

Explore the business value of Citrix Virtual Apps and Desktops service

Key considerations when moving from on premises to cloud with Microsoft Azure

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Executive summary

As organizations shifted from traditional PC desktops to virtualized solutions, IT administrators hosted and provided access of applications and desktops from an on-premises data center. This proved to be more efficient than traditional PC environments because IT admins were able to centrally manage desktop and app delivery, however, there were still aspects that needed to be streamlined and made more efficient. Now, with an evolving macro environment and increasing economic pressures, businesses are turning to harness the power of cloud services in order to simplify the management of their existing deployments. They can also unlock additional benefits, ease administrative burdens, and enhance end-user experiences, and create a more agile, secure IT environment. In this paper we will assess the benefits of migrating to the cloud with Microsoft Azure and transitioning to Citrix Virtual Apps and Desktops cloud services over a traditional, fully on-premises deployment. We will also examine how it can fit within an organization's overall corporate strategy, help prepare for today's business demands, and those in the future.

When evaluating on-premises versus cloud service solutions, it is important to assess the value-add of moving an existing Citrix on-premises infrastructure to Citrix Virtual Apps and Desktops service on Azure to provide a net positive impact for their business

and simplify the delivery and management of virtual applications and desktops. Specifically, Citrix aims to deliver significant benefits to IT teams and their organizations.

Benefits delivered by Citrix and Microsoft.

- ✓ **Faster time to value:** Simply transition to cloud with seamless integration. Speed transition from on-prem Citrix workloads to Microsoft Azure and reduce time to value. Deploy Citrix workloads up to 4 times faster, simplifying user on-boarding for mergers and acquisitions, new employees, contractors, and a multitude of business-critical uses cases.
- ✓ **Deployment flexibility:** Manage existing on-premises Citrix deployments alongside new Windows Virtual Desktops in Azure. IT can transition on-premises deployments to hybrid/cloud resource locations in a time frame that aligns with business needs.
- ✓ **Simplified management, security, and business continuity:** Integrated cloud services on Azure simplify the management of on-premises and cloud hosted resources, streamline business continuity and disaster recover planning, and help protect sensitive intellectual property.



Business and economic pressures

Navigating the now, planning what's next, and shaping the future

In recent months, many different businesses and organizations, regardless of industry, have felt the economic pressures of the global pandemic. As businesses have been forced to adapt and enable remote work with flexibility and agility, we have seen many customers face headwinds in this macro environment.

As our customers look to chart a course through this crisis, we see three distinct phases. First, navigating the now. Here customers are enabling remote work and figuring out how to stay productive and maintain business continuity. Many of our customers are now thinking about planning what's next. Given the uncertain macro environment, focusing on value, reducing cost and adapting business models and product offerings is center change. Eventually, our customers will start shape their future and focus on growth.

Concerns and challenges of IT leaders

As we talk to customers and understand their challenges, here are some of the top-of-mind concerns that we are hearing from IT leaders:

- How do I address here and now needs and prioritize next set of IT priorities?
- How can I ensure my business continues to run without interruptions?
- Should I reconsider running my own datacenter given resource/financial constraints?
- How can I secure my network and assets from attackers during these already tough times?
- How do I build the case to invest in the right areas, so we're better prepared for next time?
- How will my staff adapt to the steep learning curve with new technologies?

Cloud migration triggers

During these challenging times, a few specific triggers are making many customers evaluate cloud migration. Many organizations are faced with significant cash flow challenges. This includes cash flow challenges not just for our customers, but also their entire ecosystem, including suppliers, distributors, and end customers. Organizations must also stay wary of cybersecurity threats – as many businesses have had their defenses down, they are feeling more vulnerable to attackers.

Many businesses are also challenged with scarce IT budgets and resources. As we have conversations with customers, many organizations are reporting the need to free up IT dollars in order to invest into other parts of the business that may need it more.

While many have ground to a halt, several industries such as healthcare and retail are seeing a surge in demand. They are finding that their existing systems and solutions just can't keep up with the surge in demand and are in search of new solutions.

Customers have real concerns about their day-to-day operations being interrupted, as business continuity, network connectivity, and data loss have all become topline concerns.

As datacenter contracts expire, many customers we speak to are viewing contract expiry as an inflection point to consider cloud migrations.

Gain clear economic benefits through cloud migration

Moving to the cloud has clear economic benefits. Convert upfront capital expenditures into operating expenditures and pay as you consume. Security is now a reason to migrate to the cloud – customers see that cloud providers can help them improve their security posture, which is especially critical during times of vulnerability. The cloud scales up and down to meet demand as you need, so you don't need to over-provision resources to be ready for peak usage and incur expenses on idle servers. Best of all, the cloud improves operational productivity for your staff, so they can focus on priority business initiatives.

The power of Citrix and Microsoft

Employees need a consistent experience and seamless access to the applications and insights vital to doing their best work wherever work needs to get done — in the office, on the road, or at home.

Together, Citrix and Microsoft are reimagining a new, flexible workplace. We are helping organizations accelerate the move to the cloud and speed adoption of digital workspaces and virtual desktops to enable greater agility, productivity, and security.

Reduce IT costs and increase efficiency with cloud VDI solutions on Microsoft Azure

Citrix builds on their long-standing partnership with Microsoft and offers multiple VDI deployment options for Citrix solutions on Microsoft Azure—including virtual apps, desktops, data and networking. Customers can provision and deliver workloads on Microsoft Azure cloud platform, reducing overall IT costs and increasing efficiency, or choose to deploy VDI with Citrix Cloud services on Microsoft Azure.

VDI with Citrix Cloud on Microsoft Azure

Citrix leverages Microsoft investments in Azure and Remote Desktop Services to enable Citrix Cloud, the fastest and most flexible approach to deploying Citrix technology. Citrix Cloud simplifies how customers deploy VDI, virtual apps, desktops, and complete Citrix workspaces on one or more Azure-based resource locations.

Deploy Citrix Virtual Apps and Desktops workloads in Azure

When deployed on Microsoft Azure, Citrix Virtual Apps and Desktops give IT departments the flexibility of delivering Enterprise-class VDI infrastructure services for Windows applications and desktops with the benefits of cloud elasticity. The Azure platform enables IT to expand and contract computing resources on-demand.

This elasticity simplifies management and reduces costs as customers only pay for what they use.

You can now try a fully functional Citrix Virtual Apps environment in Azure and deliver virtual apps to any user, on any device, anywhere. This VDI solution brings you all the benefits of a traditional Citrix application delivery solution combined with the simplified deployment and lower cost associated with utilization of the Microsoft Azure cloud services.

Migrate to Azure efficiently on your own terms

Azure offers a comprehensive mix of technology, best practice guidance, programs, offers, and tools to migrate your entire datacenter to the cloud. Migrate with confidence and optimize your costs with our on-demand global infrastructure with the most regions of any cloud vendor.

Azure is the best cloud destination for your servers, applications, and databases. Our cost saving offers and capabilities are hybrid by design, knowing that you will likely operate that way for the foreseeable future. With Azure, you can be confident that you are running your Windows and SQL workloads at the lowest total cost of ownership versus competitors. Migrate your proprietary or open-source databases, modernize your applications, and optimize your costs in the process. In addition to delivering a competitive total cost of ownership (TCO), customers can secure their workloads with industry leading intelligence and built-in security controls. Your business is no longer hostage to the capacity of your data center, and customers can scale their applications on demand to meet the business demands of tomorrow, without having to worry about infrastructure management.

Microsoft Azure is investing in areas to help you weather the crisis and set you up for resilience in the long term.

Optimize costs and migrate with confidence

Save money and realize operational efficiencies with hybrid offers on Windows Server and SQL Server, comprehensive datacenter migration programs, and optimized infrastructure. Whether it's Microsoft workloads like Windows Server or SQL Server, or Linux or open-source databases, you can leverage curated guidance and best practices to migrate with confidence. Citrix and Microsoft will help your business lower migration costs and risk with best practice guidance and resources.

Unmatched security, built-in resiliency

Take advantage of multi-layered hybrid security in Azure. Rely on a cloud that is built with customized hardware, has security controls integrated into the hardware and firmware components, and added protections against threats such as DDoS. With over 3500 security experts, Azure dedicates \$1B per year investment to security. Ensure maximum resiliency with built-in disaster recovery. Secure your organization from threats with cloud-native SIEM that can be accessed from anywhere. Additionally, Azure Security Center enables organizations to protect your cloud workloads with context from >8T threat signals processed per day.

On-demand scale and ops efficiencies

Use the cloud to scale your web applications and meet business demands of today and tomorrow. By migrating to the cloud, you can leave the operational work to Citrix and Microsoft, so you can stay focused on what matters. Future proof your business with on-demand scale, always up to date databases, and innovative managed services that are always on. Plus, gain unmatched hybrid flexibility and efficiency.

“Citrix Cloud delivered on Microsoft Azure is the latest example of our collaboration with Citrix, which has always been centered on innovation and the success of our mutual customers and partners. Together, we defined the virtual desktop category and now we are collaborating on new Citrix services on Azure, which will do the same for the cloud.”

– Brad Anderson

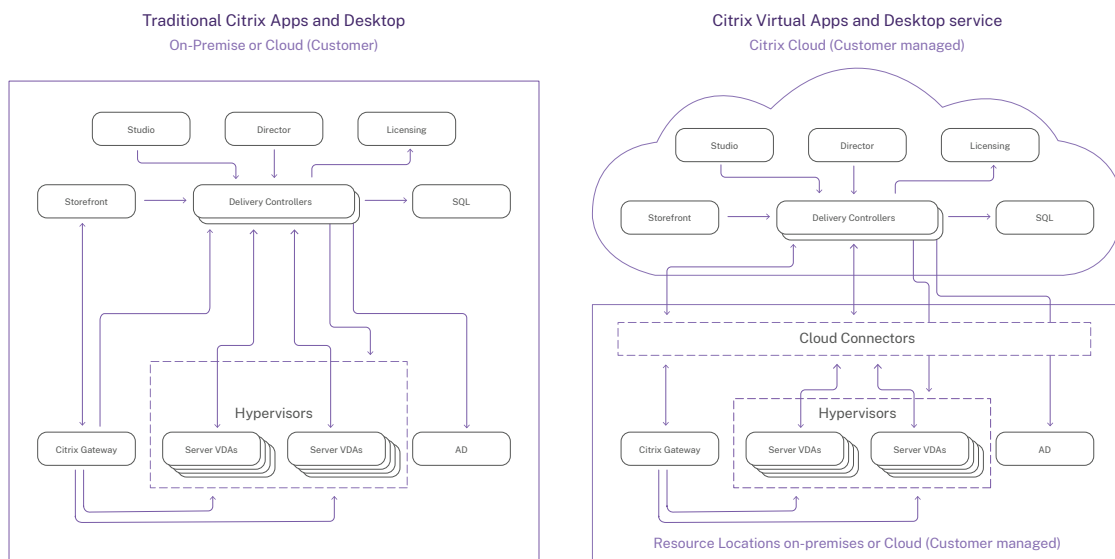
*Corporate Vice President
Cloud & Enterprise at Microsoft*

Citrix Virtual Apps and Desktops service on Azure—an overview

Citrix Virtual Apps and Desktops, the on-premises solution existing administrators are familiar with, provides virtualization solutions that give IT control of virtual machines, applications, desktops, and security while providing access from any device. End-users can use applications and desktops independently of the device's operating system and interface.

With Citrix Virtual Apps and Desktops service, organizations can securely deliver virtual apps and desktops to any device similar to the on-premises solution, and leave most of the product installation, setup, upgrades, and component architecting to Citrix. As the IT admin, you maintain complete control over applications, policies, and users while delivering the best user experience on any device. Simply connect resources to the service through Citrix Cloud Connector, which serves as a channel for communication between Citrix Virtual Apps and Desktops service and the organization's resource locations. Cloud Connectors enable cloud management without requiring any complex networking or infrastructure configuration such as VPNs or IPsec tunnels. Each resource location hosts a Cloud Connector alongside the machines and other resources that deliver your applications and desktops to your users.

Deployment comparison



Who manages what?

The following graphic shows the core differences between the components in a traditional, on-premises Citrix Virtual Apps and Desktops deployment versus a Citrix Virtual Apps and Desktops service deployment:

- All of the control plane components—StoreFront/Workspace, Delivery Controllers, and even the SQL database, are made highly available and part of the cloud service offering. Administrators can focus on the workload resources of the server and desktop Virtual Delivery Agents* (VDAs) hosted on the hypervisor or cloud of their choice. Each workload location defined to a hypervisor or cloud with specific resources is known as a Resource Location.
- The Cloud Connector is installed in the resource location to connect the resources up to Citrix cloud services. It is placed next to the VDAs, within the hypervisor(s) or public cloud(s), and the Active Directory environment. Citrix Cloud Connector is designed for seamless integration and for delivering the best user experience on any device under any network condition. The Cloud Connector also works in conjunction with the Citrix Virtual Apps and Desktops service to extend access to your virtual apps and desktops even in the unlikely event of a cloud outage.

*VDA Definition: A VDA enables connections to applications and desktops. The VDA is installed on the server that runs the applications or virtual desktops for the user. It enables the machines to register with Delivery Controllers and manage the High Definition experience (HDX) connection to a user device.

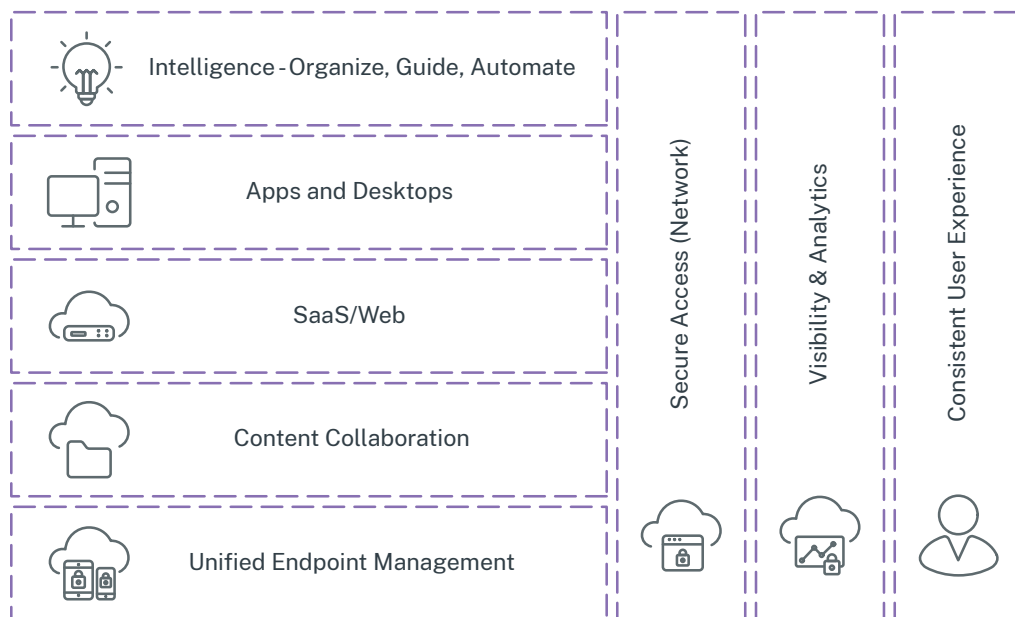
The elegant way Citrix supports different resource locations is by having IT deploy a Citrix Cloud Connector per resource location. The cloud connector “connects” all of the components under the administrator’s control to the Citrix service. Once installed, the connector is low-touch. It includes an auto-update service managed by Citrix, which ensures it is always patched and up-to-date with the latest features. For better security and risk mitigation, the connector only needs outbound Internet access. All the traffic is just one-way out sent over port 443, and the connector can even be configured to operate behind an HTTP proxy.

Citrix Workspace Experience, an enhanced version and successor of StoreFront available as a Citrix-hosted cloud service, is the industry’s first solution offering the integration of Windows, Linux, Web, SaaS, and mobile applications in a unified and simple-to-use interface that includes our new workspace intelligence capabilities. Citrix Workspace fully aggregates apps and data from both on-premises and cloud environments to deliver the

required resources with the optimal experience securely to the right user at the right time. With this enhanced architecture, you still own and maintain complete control of over-provisioned resources like desktops, applications, policies, and users using the Citrix cloud administrator portal.

Citrix Virtual Apps and Desktops service on Azure is a cloud service offering as part of the broader cloud service solution, Citrix Workspace, a complete digital workspace solution that unifies other Citrix cloud services in order to allow organizations to deliver secure access to the information, apps, and other content that are relevant to a person’s role in organizations. Citrix Workspace helps organize and automate the most important details your users need to collaborate, make better decisions, and focus fully on their work. The Citrix Workspace includes: Virtual Apps and Desktops service, Endpoint Management service, Content Collaboration, Gateway service, Access Control, and Citrix Analytics services.

Workspace Technology Stack



Value and benefits of migrating to Citrix Virtual Apps and Desktops service on Azure

This section discusses the benefits of Citrix Virtual Apps and Desktops service on Azure and the operational efficiencies achieved by adding net-new capabilities to the provisioning, management, security, and overall end-user experience. Citrix Virtual Apps and Desktops service lowers the impacts of the hard and soft costs as IT accelerates their journey to cloud. Citrix and Microsoft deliver the following key values to IT and the business—that is, Citrix solutions on Azure deliver faster time to value, better flexibility, and secure and simplified management. We encourage administrators to use these points as guidance to develop a meaningful assessment and be able to articulate the added value of moving to Citrix cloud services on Microsoft Azure.

Faster time to value

Accelerate time to value; time to production

In a rapidly changing world, Citrix Virtual Apps and Desktops service on Azure increases overall agility—enabling Citrix administrators to securely deliver and support apps and data users need to be productive. Service provisioning is completed within minutes; from initial subscription to standing up virtual machines and publishing a secure digital workspace anywhere, accessible from any device.

Deploying traditional software on-premises requires several capital acquisition activities such as acquiring and provisioning hardware, networking, storage, and data center resources. Deployment begins with

installation, configuration, and tuning—often within a staged environment—to be followed by a production deployment. These precursors to full production can span weeks or months, which is not necessarily easy. Ease of use pertains to initial go-live, subsequent scale out, and the adoption of new services. Administrators who use Citrix Virtual Apps and Desktops service reduce the number of cycles spent on maintenance, patching, and upgrades. Citrix even provides specific tools to help ease and automate the migration of on-prem configurations from on-prem Studio to Citrix Virtual Apps and Desktops service. The IT shopping list for hardware procurement to run Citrix infrastructure is considerably decreased—making delivering the service a much simpler task.

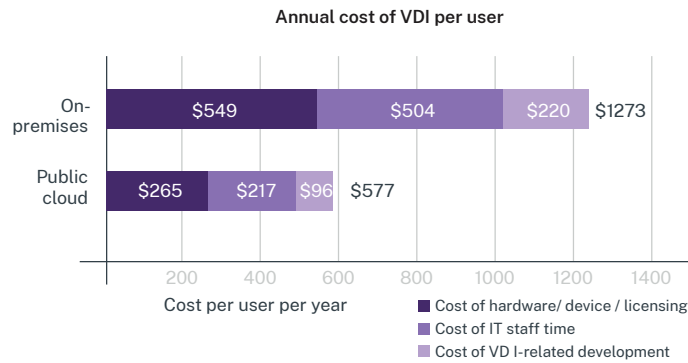
When Citrix Virtual Apps and Desktops service is used, the speed with which apps and desktops can be provisioned is increased, because most services are activated rather than installed and configured. Since many of the functions are pure cloud-only, they do not require any additional provisioning. With seamless integration to Microsoft Azure, customers can modernize their monitoring and security. Real-time policy engine adapts to changing access conditions – location, identity, device, and threats. Continuous monitoring and real-time analytics respond before an incident occurs. Adaptive security and performance settings are automatically applied on-premises and in Azure.

“With Citrix cloud services, we will spend less time fixing and improving what we have and free up time for our people to think ahead and develop for the future.”

– Julian Muller

*Head of IT Operations
The National Archives*

According to common industry statistics, a physical server’s initial capital cost may represent only 20%–50% of its total cost of ownership (TCO) over a 3- to 5-year financial lifetime with the rest being the cost of managing it for uptime, performance, upgrades, patching, etc. When IT can convert physical server components to cloud services, the labor and time savings instantly accelerate the overall time to value of their investment.



Savings estimation:

Based on our internal assessment of multiple administrator scenarios, a typical 5,000-user on-premises Citrix Virtual Apps and Desktops deployment may take 3–9 weeks to stage, configure, deploy, and move the core components into production, including back-end resources and necessary networking components.

In contrast, using the Citrix Virtual Apps and Desktops service model, the administrator is only responsible

for the deployment and maintenance of the VDAs and integration with the local Active Directory (AD). The remaining infrastructure is deployed, configured, and managed by Citrix. This translates into a significantly shorter implementation and test time for the administrators, thereby reducing time to production.

Citrix Virtual Apps and Desktops service allows administrators to vastly reduce (or eliminate) costs and delays associated with preparing POCs, staging environments, conducting upgrades, and onboarding new employees and acquisitions—and enables a business to adopt the latest Citrix technologies, which results in net-positive impact.

Faster access to platform upgrades and features

When delivering a comprehensive solution within the enterprise, there is a need to constantly innovate, especially when there is either a user-experience gap, key integration with third-party vendors, or perhaps even a security-related issue. However, software upgrading often means time, money, and a complex process. As a result, upgrades are often delayed or avoided altogether. Avoidance often prevents short-term headaches, but it also can keep users from leveraging the latest and greatest product and security enhancements. Failure to upgrade software can lead to security vulnerabilities, loss of productivity, compatibility and integration challenges with other technologies, and compromised maintenance and/or support.

Components	Traditional deployment	Citrix Virtual Apps and Desktop service
SQL server	Manual configuration	As a service
Deliver controllers	Manual configuration	As a service
Licensing server	Manual configuration	As a service
Citrix Gateway	Manual configuration	As a service
Citrix Studio	Manual configuration	As a service
Citrix Director	Manual configuration	As a service
Citrix StoreFront	Manual configuration	As a service(New Workspace UI)
Server & Desktop VDAs	Manual configuration	Manual configuration/ Citrix automated updates
Citrix Cloud Connectors	Not required	Manual configuration/ Citrix automated updates
Active Directory	Manual configuration	Manual configuration/ Citrix automated updates

It is important to note that Citrix releases 2–4 updates to Virtual Apps and Desktops (on-premises) each year; however, Citrix Virtual Apps and Desktops service has a shorter release cadence. With Citrix Virtual Apps and Desktops service, upgrades to the Citrix Cloud management plane, as well as upgrades to individual services, are automatic (managed by the Citrix Cloud operations team). Cloud administrators are always using the latest Citrix technology as soon as it's available—before on-premises administrators—and they avoid the operational overhead, time, and testing necessary to perform manual upgrades. Users are leveraging the latest features and functionality, while the VDAs are constantly being optimized with each new release. With the ability to offload upgrades to Citrix services, organizations mitigate the costs associated with installation, data migration, staging and testing, and roll-out and potential conversion downtime.

In addition, traditional on-premises administrators must rely on product documentation, blogs, social media, email, and webinars to know when new features and capabilities are available and then manually install and configure that new capability. Due to the dynamic nature of the cloud services, Citrix can communicate directly with the administrative UI regarding improvements, news services, or scheduled outages. This makes it easy for admins to know what's available when, and how much it can enhance or improve the performance for their users.

Choosing Citrix Virtual Apps and Desktops service alleviates time-consuming software installations, upfront configurations, ongoing maintenance, and eventual upgrades. Administrators don't need to procure, install, and maintain additional servers or other hardware conserving valuable time for more strategic initiatives and assigning capital for other investments.

Additionally, to assure rapid and complete production service in the first attempt, a dedicated Citrix Cloud Success team is available to guide administrators through every step of the process and help navigate any challenges. This complimentary service is included with your Citrix Virtual Apps and Desktops service subscription, and your Success Manager is there to ensure you have the necessary Citrix guide and resources to meet your organization's business and technology goals.

“The more complex aspects of the job are now done automatically by Citrix. We no longer have downtime, any maintenance is carried out by Citrix without impacting our operations. I have more time to spend on new business projects with Geas.”

– John Huitink

*Head of IT Operations
Geas Energiewacht*

Deployment flexibility

Transition to the cloud at “your pace,” with flexibility and choice

In the journey to cloud, many organizations grapple with how they should move or migrate their on-premises app and desktop workloads to a public cloud environment. The reasons are many—security risk mitigation, privacy concerns, local data sovereignty laws, industry compliance regulations, or anticipated mergers and acquisitions, to name a few. These factors cause many businesses to slow down their journey or completely stall the move to cloud, and invariably they give up on the benefits that come with using cloud services.

Citrix Virtual Apps and Desktops service architecture helps alleviate multiple concerns that most organizations find challenging to overcome. With Citrix Virtual Apps and Desktops service on Azure, it doesn't matter where the app and desktop resources live—in an on-premises data center, in Azure, or a hybrid of both locations. There is a clear separation between the control or management plane versus the resource or data plane where the workloads reside. End-users access and authenticate in the cloud control plane wherein they are authorized to access the app or desktop resources they need, indifferent of their hosting location.

Citrix provides IT teams the flexibility and choice to select where they host their workloads—between Azure public clouds, private managed cloud, or hybrid environments, which may be a mix of on-premises workloads with the management control plane in cloud. Administrators are never required to move workloads to the cloud—CVAD service will always manage on-premises VDAs side by side with public clouds. Citrix Virtual Apps and Desktops service will connect it all together for the most adaptable way to deploy the app or desktop of choice. IT admins can securely monitor and manage apps and data deployed in one or more locations or clouds from a single cloud-based console.

In addition, existing Citrix Virtual Apps and Desktop customers benefit from Hybrid Rights. Hybrid Rights empowers an existing Citrix customer making the transition from their on-premises deployment to the cloud service over a “transition” period. When an existing Citrix customer makes the decision to transition the cloud service, they can select the duration of their transition period. During the transition period, they can leverage their licenses for their on-premises deployment and then transition those same licenses to the cloud service when they are ready. With Hybrid Rights, organizations get all the benefits of the cloud service and all the updates, security fixes, and technical support for both the cloud service and their existing Citrix Virtual Apps and Desktops deployments. This is a key benefit Citrix provides only to existing customers.

Multiple Citrix Virtual Apps and Desktops service administrators have chosen to start their cloud journey with a hybrid environment. This allows administrators to adopt the cloud at their own pace, gradually migrating their infrastructure to cloud services. For example, some enterprises need to comply with data sovereignty laws if they operate in various countries and will need to address regulation issues before they can move all of their workloads to the cloud.

Combine the power of Citrix with Windows Virtual Desktop

Organizations can modernize your virtual apps and desktops deployments with Citrix Virtual Apps and Desktops service and Microsoft Windows Virtual Desktop. Windows Virtual Desktop provides an easy path to modernize your environment and reduce data center spending. Together with robust Citrix management tools, administrators can take advantage of Windows Virtual

Desktop, including the new multi-session Windows 10 capabilities, extended support for desktop operating systems, and optimizations for Office 365 Pro Plus, while providing the best end-user experience through Citrix user experience optimizations, all alongside their existing on-premises applications and desktops.

With Citrix Virtual Apps and Desktops service, organizations can leverage entitlements to Windows Virtual Desktop (WVD) and integrate those capabilities alongside their existing on-premises deployments. This hybrid cloud deployment makes it easy for organizations to take advantage of new WVD entitlements, while combining them with the security, performance, management, and scalability benefits of the Citrix Virtual Apps and Desktops service.

As indicated, Citrix Virtual Apps and Desktops service supports multiple environments, allowing administrators to deploy virtual workloads onto commonly used virtualization platforms hosted anywhere, including:

- Existing or new on-premises infrastructure
- Windows Virtual Desktop on Azure
- Microsoft Azure
- Hybrid Cloud environments, which are any:
 - combination of Azure and private clouds
 - combination of Azure and administrators' data centers
 - hyper-converged infrastructure (HCI)

Cost effectively manage cloud and on-premises IaaS

With organizations considering hybrid environments, Citrix Virtual Apps and Desktops service also provides a rich set of cloud-based power management tools. These tools help IT optimize and manage applications and desktops across on-premises and cloud environments. IT will benefit from proactive health checks of their systems that are automated and run on a regular basis.

One component of Citrix cloud-based tools is Autoscale. Autoscale enables proactive scaling and power management of machines (e.g., systems that run the VDAs) for virtual machines in Azure deployments based on load and schedule.

IT can reduce the costs of running Citrix VDAs in Microsoft Azure by dynamically scaling up or scaling down the number of powered-on virtual machines in a given VDA Delivery Group. This helps better estimation of savings based on the per-machine costs and utilization history. IT admins can perform schedule-based scaling, load-based scaling, or a combination of the two.

VM instance	VM specs	Cost per month	Cost per hour	Storage costs per month
D3_V2	4vCPU / 14GB	\$367.92	\$0.504	\$5.94
D4_V2	8vCPU / 28GB	\$735.84	\$1.008	\$5.94
F16	16 cores/ 32GB	\$1,264.36	\$1.732	\$5.94

Let's analyze the cost-savings achieved in a schedule-based scenario, leveraging the Azure (West) compute instances from the above table. In this scenario, there is horizontal scaling with defined peak and off-peak hours. Off-peak hours are zero active users.

Some important points to consider:

- Cost per month calculation assumes the machine is running for the entire month (730 hours). The storage cost is a fixed monthly cost regardless of whether the machine is powered on or off.
- With Autoscale, we reduce the time the machine remains powered-on to better align with user behaviors.

“By extending Windows Virtual Desktop, Citrix services help our mutual customers and partners to realize the scalability and cost benefits of the new multi-session Windows 10 virtual desktop experience.”

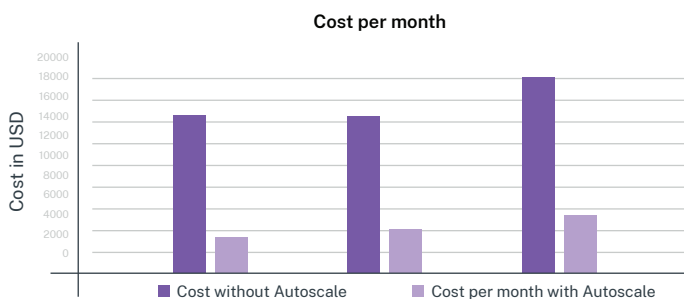
– Scott Manchester

Group Program Manager
Windows Virtual Desktop at Microsoft

- If all the machines are shut down after the off-peak times begin, the number of hours the machines would be on during a single month is 198 hours. The cost savings calculations are as follows:

Knowledge worker -machine size	D3_v2	D4_V2	F 16
VSI - sessions/ machine	25	50	74
Number of machines needed	40	20	14
Compute cost per hour (in USD)	\$0.504	\$1.008	\$1.732
Cost per hour (incl. 128 GB disk for 1,000 users)	\$20.48548	\$20.32274	\$24.36192
Cost per month (100% on)	\$14,954.40	\$14,835.60	\$17,784.20
Cost per month with Autoscale (198 hours)	\$4,229.28	\$4,110.48	\$4,884.26
Percentage cost savings	71.72	72.29	72.54

The following graph shows the difference in cost of running the machines, when being powered on all the time vs being power-managed by Autoscale.



While the example focused on the schedule-based benefits of Autoscale, the same cost savings are applicable to load-based scheduling as well

Simplified management, security, and business continuity

A core benefit of Citrix Virtual Apps and Desktops service on Azure is the ability to simplify the adoption journey to cloud for IT and their business users, while also ensuring security. Citrix Virtual Apps and Desktops service delivers unified and reliable secure access to the apps, data, and network that end-users need, with the added ability to extend existing on-premises software deployments and create hybrid workspace services using Microsoft Azure.

Given the radical and changing remote work landscape of 2020 and the on-going pandemic, many organizations worldwide are rethinking business continuity strategies as a result. Based on a LogicMonitor Cloud 2025 Survey, "87% of Enterprises Will Accelerate Their Cloud Migration in a Post-COVID World". Data sovereignty and protection of intellectual property are still key influencers to maintain local control of data, but cloud-hosted content and hybrid-cloud environments have shown strengths in robustness and scale. Forward-thinking IT departments are turning to hybrid cloud deployments to both maximize their control and minimize exposure to external threats.

Business continuity and disaster recovery

Many business continuity plans were designed for localized events: data center outages, short-term connectivity challenges, or isolated physical disasters. In widespread events, on-premises hosting capacity is a challenge and the ability to scale rapidly is critical to success. Hybrid-cloud management of apps and desktops gives a reliable cloud-hosted platform for organizations to integrate on-premises and Azure cloud infrastructure to meet business demands. With Citrix Virtual Apps and Desktops service on Azure, IT can quickly roll out app and desktop workloads across multiple locations, in on-premises data centers or public clouds globally.

Citrix Virtual Apps and Desktops service customers found themselves in a unique situation when faced with the COVID-19 crisis: IT was ready. By leveraging the Citrix Cloud control plane, IT had easy access to management and monitoring tools for their environment. Existing desktop images and application packages could be quickly deployed to new users, and as data centers exceeded capacity, new cloud-hosted workloads could easily be brought online. Maintenance and monitoring of these hybrid sites happen from a single console, with advanced security and performance analytics to monitor user activity and session responsiveness. For customers who needed to provide immediate access without having to build back-end infrastructure to support more users, they leveraged Citrix Virtual Apps and Desktops' RemotePC capabilities. With this feature, admins install

a VDA agent on existing physical PCs and can quickly provide secure remote access to that desktop, ensuring minimal disruptions to the business.

In many cases, all an administrator needs to do is activate, configure, and publish. Enterprises that are rapidly increasing headcount, expanding locations, or growing through mergers and acquisitions, rely on Citrix Virtual Apps and Desktops service to get people and locations productive quickly—often within hours. Users have customized, unified, and reliable access to all the apps and content they need to be engaged and productive anywhere, anytime.

Administrators can easily scale up or scale down their resources to run the service in order to meet business needs. IT admins may start with Citrix Virtual Apps and Desktops service and subscribe to additional services with a few clicks. This is a common path for many administrators and existing Virtual Apps and Desktops administrators who are on their journey to the cloud and are preparing to migrate on-premises deployments to the cloud.

Because Citrix Virtual Apps and Desktops service can easily manage multiple resource locations across multiple data centers or multiple clouds or hybrid environments, it is easier to grow or transition between primary and secondary locations. The distributed nature of this approach eliminates the risk of single point of failure and ensures the continuous operation for administrators even when natural calamities or disasters occur. In the case of an unforeseen incident, Citrix Virtual Apps and Desktops service has built-in failover capabilities to get an organization's apps and data quickly back up and running again. IT admins can take advantage of secondary sites—whether a data center or in Azure—and quickly activate the site for operation.

Drawn by the increasing power and affordability of cloud and mobile technologies, growing businesses, like Clint Newell Auto Group, are finding new ways to innovate, boost efficiency, and drive business using the Virtual Apps and Desktops service. “The Citrix Cloud management plane unifies apps, desktops, data, device management, and networking on one platform. This is

the most effective way to securely deliver virtual apps and workspaces,” said Ryan Parker, chief technology officer, Clint Newell Auto Group.

Savings estimation with the right solution

According to IDC, on average, infrastructure failure can cost large enterprises \$100,000 per hour. Critical application failures exact a far steeper toll, from \$500,000 to \$1 million per hour. Because Citrix manages the Citrix cloud platform and Citrix Virtual Apps and Desktops service on a reliable platform with redundancies, administrators can count on maximum uptime, improved disaster recovery, and failovers resulting in minimal interruptions to continuous operations of their service to end-users.

Provide a single identity-based authentication for users

Today, business users desire to collaborate and work from any device, in any location, on any network, with many actively embracing SaaS and cloud-based apps that may not be sanctioned by IT. Having a formal cloud strategy is an excellent way for IT teams to proactively support these new workstyles and deliver a secure digital workspace. However, IT needs to develop confidence for defending against new security threats and ever more sophisticated attacks. Citrix Virtual Apps and Desktops service provides a number of powerful tools and features to address some of the common and even more complex security threats an organization will face as they shift toward the cloud.

Citrix Virtual Apps and Desktops service integrates with Azure Active Directory. This ensures that users can utilize their existing identity provider and authentication access strategy. For more robust authentication measures, Citrix Virtual Apps and Desktops service integrates with additional multi-factor authentication providers.

Always encrypted credentials and data—at rest and in motion

Administrators usually are concerned with the handling of user passwords when it comes to public cloud or hybrid cloud deployments. With app and desktop virtualization, it is important to provide end-users with a single sign-on (SSO) to apps, so they are not prompted to enter their password multiple times.

The Virtual Apps and Desktops service handles this by encrypting passwords on-premises, ensuring that components in the Citrix cloud control plane cannot decrypt them. That is, the user's password is entered into Citrix Workspace app, and flows through the Citrix Gateway which is usually deployed at the resource location (on-premises) and then to the cloud connector, which is also at the resource location. The connector encrypts all plain-text passwords with robust AES 256 encryption before forwarding them to the Citrix Cloud management (control) plane.

For further hardening security in cloud, Citrix only stores metadata on users and applications within the cloud control plane. The virtual machine images (VM)—which includes all the intellectual property and app resources/data—remain on administrator's premises or their choice of resource location.

Proactively identify threats and mitigate risks early with user-based analytics

Citrix Analytics for Security helps organizations identify and mitigate threats using intelligent and advanced analytics of user and entity behavior, in addition to app and network performance and operations. Citrix Analytics proactively alerts IT on malicious behaviors and anomalies, and recommends actions to mitigate security risks, while also helping improve performance and operational efficiency.

Secure access from unmanaged devices

Whether an organization has an extensive “Bring Your Own Device” policy, has a large contractor/consulting base, or has experienced abrupt changes (like the pandemic) that have forced its employees to leverage personal or family-owned devices to execute their work remotely—unmanaged devices with access to sensitive corporate data are proliferating. Industry experts predict that there will be 6 billion additional devices connected to the internet by the end of this year, opening more gateways for cyber-criminals to launch cyber-attacks, like ransomware. Citrix Virtual Apps and Desktops service provides robust policies and controls to ensure that sensitive intellectual property is protected on any type of device. Integration with Citrix Analytics for Security and our set of additional Zero Trust cloud services can further protect the organizations' sensitive resources.



Summary

While traditional on-premises Citrix Virtual Apps and Desktops deployments have long addressed key strategic initiatives for organizations over the years, the shift to the cloud is now becoming more valuable when considering the variables that come with creating a hybrid-cloud or fully cloud environment. Compared to the purchasing, installing, and maintaining of perpetually licensed software, Citrix Virtual Apps and Desktops service on Microsoft Azure offers highly differentiated technical, financial, and value-add capabilities. Considering the factors mentioned throughout this document, organizations leveraging Citrix Virtual Apps and Desktops service as part of their Azure cloud strategy achieve faster time to value, better flexibility and agility, and simplified management and security. The shift to Virtual Apps and Desktops service is more than just a licensing upgrade: Virtual Apps and Desktops service provides a superior economic and strategic alternative to purchasing and maintaining the Citrix infrastructure on-premises.

When building an assessment model for virtual application and desktop delivery, Citrix recommends that organizations consider the benefits of accelerating time-to-value by removing provisioning bottlenecks and automating deployments of virtual workloads and enterprise applications across data centers and on- or off-premises cloud environments. This will enable IT to adopt cloud at a pace that meets the business requirements. With Citrix cloud services, IT can expand

capacity without capital investments, in addition to providing redundancy, and enable automatic scaling and disaster recovery of applications, while providing a superior end-user experience.

Using a cloud architecture based on best practices, Citrix and Microsoft deliver significant value with the cloud-based services providing savings on infrastructure procurement and management, mitigating the security and risk concerns, reducing the time and effort to complete successful software upgrades, and ensuring that administrators have the benefits of always using the latest upgraded software.

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APPENDIX: References

[IDC Solution Brief: Assessing the Business Value of VDI in the Public Cloud](#) (Please speak to your sales rep or Citrix Partner to get access to this brief.)

[Citrix Cloud Services Total Economics Benefits Assessment Guide](#)

Workspace services

[Preparing for the Workspace of the Future](#)

[Cloud Workspace Services: Adoption Made Simple](#)

[Simplify your cloud strategy by taming cloud sprawl](#)

[Full list of Citrix Virtual Apps and Desktops service](#)

[Stages of Software Deployment](#)

[Citrix AutoScale](#)

[Citrix Trust Center](#)

Less infrastructure—better disaster recovery

[Microsoft Azure TCO calculator](#)

Business continuity

[Citrix Cloud Business Continuity Advantage \(blog\)](#)

[Citrix Virtual Apps and Desktops service reference architecture and deployment methods](#)