1.0
6/10/2020, 7:39:44.531 AM	2eed3681-6404-4c20-b144-0e95b5a91200	Bill.Smith@M365j536930.onmicrosoft.com	Completed	Windows 10 Chrome 83.0.4103.97	1.0
6/10/2020, 7:35:23.532 AM	2eed3681-6404-4c20-b144-0e95b5a91100	Bill.Smith@M365j536930.onmicrosoft.com	Completed	Windows 10 Chrome 83.0.4103.97	1.0

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Call to Action

Microsoft Azure

Call to Action

Azure Architecture Center

Azure Architecture Center provides guidance for architecting solutions on Azure using established patterns and practices.

Windows Virtual Desktop resources to explore

Overview:	aka.ms/wvd
WVD Best Practices	aka.ms/wvdbestpractices
FSlogix Best Practices	aka.ms/fslogixbestpractices
Microsoft Learn	aka.ms/learnwvd
WVD Quickstart tool	aka.ms/wvdquickstart
Microsoft Mechanics:	microsoft.com/mechanics

Q&A

Please submit your questions into the Q&A window. We have Subject Matter Experts ready to answer your questions.

Microsoft Azure

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Thank you for joining us.