Microsoft

# VMware on Azure:
## Migration and Modernisation Planning Guide

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# Organisations with VMware-based operations want options in the face of a changing Broadcom business model. They want to get ahead of data centre expiry dates, contain infrastructure costs and perhaps modernise their legacy infrastructure.

Many organisations continue to run VMware workloads on-premises as they explore cost-effective, long-term alternatives. While some will consider on-premises solutions like Microsoft Hyper-V, these solutions represent lateral moves that fail to address broader strategic goals. In contrast, Azure, which relies on Hyper-V for virtualisation, offers an innovative and adaptive cloud platform that helps organisations break free from the constraints of on-premises operations.

What if you could achieve more – overcome pricing volatility, scale efficiently and set your organisation up for sustained success? Microsoft Azure helps you drive innovation with AI, machine learning and developer tools to stay competitive in a digital world. Azure automation tools reduce operational complexity and empower your IT team to focus on strategic growth.

As you will learn, Azure offers a range of solutions for VMware workloads. This guide will help you assess your options, identify workloads ready for the cloud, plan your next steps and align your current infrastructure with long-term objectives.

Turn the page to get started.

# Introduction:
# Microsoft Cloud support for VMware

**Microsoft is the only supplier that offers both cloud and on-premises options to modernise VMware workloads.**

## Embracing the cloud

On-premises infrastructure has been the traditional model of IT infrastructure. Yet when it comes to performance, speed to market, cost and other key metrics, cloud environments can be equal or superior to what you get on-premises.

Cloud migration offers new business models and new capabilities. You can move from a CapEx to an OpEx model, in which your charges reflect actual usage and maintenance needs rather than fixed equipment costs. You can apply services as needed without upfront integration requirements, including multiple availability and disaster recovery options. And, when you're ready, you can modernise your workloads.

## Choosing Azure

The Azure cloud platform offers more than 200 products and cloud services to help bring new solutions to life. Build and optimise your workloads with proven documentation, architectures, partner services and more (figure 1).

Although Azure can support the migration of any workload, this guide focuses on VMware workloads and associated databases.

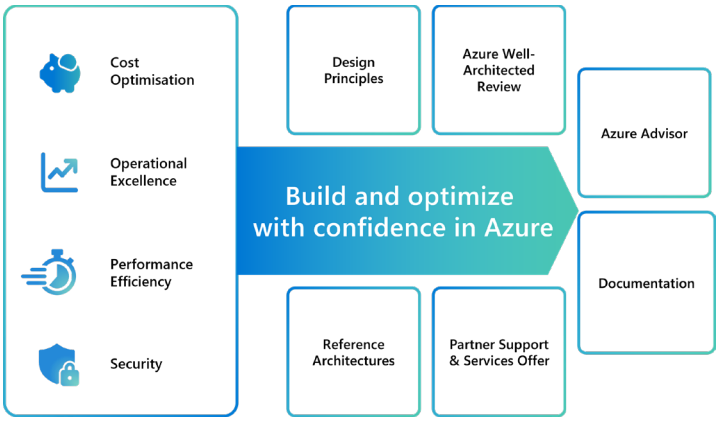



Figure 1: Use Azure best practices and resources to build with confidence on Azure.

### Azure options for VMware

Customers often choose a combination of Azure solutions to fit their specific needs including these:

1. Azure VMware Solution for the fastest path to Azure for all VMware workloads.
2. Azure native services for cloud-ready workloads that don't require a private cloud. Azure native services include Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS).
3. Azure Arc for VMware workloads that must remain on-premises, providing visibility across your estate.

> Generally, Microsoft will recommend Azure VMware Solution as the best solution for VMware customers with migration time constraints.
>
> With Azure VMware Solution, you benefit immediately from cloud-native services, tools and patterns. This solution, co-engineered with VMware, is a fully managed VMware Cloud Foundation (VCF) private cloud operated and supported by Microsoft. Your team can use familiar VMware tools and skills while gradually adopting Azure competencies.

# Choosing an approach

There is no single path toward modernisation. Customers often combine approaches (figure 2), typically moving most of their workloads initially to Azure VMware Solution. Work with your partner and Microsoft account team to identify an approach that meets your short-term needs. To address longer-term goals that include evolving workloads with Azure services, include a migration and modernisation plan.

## vMotion with ease

If your working time frame is short, the fastest path to Azure is using vMotion to migrate to AVS. The VMware HCX application enables zero downtime live migration capabilities for your VMware VMs.

AVS is a VCF private cloud environment. If your workloads work on-premises, they'll work in AVS. Your employees will continue to use familiar VMware skills. Microsoft takes on everyday tasks like managing the infrastructure and maintenance, freeing your team to gain cloud skills and focus on business value.

## Lift and optimise

If you have cloud-ready or smaller workloads, you might choose to move those workloads directly to Azure native services where you can innovate with cloud-native services.

The effort involved includes refactoring, retooling for the new environment, and retraining your staff.

Depending on the size and criticality of your data platform, you can choose several options, including Azure services optimised for Oracle Exadata and SQL Server databases. Learn more in Database planning later in this eBook.

## Improve on-premises operations

For workloads that must remain on-premises, consider using Azure Arc to operate across your hybrid environment from a single AI-enhanced management layer. Azure Arc acts as a bridge to extend the Azure platform so you can secure, govern and develop with standardised visibility, operations and compliance.

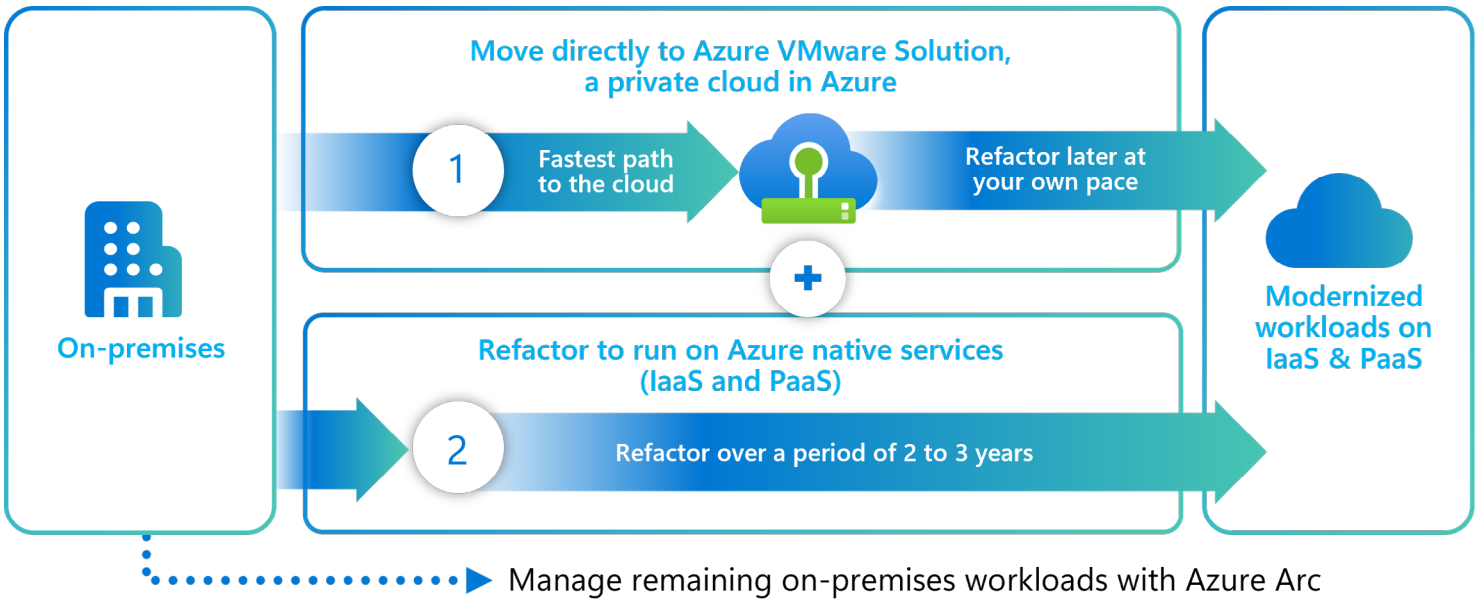



Figure 2: Organisations can choose multiple options to move workloads to Azure. Often, they use Azure VMware Solution as a stepping stone to Azure native services.

# **Discover** technical assets and explore options

## Set up your organisation for success by clarifying the outcomes you want, aligning your team and key partners and analysing your environment.

## Get prepared

Your partners can help you best if they understand why you're exploring options, what you want to achieve and by when.

### Build a requirements list

Build your requirements list to accommodate existing requirements and future needs. Consider using both business and IT KPIs to help you measure migration success.

### Identify a working time frame

Define your time frame, which is typically based on your modernisation goals, datacentre exit plans, hardware lifecycles and VMware renewals. Keep in mind that if you need to move to the cloud quickly, AVS is the fastest path to Azure.

### Define a migration team

Bring your experts together. Although the migration is typically led by the infrastructure team, you'll need your network, security and storage teams involved in the discovery, pilot and migration processes. Now is the time to engage your partner and Microsoft account team to help lead the process; they'll have greater access to internal Microsoft resources.

## Understanding discovery

The discovery process helps you understand your existing environment, assess workload readiness and determine potential costs.

Many organisations undertake a discovery and assessment process in three stages, including:

1. **Environment snapshot** through RVTools.
2. **Readiness review** through your Microsoft account team.
3. **Deeper dive** to understand performance and sizing peaks, dependencies and architecture optimisation considerations, such as grouping dependent VMs together.

### Sizing considerations

AVS is typically best for organisations with 100 or more VMs. Organisations with fewer than 100 VMs tend to gravitate toward Azure IaaS and PaaS options. In either case, you'll begin with discovery and planning.

## RVTools snapshot

Before your first meeting, your partner and Microsoft account manager will likely ask you for an RVTools export. This export will support a productive conversation about your options and enable you to get an initial price estimate.

The free VMware utility connects to a vCenter server to gather and display details about your VMs in an easy-to-use, tabbed interface, as shown in figure 3.

Learn about RVTools

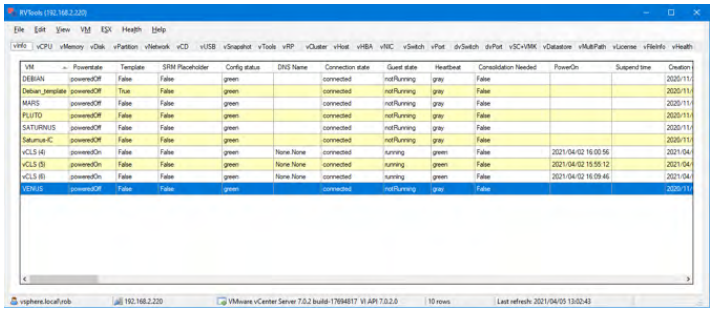


Figure 3: The RVTools report displays details for each VM.

## Readiness review with your Microsoft account team

Your Microsoft account team might offer an AVS Express TCO analysis to help you understand general costs for moving to Azure VMware Solution.

At this point, you might be ready to get started with a pilot project on AVS. If you need more data, your account team will recommend a deeper dive.

## Deep dive assessment

In some cases, your Microsoft account team might recommend a deep dive assessment to identify optimal approaches for each of your workloads.

This deep dive helps you identify workload trends and peaks over time, information that you can't get from the RVTools snapshot approach. The deep dive involves capturing data for a defined time period, usually at least three weeks.

# Optimising for pricing and licensing

The discovery process will help you determine how to optimise costs based on Azure pricing options. Choose a pay-as-you-go approach, lock in pricing for a specific number of VMs or do both.

**Pay-as-you-go.** With Azure, you pay only for the computing resources you use and stop buying hardware you might not need. This approach is ideal for organisations with unpredictable, variable workloads that periodically require them to scale processing power depending on demand. Many organisations further optimise costs with Azure Hybrid Benefit, which enables them to bring qualified Windows Server, SQL Server and Linux licences to Azure.

**Reserved capacity.** If you have predictable workloads, consider locking in pricing with Azure Reserved Virtual Machine Instances. With reserved instances, you reserve VMs for dedicated use over a one-, three- or five-year period at a substantial reduction in cost. When combined with Azure Hybrid Benefit, your savings quickly add up.

**Azure VMware Solution considerations.** If you choose AVS, you gain additional pricing incentives. And if you discover you're ready to modernise faster than expected, you can exchange your AVS reserved instances for other Azure reserved instances.

Choose from two VMware subscription options:

1. Purchase Azure VMware Solution from Microsoft with VCF included.
2. If you've already renewed with VMware, use your VMware VCF subscription in AVS to avoid paying twice.

With both options, Microsoft becomes the single contact for support.

# **Plan** your environment and configuration

## Are you replacing or improving? Work with your partner and account team to plan and configure your environment for technical and regional needs.

## Migration planning

Planning is everything with migrations. If you've selected Azure VMware Solution, for example, you'll be working toward a solution architecture like figure 4.

Part of planning is timing. Whether you plan a hot or cold migration, best practices require migrating during low-volume periods with proper notifications.

Build a project plan to help track your progress across the key milestones. Include all key deadlines that will affect the migration, including licensing renewals, datacentre decommissioning and deadlines for internal initiatives.

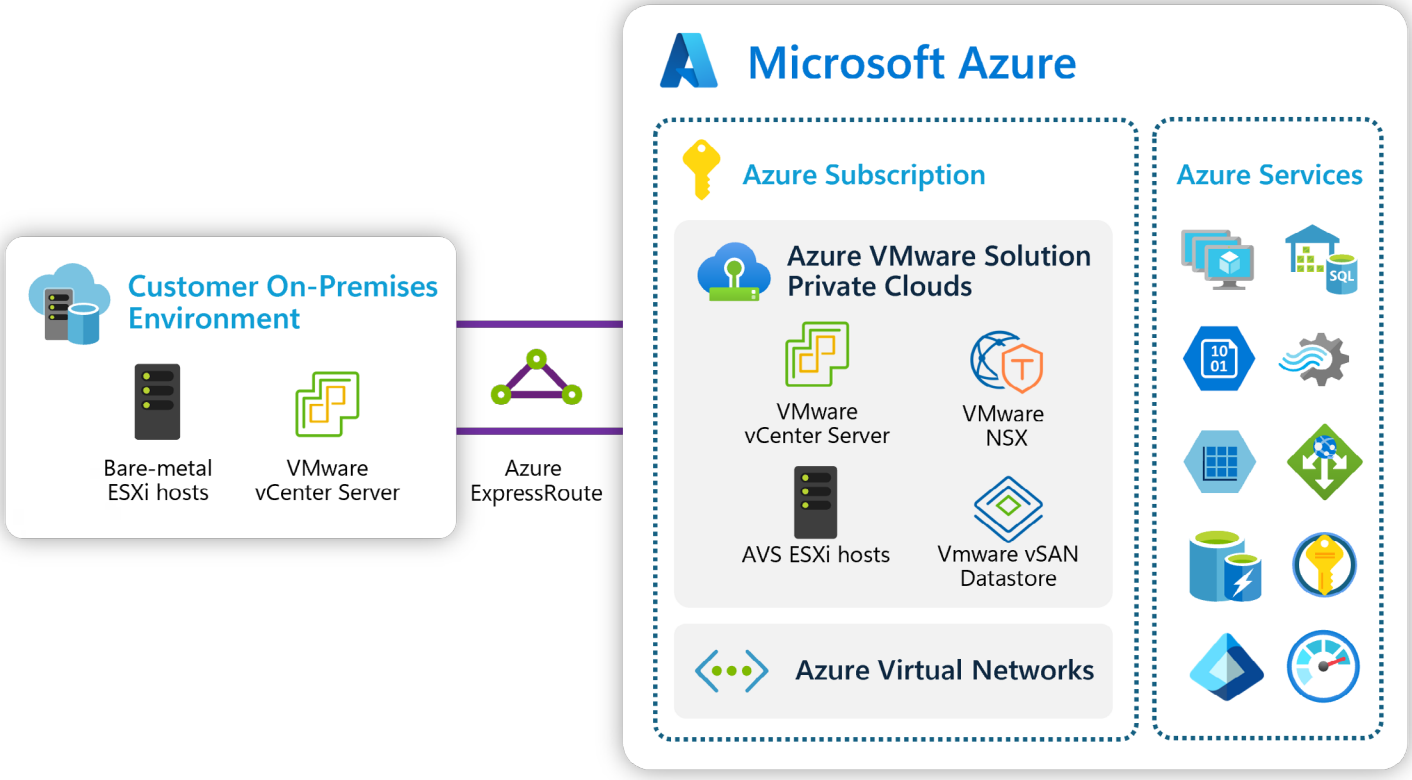



Figure 4: Example of an Azure VMware Solution architecture

# Designing your environment

Whether you're moving to Azure VMware Solution or Azure native services, you need to right-size and configure your environment.

## Clustering architectures

Two common clustering architectures optimise for key benefits: simplified licensing and administration.

- To simplify licensing, group similar VMs on the same cluster, such as a Windows Server cluster and a separate SQL Server cluster.
- To simplify administration, create a mixed licensing cluster to support a larger application or set of applications for ease of delegation to that application owner.

If you're moving workloads to Azure VMware Solution, keep in mind that your solution environment will have a minimum of three dedicated nodes and a maximum of 16 in each deployed cluster. Microsoft recommends that you deploy at least six nodes to optimise for fault tolerance and storage capacity and stay within 12 nodes to allow room for growth later.

## Inspecting old practices

Take this opportunity to decide what you want to improve by using integrated Azure services that also reduce cost and complexity.

**Backup and restore.** Are you using a modern backup and restore capability?

**Antivirus software.** Is it time to upgrade old antivirus solutions to integrated Azure solutions such as Microsoft Defender for Cloud?

**Disaster recovery.** Do you want to improve your approach to disaster recovery?

**Monitoring tools.** Do your monitoring tools require an update?

## Optimising bandwidth

Choose higher speed connections to help mask any environmental inefficiencies you might experience during migration. Although VPN is acceptable for a pilot, Microsoft recommends Azure ExpressRoute for most production environments. Most customers start with a 1-GB ExpressRoute connection. You can scale it to 2-, 5- or 10-GB depending on your needs.

## Defining your network

**IP addresses.** Choose whether you'll assign new IP addresses for the VMs (recommended) or bring existing IP addresses to speed migration and reduce risk.

If your developers or application owners used DNS names, assign new IP addresses. Microsoft recommends this approach to avoid using a Layer 2 extension, which can cause network inefficiencies.

If your applications have hard-coded IP addresses of virtual machines instead of DNS names, you can bring the current IP addresses to AVS by using a Layer 2 extension, or you can change the IP addresses to DNS names before migration. A Layer 2 stretched network enables communication between devices across different physical locations as if they were on the same local network segment. Use the Layer 2 extension only during the migration period and – assuming you've migrated all VMs on the stretched networks – disable it after migration is complete. After migration, give anything remaining in the old environment a new IP address in a different (non-stretched) network.

**/22 network segment.** AVS requires a non-overlapping, unused /22 network address space upon deployment. The /22 segment will host the dedicated IP addresses for the AVS host environment. You'll need additional network segments for virtual machines operating within the AVS environment.

## Evolving your security

Be sure to re-create your firewall rules based on your new environment, especially if your IP addresses are changing. Define where your firewall will live – on-premises, in Azure native services or in Azure VMware Solution. Also, you'll need to review the existing security landscape and discuss with your partner how you can improve your security posture.

# Database planning

Generally, Microsoft recommends that you plan on moving each application group with all dependencies, including the database. When you co-locate the app and database in Azure, you can reduce latency and optimise traffic flows and the user experience.

## Choosing the best option

Identify the best destination in Azure for your database based on features, size, cost and migration ease:

1. vMotion your databases to Azure VMware Solution using HCX.
2. Refactor to Azure native services (IaaS and PaaS).

Azure also offers options for business-critical databases like SQL Server and Oracle Exadata (figure 5):

- Azure SQL Database and Azure SQL Managed Instance help simplify database operation and offer superior analytics and security.
- Oracle Database@Azure enables the high performance and availability of Oracle Exadata and Oracle Real Application Clusters with streamlined migration and easy access to Azure services.
- Azure Database for PostgreSQL, not shown in figure 5, is a fully managed, AI-ready database.

## Getting started

Use Azure Migrate to discover and assess your database infrastructure to determine your options and estimated pricing.

# Storage planning

Depending on your storage needs, Azure has a wide range of storage options to support your workloads.

If you're moving to Azure VMware Solution, VMware vSAN storage is included. However, you might find it less expensive to run storage-intensive apps on external storage that scales independently of compute. AVS offers two first-party, external options that integrate with AVS:

1. Azure NetApp Files for Azure VMware Solution
   - Highest-performance file storage service for the most demanding enterprise storage workloads
   - Four service tiers to choose from, along with Azure NetApp Files backup
2. Azure Elastic SAN for Azure VMware Solution
   - External iSCSI-based block storage emulating the conventional SAN implementation in the cloud
   - Lowest cost per GiB external storage option for Azure VMware Solution

Find other AVS storage solutions in the Azure Marketplace offered by partners, including Pure Storage.

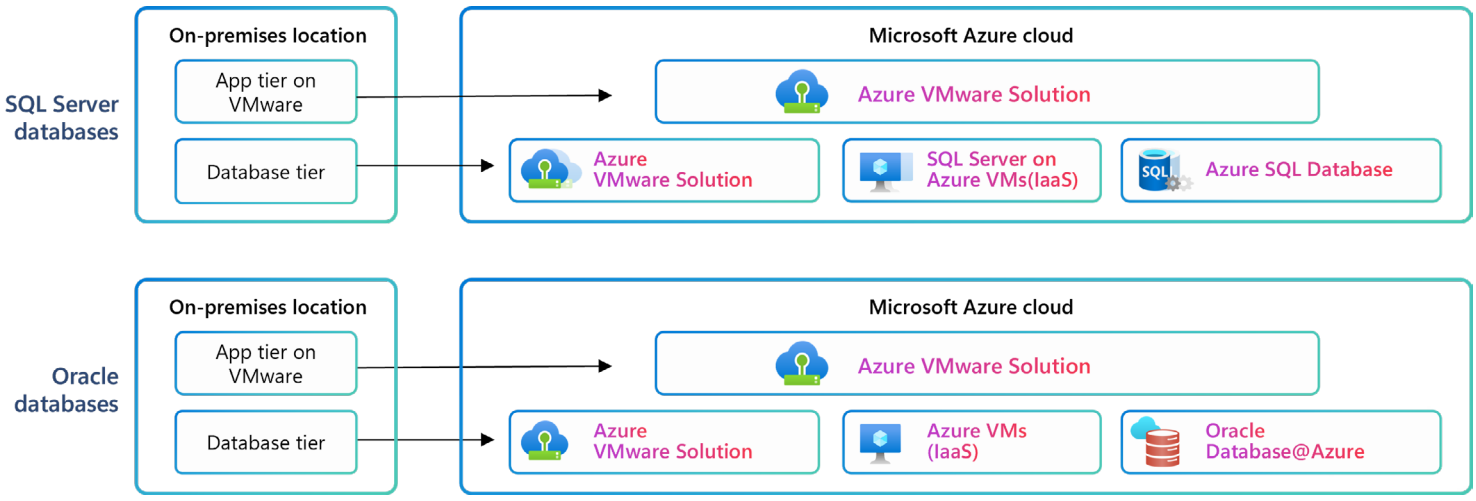



Figure 5: Examples of migration options for business-critical databases.

# **Pilot** and test your environment

## Piloting your design helps you learn about Azure and your networks.

## Landing zone

*A landing zone* is a complete, scalable, production-grade environment for your pilot and – after validation – for your entire production workload. Based on your plan, your partner might configure Azure VMware Solution as part of your landing zone configuration. You and your partner can use Azure landing zone accelerators to streamline design decisions while enabling customisation (figure 6).

Customers with enterprise-scale migrations might be eligible to engage the Microsoft Customer Success Unit (CSU) Migration Factory (CMF) to design the landing zone architecture and move workloads. CMF participation can ensure long-term project success and help you avoid potential obstacles.

### Engage the CMF

CMF is a program sponsored and delivered by the Microsoft CSU to accelerate Azure migration for Windows, Linux and SQL Server, along with their associated applications. CMF staff includes cloud solution architects, and the programme focuses on vMotion migrations with minimal code changes.

CMF offers these migration support services at no cost to eligible customers. Work with your account rep to engage them from the very beginning of the pilot.

## Connectivity

If you've deployed Azure VMware Solution, consider enabling Global Reach between the AVS ExpressRoute connection and on-premises ExpressRoute circuits. Global Reach handles the east-west traffic routing between the two circuits by using Border Gateway Protocol. Global Reach supports a majority of routing scenarios, and is an easy way to connect your Azure VMware Solution private cloud to your on-premises environment.

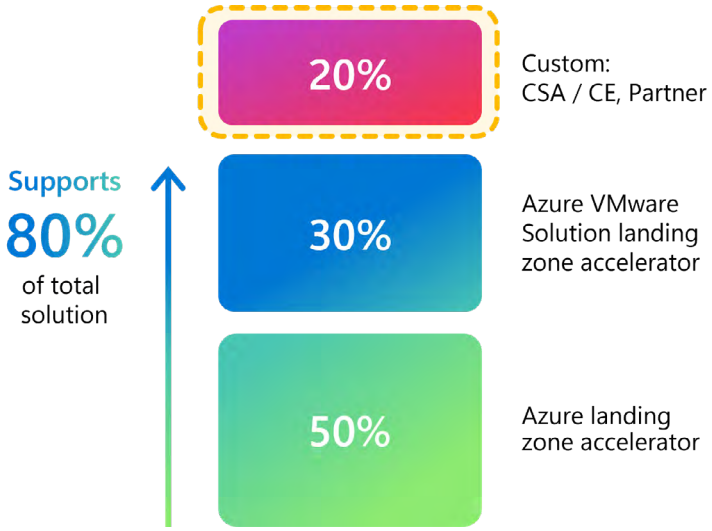



Figure 6: Using Azure landing zone accelerators, you and your partner can eliminate 80% of the effort to deploy.

# Testing your workload

Work with your partner to define the pass/fail criteria for your pilot. Test access, bandwidth, connectivity, the performance of your critical workloads and the integration of your management tools. Confirm that a VM can be migrated, validate backup and restore and test monitoring tools.

If you're piloting an Azure VMware Solution deployment and require a significant amount of storage, Microsoft recommends creating storage outside of the solution to test external storage performance across the environment.

Your validation process continues until the workload performance is validated and meets your needs.

## Building test criteria for your pilot

Design test parameters to help validate your pilot's performance, scalability and reliability, and ensure a successful production-ready environment.

**Pilot Scope**

- **Workload Selection:** Select a representative set of workloads for the pilot, considering factors such as complexity, size and business criticality.
- **Pilot Environment:** Establish a dedicated pilot environment with isolated networks and resources.

**Test Scenarios**

- **HA (High Availability) Testing:** Test the pilot environment's ability to recover from node failures and ensure application availability.
- **Network Connectivity Testing:** Test network connectivity and ensure seamless communication between on-premises and AVS environments.
- **Distributed Resource Testing:** Test the pilot environment's ability to allocate resources efficiently and respond to changes in workload demand.
- **Disaster Recovery Testing:** Test the pilot environment's disaster recovery capabilities, including replication and failover scenarios.

**Test Data**

- **VMware vSphere VMs:** Collect sample points every 20 seconds and combine them to create a single data point every 10 minutes.
- **AVS Metrics:** Collect metrics on resource utilisation, performance and availability for the pilot workloads.

# **Migrate** your remaining production environment

## Migrate in waves, grouping VMs based on dependencies in each wave.

## Moving to Azure VMware Solution

Based on your plan, migrate VM and dependencies to Azure VMware Solution one group at a time. Unless you must keep data on-premises, AVS is a good starting point for both applications and data, buying you time to modernise on your terms.

Validate each wave before migrating the next group.

Typically, AVS migrations use the VMware HCX application mobility platform to simplify application migration. HCX includes both vMotion for live virtual machine migrations and a Bulk Migration service.

Install HCX in AVS, then configure the HCX Connector and network extension on-premises and configure your migration parameters. This process will be managed by you, your partner and the Microsoft Customer Support Unit (CSU) Cloud Migration Factory (CMF) personnel.

When you're ready, your partner or the Microsoft CMF will migrate the first 10-20 VMs to ensure that everything is working. Future migration waves might contain more VMs as you build confidence.

### Managing AVS

Microsoft manages Azure VMware Solution private cloud infrastructure for customers. Regular upgrades ensure the latest security, stability and feature sets.

To control your VMs from the Azure portal, enable Azure Arc on all servers within Azure VMware Solution so you can see each VM as an Azure resource.

Azure Arc offers visibility across your entire VMware environment, including on-premises. Azure Arc extends the Azure control plane to VMware vSphere infrastructure, enabling the use of Azure security, governance and management capabilities consistently across VMware vSphere and Azure.

## Migrating to Azure native services

If you have applications that are cloud-ready, work with your Microsoft team or partner of choice to migrate them to the appropriate solution on Azure, which might include Azure App Service, for example.

If you're moving a specialised database, for example a SQL Server database or an Oracle Exadata database, use the appropriate tools based on the target destination.

# **Modernise** with Azure services

## Every organisation defines modernisation differently. Your partners can help you determine the best approach.

## Engage your team

For long-term success, you'll want to shift to using cloud-based architectural patterns and start the transition to a cloud operations model. Get your team up to speed on Azure cloud technologies and capabilities. As your team gains cloud skills, team members can experiment with development platforms, AI and analytic services to maximise business value.

Azure documentation and skilling enables enterprises to help teams evolve at their own speed. Microsoft Learn offers training materials including coursework, certification programmes, labs and videos.

## Modernise to innovate

Microsoft helps customers drive innovation with unique Azure options for application modernisation and databases, and integrations to industry-leading AI and analytics services. To innovate with cloud services like analytics or AI at scale, start by modernising your infrastructure, data estate and app platform.

### Modernise with Azure native services

Consider the time you saved by moving to the AVS managed service and the cloud skills your team has since acquired. If you're ready, start to refactor workloads to Azure native services infrastructure and platforms to open up opportunities for innovation.

### App development

Business outcomes tend to be dependent on apps. By moving to modern app platforms, developers can create scalable and resilient apps. They can build and iterate faster by using preferred tools. Azure offerings include:

- **DevOps integration:** Manage and deploy applications efficiently with Azure services that enable continuous integration and continuous deployment (CI/CD).
- **Support for modern architectures:** Azure supports modern development practices such as microservices, containers and serverless computing for resilient and high-performing applications.
- **Low/no code PaaS:** Microsoft Power Apps and Power Automate allow rapid application development with minimal coding.
- **Container PaaS:** Run workloads with high control over the environment by using container technologies like Azure Kubernetes Service (AKS).
- **Application PaaS:** Solutions like Azure App Service and Azure Functions manage health, availability and deployment with less management overhead.

### Data analytics

Azure offers a comprehensive set of intelligent solutions that turn your data into actionable insights, including an end-to-end analytics platform that helps unify your data.

### Artificial intelligence

Azure platforms, services and AI models help developers build AI into apps and build high-quality generative AI apps at scale.

# Next steps

## It's time to get started and schedule an exploratory meeting with your partner.

Move to Azure VMware Solution, a comprehensive managed solution co-engineered by Microsoft and VMware. Continue to work with VMware skills and software, offload routine administrative tasks to Microsoft (figure 7), and focus on creating business value with cloud computing.

## Next steps:

1. **Build your internal migration team:** You'll need people from your infrastructure, network, security and storage teams.
2. **Contact your VMware partner:** Your partner will be instrumental in your migration.
3. **Contact your Microsoft account team:** They'll be able to provide access to internal Microsoft tools.
4. **Provide an RVtools export:** Create an RVtools export to provide to Microsoft and your partner.
5. **Schedule a meeting to discuss options:** Bring together your team, your partner and your Microsoft account manager to begin planning.

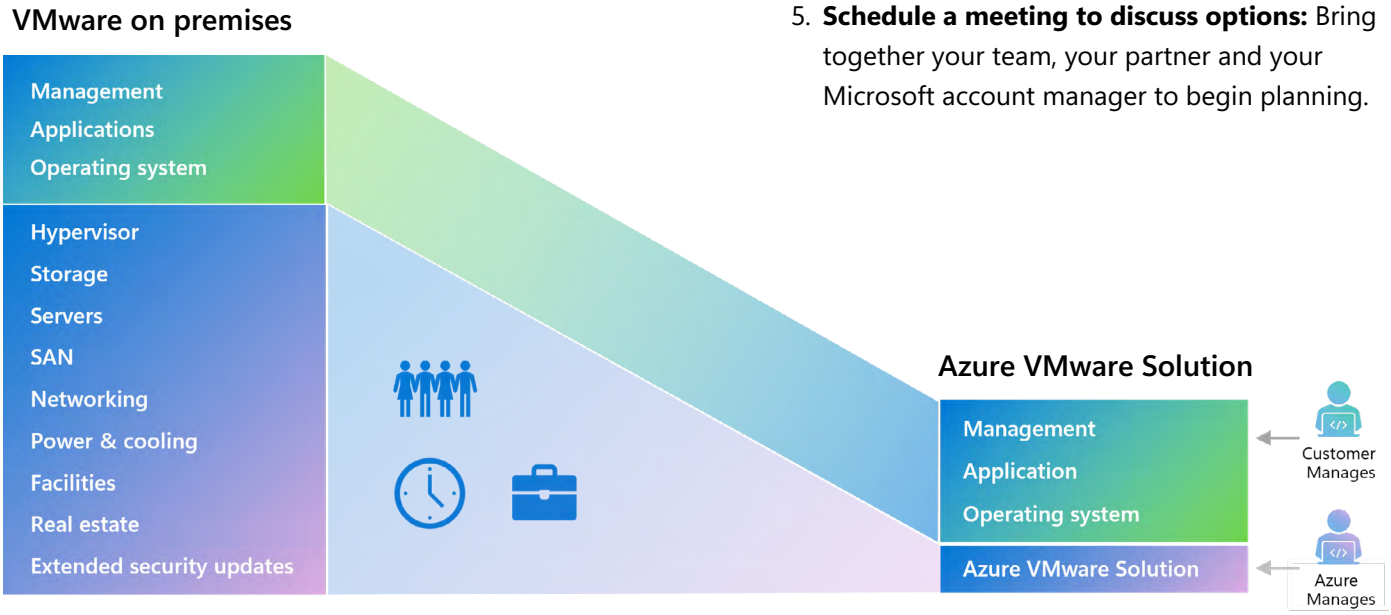



Figure 7: AVS offloads routine IT tasks to Microsoft, freeing up your team to focus on business value

## Ready to take the next step?

- Contact your Microsoft account manager.
- Contact your VMware/Microsoft partner.
- Head over to the Azure Innovate & Azure Migrate and Modernise website.

# Resources

## Azure VMware Solution

- Azure VMware Solution overview
- Azure VMware Solution technical documentation
- Azure VMware Solution customer stories
- EBook: The Total Economic Impact of Microsoft Azure VMware Solution, Forrester
- Webinar: Get Started with Azure VMware Solution: A Look Inside
- Azure VMware Solution landing zone accelerator
- Training: How to deploy and move to AVS

## Migration and modernisation

- Azure Innovate & Azure Migrate and Modernise programme
- Webinar: How to Modernise Your VMware Environment with Azure
- Migrate to Azure with Azure VMware Solution
- Click-through demo: HCX migration to AVS

## Azure database options

- Azure SQL Database documentation

## Azure storage options

- Attach Azure NetApp Files datastores to Azure VMware Solution hosts
- Use Azure VMware Solution with Azure Elastic SAN
- Click-through demo: AVS and Azure Elastic SAN
- Click-through demo: AVS and Azure NetApp Files

## The Azure difference

- Azure Hybrid Benefit
- Extended Security Updates in Azure VMwareSolution VMs
- Azure compliance offerings
- Azure products

## Azure Arc

- Azure Arc product overview
- Azure Arc documentation
- Video: VMware vSphere scaled onboarding with Azure Arc enabled servers
- Click-through demo: Capabilities ofArc-enabled AVS

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