

The Ultimate Azure Migration Guide

Your future in the public cloud—and
how a Managed Cloud Service Provider
(MCSP) will help you get there



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This guide is for **ANYONE** planning a migration to the public cloud using Microsoft Azure. But that doesn't mean you have to read **EVERYTHING** in it.

ORGANIZATION

The guide is divided into three parts:

- **Part One** provides a quick overview of what's happening with the public cloud and Azure today.
- **Part Two** gives you a quick overview of typical migration paths to Azure.
- **Part Three** explains the role that a Managed Cloud Service Provider such as Navisite can play in your Azure migration and looks at other key issues, including security, compliance, and ROI.

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Until very recently, running a data center was essentially a go-it-alone undertaking. Most organizations wanted total control over their own IT infrastructure environment. Now all of that is changing. More and more organizations are vacating their data centers and migrating to the public cloud—particularly Microsoft Azure.

This is a turning point in the world of business and IT. Managed correctly, a move to the public cloud may be the single biggest thing an organization can do to lower IT costs and achieve the flexibility, scalability, and agility it needs to become more competitive and successful.

Lower costs AND the commitment to making organizations more agile and competitive?

Yes, that's the promise of the public cloud and the reason why it is now growing so fast. As the research firm IDC put it, "The majority of CIOs have already adopted a 'cloud-first' purchasing strategy... This doesn't necessarily mean they will always purchase the cloud option, but they will always consider it first."¹

But what's involved in migrating to the public cloud and, in particular, to Microsoft Azure—now the leading public cloud choice among organizations? This guide will help you find out.

THE AZURE MIGRATION CHALLENGE

While a migration to the public cloud may be inevitable, that doesn't make it any less challenging. You need a detailed understanding of your infrastructure environment as it exists today and of what it will look like in the cloud. You need to understand the many capabilities Azure makes available. Because the cloud is still so relatively new, the skill sets required to pull this off correctly are in notoriously short supply.

That's essentially why Microsoft established the Azure Cloud Solution Provider (Azure CSP) program. An Azure CSP is a highly experienced, cloud-savvy provider who becomes your single point of contact for everything Azure. Navisite is an Azure CSP. In fact, because of our extensive experience helping organizations manage their migrations to the cloud—and to Azure—Microsoft has recognized Navisite as an Azure Center of Excellence (COE).

So, in addition to everything else, this guide is a great way to learn all the ways—and there are many—in which Navisite can simplify and streamline your Azure migration.

Good luck. And rest assured that, whatever your path to the Azure cloud, Navisite is ready to help make it a success.

¹The Booming Cloud Opportunity, The Modern Microsoft Partner Series, An IDC eBook, sponsored by Microsoft, 2018.

PART 1:

The Rise of the Public Cloud



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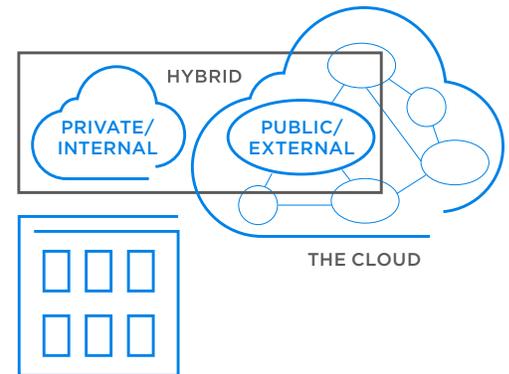
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The term “cloud” is used extensively today, so it’s a good idea to clarify how this guide defines public clouds and how they differ from private or hybrid clouds.



Public clouds are typically defined as computing services that third-party providers offer over a wide area network (WAN) and that are available to anyone who wants to use or purchase them. Microsoft Azure is designed for use by any organization—and that makes it a great example of a public cloud.

Typically, a public cloud has these characteristics as specified by the National Institute of Standards and Technology:²

- 1 On-demand self-service.** The computing capabilities—server, storage, network, platform services, etc.—can be provisioned over a WAN at any time.
- 2 Broad network access.** The services can be used on generally available computer and mobile devices (e.g., PCs, laptops, mobile phones, tablets, and workstations).
- 3 Resource pooling.** Instead of controlling their IT, subscribers get access to a centrally pooled resource, which they share with other tenants. Physical and virtual resources in that shared pool are dynamically assigned and reassigned according to consumer demand.
- 4 Rapid elasticity.** In place of the need to build up architectures in advance, the capabilities can be elastically provisioned and released, scaling upward and downward to match actual demand.
- 5 Measured service.** A metering capability is in place to monitor the consumption of the service (e.g., the amount of storage, processing, or bandwidth consumed or the number of active user accounts), impose controls on usage, and deliver reporting that provides transparency for both the provider and consumer of the utilized service.

²The NIST Definition of Cloud Computing.

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What are Public Clouds? (Cont.)



So how does the public cloud differ from private and hybrid clouds?

PRIVATE CLOUD

A private cloud has the fundamental capabilities and characteristics of a public cloud with one important exception—it is private, typically only available to a single organization or group of subscribers. Resources are pooled but only on behalf of one organization.

A private cloud can be managed/hosted internally or by a third party. Typically, a private cloud is implemented to provide flexibility and scalability in a situation that requires special attention to compliance and security issues. But, because it is not “multitenant,” the cost advantages of the pooled infrastructure are lost.

HYBRID CLOUD

Being hybrid means using a mix of IT services—public and private cloud services, public cloud services from different cloud providers, cloud and on-premises services. That’s why a hybrid cloud is not so much a different type of cloud as it is a strategy. Also, it’s probably the single most popular approach to the cloud—most organizations want the flexibility of being hybrid.

Microsoft recognized this when creating Azure and offers a range of services specifically designed to support hybrid cloud environments. In fact, its support for hybrid implementations is a key reason why Azure has become such a popular public cloud choice for organizations in a relatively short space of time—and why more than 90% of the Fortune 500 use it.

At the same time, managing a hybrid implementation can be a complex undertaking and one of the single biggest reasons why organizations enlist the support of a managed cloud service provider (MCSP).

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The public cloud took off as a real IT alternative in the late 2000s. Two major announcements were key to establishing it:

- The 2006 introduction of Amazon Web Services (AWS).
- The 2008 announcement of Microsoft’s cloud—released in 2010 as Windows Azure and later renamed Microsoft Azure.

Before the introduction of AWS and Azure, when people mentioned “the cloud” they were primarily referring to software-as-a-service (SaaS) as typified by companies such as Salesforce, which provided their software entirely via the cloud.

SaaS still accounts for the largest share of the cloud business, but now that’s changing (see chart below). Public cloud services that enable organizations to shift their infrastructure, applications, and development activities to the cloud—infrastructure-as-a-service and platform-as-a-service (IaaS/PaaS)—are now the fastest growing parts of the cloud. While public cloud service revenues are growing by 20% annually overall worldwide, IaaS and PaaS combined are growing at 36%, and their share of the public cloud market is increasing from 27% to 37%.

IT WORKLOADS

Another important measure of the growth of the public cloud is the percentage of IT workloads leaving data centers and other on-premises installations and moving to the public cloud. The percentage of IT workloads running on enterprise-operated infrastructure has plummeted to 37% and is expected to drop to 27% by 2020.³

Worldwide Public Cloud Service Revenue Forecast (Billions of U.S. Dollars)

	2017	2018	2019	2020	2021
Software-as-a-service (SaaS)	60.2	73.6	87.2	101.9	117.1
Infrastructure Services (IaaS)	30.0	40.8	52.9	67.4	83.5
Platform/Application Infrastructure Services (PaaS)	11.9	15.0	18.6	22.7	27.3
Business Process Services (BPaaS)	42.6	46.4	50.1	54.1	58.4
Management and Security Services	8.7	10.5	12.3	14.1	16.1
Total Market	153.5	186.4	221.1	260.2	302.5

Source: Gartner (April 2018) Note: Totals may not add up due to rounding.

³ LogicMonitor, https://www.logicmonitor.com/resource/the-future-of-the-cloud-a-cloud-influencers-survey/?utm_medium=pr&utm_source=businesswire&utm_campaign=cloudsurvey

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Two key factors that are driving the growth of the public cloud for organizations are the lessening of security concerns and the growing availability of services—or “on-ramps”—specifically designed to simplify cloud migration.

FEWER CONCERNS OVER SECURITY

For years, many CIOs and IT executives resisted hosting their IT infrastructures in the public cloud, citing concerns over control, security, and governance among others. But those worries are rapidly diminishing, if not virtually gone for many decision-makers:

- In every industry today—including the most highly regulated, compliance-oriented sectors, such as, healthcare, law, and government—organizations are voting with their wallets and migrating to the public cloud. Azure was the first public cloud to earn the Level 5 Department of Defense (DoD) Provisional Authorization⁴ and, as of August 2018, is the leading contender⁵ for the DoD’s lucrative JEDI project.
- In the report presenting the results of its 2018 survey of nearly a thousand IT professionals, RightScale declared, “Among enterprise central IT teams, who typically have the most responsibility for security, there has been a significant decline in security concerns among this group over the last few years.”⁶

CLOUD ‘ON-RAMPS’

Public cloud providers such as Microsoft Azure have also increased their appeal in enterprise markets by introducing a host of tools and platform services—‘on-ramps’—that directly address a wide range of cloud migration scenarios. Examples include

- “Lift-and-Shift” cloud migrations where the economics in favor of deploying in a public cloud are overwhelmingly positive.
- Transitioning from existing on-premises architectures, including Hyper-V, VMware, SQL, Windows Server, Linux, and .Net.
- Using the public cloud for replication, backup, and other business continuity applications.
- Hybrid cloud implementations.
- Supporting the testing, development, and rollout of new cloud-native services along with the conversion of existing applications to cloud-ready ones.

THE RIGHTSCALE SURVEY

- In 2018, adoption of the public cloud crossed the 90% mark for the first time.
- The percentage of organizations declaring that the public cloud was their top priority grew to 38%, a significant jump from 27% in the previous year.
- 20% of organizations plan to more than double public cloud spend in 2018, and 71% will grow public cloud spend by more than 20%.

⁴<https://docs.microsoft.com/en-us/azure/azure-government/documentation-government-overview-dod>

⁵https://www.theregister.co.uk/2018/08/13/microsoft_azure_stack/

⁶RightScale 2018 State of the Cloud Report.

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Another key factor in the growth of the public cloud is the pressure on IT departments to support digital transformation strategies. IT has long been critical to organization go-to-market strategies but typically in a supporting role. Not anymore.

Now, for many businesses—especially newer cloud-native organizations—IT IS the go-to-market strategy. Organizations that want to be competitive in today's digitally transformed marketplaces need well-oiled IT infrastructures and processes capable of rapidly rolling out the innovative, consumer-facing applications and personalized experiences that are today's differentiators.

That's what makes the move to a public cloud such as Microsoft Azure a logical next step for CIOs and IT executives who have heard the clarion call for digital transformation.

MAKING IT SERVICE-ORIENTED

Moving to the public cloud makes it possible to shift focus from managing IT architectures and data center buildouts to agile development and service delivery. By relying on the public cloud provider to manage the servers, storage, networking, virtualization, applications, security, compliance updates, etc., you free up resources to focus on competitive differentiators.

BECOMING A MORE INTEGRATED, DEMOCRATIZED ORGANIZATION

Relying on cloud services helps makes critical IT capabilities more integrated and available. It eliminates the fiefdoms and silos that prevent organizations from harnessing cross-organization insights. Using the cloud, you can connect stakeholders with real-time communications, streamline and democratize access to data and intelligence, and integrate customer-facing and employee-facing technologies together on a single platform.

ADOPTING AGILE DEVELOPMENT

The cloud makes it possible to embrace what Microsoft calls "rapid incrementalism," essentially relying on the many services available in Azure to "fly your plane while building it": rapidly developing, testing, and deploying new services without having to first tear down or build-up infrastructures. Keep what works, jettison the rest, and move on.

Here is how Microsoft describes this shift in the use of IT:

- In the pre-digital economy, companies focused on process efficiency and effectiveness and executed with a divide-and-conquer approach.
- In the digital economy, the goal is to architect for agility and new types of business models in order to empower employees and customers to innovate at a pace unimaginable in earlier generations.

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Microsoft Azure was launched in 2010, at which point it began offering platform-as-a-service (PaaS) and Azure SQL:

- The PaaS services made Azure a top choice for organizations that previously used the .NET programming framework for their applications.
- Azure SQL offered an ideal transition to the cloud for companies that wanted to both simplify and to up their game in data management and applications built on SQL.

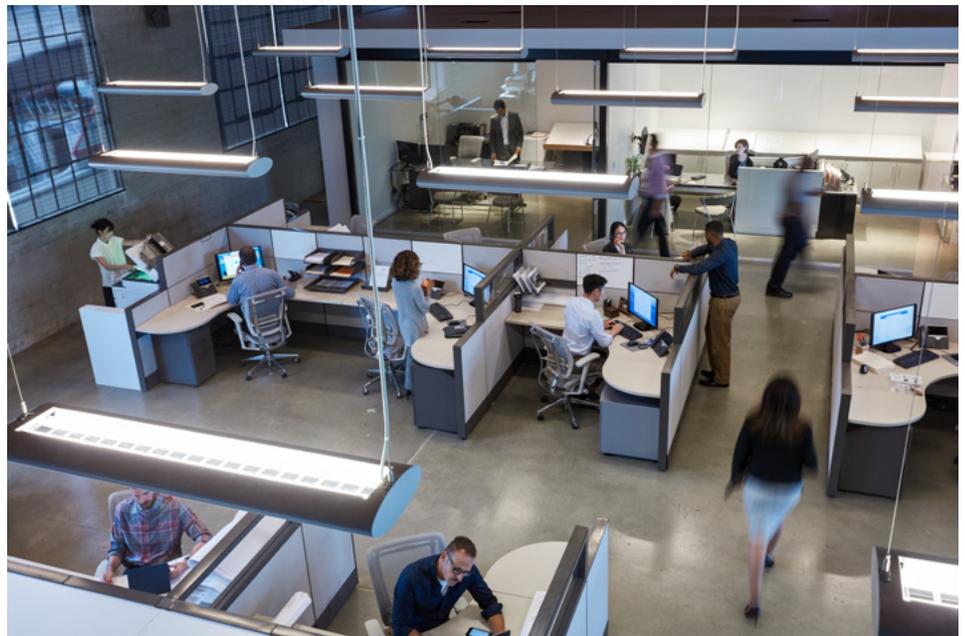
Since then, Azure has grown rapidly as a public cloud platform and is becoming the fastest growing public cloud provider. It is growing faster than the overall cloud, and that is almost entirely due to its success in offering a wide range of tools and services that CIOs and IT executives can trust for the transitioning of their IT from on-premises to the cloud.

COMPREHENSIVENESS

Today, Azure offers some 200 services for compute/virtual machines, web applications, storage, analytics, networking, disaster recovery, artificial intelligence, and more. (See List of Azure Services in [Appendix](#).)

STREAMLINING MIGRATIONS

IaaS has been a prominent part of Azure since 2012, with the availability of Windows and Linux virtual machines on the platform. And Azure has continued to add a wide range of tools. Whatever platform you are using today, it is likely that a specific service or group of services has been designed to facilitate your transition to the cloud, often with no changes to your current environment required.



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Azure—A Top Choice for Organizations (Cont.)

STRENGTH AS PAAS

Azure remains a top choice for Windows developers who want to keep using the tools and frameworks that they are familiar with when developing applications for the cloud. Azure PaaS supports all leading development frameworks, for instance, .NET, Java, Ruby, Node.JS, PHP, and Python; it also supports DevOps tools such as VSTS, Bitbucket, GitHub, etc. Moreover, there are numerous out-of-the-box applications in the Azure Marketplace. Gartner has designated the Azure PaaS a “leader” in its Magic Quadrant for Enterprise Integration PaaS. (AWS was not included in this Magic Quadrant.⁷)

HYBRID SUPPORT

Many customers turn to Azure for its extensive support of hybrid cloud implementations. For example, organizations can choose to store sensitive data on-premises while leveraging the scale of the Azure cloud for other application tiers. Integration capabilities built into Azure make this process easier and more flexible.

GEOGRAPHICAL REACH

Azure covers more regions than any other cloud service provider. 42 regions are currently available, and 12 new ones have been announced, with a data center footprint in 140 countries. If your reach is global, Azure is ready to match it.⁸

INVESTMENT PROTECTION

By making the move to Azure, you are not only transitioning your existing Microsoft infrastructure to the cloud, but you are likely also preserving your investment in existing licenses you may own now. (See [A Roadmap to the Savings and Productivity Benefits of Azure](#).)

⁷2018, Gartner, Magic Quadrant for Enterprise Integration PaaS, <https://www.gartner.com/doc/reprints?id=1-4X33NBH&ct=180420&st=sb>

⁸For the latest figures, see <https://azure.microsoft.com/en-us/global-infrastructure/regions/>

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Because IT increasingly **IS** the interface between organizations and their customers (as opposed to just supporting it), the IT's location is critical.

As Gartner has noted, being focused on agility and the ability to enter new markets quickly means IT services must be delivered closer to the customer and must be able to address local business, regulatory, and geopolitical impacts. In effect, in IT today, the “where” factor has become a big deal. Where your IT is hosted matters...

- For the quality of the experience.
- For the ability to make use of real-time data.
- For the handling of the growing number of local privacy and regulatory issues, for instance, the EU's General Data Protection Regulation [GDPR].

As it happens, the “where” factor is also a major strength of Azure.

Azure's rapid ascent as the public cloud of choice for organizations is due both to its extensive geographical reach and the major commitment it has made to addressing local regulatory issues:⁹

- Azure covers more regions than any other cloud service provider. 42 regions are currently available, and 12 new regions have been announced with a data center footprint in 140 countries.
- Azure is the first foreign public cloud service provider in China (through its collaboration with 21Vianet) to provide services in compliance with government regulations.
- Similarly, Azure Government Cloud, which creates secure cloud computing environments for government agencies that have strict compliance requirements, has an edge over its competition because it offers more geographical redundancy than any other cloud service provider.
- Azure was the first cloud service provider to enter into a contractual commitment to meet the requirements of the GDPR.
- Azure has a wide compliance coverage range with 80+ compliance offerings.¹⁰
- FedRAMP authorization is yet another example of Azure's edge over other cloud providers. Azure has 38 services with FedRAMP High authorization, the most among public cloud providers.

⁹ <https://azure.microsoft.com/en-in/global-infrastructure/regions/>

¹⁰ <https://www.microsoft.com/en-us/trustcenter/compliance/complianceofferings>

Does the Rise of the Cloud Mean the End of the Data Center?

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IT has changed a lot over the years, but, from the days of mainframes and minicomputers (from the 1950s to the 1980s) and through the modern era of the data center (from the 1980s to today), the idea that an organization should have total control over its IT infrastructure was never questioned.

Sure, IT experts have always known that there were better ways of doing things. Inefficiencies inevitably plagued enterprise-managed data infrastructures—they were difficult to maintain, labor-intensive to manage, often constituting a roadblock as much as an enabler of new services. In particular, the pairing of hardware and software (i.e., dedicating a server to a specific application) left lots of raw compute power unused. But, with the overall benefits of IT-led automation so great and the cost of hardware plummeting, enterprise-owned and enterprise-managed infrastructures grew.

Then virtualization strategies and the Internet started to shake things up. New virtualization solutions that created a way to pool compute power opened the door to a new generation of smaller, more efficient data centers. But they also planted the seeds of the data center's demise.

Once it became possible to easily pool hardware and support multiple applications, people realized they could also pool hardware to support multiple users and—thanks to the Internet—those users could be located anywhere in the world. And so the modern cloud was born and data centers ended up on the ropes.

According to IT research expert, Gartner, some 10% of organizations have already done away with their data centers, and, within a few years (2025), that percentage will rise to 80%.¹¹

Enterprise-owned data centers will probably never disappear completely, but they will never regain their status at the center of the IT world.

According to Gartner, the traditional data center is effectively “dead” and likely to be relegated to the role of a legacy holding area for services that cannot be supported elsewhere or that are simply more economically efficient on-premises.

¹¹The Data Center is Dead, Gartner, https://blogs.gartner.com/david_cappuccio/2018/07/26/the-data-center-is-dead/

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The move to the public cloud may be inevitable, but that doesn't mean it's easy.

Because so many capabilities are available through Azure, many organizations are struggling to make the most of them.

To support organizations in their move to Azure, Microsoft established the Azure Cloud Solution Provider (Azure CSP) program, which consists of select, highly experienced cloud-savvy providers who become your single point of contact for everything Azure—they design your Azure solution, configure it, handle your migration, and provide ongoing monitoring and support.

Navisite is an Azure CSP and has also been designated an Azure Center of Excellence (COE)—this designation is given to a few select partners that have extensive and deep expertise and have demonstrated continuous success across a wide range of Azure deployments.

Azure CSPs specialize in Azure and possess in-depth knowledge of the issues and technical challenges that are likely to arise before, during, and after an Azure migration. In addition, a qualified Azure CSP maintains strong ties to Microsoft and can efficiently solve difficult problems or get answers to complex technical questions.

The support of a CSP allows a business to supplement its internal resources and, without sacrificing control or transparency, achieve a tailored Azure migration. CSPs do the heavy lifting during migration. Post-migration, the CSP manages routine monitoring and maintenance, again reducing the burden on in-house IT.

Assembling the right Azure expertise and resources will remain a challenge. Managing, troubleshooting, and identifying next steps—and ensuring that these steps are secure and compliant—all require ongoing access to skilled Azure resources.

That's what you get with an Azure CSP such as Navisite.

PART 2:

Migration Paths to the Cloud



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An old Chinese proverb says that the journey of a thousand miles begins with a single step. For organizations embarking on a public cloud strategy, that's good advice.

At Navisite, when we help organizations make the transition to Microsoft Azure, we focus on creating a practical, step-by-step roadmap based on the specific objectives they want to achieve and the realities of their IT environment—their applications, usage patterns, licenses, investment levels, and more.

This is a significant change from many organizations' first experience of the cloud. One of the early attractions of the cloud was the ability to simply “sign up” and benefit from the immediate provisioning of compute power and storage.

Ad hoc, opportunity-led signups are still a popular cloud entry point, but, to appeal to organizations' needs, Microsoft Azure has invested heavily in providing on-ramps that are designed to support the migration from traditional platforms such as VMware, Windows Server, and SQL and to also support core IT strategies such as disaster recovery.

In this section of the guide, we look at:

- “Lift-and-Shift” cloud migrations where the economics in favor of deploying in a public cloud are overwhelmingly positive and the complexity of the transition is low.
- The transition from existing on-premises architectures, including Hyper-V, VMware, SQL, Windows Server, and .Net. In several instances, these architectures are reaching “end of service.”
- The use of the public cloud for replication, backup, and other business continuity applications.
- Hybrid cloud implementations.
- Support for the testing, development, and rollout of new cloud-native services.

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When you are looking at what to migrate to Azure, one of the first questions you will confront is whether to move applications “as is”—popularly known as “Lift-and-Shift”—or refactor/re-architect them.

LIFT-AND-SHIFT

Lift-and-Shift is the quickest, easiest, and, likely, the least complex path to the cloud. Moreover, because refactoring/re-architecting applications can be costly, a Lift-and-Shift approach keeps the budget down.

With Lift-and-Shift, you will move your existing infrastructure, applications, and/or services to Azure-based virtual machines using an operating system and a networking configuration that closely resembles your current on-premises configuration. This will allow you to benefit from the infrastructure benefits and management features of Azure while minimizing the cost and the time required to complete the migration.

REFACTORING/RE-ARCHITECTING

By refactoring or re-architecting an application, an organization makes the decision not to simply house the application in the cloud but to also make it cloud-ready.

This might involve taking an application that performs a range of different functions, breaking it down into smaller chunks that target specific business processes, and providing new functionality that the company and users need.

Instead of allowing companies to use the application the way they have always used it—but now supporting it less expensively—refactoring helps companies transform entire business processes and makes them more effective.

IMMEDIATE SAVINGS VS. LONG-TERM BENEFITS

The prospect of immediate savings typically drives a Lift-and-Shift approach: when applications are suitable for the Lift-and-Shift approach, an organization can quickly reduce its data center footprint and lower the costs of maintaining legacy systems.

But, from the standpoint of truly benefiting from all that the cloud has to offer, Lift-and-Shift is never an ideal migration strategy. For example, the applications may not be able to take advantage of on-demand scalability or other cloud-native capabilities. Moreover, if users found the experience of using the on-premises version less than ideal, the Lift-and-Shift to the cloud won't make that experience any better.

However, when the objective is cost savings, Lift-and-Shift has the virtue of achieving its defined goal. And the option of re-architecting the applications later to make them more cloud appropriate always exists. In fact, that may be easier to do later partly because a lot of the hard part—migrating the application, data, and traffic—has already been done.

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Lift-and-Shift or Refactor? (Cont.)

SHOULD YOU LIFT-AND-SHIFT OR REFACTOR?

When making this decision, here are some things to consider:

- If cloud attributes really won't enhance the applications, Lift-and-Shift is the better option.
- Applications that are essentially being used as the software provider supplied them—and which generate good value for the organization—are good candidates for Lift-and-Shift. You can't go in and re-architect them anyway.
- If you are experiencing reliability issues that disrupt the performance of critical applications, a Lift-and-Shift approach may be appropriate for addressing those immediate reliability concerns.
- How important is this application to your business?
 - If it's an application that contributes to revenue and should be invested in, refactoring is likely to take place now or in the future—when you want to pay for it is up to you.
 - If it is necessary but not strategic, Lift-and-Shift and coming up with the most cost-effective way to retain it on-premises are likely to be the best options.
- Because cost savings are often such a big part of the reason for undertaking a Lift-and-Shift, it's important to zero in on the real cost of maintaining these applications in the cloud.
 - For example, applications that consume a lot of resources may be better left on-premises; without some serious re-architecting, they may run up the cloud bill.
 - Would the benefits associated with refactoring outweigh the cost?
- After deployment to Azure, be sure to closely monitor and tune your usage assumptions to make sure you're using the correct virtual machine sizes. In Azure, virtual machines can easily be resized.

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By making it easier to pool hardware, virtualization solutions have made data center operations more efficient and cost-effective.

But, in any data center, change is inevitable. No matter how virtualized and efficient a data center is today, it must still be maintained, managed, and updated for tomorrow. A new or expanded data center footprint is necessary for, among other things,

- Any market expansion.
- Maintaining compliance with emerging data privacy requirements.
- The additional scale and reach needed to meet global needs and seasonal bursts.

That's why IT organizations today—whether they are using Microsoft's Hyper-V or VMware—should consider the cloud. (And regardless of what hypervisor you are using, Azure simplifies the process.)

WHY PLANNING IS ESSENTIAL

Cloud computing enables a level of flexibility and scalability in architecture that's far beyond what's possible in even the most virtualized data center. But the right planning is key.

In traditional data centers—especially those that are virtualized—it's common to find oversized server instances. That's something you don't want to do in the cloud—you don't want to underpower or overpower your applications. Unfortunately, that's exactly what many organizations are doing. In RightScale's 2018 survey, respondents estimated a 30% waste factor in their cloud spend. According to RightScale, the actual measured waste was closer to 35%.

The cloud isn't about building extra room that you will use down the road. It's about understanding your exact needs from a service-oriented perspective and allocating resources based on that. It's easy to scale up immediately if you determine that you need more resources.

KEY QUESTIONS TO ASK INCLUDE THE FOLLOWING:

- What CPU, RAM, and storage does the application need? How do they compare to the ones allocated now?
- What type of network performance is required?
- Is it possible to organize single-role servers into large clusters or groups of smaller servers?
- What is the application's usage pattern, and how can I use the cloud's flexibility to adapt to it (e.g., may I turn the service off at certain times)?
- What is the input/output operations per second (IOPS) requirement of this application?

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From a Virtualized Data Center to the Cloud (Cont.)

STREAMLINED MIGRATIONS

By now, most companies leverage hypervisor-based solutions in their data centers—Hyper-V or VMware—and they are considering their options in the cloud. A few years ago, this might have required a complete redesign. Now, with the tools available in Azure, you can retain your virtual architecture, maintaining all the features of Hyper-V or VMware that you currently rely on, and gain the benefits of residing in Azure.

By leveraging what is basically a VMware environment that happens to reside on Azure, you can move workloads back and forth without bringing your system down and maintain security and other important configurations. You can also separate your dev/test environments from your production environments. This allows someone with a VMware environment to leverage the scaling, capacity, and burstability of putting servers in Azure while preserving many years' worth of work.

Using tools such as Azure Migrate, Azure Site Recovery, and Azure Cost Management, VMware users can

- **Do the Discovery:** Discover and migrate workloads to the Azure cloud without requiring modifications to their VMware environments.
- **Rightsize:** Assess the current utilization of the CPU, memory, disks, and network to offer size and cost guidance for provisioning the right level of cloud resources.
- **Make the Move:** Migrate an entire multi-server application, not just server by server.
- **Be Application-aware:** Visualize group-level dependencies in multi-VM applications and logically group, prioritize, and sequence the entire application for migration.
- **Stay on Budget:** Once deployed in Azure, forecast, track, and optimize their spending.

INTEGRATE VMWARE WORKLOADS WITH AZURE SERVICES

VMware customers can also use a range of Azure services with their VMware workloads on-premises (without any migration or deployment to the Azure cloud), enabling them to keep their entire environment secure and well-managed across the cloud and on-premises. These include Azure Backup, Azure Site Recovery (for disaster recovery and migration), update/configuration management, Azure Security Center, and operational intelligence using Azure Log Analytics.

SAVINGS

By eliminating the 'VMware Tax'-associated licenses/support and taking advantage of options such as Azure Reserved VM Instances and Azure Hybrid Benefit (for Windows Server workloads), VMware customers can save as much as 67% more than those who opt for the same implementation on other cloud options.¹²

¹² Microsoft, Migrating VMware to Microsoft Azure: Total Cost of Ownership Guidance, Nov. 2017.

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In the age of digital transformation, data analytics have become critical to organization performance. Hence, a premium has been put on the ability to aggregate data and make it easily accessible for analysis.

That makes SQL a go-to resource, but managing a SQL environment can be costly and time-consuming. It's often common for there to be disparate systems that don't work well together, leading to performance limitations and lengthy delays in getting answers to basic questions.

With Microsoft phasing out support for older SQL (and Windows Server) solutions—ending security updates and complicating compliance, for example—the move to Azure SQL Database is a major option.¹³

By migrating to Azure SQL Database, you will get access to full versions of the SQL Server you are already familiar with (no need to change your current application). You will realize all the benefits of the cloud, for instance, scalability, reliability, security, and an end to equipment refreshes. Plus, you will get free extended support for SQL 2008 and 2008 R2 for three years beyond the deadline.

UNDERSTANDING AZURE SQL DATABASE

Azure SQL Database delivers a mix of operational efficiencies—automating basic database administration tasks—combined with the latest features, for instance, in-memory technologies and AI-driven intelligent PaaS capabilities.

As your app runs, Azure SQL Database continuously learns your unique app patterns, adaptively tunes your performance, and automatically improves reliability and data protection. This frees you to focus on your app.

Azure SQL Databases are also exceptionally reliable by default. Without anything being configured, full backups of your database are created every hour and incremental backups are made every 5 minutes. These backups are stored three times in the local data center and three times in another data center. Furthermore, you can restore backups from 35 days ago, depending on the pricing tier that you use.

New SQL Server features are incorporated in Azure SQL Database first and in the on-premises SQL Server later. Immediately benefit from advanced features such as:

- Geo-replication, which replicates data to other geographical regions in real-time.
- Dynamic data masking, which masks sensitive data for certain users at runtime.
- Auditing, which provides a complete audit trail of all the actions applied to the data.

¹³ SQL Server 2008 and SQL Server 2008 R2 support by Microsoft ends on July 9th, 2019.

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From SQL or Windows Server to the Cloud (Cont.)

Azure virtual machines run in many different geographical regions around the world. They also offer a variety of machine sizes. The virtual machine image gallery allows you to create a SQL Server VM with the right version, edition, and operating system. This makes virtual machines a good option for many different SQL Server workloads.

YOUR OPTIONS, SHOULD YOU CHOOSE TO ACCEPT THEM

After the end-of-support (EoS) deadline, there will be no new security updates, non-security updates, free or paid Microsoft support options, or online technical content updates after extended support ends. Users must act to avoid challenges and vulnerabilities resulting from end-of-support.*

- **Migrate to Azure:** Start benefiting from the cloud now and get free Extended Security Updates for SQL 2008 and 2008 R2 for three years after the deadline.
- **Upgrade to a later version of SQL:** Upgrade to a later version, such as SQL Server 2017, to maintain support.
- **Azure Hybrid Benefit:** Clients may take their SQL licenses with them and use existing on-premises licenses to save up to 55% on Azure.

While the savings can be substantial—reducing infrastructure build-out and maintenance costs—moving to Azure is often not primarily about cost savings. Instead, it's typically about performance: delivering more cloud-based compute power and storage than was available on-premises and enabling better analytics and business intelligence for both internal and external use.



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By any measure—whether you are looking at lost revenue, compliance penalties, lost time and employee productivity, reputation damage, or the cost of recovery efforts—the price of downtime is growing precipitously.

A study by Ponemon Institute/Vertiv showed that downtime costs rose by 38% from 2010 to 2016, with increases taking place across the board in every industry and for every kind of IT outage.¹⁴

The high cost of downtime is one of a range of factors that have organizations looking to the cloud for alternatives to traditional business continuity/disaster recovery solutions (BCDR).

Other factors include:

- **The high cost of traditional BCDR:** Cost cutting has left IT understaffed regardless of the business size, meaning that IT teams are ill-inclined to invest in traditional redundant approaches. Cloud technologies offer a way to provide more manageable, automated, self-service-oriented solutions for BCDR.
- **Data explosion:** The amount of data businesses are handling is exploding. Where traditional backup strategies cannot keep up, cloud-based storage-as-a-service solutions provide a practical, scalable option and can play a key role in supporting BCDR.
- **Opportunity to differentiate:** Regulatory requirements are tightening in industries such as healthcare, financial services, and retail. Taking a smart approach to data protection and security addresses evolving compliance requirements while also providing an opportunity to differentiate.

This section of the Guide will introduce you to some of the compelling factors that make Azure a good choice for BCDR, including how it often provides a superior solution when compared to AWS.

THE APPEAL OF AZURE FOR BCDR

The appeal of the Azure cloud for BCDR is the same as that for other business functions—instead of the fixed costs and responsibilities associated with dedicated solutions (in the case of BCDR, often a remote facility), Azure offers tailored protection on a pay-per-use model. You can adapt your Azure-based BCDR to your specific needs:

- Organizations can choose from a wide range of options involving backups and replication to their own servers, hosted third-party servers, and the cloud. Rely on Azure for cold-data backups alone, or benefit from fully resilient replicas of data, applications, and relevant infrastructure. Applications can seamlessly fail over to one or multiple locations.
- Back up as much or as little of your systems and data as needed. Pre-assess network, storage, and compute resources, and pay only for what's needed to run apps in Azure during outages.

¹⁴ Cost of Data Center Outages, Ponemon Institute, January 2016.

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Disaster Recovery (Cont.)

- Set different recovery point objectives (RPOs)/recovery time objectives (RTOs) based on the specific needs of different parts of your environment. Make these RPOs/RTOs more granular: measured in minutes and even seconds.
- Get consistent, repeatable recoveries across heterogeneous environments—on-premises physical/bare-metal servers, VM-to-cloud, VM-to-VM, and more.
- Use BCDR actively as part of day-to-day IT for load balancing—BCDR becomes a working asset that delivers constant value and returns.
- Migrate systems/applications/data to the cloud in stages, eliminating the requirement and pressure to transition an entire data center at once.
- Do regular testing of your BCDR capabilities without disrupting your normal day-to-day operations.

TECHNOLOGY AGNOSTIC BCDR

A major advantage of using Azure for BCDR is that Azure Site Recovery is a technology-agnostic solution. This means that you can easily replicate Hyper-V, VMware, or even physical server-based workloads regardless of whether you are running them as standalone hosts or clusters or whether they are backed up by simple or advanced storage systems. (As it happens, this is very different from what takes place with AWS—there, you must first bring data to the cloud using cold backup to cloud storage and then develop ways to recover independently.)

While running in the background, Azure will automatically convert machines to Azure Virtual Machines on the fly, so no additional configuration or administrative overhead from the customer is necessary. Azure Site Recovery uses Azure IaaS to host replicated machines, so you can count on full support for Linux, Windows, and specific enterprise workloads like SAP.

Additionally, you do not need to establish and maintain dedicated tunnels to Azure in order to replicate data if you do not want them; replication is performed over the Internet using highly secure connections and session keys that Azure itself manages. Of course the solution is sensitive to possible bandwidth issues, so it can be tuned and throttled during working hours. In an advanced scenario, you can choose to replicate data over ExpressRoute, an enterprise-grade direct connection from your data center to Azure.

OPTIONS FOR REPLICATION

Once you define which workloads to protect, it's time to consider replication parameters. In Azure, it is possible to define parameters like replication interval, failover virtual machine type, scale, and network configuration. This way, the machine has the whole configuration before it needs to start, eliminating the time needed to trigger mandatory procedures that would be associated with operating in AWS.

You can send initial replicated data over a network or even choose to send data on physical disks to Microsoft to prevent a large replication job from disrupting your internet uplink. On top of that, you can use compression during replication and define copy frequency in intervals as short as 30 seconds—which is amazing in terms of RPO goals—while actual numbers on the AWS side are a bit unclear and unspecific.

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Disaster Recovery (Cont.)

In addition, you can configure the number of recovery points-in-time and the frequency of an application-aware snapshot. The feature is great because it allows you to replicate your virtual machines to Azure and to ensure that you're covering the crucial step of a consistent application state.

OPTIONS FOR FAILOVER

In the event of disaster, a failover process is initiated automatically to get replicated machines up and running. You can choose between three failover processes—planned, unplanned, and test.

Planned failover is used in case you expect to have a major outage at a primary location. In such a situation, Azure will attempt to synchronize all differences made between two replication intervals, stop the machine at the primary location, and spin up a machine in Azure.

Once the data center becomes available again, you can easily reverse replication from Azure to on-premises and initiate a fallback procedure. This out-of-the-box solution ensures zero data loss, and it's something AWS cannot offer because its solution is not DR-aware—AWS relies instead on building procedures manually. Not only can you use this option for DR scenarios, but you can also use it as a handy tool to move workloads from your data center to Azure and group your on-premises infrastructure and Azure into one hybrid entity.

Unplanned failover is used in case you have a sudden outage in production, and it involves data loss between synchronization intervals. Test failover is used to create an isolated replica of a disaster recovery site for testing the environment. Additionally, you can use Azure Site Recovery as an orchestrator between two locations in your own data centers even if they are outside Azure.

BCDR CHALLENGES

Even though Azure Site Recovery is an all-in-one solution that offers your organization enterprise-grade features, you still need to consider factors such as which workloads to protect, what protection policies to apply, and how to ensure replication is continuous and tested. Moreover, if you plan to move VMware off physical servers to the cloud, you should comply with the supported options.

Finally, mapping from on-premises to the cloud is frequently not one-to-one, so you must devote time to careful planning before you start to replicate workloads to the cloud. This is where relying on the expertise of Navisite experts can make the process much smoother and, most importantly, keep your disaster recovery site clean and efficient in addition to constantly monitoring vital replication parameters.

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It's the rare organization that is "all cloud" or "all on-premises." Most organizations deploy applications and data across different combinations of public, private, and/or traditional on-premises implementations and are therefore deemed to be hybrid.

As was noted earlier, a hybrid cloud is not so much a different kind of cloud as it is a strategy for migrating to the cloud in situations when, for a variety of reasons, not all applications or workloads are deemed cloud-ready. The reality is that these reasons are numerous and varied, and that's why the hybrid cloud is often the de facto migration path to the cloud.

TYPICAL REASONS FOR GOING HYBRID

Some of the typical reasons for going hybrid include:

- A company has multiple locations or branch offices and wants to only shift some to the cloud.
- Certain applications can benefit from the cloud (e.g., the cloud's elasticity), while others are too outdated, critical, or fragile on-premises to make the transition.
- There is still too much residual value in certain legacy investments to transition them to the cloud, while others are at, near, or beyond the break-even point.
- An organization wants to shift only backup or disaster recovery resources to the cloud.
- A company previously tried to implement privately hosted cloud infrastructures and now wants to use those efforts as a starting point for more strategic hybrids.
- Applications differ in terms of seasonal use/scalability, storage requirements, etc.
- Addressing legal compliance concerns by keeping certain datasets and applications on-premises is likely to be an ongoing reason why hybrid cloud implementations are utilized.

HYBRID COMPLEXITY

While a hybrid cloud strategy makes sense, it is inevitably more complex than going all out to the cloud or staying completely on-premises:

- In a hybrid situation, IT manages varied application architectures and systems development processes scattered across multiple teams and enabled by different tools.
- Many of the efficiencies the cloud offers are undermined because of duplicate or underutilized infrastructure, inefficient maintenance and support structures, and complex processes for onboarding and chargeback.

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Hybrid Cloud (Cont.)

AZURE ADVANTAGES

Alone among public cloud providers, Azure was early to recognize that hybrid was the de facto migration path to the cloud and set about offering a range of services specifically designed to support hybrid cloud environments. In fact, hybrid support is a key reason why Azure has become such a popular public cloud choice for organization IT deployments.

A key advantage of Microsoft Azure is the consistency it delivers across cloud and on-premises environments—including application development, management, security, data, and identity.

No other cloud offers this level of comprehensive hybrid capabilities, that allows you to:

- Use the same virtual machines for Linux and Windows.
- Get the flexibility and rightsizing to run workloads on the most suitable platform and integrate with common security and service management systems.
- Provide tools to better manage operations and embed governance policies while staying flexible enough to take advantage of emerging technologies and platforms.
- Provide a common user experience for application and infrastructure teams.

Because hybrid cloud implementations pose unique challenges, many organizations rely on Navisite managed-cloud services to get it right.

Making the most of Azure capabilities for hybrid/multi-cloud deployments inevitably requires management and operational considerations that are organization-specific. This level of customization requires the help of engineers who have been down that road before—such help is available from an experienced Azure MCSP like Navisite.

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Almost from the day it was launched, Microsoft Azure became very popular among developers of Microsoft applications. It's easy to see why.

Let's say:

- You have a great idea for a new application or service, and you want to get it out the door as quickly as possible.
- You have already created some great applications and now want an easy way to move them from your servers to the cloud.

Start on any of these projects, and you can soon find yourself bogged down in a range of tedious “plumbing issues”—linking to a new SQL database, setting up push notifications to mobile devices, or adding search functionality.

Microsoft Azure PaaS capabilities help you address all these issues by giving you access to a wealth of prebuilt solutions that should bring those days of complicated “plumbing” to an end. PaaS on Azure handles most of the hosting, networking, infrastructure, and configuration tasks required in a traditional data center. For example, you no longer need to patch your virtual machines or manage virtual machine operating system health. Now you can focus on the pieces of your application that make it unique—the features that provide real added value for your users.

EFFICIENCIES FOR DEVELOPERS AND TESTERS

Typical efficiencies for developers and testers include

- Setting up environments much more quickly—creating environments that exactly match production in just a few clicks.
- Taking advantage of Azure integrations more easily, avoiding issues that can come up when production and development environments are not identical.
- Quickly self-provisioning assets and turning on a specific testing environment, meaning that less time is spent waiting for servers to install or for requests to be completed, or even for physical servers to be ordered and set up.

SIMPLIFYING MIGRATION

Azure offers an easier migration path for existing .NET-based applications via Azure Virtual Machines or Azure App Service, or by using Windows Containers in the cloud. Since Azure is built on Microsoft technologies, no major re-architecting effort is required to adapt and deploy existing applications to the cloud.

Azure App Service

Azure App Service is a fully managed compute platform-as-a-service (PaaS) that takes care of hosting your website or application and abstracting away the complexities of the operating system and infrastructure. You don't have to worry about administering the OS or framework patching. Scaling, availability, and deployment can be easily automated. Azure App Service is well suited for all ASP.NET websites and many WCF services.

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.NET to the Public Cloud (Cont.)

Azure Virtual Machines

Azure Virtual machines offer the easiest path for migrating an application from on-premises to the cloud: Lift-and-Shift existing applications from virtual machines that you run in your data center to VMs that run in Azure. Replicate the same environment your application uses on-premises. There are many predefined VM images that you can use, for instance, Windows Server 2016, which runs IIS and has ASP.NET installed and preconfigured on it. You can even bring your own software licenses if you already have them (for instance, one for SQL Server).

Windows Containers

You can run your applications in containers, which are very lightweight and start and stop in seconds. Containers are typically used for running a microservices architecture. This means that you can create many small services, each of which has a function and separate development and deployment life cycles. Containerize your existing web app using Windows Server Docker containers with minimal-to-no code changes.



PART 3:

How a Managed Cloud Service Provider Supports your Azure Migration



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Cloud computing has grown by leaps and bounds largely because of ease of entry.

Now, in just minutes and with just a credit card and a browser, one can get access to an array of IT resources—compute power, storage, application support, and more—that in the past, would have taken days, weeks, and even months to set up.

Unfortunately, that ease of entry has also led many organizations to give short shrift to the need to plan their cloud strategy. While an ad hoc or experimental cloud initiative can get underway with relatively little upfront work, that's not the case for a data center migration.

Plunging ahead without careful planning and a phased approach to execution is likely to lead to an inadequate cloud architecture that will ultimately prevent the organization from realizing the benefits that prompted the migration in the first place. The potential outcomes include significant negative impacts to business operations, service delivery, performance, and data protection requirements.

A key problem is that many organizations lack the skill sets to accurately assess, plan, and migrate workloads from legacy environments to the cloud. Those skills are in notoriously short supply—cloud/distributed computing regularly tops LinkedIn's annual list of the most in-demand IT skills. And, even though Azure is one of the most popular cloud platforms today, many IT professionals are unfamiliar with its wide range of services, particularly its newer ones, as Microsoft regularly adds new capabilities.

Even at organizations that have invested in assembling the right resources, an Azure implementation that requires valuable senior in-house IT staff to manage day-to-day demands inevitably takes away from tasks that align with strategic goals and revenue-enhancing projects.

Managed Cloud Service Providers can play a key role in addressing this skills shortage.

This section of the guide takes a look at exactly how an MCSP can support your migration and provides some more practical information that you can use on security, compliance, and ROI.

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ASSESSMENT AND PLANNING

The first step in migrating to the cloud involves getting a clear understanding of your applications, servers, VMs, and how you'll move them to the cloud.

While many workloads can run immediately on Azure without modification, others may have operational and application dependencies that will require further analysis.

Planning all of this and getting accurate cost comparisons can be challenging when you're estimating the load and cloud VM series type. Without automated analysis to map on-premises capacity to VM instance, your estimations may fall short, causing performance issues. Alternatively, your estimations may go too far, stretching your budget.

Our team of Azure experts will work with you to assess your applications and workloads for cloud readiness, determining what can and cannot be readily moved to a cloud environment and what delivery models can be utilized.

The key is to gain a full understanding of the impact of any move before the migration to Azure gets underway by taking actions such as:

- Mapping dependencies between applications (e.g., how do they share functions, data, and/or a user interface) and specific lines of business within your organization.
- Prioritizing apps based on their readiness and how mission-critical they are to your business. Rightsize any overutilized or underutilized resources.
- Addressing any security or privacy issues.
- Estimating the TCO of running applications in the cloud with accurate inputs on labor, infrastructure, tools, training, etc.

MIGRATION PLANNING

Once the discovery and assessment are complete, we will start preparing for the actual migration—the process of physically moving your workloads and applications (including data) to the cloud and planning to retire the on-premises versions.

Every organization requires a different approach. Once we've worked with you to determine which workloads will move to Azure, we will develop an application-centric migration plan based on:

- The application components being migrated, e.g., storage data, web servers, databases, single VMs, N-tier apps, entire data centers, etc.
- Whether this will be a Lift-and-Shift migration or will involve any degree of re-platforming or code factoring.
- Which Azure region(s) the applications will migrate to.

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- Whether the entire migration process will be automated or will be a combination of manual and scripted efforts.
- What will happen to existing software licenses during migration to Azure.
- Whether it is possible to make use of programs such as Azure Hybrid Use Benefit or License Mobility.

CONFIGURATION

The configuration step is crucial to the operations function of any Azure implementation. Configuring a cloud-powered IT environment requires the following:

- Managing the PCs and servers, keeping software up to date, setting configuration and security policies, monitoring system status, and managing employees' access to apps on the devices they choose.
- Updating the OS, software, and apps.
- Monitoring and remediating client devices for compliance purposes.
- Applying security patches, setting passwords, and remotely administering computers.
- Managing networks and the users/devices accessing them.
- Troubleshooting problems with connectivity and configuration.
- Tracking, logging, and reporting configuration changes.

MONITORING

Once live, we will keep you informed with a 360-degree view of your entire cloud infrastructure—including Azure and other private or public clouds. Navisite monitoring tools deliver:

- An aggregated view of your entire IT environments via personalized dashboards, providing the most relevant data to drive actionable insights.
- Historical performance and service metrics as well as deeper intelligence and analytics that support critical business decisions.
- API access for seamless integration into a client's core IT systems.

PROACTIVE MANAGEMENT

Proactive usage analytics anticipate future Azure infrastructure needs, allowing you to plan and smoothly scale up or down as required. We offer automated alerting to identify potential technical issues before they impact business processes.

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ITIL PROCESSES

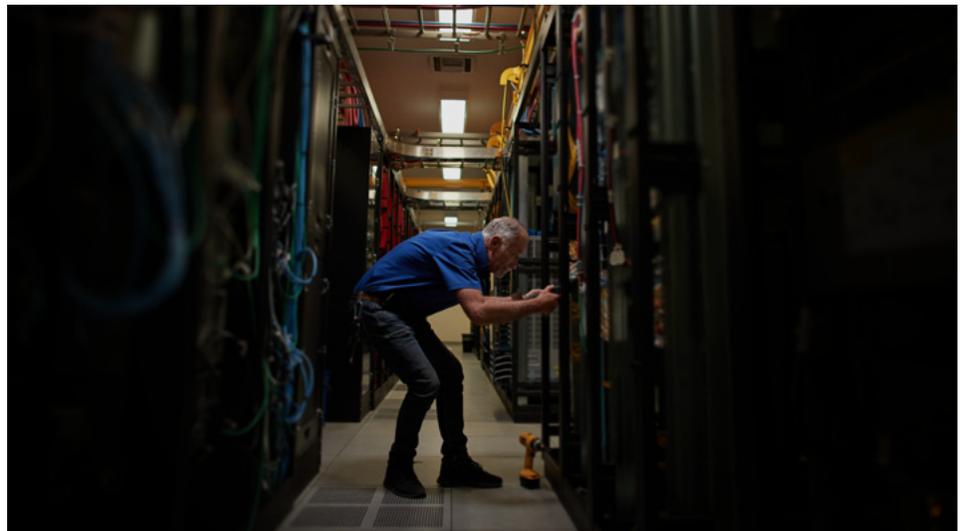
Successful IT operations have always been process-driven, and a migration to the Azure cloud is no different.

The enhanced “speed of business” that the cloud makes possible, faster service rollouts, and shorter service life cycles increase the need for well-honed processes. It is possible to achieve these processes by actively following guidelines based on the Information Technology Infrastructure Library, which is commonly known as ITIL.

ITIL identifies five phases of the IT services life cycle:

- 1 Setting the Strategy**—defining the market and customer requirements.
- 2 Designing the Service**—setting KPIs for security, service continuity, capacity, and availability.
- 3 Transitioning the Service**—establishing expectations and adapting in real time.
- 4 Operations**—maintaining service levels and achieving the goals set in phase one (and doing so as cost-effectively as possible).
- 5 Continuous Service Improvement**—tracking performance levels and adapting accordingly.

While ITIL was developed in the pre-cloud world, following ITIL guidelines is still critical today. Navisite’s in-depth experience with ITIL processes is a key factor in our successful track record of Azure migrations and a primary reason why Microsoft has designated Navisite as an Azure Center of Excellence.



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As noted in the introduction of this guide, the public cloud is growing fast because it offers an unbeatable value proposition: enabling organizations to achieve lower IT costs AND become more agile and competitive.

For years, CIOs and other IT executives resisted this value proposition, often because of security concerns. Now the situation is completely reversing: CIOs and IT executives are moving to the public cloud to achieve better security.

What has been happening in the cloud market is a bit like what has taken place in the automobile industry. Like carmakers that use safety as a selling feature, public cloud providers now regularly tout their security investments to get more organizations to pursue cloud migration strategies.

Microsoft Azure invests some \$1 billion annually in security measures according to Ann Johnson,¹⁵ a vice president in Microsoft's enterprise cybersecurity group. As a result, she argues, the cloud has democratized cybersecurity, giving both the well-heeled and the resource-constrained access to the same powerful security tools.

Where cars are concerned, safety features that were once only found in luxury auto brands (think anti-lock brakes and blind spot control) have made their way into more affordable models. The same thing is happening with respect to the cloud with things like identity control and encryption.

Does that mean you are 100% safe in the cloud? Of course not. Microsoft Azure and other leading providers of cloud services—including Amazon Web Services and Salesforce—have all experienced unplanned outages. And the growing concentration of IT services in the hands of a smaller number of providers is itself a risk that didn't exist previously. According to Cloud Down, an in-depth report that Lloyd's of London and the catastrophic risk modeler, AIR Worldwide, prepared, a cyber incident that took a top-three cloud provider offline in the US for 3-6 days would result in losses of nearly \$18 billion, only a fraction of which insurance would cover.¹⁶

However at the micro-level—that is, the individual-organization level—a growing body of data and expert opinions argues that migrating to the cloud is a safer bet than staying put in your own data center.

MORE INVESTMENT IN PUBLIC CLOUD

For starters, in every industry today—including highly regulated, compliance-oriented sectors such as healthcare, law, and government—companies are voting with their pocket books and migrating to the cloud, specifically the public cloud. These are the very same companies that, in the past, might have implemented cloud computing strategies that maximized their own control, e.g., hybrid cloud or private cloud strategies or limiting themselves to cloud storage or cloud backup.

¹⁵ <http://ww2.cfo.com/the-cloud/2018/05/cloud-security-thunder-cloud/>

¹⁶ Cloud Down, Lloyd's of London.

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Now those older, limited, security-driven cloud migration strategies are giving way to the full embrace of public cloud options.

According to the 2018 RightScale State of the Cloud Report, IT professionals now have greater faith in the cloud than ever before. RightScale found that “among enterprise central IT teams, who typically have the most responsibility for security, there has been a significant decline in security concerns among this group over the last few years.”

According to IT analyst, Gartner, through 2020, organizations that are running workloads in the public cloud (e.g., migrating applications to Azure) will see at least 60% fewer security incidents than those in traditional data centers. “CIOs need to ensure their security teams are not holding back cloud initiatives with unsubstantiated cloud security worries,” says Jay Heiser, the Research Vice President at Gartner. “Exaggerated fears can result in lost opportunity and inappropriate spending.”¹⁷

The software and cloud-services provider, Oracle,¹⁸ says flatly that, when you make an apples-to-apples comparison of security in a traditional, enterprise-operated data center and security in the cloud, the cloud consistently comes out on top. According to Oracle, inconsistent patching and insufficient encryption in traditional data centers create needless risks. Cloud providers with comprehensive security management—including the ability to autonomously detect and fix vulnerabilities, encrypt data, and conduct regular patches throughout the stack—are far more reliable.

CLOUD MIGRATION CHECKLIST

So users are voting with their investments, and analysts are voting with their expert opinions. As you pursue a migrating-to-the-cloud-strategy, here are a few key considerations:

- **Understand Your Shared Responsibility:** Making the decision in favor of migrating to the cloud doesn't mean that you have offloaded all your risk to the cloud services provider. Most cloud providers (including Azure) operate under the “shared responsibility” approach, meaning that both the provider and the customer are responsible for security. You are likely responsible for the data that is being stored outside your business, which, in the event of a breach, makes you the most liable for any third-party damages or compliance penalties.
- **Access Controls:** While your data and applications may be in the cloud, you control user access. And this is your most significant point of vulnerability. Through 2022, according to Gartner, at least 95% of cloud security failures will be the customer's fault. IT should look to the “principle of least privilege” by configuring read and write permissions so they are granted only to those who need them. Enforce multi-factor authentication (MFA) to help ensure people are who they say they are.

¹⁷ Gartner, Is the Cloud Secure, <https://www.gartner.com/smarterwithgartner/is-the-cloud-secure/>

¹⁸ <https://www.oracle.com/assets/2018-cloud-predictions-4242085.pdf?intcmp=ocom-hp-apac-0118>

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- **A Holistic Management View:** A provider of cloud infrastructure services is responsible for the reliable, efficient, and secure performance of the hardware, but you are ultimately responsible for making sure your guest operating systems are fully patched and compliant with security baselines. Experts advise using a single management platform to get a holistic view of security across all environments. Microsoft Azure, for example, provides management tools for looking across all cloud and on-premises systems. Also, consider turning off virtual machines that are no longer in use to prevent an attacker from getting inside an under-monitored cloud VM then moving around inside the cloud infrastructure to plunder more lucrative targets. Doing this can also cut down on unnecessary costs.

SECURITY AND COMPLIANCE IN AZURE

Azure offers a wide range of services to ensure security, privacy, compliance, and transparency. Products in this portfolio include Azure Security Center, Azure Key Vault, Azure Active Directory for identity and access management, Operations Management Suite, and Web Application Firewall (WAF). Azure Security Center facilitates preventing, detecting, and responding to the security vulnerabilities of environments deployed in Azure. It also has built-in advanced threat detection, behavior analysis, crash analysis, and anomaly detection to provide enterprise-class security without using third-party products.

Azure's disk encryption feature is linked to its Hardware Security Module (HSM) service, Key Vault for key management, and Azure Active Directory, which is mandatory for certain corporate compliance requirements.

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The GDPR is a landmark data privacy law and will likely be the harbinger of more regulations in the U.S. and other countries.

It is important to note that, while the GDPR was enacted in Europe, it impacts ANY organization that has even a single European Union resident as a customer or employee (even if the individual is in the U.S.).

The GDPR poses special challenges for any organization that makes extensive use of personal information and financial information.

Failure to comply with the GDPR requirements can result in fines of up to 4% of a company's annual revenue or 20 million EUR, whichever is greater, in addition to devastating the company's reputation and the possibility of further regulatory and enforcement actions. Gartner predicts that, by the end of 2018, more than 50% of companies that the GDPR affects will still NOT be in full compliance with its requirements.¹⁹

The GDPR has put in place a wide range of protections regarding personal data:

- **Access:** Giving individuals access to any data on file about them, including data records, recordings, transcripts of recordings, screen captures, browsing history, surveys—the GDPR covers virtually any data of any kind about an interaction.
- **Control:** Individuals can ask to have their data changed (the right of rectification), erased (the right to be forgotten), or transferred to another entity (data portability).
- **Consent:** Personal data can only be processed/recorded on a lawful basis, for instance, with the individual's consent. If consent is the lawful basis upon which the data is captured, the consent must be explicitly given.
- **Design:** Organizations are required to encrypt data, provide notice of any breaches within 72 hours, and restrict the range of internal access to personal records.

HOW AZURE SUPPORTS GDPR COMPLIANCE

Options that Azure makes available can streamline and simplify compliance and decrease exposure to penalties for noncompliance.

Azure was the first cloud service provider to enter into a contractual commitment to meet the requirements of the GDPR. Moreover, Azure has more compliance coverage than AWS, with 70 compliance offerings. FedRAMP authorization is yet another example of Azure's edge over AWS in compliance. Azure has 38 services with FedRAMP High authorization, while AWS has only 21 services in the same category. The availability of Azure services in many regions helps to meet geographical data compliance requirements such as those included in the GDPR.

¹⁹ Gartner Says Organizations Are Unprepared for the 2018 European Data Protection Regulation, <https://www.gartner.com/newsroom/id/3701117>

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Since its formal release in 2010, Microsoft Azure has emerged as a leading option for organizations looking to migrate infrastructure and applications to the cloud. It is important to determine how exactly your organization will benefit from Azure in terms of:

- Increased revenue opportunities and profits.
- Improved production efficiency.
- Reduced IT costs.

You can find the answers in an in-depth Total Economic Impact™ (TEI) study of Azure IaaS by the IT analyst firm, Forrester.²⁰

The Forrester TEI study is based on extensive research on the behavior of actual Azure users combined with risk-adjusted estimates of benefits that Forrester calculated using its proprietary TEI methodology. The result is one of the most complete pictures you will find anywhere of how you can enhance your business by migrating to Azure IaaS.

For example, based on interviews with users, Forrester estimated how much data centers could lower costs by “Lifting-and-Shifting” workloads to Azure or reducing the fees they paid for the IT outsourcing services that solution integrators provided. It then applied its TEI methodology to make a risk-adjusted estimate of the resulting financial savings over a five-year period. Forrester used the same approach when looking at the impact of business process reengineering opportunities, increased profits through better use of web technology, and improvements to development and test environments.

The result is both a financial and tactical roadmap to Azure benefits that should be helpful to decision-makers in IT, finance, and individual business units.

To develop its TEI study of Azure IaaS, Forrester relied on information gathered through a series of in-depth interviews with top executives at existing Azure users then created a composite picture of a hypothetical global manufacturer (named MultiGlobal) with 25,000 employees and \$4 billion in annual revenue.

²⁰ Forrester, The Total Economic Impact™ of Microsoft Azure IaaS.

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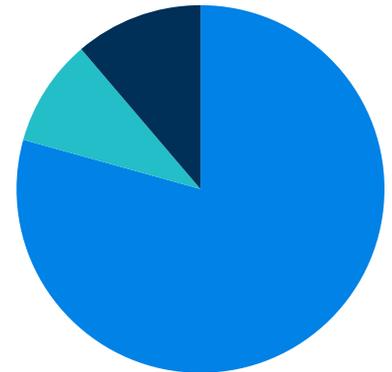
A Roadmap to the Savings and Productivity Benefits of Azure (Cont.)

QUANTIFIED BENEFITS

Key findings were

- **Reduction in Data Centers and IT Services:** MultiGlobal was able to easily migrate server workloads to the Azure cloud, reducing its data center footprint by over half and significantly cutting its reliance on IT outsourcing services. The present value of the total savings over five years was nearly \$22 million—79.3% of the total savings achieved by migrating to Azure
- **Business Process Reengineering:** Forrester estimated that relying on Azure IaaS would open the door to more streamlined processes. It cited the example of a manufacturing firm that was interviewed and that eliminated the need to provide clients with production samples during the pre-order process. The firm replaced them with a digital review. The savings amounted to \$2.75 million over five years—just under 10% of the total savings.
- **Increased Income:** Thanks to improved prototyping and faster time to market, Forrester estimated a rise in organization sales—including income from more numerous and larger web transactions—at \$2.9 million—about 11% of the total overall benefit

Savings (M)



- Reduction in Data Centers and IT Services 79%
- Increased Income 11%
- Business Process Reengineering 10%

UNQUANTIFIED BENEFITS

Forrester also described a range of benefits that were not included in its calculations, including

- The ability to more flexibly and easily pilot new technologies with little or no upfront investment. (The report cited a user that tested out Hadoop functionality, which would have been cost prohibitive to do using on-premises technology.)
- Improvements to the development, testing, and quality assurance processes.
- Using Azure integrations to streamline incompatibilities between the production and development environments.
- Speeding up developer self-provisioning.
- Reducing time to market for both client and internal projects.
- Using existing IT resources to manage all the workloads, including those that outside providers previously managed. Without Azure, one organization estimated it would have needed to double its IT resources headcount.
- Workload and service rightsizing and right-timing (e.g., turning off some services during quiet hours).
- Saving 25 hours in application testing and development time per application created or updated, thus improving developer productivity.

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**APPENDIX: LIST OF
AZURE SERVICES**

The wide-scale migration to the public cloud is a turning point in the world of business and IT. Like all significant events, it presents opportunities and challenges.

For many organizations, the single biggest challenge will be successfully adopting a “cloud mindset.”

When any major transition is underway, one of the biggest mistakes is to view the new world that is coming into focus through the same lens or perspective that was used in the past. When the change is really big—and the move to the public cloud really is—that’s neither possible nor effective.

The cloud is not just a different place in which to house your IT. It’s not simply a faster, more efficient, less expensive version of how IT was managed before. The cloud introduces entirely new ways of thinking about the role of IT in today’s organization, and entirely new ways to drive business efficiencies and effectiveness.

The ability to “fly your plane while building it”—to rapidly develop, test, and deploy new services without having to first tear down or build up infrastructures—is a radical change that is already completely transforming the competitive dynamics in a wide range of industries and markets.

Enlisting the support of a managed cloud service provider like Navisite to streamline and support the migration to the cloud can be the most significant step that any organization takes to free up the resources needed to fully embrace the possibilities of the cloud.

As an experienced cloud provider with extensive experience in Azure migrations, Navisite stands ready to provide the critical support needed to make your cloud transition a success.

For more information, call (888) 298-8222 or [click here](#).

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AI + MACHINE LEARNING

Machine Learning Service: Bring AI to everyone with an end-to-end, scalable, trusted platform with experimentation and model management

Machine Learning Studio: Easily build, deploy, and manage predictive analytics solutions

Azure Databricks: Fast, easy, and collaborative Apache Spark-based analytics platform

Azure Batch AI: Easily experiment and train your deep learning and AI models in parallel and at scale

Azure Bot Service: Intelligent, serverless bot service that scales on demand

Microsoft Genomics: Power genome sequencing and research insights

Cognitive Services: Add smart API capabilities to enable contextual interactions

Azure Search: Fully managed search-as-a-service

Bing Autosuggest: Give your app intelligent autosuggest options for searches

Bing Custom Search: An easy-to-use, ad-free, commercial-grade search tool that lets you deliver the results you want

Bing Entity Search: Enrich your experiences by identifying and augmenting entity information from the web

Bing Image Search: Search for images and get comprehensive results

Bing News Search: Search for news and get comprehensive results

Bing Spell Check: Detect and correct spelling mistakes in your app

Bing Video Search: Search for videos and get comprehensive results

Bing Web Search: Get enhanced search details from billions of web documents

Computer Vision: Distill actionable information from images

Content Moderator: Automated image, text, and video moderation

Custom Vision: Easily customize your own state-of-the-art computer vision models for your unique use case

Emotion: Personalize user experiences with emotion recognition

Face: Detect, identify, analyze, organize, and tag faces in photos

Language Understanding: Teach your apps to understand commands from your users

Linguistic Analysis: Simplify complex language concepts and parse text with the Linguistic Analysis API

QnA Maker: Distill information into conversational, easy-to-navigate answers

Speaker Recognition: Use speech to identify and verify individual speakers

Text Analytics: Easily evaluate sentiment and topics to understand what users want

Translator Text: Easily conduct machine translation with a simple REST API call

²¹ <https://azure.microsoft.com/en-us/services/>

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APPENDIX: List of Azure Services (Cont.)

AI + MACHINE LEARNING (CONT.)

Video Indexer: Unlock video insights

Web Language Model: Use the power of predictive language models trained on web-scale data

Data Science Virtual Machines: Rich preconfigured environment for AI development

ANALYTICS

Stream Analytics: Processing of real-time data stream from millions of IoT devices

SQL Data Warehouse: Elastic data warehouse-as-a-service with enterprise-class features

Azure Databricks: Fast, easy, and collaborative Apache Spark-based analytics platform

HDInsight: Provision cloud Hadoop, Spark, R Server, HBase, and Storm clusters

Data Factory: Hybrid data integration at organizational scale made easy

Data Lake Analytics: Distributed analytics service that makes big data easy

Event Hubs: Receive telemetry from millions of devices

Power BI Embedded: Embed fully interactive, stunning data visualizations in your applications

Azure Analysis Services: Enterprise-grade, analytics engine-as-a-service

Apache Spark for Azure HDInsight: Apache Spark in the cloud for mission-critical deployments

Apache Storm for HDInsight: Real-time stream processing made easy for big data

R Server for HDInsight: Predictive analytics, machine learning, and statistical modeling for big data

Data Catalog: Get more value from your organization data assets

Azure Data Lake Storage: Massively scalable data lake storage

Azure Data Explorer: Fast and highly scalable data exploration service

COMPUTE

Virtual Machines: Provision Windows and Linux virtual machines in seconds

App Service: Quickly create powerful cloud apps for web and mobile

Functions: Process events with serverless code

Batch: Cloud-scale job scheduling and compute management

Container Instances: Easily run containers on Azure without managing servers

Azure Batch AI: Easily experiment and train your deep learning and AI models in parallel and at scale

Service Fabric: Develop microservices and orchestrate containers on Windows or Linux

Virtual Machine Scale Sets: Manage and scale up to thousands of Linux and Windows virtual machines

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APPENDIX: List of Azure Services (Cont.)

COMPUTE (CONT.)

Azure Kubernetes Service (AKS): Simplify the deployment, management, and operations of Kubernetes

Cloud Services: Create highly available, infinitely scalable cloud applications and APIs

Web Apps: Quickly create and deploy mission-critical web apps at scale

Mobile Apps: Build and host the backend of any mobile app

API Apps: Easily build and consume cloud APIs

Linux Virtual Machines: Provision virtual machines for Ubuntu, Red Hat, and more

SQL Server on Virtual Machines: Host organization SQL Server apps in the cloud

SAP HANA on Azure Large Instances: Run the largest SAP HANA workloads of any hyperscale cloud provider

Azure CycleCloud: Create, manage, operate, and optimize HPC and big compute clusters of any scale

CONTAINERS

App Service: Quickly create powerful cloud apps for web and mobile

Batch: Cloud-scale job scheduling and compute management

Container Registry: Store and manage container images across all types of Azure deployments

Container Instances: Easily run containers on Azure without managing servers

Service Fabric: Develop microservices and orchestrate containers on Windows or Linux

Azure Kubernetes Service (AKS): Simplify the deployment, management, and operations of Kubernetes

Web Apps: Quickly create and deploy mission-critical web apps at scale

Mobile Apps: Build and host the backend of any mobile app

API Apps: Easily build and consume cloud APIs

Web App for Containers: Easily deploy and run containerized web apps that scale with your business

DATABASES

Azure SQL Database: Managed relational SQL database-as-a-service

Azure Cosmos DB: Globally distributed multi-model database for any scale

SQL Data Warehouse: Elastic data warehouse-as-a-service with enterprise-class features

Data Factory: Hybrid data integration at organization scale made easy

Redis Cache: Power applications with high-throughput, low-latency data access

SQL Server Stretch Database: Dynamically stretch on-premises SQL Server databases to Azure

SQL Server on Virtual Machines: Host organization's SQL Server apps in the cloud

Table Storage: NoSQL key-value store using semi-structured datasets

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APPENDIX: List of Azure Services (Cont.)

DATABASES ((CONT.))

Azure Database for PostgreSQL: Managed PostgreSQL database service for app developers

Azure Database for MariaDB: Managed MariaDB database service for app developers

Azure Database for MySQL: Managed MySQL database service for app developers

Azure Database Migration Service: Simplify on-premises database migration to the cloud

DEVELOPER TOOLS

Visual Studio: The powerful and flexible environment for developing applications in the cloud

Visual Studio Code: A powerful, lightweight code editor for cloud development

SDKs: Get the SDKs and command-line tools you need

Azure DevOps: Services that allow teams to share code, track work, and ship software

CLIs: Build, deploy, diagnose, and manage multi-platform, scalable apps and services

Azure Pipelines: Continuously build, test, and deploy to any platform and cloud

Azure Lab Services: Set up labs for classrooms, trials, development and testing, and other scenarios

Azure DevTest Labs: Quickly create environments using reusable templates and artifacts

Developer Tool integrations: Use the development tools you know—including Eclipse, IntelliJ, and Maven—with Azure

DEVOPS

Azure DevOps: Services that allow teams to share code, track work, and ship software

Azure Pipelines: Continuously build, test, and deploy to any platform and cloud

Azure Boards: Plan, track, and discuss work across your teams

Azure Repos: Get unlimited, cloud-hosted private Git repos for your project

Azure Artifacts: Create, host, and share packages with your team

Azure Test Plans: Test and ship with confidence with a manual and exploratory testing toolkit

Azure DevTest Labs: Quickly create environments using reusable templates and artifacts

DevOps Tool Integrations: Use your favorite DevOps tools with Azure

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APPENDIX: List of Azure Services (Cont.)

IDENTITY

Azure Active Directory: Synchronize on-premises directories and enable single sign-on

Azure Information Protection: Better protect your sensitive information—anytime, anywhere

Azure Active Directory Domain Services: Join Azure virtual machines to a domain without domain controllers

Azure Active Directory B2C: Consumer identity and access management in the cloud

INTEGRATION

Event Grid: Get reliable event delivery at massive scale

Logic Apps: Automate the access and use of data across clouds without writing code

API Management: Publish APIs to developers, partners, and employees securely and at scale

Service Bus: Connect across private and public cloud environments

INTERNET OF THINGS

IoT Hub: Connect, monitor, and manage billions of IoT assets

IoT Edge: Extend cloud intelligence and analytics to edge devices

IoT Central: Experience the simplicity of SaaS for IoT, no cloud expertise required

IoT Solution Accelerators: Create fully customizable solutions with templates for common IoT scenarios

Azure Sphere: Securely connect MCU-powered devices from the silicon to the cloud

Time Series Insights: Explore and analyze time-series data from IoT devices

Azure Maps: Simple and secure location APIs provide geospatial context to data

Functions: Process events with serverless code

Event Grid: Get reliable event delivery at massive scale

Windows 10 IoT Core Services: Long-term OS support and services to manage device updates and assess device health

Machine Learning Service: Bring AI to everyone with an end-to-end, scalable, trusted platform with experimentation and model management

Machine Learning Studio: Easily build, deploy, and manage predictive analytics solutions

Stream Analytics: Processing of real-time data stream from millions of IoT devices

Logic Apps: Automate the access and use of data across clouds without writing code

Notification Hubs: Send push notifications to any platform from any backend

Azure Cosmos DB: Globally distributed, multi-model database for any scale

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APPENDIX: List of Azure Services (Cont.)

INTERNET OF THINGS (CONT.)

API Management: Publish APIs to developers, partners, and employees securely and at scale

Azure Digital Twins: Build next-generation IoT spatial intelligence solutions

MANAGEMENT AND GOVERNANCE

Azure Backup: Simple and reliable server backup to the cloud

Azure Site Recovery: Orchestrate protection and recovery of private clouds

Azure Advisor: Your personalized Azure best practices recommendation engine

Scheduler: Run your jobs on simple or complex recurring schedules

Automation: Simplify cloud management with process automation

Traffic Manager: Route incoming traffic for high performance and availability

Azure Monitor: Highly granular and real-time monitoring data for any Azure resource

Network Watcher: Network performance monitoring and diagnostics solution

Azure Service Health: Personalized guidance and support for when issues in Azure services affect you

Microsoft Azure Portal: Build, manage, and monitor all Azure products in a single, unified console

Azure Resource Manager: Simplify how you manage your app resources

Cloud Shell: Streamline Azure administration with a browser-based shell

Azure Mobile App: Stay connected to your Azure resources—anytime, anywhere

Azure Policy: Implement corporate governance and standards at scale for Azure resources

Cost Management: Optimize what you spend on the cloud while maximizing cloud potential

Azure Managed Applications: Simplify management of cloud offerings

Azure Migrate: Easily discover, assess, rightsize, and migrate your on-premises VMs to Azure

Azure Blueprints: Enable quick, repeatable creation of governed environments

MEDIA

Media Services: Encode, store, and stream video and audio at scale

Encoding: Studio-grade encoding at cloud scale

Live and On-demand Streaming: Deliver content to virtually all devices with scale to meet business needs

Azure Media Player: A single layer for all your playback needs

Content Protection: Securely deliver content using AES, PlayReady, Widevine, and Fairplay

Media Analytics: Uncover insights from video files with speech and vision services

Video Indexer: Unlock video insights

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APPENDIX: List of Azure Services (Cont.)

MIGRATION

Azure Site Recovery: Orchestrate protection and recovery of private clouds

Cost Management: Optimize what you spend on the cloud while maximizing cloud potential

Azure Database Migration Service: Simplify on-premises database migration to the cloud

Azure Migrate: Easily discover, assess, rightsize, and migrate your on-premises VMs to Azure

Data Box: Secure, ruggedized appliance for Azure data transfer

MOBILE

App Service: Quickly create powerful cloud apps for web and mobile

Azure Maps: Simple and secure location APIs provide geospatial context to data

Notification Hubs: Send push notifications to any platform from any backend

Web Apps: Quickly create and deploy mission-critical web apps at scale

Mobile Apps: Build and host the backend of any mobile app

API Apps: Easily build and consume cloud APIs

Azure Mobile App: Stay connected to your Azure resources—anytime, anywhere

Visual Studio App Center: Ship apps faster by automating application life cycles

Xamarin: Create cloud-powered mobile apps faster

Web App for Containers: Easily deploy and run containerized web apps that scale with your business

NETWORKING

Content Delivery Network: Ensure secure, reliable content delivery with broad global reach

ExpressRoute: Dedicated private network fiber connections to Azure

Azure DNS: Host your DNS domain in Azure

Virtual Network: Provision private networks, optionally connect to on-premises data centers

Traffic Manager: Route incoming traffic for high performance and availability

Load Balancer: Deliver high availability and network performance to your applications

VPN Gateway: Establish secure cross-premises connectivity

Application Gateway: Build secure, scalable, and highly available web frontends in Azure

Azure DDoS Protection: Protect your applications from distributed denial-of-service (DDoS) attacks

Network Watcher: Network performance monitoring and diagnostics solution

Azure Firewall: Native firewalling capabilities with built-in high availability, unrestricted cloud scalability, and zero maintenance

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APPENDIX: List of Azure Services (Cont.)

NETWORKING (CONT.)

Virtual WAN: Optimize and automate branch-to-branch connectivity through Azure

Azure Front Door Service: Scalable, security-enhanced delivery point for global, microservice-based web applications

SECURITY

Azure Active Directory: Synchronize on-premises directories and enable single sign-on

Azure Information Protection: Better protect your sensitive information—anytime, anywhere

Azure Active Directory Domain Services: Join Azure virtual machines to a domain without domain controllers

Key Vault: Safeguard and maintain control of keys and other secrets

Security Center: Unify security management and enable advanced threat protection across hybrid cloud workloads

VPN Gateway: Establish secure, cross-premises connectivity

Application Gateway: Build secure, scalable, and highly available web frontends in Azure

Azure DDoS Protection: Protect your applications from distributed denial-of-service (DDoS) attacks

Azure Advanced Threat Protection: Detect and investigate advanced attacks on-premises and in the cloud

STORAGE

Storage: Durable, highly available, and massively scalable cloud storage

Azure Backup: Simple and reliable server backup to the cloud

StorSimple: Lower costs with an enterprise hybrid cloud storage solution

Azure Data Lake: Massively scalable data lake storage

Blob Storage: REST-based object storage for unstructured data

Disk Storage: Persistent, secured disk options supporting virtual machines

Managed Disks: Persistent, secured disk storage for Azure virtual machines

Queue Storage: Effectively scale apps according to traffic

File Storage: File shares that use the standard SMB 3.0 protocol

Data Box Secure: Ruggedized appliance for Azure data transfer

Storage Explorer: View and interact with Azure Storage resources

Archive Storage: Industry-leading price point for storing rarely accessed data

Azure NetApp Files: Powerful hybrid network file system (NFS) file shares

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APPENDIX: List of Azure Services (Cont.)

WEB

App Service: Quickly create powerful cloud apps for web and mobile

Content Delivery Network: Ensure secure, reliable content delivery with broad global reach

Notification Hubs: Send push notifications to any platform from any backend

API Management: Publish APIs to developers, partners, and employees securely and at scale

Azure Search: Fully managed search-as-a-service

Web Apps: Quickly create and deploy mission-critical web apps at scale

Mobile Apps: Build and host the backend of any mobile app

API Apps: Easily build and consume cloud APIs

Web App for Containers: Easily deploy and run containerized web apps that scale with your business

Azure SignalR Service: Add real-time web functionalities easily