



Azure Stack

Unified Application Management on
Azure and Beyond



CLOUDIFY

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Introduction

Organizations embarking on a digital transformation journey will inevitably consume cloud services—either public or on-premises—as part of application modernization efforts. While the limitless capacity of a public cloud figures as a key advantage, there are often downsides such as latency, security and regulatory complications. Hybrid cloud is common within organizations that still maintain on-premise data centers or private cloud, while beginning to migrate applications to public clouds.

[Azure Stack](#) delivers an enterprise-class on-premises cloud, all with the same code base and technology used for powering up the Azure public cloud, closely integrated with its public cloud offering through their ARM technology (Azure Resource Manager). With this turnkey private-cloud solution, Microsoft targets organizations finding themselves still requiring hybrid cloud architectures - whether for regulatory compliance requirement or during digital transformation processes. Speed, agility, flexibility, reusability and tight integration with the public Azure cloud makes Azure Stack a quick win for organizations deeply invested in Microsoft technologies, and who want a seamless experience of managing both private and public clouds.

Azure Stack provides a uniform platform for deployment of applications using either the PaaS or the IaaS models, depending on the preferences of the customer. Customers can deploy application workloads in virtual machines or containers, leverage PaaS offerings like WebApps and SQL/MySQL DbaaS, or use a combination of these services. The services can be managed and deployed using the same toolsets and processes that are used for managing existing workloads in an Azure public cloud. This makes it an easy fit for your existing CI/CD pipelines; it requires little or no change to your application code. This article will explore the features of Azure Stack that enable unified application management across public- and on-premises cloud boundaries. The features could also play a key role in your enterprise cloud migration and for hybrid cloud strategies.

Deployment Models

[Azure Stack](#) is delivered for production environments as an integrated system along with OEMs like Cisco, Dell EMC, HP, Huawei, Lenovo, etc. With Azure Stack, the approach is to provide a turnkey solution so that customers do not have to spend much time on infrastructure layer setup, and focus instead on services that can be offered by leveraging Azure Stack. The infrastructure for Azure Stack is standardized and sealed off from customer-specific configurations, which is a small inconvenience considering the innovation that Azure Stack enables at the application layer. The compute, storage and network are accessed by the Azure services using the same topology used in the Azure public cloud. For evaluation purposes, customers can download and use the Azure Stack Development Kit (ASDK), which is intended for single-node deployment of Azure Stack. Let's explore some of the enterprise-cloud use cases powered by Azure Stack.

Dedicated On-Premise Cloud

Organizations frequently prefer to keep sensitive data on-premises to meet security and compliance policies. Azure Stack allows a configuration in which apps and VMs processing sensitive data can remain on-premises, while the Azure public cloud can be leveraged for additional computing capabilities as needed.

Shared Application Hosting

Azure Stack can be used to implement an in-house multi-tenant on-premises cloud in which data and applications from different business units can be hosted in a secure manner. It can also be used to provide a self-service computing environment for customers that want more control over hosted applications and environments.

Extended Hosting Capabilities

Azure Stack can complement an organization's pre-existing infrastructure investment. Migrating services to Azure Stack could also be the first step in implementing a hybrid cloud architecture. The same approach can be used later to extend deployments to the Azure public cloud using Azure Stack's toolsets and processes.

Unified Application Deployment

If an organization has already adopted an Azure public cloud, Azure Stack provides a consistent experience for application deployment and management. For example, the same ARM template can be used for the deployment of workloads in both Azure and Azure Stack with minimal or no changes. This however, does not extend to multi-cloud management, in order to be able to achieve unified application management across Azure and Azure Stack, an application orchestration layer can be utilized, such as [Cloudify](#) (more on this below).

Azure Stack can be deployed in a connected or [disconnected](#) architecture depending on the target use cases and preferred billing model. This is a one-time decision and cannot be reversed without redeploying the infrastructure. In the connected deployment model, Azure Stack is connected to the internet and an Azure public cloud. This model works well for hybrid cloud deployments and helps unlock the full capabilities of Azure Stack. It supports both Azure Active Directory and Active Directory Federation Services (ADFS) for identity management. Customers can choose between pay-as-you-go billing or capacity-based payment for connected deployments. Disconnected deployments, on the other hand, target isolated deployments with no connection to internet. This type of deployment primarily targets secure on-premises deployment use cases. It supports only ADFS for identity and capacity-based models for billing.

Azure Stack Service Catalog

Azure Stack enables administrators to provide hybrid cloud services in a controlled manner. Administrators can create service [offerings](#) customized for individual customers with quotas and restrictions in place. The services available in Azure Stack are a subset of what is currently available in the Azure public cloud. The services can be grouped into plans that have specific quotas associated with them, e.g., the number of VMs, CPU cores, RAM, etc. The plans are then grouped to create offers that can be purchased by tenants. Some of the key services available in Azure Stack are listed below for quick reference.

Azure Virtual Machines: Not all Azure public cloud Virtual Machine SKUs are available in Azure Stack as of now. Along with the A series, D series, Dv2, DS and DSv2 SKUs that were originally available, Av2 and F-series machines were also recently announced to be generally available in Azure Stack.

Azure Virtual Machine Scale Sets: If the Azure Stack deployment is syndicated with Azure Marketplace, you can deploy VM scale sets with OS images available from the marketplace.

Azure Storage: Azure storage services in Azure Stack provides Blobs, tables and queues that are similar to those available in the Azure public cloud. Blob storage can be used to store a large amount of unstructured data in the cloud. Tables provide NoSQL schema-less database storage to meet flexible application database requirements. Queue storage offers a reliable messaging service, which is used predominantly in decoupled application architectures.

Azure Key Vault: The Key Vault service available in the Azure public cloud is available in Azure Stack as well. This allows organizations to both store and manage keys used by applications and virtual machines. The Key Vault service can be used for secure storage of an authentication key, storage account keys, passwords, .pfx files, and data encryption keys. The keys can be accessed from applications directly using APIs or URIs from administrators.

Azure Networking: Azure Stack uses Windows server 2016 SDN components to provide networking components like virtual networks, load balancers and VPN gateways. Services hosted in Azure Stack can be published to the internet using a pool of public IP addresses allocated to a public VIP pool.

Azure App Service: Azure App Service is the PaaS offering in Azure Stack that supports deployment of applications built for all major frameworks like ASP.NET, Node.js, Java, PHP and Python. Customers can

choose between Web Apps, API Apps and Azure functions in App Service depending on the use case. Web Apps can be used for hosting websites and applications. API APPs are useful for hosting Restful APIs and Azure Functions-event driven serverless workload use cases.

SQL/MySQL DBaaS: SQL and MySQL database-as-a-service offerings are supported if these resource providers are configured on Azure Stack. If organizations want to adopt an end-to-end PaaS approach for deploying applications using Azure Stack, they can use SQL/MySQL DBaaS along with Azure App Service.

Containers: Users can host Docker for Windows and Linux Docker containers in Azure Stack. Docker For Windows server containers and the Linux Docker extensions are available for download from Azure Marketplace to support this.

Azure Marketplace: Azure Marketplace provides a list of services that can be deployed in Azure Stack. An Azure Stack operator can connect to the marketplace available in the Azure public cloud to locate and download items tested for Azure Stack. Alternatively, in a disconnected deployment scenario, a syndication tool can be used to download and transfer marketplace items to an Azure Stack installation.

Enterprise Cloud Migration

Many organizations rely heavily on virtualization to get optimal benefit out of their infrastructure investment. The cloud, on the other hand, is a significant paradigm shift for organizations focusing on innovation, self-service and on-demand services. The trigger for cloud migration differs among organizations. It could be anything from a technology upgrade, demand for scalability, a phase out of legacy systems, or new technology requirements to comply with business strategies. Azure Stack can fit into a cloud migration strategy by acting as a stepping stone for cloud adoption. Customers can deploy applications in Azure Stack using the same APIs, interfaces and tools that they would use later in the Azure public cloud.

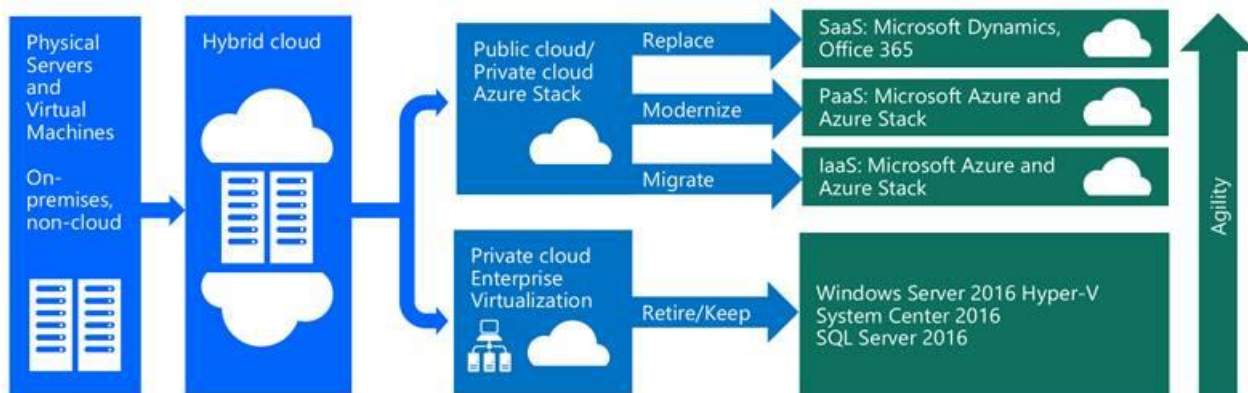


Image courtesy: Microsoft

Migrating services and applications to the cloud depends on whether it is more beneficial to replace, modernize or migrate them. Customers can choose various SaaS, PaaS or IaaS services to assist in the transition. Commoditized SaaS services like Office 365, Microsoft Dynamics, and SharePoint Services can be used to replace legacy mail systems, file servers, CRM, etc. Applications included in the long-term IT

roadmap of an organization are good candidates for modernization and can be refactored to use PaaS services. For example, Web Apps can be used for hosting an application front end while SQL or MySQL DBaaS can be used for the back end.

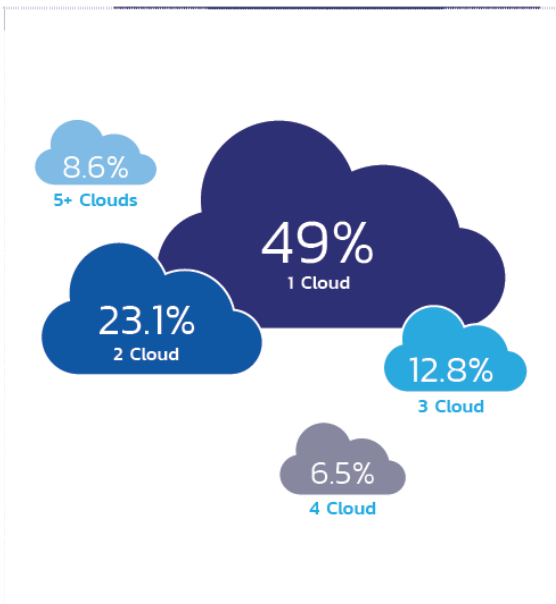
Applications that cannot be refactored should be considered for lift-and-shift migration to IaaS by deploying them in VMs or virtual machine scale sets, or a more integration-based approach is also possible through a hybrid stack approach. A good example of this scenario would be a highly customized application with specific storage and networking requirements. Azure Site Recovery, which helps to migrate workloads from heterogeneous environments to Azure IaaS, is one service that can be used in this instance, or Cloudify to enable automation for legacy environments with unified management, while transforming such applications in the background to more modern architectures suited for the cloud.

The target environments for cloud migration could be an Azure Stack on-premises cloud, an Azure public cloud, or a virtualized infrastructure hosted on-premises, such as OpenStack or VMware. A public cloud offers maximum benefit in terms of cost savings, flexibility and scalability. However on-premise clouds are preferable when an organization must meet specific regulatory compliance standards. A hybrid cloud blends the benefits of an on-premise cloud and a public cloud; it also allows easy mobility of workloads between the two environments. Having a consistent architecture among cloud platforms is the best practice for ensuring a seamless migration of workloads, however application orchestration can help simplify this exponentially as well. Both Azure Stack and the Azure public cloud offer the customer a unique value proposition: they complement each other in terms of service offering, tools, management interface, and operational agility.

Azure and Multi-Cloud Strategy

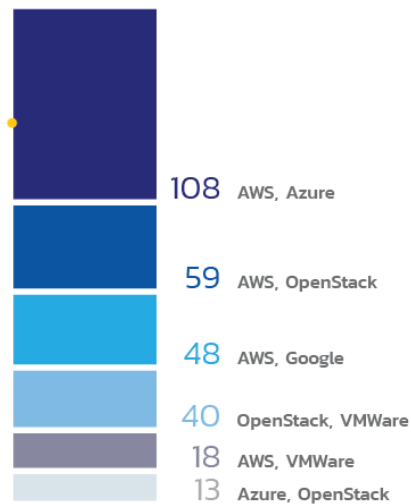
According to the Cloudify [2017 State of the Cloud Report](#), 51 percent of organizations already have a multi-cloud strategy in place for IaaS workloads.

If more than one,
then how many clouds?



○ Best friends: most common combination

And what are the most popular
two-cloud combinations?



When building modern, scalable cloud-native applications, organizations prefer a consistent platform for deployment and operations, yet to still be able to gradually achieve this transformation goal without having to rip out and replace all of their existing technology assets. These migration and transformation processes have proven quite challenging, and as many as 70% of these initiatives fail when organizations are required to rip out old technology for new technology, according to a recent [McKinsey Report](#). Along with PaaS platforms, containers are also gaining momentum, as well as FaaS - requiring both microservices and serverless architectures. However, the speed of adoption is not nearly as rapid as the speed of innovation, and organizations are finding themselves unable to keep up the pace.

That's why many organizations are looking for a platform versatile enough to enable the deployment of these services either on-premises or in a public cloud per business requirements. With the introduction of Azure Stack, Microsoft has cemented its position in the hybrid cloud landscape by providing organizations a seamless and unified experience for the deployment of workloads across cloud environments.

Azure Stack is built based on the principles and the architecture of the Azure public cloud. It offers the highest levels of consistency for a hybrid cloud environment compared with any other offering currently available in the market with same portal experience, APIs, application model and tools. The integrated systems approach reinforces this consistency by enforcing standards and a well-defined mechanism for service onboarding, delivery of hardware/software updates, and this is where [TOSCA](#) and Cloudify can glue these services together.

Azure AD can be used in both Azure and Azure Stack to implement role-based access control to resources, and through Cloudify's pluggable support of a diversity of authentication & authorization protocols (LDAP, SAML, Kerberos), you can then ensure consistent access governance and RBAC across all environments - whether OpenStack, VMware or Kubernetes. Azure Resource Manager (ARM) used in

the Azure public cloud is also used in Azure Stack to provide user interfaces like Azure portal, PowerShell and CLI. Tools like SCOM and OMS can provide integrated management and security for the workloads. In this way, organizations can leverage their previous investment in technology across clouds, either through a Microsoft tool suite or an open source toolset can be used for deployment across an on-premises cloud and a public cloud.

Interoperability of workloads among multiple cloud platforms becomes important when adopting a hybrid cloud strategy. Frameworks like TOSCA become relevant here because they are the industry-leading standard to ensure interoperability of cloud applications and services across cloud environments. Orchestration tools based on TOSCA help in the hybrid cloud adoption process by automating the various phases of configuration, installation, deployment and monitoring. [Cloudify](#) is one such open-source implementation of TOSCA which simplifies the cloud native transformation and migration journey in multi-cloud environments

In simple terms, Cloudify is an open-source cloud orchestration framework that can provide out-of-the-box integration with leading cloud service providers using plugins. Cloudify's framework helps in lifecycle management of applications deployed in cloud environments; it starts from deployment and continues through management and monitoring of deployed applications for possible failures and errors, and can trigger remediation workflows. The Azure plugin for Cloudify can be used to manage and deploy resources in both the Azure public cloud and Azure Stack, as well as Azure Kubernetes Service (AKS). Customers using both Azure and Azure Stack will benefit from this because the same blueprints can be reused for maintaining consistency of workloads across cloud environments, whether they are hosted in an on-premise cloud or a public cloud, and even migrate workloads between these environments once applications are cloud-ready.

Conclusion

Azure Stack is an extension of Azure that runs from the secure confines of your data center, while empowering application modernization and workload mobility as required across private and public cloud platforms. With Azure Stack, the focus is on empowering innovation like never before. The cloud boundaries are blurred as cloud orchestration tools help with unified application deployment and management across multi-cloud environments. Enterprises adopting a hybrid cloud strategy using Azure Stack should carefully select tools that not only help with the migration, but also ensure stability and security of environments in the long run.

[Cloudify](#) offers open-source, standards-based orchestration that helps with hybrid-cloud deployments. Cloudify covers all aspects of migration, cloud bursting and ongoing management. By enabling application portability with minimal operational overhead, Cloudify helps in building a unified infrastructure where applications can be deployed either to the Azure public cloud or to the Azure Stack, depending on business needs. Explore the Cloudify Azure plugins today along with Azure Stack to understand how it could be the most powerful tool in your cloud native transformation journey.



Learn more at: cloudify.co/academy

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