

15 lessons learned migrating SAP to the cloud



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01

Moving SAP to the cloud

SAP is the backbone of your business—from sales to operations and from financials to supply chain. But even for business-critical technology like your SAP implementation, you expect and even desire change. You're adapting to changing business needs or planning for SAP's mandatory transition to HANA-only support in 2025, or you're looking for ways to lower the costs and improve the performance of your SAP deployment. Whether you're part of a one million or a one billion dollar business, managing change with your traditional IT infrastructure is a challenge.

Moving to the cloud can transform the way your business uses technology by helping you provision and consume computing and storage as needed instead of making expensive upfront investments to handle infrequent heavy workloads. It's a fundamental shift in the way you invest in your technology infrastructure, and it offers nearly unlimited flexibility in design, implementation, and cost. Making your new SAP investments in the cloud will help you be more efficient, agile, and innovative.

“Moving to the cloud will save us money, but this is really about becoming more agile and innovative.”

This means our teams can stop worrying about keeping our infrastructure up and running and focus on innovating without a lot of heartburn. They can run experiments, learn, and then use those learnings to take us in new directions—and if an experiment doesn't work, they can easily shut it down and move on to something else.”

Mike Taylor

Manager of the Microsoft SAP program in Core Services Engineering and Operations

Why SAP on Azure?

For more than two decades, Microsoft and SAP have partnered in pursuit of one goal: to provide businesses with a clear roadmap for the cloud, so they can confidently drive innovation. Microsoft Azure brings unparalleled performance and clarity to your entire SAP estate, ensuring you and your business are prepared for the future. Azure allows for the deployment and implementation of popular SAP products and solutions within minutes—on a secure, scalable, and business-proven cloud platform. This joint Microsoft and SAP ecosystem provides unique insights and rich product integration to help you make the most of running SAP solutions and applications in the cloud—accelerating your performance, productivity, and innovation with seamless enterprise-class support.

Once we have all of the information we can get back to you with a holistic approach, updated scope recommendations, and schedule.

When you migrate your SAP workloads to Microsoft Azure you get:



Reliable, highly available, and scalable SAP-certified infrastructure.



Microsoft and SAP partnership and a shared roadmap.



Flexibility to adopt an IaaS or PaaS strategy.



Leading security, global reach, and compliance.



The ability to bring your own SAP license, reduce capital expenses, and monitor costs for lower TCO.



Data analytics that powers better, faster decisions and more innovation.



Freedom to move to HANA on your terms.

We know that making the shift to the cloud with important workloads like SAP can be daunting. Your business runs on SAP. You can't afford downtime and you can't afford mistakes. So how do you make the move to the cloud with SAP? You could make the journey on your own, or you could follow the path of others who have successfully made the journey—and learn from their experience.

Like you, Microsoft is an SAP customer. We've made the journey to SAP in the cloud ourselves and we've also helped other organizations, large and small, successfully move their SAP workloads to the cloud. Along the way, we've learned some lessons and developed some best practices that apply to businesses of all sizes—lessons and best practices that can help you in your migration. We've shared those lessons throughout this e-book—and even collected them in a handy checklist so they'll always be at hand.

Our path to SAP in the cloud

Cloud migration requires careful planning and strategy. The key is determining your priorities for migration and the path to the cloud that optimizes your results.

Like many organizations, Microsoft uses SAP to run a large portion of its business, so having a well-planned and executed migration path was an absolute necessity for us. You can follow the path we took to SAP in the cloud. Just follow these steps and take advantage of the tips we learned along the way:



Take a close look at your SAP workloads and plan your migration.



Move SAP to the cloud, minimizing downtime and ensuring success.



Make the most of SAP in the cloud and optimize your SAP investment.

Continue to **secure and manage SAP in the cloud**.

Let's take a closer look at the work we did during each step and how the lessons we learned in the process can help make your journey to SAP on Azure easier.

02

Take a close
look at your
SAP workloads

The first step in your journey to SAP on Azure is making sure you have a good understanding of your existing SAP application, including the underlying infrastructure of your application workload, the dependencies, and the IT resources your application is consuming. This information will help you develop an effective strategy for your migration.

For example, like Microsoft, your organization likely runs SAP applications across a range of physical or virtual servers. While your current management tools might represent these clearly, to kickstart your migration journey, you'll need an assessment mechanism that can feed data into subsequent steps. Discovering servers and virtual machines is usually a straightforward process. It relies on interaction directly with the endpoint (using an agent) or the managing hypervisor, like Microsoft Hyper-V. Ultimately, the goal of the assess phase is to collect server and application information, including type, configuration, usage, and applications that might be running.

Identify application and server dependencies

Once you've gathered information about all the servers and virtual machines you discovered, it's time to map any dependencies or communications among your SAP application, third-party applications, and the underlying infrastructure. This is a critical step because it helps you discover application dependencies, so you can:

Decide what you can retire.

Across all SAP workloads, are there any workloads that are running on old hardware that aren't used often or that are used by very few people? Are there any application roles that you can consolidate? Now is the right time to streamline and right-size your SAP workloads.

Decide what you can replace.

Look for systems that you can replace with software as a service (SaaS) offerings. For example, SAP has SaaS solutions like Concur, SuccessFactors, Ariba, and others. Microsoft has SaaS products—like Dynamics CRM Online—that provide integration into SAP business processes.

Prioritize workloads for migration.

It's also important to determine migration risk. Migration risk usually depends on two factors:

Business impact. How important is the workload to your business operations?

Complexity. How complex is the application and how well does your team understand it?

A critical workload will score a higher risk even if it's simple. A more complex but less critical workload might end up with a lower risk score—and so might be a better candidate for early migration.

Analyze your configuration

Configuration analysis ensures your SAP workload will function as expected on Azure. This process provides insight into your SAP workloads, the best way to migrate them, and any modifications you need to make to ensure a successful migration. At this stage, you need to look at your SAP configuration and its cloud compatibility. Can it be migrated with its current configuration? Or do you need to provide workarounds or recommend configuration changes? Does anything about the solution need to change?

Plan your costs

Evaluate the potential cost savings of your migration. For example, you can use the [Total Cost of Ownership \(TCO\) Calculator](#) to calculate your TCO for Azure and compare it to that of a comparable deployment that uses your on-premises infrastructure. On-premises servers and virtual machines are often over-provisioned, using less than 20% of capacity. If you were to take the physical configuration of your on-premises server and map this to an IaaS VM series type, you would likely find that you were paying for more performance and scale than you need.

Based on your assumptions and inputs for configuration requirements for running SAP workloads—including compute, storage, network, and database—you can predict the cost of resources to be used on the cloud and estimate the cost savings you can realize by migrating your workloads to Azure.

How we assessed our SAP environment

Running SAP in the datacenter presented several day-to-day challenges for our Core Services Engineering and Operations (CSEO) team. On-premises infrastructure costs were high, and the infrastructure failed to support peak load and was hampering digital transformation.

The team looked at the SAP system—which ran on over 600 servers and virtual machines—looking for machines that weren't used often or that only had a few users. Could we consolidate functionality into one app? It was the perfect time to streamline, right-size, and eliminate physical servers and on-premises virtual machines. As part of the assessment, the team looked at the performance and capabilities of physical servers and virtual machines. We also looked for systems that they could replace with a SaaS solution. All these considerations helped them define the strategy that best met migration requirements.



Lessons learned

Along the way, the CSEO team learned some valuable lessons about the assessment phase of migration:

Understand suitability and migration efforts.

Before performing an IaaS migration, the team needed to understand the complexity of the SAP workloads, the underlying infrastructure, the size of each workload and related databases (in terms of velocity, volume, and variety), and the requirements for seasonal elasticity.

Clean out your closet.

Moving to the cloud is an opportunity to throw out the stuff you're not using. When you own that old on-premises server, it doesn't matter how much old stuff you have buried in there. When you're on the cloud, the cost of carrying around a lot of dead weight can add up fast.

Ensure that you don't overprovision your virtual machines.

It's important to make sure that you provision enough resources so that you don't have to keep increasing your system weekly.

Determine Azure region strategy before moving.

[Azure regions](#) have truly global reach, so make sure that your resources are hosted in an Azure region or regions that provide the best connectivity for your company.

For a closer look see, [Building an agile and trusted SAP environment on Microsoft Azure](#).

03

Move your SAP
to the cloud

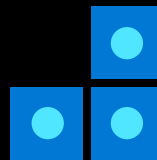
Once you've completed your discovery and assessment, it's time to prepare for the next step—the actual migration. This is where, after you've determined your migration goals and gathered all requirements and constraints, you can choose the best approach to meet your ultimate business requirements.

When migrating SAP to the cloud, you'll take one or more of these approaches:



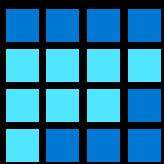
Rehost

"Lift and shift" your current solutions to VMs in the cloud.



Rebuild

Rebuild your solution using cloud-native technologies to get the most from the cloud.



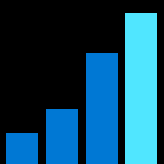
Refactor

Make minimal changes to your solution so it works in the cloud.



Replace

Replace portions of your current solution with SaaS.



Rearchitect

Change how your solution works to optimize it for the cloud.

For example, you might lift and shift your SAP database—using SQL Server Always On or SAP HANA System Replication to seamlessly replicate your on-premises data to the cloud—while you refactor the application tier of your SAP workloads so they connect to data in the cloud. And you might decide that a SaaS solution like SAP Concur makes sense for expense management.

How we migrated SAP to the cloud

Along with planning which aspects of our SAP environment to rehost, refactor, rearchitect, rebuild, or replace, the CSEO team also looked at the migration from a standpoint of horizontal and vertical workloads. The horizontal set of workloads was a complete sandbox environment that cut across all workloads, so the team gained experience across the SAP environment. The vertical workload was a low-risk system, but it included sandbox, development, test, and production environments, so we gained experience in real-world use. We were already using server virtualization in our on-premises datacenters, so the team took advantage of the virtualized state of the infrastructure to create a new virtualized environment in Azure with

As you choose your strategy, we recommend that you migrate lower-risk SAP solutions before more critical ones.

minimal changes to the server operating system (OS) and OS-level configuration. We also made only small changes to the configuration of SAP applications.

The team used a lift-and-shift (rehost) strategy to take servers from the on-premises environment and re-create them as Azure VMs that had roughly the same available resources and configurations. Because we run multiple sandbox, test, development, and production environments, the team used the horizontal strategy on the sandbox environment as a series of test cases or mini pilot migrations. It was perfect for

initial experimentation. We used the vertical strategy to adjust their internal processes. It was also a great way to spot any issues in production early on.

As a result of the migration, the team realized that developers need help as they refactor, rearchitect, and rebuild their apps to integrate SAP with Azure services. This is why we created the [SAP ABAP SDK](#) for Azure, which simplifies SAP integration, and the SAP Web Services Platform for Azure, which enables partner applications to integrate with SAP in a consistent and efficient way.

February 2018

	Enterprise resource planning	Global trade services	Supply chain management	Business intelligence	Object event repository
Production	On-prem physical	On-prem virtual	On-prem virtual	On-prem virtual	Azure
Test	On-prem physical	On-prem virtual	On-prem virtual	On-prem virtual	Azure
Dev	Azure	Azure	Azure	Azure	Azure
Sandbox	Azure	Azure	Azure	Azure	Azure

Chart showing SAP migration to the cloud based on vertical and horizontal workloads.

February 2019

	Enterprise resource planning	Global trade services	Supply chain management	Business intelligence	Object event repository
Production	Azure	Azure	Azure	Azure	Azure
Test	Azure	Azure	Azure	Azure	Azure
Dev	Azure	Azure	Azure	Azure	Azure
Sandbox	Azure	Azure	Azure	Azure	Azure

Chart showing the integration of Azure across vertical and horizontal workloads.



Lessons learned

Migrating our SAP infrastructure helped us to learn a few things:

Consider moving low-risk systems to the cloud with the vertical strategy right away.

When we started, we planned to use the horizontal strategy and then the vertical strategy. But because one of our end-to-end systems was low risk, we used it as a test case for the vertical strategy to get experience with a production environment in Azure.

Consider building new systems in the cloud from the start.

When we built a new system, we weren't sure whether to put it on-premises and then move it or to build it in Azure from the get-go. It was low business impact, so we built it in Azure. We saved money and learned about cluster setups and production environments in Azure.

Understand migration strategies and how they can be best applied to your environment.

Understanding what to move and when to move it is a big part of moving SAP to Azure. The horizontal and vertical strategies discussed in the first resource provided below give you practical, business-friendly guidance on migration strategies.

Predict known business events.

Don't move systems when they're highly critical. We schedule around events like product releases, quarterly financial reporting, and big projects that go live in the production environment.

For a closer look, see [Strategies for migrating SAP systems to Microsoft Azure](#) and [Streamlining business processes with SAP connectors and Azure services](#).

04

**Make the
most of SAP
in the cloud**

Once you've made the move to the cloud, you'll want to optimize your SAP cloud environment to gain business and cost efficiencies.

You'd typically size on-premises servers and storage infrastructure for the next three to five years, based on the expected maximum use and workload during the lifespan of the asset. But often the full capacity of the hardware isn't used outside of peak periods—or isn't needed at all. Maintaining these on-premises systems is costly.

The cloud gives you more flexibility. For example, the optimization capabilities of Azure empower you to combat infrastructure underutilization and overprovisioning. This makes it possible for you to quickly and easily scale your SAP systems up or down for current and short-term needs, not for maximum load over the next three to five years. This also enables you to optimize continuously. As your needs change, you can reoptimize your environment based on your current needs—not yesterday's.

Here are some other examples of cloud optimization capabilities you can use to keep your SAP cloud environment optimized:

Cost Management to decrease cost and increase agility.

You can use capacity management tools like Azure Cost Management to help you

size your SAP workloads in Azure, so you pay only for what you need, when you need it. This reduces the total cost of ownership of unused hardware and ongoing server maintenance and gives you the agility to size your SAP workloads for now and easily change your setup as needed to handle future requirements.

High availability and scalability.

For scalability and high availability of the SAP application layer, you can deploy and assign multiple SAP app instances to SAP redundancy features like logon groups and batch server groups. You can configure these app instances on different virtual machines in Azure for high availability. SAP automatically dispatches the workload to multiple instances per the group definitions. If an instance isn't available, business processes can still run via other SAP app instances that are part of the same group.

Rolling maintenance.

The scale-out logic of SAP app instances can be used for rolling maintenance. You can remove one virtual machine (and any SAP instances running on it) from the SAP system for maintenance activities without affecting production. After you finish your work, you can add the virtual machine back, and the SAP system automatically uses the instance again.

How we optimize SAP in the cloud

Like you, we want our SAP environment to be agile, efficient, and able to grow and change with our business. This requires monitoring the environment and optimizing it to:

Increase cost savings by using our Azure infrastructure more efficiently.

Create a more agile, scalable, and flexible SAP on Azure solution.

By optimizing SAP on Azure, the CSEO team positioned our SAP environment to grow and change with our business needs. It's now leading our digital transformation and empowering everyone in our organization to achieve more. Put simply—Azure makes our SAP solution better.



Lessons learned

In the process of optimizing our SAP environment on Azure, we learned several lessons:

Monitor technology advances.

Azure technology and available virtual machine sizes and features always advance. Keep up-to-date with new capabilities and use them to achieve the best possible benefits for your business.

Consider optimizing your SAP environment before and after moving to Azure.

You can optimize your environment before migrating by ensuring that retired systems aren't migrated, that your SAP infrastructure inventory is accurate, and that your disaster recovery plan is tested and in place. You don't want to waste migration time on systems or data that you don't need.

Design for high availability in your production systems with Windows Server Failover Clustering, SQL Server Always On, and SAP features like logon groups, remote function call groups, and batch server groups.

Snooze so you don't lose.

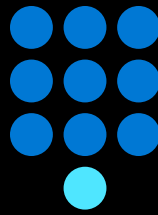
Slash your costs by taking advantage of one of the cloud's best benefits: snooze your usage of Azure when your teams are out of the office on nights and weekends.

For a closer look, see [Optimizing SAP for Azure](#).

05

**Secure and
manage SAP
in the cloud**

Given the increasing number of threats to your cyber infrastructure, your solution is only as good as your ability to secure and manage it. At Microsoft, we wanted to get visibility into and control over how SAP in the cloud is used and the security of SAP. Avoiding business disruptions, meeting compliance goals, and protecting our own data and customer data were all important. We use Azure services in combination with SAP capabilities to provide integrated cloud security and compliance for our SAP workloads and their underlying infrastructure and data while supporting more complex configurations and more user-accessible SAP solutions.



Azure security

Data security and encryption.

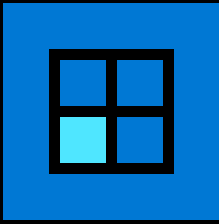
Use built-in industry-leading controls and capabilities to enable data security and encryption.

Security monitoring and threat detection.

Use the Azure logging and monitoring capabilities and artificial intelligence for real-time visibility, threat detection, and event analysis.

Single sign-on.

Seamlessly access all SAP applications with a single credential by using Azure Active Directory single sign-on integration.



SAP security

Native malware protection.

Take advantage of the native malware protection, OS-level controls, OS hardening, and patch management built into your chosen operating system.

Role-based user access.

Use HANA's role-based access architecture to deploy privileges to your user base, restrict actions that specific users can perform in the HANA database, and restrict data that specific users can view through reports.

Access anywhere.

Enable user access via web or mobile devices—ensuring users can perform only the activities for which they're authorized—by using the Fiori Gateway user interface.

For compliance, we already knew that Azure is an industry leader in compliance, providing more certifications than any other cloud provider. This meant we could focus on internal business processes to complete our compliance solution.

How we secure SAP in the cloud

Like other SAP users, we need to make sure that our SAP infrastructure and data are secure. So we developed a strategy to protect SAP assets and data with Azure security solutions and SAP tools. The strategy is to make our Azure and SAP infrastructure secure by design by using integrated systems, tight controls, and effective monitoring that enables us to mitigate current and emerging security risks. We focus on protecting Microsoft assets and data in a high-profile environment while streamlining compliance with existing regulations like Sarbanes-Oxley (SOX) and newer ones like the General Data Protection Regulation (GDPR).

Our S/4HANA security redesign initiative incorporates the robust Microsoft enterprise security framework and principles that we have developed over time. It takes advantage of the Azure-specific security framework that has positioned Azure as a cloud services leader, and it incorporates the security tools and technology that SAP and its partners have developed.



Lessons learned

As we secured our SAP infrastructure, we learned a few lessons:

Always keep security in mind.

Protecting business data is a top priority at Microsoft. When migrating SAP workloads to Azure, we needed to consider all the compliance and data security aspects of hosting data in the public cloud.

Balance security needs with the ability to troubleshoot.

In Azure, we don't open all ports on the cluster installation. We open only the ones that are really needed. We want the environment to be somewhat open to help with troubleshooting, but we don't want it to be too open.

Capture all application and data legal requirements during planning.

Because complying with legal requirements for data safety and security can be complicated, we needed to work with the stakeholders and data owners for each application to capture all corporate and legal compliance needs. Plan for this up front.

For a closer look, see [Protecting SAP S/4HANA data on Azure at Microsoft](#).

Our move to S/4HANA continues

Our move to S/4HANA is a long-term project, as it would be for any business. As our journey continues, we'll integrate industry best practices into every facet of the security infrastructure that we build for S/4HANA on Azure. This allows us to be agile and efficient and to provide scalability in our SAP environment—for ourselves and for you, our customers.

06

**Make the most
of your SAP
investment**

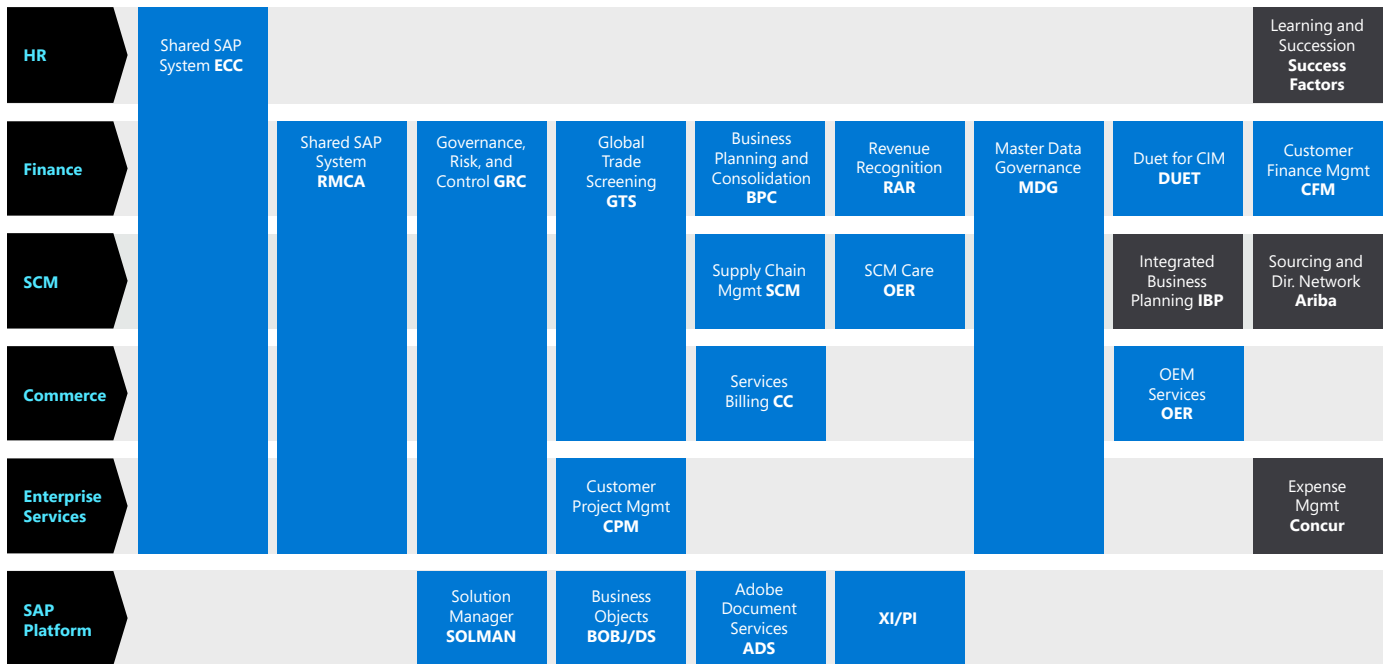


Chart representing the use of Azure and SAP SaaS at Microsoft.

■ Azure ■ SAP SaaS

At Microsoft, we're running 100% of our SAP applications on Azure. While our initial migration is complete, the CSEO team's optimization efforts are ongoing as we continue to lower our operating costs and improve our efficiency. We're also on guard for security threats and new ways to prevent attacks. And, as we noted earlier, we're now in the process of moving the company to S/4HANA.

With virtual machines sized to handle even a Microsoft-sized SAP ERP system, Azure can handle the smallest to the largest SAP deployment—so no matter the size of your business, Azure will help you make the most of your SAP investment.

Next steps

Contact us about scheduling an [SAP on Azure Migration Assessment](#)

[Try Azure for free](#)

Checklist:

15 lessons
learned on
moving SAP to
the cloud

Tips for assessing your SAP environment

- 1. Understand suitability and migration efforts.**

Before performing an IaaS migration, a best practice is to assess the complexity of your SAP workloads, the underlying infrastructure, the size of each workload and related databases (in terms of velocity, volume, and variety), and the requirements for seasonal elasticity.
- 2. Clean out your closet.**

Moving to the cloud is an opportunity to throw out the stuff you're not using. When you owned that old on-premises server, it didn't matter how much old stuff you had buried in there. When you're on the cloud, the cost of carrying around a lot of dead weight can add up fast.
- 3. Ensure that you don't overprovision your virtual machines.**

It's important to make sure that you provision enough resources so that you don't have to keep increasing your system weekly.
- 4. Determine an Azure region strategy before moving.**

Azure regions have truly global reach, so make sure that your resources are hosted in an Azure region or regions that provide the best connectivity for your company.

Tips for migrating SAP to the cloud

- 5. Consider moving low-risk systems to Azure with the vertical strategy right away.**

In evaluating when to use a vertical strategy, keep in mind that a low-risk end-to-end system might be a good candidate for testing this strategy and gaining experience with a production environment in Azure.
- 6. Consider building new systems in Azure from the start.**

When building new systems, consider building low-business impact systems in Azure. This might save you money and help you learn about production environments in Azure.
- 7. Understand migration strategies and how they can be best applied to your environment.**

Understanding what to move and when to move it is a big part of moving SAP to Azure. The horizontal and vertical strategies discussed in [Strategies for migrating SAP systems to Microsoft Azure](#) provide practical, business-friendly guidance.
- 8. Predict known business events.**

Don't move systems when they're highly critical. Consider scheduling around events like product releases, quarterly financial reporting, and big projects that go live in the production environment.

Tips for optimizing SAP in the cloud

- 9. Monitor technology advances.**
Azure technology and available virtual machine sizes and features always advance. Keep up-to-date with new capabilities and use them to achieve the best possible benefits for your business.
- 10. Consider optimizing your SAP environment before and after moving to Azure.**
You can optimize your environment before migrating by ensuring that retired systems aren't migrated, that your SAP infrastructure inventory is accurate, and that your disaster recovery plan is tested and in place. You don't want to waste migration time on systems or data that you don't need.
- 11. Design for high availability in your production systems** with Windows Server Failover Clustering, SQL Server Always On, and SAP features like logon groups, remote function call groups, and batch server groups.
- 12. Snooze so you don't lose.** Slash your costs by taking advantage of one of the cloud's best benefits: snooze your usage of Azure when your teams are out of the office on nights and weekends.

Tips for securing and managing SAP in the cloud

- 13. Always keep security in mind.**
Protecting business data is a top priority. When migrating SAP workloads to Azure, consider all the compliance and data security aspects of hosting data in the public cloud.
- 14. Balance security needs with the ability to troubleshoot.**
In a cluster installation, consider how you balance security with the ability to troubleshoot. A best practice is to open only the ports that are really needed. You might want the environment to be somewhat open to help with troubleshooting, but you don't want it to be too open.
- 15. Capture all application and data legal requirements during planning.**
Because complying with legal requirements for data safety and security can be complicated, it's a good idea to work with the stakeholders and data owners for each application to capture all corporate and legal compliance needs. Plan for this up front.



Next steps

Learn more about [SAP on Azure](#)

[Try Azure for free](#)

[Contact us](#)