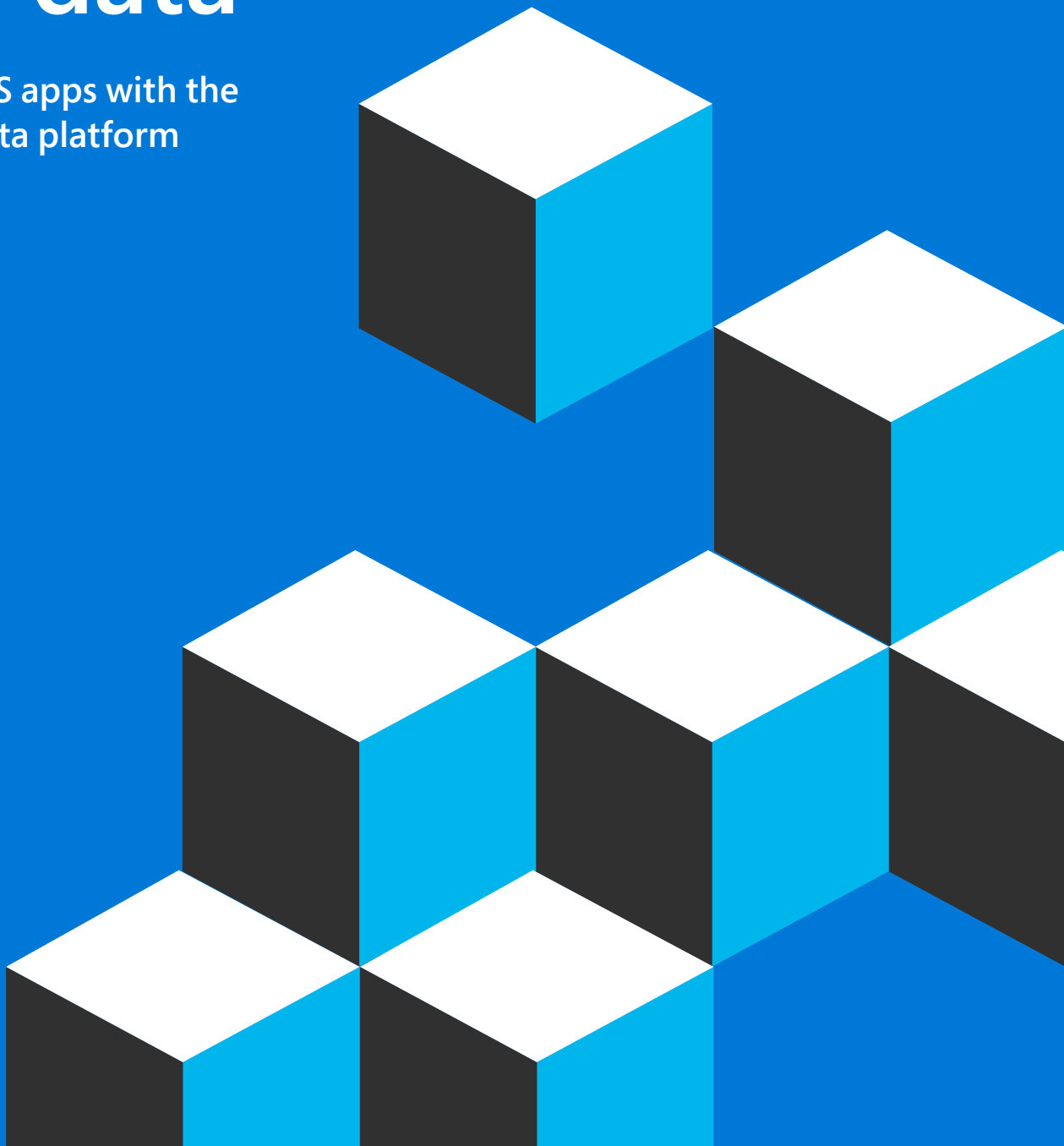
Azure e-book series

Microsoft

Five steps to modernizing your data

Creating SaaS apps with the Microsoft data platform



This guide to data modernization and creating SaaS apps tackles common issues driving you to consider a transition to SaaS.

Whether it's scalability, availability, security, globalization, or something else, you're under pressure to respond to customer demand for cutting-edge capabilities and lower TCO. At the same time, you need to reach new customers, differentiate your product, streamline your sales cycle, grow your revenues, and improve your margins. All of these are areas where the Microsoft data platform can help, and this e-book provides practical pathways forward.

Who should read this e-book

We wrote this e-book for software providers who are looking to make the transition from traditional on-premises or self-hosted solutions to modern SaaS apps. It includes ways to modernize your data platform as the first step in your move to SaaS, the role of the cloud and what you should look for from a cloud provider, key database requirements for multitenant SaaS apps, and how you can personalize the experience to delight customers in compelling new ways.

Are you ready for the move to SaaS?

When you're in the software business, your resources can be spread pretty thin. You like to stay focused on building great software, but there are always distractions—from supporting sales opportunities to assisting with customer deployments and troubleshooting existing installations. With so much time spent maintaining the status quo, few cycles remain for modernizing your technology, streamlining internal operations, delivering new customer value, and broadening your customer base.

More likely than not, your offerings are based on an on-premises approach, forcing you and your customers to spend considerable time on essential requirements like infrastructure, scalability, availability, and security. Today, you still must deliver on those essentials, but the solutions you're building—or, more accurately, the solutions you want to be building—need to do a lot more: support millions of users, span the globe, make sense of petabytes of data, and wow users in new ways.

At the same time, your customers want to minimize TCO, which is why more and more of them are choosing software as a service (SaaS) over traditional, on-premises deployments.

The Shift to SaaS: A high-value opportunity for ISVs, a paper by Keystone Research, frames the situation well: "SaaS represents an opportunity for ISVs to fundamentally transform their business …. The market for software is quickly changing to demand this mode of delivery, as software buyers start considering total ownership costs, ease of use, and flexibility in their purchase decisions. ISVs need to prepare for such a transition."[1]

Given that more and more software buyers are looking to SaaS solutions, how can you transform your business to meet that demand—and while you're at it, deliver new customer value? That's where the Microsoft data platform can help.

1 See https://content.microsoft.com/isv-keystone-saas

This paper examines five of the most common issues that you're likely to face in making the transition to SaaS and maps them to the Microsoft data platform offerings you might want to consider as a starting point.

Modernizing your data environment—as required to make your own move to the cloud or to simply do more with your existing on-premises app

Choosing a proven cloud platform that can help you deliver on the essentials, such as scalability and availability, so that you can focus more of your resources on delivering new value

Building a multitenant SaaS app that can effectively deliver the same services to hundreds or thousands of customers—while ensuring that they can't see one another's data

Achieving global reach with your app, such as delivering fast, real-time recommendations to users across multiple countries and regions

Ensuring security and compliance, regardless of what you're building in the cloud

Like most software companies, you have an existing software stack and skill set, and want to use what works best for you, without discarding what you already have or compromising how your team works. With the Microsoft data platform, it's easy to delight users in compelling new ways while using your preferred data engine and the languages, frameworks, and tools of your choice. Read on to discover how to unlock the full potential of your data—and your potential for business success—wherever it lives, in whatever form it currently resides.

Many ways to modernize

For many providers of on-premises software, the modernization of existing environments is a necessary early step in the move to SaaS. After all, you'll likely need to re-architect your apps to support your new business model. By modernizing your environment, you'll be able to do that faster and more flexibly. Do it right and you'll also streamline application delivery and enable yourself to build "smarter" apps that improve the customer experience.

Data is often the driver for such modernization: there's more and more of it; it needs to be analyzed faster than ever; and it's coming in more and more forms—including unstructured formats that legacy relational database systems just aren't built to handle.

Before moving on, let's address the elephant in the room: the cloud.

It's what's driving your customers to SaaS, and it's here to stay. And for good reason.

It provides powerful economies of scale, global reach, freedom from the hassles of maintaining physical infrastructure, and access to powerful new technologies like artificial intelligence (AI), which would be difficult to bring in-house. It's for all these reasons and more that your customers are turning to the cloud in the first place.

So why not make the most of the cloud? If you're considering SaaS, then by definition, the cloud already plays a role as your means of application delivery. Sure, you could host a SaaS app in your own datacenter, as some companies do. But do you really want to maintain your own physical infrastructure, patch your own servers, manage your own backups, and pay for new compute and storage capacity well before it may ever be needed? After all, your customers are abandoning on-premises deployment so they can focus on delivering greater customer value instead of deploying and maintaining servers. Maybe you should too. You don't need to make this leap today, as a first step. But more likely than not, sooner or later, the cloud will play a role—and that role will grow over time.

Plotting a course to data modernization

Now let's look at how you can modernize your data environment as part of your transition to SaaS and—if you're not ready to make your own move to the cloud just yet—what you can do to ensure that you'll be successful when you're ready to do so. Regardless of the technology stack you're on today and the speed at which you want to move, the Microsoft data platform provides a path forward.

If you have a packaged, on-premises app based on Microsoft SQL Server or Oracle, there are several paths you can take.

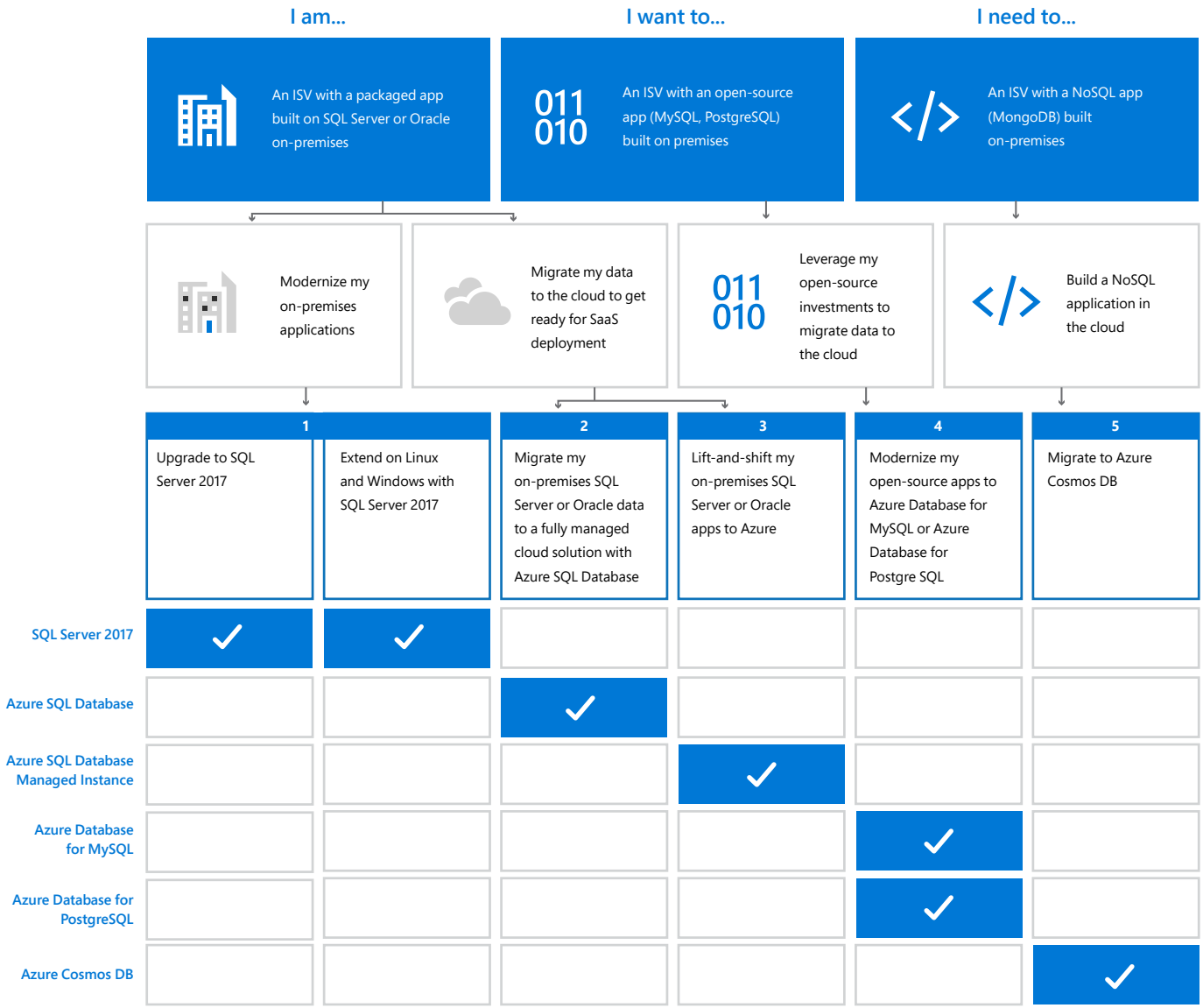


Figure 1. Regardless of your starting point, the Microsoft data platform provides a path to data modernization.

If you're not ready for the cloud yet, you can upgrade (or extend) your existing database to SQL Server 2017. It runs on Windows or Linux and supports your choice of programming languages, including T-SQL, Java, C/C++, C#/Visual Basic .NET, PHP, Node.js, Python, and Ruby. SQL Server 2017 provides industry-leading performance,[2] delivers unmatched security,[3] and is the only commercial database with AI built-in—all at one-tenth the cost of Oracle.[4]

If you're ready make your move to the cloud, you can migrate to Azure SQL Database, an intelligent cloud database for application developers. It shares a code base with SQL Server 2017, so you get the same powerful technologies—including your choice of tools and platforms, automatic performance tuning, built-in security, and powerful features for building multitenant SaaS applications. You also get all the advantages of a fully managed cloud service, including on-the-fly scalability, automatic patching and backups, and more.

2 #1 price/performance in TPC-H nonclustered as of September 1, 2017 (see http://www.tpc.org/3323); #1 TPC-H nonclustered benchmark as of September 1, 2017 (see http://www.tpc.org/3323); and #1 TPC-E performance as of September 1, 2017 (see http://www.tpc.org/4075).
3 As measured by number of software vulnerabilities for major database platforms (2010–2016).
4 Source: http://www.oracle.com/us/corporate/pricing/technology-price-list-070617.pdf

If you want the benefits of the cloud but your existing architecture isn't fully compatible—maybe due to instance-level functionality or isolation requirements—you can **"lift and shift" your existing database built on SQL Server 2008 or later to Azure SQL Database Managed Instance**. It provides all the benefits of a fully managed database service along with near 100 percent compatibility with SQL Server. So you can continue using features like the common language runtime (CLR), SQL Server Agent, and cross-database querying—all without changing the design of your app.

Similarly, if your on-premises app is based on an open-source relational database, the Microsoft data platform has you covered. If you're running MySQL, you can migrate to Azure Database for MySQL, and if you're running PostgreSQL, you can migrate to Azure Database for PostgreSQL. Both provide all the benefits of a fully managed service, including on-the-fly scalability; built-in high availability; and automatic backups, patching, monitoring, and more. Of course, you also have the freedom to keep using your preferred programming languages and frameworks.

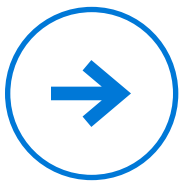
Last but not least, if you're running a NoSQL database on-premises, such as MongoDB, you can migrate to Azure Cosmos DB. It's currently the only fully managed database service to offer turnkey global distribution; support for key-value, graph, and document data in a single service; and five well-defined consistency levels—enabling you to best navigate the tradeoffs between consistency, latency, availability, throughput, and other considerations. You also get limitless elastic scalability across the globe, guaranteed single-digit latency, and industry-leading service-level agreements (SLAs). And you have your choice of APIs—including SQL, JavaScript, Gremlin, MongoDB, and Azure Table storage.

Although most of the above are cloud based, that doesn't mean you need to make your own move to the cloud all at once. Microsoft is unique in having an established presence both on-premises and in the cloud, enabling a hybrid approach that lets you transition to the cloud at your own speed, regardless of where your data and computing resources reside now. For example, you could upgrade (or extend) existing on-premises apps to SQL Server 2017, and then use the capabilities it provides to augment those on-premises apps with new functionality driven by one or more cloud database services.

The Data Accelerator program

If you're ready to take the next step toward data modernization, Microsoft is ready to help.

Through the Data Accelerator program, which currently supports all the above pathways to modernization except for Azure Cosmos DB, you can get help from the experts at Microsoft. Check out the Data Accelerator program page for more information, to see if you qualify, and to apply for the program.



Apply for the Data Accelerator program.

Learn more about modernizing your applications with Microsoft in a free webinar.

Choosing a proven cloud platform

No matter what your app does or where it resides, it needs to deliver on the "essentials." Let's face it, every customer demands a flawless experience with every interaction, including fast performance, high availability, ironclad security, and uncompromised privacy. And while you know you need to meet those expectations, you probably don't want to spend a lot of time on the details necessary to do so.

You likely already have a firm grasp on how well you're able to support those basic requirements using your existing, on-premises database, including any limitations it may have. But what about the cloud? To determine whether you can trust a cloud platform to help you deliver on the essentials—in a way that lets you stay flexible and focus on more important things—it's worth asking yourself a few questions:

How can the platform help me avoid downtime, both planned and unplanned? What does it offer that can help me avoid calls from frantic customers, or having to tell them that our app will be offline again for scheduled maintenance?

How can the platform help me handle unexpected spikes in workload and avoid complaints about poor performance—without having to pay for a lot of spare capacity that I might rarely need?

Can the platform help me expand to other geographic regions? And when it's time to do so, will I still have access to the same built-in availability, scalability, and security mechanisms that I've come to depend on?

How can the platform help me keep customer data secure? If there are regulatory or compliance requirements, does the platform have the necessary certifications?

More than any other factor, customer experiences determine whether companies thrive and profit, or struggle and fade.

Harley Manning and Kerry Bodine

Outside In: The Power of Putting Customers at the Center of Your Business (New Harvest, 2012)

Unless you plan to take on everything required to host your own SaaS apps, your move to SaaS begins with choosing the right cloud platform for your business and your customers. Invest the time to find a provider that can meet your needs both today and into the future, and you'll have taken a successful first step in positioning yourself to deliver new customer value and fuel continued business growth.

The cloud platform that 90 percent of Fortune 500 companies trust

Microsoft Azure services are built cloud-first, so they're ready to help you transform how you deliver value to your customers, no matter where you are in the world. Azure runs on a worldwide network of Microsoft-managed datacenters, across 36 regions (and growing), delivering global coverage.

With Azure, you don't need to worry about capacity or performance. You can easily and instantly scale up when more capacity is needed, and then scale down to save money when demand subsides. You can configure Azure to let you know when capacity or performance needs attention, or you can configure your apps to scale up and down on their own.

Azure managed services help ensure availability through automatic patching and backups, built-in monitoring and security, and more, so you can stay focused on building great apps. Many Azure services are backed by SLA that include uptime guarantees and downtime credit policies. To ensure business continuity and disaster recovery, you can choose from locally redundant storage, where data is replicated locally within your primary region, or geographically redundant storage, where data is replicated to a secondary region that's at least 250 miles (400 km) away but within the same geography.

Figure 2. Microsoft Azure runs on a worldwide network of Microsoft-managed datacenters, across 36 regions(and growing).

What's more, because Azure is available in 140 countries and regions, you can put your data where its users are. The storage of data can be restricted to a single geography, region, or country, so you always have control over how close your apps and data are to the people who use them.

Azure also provides comprehensive security and identity management tools and services, including advanced threat detection, Azure Security Center, Azure Active Directory, Azure Key Vault, and Azure Multi-Factor Authentication. And Azure offers the most comprehensive set of compliance offerings (including certifications and attestations) of any cloud service provider. (Security is such an important topic that we cover it separately later, in Security and compliance.)

Whatever your apps do, Azure helps them do it with enterprise-proven levels of scalability, availability, and security—everything your customers expect. And while Azure takes care of those fundamentals, you get more time to focus on new ways to delight customers and grow your business.

Customer case study: SnelStart

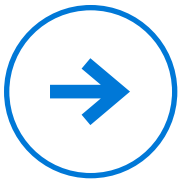
Netherlands-based SnelStart, which has 100 employees, provides financial and business management software to small- and medium-sized businesses.

The company ran a successful software business for years, using a traditional, on-premises model: code, package, ship, and repeat.

Over time, as the pace of change grew faster and faster, SnelStart needed a way to keep up. An on-premises approach limited how often the company could deliver new releases. To complicate matters, SnelStart could never be assured that customers upgraded to the latest version of its software, which meant that SnelStart had to support several versions and made providing that support more difficult. SnelStart moved to a SaaS offering running on Microsoft Azure. The company now can fix bugs and provide new features rapidly, without customers needing to

download and upgrade software to adapt to new requirements, such as changes in accounting rules. Because the move to SaaS also enabled SnelStart to reduce overhead and automate deployments, the company can grow its business without a linear increase in staff.

"We were able to grow our current operations with a very small staff while simultaneously increasing scalability, speed, and disaster-recovery options for our clients," says Carlo Kuip, IT Architect at SnelStart. "The shift to services development freed up resources to focus on new services and features, instead of just updating existing code to keep up with new regulations or tax codes. By automating management and using the SaaS offering, we are able to deliver more value for our clients without having to make large investments in operational staff."



Apply for the Data Accelerator program.

Learn more about modernizing your applications with Microsoft in a free webinar.

Learn why you can trust Microsoft Azure with your data.

Working with Azure means we can deliver software faster, quickly react to customer demands, and scale solutions when demands increase.

Henry Been

OutsideSoftware Architect, SnelStart

Read the entire SnelStart case study.

Hear from other customers who are using Azure.

Multitenant SaaS apps

According to Keystone Research, "SaaS represents an opportunity for on-premises software providers to deliver greater value to customers, sell software to a broader range of customers, and streamline their internal operations."[5] Keystone cites a wealth of benefits experienced by ISVs who successfully transitioned from a traditional software-licensing and delivery model to SaaS:

New customer segments through lower adoption and operating costs

Reduced customer TCO through decreased infrastructure complexity

Improved product offerings through the integration of value-added cloud services

Product improvements driven by the aggregation of usage data and data-scale effects

5 See https://content.microsoft.com/isv-keystone-saas

ISVs who made the move to SaaS also improved recurring revenue and financial predictability, drove increased revenue through new pricing models that were better aligned with customer needs, and shortened sales cycles through new trial and end-user engagement opportunities. Finally, they reported significant operational benefits—including a 33 percent increase in the speed of product development and a 26 percent increase in engineering efficiency. Pretty compelling, isn't it?

So how can your business successfully transition to SaaS? To effectively build a SaaS app that serves hundreds or thousands of customers, delivers essential elements such as data isolation and security, and helps protect your margins, you might want to start by asking these key questions:

How can we provision new customer environments quickly—and keep performance high as overall usage grows? How will I handle varied and unpredictable spikes in demand?

How can we manage customer environments at scale, so that I won't need to bring on new staff linearly as my business grows?

How can we keep customer data secure—and isolate it to ensure that our customers can't access one another's information? And how can we help customers ensure secure access across their own user bases?

As the data in our app grows, how can we uncover relationships in the data and gain new insights from it—in areas ranging from app performance to customer behavior?

How can we help customers visualize their data to gain new insights quickly and easily—and thus add even more value to our offerings?

If these questions resonate, you probably already have a firm grasp of what you need from a cloud database.

Azure SQL Database: Redefining multitenancy

Azure SQL Database, an intelligent relational cloud database service, helps you avoid the typical tradeoffs between development efficiency, manageability, performance, and security for SaaS apps. As your SaaS app runs, Azure SQL Database employs built-in machine learning to continuously assess its behavior, tune performance, and automatically improve reliability and data protection—freeing you to focus on other things. And as demand for your SaaS app grows, Azure SQL Database scales on the fly, with virtually no app downtime.

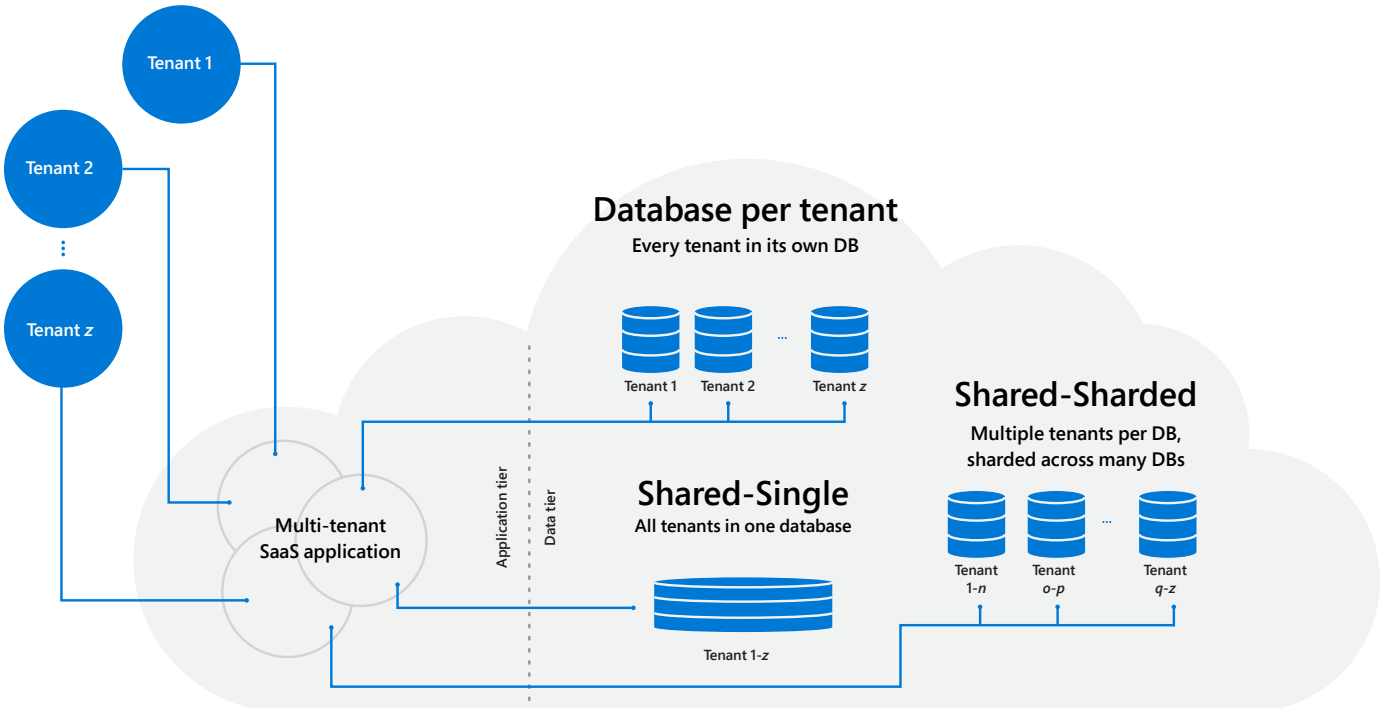
With Azure SQL Database, you can take advantage of:

Elastic database pools, which enable cost-effective and predictable pooling of resources to help you handle varied and unpredictable spikes in demand.

Elastic database jobs, which streamline admin tasks by letting you make changes to many databases at once—ultimately enabling you to manage thousands of databases as one.

In-memory online transaction processing (OLTP), which keeps active data in main memory to improve performance by a factor of up to 30—giving you more performance for your money.

ColumnStore, which stores table data as columns instead of rows to deliver 10 times the data compression and queries that are up to 10 times faster.



Numerous ways to help keep customer data secure—including **row-level security**, **dynamic data masking**, and the **Always Encrypted** feature.

Built-in intelligence to further boost app performance and data security—including features such as **Threat Detection**, **Query Performance Insight**, and **Azure SQL Database Advisor**.

Graph processing, which can make it easier to express certain kinds of queries—and potentially improve query performance—by enabling you to model many-to-many relationships among relational data.

Figure 3. Azure SQL Database supports multiple data models for multitenant SaaS apps.

Azure SQL Database supports multiple data models for multitenant SaaS apps, so you can choose the one that delivers the optimal balance of isolation, cloud resource costs (compute and storage), and DevOps complexity for your customers and your business. This also allows for a more flexible business model that includes a trial/free tier; serves a breadth of moderately active customers; and offers high-end, dedicated, premium offerings for your most demanding customers.

A list of all major Azure SQL Database features (with links to more information) can be found on the Azure SQL Database features page.

Azure Active Directory

With a multitenant SaaS app, you need a way to organize and manage user accounts. More likely than not, your customers already have an identity management and authentication mechanism. And they don't want to use and maintain a different one just to access your app.

You can use Azure Active Directory (Azure AD)—a multitenant, cloud-based directory and identity management service—to easily add single sign-on to your SaaS app for greater value and differentiation in the marketplace. With Azure AD, you make it quick and simple for your customers to integrate with an existing Windows Server Active Directory, enabling them to leverage existing on-premises investments to manage access to your app.

Power BI Embedded

Few SaaS apps are complete without some sort of reporting environment. But all too often, such reports are static and deliver only limited insights. Embedding a rich, interactive analytics environment into your app is another way to increase its usefulness and help your customers make quick, data-driven decisions.

Microsoft Power BI Embedded is an Azure service you can use to bring data to life within your app—without the time and expense of building and maintaining your own analytics environment. You can easily embed stunning, fully interactive reports into your app in a cost-effective and scalable way, adding value and further differentiating your app. You could also gain an additional revenue stream if you choose to position such functionality as a premium offering. You don't need to change the design of your app to use Power BI Embedded, and your users can sign in to your app just like before.

Customer case study: Umbraco

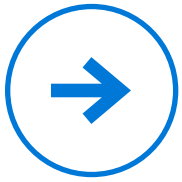
Umbraco is a popular, open-source content management system.

To deliver new customer value, Umbraco used Azure SQL Database and other Microsoft Azure services to build Umbraco-as-a-Service (UaaS), a multitenant SaaS app that lets customers provision new environments themselves.

To make new customer environments available virtually immediately, Umbraco uses elastic database pools to maintain a pool of preprovisioned databases. As the preprovisioned databases are used, new elastic database pools are created and new databases are preprovisioned. When databases are no longer needed, an automated process restores them to the elastic database pool. As of October 2016, Umbraco had nearly 3,000 databases across 19 elastic database pools.

Remarkably, Umbraco doesn't employ any database administrators. "We wanted to spend our time on solving our customers' problems, not managing infrastructure," says Niels Hartvig, founder of Umbraco. "We initially considered hosting the servers ourselves, but capacity planning would have been a nightmare."

By choosing Azure, Umbraco is able to provide customers with optimal performance, without the investment in IT resources that a self-hosted solution would require. "We love the developer convenience and scalability that Azure gives us, and our customers are thrilled with the features and reliability," says Morten Christensen, Technical Lead at Umbraco.



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Learn more about modernizing your applications with Microsoft in a free webinar.

Get hands-on experience in GitHub Developer Immersion.

Browse the code samples in the GitHub Reference Implementation Repository.

Review the advanced security and compliance features in Azure SQL Database.

Learn how to help secure your Azure SQL Database.

Get details about application development with Azure SQL Database.

Elastic database pools are a perfect fit for our SaaS offering because we can dial capacity up and down as needed. Provisioning is easy, and with our setup, we can keep utilization at a maximum.

Morten Christensen

Technical Lead, Umbraco

Read the entire Umbraco case study.

Hear from other customers who are using Azure SQL Database.

Personalization around the globe

In today's global economy, apps and their users span the planet. To support rich, real-time personalization at a global scale, your SaaS app needs fast access to the data that drives this personalization, regardless of where the user is located.

To achieve this, from a data perspective, you need to consider how to:

- Manage and version complex schemas.
- Scale both throughput and storage to meet global demand.
- Balance the tradeoffs between the limited consistency models in a distributed database, including latency, availability, throughput, and scalability. (Most databases offer only two models, consistent and eventual, forcing you to choose from one end of the spectrum or the other.)

Deliver customized, real-time, and highly responsive experiences.

Ensure an always-on system around the globe.

In addition, to deliver the greatest value, you need to handle a variety of unstructured data at scale. Social media posts, mobile data, document text, app telemetry, and website content are just a few examples of today's data that doesn't always fit neatly into rows and columns. You also need to collect and analyze the data needed to drive real-time personalization before you can operationalize it for real-time access.

Azure Cosmos DB: A globally distributed, multimodel database service

Azure Cosmos DB provides low-latency access to rich data anywhere in the world—making real-time personalization at a global scale exactly the type of scenario that Azure Cosmos DB is ideally suited for. What's more, with Azure Cosmos DB, you can model your data the way your app requires, using familiar APIs, tools, and frameworks.

Azure Cosmos DB provides:

Turnkey global distribution—Azure Cosmos DB is currently the only fully managed database service to offer turnkey global distribution, letting you put your data where your users are for fast, responsive access. Every database account can be associated with any number of Azure regions, and the data replicates automatically, synchronously, and durably.

Support for multiple modes and APIs—Only Azure Cosmos DB empowers you with key-value, graph, and document data in one service. Azure Cosmos DB automatically indexes all data, so you don't need to worry about schema or index management. You also have your choice of APIs—including SQL, JavaScript, Gremlin, MongoDB, and Azure Table storage.

Limitless elastic scale around the globe—With Azure Cosmos DB, you can independently and elastically scale storage and throughput at any time, anywhere across the globe, paying only for the throughput and storage you need.

Multiple, well-defined consistency choices—Azure Cosmos DB offers an intuitive programming model and is currently the only nonrelational database service to offer five well-defined consistency levels. You can build for the unique needs of your app, and best navigate the tradeoffs between consistency, latency, availability, throughput, and scalability.

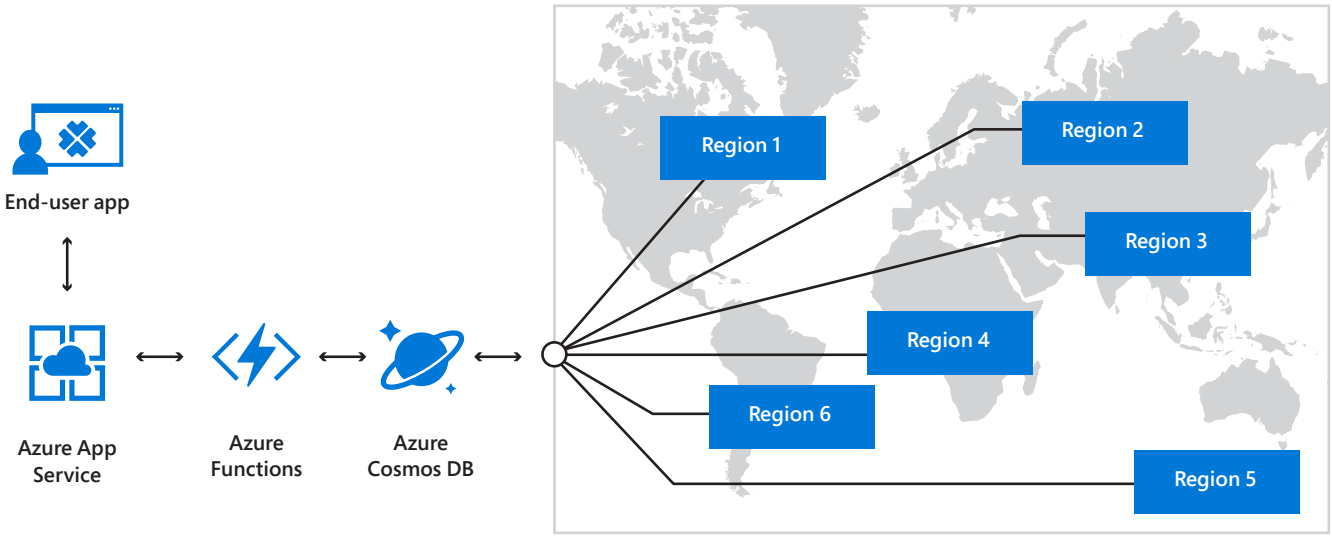
Guaranteed low latency—With its latch-free and write-optimized database engine, Azure Cosmos DB guarantees less than 10-ms latencies on reads and less than 15-ms latencies on (indexed) writes at the ninety-ninth percentile.

Industry-leading, enterprise-grade SLAs—Azure Cosmos DB is currently the only cloud database service to offer industry-leading SLAs for 99.99 percent availability, latency at the ninety-ninth percentile, and guaranteed throughput and consistency.

The capabilities provided by Azure Cosmos DB make it well suited for many use cases beyond real-time personalization at a global scale—including the Internet of Things and telematics, retail and marketing, gaming, web and mobile apps, banking, and other mission-critical, global scenarios.

Azure Functions: Enabling a serverless architecture

By taking advantage of how Azure Cosmos DB and Azure Functions work together, you can quickly and easily build and deploy event-driven, serverless, personalized apps that have low-latency access to rich data on a global scale. Because Azure Functions are event driven, you can just listen to a change feed from Azure Cosmos DB instead of creating your own listening logic. You can also bind a function to an Azure Cosmos DB collection using an input binding



(which reads data from a container when a function executes) or using an output binding (which writes data to a container when a function completes).

With Azure Functions, there are no limits—you set the parameters, and the functions execute in parallel, with the Azure Functions service spinning up as many times as you need. The service creates new instances of functions whenever an event fires and closes them as soon as the function completes. This makes functions good for quick tasks and enables you to pay only for the time your functions are running.

Used together, Azure Cosmos DB and Azure Functions deliver a compelling set of benefits: event-driven, serverless computing at a near-infinite global scale, with low-latency access to rich data for serverless apps, app performance that enables a real-time user experience, and freedom from infrastructure through fully managed services.

Figure 4. Native interoperability between Azure Cosmos DB and Azure Functions makes it easy to build fast, serverless, personalized apps at a global scale.

Customer case study: Next Games

Next Games, maker of the popular mobile strategy game The Walking Dead: No Man's Land, has been with Azure from the start.

By 2017, No Man's Land had 16 million installations, had generated 120 GB of new data each day, and was handling 11,500 database requests per second. To support continued growth, Next Games needed more storage, increased flexibility, and the ability to maintain availability and performance for users who aren't geographically close to one another.

To meet those needs, the company adopted Azure Cosmos DB. "We want our game data to always reside in the datacenter closest to the player so that we can load the player data as fast as possible," says Kalle Hiitola, Chief Technology Officer at Next Games. "[The Azure Cosmos DB] replication feature allows us to do this, so that we always have the data close by the player, no matter which datacenter it comes from."

Currently, all player data is in Azure Cosmos DB except for the actual saved player file, which is stored in Azure Blob storage. In addition to Azure Cosmos DB and, soon, Service Fabric, Next Games is using Media Services for streaming video, Event Hubs for analytics, Notification Hubs to send push notifications to clients, Traffic Manager for load balancing, and Web Apps for the dashboard, which provides game management.

Learn more about modernizing your applications with Microsoft in a free webinar.

Read the technical introduction to Azure Cosmos DB.

Watch the Introducing Azure Cosmos DB video.

Learn how to partition and scale in Azure Cosmos DB.

Check out the sample Azure CLI scripts and Azure PowerShell scripts for Azure Cosmos DB.

The good thing about Azure is that we can incrementally add new features Microsoft brings on to Azure into our platform and switch them behind the scenes. You just start a new service, and off you go exploring what it can do for you.

Kalle Hiitola

Chief Technology Officer, Next Games

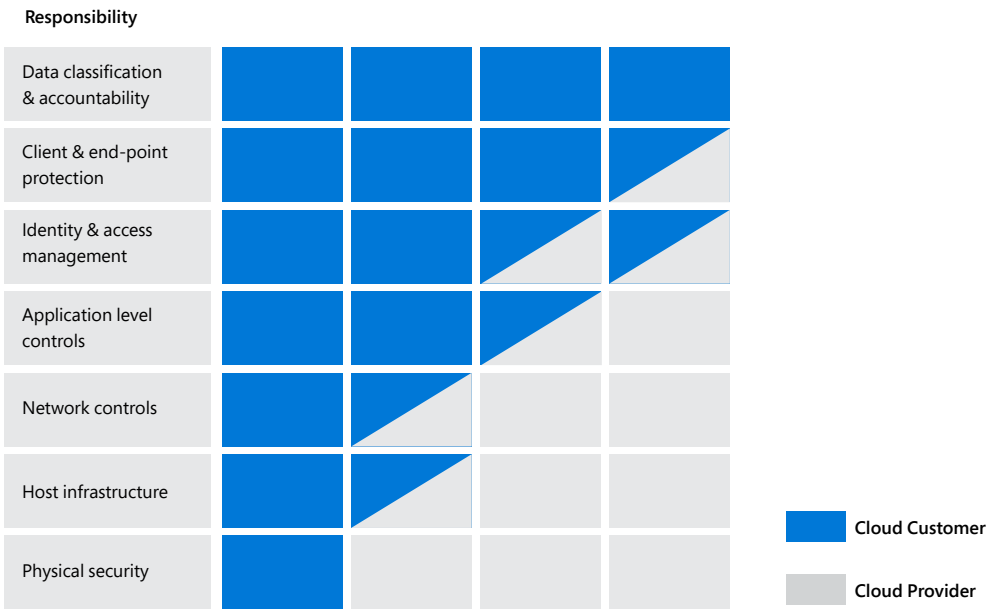
Read the entire Next Games case study.

Hear from other customers who are using Azure Cosmos DB.

Security and compliance

No matter what you're building, you need to protect users' data and ensure compliance with any applicable regulations. You can do some of this within your app, which is why key security features that are specific to certain Azure services are covered earlier in this e-book, under the relevant scenarios for those services. However, when you rely on a cloud service provider for your infrastructure, you're also relying on that provider to help you keep your customers' data secure. It's the same with regulatory compliance; if the cloud services you're using aren't compliant, neither is your app.

One of the best reasons to use Azure for your apps and services is to take advantage of its many built-in security tools and capabilities—additional layers of protection that you can use to achieve a defense-in-depth approach. For example, across all scenarios, you can use Azure Security Center for increased visibility and control over the security of all your Azure resources, use Azure Active Directory to help secure access to on-premises and cloud apps, use Azure Key Vault to safeguard cryptographic keys and other secrets used by your cloud apps and services, and use Azure Multi-Factor Authentication to provide even more security for your data and apps.



Microsoft Azure: The trusted platform

From facility to apps, the Azure infrastructure is designed for hosting millions of customers simultaneously, providing a trustworthy foundation upon which you can meet your needs. Security and privacy capabilities are built in from the start, beginning with the Security Development Lifecycle (SDL), which addresses security at every development phase and helps ensure that Azure is continually updated to make it even more secure. Operational Security Assurance builds on SDL knowledge and processes to supply a framework that helps provide secure operations throughout the lifecycle of cloud-based services.

Functional security areas

Depending on the cloud service model, responsibility varies for managing security at different solution layers. Azure provides a wide array of configurable security options so you can customize security to meet your unique requirements.

Security capabilities built into the Azure platform cover all major functional areas, including network security, database security, storage security, compute security, operational security, security monitoring and management, and more. The introduction to Azure security provides an overview of all those areas.

Figure 5. Who manages security—whether the cloud customer or the cloud provider—depends on the cloud service model.

Compliance

In a world where data breaches and government requests for access to online customer information happen daily, you need a cloud platform that helps you ensure regulatory compliance. Microsoft provides the most comprehensive set of compliance offerings, including certifications and attestations, of any cloud service provider.

For example, in May 2018, a European privacy law, the General Data Protection Regulation (GDPR), is scheduled to take effect. The GDPR imposes new rules on companies, government agencies, nonprofits, and other organizations that offer goods and services to people in the European Union (EU) or that collect and analyze data tied to EU residents, and it applies no matter where the organization is located. Microsoft is committed to GDPR compliance across its cloud services when enforcement begins May 25, 2018, and provides GDPR-related assurances in its contractual commitments.

Review the list of all Azure compliance offerings on the Trust Center.

Read the white paper on how Microsoft Azure can help organizations comply with the GDPR.

Customer case study: GEP

GEP delivers software and services that enable procurement leaders to maximize their business impact.

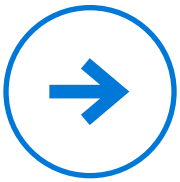
In the past, the company ran SMART by GEP, its cloud-based procurement platform, in its own datacenters. But the investments required to ensure the scalability and performance of that model were steep. Regulatory requirements in new markets would have made the necessary investments more daunting still. "To meet that demand with our existing datacenters, we would have had to expand our infrastructure and IT resources considerably," says Dhananjay Nagalkar, VP of Technology at GEP. "The investment and time frame for that would have been enormous."

GEP explored several cloud options, but most were infrastructure-as-a-service providers that still would have required substantial investment in IT resources. The Azure platform-as-a-service model

turned out to be a much better fit. "With Azure, GEP doesn't need to deal with database management, virtual-machine configuration, patching, or other infrastructure-management tasks," says Nagalkar. "Instead, we can focus our resources on what we do best: leveraging our expertise in procurement to write software that truly delivers results for our customers."

By moving to Microsoft Azure, GEP has been able to cost-effectively accommodate its continued growth. For instance, through its worldwide network of Microsoft-managed datacenters, Azure has enabled GEP to overcome regulatory barriers that kept it out of some global markets—such as European markets where regulations require data to be stored in that local geographic region.

Azure services have also enabled GEP to address other customer needs. For example, the company used Azure Access Control service—now part of Azure Active Directory—to support a broad range of options for signing in to its software, enabling GEP to offer single sign-on for customers without worrying about storing user credentials and maintaining customer-password policies.



Apply for the Data Accelerator program.

Learn more about modernizing your applications with Microsoft in a free webinar.

Learn more about Azure security at the Azure security documentation site.

Get details on Azure database security.

Microsoft Azure has played a key role in GEP's success by allowing us to rapidly scale services with agility, and by providing regional datacenters that help us meet the regulatory needs of our global customers.

Dhananjay Nagalkar

VP of Technology, GEP

Read the entire GEP case study.

Hear from other customers who are using Azure Active Directory.

Innovate faster with Microsoft

With a broad portfolio of services, Microsoft Azure can help you successfully transform from a seller of on-premises software to a SaaS provider in the cloud. You get all that you need to deliver greater customer value, sell software to a broader range of customers, and streamline your internal operations. What's more, you can do so across your choice of technology stack, with innovative, built-in technology like analytics and AI to help you wow your customers and make you more productive. The Microsoft cloud platform supports more than a billion customers in more than 140 countries and regions, providing a unique platform to help you grow your business. Azure also supports a fully hybrid architecture, which helps you deliver the functionality you need, regardless of where the data or computing resources that power your apps reside: your own datacenter, a customer's datacenter, an Azure datacenter, other public cloud datacenters, or even a mobile device.

With Azure and data services from Microsoft, you can:

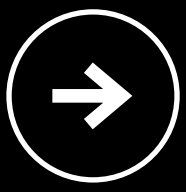
Easily build and deploy anywhere. Use your team's existing skill sets and favorite tools to integrate data and build intelligent apps, and then deploy without a change in code. Build once and deploy anywhere—in the cloud, on-premises, and to edge devices—knowing that the global distribution of Azure means you can reach your users wherever they are.

Create an impact with an open platform. Maximize your team's effectiveness while using the technology of your choice, including open source, backed by a platform that offers unparalleled performance, availability, and security. You can choose from several languages, employ a comprehensive range of data engines and processing technologies, and then deploy on your favorite platform.

Develop apps with built-in intelligence. Creating intelligent apps with Azure is easy; it includes advanced analytics and a rich set of cognitive APIs that provide human-like intelligence to enable more natural and contextual user interactions. No other platform brings analytics and native AI to your data wherever it lives, in the languages you use.

So, are you ready to make the move to SaaS?

No matter what your data needs are, the Microsoft data platform helps you unlock the full potential of your apps. This e-book is just the first step in unlocking that potential and creating modern SaaS apps.



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