

LENOVO BRINGS AZURE STACK ON-PREMISES

MIGRATION TO THE CLOUD DOES NOT MEAN GIVING UP CONTROL OR CAPABILITY

EXECUTIVE SUMMARY

Public cloud technologies are being adopted quickly to help businesses become more agile and flexible. However, many of the current workloads being run within datacenters cannot be deployed off-premises, as public cloud demands, because of the need for control, performance, security, or user experience. Private cloud services are a way for businesses to bring the benefits of public cloud to a local deployment. However, private cloud deployments can be more complex, and the IT staff may not have the required skills to maintain a cloud in their datacenter.

Microsoft Azure Stack helps address this need by creating a private cloud where on-premises services look and act just like the Azure public cloud. Lenovo has developed the Lenovo ThinkAgile SX for Microsoft Azure Stack as a completely integrated turnkey solution that brings the power of the Azure cloud directly into the datacenter. This solution combines the flexibility and agility of the public cloud with the control and security of a private solution.

TODAY'S CUSTOMER NEEDS

The question for most businesses is not whether to use cloud-based technology, but instead how to make the transition, just like the movement to virtualization a decade ago. The need for agility and flexibility is driving businesses towards cloud technology because of cloud's ability to scale up or down and change quickly. This enables businesses to capture new opportunity. Being able to shift the consumption model from CapEx to OpEx also brings significant benefit to a business' bottom line. Business units and departments are becoming more autonomous with less reliance on the time-consuming traditional IT processes, as it is easy to swipe a credit card and consume public cloud-based services. Even IT is using public cloud; moving less critical workloads delivers more agility to the business units while freeing up IT resources and time to address more critical workloads. But while public cloud has its place in the IT world today, it also has limitations that prevent it from being the destination for most of the IT capability. Because of all the varied workload needs, IT will have to support a breadth of deployment solutions from legacy applications running on bare metal or VMs through cloud solutions serving up containers and microservices for consumption.

The traditional datacenter will not go away for the clear majority of businesses. A hybrid IT environment will be the long-term outcome, as private cloud enables businesses to embrace cloud benefits without trading off security or control. However, current private cloud options are difficult to deploy and manage based on the skill level of most IT departments today. Carriers, cloud providers, and some technical customers may be able to accept the DIY-style of today's private cloud, but most enterprises will not be in the same position. The lack of a fully integrated solution leaves private cloud off the table for many businesses because of the complications and risk involved. The appeal to enterprises for cloud technology is simplicity; any private cloud offering needs to follow that tenet—without increasing risk.

PUBLIC CLOUD LIMITATIONS DON'T ADDRESS CRITICAL WORKLOADS

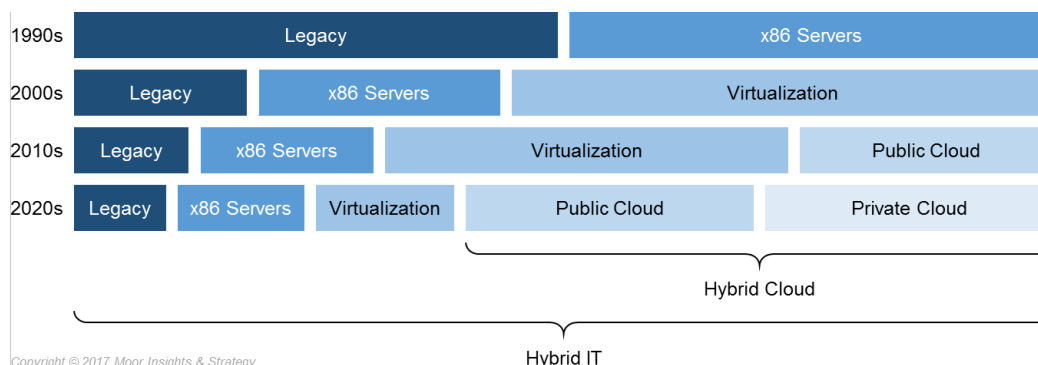
While public cloud can handle some things well, it is not a panacea for all workloads. Test/dev environments can move easily to public cloud because of their low system requirements, lack of required redundancy, and low criticality to most business operations. For more critical workloads, increased capability is required. Business applications need to be designed for availability, multiple zones, more complex interaction, and a better end user experience. These key factors are difficult to maintain in a public cloud environment, because moving outside of a datacenter creates large latencies and diminishes the control that IT has over applications and experience.

Businesses that have begun to move to the cloud are finding a clear set of factors that determine whether applications can be deployed in a public cloud or whether an on-premises private cloud solution is required. These factors include:

- **Cost:** Both OpEx and CapEx
- **Criticality of data:** Level of importance for driving business decisions
- **Government regulation:** Including limitations on how data can be handled and where it can be housed (data sovereignty)
- **Latency:** Proximity to connected services and users
- **User experience:** Application performance for users and other applications
- **Privacy / confidentiality of data:** Customer info, proprietary research, *etc.*
- **Unclear data scalability needs:** The degree of data or compute growth

These requirements are shifting the “inevitability” of a wholesale public cloud migration into a more measured view. This view sees both public **and** private cloud as part of a Hybrid Cloud solution, which in turn becomes part of a Hybrid IT environment.

FIGURE 1: HYBRID IT & HYBRID CLOUD



(Source: Moor Insights & Strategy)

MICROSOFT AZURE STACK TO ADDRESS PRIVATE CLOUD

Microsoft offers its [Azure public cloud services](#) as an alternative to on-premises IT and in the past year has [seen growth](#) in this area. Despite having growth in public cloud, there is a large private cloud opportunity that Microsoft can still address, as the company is already adept at providing solutions for on-premises computing through its Windows Server products. With [Microsoft Azure Stack](#), Microsoft brings the capability and toolsets of public Azure to the datacenter, enabling businesses to set up private clouds easily. This solution allows IT to enable public cloud-style deployment and consumption in a private environment, behind their firewall, in their own datacenter.

Azure Stack brings a consistent application development structure with consistent DevOps processes for hybrid cloud environments, because Azure Stack behaves exactly like the Azure public cloud. With common tools and technologies across both, applications can be quickly created in one and more easily migrated to the other. Most Azure Marketplace solutions work on Azure Stack just as they work in the Azure public cloud, without modification. This commonality increases flexibility for customers when deploying applications that rely on technology from the Azure ecosystem, including Blockchain, Chef, Cloud Foundry, Docker, Mesos, Red Hat, SuSE, and others.

Azure Stack brings more control for IT through better accountability, as all data lives on-premises, and it delivers more flexibility, with IT specifying the tools and capabilities for developers. This flexibility extends to applications that are now capable of having more transportability regarding where they are deployed, on- or off-premises. For times of high utilization, the ability to “burst” from private cloud to public cloud gives IT the ability to build additional scalability into an application without having to make an upfront capital expense commitment. This is a key way that IT can deliver true agility to the

business instead of just providing technology for technology's sake. Keeping with the open nature of cloud technologies, the foundational layer for the software-defined storage solution of Azure's [Storage Spaces Direct](#) (S2D) is based on open source.

Initially targeted workloads for Azure Stack include:

- New cloud-native applications to handle Internet of Things (IoT) and edge compute. Much of the IoT analytical work can be handled at the edge to reduce latency, enabling private cloud deployments to accelerate time to respond.
- Cloud-native applications that provide horizontal microservices across many existing datacenter applications.
- Test/dev environments are already a public cloud target, but as businesses deploy Azure Stack for private cloud, they will now have the infrastructure in-house to offer this as an internally hosted service that could seamlessly integrate public and private cloud environments.
- Vertical enterprise applications that create or access confidential data that must stay on-premises can be hosted on an Azure private cloud to help address these data requirements.

The private cloud consumption capabilities directly map to the same public cloud consumption models. The Platform as a Service (PaaS) capabilities include Azure App Service, Azure Functions (microservices), Azure Service Fabric, Azure Container Service, and Cloud Foundry. The Infrastructure as a Service (IaaS) capability includes virtual machines (VM scale sets), containers (with Docker), networking, and storage.

The Azure Stack software is preinstalled on the solution hardware. Through its flexible cost model, Azure Stack is sold as a service. Services are billed via a business' Microsoft EA or CSP, mirroring the Azure public cloud experience, enabling business to get started faster; software fees are for consumption only. Businesses only pay for the services running on Azure Stack with no upfront licensing fees, delivering the same subscriptions, experience, monetary commitment, and invoice as Azure public cloud.

LENOVO THINKAGILE SX FOR MICROSOFT AZURE STACK

Lenovo ThinkAgile SX for Microsoft Azure Stack is a purpose-built integrated private cloud system that enables public cloud experience from the safety of one's own firewall. Lenovo was the first hardware vendor to demonstrate S2D and Azure Stack running in a private cloud. ThinkAgile SX for Microsoft Azure Stack will be one of the first solutions commercially available.

Built on the integrated and hyperconverged [Lenovo ThinkAgile](#) systems, this solution drives considerable time-to-value benefits by enabling IT to quickly order, deploy, and run fully integrated private cloud solutions. Lenovo believes that ThinkAgile SX for Microsoft Azure Stack can drive up to [33% TCO cost savings](#) versus competitive offerings. The integrated nature of the platform helps it deliver high throughput for the types of I/O-intensive workloads that will be found in private cloud environments.

This solution was designed specifically for a Microsoft Azure Stack deployment, reflecting the needs of a private cloud by enabling it to easily scale up or down to match the workloads. ThinkAgile SX for Microsoft Azure Stack provides flexible provisioning of resource pools instead of the tightly aligned and inflexible system resources that are normally found in traditional architectures.

High resiliency is achieved through clustered, hyperconverged compute and storage nodes. Built on System x3650 servers, this solution helps safeguard data by including [Lenovo Trusted Platform Assurance](#) along with an option to use key managers to help manage authentication, encryption, and security. TruDDR4 Memory adds protection through authenticated and verified memory. Redundant [RackSwitch Ethernet switches](#) provide top-of-rack network connectivity for the full solution as well. The Lenovo XClarity Administrator will handle faults in real-time, including the analysis required for predictive failure alerts. Through predictive analytics, nine out of ten issues that are detected can be corrected before they are ever noticed by the administrator.

Along with these availability features, ThinkAgile SX for Microsoft Azure Stack powers a private cloud that enables all of a business' critical data to reside within the firewall in an on-premises deployment. IT has more control, and the business has more security to help protect this critical data. All Lenovo components pass a thorough security audit and adhere to the highest security standards. In addition, the entire solution stack must pass a robust security audit before any configuration change or update can be released to the field.

ThinkAgile SX for Microsoft Azure Stack is designed to drive a better return on investment, because the predictability of a private cloud helps a business better control the infrastructure and management. Private clouds can help drive better economies of scale, because a business can more adequately assess the usage and better understand the costs involved from within its own datacenter. While public clouds boast the availability of unlimited upside for growth, the costs can scale up quickly and disproportionately if not properly planned upfront. Private clouds help insulate a business from these types of "runaway costs" in periods of heavy growth.

LENOVO DRIVES A BETTER CUSTOMER EXPERIENCE

Lenovo is focused on delivering a better customer experience with this purpose-built solution for deploying hybrid clouds with Microsoft Azure by reducing cloud complexity and driving public / private cloud consistency. Lenovo servers have received the highest customer satisfaction in both the [1H2016](#) and [2H2016](#) surveys from Technology Business Review where the company beat the competition in 21 of the 22 categories.

Azure Stack brings Azure into a business' datacenter, enabling a consistent experience for cloud-native applications whether deployed in public or private clouds, reducing the need for location-based architecture. This co-engineered solution is integrated, assembled, shipped, and supported directly by Lenovo. Based on software-defined infrastructure, Lenovo ThinkAgile SX for Microsoft Azure Stack is designed to provide resiliency, security, performance, energy efficiency, ease of manageability, and rapid deployment.

Hardware management tasks are handled by Lenovo XClarity, which enables a holistic view of the entire solution, increasing productivity through simplifying tasks and accelerating processes. XClarity centralizes and automates hardware infrastructure management, bringing control over server, networking, and storage. The management software provides integration with Microsoft System Center Operations Manager (SCOM) and other external IT tools. The Azure Stack software can forward events, notifications, and alerts to external tools like SCOM, enabling linkage between the hardware and software of the private cloud. From a deployment perspective, Lenovo ThinkAgile SX for Microsoft Azure Stack includes the "best recipe" for the software components, including firmware, drivers, and more, giving IT a robust and supportable configuration from day one.

Lenovo has worked to optimize the purchase process, streamlining the steps so a business can move from order to fulfillment and then customer acceptance in only [3 weeks](#), up to [2x faster](#) than other competitive stacks. In either of its two integration factories, Lenovo performs a complete build top-to-bottom and then completely tests the solution before shipping it to the end customer, ensuring full functionality for the solution including all the latest builds and updates. When it arrives, there is no waiting for that one missing widget, because complete functionality tests ensure everything is included before it is prepared for transport.

Once at the integration site, Lenovo representatives will install the equipment, and then Lenovo Professional Services will deploy the Microsoft Azure Stack software, bringing it

online in roughly 4 hours. This process provides for a rapid, experienced deployment. The first contact an administrator will have with the solution is when they sign into the Azure Stack console.

All installation services are included in the solution cost. Businesses purchase a complete private cloud that is installed and ready to run in their datacenter. The result of the installation should be identical to the purchase of Azure as a public cloud service: login and begin working. This is a stark contrast to other private cloud solutions that require far more integration and handholding because components come from a variety of sources, lack the same level of integration, and rely on the end customer's IT department for much of the heavy lifting.

Lenovo's transformative support provides a single point of contact for the complete solution, whether it is a hardware or software issue. There is no need to "press 1 for hardware, press 2 for software". Lenovo's frontline support includes a trained and certified Lenovo engineer who will handle the support and see each issue through to resolution from start to finish, as opposed to simply pushing it along through the next stage of the process. As issues escalate to Level 3, Lenovo stays in the loop, even for issues that need to be handed off to the Microsoft team. As the engagement continues, the engineer can "translate" ticket numbers between the two companies to ensure continuity, maintaining contact throughout the entire process. In addition to the support that Lenovo delivers as part of the solution, Lenovo also has access to leverage the full breadth of IBM Global Services with its global enterprise resources to provide additional capabilities that can match a business' exact requirements.

MI&S VIEW ON AZURE STACK & HYBRID IT

Traditional enterprise technologies do not offer the flexibility that businesses now demand. Unfortunately, the long tail of IT solutions means that we should anticipate many of these workloads will continue well into the future. To change this dynamic and inject agility into their environments, public and private clouds represent today's best opportunity for IT. However, adding these cloud elements that boost agility will also create additional management complexity, as there are now more deployment types to contend with throughout the datacenter.

MI&S expects this Hybrid IT environment will bring more agility at the cost of additional complexity. Nonetheless, there are ways to minimize the total ownership costs by choosing solutions that minimize the deployment cost and enable common platform tools across multiple deployment scenarios. In this world of Hybrid IT, businesses will

gravitate to solutions like Azure Stack that enable them to reduce the variability in application deployment and allow them to leverage common skillsets and tools, whether cloud applications are on-premises or off-premises. A consistent interface will also help reduce the cost of support. Some cloud players, like Amazon Web Services, will reach their limits as businesses begin to understand the cost of deployment and lock-in for their public-only offering (as there is no credible private cloud counterpart).

The movement to cloud will be awkward and uneven, not smooth and predictable; options that minimize lock-in will be more valuable. Azure Stack helps minimize variability in deployment methodology, boosting consistency and productivity. An integrated solution from Lenovo that brings the benefits of the ThinkAgile product line to private cloud with Azure Stack is a strong contender for private cloud deployments. The single point of contact and support that Lenovo brings is critical as IT organizations begin their movement to the cloud with fewer skills and capabilities in this area. IT will need to rely more on the expertise of their system partners to help on this journey.

CALL TO ACTION

There is a significant shift in how businesses are approaching IT. The reality of Hybrid IT is setting in as businesses realize that cloud is inevitable and that cloud is not just public cloud but also on-premises private cloud. As cloud enablement grows, businesses will want more flexible options. But they will need simplicity, as the DIY-style of today's private cloud choices leaves many businesses ill equipped to deploy and manage these on-premises solutions.

Microsoft Azure Stack is the only large-scale solution that can currently provide the flexibility and integration that customers demand, yet still enable them to control the cloud deployment in their own datacenter. Lenovo will be delivering an Azure Stack solution based on its ThinkAgile product that is designed to deliver the flexibility of a public cloud with all the control of an on-premises deployment. Lenovo has put significant focus on the delivery and deployment aspects, because these are key factors that drive cloud decisions for businesses. Based on the level of integration and support that Lenovo is delivering, MI&S recommends that businesses investigate and consider Lenovo ThinkAgile SX for Microsoft Azure Stack as a solution to their private cloud needs.

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