

Introduction

2 minutes

The Learn modules for the Microsoft Cloud Adoption Framework for Azure will teach you how to apply the various guidance, tools, best practices, and reference architectures found within each methodology of the framework. This module can help you accelerate and unblock adoption in parallel to your learning paths.

In this module, you'll review the narrative that spans the majority of the Learn modules in this learning path. You'll also see how a range of getting-started resources in the Cloud Adoption Framework can accelerate results across your cloud-adoption efforts.

Learning objectives

In this module, you will:

- Understand common roadblocks that prevent adoption success
- Evaluate one or more guides that can help you get things moving or moving faster
- Get started on the proper course of action by using shared guidance and related Learn modules

Prerequisites

Before you apply the Learn modules for the Cloud Adoption Framework, you should have a general understanding of your current cloud-adoption plan. You should also understand the roadblocks that might prevent your organization from being successful.

As an alternative, this module provides a narrative and cloud-adoption plan for a reference customer named Tailwind Traders.

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Customer narrative

15 minutes

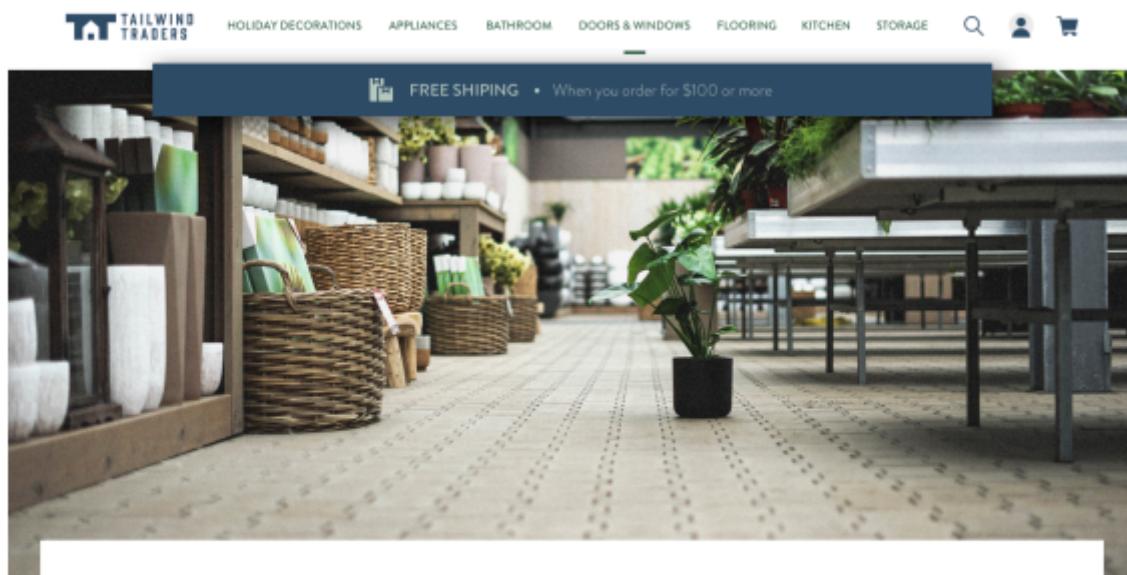


Figure 1: The Tailwind Traders logo.

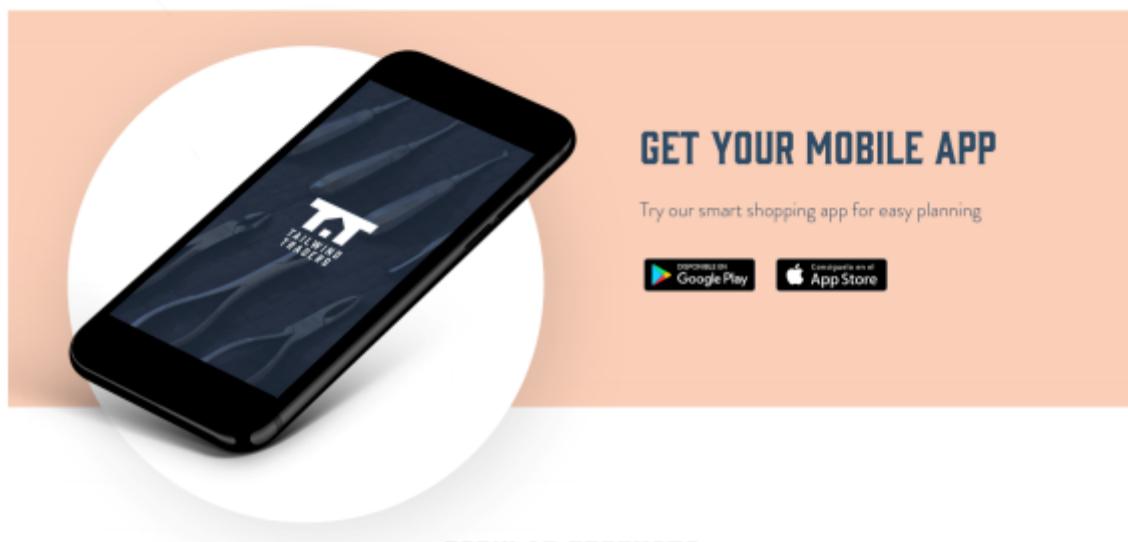
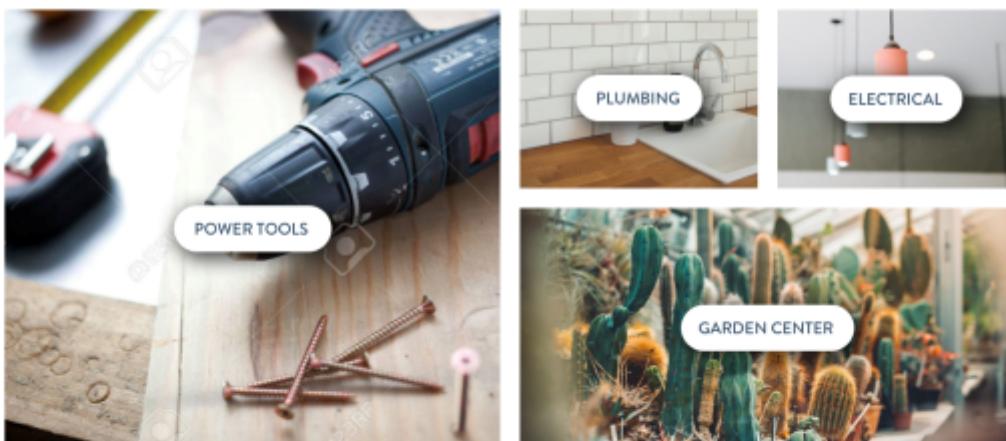
Tailwind Traders is a modern commerce company. For more than 30 years, the company has been a popular retail destination. It has grown to more than 50 physical stores. Several years ago, its Chief Executive Officer (CEO) anticipated changes in retail and bought a competing e-commerce startup that was growing aggressively in niche markets. Today, the company is seen as an innovative leader with customer-focused local storefronts.

Retail innovation

The Tailwind Traders retail innovation team uses technology to continually redefine the company's position as a leader in modern commerce.



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POPULAR PRODUCTS



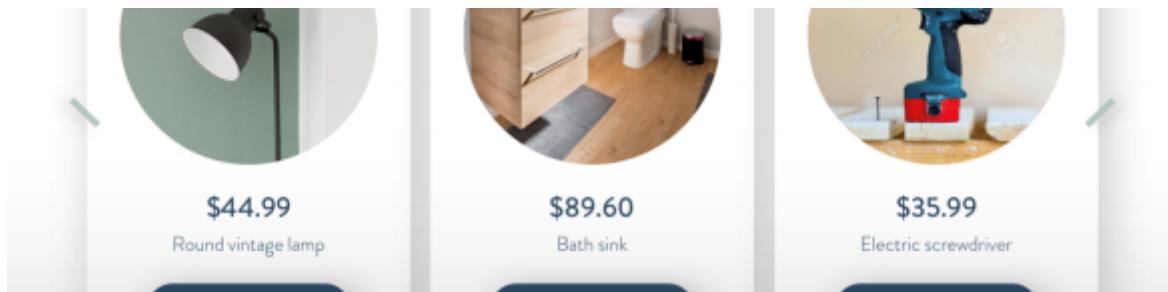


Figure 2: The website and application that started the retail innovation efforts.

The retail innovation team reports to the company's Chief Technology Officer (CTO), who was the CEO of the acquired e-commerce startup. Those technology solutions are the main hub for interactions with customers. Those solutions affect 60 percent of global revenue and produce 30 percent of annual gross sales. Examples of those innovations include:

- **Boundless commerce:** Originally a simple e-commerce solution, this custom-built platform now provides online and offline experiences for customers. Customers can make purchases from the platform. The mobile app gathers information from customers' viewing history to customize the retail experience with in-store ads, shopping lists, and other interactions.
- **Analytics, AI, and robotics innovation:** The team is experimenting with drone delivery, autonomous warehousing, and other AI-led approaches to reduce costs, scale through automation, and improve customer experiences. These experiments are built on big data, analytics, and AI solutions.

Information technology

Beyond new innovations, Tailwind Traders' central IT teams support the back office and store technologies.

Achieve balance

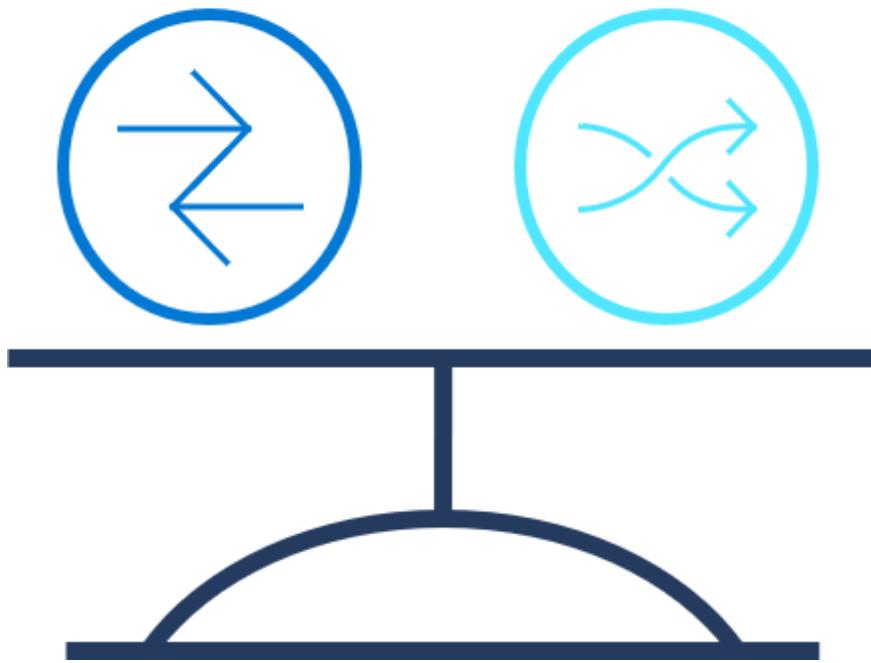


Figure 3: A balance of speed and control.

The retail innovation team is a division of the company's IT team. It's led by Tailwind Traders' Chief Information Officer (CIO). E-commerce and innovation are just the beginning of the company's technical capability, and they're a small portion of the overall IT spend. The company supports 3,500 employees, and fewer than 100 are dedicated to IT. The innovation team consists of only 20 employees who are mostly developers.

Beyond core innovation, the IT team supports the following types of technologies:

- **Smart storefronts:** Storefronts include environmental controls, doors, lighting, interactive shelves, in-store displays and advertisements, and more than 500 point-of-sale systems.
- **Corporate headquarters:** More than 900 employees work in corporate headquarters. Technology systems cover best-of-breed solutions to support processes across areas like real estate, logistics, supply chain, pricing, human resources, employee schedules/tracking, and payroll.
- **User workstations:** Workstations are mostly desktop-based. A growing number of employees are opting for mobile and BYOD (bring your own device) options, in-store kiosks, and virtual desktop solutions.
- **Central operations:** The IT team provides ongoing technical operations for all IT and retail innovation assets.

CIO transition (new strategy)

The previous CIO of Tailwind Traders recently retired. The new CIO is focused on improving technical operations in multiple areas to fuel greater innovation throughout the company while limiting disruptions to core business operations. The cloud will play an important role in this transition.

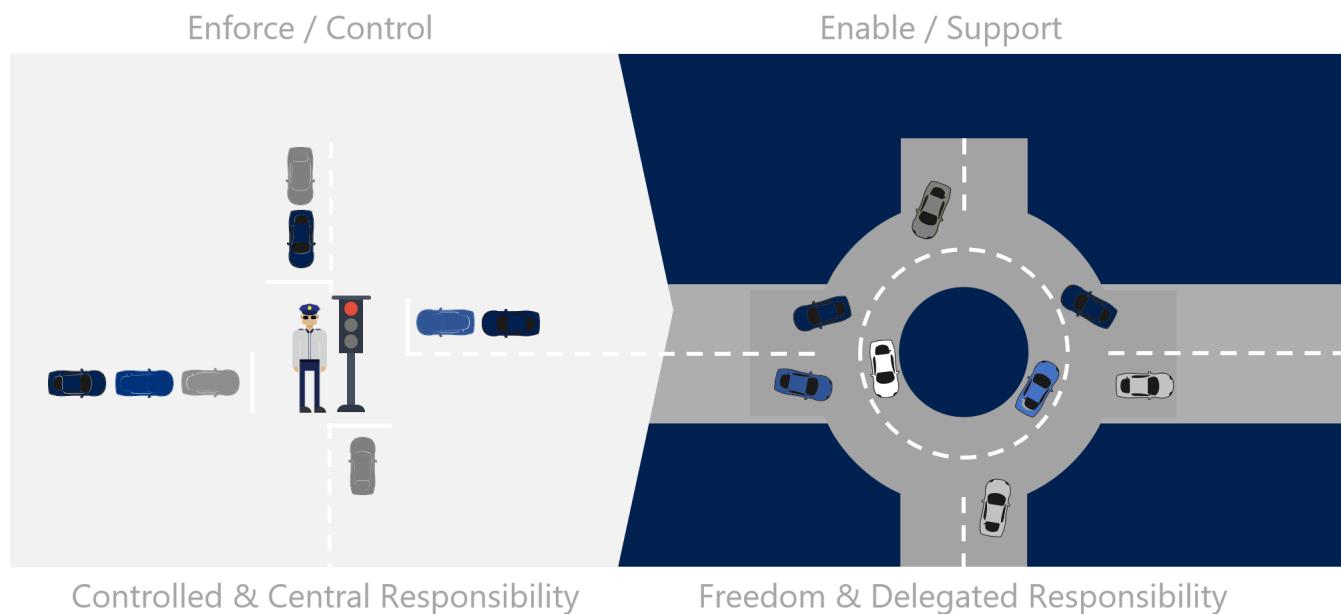


Figure 4: The shift in IT operations.

A cornerstone of this strategy will be a shift in the operating model: moving from a centralized command-and-control operating model to a model that focuses on delegated responsibilities led by a cloud center-of-excellence team. This transition is expected to take several years. The CIO will be looking for small incremental steps to transition in each of the coming projects.

IT portfolio overview

Tailwind Traders currently has three datacenters. One is located in the same office building where employees work; the company owns this building and datacenter. The two other datacenters are in separate locations and are leased from datacenter providers.

The datacenters are a mix of physical and virtual servers. The virtualization platforms are a mix between Hyper-V and VMware, because various people with different strategy ideas have led the IT department over the years.

The company's servers primarily run Windows Server, with a mix of Windows Server 2008 R2, Windows Server 2012, and Windows Server 2016. The company has only a few Windows Server 2019 instances. Upgrading the operating systems to the latest version or following a consistent strategy has never been a priority for the organization, despite IT team members trying to push that goal.

There are a few Linux and other open-source servers. The IT operations team isn't familiar with the servers, because the development team has introduced them without collaboration between the teams.

The leases for the two external datacenters are due to run out in 18 months and 2 years, respectively. The IT manager and finance director have been talking, and they don't want to renew the leases. Instead, they're considering a project to upgrade, consolidate, and use the cloud as a replacement datacenter. The new CIO is using this project as an opportunity to rethink IT operations.

Team

- **CIO:** This is the first transformation effort to start since the new CIO accepted the role. The CIO will closely monitor the project and will examine how IT operates in the cloud.
- **CTO:** The smaller of the two external datacenters hosts IT assets, including the experiments that the retail innovations team is developing. That datacenter also hosts mainstreamed innovations that are now considered production IT assets. The CTO wants to ensure that the company continues to innovate and that the existing innovations will be properly supported.
- **Project managers:** Part of the IT department, project managers help to keep projects on time and on budget. They ensure that all the right stakeholders are involved.
- **Central operations or infrastructure team:** The operations team is currently in charge of the datacenters. This team oversees areas like hardware maintenance, operating systems, patch management, networking, and out-of-hours support. Most team members are familiar with the current infrastructure but have little coding experience. The majority holds Microsoft qualifications related to Windows Server.
- **Developer:** The in-house development team makes the website for the online store that Tailwind Traders hosts from its own datacenter.
- **IT manager:** The IT manager is in charge of the operations, developer, and project-management teams. This manager wants to make the IT department run better, replace old servers, and make Tailwind Traders more competitive. Another goal is to make things better for the operations team, which juggles many different systems.
- **Finance director:** The finance director wants to reduce costs from the budget where possible. This director is familiar with the capital expenditure for the IT department and equipment.

Check your knowledge

1. Which assets in the technology portfolio summary aren't compatible with Azure?

- VMware virtualization
 - Linux and other open-source servers
 - Servers running Windows Server
 - All of the above are compatible with Azure
- ✓ **Azure can host VMware, Windows, Linux, and various other technical assets.**

2. What risks might prevent Tailwind Traders from successfully migrating two datacenters in the next 18 to 24 months?

- Effort and time to migrate the portfolio
- Controls to operate the migrated assets

✗ **Governance, security, and operations controls are required to migrate whole datacenters. This isn't the only risk.**
- Organization of people, teams, and responsibilities
- It depends; all of the above

✓ **At different stages of cloud adoption, the risks and roadblocks will change. The next module in this series will help you detect and address each of these common risks.**

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Common blockers

15 minutes

In this exercise, you review a few common blockers and find the most applicable getting-started guides to overcome them. This exercise will focus all of the various points of guidance from the Cloud Adoption Framework into manageable, actionable steps.

Scenario 1: The chief information officer is concerned about progress

In the previous unit, Tailwind Traders was considering migrating two datacenters to avoid costly contract renewals and move to a modern operating model in the cloud. The company assembled a migration team that consists of a project manager, a central operations/infrastructure team, and an IT manager.

In the last three months, the team has migrated a few hundred virtual machines (VMs) to Azure. The team has retired 30 percent of the VMs in the existing datacenter. The team members feel like they're ahead of schedule, but they haven't retired any production hosts yet.

As the deadline for this project approaches, the Chief Information Officer (CIO) has begun to express concerns with progress toward retiring the physical infrastructure in the existing datacenters. Unfortunately, the team doesn't have a clear dependency map to show the hosts for each VM and when a host is no longer needed.

This is a common experience for customers who are new to cloud migration. Engaging an experienced partner can help with these concerns, as can proper planning and data-driven decisions.

The getting-started guide for [accelerating migration](#) will help the Tailwind Traders migration team address these concerns. In particular, that guide will help the team create a data-driven dialogue with leadership around stakeholder expectations and the general strategy. It will also help the team collect data on the overall portfolio and then map that data to actionable cloud adoption plans.

Scenario 2: Cost misalignment

The Tailwind Traders migration team has gotten its migration-factory processes running smoothly. The finance director recently joined the team to review the budget and overall progress. That meeting didn't go as planned. Progress toward business objectives was well received, but the cloud costs are rising at a much higher pace than expected. Updated forecasts suggest that the final costs of hosting in the cloud will be significantly higher than expected.

As cloud adoption scales, customers commonly experience issues related to proper controls. By accelerating the migration effort, the migration team has skipped important steps around governance and establishing proper guardrails. Cost is the first indicator of this missed step. Fortunately, it's the easiest to bring back under control.

The getting-started guide on [managing cloud costs](#) is the best starting point for this common blocker. That article outlines a series of best practices to quickly optimize enterprise costs and resolve the finance director's concerns. It then builds on those best practices by establishing recurring processes to minimize budgetary surprises in the future.

Scenario 3: Operations support

When a migration results in hosting a production workload in the cloud, the business now takes a dependency on the operations of those cloud assets. Tailwind Traders didn't account for this dependency. It was just assumed that the central operations team would use its existing tools and processes to manage operations. That assumption might not prove accurate.

Before operational management processes could start, the CIO asked the following basic questions. Because the team didn't have answers readily available, the CIO advised that production traffic remain with the current datacenter until the team knew the answers to those questions.

- We can stick with our existing processes, but should we? Is that the best thing for our business, or do we need a dedicated cloud-operations team?
- As we democratize decisions and empower workload teams to drive innovation, how do those teams interact with the operations team?
- What services are included in our operations baseline for all workloads?
- What things can a workload team add on to go deeper into operations monitoring and optimization?
- Are we capitalizing on the advanced operations built into the Azure platform?
- What guardrails will ensure that all workload teams follow best practices for stable operations?

You don't need to change how you operate to adopt the cloud, but you should be able to answer these basic operations-management questions during any migration of a full datacenter. Transitioning to an operations team after migration is often a blocker for migration efforts. The getting-started guide on [building a cloud operations team](#) walks through steps to answer each of these questions and determine whether you need a dedicated cloud operations team.

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Knowledge check

10 minutes

Getting-started guides

The Cloud Adoption Framework spans the entire cloud adoption lifecycle. Throughout that lifecycle, you can use various methodologies that are designed to help a specific role deliver a defined function.

But when you're dealing with an adoption blocker, there isn't time to mature along all of those potential roles and methodologies. The framework's getting-started guides pull out the actionable tasks and deliverables from each relevant methodology to help a smaller team deliver results faster.

The guides organize blockers into the following categories on the [getting-started page](#):

- **Establish teams:** Depending on your adoption strategy and operating model, you might need to establish a few teams. These guides help you get those new teams started, or redistribute duties if a dedicated team isn't needed.
- **Improve controls:** As cloud adoption grows, you need a solid operating model to ensure wise decisions and proper organizational change. Align people and improve operations to develop your cloud operating model.
- **Accelerate adoption:** Cloud adoption requires technical change, but to digitally transform with the cloud, it requires more than just IT. Use these guides to start aligning various teams to accelerate migration and innovation efforts.
- **Align foundation:** Your company's cloud is built on a set of foundational decisions that can affect all cloud-based outcomes. This guide and conceptual information can help you make core decisions and document them.

Choose the best response for each question, then select **Check your answers**.

Check your knowledge

1. Which getting-started guides can help if your adoption efforts stopped or reached a plateau?

- Establish teams
- Improve controls

✓ When adoption stops entirely, it's commonly the outcome of some fear, uncertainty, or doubt. The team needs to build confidence in its ability and be sure that its decisions won't hurt the company. The guide on enabling customer success can help with each of the common blockers here.

- Accelerate adoption

✗ Fast is good, but trying to move faster might not address this blocker.

- Align foundation

2. Which getting-started guides can help if things are progressing slower than expected?

- Establish teams
- Improve controls
- Accelerate adoption

✓ Each of the guides that focus on accelerating adoption can help you slow down and check the basics so that you can go faster as a team.

- Align foundation

3. The IT governance team is concerned about guardrails outlined in your IT governance policies. How can you partner with it to establish the right guardrails?

- Establish teams

✓ Governance can be complex. Start by working with IT governance to see whether a cloud governance team is required. Either way, ensure that steps 5-7 are clearly assigned.

- Improve controls

✗ There might be easier approaches that don't require ongoing processes.

- Accelerate adoption
- Align foundation

4. Designing a cloud environment that can support your term adoption plans is slowing your adoption plans. How do you get back on track?

- Establish teams
- Improve controls
- Accelerate adoption

✓ Azure landing zones and the getting-started guide on environment design can help you design and deploy the environment that you need.

- Align foundation

5. The business is responding to rapidly changing market conditions, which is disrupting cloud adoption and digital transformation progress. Which getting-started guides can help?

- Establish teams

✓ When changing priorities hinder adoption and transformation efforts, a cloud strategy team can help you create the clarity and stability that you need to move forward.

- Improve controls

- Accelerate adoption

✗ Fast is good, but trying to move faster might not address this blocker.

- Align foundation

6. You need to be able to onboard new employees, partners, or other forms of support. How can you accelerate onboarding and transitions from one project to another?

- Establish teams

- Improve controls

- Accelerate adoption

✗ Fast is good, but trying to move faster might not address this blocker.

- Align foundation

✓ There are many ways to adopt the cloud and several decisions to make along the way. Clear documentation of your foundational decisions will help new team members understand your environment and decisions quickly.

✓ 100 XP ➔

Introduction

5 minutes

All great efforts start with a simple question: *Why?* Digital transformation is disrupting entire industries. Some organizations embrace transformation and reshape their futures. Others use transformation to improve margins and hold onto existing market share. Success in cloud adoption depends on having a clear strategy that helps a team understand executive direction and regularly measure progress. This module will help you capture the cloud adoption strategy you need to drive your success.

In this executive-level module, you'll:

- Compare motivations
- Define business objectives and key results
- Evaluate your financial and technical considerations
- Successfully build your cloud business case with key financial and technical guidance
- Learn how tools like the Cloud Adoption Strategy Evaluator and the Azure Virtual Machine (VM) Cost Estimator can help you better understand the value and financial considerations of cloud adoption

Learning objectives

In this module, you'll:

- Create clarity for a corporate strategy to ensure that all team members are working toward common goals
- Establish metrics to create clarity, help the team learn, and systematically work toward your organizational objectives
- Evaluate financial considerations to understand the value of cloud adoption
- Assess your strategy using the Cloud Adoption Strategy.
- Evaluate technical considerations to help the team prepare for successful cloud adoption projects

To support these learning objectives, download the [Cloud Adoption Framework strategy and plan template](#) to record strategic decisions you make while completing this module.



Customer narrative

10 minutes

In earlier Microsoft Learn modules for the Cloud Adoption Framework, we shared the narrative of Tailwind Traders. This module is the first step toward Tailwind's cloud adoption journey. The Tailwind team is evaluating its strategic direction and ensuring stakeholder buy-in before committing to a cloud effort.

The following excerpts from the customer narrative outline strategic objectives for Tailwind.

Innovation objectives

Like most businesses, Tailwind Traders is attempting to balance two competing business drivers: digital transformation and risk mitigation.

The Tailwind Traders retail innovation team uses technology to continually redefine the company's position as a leader in modern commerce. Those technology solutions are the primary hub for interactions with Tailwind customers. The solutions affect 60 percent of global revenue and produce 30 percent of annual gross sales. A few examples of those innovations include:

- **Boundless commerce:** Originally a simple e-commerce solution, this custom-built platform now provides online and offline experiences for customers. Customers can make purchases from the platform. The mobile app gathers information from the customers' viewing history to customize the retail experience with in-store ads, shopping lists, and other interactions.
- **Analytics, AI, and robotics innovation:** Tailwind is experimenting with drone delivery, autonomous warehousing, and other AI-led approaches to reduce costs, scale through automation, and improve customer experiences. These experiments are built on big data, analytics, and AI solutions.

Migration objectives

In addition to new innovations, Tailwind Traders' central IT team supports the back office and its store technologies. The company's central IT team supports 3,500 employees. Fewer than

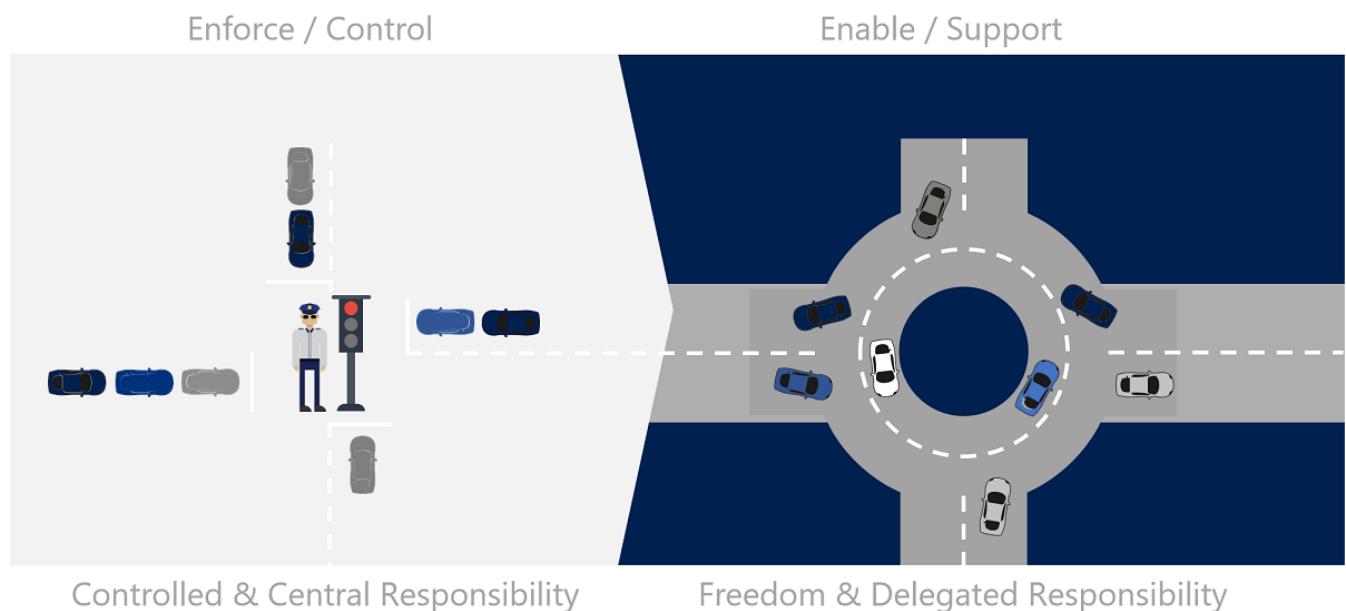
100 Tailwind employees are dedicated to IT. The IT team represents most of the technical staff, with roughly 80 employees focused on supporting the following types of technologies:

- **Smart storefronts:** Environmental controls, doors, lighting, interactive shelves, in-store displays and advertisements, and more than 500 point-of-sale systems.
- **Corporate headquarters:** More than 900 employees hosted in corporate headquarters, with technology systems that offer best-in-class solutions to support processes like real estate, logistics, supply chain, pricing, human resources, employee schedules and tracking, and payroll.
- **User workstations:** Mostly desktop-based, with a growing percentage of employees opting for mobile, bring your own device (BYOD), in-store kiosks, and virtual desktop solutions.
- **Central operations:** Ongoing technical operations for all IT and retail innovation assets.

Tailwind Traders currently has three datacenters. The leases for two of its datacenters are due to end in 18 months and 24 months. The IT manager and finance director have been talking, and they don't want to renew the leases. Instead, they are considering a project to upgrade, consolidate, and use the cloud as a replacement for the two expiring datacenters. The CIO sees this project as an opportunity to rethink IT operations for the company.

Strategic priorities

Tailwind Traders has a new CIO because of a recent retirement. The new CIO is focused on improving technical operations in several areas to fuel greater innovation throughout the company, but while limiting disruptions to core business operations. The cloud will play an important role in this transition.



A cornerstone of the new strategy will be a shift in the operating model, moving from a centralized command-and-control operating model to a model that focuses on delegated

responsibilities that are led by a cloud center of excellence team. This transition is expected to take several years. The CIO will be looking for small, incremental steps that will transition the company in each of the coming projects.

The CIO also uses the [Cloud Adoption Strategy Evaluator](#) to assess the company's cloud adoption plan and get recommendations on building or advancing the cloud business case. The Cloud Adoption Strategy Evaluator is based on the Cloud Adoption Framework. It helps organizations assess their approach to cloud adoption. This assessment makes recommendations based on the principles of cloud economics that help an organization create a robust business case and enable successful cloud adoption.

Transitioning to this new operating model is expected to reduce vendor complexity and Tailwind's overall cost of operations. The CIO will use the redistributed savings to further accelerate technical and operational capabilities, increasing the IT team's position as an innovation leader across the business.

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✓ 100 XP



Capture strategic motivation

10 minutes

This unit discusses some of the motivations for cloud migration that can lead to more successful business outcomes. Considering common motivations can help facilitate a conversation about business drivers and, ultimately, business outcomes.

Tailwind Traders' executive challenge

A review of the customer narrative would suggest that both innovation and migration are motivations for Tailwind Traders. Much of the company's focus is on innovative technology investments, but most of the technology costs are on central IT operations.

Tailwind exhibits many common business values and expected benefits, including innovation and growth, improvements to operations and security, and technical capabilities and agility. Use this unit to understand how the company balances those expectations.

Guiding the conversation

Digital transformation is a substantial bet for many organizations and the technology teams that lead the efforts. A successful digital transformation produces returns for all who are involved.

Whether they succeed or fail, digital transformation programs can define careers and the future of a business. Strategic clarity and executive buy-in are imperative for success. A clear commitment to strategic motivations drives investment allocation and helps leaders make difficult technical decisions.

Prioritizing motivations is the first step toward creating clarity in corporate strategy. This step helps ensure that all team members are working toward common goals, and it secures executive sponsorship to set budget, modify operations, and review results.

Most digital transformation "failures" end in technological success, but they don't deliver on the initial strategic change that's required to positively affect the business. Ensure that technical success equates to business success by defining clear motivations and expectations with executive level leaders as early as possible.

Throughout this conversation, be prepared to engage various personas. The following list shows a few of the types of roles that will be involved in establishing strategic vision and each persona's most common focus area:

- **Finance leadership:** Increase profitability while driving compliance
- **Marketing:** Acquire and retain customers and build reputation
- **Sales:** Accelerate sales and improve customer lifetime value
- **Human resources:** Retain, recruit, and empower employees
- **Executive leadership/board of directors:** Meet market growth requirements and environmental sustainability metrics

Motivations

Business transformations that are supported by cloud adoption can be driven by various motivations. It's likely that several motivations apply at the same time.

The goal of the lists in the following table is to help generate ideas about which motivations are relevant for your organization. From there, you can prioritize and assess the potential impacts of the motivations. Your cloud-adoption team should meet with executives and business leaders and use this list to understand the motivations that might be affected by a cloud adoption effort.

Critical business events	Migration	Innovation

Critical business events	Migration	Innovation
Datacenter exit	Cost savings	Preparation for new technical capabilities
Merger, acquisition, or divestiture	Reduction in vendor or technical complexity	Building new technical capabilities
Reduction in capital expenses	Optimization of internal operations	Scaling to meet market demands
End of support for mission-critical technologies	Increase in business agility	Scaling to meet geographic demands
Response to regulatory compliance changes	Preparation for new technical capabilities	Improved customer experiences and engagements
New data sovereignty requirements	Scaling to meet market demands	Transformation of products or services
Reduction of disruptions and improvement of IT stability	Scaling to meet geographic demands	Market disruption with new products or services
Reduce carbon footprint	Integration of a complex IT portfolio	Democratization or self-service environments

Classify your motivations

Your motivations for cloud adoption likely will fall into multiple categories. As you're building the list of motivations, you'll probably see trends emerge. Motivations tend to be associated more with one classification (critical business event, migration, innovation) than with others. Use the predominant classification to help guide the development of your cloud-adoption strategy.

When a response to *critical business events* is the highest priority, it's important to [get started with migration](#) early, often in parallel with strategy and planning efforts. Taking this approach requires a growth mindset and a willingness to iteratively improve processes based on direct lessons learned.

When *migration* is the highest priority, strategy and planning play a vital role early in the process. We recommend that you implement the first workload in parallel with planning efforts to help the team understand and anticipate any learning curves that are associated with cloud adoption.

When *innovation* is the highest priority, strategy and planning require additional investments early in the process to ensure balance in the portfolio and wise alignment of the investment that's made during cloud adoption. For more information and guidance, see [Understand the innovation journey](#).

To ensure wiser decision making, all participants in the migration process should have a clear awareness of their motivations. The following section outlines how leaders in the organization can influence wiser decision outcomes through consistent, strategic methodologies.

Motivation-driven strategies

This section highlights the *migration* and *innovation* motivations and their corresponding strategies.

Migration

The migration motivations that are listed near the top of the motivations table are the most common reasons for adopting the cloud, but they're not necessarily the most significant reasons. These outcomes are important to achieve, but they're most effectively used to transition to other, more useful worldviews. This important first step to cloud adoption often is called a *cloud migration*. The framework uses the term [migrate](#) to refer to the strategy of executing a cloud migration.

Some motivations align well with a migration strategy. The motivations at the top of this list likely will have significantly less business impact than motivations toward the bottom of the list. Top migrations motivations include:

- Saving on operating costs
- Reducing vendor or technical complexity
- Optimizing internal operations
- Increasing business agility
- Preparing for new technical capabilities
- Scaling to meet market demands
- Scaling to meet geographic demands

Innovation

Data is the new commodity. Modern applications are the supply chain that drives data into various experiences. In today's business market, it's hard to find a transformative product or service that isn't built on top of data, insights, and customer experiences. The motivations that

appear lower in the innovation list align to a technology strategy that's referred to as [innovate methodology](#) in this framework.

The following list includes motivations that cause an IT organization to focus more on a strategy to innovate than on a strategy to migrate:

- Increasing business agility
- Preparing for new technical capabilities
- Building new technical capabilities
- Scaling to meet market demands
- Scaling to meet geographic demands
- Improving customer experiences and engagements
- Transforming products or services

Cloud adoption horizons

It's common for organizations to have competing motivations. But competing motivations create a divide in the financial investments that the company can make in any one objective. Such a divide leads to an overall reduction in the amount of change or transformation that any effort can deliver.

Stratification is a sound principle in macroeconomics. But with the limited budget of most technology-driven change management projects, a stratified approach leads to confusing and distracting signals within the program. More noticeably, multiple, simultaneous investments in competing strategies lead to misalignment of the people, processes, and projects that are required for overall program success. For digital transformations to succeed, organizations must prioritize motivations based on timeline expectations, organizational alignment, and capacity for investment.

To create clarity and alignment, it's suggested that complex digital transformation projects align to an organization's horizons or phased program delivery. In this type of approach, the company commits to a single motivation category for a time-bound period. All teams and organizations prioritize investments and collaborate to support the priority outcome, as needed, for the defined period of time. This approach creates unity, clarity, and drives a snowball effect, allowing the success of one horizon to accelerate the target outcomes of the next horizon.

Cloud adoption strategy tools

Tailwind Traders uses the [Cloud Adoption Strategy Evaluator](#) to assess its strategy posture across distinct areas of the Strategy methodology, such as:

- Identifying motivations
- Documenting expected business outcomes
- Evaluating financial considerations
- Technical considerations in creating a business case.

Based on responses to the assessment questions, the Cloud Adoption Strategy Evaluator navigates you in detail through the categories most relevant to your organization.

Personalized to you, according to your inputs for each question, we provide you with an aggregate strategy score—calculated and averaged across your uniquely identified strategy areas.

As you create your cloud adoption plan, and then document your strategy for stakeholder review, you'll also receive curated guidance that points to specific tools and templates, along with recommendations based on principles of cloud economics and organizational alignment that provide a unified approach to build your business case.

[Take the Cloud Adoption Strategy Evaluator assessment.](#)

Tailwind Traders' horizon plan

For Tailwind, a high number of motivations appear in each category of the motivations table. Diverse motivations suggest that the organization has multiple critical business events to address, a need for operational improvements from a migration or modernization, and innovation opportunities:

- **Datacenter exit:** The datacenter exit requires significant focus from the central IT and retail innovation teams. The 12- to 18-month time frame to fully plan two datacenter replacements is aggressive but realistic, if there are few distractions.
- **Operational improvements:** Accelerating innovation requires modernizing existing operational systems. It also requires modernizing processes that are dedicated to current production environments.
- **Innovation expansion:** The long-term objective is to continue to grow and lead the market through innovation. The ultimate goal is to maximize the amount of effort IT invests in innovation overall.

Tailwind's horizons would align to the following target schedule, to be evaluated quarterly:

Horizon	Objective	Time frame	Considerations

Horizon	Objective	Time frame	Considerations
1. Migration and modernization	Prioritize the datacenter exit with a focus on modern platform as a service (PaaS) solutions over a basic lift-and-shift migration	Months 0 - 18	The migration as priority should minimize conflicts with existing innovation commitments
2. Operation modernization	Prioritize operational improvements built on cloud-native governance, operations management, security, and compliance capabilities	Months 6 - 18	This effort complements and supports the primary migration effort
3. Advanced modernization	With post-migration and operational improvements, the team will have sufficient data and cloud skills to perform deeper modernization of complex architectures	Months 18-24	
4. Innovation and growth	Redirect capital reduction from datacenter exits and new skills in central IT to focus on accelerating continued innovation	Month 24+	All prior horizons will produce a long list of new innovations as the central IT and retail innovations teams create tighter collaborations and build out automation assets

Record your observations

If you haven't already, download the [Cloud Adoption Framework strategy and plan template](#). Under **Motivations and drivers**, use the motivations discussion in this unit to describe your motivations.

Next unit: Define objectives and key results

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Define objectives and key results

5 minutes

Business outcomes are how we measure strategic impact. Some organizations have existing key performance indicators (KPIs), which provide a measure for strategic impact. KPIs are a fine way to measure impact, but for organizations that don't already have operational KPIs and the rich analytics systems required to track that progress, objectives and key results (OKRs) are a more manageable approach.

This unit demonstrates how to define OKRs that can measure your strategic impact.

Define business outcomes by using OKRs

Modern operations require modern ways to measure business outcomes, and cloud technology can help increase velocity for a business. An organization's measurement platform should support a company's outcomes and plan for growth by:

- Providing insights to team members and groups
- Supporting staff to pivot quickly when outcomes don't align with strategy and expectations
- Offering a structured format, templates, sequences, and tools to help teams plan for and visualize increasing velocity

OKR overview

OKRs have proven to drive alignment in complex work environments, foster innovation, and help individuals focus on what matters. Many organizations have begun to use OKRs. OKRs are based on two components: an objective and key results for that objective. An objective is the statement of intent: what is the team trying to accomplish, and why is it important? Key results are specific outcomes that track impact on the objective:

Objective: Clarity and intent

Key results: Measures of success within a quarter

It's important to understand that OKRs are useful for measuring team outcomes rather than individual performance. Because deadlines often motivate team performance, key results are

established quarterly. OKRs help teams focus on the most important tasks instead of on the volume of work at hand. To focus on critical tasks, focus on what happens in a month, a quarter, and other short-term intervals. You can have OKRs that last longer, but shorter intervals emphasize the need for OKRs that track short-term impact.

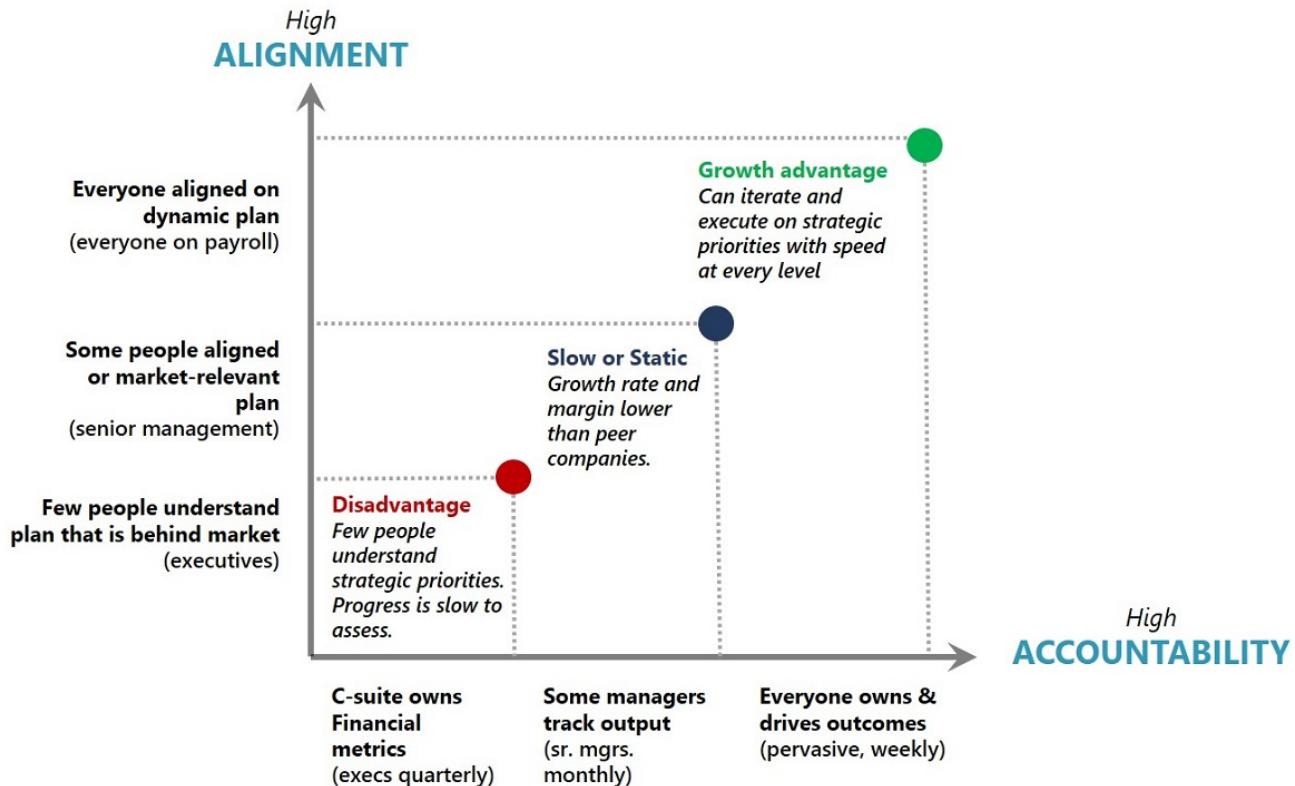
OKR key principles

Here are the key principles of OKRs:

- **Aspire and inspire:** Teams establish their best possible results in a given quarter, focus efforts on great outcomes, and use retrospectives to learn and iterate.
- **Outcome focus:** Quarterly key results provide clarity on where value is created. Being aware of where value is created helps teams and the organization drive business impacts faster.
- **Global and local:** Teams localize OKRs into their nouns, verbs, and numbers that enrich OKRs with the team's expertise and insights.
- **Transparent:** OKRs, alignment, and progress are visible to everyone through OKR software, which simplifies collaboration and supports making good decisions faster.

How OKRs add value to an organization

OKRs help create alignment and accountability within organizations, as demonstrated in the following graph:



Examples of OKRs

The principles of OKRs can help your organization understand how useful OKRs take form. Objectives need to inspire your company and its teams to fully understand your mission. Key results need to be specific and measurable within a quarter.

Here are some examples of OKRs:

Objective 1: Be the top US provider of learning platforms to schools

Key results:

- 45 percent of K-12 schools using our platform
- A 12 percent increase in student engagement, as measured through internal systems
- A 95 percent satisfaction rate from quarterly parent surveys

Objective 2: Build a technology platform that supports every person in our business to innovate and create

Key results:

- Five new applications developed and adopted across the organization
- Every team with at least two members using Microsoft Power Platform
- Including new cloud technologies like data analytics and machine learning in all customer-facing applications

Objective 3: Transform our approach from sales driven to data driven

Key results:

- Increasing pipeline coverage from 50 percent to 200 percent
- Increasing closing rates for sales engagements by 5 percent
- Reducing the time to close deals by 8 percent

Implement OKRs

Five steps can help your organization move forward with OKRs:

Step 1: Learn. Start exploring what OKRs can do for your business. Tune in to some of your industry peers and leaders to learn how OKRs have benefited their organizations.

Step 2: Plan. As you begin to draft your OKRs, ensure that your sponsors contribute and are involved in the process. Work with an OKR coach to refine your OKRs.

Step 3: Launch. Each organization launches initiatives differently. Maintain a strong communication plan, and build the OKR calibration and celebration process into your operating model.

Step 4: Drive. To maintain rigor and focus, make sure that you're sharing outcomes and results across the organization. Sharing results and outcomes helps your teams adopt a habit of using OKRs.

Step 5: Improve. Continue to improve, revisit, and rethink how you connect across the organization. OKRs in spreadsheets can be useful, but an organization can benefit most from everyone participating to meet objectives and gain insights from the aligned data.

Record your observations

If you haven't already, download the [Cloud Adoption Framework strategy and plan template](#). Under **Business outcomes**, use the OKR principles discussed in this unit to shape your first business outcomes.

Anticipate financial considerations

When migrating to the cloud, it's important to think differently about how you'll consume and manage your cloud resources. As you build your business case, it's critical to understand the key principles of cloud economics and transform your mindset. Part of this transformation is discovering technical and financial flexibility, efficiencies, and capabilities that aren't possible

with your on-premises IT infrastructure. When you plan short- and long-term cloud solutions and align them to business outcomes, you can achieve more with every dollar you invest.

Next unit: Evaluate financial considerations

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Evaluate financial considerations

10 minutes

Measuring objectives and identifying the return expected from a specific objective can help you to define a financial consideration. Cost is another key financial consideration. In this unit, we explore various outcome-driven considerations, a few formulas to calculate costs, and how organizations can reduce capital expenditures.

Understand your financial stories

The core financial benefits of Azure are driven by a fundamental shift in the IT operating model. This shift benefits your organization's core financial statements and frees up cash flow for reinvestment:

Balance sheet: When you operate on-premises in datacenters, you might have invested up front in long-term assets that limit the cash and capital required to grow your business. While in the cloud, you can shift datacenter operations costs into modernization, developing cloud applications, and other projects that drive business growth. This shift can make your balance sheet more agile.

Cash flow statement: The pay-for-what-you-consume model and the ability to apply policies and tags to your Azure resources can help you improve the predictability of your cash flow statement. This model delays spend and improves the timing of your cash flow.

Income statement (profit and loss): You can improve profitability over time by taking advantage of Azure's flexibility, low management costs, services, and pricing models.

Common finance vocabulary terms

Use these common finance terms when your team is creating a cloud migration business case. These terms can help when you share your business case with a finance team.

Terms

Amortization: An expense tied to a typically intangible asset, that reflects the *economic* usage of that asset in a particular time period. For example, if you purchase a license worth USD100,

you'd capitalize that on your balance sheet. If you amortized it over five years, you'd annually recognize an expense of USD20 per year that impacts your income statement.

Balance sheet: A balance sheet is a financial statement that reports a company's assets, liabilities, and shareholders' equity as of a specific date.

Capital Expense (CAPEX): The upfront investment in equipment. This equipment is capitalized as an asset and put on your balance sheet.

Cash flow statement: A cash flow statement is a financial statement that summarizes the amount of cash and cash equivalents entering and leaving a company during a given period.

Cloud economics : An understanding of the benefits and costs of the cloud, and the financial impact when you start a migration from on-premises to cloud computing.

Depreciation: An expense tied to a capitalized asset, that reflects the *economic* usage of that asset in a particular time period. For example, if you purchase a server worth USD100, you'd capitalize that on your balance sheet. If you depreciated it over five years, you'd annually recognize an expense of USD20 per year that impacts your income statement.

Double-mortgage period: A period when you have two sets of costs at the same time. For example, when you have both on-premises and cloud costs.

Earnings before interest, taxes, depreciation, and amortization (EBITDA): A performance indicator of the profitability of a business. This starts from *operating income*, which is the income from your ongoing business operations (ignoring things like taxes or interest expense) and adds back depreciation and amortization. While a useful performance metric that's used for comparability, it's often viewed in conjunction with metrics like Capital Expenditure to have a better all-up understanding of a company's ability to generate free cash flow.

Net Present Value (NPV): An assessment of the financial value of a business investment. This metric looks at cash flows, timing, and the required interest rate.

Operating Expense (OPEX): The ongoing expenses for a business. For example, a maintenance payment or periodic bill for Azure services.

Profit and Loss (P&L): A financial statement that summarizes the revenues, costs, and expenses incurred over a specified period, usually a fiscal quarter or year. It is also referred to as the income statement.

Return on Investment (ROI): Return on investment (ROI) is a metric used to understand the profitability of an investment. ROI compares how much you paid for an investment to how much you earned to evaluate its efficiency.

Sample outcomes by category

Speaking in terms of business outcomes can feel like a foreign language to many technical-minded individuals. To help ease translation, we've curated a set of business outcome examples. You can use the following examples to inspire and demonstrate business outcomes that are based on actual transformation journeys.

To help you find specific types of examples of business outcomes, we've separated our list of examples into categories. This approach tends to drive consensus-building conversations across business units.

Fiscal outcomes: Financial or fiscal performance is the cleanest business outcome for many business leaders, but it's not the only one.

View samples of [fiscal outcomes](#).

Agility outcomes: Today's fast-changing business environment places a premium on time. The ability to respond to and drive market change quickly is the fundamental measure of business agility.

View samples of [agility outcomes](#).

Reach outcomes: In a constantly shrinking market, global reach (the ability to support global customers and users) can be measured by compliance in geographies that are relevant to the business.

View outcomes related to [global reach](#).

Customer engagement outcomes: Social marketplaces are redefining winners and losers at an unheard-of pace. Responding to user needs is a key measure of customer engagement.

Learn more about [customer engagement outcomes](#).

Performance outcomes: Performance and reliability are assumed. When either falters, reputation damage can be painful and long-lasting.

Learn more about [performance outcomes](#).

Sustainability goals: Organizations are increasingly discussing environmental goals and sustainability targets.

Learn more about [sustainability goals](#).

Create a financial model for cloud transformation

Creating a financial model that accurately represents the full business value of any cloud transformation can be complicated. Financial models and business justifications tend to vary for different organizations. This unit establishes some formulas and points out a few things that often are missed when strategists create financial models.

Return on investment

Return on investment (ROI) often is an important criteria for the C-suite or the board of directors. ROI is used to compare different ways to invest limited capital resources. The formula for ROI is fairly simple. The details you'll need to create each input to the formula might not be as simple, though. Essentially, ROI is the amount of return produced from an initial investment. ROI usually is represented as a percentage:

$$\text{Return on investment (ROI)} = \frac{\text{(Gain from investment} - \text{Initial investment)}}{\text{Initial investment}}$$

In the next sections, we'll walk through the data you'll need to calculate the initial investment and the gain from investment (earnings).

Calculate initial investment

Initial investment is the capital expense and the operating expense that's required to complete a transformation. The classification of costs can vary depending on accounting models and CFO preference. But this category includes items like professional services that are required to complete the transformation, software licenses used only during the transformation, the cost of cloud services during the transformation, and potentially the cost of salaried employees during the transformation.

Add these costs to create an estimate of the initial investment.

Calculate the gain from investment

Calculating the gain from investment often requires a second formula that's specific to the business outcomes and associated technical changes. Calculating earnings is harder than calculating cost reductions.

To calculate earnings, you need two variables:

- Changes (deltas) in revenue
- Changes in costs

Gain from investment = Revenue deltas + cost deltas

These variables are described in the following sections:

Revenue deltas

Revenue deltas should be forecast in partnership with business stakeholders. After the business stakeholders agree on a revenue impact, the agreement can be used to improve the earnings position.

Cost deltas

Cost deltas are the increase or decrease in costs that will be caused by the transformation. Independent variables can affect cost deltas. Earnings largely are based on hard costs like capital expense reductions, cost avoidance, operational cost reductions, and depreciation reductions. The following sections describe some cost deltas to consider.

Depreciation reduction or acceleration

For guidance on depreciation, speak with the CFO or finance team. The following information is meant to serve as a general reference on the topic of depreciation.

When capital is invested in the acquisition of an asset, that investment might be used for financial or tax purposes to produce ongoing benefits over the expected lifespan of the asset. Some companies see depreciation as a positive tax advantage. Others see it as a committed, ongoing expense that's similar to other recurring expenses attributed to the annual IT budget.

Speak with the finance office to find out whether eliminating depreciation is possible and whether the depreciation elimination would make a positive contribution to cost deltas.

Physical asset recovery

In some cases, retired assets can be sold as a source of revenue. This revenue often is lumped into cost reduction for simplicity. But selling retired assets truly can be an increase in revenue, and the revenue can be taxed. Speak with the finance office to understand the viability of this option and how to account for the resulting revenue.

Operational cost reductions

Recurring expenses that are required to operate a business often are called operating expenses. This category is broad. In most accounting models, this expense category includes:

- Software licensing
- Internet hosting expenses
- Electric bills
- Real estate rentals
- Cooling expenses
- Temporary staff required for operations
- Equipment rentals
- Replacement parts
- Maintenance contracts
- Repair services
- Business continuity and disaster recovery services
- Other expenses that don't require capital expense approvals

This category provides one of the highest earning deltas. When you're considering a cloud migration, time invested in making this list exhaustive rarely is wasted. Ask the CIO and finance team questions to ensure that all operational costs are accounted for.

Cost avoidance

When an operating expenditure is expected but not yet in an approved budget, the expenditure might not fit into a cost reduction category. For example, if VMware and Microsoft licenses need to be renegotiated and paid next year, they aren't fully qualified costs yet. Reductions in those expected costs are treated like operational costs for the sake of cost delta calculations. Informally, however, they should be referred to as cost avoidance until negotiation and budget approval is complete.

Soft-cost reductions

At some companies, soft costs like reductions in operational complexity or reductions in full-time staff for operating a datacenter might also be included in cost deltas. But including soft costs might not be a good idea. When you include soft-cost reductions, you insert an undocumented assumption that the reduction will create tangible cost savings. Technology projects rarely result in actual soft-cost recovery.

Headcount reductions

Time savings for staff often are included in soft-cost reductions. When those time savings map to actual reductions in IT salary or staffing, they might be calculated separately as headcount

reductions.

That said, skills that are needed to work on-premises generally map to a similar (or higher-level) skill set that's needed to work in the cloud. So, people generally aren't laid off after a cloud migration.

An exception occurs when operational capacity is provided by a third party or an Azure Expert Managed Services Provider (MSP). If IT systems are managed by a third party, the operating costs could be replaced by a cloud-native solution or cloud-native MSP. A cloud-native MSP can operate more efficiently and potentially at a lower cost. If that's the case, operational cost reductions belong in hard-cost calculations.

Capital expense reductions or avoidance

Capital expenses are slightly different from operating expenses. Generally, this category is driven by refresh cycles or datacenter expansion. A datacenter expansion example is the cost of a new high-performance cluster to host a big data solution or data warehouse. This expense generally would fit into a capital expense category.

More common are basic equipment refresh cycles. Some companies have rigid hardware refresh cycles, which means that assets are retired and replaced on a regular cycle (usually every three, five, or eight years). These cycles often coincide with asset lease cycles or with the forecasted life span of equipment. In a new refresh cycle, IT draws on capital expense to acquire new equipment.

If a refresh cycle is approved and budgeted, a cloud transformation might help eliminate that cost. If a refresh cycle is planned but not yet approved, the cloud transformation might avoid a capital expenditure. Both reductions would be added to the cost delta.

What is cloud accounting?

The cloud changes how IT accounts for costs. Various IT accounting models are much easier to support because of how the cloud allocates costs, so it's important to understand how to account for cloud costs before you begin a cloud-transformation journey. This article outlines the most common cloud accounting models for IT.

Traditional IT accounting (cost-center model)

It's often accurate to consider IT a cost center. In the traditional IT accounting model, IT consolidates purchasing power for all IT assets. As we pointed out in the financial models

article, that purchasing power consolidation can include software licenses, recurring charges for CRM licensing, purchase of employee desktops, and other large costs.

When IT serves as a cost center, the perceived value of IT is largely viewed through a procurement-management lens. This perception makes it difficult for the board or other executives to understand the true value that IT provides. Procurement costs tend to skew the view of IT by outweighing any other value added by the organization. This view explains why IT is often lumped into the responsibilities of either the chief financial officer or the chief operating officer. This perception of IT is limited and might be shortsighted.

Central IT accounting (profit-center model)

To overcome the cost-center view of IT, some CIOs opted for a centralized IT model of accounting. In this type of model, IT is treated like a competing business unit and a peer to revenue-producing business units. In some cases, this model can be entirely logical. For example, some organizations have a professional IT services division that generates a revenue stream. Frequently, centralized IT models don't generate significant revenue, making it difficult to justify the model.

Regardless of the revenue model, centralized IT accounting models are unique because of how the IT unit accounts for costs. In a traditional IT model, the IT team records costs and pays those costs from shared funds like operations and maintenance (O&M) or a dedicated profit and loss (P&L) account.

In a central IT accounting model, the IT team marks up the services provided to account for overhead, management, and other estimated expenses. It then bills the competing business units for the marked-up services. In this model, the CIO is expected to manage the P&L associated with the sale of those services. This can create inflated IT costs and contention between central IT and business units, especially when IT needs to cut costs or isn't meeting agreed-upon SLAs. During times of technology or market change, any new technology would cause a disruption to central IT's P&L, making transformation difficult.

Chargeback

One of the common first steps in changing IT's reputation as a cost center is implementing a chargeback model of accounting. This model is especially common in smaller enterprises or highly efficient IT organizations. In the chargeback model, any IT costs that are associated with a specific business unit are treated like an operating expense in that business unit's budget. This practice reduces the cumulative cost effects on IT, allowing business values to show more clearly.

In a legacy on-premises model, chargeback is difficult to realize because someone still has to carry the large capital expenses and depreciation. The ongoing conversion from capital expenditures to operating expenses associated with usage is a difficult accounting exercise. This difficulty is a major reason for the creation of the traditional IT accounting model and the central IT accounting model. The operating-expenses model of cloud cost accounting is almost required if you want to efficiently deliver a chargeback model.

However, you shouldn't implement this model without considering the implications. Here are a few consequences that are unique to a chargeback model:

- Chargeback results in a massive reduction of the overall IT budget. For IT organizations that are inefficient or require extensive complex technical skills in operations or maintenance, this model can expose those expenses in an unhealthy way.
- Loss of control is a common consequence. In highly political environments, chargeback can result in loss of control and staff being reallocated to the business. This could create significant inefficiencies and reduce IT's ability to consistently meet SLAs or project requirements.
- Difficulty with accounting for shared services is another common consequence. If the organization has grown through acquisition and is carrying technical debt as a result, it's likely that a high percentage of shared services must be maintained to keep all systems working together effectively.

Cloud transformations include solutions to these and other consequences associated with a chargeback model, but each of those solutions includes implementation and operating expenses. The CIO and CFO should carefully weigh the pros and cons of a chargeback model before considering one.

Showback or awareness-back

For larger enterprises, a showback or awareness-back model is a safer first step in the transition from cost center to value center. This model doesn't affect financial accounting. In fact, the P&Ls of each organization don't change. The biggest shift is in mindset and awareness. In a showback or awareness-back model, IT manages the centralized, consolidated buying power as an agent for the business. In reports back to the business, IT attributes any direct costs to the relevant business unit, which reduces the perceived budget directly consumed by IT. IT also plans budgets based on the needs of the associated business units, which allows IT to more accurately account for costs associated with purely IT initiatives.

This model provides a balance between a true chargeback model and more traditional models of IT accounting.

Cloud accounting tools

There are several valuable tools you can leverage to project the costs involved in migrating to the cloud up front. Predicting and estimating costs will provide your organization with KPIs you can later use to compare predicted versus actual costs once you've completed your cloud migration.

Azure Pricing Calculator: Use the [Azure Pricing Calculator](#) to configure and estimate the costs for Azure products.

Try the Azure Pricing Calculator [here](#).

Azure Virtual Machine (VM) Cost Estimator: The Azure VM Cost Estimator is a Power BI template that allows you to estimate your cost savings against pay-as-you-go pricing by optimizing Azure offers and benefits for VMs like Azure Hybrid Benefit and reserved instances. When you're evaluating large-scale data centers, more than a hundred compute units, for example, using the web-based Azure Pricing Calculator can be challenging because it requires you to input a significant number of technical criteria. The Azure VM Cost Estimator includes an Excel file that feeds data into the BI template, allowing you to input a much larger list of criteria, along with additional technical specifications like the number of cores assigned to a specific compute unit or the memory footprint and associated utilization. You can even specify the currency value you want the price list generated in, and the different Azure targets you want to place your workloads in. In that way, the Azure VM Cost Estimator helps you automate the cloud cost estimation process.

Download the following files to use the Power BI model:

- [Power BI template](#)
- [Excel file that feeds data into the Power BI template](#)

Impact of cloud accounting models

The choice of accounting models is crucial in system design. The choice of accounting model can affect subscription strategies, naming standards, tagging standards, and policy and blueprint designs.

After you've worked with the business to make decisions about a cloud accounting model and [global markets](#), you can learn more about how to [achieve more with your investment in the cloud](#).

Record your observations

If you haven't already, download the [Cloud Adoption Framework Strategy and Plan template](#). Under **Business justification**, use the financial considerations that are discussed in this unit to describe your business justification or financial considerations.

Next unit: Understand technical considerations

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Understand technical considerations

10 minutes

To prepare for executing your digital-transformation strategy, it's important to understand the technical considerations that will drive the implementation of the strategy. This unit helps you evaluate those technical considerations through the selection and completion of your first technical project.

How does cloud pricing work?

Cloud costs are tied to compute and storage and include the underlying software licensing fees. The cloud uses a pay-for-what-you-consume model versus the up-front server infrastructure and software licensing costs that you would typically pay on-premises in your data center. On-premises, you typically have a combination of upfront costs and operating expenditures. When you move to the cloud, you shift to the pay-as-you-consume model and mainly operating expenditures.

To take advantage of the best pricing in the cloud, you must understand how you'll consume resources for your specific workloads. Once you have a consumption plan, you can establish your fixed- and variable-cost models to maximize your investment.

Understand your workloads

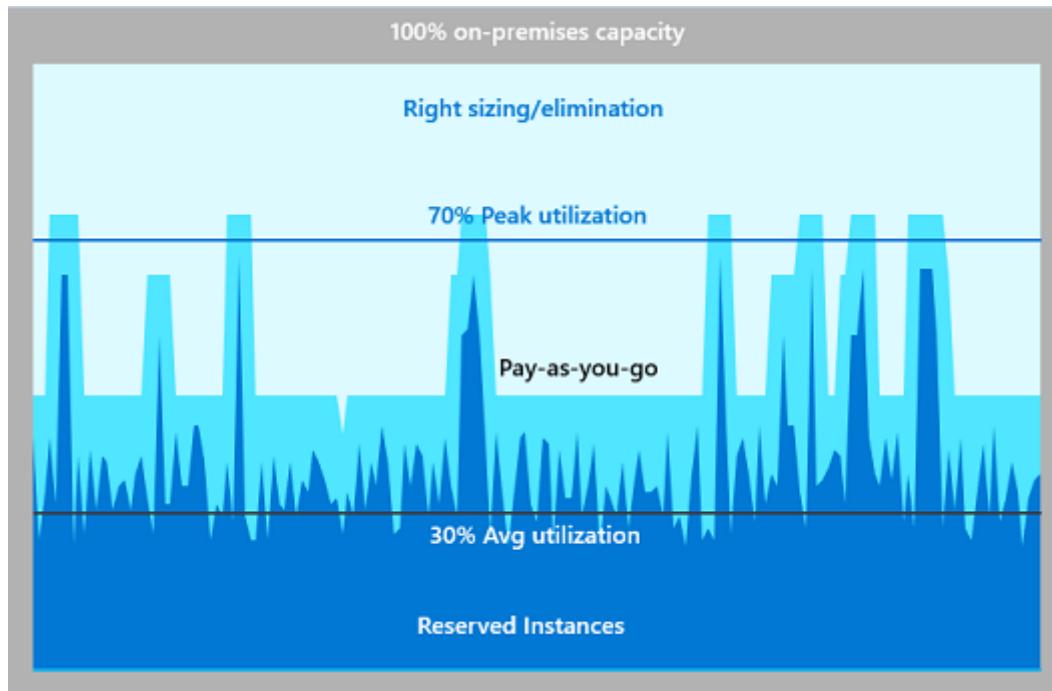
On-premises, your architecture is typically provisioned for peak capacity. Migrating from on-premises to the cloud gives you the flexibility of scalability, and you can scale up and down as needed. It's critical to understand your workloads to realize the full benefits of the cloud.

Idle capacity: Azure helps eliminate the idle capacity created by overprovisioned architecture for coverage during peak usage. Rightsizing and eliminating workloads you don't need helps reduce your idle capacity when moving to the cloud. This exercise delivers immediate savings and cash flow reductions.

Unpredictable workloads: You can scale your compute resources up and down in the cloud as the demands of your business change. You're able to scale your capacity up and down and use a variable-cost model as opposed to a fixed-cost model. This elasticity of the cloud makes the pay-for-what-you-consume model possible and works well for your unpredictable workloads.

Consider using virtual machine scale sets and snoozing VMs to only pay for the resources you need when you need them.

Predictable workloads: For your predictable workloads, you can take advantage of the cost-savings offers such as Azure Reservations.



Initial clean-up, right-sizing, and optimization: When planning to move to Azure, review which workloads are no longer needed. This process of cleanup can help you build a stronger business case and show an immediate effect on your budgets. For workloads you still want to use and bring to the cloud, you can use tools to help optimize them, like Azure Migrate.

Take advantage of cost-savings offers

Cloud billing models and offers differ from on-premises, and they can create meaningful savings opportunities for you to reduce cloud costs. Saved costs from cloud adoption can be reinvested into iterative modernization. Cloud costs are flexible and can be reduced with:

Azure Hybrid Benefit: Reduce the costs of running your workloads in the cloud by using this licensing benefit. You can use your on-premises Software Assurance-enabled Windows Server and SQL Server licenses on Azure. This benefit applies to RedHat and SUSE Linux subscriptions, too. To learn more, see [Azure Hybrid Benefit](#).

Azure Spot Virtual Machines: You can use Spot Virtual Machines with deep discounts for workloads that can be interrupted and don't need to complete within a specific time frame. For example, high-performance computing scenarios, batch processing jobs, visual rendering applications, dev and test environments, including continuous integration and continuous

delivery workloads, or large-scale stateless applications. To learn more, see [Spot Virtual Machines](#).

Reservations: Receive a discount on your workloads when you reserve your resources in advance. In return, Microsoft passes the savings on to you as discounts of up to 72 percent. For more information, see [Azure reservations](#).

Azure Dev/Test pricing: Take advantage of discounted rates for your development and testing, including the Microsoft software charges on Azure Virtual Machines and special dev and test pricing on other services. For more information, see [Azure Dev/Test pricing](#).

Extended security updates: Receive continued support for SQL Server 2008 and SQL Server 2008 R2 in the cloud, which have reached the end of their support lifecycle. You can migrate your on-premises SQL Server instances to Azure Virtual Machines, Azure SQL Database, or stay on-premises and purchase extended security updates. You'll receive free extended security patches by migrating to an Azure Virtual Machine. To learn more, see [Lifecycle FAQ: Extended Security Updates](#).

Continually optimize your environment

Microsoft provides frameworks and tools to help you understand your costs and continually optimize your environment:

Understand and forecast your costs: Monitor your bill, set budgets, and allocate costs to teams and projects with Microsoft Cost Management.

Learn more:

- [Optimize costs from recommendations](#)
- [Prevent unexpected charges](#)
- Cost-optimize your workloads: Optimize your resources and architecture with Azure best practices from Azure Advisor and the Microsoft Azure Well-Architected Framework

Learn more:

- Read about [Azure Advisor](#)
- Get Azure [Advisor cost recommendations](#)
- Learn about the [Microsoft Azure Well-Architected Review](#)
- Learn about the [Microsoft Azure Well-Architected Framework](#)

Save with Azure offers and licensing terms like the Azure Hybrid Benefit and Azure Reservations.

Learn more:

- Learn about the [Azure Hybrid Benefit](#)
- Learn about [Azure Hybrid Benefit for Windows Server](#)
- Review [pricing guidance for SQL Server Azure VMs](#)
- Learn about [Azure Reservations](#)
- Read the [reserved instances FAQ](#)

Control your costs: Establish spending goals and policies with guidance from the Microsoft Cloud Adoption Framework for Azure. Implement cost controls with Azure Policy, so your teams can go fast while complying with policy. For more information, see [enforce tagging conventions using Azure Policy](#).

Achieve more with your investment

The goal of your cloud business case is to achieve more with every dollar invested. You can accomplish this goal by releasing committed cash flows and budgets that can be reinvested into further modernization. This concept is the velocity of the dollar; you accelerate value per dollar through phased reinvestment driving modernization and value.

The initial technical benefits of a cloud migration focus on the lift and shift model, where you migrate workloads to infrastructure-as-a-service (IaaS) in the cloud. The goal is to get the most out of your on-premises investment, then move those workloads to IaaS, potentially freeing up cash flow. Historically, this process would be considered a savings opportunity. This approach in the cloud is better viewed as a reinvestment opportunity.

As you free up cash flow, continue your cloud adoption, and mature your workloads, you can reinvest the savings to modernize to different service levels. Once you have your initial workloads in IaaS, you might consider shifting some workloads to platform-as-a-service (PaaS). You'll still provide the same type of service delivery; however, you'll deliver it at a lower cost with more features and functionality. The next step in the iterative modernization process is moving some workflows and line-of-business applications to software-as-a-service (SaaS).

When you plan your phases of cloud maturity and the reinvestment of your cloud savings, and align with [business outcomes](#), you can achieve more with every dollar you invest.

Hands-on evaluation of technical considerations during your first project

There's a learning curve and a time commitment associated with cloud adoption planning. Even for experienced teams, proper planning takes time, to align stakeholders, to collect and analyze data, to validate long-term decisions, and to align people, processes, and technology. In the most productive adoption efforts, planning grows in parallel with adoption, improving

with each release and with each workload migration to the cloud. It's important to understand the difference between a cloud adoption plan and a cloud adoption strategy. You need a well-defined strategy to facilitate and guide the implementation of a cloud adoption plan.

Beginning a first adoption process in parallel with developing the plan provides the following benefits:

- Establishes a growth mindset to encourage learning and exploration
- Provides an opportunity for the team to develop necessary skills
- Creates situations that encourage new approaches to collaboration
- Identifies skill gaps and potential partnership needs
- Provides tangible inputs to the plan

First-project criteria

Your first adoption project should align with your motivations and any defined adoption horizons. Whenever possible, your first project should also demonstrate progress toward a defined business outcome.

First-project expectations

Your team's first adoption project likely will result in a production deployment of some kind, but it isn't always the case. Establish proper expectations early. Here are a few wise expectations to set for the first project:

- The project is a source of learning
- The project might result in production deployments, but it probably will require additional effort first
- The output of the project is a set of clear requirements to provide a longer-term production solution

First-project examples

To support the preceding criteria, this list provides an example of a first project for each motivation category:

- **Critical business events:** When a critical business event is the primary motivation, implementing a tool like Azure Site Recovery might be a good first project. During migration, you would use a tool like Azure Migrate to quickly migrate a few low-impact datacenter assets. But during the first project, you might also first use Site Recovery as a

disaster recovery tool. You would be reducing dependencies on disaster recovery assets within the datacenter before pragmatically planning the migration.

- **Migration motivations:** When migration is the primary motivation, it's wise to start with the migration of a noncritical workload. The next module in this learning path, [Migrate to Azure through repeatable processes and common tools](#), teaches the team how to deliver that type of project.
- **Innovation motivations:** When innovation is the primary motivation, the creation of a targeted dev/test environment can be a great first project.

Here are other examples of first adoption projects:

- **BCDR:** Beyond Site Recovery, you can implement multiple BCDR strategies as a first project.
- **Nonproduction:** Deploy a nonproduction instance of a workload.
- **Archive:** Cold storage can place a strain on datacenter resources. Moving that data to the cloud is a solid quick win.
- **End of support (EOS):** Migrating assets that have reached EOS is another quick win that builds technical skills. It also might provide some cost avoidance from expensive support contracts or licensing costs.
- **Virtual desktop interface:** Creating virtual desktops for remote employees can provide a quick win. In some cases, this first adoption project might also reduce dependence on expensive private networks in favor of commodity public internet connectivity.
- **Dev/test:** Remove dev/test from on-premises environments to give developers control, agility, and self-service capacity.
- **Basic applications (fewer than five):** Modernize and migrate a basic application to quickly gain developer and operations experience.
- **Performance labs:** When you need high-scale performance in a lab setting, use the cloud to quickly and cost-effectively provision those labs for a short time.
- **Data platform:** Create a data lake that has scalable compute for analytics, reporting, or machine learning workloads, and migrate to managed databases by using dump/restore methods or data migration services.

Align your partner strategy

The Cloud Adoption Framework approaches cloud adoption as a self-service activity. The objective is to empower each of the teams supporting adoption through standardized approaches. In practice, you can't assume that a self-service approach will be sufficient for all adoption activities.

Successful cloud-adoption programs typically involve at least one level of support. Some cloud-adoption efforts might require support from multiple partners working together toward

a common goal.

Steps to align the partnership strategy

It's important to start aligning your partnership strategy while strategizing adoption. The following steps can help remove roadblocks in later phases of the adoption lifecycle.

- Start to understand support needs
- Consider partnership options that fit your culture and needs
- Evaluate a shortlist of partner options
- Begin contract and paperwork reviews with selected partners

Completing these steps early will ensure success of the team when the technical efforts begin. The following sections provide guidance for each of these steps:

Understand support needs

Throughout the cloud adoption lifecycle, various teams might require support to be successful. The following are a few examples of the types of help commonly required.

- **Strategy:** Support defining the business strategy, building a business case, and supporting technology strategy
- **Plan:** Support with discovery of the portfolio, quantitative assessment of the digital estate, development of a cloud adoption plan, and the creation of a skilling plan
- **Ready:** Support deploying a landing zone or full cloud environment capable of supporting the cloud adoption plan
- **Migrate:** Assistance migrating workloads or building a migration factory to ensure sound migration processes
- **Innovate:** Assistance developing new solutions or rebuilding/rearchitecting existing solutions to drive innovation
- **Govern:** Support or ongoing managed services to provide governance and controls across the cloud environment
- **Manage:** Support or ongoing managed services to operate the cloud platform and the workloads hosted in the cloud

Few corporations have the diversity of skills required to support strategy, planning, readiness, adoption, governance, and management. Partners and other support models are often necessary to fill in the gaps in the team's skills and responsibilities.

Various partnership options can help develop needed skills, augment staffing requirement, or completely offload specific processes.

Partnership options

You are not alone in your cloud journey. There are several options to support your team throughout your cloud adoption journey.

- **Azure solution providers (partners):** Get connected with Azure Expert Managed Services Providers (MSPs) and other Microsoft partners who have service offerings aligned to the Cloud Adoption Framework methodologies
- **FastTrack for Azure:** Use the Microsoft FastTrack for Azure program to accelerate migration
- **Azure Migration Program:** The Azure Migration Program aligns a mixture of partners and Microsoft employees to accelerate and support your migration
- **Solution assessments:** Get assistance from a Microsoft Solution Assessment expert or qualified partner as part of a Solution Assessment engagement

Azure solution providers

Microsoft-certified solution providers specialize in providing modern customer solutions base on Microsoft technologies across the world. Optimize your business in the cloud with help from an experienced partner.

[Find a Cloud Solution Provider \(CSP\)](#) . A certified CSP can help take full advantage of the cloud by assessing business goals for cloud adoption, identifying the right cloud solution that meets business needs and helps the business become more agile and efficient.

Azure MSPs have undergone a third-party audit to validate a higher tier of capability, demonstrated through certified staff headcounts, customer references, annual consumption of Azure at scale, and other criteria.

[Find a managed services partner](#) . An Azure MSP helps a business transition to Azure by guiding all aspects of the cloud journey. From consulting to migrations and operations management, cloud MSPs show customers all the benefits that come with cloud adoption. They also act as a one-stop shop for common support, provisioning, and the billing experience, all with a flexible pay-as-you-go business model.

In parallel to the development of the cloud-adoption strategy, the cloud strategy team should start to identify solution providers that can partner in the delivery of business objectives.

FastTrack for Azure

[FastTrack for Azure](#) provides direct assistance from Azure engineers, working hand in hand with partners, to help customers build Azure solutions quickly and confidently. FastTrack brings best practices and tools from real customer experiences to guide customers from setup, configuration, and development to production of Azure solutions, including:

During a typical FastTrack for Azure engagement, Microsoft helps to define the business vision to plan and develop Azure solutions successfully. The team assesses architectural needs and provides guidance, design principles, tools, and resources to help build, deploy, and manage Azure solutions. The team matches skilled partners for deployment services on request and periodically checks in to ensure that deployment is on track and to help remove blockers.

Azure Migration Program

[The Azure Migration Program](#) provides a mixture of technical skill building, step-by-step guidance, free migration tools, and potential offers to reduce migration costs.

The program uses FastTrack for Azure and Azure solution providers to improve customer success during migration.

Watch this short video to get an overview of how the Azure Migration Program can help you.



Solution assessments

Get assistance from a Microsoft Solution Assessment expert or qualified partner as part of a [Solution Assessment engagement](#). Microsoft Solution Assessments can help customers gain a deeper understanding of the opportunities available in their environments to improve productivity, reduce costs, and optimize investments. These assessments use modern tools to

collect the customers' data estate, analyze the deployed environment, and provide insights for data-driven recommendations to help customers determine actionable steps for digital transformations, cloud migrations, and process improvement.

Azure support

If you have questions or need help, [create a support request](#). If your support request requires deep technical guidance, visit [Azure support plans](#) to align the best plan for your needs.

Shortlist of partner options

During strategy development, it's hard to define specific partnership needs. During development of the cloud adoption plan and skilling plan, those needs will come into focus.

But, based on the culture and maturity of your team, it might be possible to decide on a partnership option that is more aligned with your expected needs.

Choose one or more of the partnership options above to narrow down the options to investigate first.

Begin contract and paperwork reviews

As the shortlist of options is reviewed, there will likely be one or more partners that stand out. If there is a clear leader among the partners, start the process to review contracts and paperwork with the partner.

The contracting process can take time. Reviewing legal terms ahead of time can remove one barrier to engagement when your teams need help the most.

This is especially true if your company requires vendors to be added to an approved vendor list.

Record your observations

If you haven't already, download the [Cloud Adoption Framework strategy and plan template](#). Under **First adoption project**, use the technical considerations discussed in this unit to define a first project for the team to use when evaluating technical considerations.

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✓ 100 XP



Create a business case

10 minutes

What is a business case?

Your organization depends on information technology (IT) for its operations, and probably for creating and supplying its products as well. It's a significant expense. For these reasons, a move to the cloud must be carefully considered and planned.

A business case provides a view of the technical and financial timeline of your environment, and can represent the opportunities for reinvestment into further modernization. Developing a business case includes building a financial plan that takes technical considerations into account and aligns with [business outcomes](#). It helps you foster support from your Finance team and other areas of the business, helps accelerate cloud migration, and enables business [agility](#).

Key components of a business case

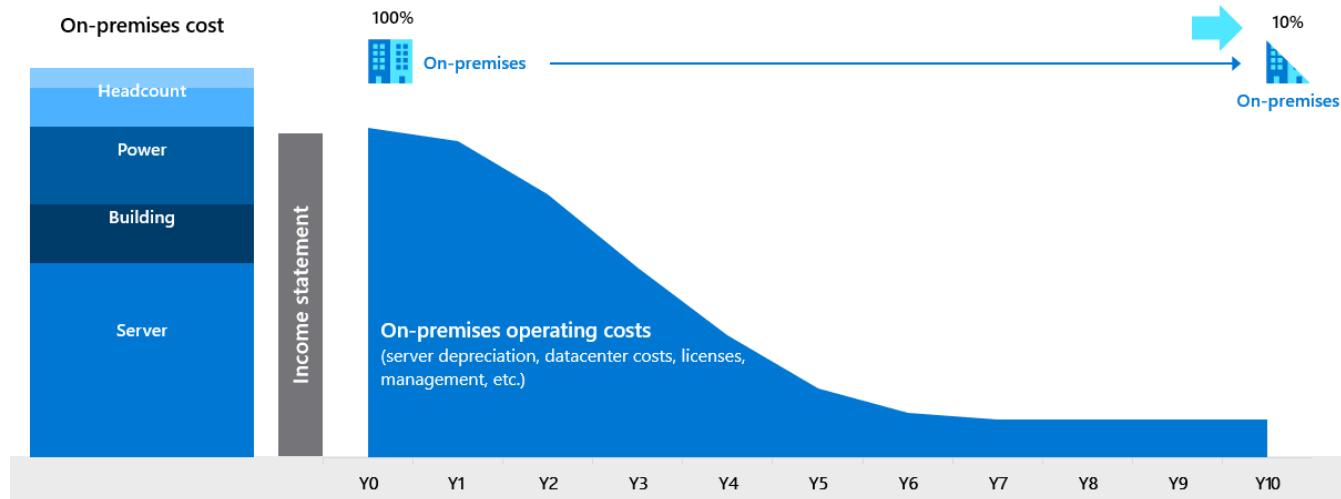
When you're planning your business case to migrate to the cloud, there are several key components to consider.

Environment scope, technical and financial: As you build out the on-premises view of your environment, think about how your environment scope, from both a technical and financial perspective, is aligned. You want to be sure the technical environment you're using for your plan matches up to the financial data.

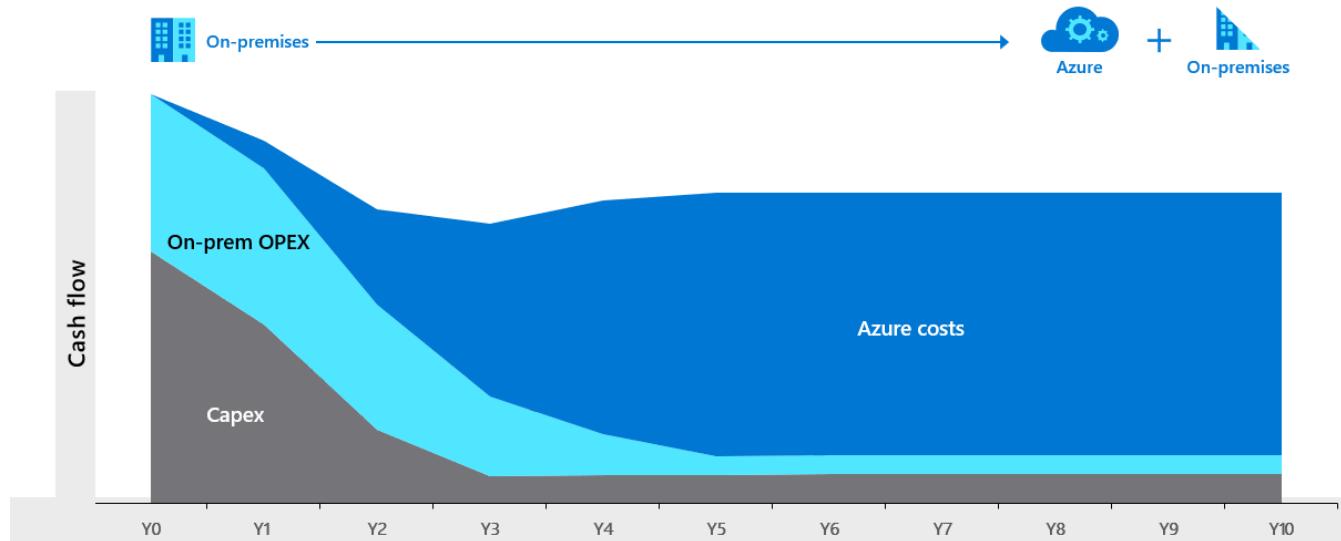
Baseline financial data: Cost to run today: When you build out your business case, it's important to pull your baseline financial data. Common questions you can ask to gather the financial data needed are:

- How much does it cost to run my environment today?
- What am I spending on servers in an average year?
- What am I spending in my data center operations categories, for example, power or lease costs?
- When is the next hardware refresh?

Projections: On-premises costs in on-premises scenario: Forecast what your on-premises costs will be if you don't migrate to the cloud.



Projections: On-premises costs in Azure scenario: Forecast what your on-premises costs will be when you migrate to the cloud in an Azure scenario. It takes resources and time to shift your environment to the cloud, so it's important to account for them in the business case. When you build out the Azure scenario, be sure to take into consideration and include all of the core benefits the cloud provides.

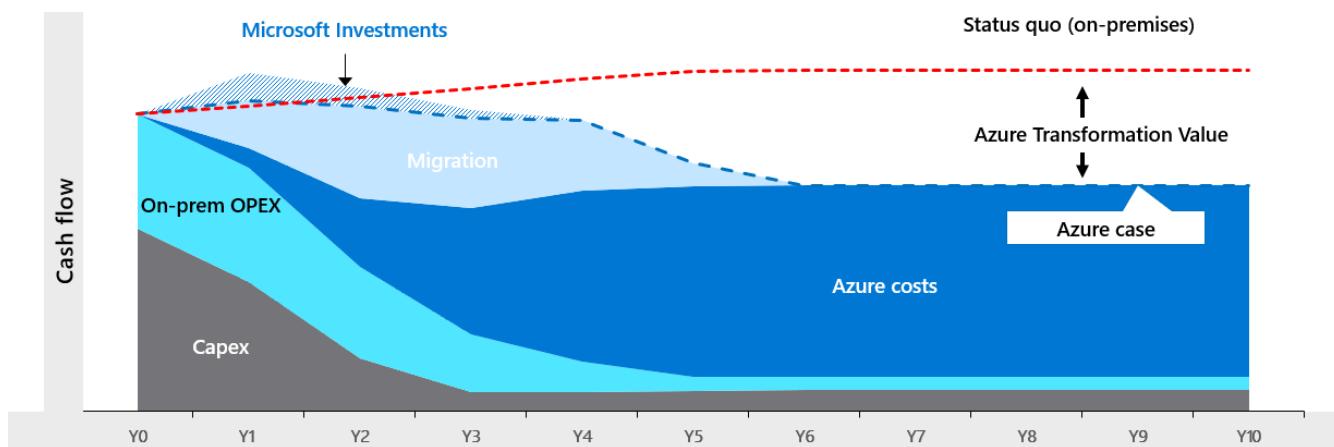


Projections: Migration timeline and Azure costs (optimized): Project what migration timeline and the Azure costs will be with a given environment. Consider how you can optimize and get the most out of your Azure investment. For example, use reserved instances, scale capacity up and down, use the Azure hybrid benefit, and right-size your resources.

A business case isn't just a point-in-time view. It's a plan for a period of time. As you shift to the cloud, you'll reduce your spend over-time and create a cloud migration plan. You can model out what the ramp-down in spend will be on-premises over time associated with your cloud migration plan.

Once you've identified on-premises workloads and cost structure, you can then build out your optimized Azure consumption plan.

As a final step, when you create your business case, you'll want to compare the cloud environment to an on-premises or status quo scenario. You can take your Azure view and compare it to your on-premises or status quo scenario with no migration so you can assess the benefit of migrating to the cloud. The Azure view will show on-premises costs that are being reduced over time, your Azure environment costs, and any migration costs associated with shifting to a cloud environment.



Tools for preparing a business case

Azure offers a range of valuable tools and calculators to help you prepare a business case for your cloud migration.

Azure Total Cost of Ownership (TCO) Calculator: Use the [TCO Calculator](#) online tool to estimate the cost savings you can realize when you migrate your workloads to Azure.

Enter details of your on-premises infrastructure into the tool including servers, databases, storage, and networking, licensing assumptions, and costs.

The Calculator creates a match from Azure Services to create a high-level initial TCO comparison. However, the results of the TCO Calculator need to be considered with care, since an on-premises server list is often complex, and optimization steps can be taken when considering Azure.

Retail Rates Prices API: Use the Retail Rates Prices API to retrieve retail prices for all Azure services. Previously, the only way to retrieve prices for Azure services was to either use the Azure Pricing Calculator or use the Azure portal. This API gives you an unauthenticated experience to get retail rates for all Azure services. Use the API to explore prices for Azure

services against different regions and different SKUs. The programmatic API can also help you create your own tools for internal analysis and price comparison across SKUs and regions. To learn more, see [Retail Rates Prices API](#).

Azure Pricing calculator: Use the [Azure Pricing calculator](#) to configure and estimate the costs for Azure products.

Partner toolsets: Microsoft Partners have access to tools in the [Azure Marketplace](#) that can help create a migration cost analysis.

Solution assessments: Get assistance from a Microsoft Solution Assessment expert or qualified partner as part of a [Solution Assessment engagement](#).

Azure Migration Program: Join the [Azure Migration Program](#) to get the guidance and expert help you need at every stage of the cloud migration journey. Migrate infrastructure, databases, and apps, and move forward with confidence.

Learn about Azure with Microsoft Learn

Many other Azure Learning paths on [Microsoft Learn](#) can help you to build your business case:

- [Control Azure spending and manage bills with Microsoft Cost Management](#)
- [Microsoft Azure Well-Architected Framework—Cost Optimization](#)
- [Plan and manage your Azure costs.](#)
- [Analyze costs and create budgets with Microsoft Cost Management](#)
- [Save money with Azure Reserved Instances](#)
- [Optimize Azure costs with data analysis in Power BI](#)
- [Configure and manage costs as a Microsoft partner by using Microsoft Cost Management](#)

Next unit: Knowledge check

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How are we doing?

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✓ 200 XP



Knowledge check

10 minutes

Check your knowledge

1. What are the goals of a well-defined strategy?

- Clarify corporate strategy, define common goals, establish metrics,
- evaluate financial considerations, and evaluate technical considerations.

✓ Correct.

- Select the cloud vendor, establish a DevOps model, and kick off technical deployment.
- Assess current technical debt, identify workloads to move to the cloud, pilot deployment, and release to production.
- Define cost management, identity management, configuration management, and governance for the cloud.

2. What are good examples of motivations to move to the cloud?

- Eliminate the IT department and save on costs.
- Win agility by removing dependencies to IT and deploy new technical capabilities.

- Save on costs, deploy new technical capabilities, drive workload optimization, achieve scale and agility, and improve customer experiences.

✓ Correct.

- Faster time to market by removing security and governance dependencies, and save on costs.

3. What are some of the benefits of cloud adoption?

Eliminate the IT department, remove IT dependencies, and win

agility.

- Eliminate the security department and faster time to market.
- Remove IT processes on-premises and remove security blockers on-premises.

X Internal process and security guidelines might need to be updated or created brand-new with cloud adoption, but they won't just be removed.

- Reduce vendor complexity, improve cost of operations, and advance technological and operations capabilities.

✓ Correct.

4. Which personas should be involved in defining cloud adoption strategy?

- IT operations, IT development, and security.
- Business owners and IT.

X Although these persons are important, it's imperative to achieve organizational alignment among all key stakeholders.

- Finance, marketing, sales, human resources, and executive leadership.

✓ Correct.

- IT and cloud vendors.

5. What tool can you use to estimate your cost savings against pay-as-you-go pricing by optimizing Azure offers and benefits for VMs?

- The Azure Pricing Calculator
- The Cloud Adoption Strategy Evaluator

X Incorrect. The Cloud Adoption Strategy Evaluator is used to assess your strategy posture across distinct areas of the Strategy methodology.

- The VM Cost Estimator

✓ Correct. The VM Cost Estimator allows you to estimate your cost savings against pay-as-you-go pricing by optimizing Azure offers and benefits for VMs like Azure Hybrid Benefit and reserved instances.

- ROI

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✓ 100 XP

Introduction

2 minutes

Cloud adoption is a change-management exercise. You make a number of technical decisions and efforts along the way, but the ultimate success of any cloud-adoption effort is defined by the quality of your cloud-adoption plan.

In this module, you'll learn how to build rich, data-driven cloud adoption plans.

Learning objectives

In this module, you'll:

- Create an actionable cloud adoption plan
- Understand your digital estate
- Assess the digital estate with Azure Migrate and refine your plan
- Establish a skills readiness plan to prepare the team

Prerequisites

- Foundational understanding of cloud adoption.
- Understanding of your organization's adoption strategy and the types of efforts you need to complete.
- Basic familiarity with Azure DevOps or other tools used to manage tasks to create a plan.
- To complete the hands-on portion of the assessment unit, you need a functioning version of Azure Migrate with data regarding local servers, applications, and data. If one isn't already available, complete [set up Azure Migrate for server migration](#) to provide the necessary environment. For project manager roles, you can skip the hands-on tooling section of that unit.

Next unit: Customer narrative

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100 XP

Customer narrative

10 minutes

We shared the narrative for Tailwind Traders in the Getting Started module and other Learn modules for the Cloud Adoption Framework. Specific to this module about planning for cloud adoption, there are two key activities. The central operations and infrastructure team is preparing to migrate a number of workloads to the cloud. The CTO and the development team are also building out new innovations by using data, IoT on the edge, and mobile applications.

Plan for Tailwind Traders' migration effort

In this module, you build out a plan for the Tailwind Traders' migration effort. The following is an excerpt of the current state environment that will be migrated.

Tailwind Traders currently has three datacenters. One is located within the same office building in which the employees work; the company owns this building and datacenter. The two other datacenters are in separate locations and are leased from datacenter providers. All three datacenters are a mix of physical and virtual servers. The virtualization platforms that the company uses are a mix between Hyper-V and VMware. This mix is the result of different people with different strategy ideas leading the IT department over the years.

Tailwind Traders' servers primarily run Windows Server, with a mix of Windows Server 2008 R2, Windows Server 2012, and Windows Server 2016. The company has only a few instances of Windows Server 2019. Upgrading the operating systems to the latest version or following a consistent strategy has never been a priority for the organization, despite various IT team members trying to push that goal.

There are a few Linux and other open-source servers. The IT operations team isn't familiar with the servers, because the development team introduced them without collaboration between the teams.

The leases for the two datacenters are due to run out in 18 months and 2 years. The IT manager and finance director have been talking, and they don't want to renew the leases. Instead, they're considering a project that will upgrade, consolidate, and use the cloud as a replacement datacenter. The new CIO is using this project as an opportunity to rethink IT operations.

Plan for Tailwind Traders' new innovation effort

Additionally, the retail innovation team will be updating its continuous integration and continuous delivery (CI/CD) pipelines to deploy new solutions to the cloud. You'll use the same migration-assessment tools to overcome some documentation challenges among the innovation team's past efforts. You'll also use migration tools to test the compatibility of those solutions with basic Azure services. The inventory of data structures, applications, and other services help to validate the team's DevOps deployments.

Build the cloud adoption plans

To keep all the cloud-adoption efforts on track, the Tailwind Traders CIO and project managers will create a set of cloud-adoption plans to manage various activities and share progress across the organization.

The exercises in the remaining units of this module walk through each step of translating the current adoption strategy and future efforts into an actionable cloud-adoption plan. You use the following steps:

1. **Confirm prerequisites.** Confirm that all prerequisite steps have been completed before you create your plan.
2. **Define and prioritize workloads.** Prioritize your first 10 workloads to establish an initial adoption backlog.
3. **Align assets to workloads.** Identify which assets (proposed or existing) are required to support the prioritized workloads.
4. **Review rationalization decisions.** Review rationalization decisions to refine adoption path decisions (Migrate or Innovate).

After this module, you might also want to experiment with establishing iterations, release plans, and timelines. You can find a link to that continued learning later in this module, in the summary.

Next unit: Exercise - Deploy your first cloud adoption plan

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Exercise - Deploy your first cloud adoption plan

20 minutes

In this exercise, you'll deploy a project plan template to Azure DevOps. That template will give you a sense of the work that needs to be done during this cloud adoption effort. In later exercises, you'll expand that plan to include data gathered from the assessment features of Azure Migrate. This allows you to create a refined plan for both migration and new innovation projects.

Introduction to the cloud adoption plans

Azure DevOps is the set of cloud-based tools for Azure customers who manage iterative projects. It also includes tools for managing deployment pipelines and other important aspects of DevOps.

In this unit, you'll learn how to quickly deploy a backlog to Azure DevOps by using a template. This template aligns cloud-adoption efforts to a standardized process based on the guidance in the Cloud Adoption Framework for Azure.

Prerequisites

In Azure DevOps, users have different access levels: basic, stakeholder, or Visual Studio subscriber. Access levels determine what features are available to each user. In order to provision projects by using the demo generator, you need at least a basic access level. For example, you might get an error that indicates the user has a stakeholder license, which doesn't grant permissions to writing shared queries.

Create an Azure DevOps organization

If you don't have an Azure DevOps organization, you can create one for free.

1. Go to the [Azure DevOps homepage](#).
2. Select **Start Free**.

Microsoft Azure

Overview Solutions Products Documentation Pricing Training Marketplace Partners Support Blog More

Contact Sales Search My account Portal

Home / Services / Azure DevOps

Azure DevOps

Plan smarter, collaborate better, and ship faster with a set of modern dev services.

[Start free](#) [Start free with GitHub](#)

Already have an account? [Sign in to Azure DevOps >](#)



3. Sign in by using a Microsoft or GitHub account.

 Microsoft

Sign in

Email, phone, or Skype

No account? [Create one!](#)

[Can't access your account?](#)

[Sign in with a security key](#) (?)

[Next](#)

 Sign in with GitHub

Create a new organization in Azure DevOps

If you have an existing Azure DevOps organization but don't have access to create new projects in your organization, you might want to create a new organization to use in this

module.

1. Sign in to the Azure DevOps portal [↗](#), and select New organization.



G GDCBADE

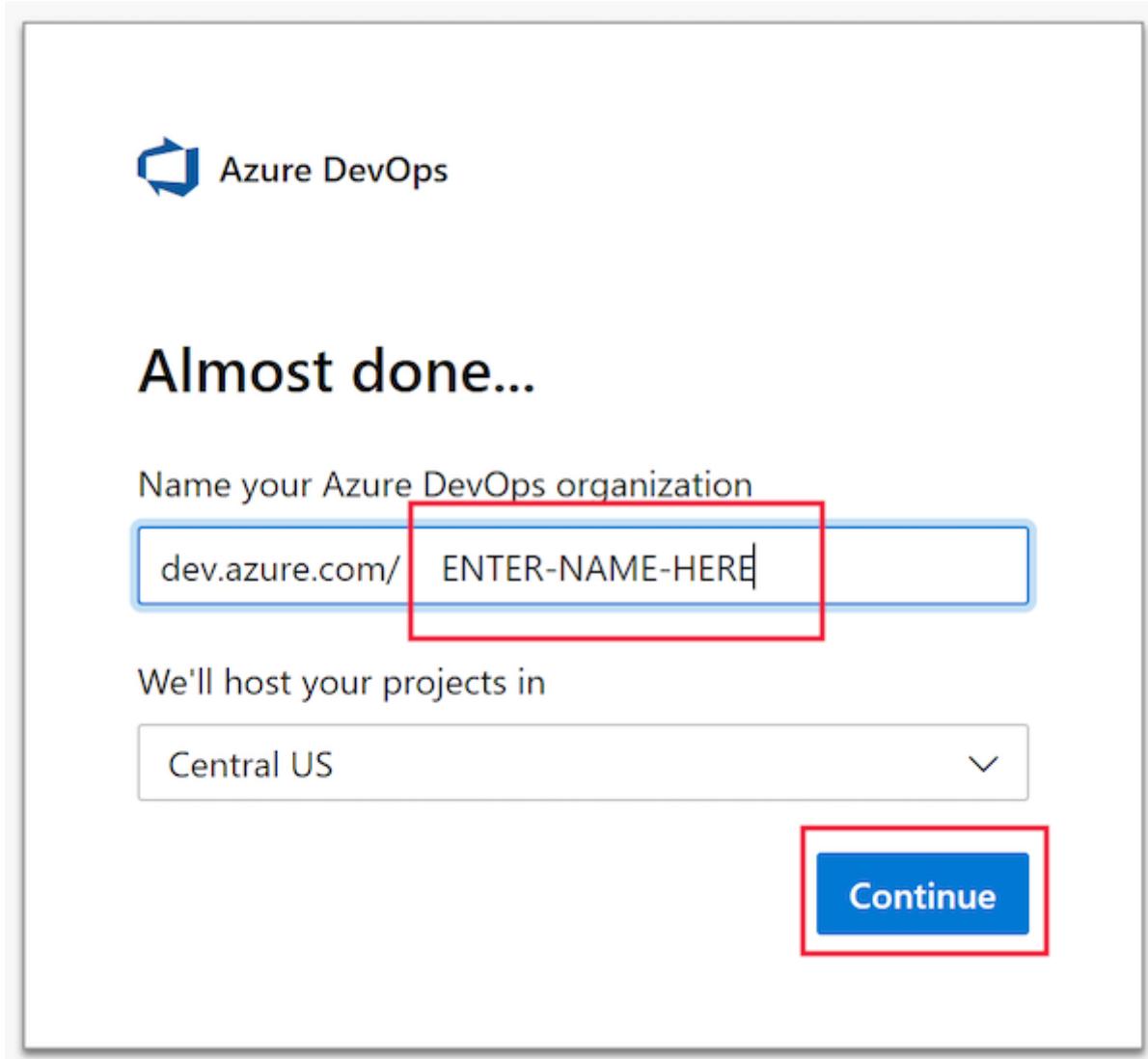
A AzureGrowthMarketing

O OneGDCSocial

4 more organizations

New organization

2. Enter a name for the new organization, and select **Continue**.



3. If the organization has been successfully created, you will see a prompt to **Create a project**.

Create a project to get started

Project name *

Description

Visibility



Public

Anyone on the internet can view the project. Certain features like TFVC are not supported.



Enterprise

Members of your enterprise can view the project.



Private

Only people you give access to will be able to view this project.

▼ Advanced

+ Create project

You don't need to create a project at this time. But feel free to do so, if you'd like to get more familiar with Azure DevOps.

Cloud adoption plan templates

To deploy the cloud adoption plan, open the [Azure DevOps demo generator](#). As mentioned in the "Prerequisites" section, the demo generator tool requires you to sign in with an account that has proper permissions.



Azure DevOps

AZURE DEVOPS DEMO GENERATOR

Azure DevOps Demo Generator helps you create projects on your Azure DevOps Organization with pre-populated sample content that includes source code, work items, iterations, service endpoints, build and release definitions based on a template you choose. [Read more](#)

The purpose of this system is to simplify working with the [Azure Devops hands-on-labs](#), demos and other education material provided by the Microsoft Azure Marketing team.

[Sign In](#)

Don't have an Azure DevOps Organization?

[Get started for free >](#)

After you sign in, you can choose a template. There is a growing list of community-led Azure DevOps templates for various purposes, including DevOps labs for demos of features. There are also Microsoft Learn templates, which deploy projects you can use in other Learn modules. You can find the templates containing cloud adoption plans in the **Cloud Adoption Framework** tab.

New Project Name :

Select Organization :

Selected Template : SmartHotel360 [Choose template](#)

About this Template

SmartHotel360

This template contains work items, code and pipeline definitions for the public web site of SmartHotel360, an E2E reference sample app with several consumer and line-of-business apps and an Azure backend. For more information, please see the project page on GitHub.

What's new

- New templates in Microsoft Learning platform

Yes, I want to fork this repository [Authorize](#)

Note: This template requires latest versions of ARM Outputs extension, please update. Ignore if you already have the latest version.

[Create Project](#)

These templates help you plan out work required to implement some of the best practices found in the Cloud Adoption Framework. In this case, choose the **Cloud Adoption Plan** template. This template will load a server migration planning template that you can use throughout this module.

Choose a template

General DevOps Labs Microsoft Learn Azure Community **Cloud Adoption Framework** Private

The Cloud Adoption Plan template creates a backlog for managing cloud adoption efforts based on the guidance in the Microsoft Cloud Adoption Framework.

CAF Strategy-Plan-Ready-Gov

In this checklist we share all the decision points needed to successfully build a Cloud Adoption Plan as well as the Landing Zone with Governance.

ServerMigration_CAF_DevOps_ProjectTaskList

AKS_CAF_DevOps_Project_TaskList

SQL Migration

Windows Virtual Desktop

Select Template

Outside of this module, you can use the cloud adoption plan templates to plan and manage work related to governance, SQL migration, knowledge mining, or other cloud adoption activities.

Important

The suggested cloud adoption plan template guides activities around migration and closely related upstream or downstream processes. There are a number of other templates that might be more applicable to your cloud adoption efforts. Feel free to use any of those plans during the remainder of this Learn module.

Deploy your first cloud adoption plan

After you've chosen your template, enter a name for the project (or plan) you want to deploy. We used `DemoForLearnModule` as our project name. You can do the same. Next, choose your DevOps organization. If you don't have one, see the "Prerequisites" section. Then select **Create**.

Project.

New Project Name :

Select Organization :

Selected Template : [Choose template](#)

[Create Project](#)

When your project is created, you see a screen like the following. Select **Navigate to project** to open your new project template.

Congratulations! Your project is successfully provisioned.

[Navigate to project](#)

Like the tool? Share your feedback 

- Project DemoForLearnModule created
- 1 team(s) created
- Board-Column, Swimlanes, Styles updated
- Work Items created

Review your new backlog

When your new project opens, you will have access to a number of different DevOps related features. In this template, you focus specifically on the backlog (or project plans).

The screenshot shows the Azure DevOps project homepage for 'Cloud Adoption Plan'. On the left, a navigation bar lists various project sections: Overview, Summary, Dashboards, Wiki, Boards, Repos, Pipelines, Test Plans, Artifacts, and Compliance. The 'Boards' section is highlighted with a blue border. The main content area displays 'About this project' (Generated by Azure DevOps Demo Generator), 'Project stats' (Boards: 93 Work items created, 0 Work items completed), and a 'Members' section showing one member (SY).

To open the project plan, hover over **Boards** in the left navigation. Then select **Backlogs**.

The screenshot shows the same project homepage as above, but with specific sections highlighted. The 'Boards' section in the left navigation is highlighted with a red box. A dropdown menu is open under the 'Boards' section in the main content area, with the 'Backlogs' option highlighted with a red box. Other options in the dropdown include Work items, Boards, Sprints, and Queries.

The backlog lists all of the different tasks in the project. But there's a better way to look at the project as a whole. In the upper-right corner, select **Stories > Epics** to view the full project hierarchy. All of the tasks in this project are now grouped to align to the Cloud Adoption Framework methodologies, or the phases of cloud adoption that you might need throughout your adoption journey.

The screenshot shows the Azure DevOps Backlog view. On the left, there's a list of 16 User Stories, each with a title and a small icon. To the right, there's a 'Planning' section with two iterations: Iteration 2 (Current, 2/25/2021 - 3/18/2021) and Iteration 3 (3/19/2021 - 4/9/2021). Both iterations show 'No work scheduled yet'. At the top right, there's a 'Stories' dropdown menu with three options: Epics, Features, and Stories. The 'Epics' option is highlighted with a red box.

This new view is hierarchical. To drill into each phase, select the caret next to any work item. That will expose its child work items.

The screenshot shows the Azure DevOps Backlog view with a hierarchical list of work items. The list includes:

- Epic: Cloud Adoption Strategy (New)
 - Feature: Define Adoption Strategy (New)
- Epic: Cloud Adoption Plan (New)
 - Feature: Define the Cloud Adoption Plan (New)
- Epic: Cloud Ready (New)
 - Feature: Landing zone creation (New)
- Epic: Cloud Innovation (New)
- Epic: Cloud Migration (New)
 - Feature: First Workload (New)
 - Feature: First Host (New)
 - Feature: Workload Template (New)

The following list explains Azure DevOps terminology in more traditional project terms:

- **Epic:** In this template, an Epic is a phase of your cloud adoption or digital transformation program.

- **Feature:** In this template, each feature is a project required to complete that phase of adoption.
- **User story:** Each user story is a shared goal or deliverable you will need to be successful when that phase is complete.
- **Task:** Each task is a unit of work that must be done to realize the goal or deliverable.

Important

Bookmark the address of your new Azure DevOps project in this Epic backlog view. You will need this in the last unit of this Learn module.

Next steps

You now have your first cloud-adoption plan deployed. In future units, you update this plan to reflect the actual work you need to complete specific to your business objectives.

Next unit: Exercise - Assess your digital estate

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How are we doing?     

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100 XP

Exercise - Assess your digital estate

60 minutes

In this exercise, we'll demonstrate how Tailwind Traders used native tools in Azure to evaluate its digital estate. This step-by-step guide includes references that you can re-create as hands-on exercises. For a faster experience, skip each exercise and build on the results from Tailwind Traders' digital estate.

Understand your digital estate

The cloud unlocks a great deal of innovative potential for your technology portfolio. Your overall strategy will likely include a mixture of workloads that simply need to be migrated to the cloud or slightly modernized. Other workloads might be better suited to more aggressive strategies that use cloud native approaches or a significant re-architecture. Even the most cutting-edge new applications and innovations will have a dependency on some existing technology. For each of these outcomes, the first step starts with a clear understanding of the assets (applications, data, and VMs) you are responsible for today. Those assets collectively are referred to as your *digital estate*.

Tailwind Traders' starting point

It's surprisingly common for an organization to have little more than surface knowledge of its digital estate. Years of technical growth, acquisitions, staffing changes, and changing business priorities can all lead to large, ambiguous collections of technical assets. Tailwind Traders is no exception.

Tailwind Traders' digital estate

Here's a list of what we know about the company's digital estate:

- Three datacenters:
 - One is owned by the organization.
 - Two are leased through multiyear contracts.
- Virtualization is inconsistent:
 - Multiple hypervisor vendors have led to cost and process complexity.

- Lack of operating system standardization:
 - Mixture of Windows Server 2008 R2, Windows Server 2012, Windows Server 2016 and Windows Server 2019
 - A number of Linux operating systems and versions are deployed across the environment.
 - Most Linux instances are appliance-based or are the result of LAMP stack deployments from the dev team.
- Operations management is inconsistent:
 - Patching is inconsistent.
 - Basic datacenter sprawl has datacenter resource consumption at 25 percent over planned targets.
 - Backup appliance has exceeded its storage capacity. Backups for low-priority workloads are local backups only.
 - Active monitoring and optimization are limited to mission critical workloads.
 - The operations team is over-taxed and understaffed.
 - The service now expert on the team left three years ago, shortly after a vendor completed configuration of the configuration management database (CMDB). Since then, there has been no new discovery or mapping of assets.
- IT is viewed as a cost center:
 - The business undervalues the role of IT.
 - The high cost of the leased datacenters is difficult to justify.
 - The business continues to place pressure on IT to reduce cost, after years of budget and staff reductions.
- The retail innovation team is considered to add a lot of value and be a source of innovation:
 - Each innovation is transitioned to the IT team upon release, adding to the continued cost burdens.
- Workloads across the datacenters consist of the following:
 - **Retail innovation:** New innovations that push the boundaries of the retail environment, spanning in-store, online, and throughout the customers' mobile experiences.
 - **Smart storefronts:** Environmental controls, doors, lighting, interactive shelves, in-store displays and advertisements, and over 500 point-of-sales systems.
 - **Corporate headquarters:** More than 900 employees are hosted in corporate headquarters. They use technology systems that cover best-of-breed solutions to support processes across numerous areas. These include real estate, logistics, supply chain, pricing, human resources, employee schedules/tracking, and payroll.
 - **End-user workstations:** Mostly desktop-based with a growing percentage of employees opting for mobile, BYOD (bring your own device), in-store kiosks, and virtual desktop solutions.

- **Central operations:** The IT team provides ongoing technical operations for all IT and retail innovations assets.

What we don't know

The challenge for Tailwind Traders is the significant ambiguity just below the surface level information. Years of information silos and no shared platform across technology solutions have resulted in a lot of knowledge gaps. The following are critical questions the team can't answer yet:

- **Servers:** How many hypervisors are there across the organization? How many servers or VMs? What resources (cores, memory, and storage) are allocated to each server or VM? Are operating systems patched, in compliance, and compatible with the target cloud platforms?
- **Applications:** How many applications are hosted on the servers/VMs? Do those applications actually use the allocation assets? Are those applications self-contained or do they depend on a collection of assets? Is there production traffic to those applications? What is the criticality of each application?
- **Data:** What data exists across the data estate? How is the data used? Does it support transactional applications? Is the data used for richer analysis? How is the data staged and moved across the environment? Does the data undergo transformation at different points within the environment? Is the data classified based on sensitivity? Is it governed, managed, or mastered?
- **Business impact:** What's the business value of the various workloads? Is there a defined business owner? Are there commitments to operational support? Are there plans to retire any of these workloads? Are there governance, compliance, or security constraints on these workloads?

Evaluate the digital estate

The following process will help clear the ambiguity and aid in building a comprehensive plan for migration based on existing data.

Start by identifying your on-premises infrastructure, applications, and dependencies. This helps you to identify workloads for migration to Azure and to gather optimized cost projections. Use the server assessment tool in Azure Migrate to identify the workloads you have in use, dependencies between workloads, and workload optimization.

! Note

There are different roles in the development of an adoption plan. The remainder of this section outlines the technical steps to collect data about the digital estate. If your role is more of a project management or project planning role, skip to the end to see how a sample data output can shape the plan by using information from the Tailwind Traders environment.

Before you start

- Review the support and deployment requirements for agent-based dependency analysis for:
 - [VMware VMs](#)
 - [Physical servers](#)
 - [Hyper-V VMs](#)
- Make sure you:
 - Have an Azure Migrate project. If you don't, [create](#) one now.
 - Check that you've [added](#) the server assessment tool to the project.
 - Set up an [Azure Migrate appliance](#) to discover on-premises machines, applications, and data by using an agentless appliance. The appliance discovers on-premises machines, and sends metadata and performance data to the server assessment tool.
Set up an appliance for:
 - [VMware VMs](#)
 - [Hyper-V VMs](#)
 - [Physical servers](#)
- Next, you'll use the discovery and assessment tool in Azure Migrate to discover and assess the following for migration to Azure: on-premises VMware VMs, Hyper-V VMs, VMs hosted on other public clouds, and physical servers. The discovery and assessment tool pulls data from the Azure Migrate appliance, which will help you complete the following:
 - **Azure readiness:** Assesses whether on-premises machines are ready for migration to Azure.
 - **Azure sizing:** Estimates the size of Azure VMs or number of Azure VMware nodes after migration.
 - **Azure cost estimation:** Estimates costs for running on-premises servers in Azure.
 - **Dependency analysis:** Identifies cross-server dependencies and optimization strategies for moving interdependent servers to Azure.

Workloads in use

Azure Migrate uses a lightweight Azure Migrate appliance to perform agentless discovery of on-premises VMware VMs, Hyper-V VMs, other virtualized machines, and physical servers. Continuous discovery collects machine configuration information, and performance metadata, as well as application data. Here's what the appliance collects from on-premises machines:

- Machine, disk, and NIC metadata.
- Installed applications, roles, and features.
- Performance data, including CPU and memory utilization, disk IOPS, and throughput.

After collecting data, you can export the application inventory list to find applications and SQL Server instances running on your machines. You can use the database assessment tool in Azure Migrate to understand SQL Server readiness.

The screenshot shows two main sections: 'Discovered servers' on the left and 'Application Inventory' on the right.

Discovered servers:

- Header: Home > Azure Migrate | Servers >
- Section title: Discovered servers
- Sub-section: ContosoMigration
- Actions: Create group, Create assessment, Replicate, Export application inventory, Refresh, Columns
- Note: Agentless dependency analysis is now available in preview. Click here to request access.
- Appliance name: VMware1 (VMware)
- Table: Shows discovered servers with columns: Name, IP address, Applications Discov..., Dependencies (Agen..., Cores, Mem. Examples include PayrollWeb04, PayrollDB02, PayrollApp01, PayrollWeb01, PayrollWeb02, PayrollDB01, PayrollWeb03, PayrollApp02, PayrollApp03.

Application Inventory:

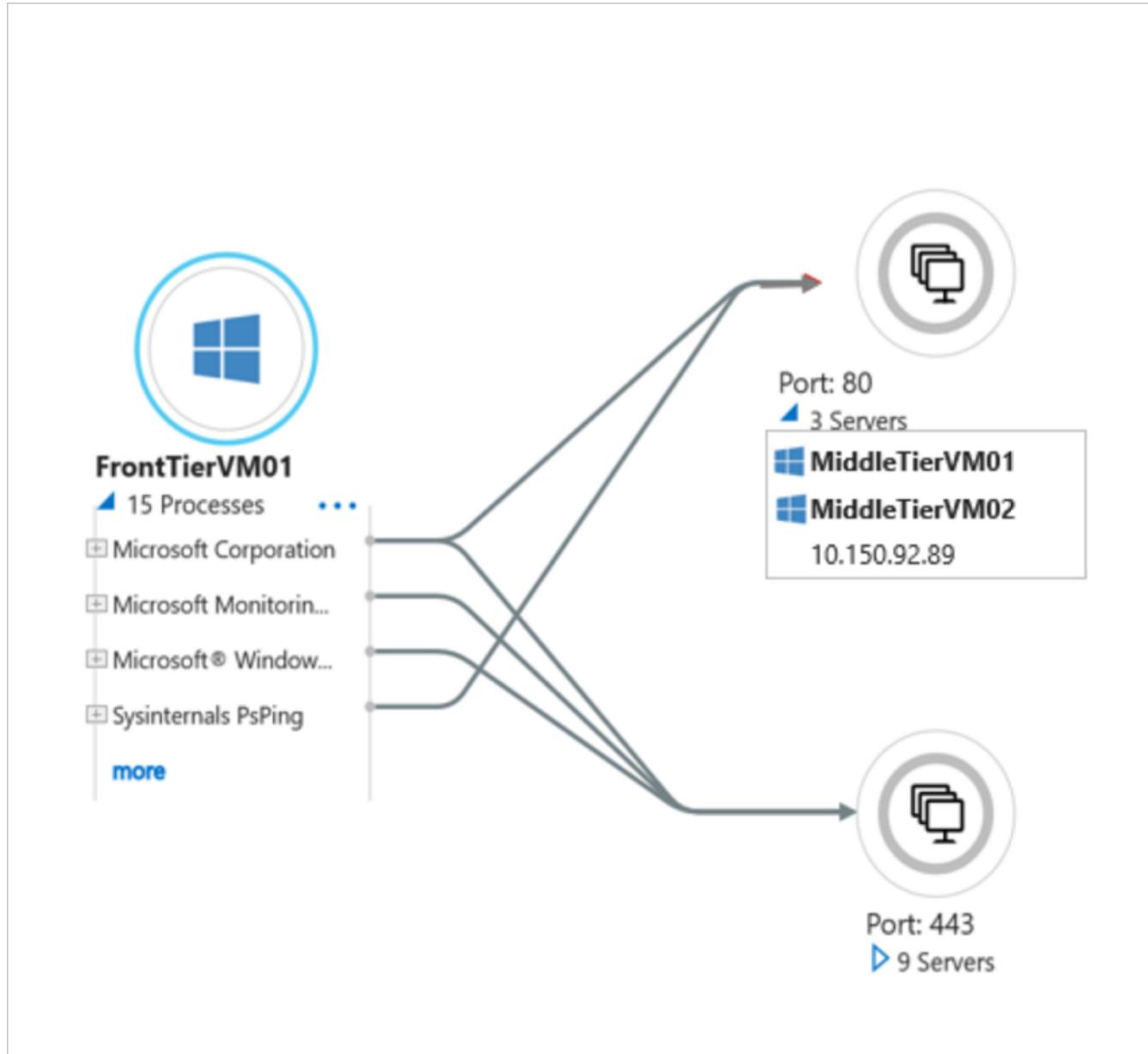
- Section title: Application Inventory
- Sub-section: PayrollDB02
- Tab: Applications (selected), Roles and Features
- Table: Shows applications with columns: Name, Version. Examples include Tools for .Net 3.5, Active Directory Authentication Library for SQL Server, Browser for SQL Server 2017, ConfigMgr Client Setup Bootstrap, Configuration Manager Client, Dependency Agent, Microsoft .NET Framework 4 Multi-Targeting Pack, Microsoft .NET Framework 4.5 Multi-Targeting Pack, Microsoft .NET Framework 4.5.1 Multi-Targeting Pack (ENU), Microsoft .NET Framework 4.5.1 SDK, Microsoft .NET Framework 4.5.2 Multi-Targeting Pack, Microsoft .NET Framework 4.5.2 Multi-Targeting Pack (ENU), Microsoft Analysis Services OLE DB Provider, Microsoft Analysis Services OLE DB Provider, Microsoft Azure Site Recovery Mobility Service/Master Target S..., Microsoft Build Tools 14.0 (amd64), Microsoft Build Tools 14.0 (x86), Microsoft Build Tools Language Resources 14.0 (amd64), Microsoft Build Tools Language Resources 14.0 (x86), Microsoft Help Viewer 2.2, Microsoft Help Viewer 2.2, Microsoft Monitoring Agent, Microsoft ODBC Driver 13 for SQL Server, Microsoft Policy Platform, Microsoft Silverlight, Microsoft SQL Server 2012 Native Client.

	A	B	C	D	E	F	G
MachineName	Instance Name	Edition	Service Pack	Version			
1 FW12R2DSSP16-03	MISSQL12.MSSQLSERVER	Enterprise Edition: Core-based Licensing	1	12.1.4100.1			
3 FW12R2-SSP1602	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
4 FW12R2DSSP16-02	MISSQL12.MSSQLSERVER	Enterprise Edition: Core-based Licensing	1	12.1.4100.1			
5 FW12R2R2SQL12-05	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
6 FW12R2R2SQL12-06	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
7 PayrollDB02	MISSQL14.MSSQLSERVER	Enterprise Evaluation Edition	0	14.0.1000.169			
8 FW12STR2SQL12-01	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
9 FW12R2-SSP1302	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
10 FW12R2R2SQL12-04	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
11 FW12R2DSSP13-05	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
12 FW12R2DSSP16-05	MISSQL12.MSSQLSERVER	Enterprise Edition: Core-based Licensing	1	12.1.4100.1			
13 FPL-VCEN55-01	MISSQL10_50.VIM.SOLEXP	Express Edition	1	10.51.2500.0			
14 FW12R2DSSP13-02	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
15 DMA VM	MISSQL11.MSSQLSERVER	Express Edition	0	11.0.2100.60			
16 FW12R2DSSP16-01	MISSQL12.MSSQLSERVER	Enterprise Edition: Core-based Licensing	1	12.1.4100.1			
17 FW12R2DSSP13-01	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
18 FPLV2A-SCOM16D9	MISSQL12.MSSQLSERVER	Enterprise Edition: Core-based Licensing	3	12.3.6024.0			
19 FW12R2-SSP1601	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
20 FWSTD2016-001	MISSQL13.MSSQLSERVER	Enterprise Edition: Core-based Licensing	0	13.0.1601.5			
21 PayrollDB01	MISSQL12.DATATIERVM01	Express Edition	0	12.0.2000.8			
22 FW12R2DSSP13-04	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
23 FW12R2-SSP1603	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
24 FPLWIN2016-01	MISSQL13.MSSQLSERVER	Enterprise Edition: Core-based Licensing	0	13.0.1601.5			
25 FW12R2DSSP13-03	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
26 FW12STR2SQL12-03	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
27 FW12R2-SSP1301	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
28 FW12R2DSSP16-04	MISSQL12.MSSQLSERVER	Enterprise Edition: Core-based Licensing	1	12.1.4100.1			
29 FW12R2LSP16D2-2	MISSQL11.MSSQLSERVER	Enterprise Edition	0	11.0.2100.60			
30 FW12R2R2SQL12-02	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
31 FW12DCR2SQL12-10	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
32 FW12DCR2SQL12-03	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
33 FW12DCR2SQL12-08	MISSQL11.MSSQLSERVER	Enterprise Evaluation Edition	2	11.2.5058.0			
34 FW12DCR2SQL12-04	MISSQL11.MSSQLSERVER	Enterprise Evaluation Edition	2	11.2.5058.0			
35 FW12DCR2SQL12-13	MISSQL11.MSSQLSERVER	Enterprise Evaluation Edition	2	11.2.5058.0			
36 FW12DCS012-08	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
37 FW12DCS012-09	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
38 FW12DCR2SQL12-06	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
39 FW12DCR2SQL12-02	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
40 FW12DCS012-13	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			
41 FW12DCS012-11	MISSQL11.MSSQLSERVER	Enterprise Edition: Core-based Licensing	2	11.2.5058.0			

Along with data discovered via the server assessment tool, you can use your CMDB data to build a view of your server and database estate. This helps you understand how your servers are distributed across business units, application owners, and geographies. You can then decide which workloads to prioritize for migration.

Dependencies between workloads

After server discovery, you can [analyze dependencies](#) to visualize and identify cross-server dependencies and understand optimization strategies for moving interdependent servers to Azure. The visualization helps to understand whether certain machines are in use, or if they can be decommissioned instead of being migrated. Analyzing dependencies helps ensure that nothing is left behind, and helps avoid surprise outages during migration. With your application inventory and dependency analysis done, you can create high-confidence groups of servers and start assessing them.



Optimization and sizing

Azure provides flexibility to resize your cloud capacity over time, and migration provides an opportunity for you to optimize the CPU and memory resources allocated to your servers. Creating an assessment on servers you've identified helps you to understand your workload performance history. This is crucial for right-sizing Azure VM SKUs and disk recommendations in Azure.

Readiness and suitability analysis

You can export the assessment report and filter on these categories to understand Azure readiness:

- **Ready for Azure:** Machines can be migrated as-is to Azure, without any changes.

- **Conditionally ready for Azure:** Machines can be migrated to Azure, but need minor changes in accordance with the remediation guidance provided in the assessment.
- **Not ready for Azure:** Machines can't be migrated to Azure as-is. Issues must be fixed in accordance with remediation guidance before migration.
- **Readiness unknown:** Azure Migrate can't determine machine readiness, because of insufficient metadata.

Using database assessments, you can assess the readiness of your SQL Server data estate for migration to Azure SQL Database, or Azure SQL Managed Instance. The assessment shows the migration readiness status percentage for each of your SQL Server instances. In addition, for each instance you can see the recommended target in Azure, potential migration blockers, a count of breaking changes, readiness for Azure SQL Database or an Azure SQL Database VM, and a compatibility level. You can dig deeper to understand the impact of migration blockers, and get recommendations for fixing them.

Assessed databases											
Columns		Subscription : DMSMigrationDemo		Migrate project : DBReadiness (DBReadiness)							
Microsoft tools											
Search to filter rows											
NAME	DATABASE SIZE (GB)	TARGET IN AZURE	MIGRATION BLOCKERS	BREAKING CHANGES COUNT	READY FOR AZURE SQL DB	READY FOR AZURE SQL VM					
Archive	0.003	Azure SQL Database Managed I...	1	0	No	Yes					
ADworks	0.02	Azure SQL Database Managed I...	0	0	Yes	Yes					
DBforTDE	0.003	Azure SQL Database Managed I...	0	0	Yes	Yes					
SitesEE	0.4	Azure SQL Database Managed I...	0	0	Yes	Yes					
HR	0.02	Azure SQL Database Managed I...	0	0	Yes	Yes					
Inventory	0.1	Azure SQL Database Managed I...	0	0	Yes	Yes					
StackOverflowEE	0.5	Azure SQL Database Managed I...	0	0	Yes	Yes					

Sizing recommendations

After a machine is marked as ready for Azure, the server assessment tool makes sizing recommendations that identify the Azure VM SKU and disk type for your machines. You can get sizing recommendations based on performance history (to optimize resources as you migrate), or based on on-premises machine settings without performance history. In a database assessment, you can see recommendations for the database SKU, pricing tier, and compute level.

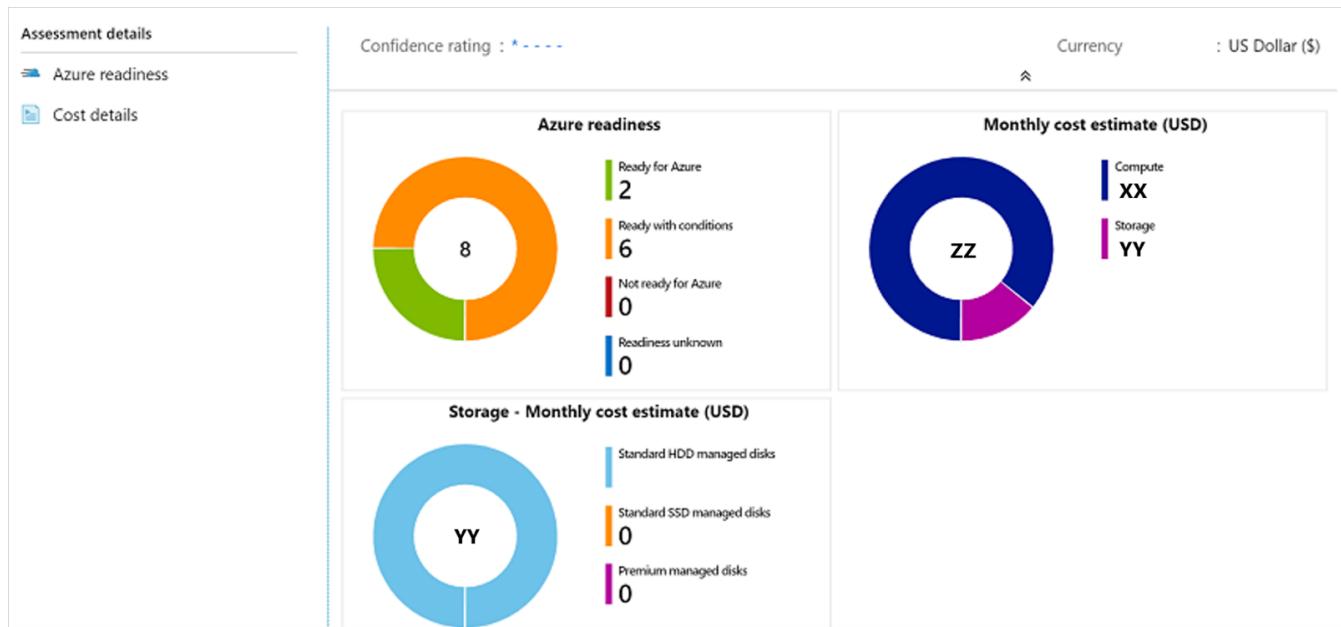
Get compute costs

The performance-based sizing option in Azure Migrate assessments helps you to right-size VMs, and should be used as a best practice for optimizing workloads in Azure. In addition to right-sizing, there are a few other options to help save Azure costs:

- **Reserved Instances:** With [Reserved Instances](#), you can significantly reduce costs compared to [pay-as-you-go pricing](#).
- **Azure Hybrid Benefit:** With [Azure Hybrid Benefit](#), you can bring on-premises Windows Server licenses with active Software Assurance, or Linux subscriptions, to Azure. You can combine this with Reserved Instances options.
- **Enterprise Agreement:** Azure [Enterprise Agreements \(EA\)](#) can offer savings for Azure subscriptions and services.
- **Offers:** There are multiple [Azure offers](#). For example, [Pay-As-You-Go Dev/Test](#), or [Enterprise Dev/Test offer](#), provide lower rates for dev/test VMs.
- **VM uptime:** You can review days per month and hours per day in which Azure VMs run. Shutting off machines when they're not in use can reduce your costs.
- **Target region:** You can create assessments in different regions, to determine whether migrating to a specific region might be more cost effective.

Visualize data

You can view server assessment reports (with Azure readiness information and monthly cost distribution) in the portal. You can also export assessments and enrich your migration plan with additional visualizations. You can create multiple assessments with different combinations of properties, and choose the set of properties that works best for your business.



Evaluate gaps and blockers

As you determine the applications and workloads you want to migrate, you'll identify downtime constraints for them and look for any operational dependencies between your applications and the underlying infrastructure. This analysis helps you to plan migrations that meet your recovery time objective (RTO) and ensure minimal to zero data loss. Before you

migrate, review and mitigate any compatibility issues or unsupported features that might block the migration. The server assessment report and the database assessment tool are particularly helpful with this.

Prioritize workloads

After you've collected information about your inventory, you can identify which applications and workloads to migrate first. Develop an "apply and learn" approach to migrate apps in a systematic and controllable way, so that you can iron out any flaws before starting a full-scale migration.

To prioritize migration order, consider factors such as complexity, time-to-migrate, business urgency, production considerations, compliance, security requirements, and application knowledge.

Here are a few recommendations:

- **Prioritize quick wins:** Use the assessment reports to identify low-hanging fruit, including servers and databases that are fully ready and require minimal effort to migrate to Azure. The following table summarizes a few ways to do this.

State	Action
Azure-ready VMs	Export the assessment report and filter all machines with state <i>Ready for Azure</i> . This might be the first group of machines that you move to Azure by using the Azure Migrate: Server Migration tool.
End-of-support operating systems	Export the assessment report and filter all machines running Windows Server 2008 R2 or Windows Server 2008. These operating systems are at the end of support, and only Azure provides a free three years of security updates when you migrate them to Azure.
SQL Server migration	Use the database assessment recommendations to migrate databases that are ready for Azure SQL Database. Migrate the databases ready for Azure SQL Database VM.
End-of-support software	Export your application inventory and filter for any software or extensions that might be reaching end-of-support. Prioritize these applications for migration.

State	Action
Under-provisioned machines	Export the assessment report and filter for machines with low CPU utilization and memory utilization (measured as percentages). Migrate to a right-sized Azure VM and save on costs for underutilized resources.
Over-provisioned machines	Export the assessment report and filter for machines with high CPU utilization and memory utilization. Solve capacity constraints, prevent overstrained machines from breaking, and increase performance by migrating these machines to Azure. In Azure, use autoscaling capabilities to meet demand. Analyze assessment reports to investigate storage constraints. Analyze disk IOPS and throughput, and the recommended disk type.

- **Start small, then go big:** Start by moving applications and workloads that present minimal risk and complexity to build confidence in your migration strategy. Analyze Azure Migrate assessment recommendations and your CMDB repository to find and migrate dev/test workloads that might be candidates for pilot migrations. Feedback and learnings from pilot migrations can be helpful as you begin migrating production workloads.
- **Comply:** Azure maintains the largest compliance portfolio in the industry in terms of breadth and depth of offerings. Use compliance requirements to prioritize migrations so that applications and workloads comply with your national, regional, and industry-specific standards and laws. This is especially true for organizations that deal with business-critical processes, hold sensitive information, or are in heavily regulated industries. In these types of organizations, standards and regulations abound, might change often, and can be difficult to keep up with.

Finalize the migration plan

Before finalizing your migration plan, make sure you consider and mitigate other potential blockers, as follows:

- **Network requirements:** Evaluate network bandwidth and latency constraints, which might cause unforeseen delays and disruptions to migration replication speed.
- **Testing/post-migration tweaks:** Allow a time buffer to conduct performance and user acceptance testing for migrated applications, or to configure and tweak applications post-migration. For example, you might need to update database connection strings, configure web servers, or perform cut-overs or cleanup.

- **Permissions:** Review recommended Azure permissions and server and database access roles and permissions needed for migration.
- **Training:** Prepare your organization for the digital transformation. A solid training foundation is important for successful organizational change. Check out free training on [Microsoft Learn](#), including courses on Azure fundamentals, solution architectures, and security. Encourage your team to explore [Azure certifications](#).
- **Implementation support:** Get support for your implementation if you need it. Many organizations opt for outside help to support cloud migration. To move to Azure quickly and confidently with personalized assistance, consider an [Azure Expert Managed Service Provider](#), or [FastTrack for Azure](#).

Create an effective cloud migration plan that includes detailed information about the applications you want to migrate, application and database availability, downtime constraints, and migration milestones. The plan considers how long the data copy will take and includes a realistic buffer for post-migration testing and cut-over activities.

A post-migration testing plan should include functional, integration, security, and performance testing and use cases. This helps you ensure that migrated applications work as expected, and that all database objects and data relationships are transferred successfully to the cloud.

Build a migration roadmap. Declare a maintenance window to migrate your applications and databases with minimal to zero downtime, and to limit the potential operational and business impact during migration.

Test migration

We recommend that you run a test migration in Azure Migrate before starting a full-scale migration. A test migration helps you to estimate the time involved and tweak your migration plan. It provides an opportunity to discover any potential issues and fix them before the full migration.

Output of the exercise

For Tailwind Traders, a total of 3,500 VMs, 1,200 applications, and 300 databases had been identified in the total digital estate. Of those, over 80 percent are hosted in the leased datacenters and must be moved to cloud solutions in less than 24 months.

The migration tooling used to collect this data is capable of migrating all of the identified assets. However, such a migration can place a great deal of strain on the change-management capacity of your organization. In particular, thoroughly testing over 1,200 applications and

validating 300 databases can strain an organization, especially if migration processes and cloud tools are new to the team.

To improve your odds of success, plan a series of subsequent waves of migrations. Identify a small set of prioritized workloads to migrate, test, and release to production in a two-week sprint. Follow that with subsequent migration waves until all workloads are migrated. Over time, you will see a steady increase in the number of workloads that the team can migrate in each sprint, increasing the size of your migration waves.

As a first wave, the following workloads were identified by Tailwind Traders due to the low impact on the business and limited technical complexity:

- **Retail innovation:**
 - Mobile coupon, an application consisting of a small website and a single independent database running on 3 servers.
- **Smart storefronts:**
 - Video shelf, a video distribution system that pushes video down to a tracked set of displays in a small number of pilot stores. This system uses 20 servers to manage and distribute video.
 - Remote store POS, instances of the POS systems used by remote locations that aren't able to connect to the organization's MPLS for high-speed transactions. This system uses 15 servers.
- **Corporate headquarters:**
 - Employee scheduling application, a simple application for managing and displaying employee schedules. This system only uses two servers, but must connect back to central ERP and HR systems for customer content.
- **End-user workstations:**
 - Virtual desktops require a 30-server solution to support as many as 500 desktops. Current business demands would suggest a 3x growth of demand, if it were available.
- **Central operations:**
 - Current backup solution limitations inject a great deal of risk into technology operations. A new solution is required to future-proof the organization's operations.

This is a very small subset of the overall digital estate, but it creates a set of measurable and actionable workloads that can be migrated, tested, and deployed to production. This first iteration will build skills for the team and prepare them for larger migration efforts.

In the next unit, we will convert this data into an actionable plan to guide migration and innovation efforts.

Next unit: Exercise - Customize your cloud adoption plan

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100 XP

Exercise - Customize your cloud adoption plan

20 minutes

In this exercise, you'll pull in data from the prior assessment step to populate the templated cloud-adoption plan. That data-driven plan will help manage the work related to migration and deployment of new, innovative workloads.

Customize your cloud adoption plan

It's tempting to build a plan that accounts for all workloads and every asset needed in the cloud. If your team doesn't have well-established processes for cloud adoption and extensive experience with your chosen cloud provider, such a plan might create false perceptions and inject unnecessary risk.

Instead, customize and test your plan by using a small set of well-defined workloads to create your first wave of cloud adoption. In this unit, we'll walk through how Tailwind Traders builds out its first adoption plan. The company uses the following steps:

1. Add your first wave of workloads
2. Associate dependent assets with each workload
3. Prioritize workloads
4. Evaluate migration tasks as a team
5. Estimate tasks and attempt to complete them in the estimated time
6. Test the deployed workloads
7. Refine processes and estimates
8. Apply your initial learning to a more comprehensive adoption plan

Open your cloud adoption plan template

In the first unit of this module, you created a backlog in Azure DevOps by using the cloud-adoption plan template. The last step of that unit suggested saving the URL to the Epic hierarchy view of that project plan. Use that link (or the steps from the first unit) to open your backlog or project plan that was created by that template.

Add workloads

Now add some workloads to the project plan. At the end of the last unit, we identified a series of workloads from the Tailwind Traders' digital estate. When you're building actual plans, you might target ten workloads for your first migration. But for brevity here, you'll only target the six workloads identified in the last unit.

! Note

The virtual desktop and backup solution workloads might be considered technology platforms, rather than workloads. However, during migration that distinction has little bearing on how the collection of assets is deployed to the cloud.

- Open the form to add a workload:** Expand the Cloud Migration Epic in your backlog to see all workloads slated for migration. Select the ellipsis to the right of the Cloud Migration Epic to see the menu. In the pop-up menu, hover over **Add link**, and then select **New item...**.

The screenshot shows the Azure DevOps Backlog page for the 'Cloud Adoption Plan Team'. The backlog is currently set to 'Backlog' mode. A specific epic titled 'Cloud Migration' (ID 5) is selected, indicated by a red box around its row. To the right of this epic, a context menu is open, also enclosed in a red box. Within this menu, the 'Add link' option is highlighted with a red box. Below 'Add link', the 'New item...' option is also highlighted with a red box. The rest of the backlog table shows other epics and user stories, each with their own columns for Order, Work Item Type, Title, State, Effort, Business, Value Area, and Tags.

- Add a new workload in the plan:** The first form asks for some basic data to add this workload to your plan. The questions are in Azure DevOps terms, not workload terms. Add all workloads to be migrated to the backlog as child elements of the cloud migration Epic. All workloads are entered as features, given the amount of work required

to migrate all of the dependent assets supporting a workload. Enter the workload name to complete this form. For this exercise, select **Child** as the Link type, select **Feature** as the Work item type, enter **mobile coupon** as the title of your first workload, then select **OK** at the bottom of the form.

Add link

You are adding a link from:

📍 5 Cloud Migration
Updated 15 minutes ago, • New

Link type

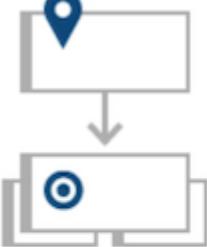
Child

Work item type

Feature

Title

Workload name



Comment

OK Cancel

- **Enter workload data:** For these first few workloads, focus on the minimum amount of data that you believe the migration team will need to complete a migration through to production. The name of the workload should carry over from the prior form. Fill in the description box with critical information that should be tagged for all assets associated with this workload, such as criticality, data sensitivity, workload tag, business group, workload owner, operations commitment, or other information that should persist throughout the workload's lifecycle. To establish best practices from the beginning, start your first discussion in this form by outlining the testing requirements that would

validate successful migration of this workload. Select **Save and close** to save the workload information.

The screenshot shows the Microsoft Teams interface for creating a new workload. At the top, there's a purple ribbon bar with a trophy icon and the text "NEW FEATURE *". Below it, the title "Workload" is displayed, along with a "Unassigned" status indicator. To the right, there are buttons for "0 comments" and "Add tag". Under the title, there are two rows of metadata: "State: New" and "Reason: New" on the left, and "Area: Cloud Adoption Plan" and "Iteration: Cloud Adoption Plan" on the right. The main content area is titled "Description" and contains a placeholder text: "Describe the workload and any tagging associated with it". Below this, a bulleted list provides guidance: "• Criticality", "• Data sensitivity", "• Workload tag", "• Business group", "• Workload owner", "• Operations commitment", and "• etc...". To the right of the description, there's a "Planning" section with fields for "Priority" (set to 2), "Risk", "Effort", "Business Value", and "Time Criticality". Below the description is a "Discussion" section containing a message from a user named "sy": "Who and how will this workload be tested and validated post-deployment? What is the deployment plan for this workload?". This section includes a rich text editor toolbar with icons for bold, italic, underline, and various styling options. To the right of the discussion, there's a "Classification" section with "Value area: Business".

Repeat these steps for each of the workloads in your first migration wave. For this exercise, create features in the plan to represent each of the six Tailwind Traders workloads: mobile coupon, video shelf, remote store POS, employee scheduling, virtual desktop, and backup solution.

Add assets

Each of the inventoried assets required to support a workload needs to be added to the plan to manage the actual work. The following process shows how to add each asset under the corresponding workload.

Note

For simplicity, we will number each asset instead of providing names for each. In real-world projects, you'd record the name and other metadata aspects to guide the technical efforts.

- Open the form to add a new asset: Expand the Mobile Coupon feature in your backlog.

Select the ellipsis to the right of Mobile Coupon to see the menu. In the pop-up menu, hover on Add link, and select New item.

The screenshot shows a Microsoft Teams backlog interface. On the left, there's a table of work items with columns for Order, Work Item Type, Title, and State. The 'mobile coupon' item is selected and highlighted with a red box. A context menu is open over this item, with the 'Add link' option and its 'New item...' submenu item also highlighted with red boxes. To the right of the backlog, there's a 'Planning' section for 'MJGuider Team Backlog' with two iterations: 'Iteration 2' (Current, 4/19/2022 - 5/10/2022) and 'Iteration 3' (5/11/2022 - 6/1/2022).

- Add a new asset in the plan: Similar to the process for adding a new workload, the first form asks for some basic data to add this asset to your plan. All assets to be migrated should be added to the backlog as child elements of the relevant workload feature. All assets are entered as user stories, because the migration of that asset is a discrete and measurable outcome based on a series of tasks. Enter the asset name to complete this form. For this exercise, select **Child** for the Link type, select **User story** for the Work item type, and enter **Asset #1** as the title of your first asset. Select **OK** at the bottom of the form.



Add link

You are adding a link from:



94 Workload
Updated a minute ago, • New

Link type

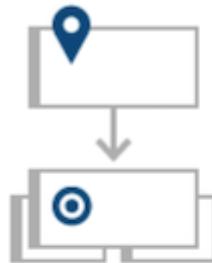
Child

Work item type

User Story

Title

Asset to migrate



Comment

OK

Cancel



- **Enter asset data:** The name of the asset should carry over from the prior form. Fill in the description box with critical information about this asset, such as asset type (VM, data, or application), current network segmentation, known dependencies, asset specific tags, or other information that can help with migration of the asset. To establish best practices from the beginning, start thinking about acceptance criteria. Use the **Acceptance criteria** box to fill in details about how and by whom this asset will be tested after it's deployed to the cloud. Select **Save and close** to save the asset information.

 NEW USER STORY *

Asset to migrate

Unassigned 0 comments Add tag

State	New	Area	Cloud Adoption Plan
Reason	New	Iteration	Cloud Adoption Plan

Description

Describe the asset

Acceptance Criteria

Who and how will the asset be tested once it is migrated to the cloud?

B I U ab A < > ab AA </> @ # ...

Planning

Story Points

Priority
2

Risk

Classification

Value area
Business

Discussion

sy Add a comment. Use # to link a work item, ! to link a pull request, or @ to mention a person.

Prioritize workloads

In the Epic hierarchy view of your backlog, you can drag workloads up and down on the list to reflect linear priority and start to establish a sequence of workloads to migrate.

As the number of workloads in your plan grows, this approach might not be robust enough to provide necessary clarity. Select any workload to open the work item editing form used to add this initial workload. Under the planning section of that form, you can use the field for priority, risk, business value, or time criticality to denote a more lasting value for prioritization.

Most importantly, defining waves of workloads to migrate will establish priority for the work to be completed. On the same form, you can set an iteration for each workload, by using the iteration drop-down list.

If you use the form to set priority values, remember to select **Save & Close** when you are finished.

The screenshot shows a Microsoft Workload item in the 'Cloud Adoption Plan' iteration. The 'Save & Close' button is highlighted with a red box. The 'Iteration' field is set to 'Cloud Adoption Plan\Iteration 1'. The 'Planning' section, which includes fields like Priority (2), Risk, Effort, Business Value, Time Criticality, Start Date, and Target Date, is also highlighted with a red box.

Evaluate migration tasks as a team

The cloud-adoption plan template deploys a sample workload template to show the various different efforts that a migration might require. Depending on the approach you choose to migrate, the tasks needed might vary.

Asset migration: At the core of any migration approach is a simple, two-step process that must be completed for each asset: assess compatibility and migrate the asset. But most teams also add basic processes to optimize sizing, configure security and management settings, and document the configuration of that asset. You can repeat these tasks for all assets in the digital estate. The template includes links to instructions for completing each task.

Asset migration is fine for small-scale, tactical efforts. But that approach doesn't scale to meet the needs of sophisticated migrations or adoption efforts, like the one Tailwind Traders needs to complete.

Workload migration: To scale these processes, a workload migration can be much more useful. In this approach, you can ignore the tasks associated with each asset in the template. Assets are migrated in bulk by using tools like Azure Migrate. You complete assessment, sizing, dependency, testing, and documentation once for each workload to reduce redundant tasks. As workloads are migrated, existing assets are also decommissioned to retire unused assets and reduce ongoing costs.

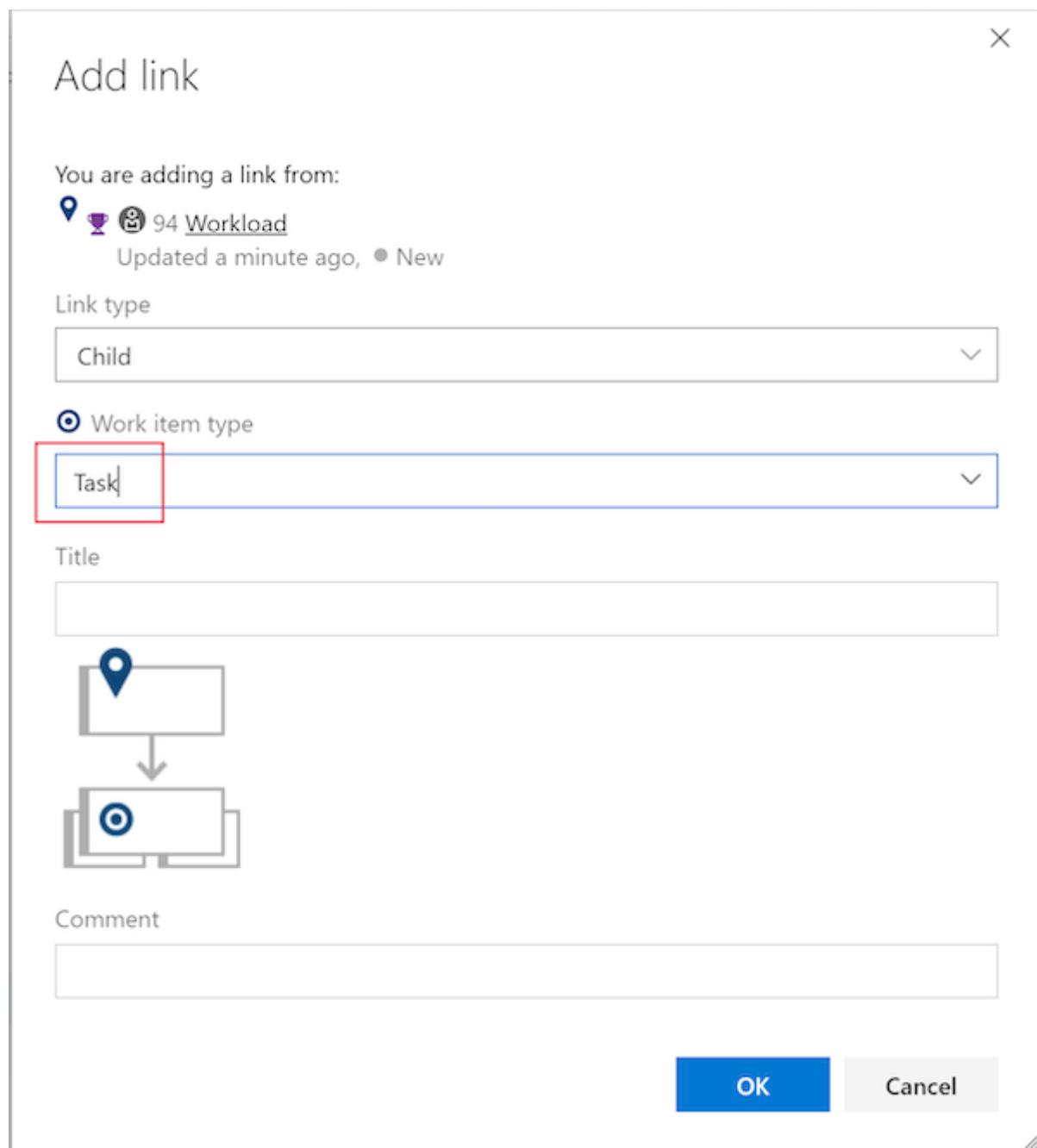
Workload migration is much more efficient, but might also hit scale points when the effort begins to focus on thousands of VMs.

Migration factory: For the highest scale and most repeatable option, you can build a migration factory as you and your team gain additional experience. The [process improvements section](#) of the Cloud Adoption Framework provides a number of processes to consider.

Add tasks

After the team aligns on the tasks required to support your processes, you can begin adding those tasks to each workload and/or asset.

Similar to the preceding steps, here you'll select the ellipsis next to any workload or asset to add tasks. The only difference is that you choose **Task** from the **Work item type** drop-down list to track the assignments and work associated with this task.



If you add tasks directly to a workload, you can also add user stories to group the work and help with assignments. The template provides examples of user stories to group work, as shown in the following image:

Order	Work Item Type	Title	State	Effort	Busin...	Value Area	Tags
	Feature	Workload Template	New	0	Business	Workload Template	
	User Story	Prerequisites	New	0	Business	Workload Template	
	User Story	Assess the workload	New	0	Business	Workload Template	
	Task	Evaluate workload and asset readiness	New	0		Workload Template	
	Task	Architect workload	New	0		Workload Template	
	Task	Estimate Cloud Costs	New	0		Workload Template	
	Task	Migration tool choice(s)	New	0		Workload Template	
	Task	Change approval process	New	0		Workload Template	
+	User Story	VM - UX Server	New	0	Business	Workload Template	
	Task	Assess	New	0		Workload Template	
	Task	Migrate	New	0		Workload Template	
	Task	Optimize workload(s)	New	0		Workload Template	
	Task	Secure and Manage	New	0		Workload Template	
	Task	Document configuration	New	0		Workload Template	

Estimate tasks and try to complete them in the estimated time

For each task the team agrees to include, come up with an estimate of time required to complete the work. Enter the estimated time in the **Original Estimate** text box, and select **Save and close**.

Each day, meet with the team during the first iteration to capture work progress. Update the remaining time and completed time values in the meeting each day. This helps the team pay close attention to the difficulty of completing each task, and helps to refine estimates for the future. For the first few iterations, practice recording observations about the work being completed in the discussion box to help retain any lessons learned.

⚠ Note

As the team progresses, some of the work they agreed to might appear unnecessary. For the sake of continued learning, try to ensure all tasks are completed during the iteration to validate those appearances, then adjust them in future iterations. Don't let an unnecessary task become a blocker to delivering on the user story or migration effort.

Test the deployment

As each asset is deployed, run a test to validate completion and adherence to initial design.

When the final asset for each workload is deployed, validate the architecture, performance, and sizing. Most importantly, perform a test of the workload with actual business users whenever possible.

Retrospective to refine processes and estimates

At the end of your first iteration, come together as a team to discuss what worked and what didn't. Also look at things the team wants to stop doing, keep doing, or do more.

Apply these simple considerations to the list of tasks to include in your next iteration. You can also use the time spent on tasks to inform new estimates from the team.

Apply your initial learning to a more comprehensive adoption plan

Repeat the steps in this article for your first three iterations to continue learning and refining processes. After a few iterations, the team should have an understanding of the tasks required, the time to require those tasks, and the overall processes that will lead to success across your digital transformation program.

In parallel to completion of each iteration, the project manager should use assessment data from the prior unit to populate the richer plan, including the larger number of workloads and assets required.

As a general rule, project managers should try to load 10 workloads per iteration for the first few iterations. As you complete more retrospectives, it will become clearer how many workloads the team can complete in a two-week iteration. For some mature teams, hundreds or even thousands of assets can be migrated in a two-week sprint. But testing and production release of the workloads those assets support will take more time.

During the first few weeks of initial iteration execution, the majority of your migration project should be able to be loaded, prioritized, assigned to iterations, and estimated. Usually, the accuracy of project duration and timelines stabilizes by the time the third iteration is complete.

Integrate your digital estate at scale

You can more quickly add workloads, assets, and tasks by using the Teams add-in for Microsoft Excel. The *Next steps* section in the next unit provides an article series that will teach you how to load a large number of workloads and assets by using the workload template provided in the initial cloud-adoption plan.

Partner engagement

Microsoft partners who provide the Cloud Adoption Framework approved offers can accelerate the planning and execution of migrations, significantly reducing the amount of recurring work required by the organization. See the [Cloud Adoption Framework partner offer site](#) for offers from experienced partners.

Next unit: Summary

[Continue >](#)

How are we doing?

100 XP

Introduction

2 minutes

Cloud adoption and operations depend on your early platform decisions. In this module, you'll compare common operating models and options for implementing Azure landing zones. The goal is to find the best path to a fully configured cloud platform.

Learning objectives

In this module, you'll:

- Compare your management, governance, and security requirements for operations to common operating models.
- Evaluate options for implementing Azure landing zones against your short-term and long-term requirements.
- Choose the best Azure landing zone and Learn modules to support your needs for cloud adoption.

Prerequisites

- Completion of the [getting-started Learn module about the Cloud Adoption Framework](#).
- An understanding of your organization's cloud adoption strategy.
- Familiarity with Azure cloud environment, including network configuration, network connectivity, and Azure Active Directory.
- Familiarity with Azure governance tools, including Azure Policy and Azure Resource Manager templates.
- A general understanding of the environmental requirements for proceeding with your cloud adoption plan.
- A basic understanding of the following two terms:
 - **Azure landing zones:** Azure landing zones provide an accelerated approach to deploying your cloud platform. That platform consists of critical design areas that should be included in your cloud environment. After you deploy the platform, you can modify the architectures that define Azure landing zones to meet your business, operations, and technical requirements.

Operating model. The way you choose to operate and run technology solutions will have a big impact on the design of your environment and the initial architecture for configuring your environment. Your cloud operating model is the specific way that you want to operate assets hosted in the cloud. Aligning to an operating model will help you to quickly assess requirements for governance, security, and operations management.

Next unit: Customer narrative

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How are we doing?

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Unit 2 of 10 ▾

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100 XP

Customer narrative

7 minutes

In the getting-started module, we shared the narrative for Tailwind Traders. The central operations team and platform team at Tailwind Traders are experienced at managing the company's existing datacenters. The ongoing project to migrate two of the datacenters to Azure is already exposing a few critical learning curves that the company's current skill sets can't address.

Important constraints

At this time, the business has placed a high priority on migration and meeting the time constraints to get out of the datacenter. Because of that business priority, the business and IT teams have deprioritized longer-term security and compliance requirements until they can complete development of their core cloud platform.

Because Tailwind Traders is new to the cloud, very few members of operations, platform, or IT admin teams are experienced with the cloud. The company wants to slowly move into modern operations, security, and governance, but it still needs a cloud foundation that can scale to meet those needs as they become more important.

Historically, Tailwind Traders has operated purely from the perspective of central operations. As a result, the workload teams can't interact with production environments. The company doesn't have an easy way of mapping assets (virtual machines, data, and apps) to defined workloads, so the boundaries of each workload can be unclear at times.

Alignment to Azure landing zones

The operations and platform teams have agreed to the following alignment:

- The conceptual architecture of Azure landing zones will serve as the long-term vision for the future state of the cloud environment. All affected teams will use that architecture as a basis for building cloud skills and configuring their cloud environment.
- The teams will use the Azure landing zone accelerator get started with their environmental configuration.

- If the teams need to customize their environment in the future, they'll use one of the custom implementation options that align to or extend the initial accelerator-based deployment.

Deviation from standard Azure landing zone guidance

The following list outlines how constraints have caused Tailwind Traders to deviate from the design principles for Azure landing zones, along with the impact of each decision:

- **Policy-driven governance:** Tailwind Traders hasn't historically automated its corporate policies. Because of the pressure to migrate the datacenter quickly, the company chose to minimize the amount of governance—including in its initial deployment of a landing zone.

The company has also committed to completing the [Learn module about the Govern methodology of the Cloud Adoption Framework](#) after it configures the initial environment. Limitations in IT staff dedicated to the cloud migration are a big driver for this deviation. This deviation is further enforced by business and IT resistance to full cloud governance or "Azure Ops."

- **Subscription democratization:** The central operations team will maintain accountability for production operations for all workloads. That team will seldom allow a workload team to have access to a production environment, so it isn't following the design principle of subscription democratization.

If a workload team requires a deviation, the central operations team will consider a dedicated landing zone for individual workloads on a case-by-case basis. Otherwise, Tailwind Traders is firmly committed to maintaining central operations and will have limited instances of workloads in isolated production environments (or application landing zones).

- **Application-centric service model:** Outage-related processes might consider workloads, especially for assets that support mission-critical workloads. However, aside from outages, the central operations team doesn't differentiate between workloads and applications for operations management processes. The team's primary processes operate, manage, make changes, and optimize all resources the same way, regardless of the workload boundaries or architecture. Given the time constraints for this migration, it's not feasible for Tailwind Traders to define app boundaries and establish an app-centric service model.

Many of the terms in the preceding list will be explained in later units of this Learn module. Several of them are reflected in notes to create teaching opportunities.

These deviations don't take away from the alignment agreement. However, these deviations will affect some options in deploying the Azure landing zone accelerator. These deviations will also affect the design for individual application landing zones, which are deployed after you start to migrate assets to the cloud.

These deviations will also require the Tailwind Traders teams to complete Learn modules about management, security, and governance in the Cloud Adoption Framework after the initial environment is deployed.

Additional constraints

The following additional constraints might affect Tailwind's decisions.

Operations

The central operations team has organically built a set of processes and controls to manage the overall portfolio. The team depends on System Center Operations Manager and System Center Configuration Manager for its operations baseline.

The team has also integrated best-of-breed tools for virtual machine management, incident and configuration management tracking, network monitoring, security operations, and governance controls, among other tools. Most of these tools have built-in integration with Azure, which influenced the decision to use Azure as the company's primary cloud provider. Operating these tools requires significant people power and capital.

Operations tools

Licensing for the operations management tooling (including hypervisors) consumes more than 20 percent of IT's budget for hard costs. The new chief information officer (CIO) has challenged the team to reevaluate those tools and processes to find cloud-first or unified operations alternatives. The CIO will watch for reduction of tooling expenses as an early indicator of success in this migration.

Operations processes

The IT manager has requested two new hires to support the central operations team. They'll help balance the load on the overstressed team. In particular, they'll support business continuity and disaster recovery (BCDR) practices and patch compliance processes.

The business isn't ready for a full-scale move to cloud-native operations, especially for mission-critical applications. The CIO believes that some investment in cloud-native operations tools would help reduce strain on the central operations team by shifting some of those responsibilities to the cloud provider.

The CIO will watch for operational shifts to improve employee satisfaction and reduce load across the central operations team. The CIO will also request frequent updates on how the adoption plan affects BCDR and patching efforts.

Service-level agreement

In spite of all the hard work and costs associated with operations, the team periodically fails to meet the service-level agreement (SLA) of 90 percent uptime for mission-critical systems in the primary datacenter. This is a costly concern for the CIO and the chief executive officer (CEO). Outdated hardware and an overdue refresh cycle in the datacenter have resulted in frequent but brief outages.

Although the company has grudgingly accepted this SLA, the new CIO is not impressed. Regardless of the financial savings, the CIO expects the central operations team to deliver a much higher SLA after the migration.

Retail innovation

The customer narrative from the getting-started module introduced you to the retail innovation team within Tailwind Traders. That team was originally a startup that Tailwind Traders acquired. The startup's original CEO is now Tailwind's chief technology officer (CTO). The CTO still runs that division like a startup, by prioritizing experimentation and innovation.

The current processes for operations management require that all new innovations from that team go through a release process. The central operations team within IT reviews the architecture for security, governance, and operations management concerns. After the team is comfortable with the solution, it releases the solution into a centrally managed production environment. This process is expected to continue in the cloud.

Identity management

Active Directory is the identity store and the primary tool for authentication and access control across the Tailwind Traders datacenters. The company has used some best-of-breed systems to extend identity into a multifactor authentication solution. The company has also federated identities to deploy its Microsoft 365 solution. But even with those, Active Directory is how Tailwind Traders manages identity.

In the cloud, the company now has more options, like Azure Active Directory or Azure Active Directory Domain Services running in an infrastructure as a service (IaaS) infrastructure. The central operations team is struggling to compare options and choose the best identity solution for its cloud adoption plans.

Network topology and connectivity

Tailwind Traders uses Multiprotocol Label Switching (MPLS) lines to connect its datacenters and physical stores. All internet traffic is funneled through the primary datacenter. Due to Internet Protocol (IP) conflicts between two of the datacenters, traffic is isolated and routing is dependent on complex routing tables. External connectivity into the datacenter or corporate office is delivered via virtual private network. That connectivity is limited and discouraged.

The primary and secondary datacenters have consistent IP address schemas that are maintained and organized clearly. The third datacenter includes 50 different IP blocks with little consistency and no clear organization or segmentation plan. The continuous innovation cycles are limited to the third datacenter, but they might present problems with defining the network topology and routing in the cloud.

Resource organization

Segmentation of resources between each datacenter treated each collection of workloads as a big block of assets. Each collection was then divided by risk profile to create isolated and controlled segments to allow limited networking flow between workloads. Workloads that require any ingress network connection from any unprotected network are isolated into one or more perimeter network segments of each datacenter.

Beyond that basic organization, there are inconsistencies in the configuration management database, so it's hard to tell which assets are associated with which workloads. Workload owners and incident escalation chains are well defined for mission-critical workloads, but they're missing for most other workloads.

For less critical workloads, it's common for the identified owner to be a former employee of Tailwind Traders. The configuration mapping often references virtual machines that have been terminated. Likewise, more than 30 percent of the supported assets are not clearly mapped to a single workload. The company will require practice during migration to ensure dependency analysis and proper resource organization.

Next unit: Common operating models

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Unit 3 of 10 ▾

Next >

✓ 200 XP

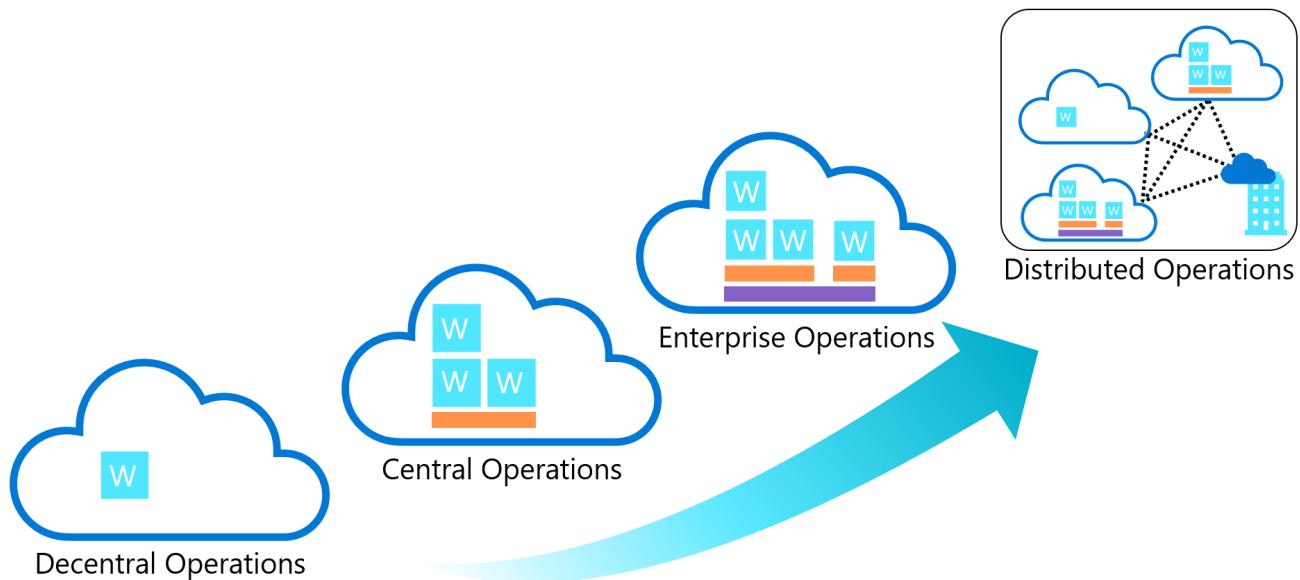
Common operating models

20 minutes

In this unit, you'll review common operating models to see which ones best align to the Tailwind Traders narrative. You'll also learn how to evaluate and map the operating model that best fits your cloud adoption plans. This information will help you choose the most relevant Azure landing zone to begin building your cloud environment.

Common operating models

The following four operating models show up across cloud adoption efforts. Examining these common operating models can shape conversations about environmental design and configuration. Each operating model maps to one or more Azure landing zones to accelerate initial deployment.



The following characteristics aid in aligning to one of the common operating models:

Strategic priority: Innovation, control (optimized operations), democratization (autonomy), and integration are all important strategic priorities for adopting the cloud. When you're speaking to the executive stakeholders, which will be the most important factor for your company in the next three to five years?

Organization: Organization of people drives some operations decisions. Do you have a small IT team that covers all of your portfolio? Are separate teams dedicated to functions like security, governance, and operations? Are teams organized around individual workloads? Are you bound by rigid third-party compliance standards that are reviewed by an auditor or other compliance bodies?

Portfolio scope: The size of your portfolio and where you focus operations are important considerations for each operating model. Do you manage a large, complex, multicloud workload portfolio? Can a single cloud platform support the portfolio? Do all of your workloads need to live in a single production subscription? Do you focus on workload-specific operations with no central support? Learn more about these terms in the [portfolio hierarchy article](#).

Accountability (separation of duties): When it comes to technology, there's always something that can go wrong. That's why few teams sign up for an uptime SLA of 100 percent. When things break or aren't performing as expected, who's accountable for taking the call? Who's accountable for proactive fixes to minimize outages? Who's accountable for cloud economics and ongoing budgets? Accountability and associated access requirements drive some environmental design decisions.

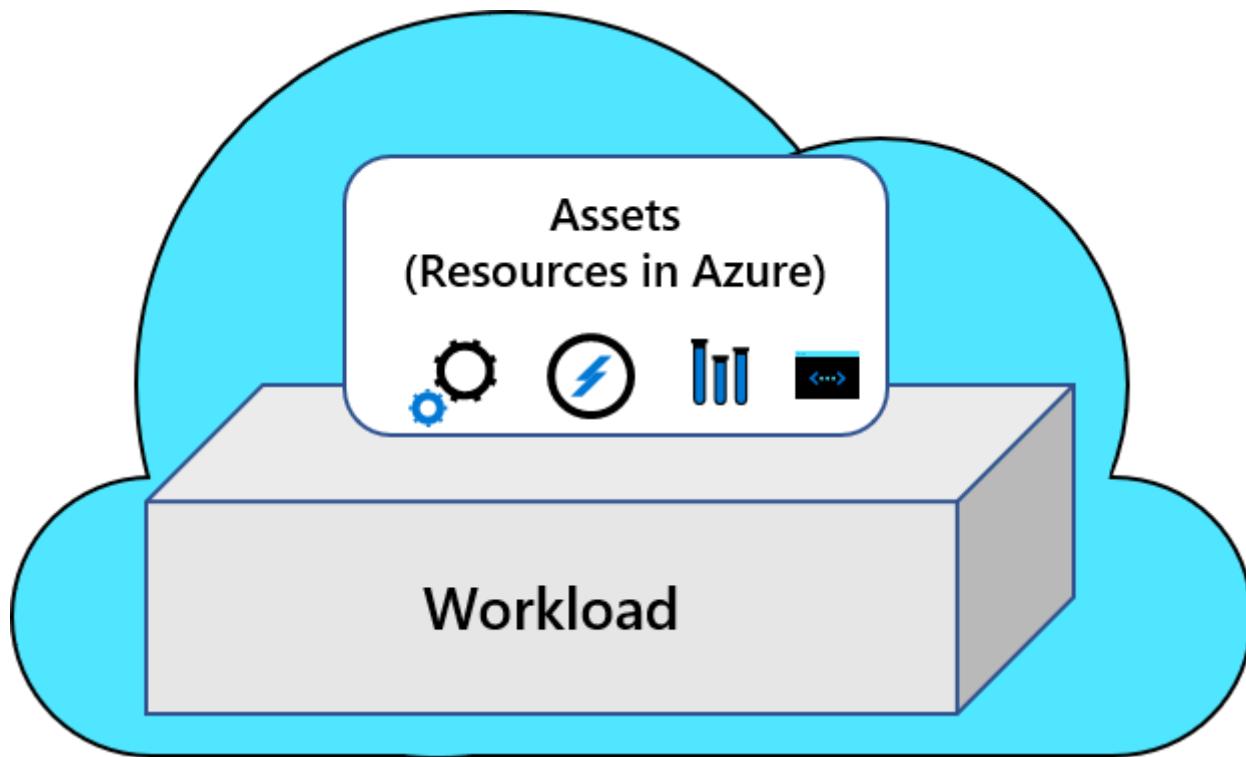
Standardization: Standardizing foundational utilities like network, identity, and security can produce tangible cost savings and reduce the amount of people power that's dedicated to various efforts. How important is standardization of utilities or shared resources?

Operations priority: In modernizing operations, it's common for an operations team to choose cloud-first services as the primary form of operations support. Alternatively, when existing on-premises tooling is the primary operations tooling that the team wants, the cloud can be an extension or a secondary operating model. Looking forward, do you prefer a cloud-first view of operations and supporting tools? Will you carry forward existing tools to extend into the cloud? Are you looking for a unified operations approach that can seamlessly blend public and private cloud operations?

Platform development velocity: Workloads require their own assets, which create the direct workload environment. Beyond those directly supporting assets, there are various degrees of upfront investment. How much effort do you want to invest in foundational utilities that will be shared across workloads (such as network and identity)? How much upfront effort should go into a centralized cloud foundation that will share those utilities across multiple landing zones?

Decentralized operations

The least complex operating model is a fully decentralized model. This model is highly focused on independent workloads with minimal dependency on centralized operations. This model is also called bimodal IT or decentralized IT.



Strategic priority: Organizations often use decentralization when they prioritize *innovation over control*. This model is common in startup organizations, but it's also an increasing trend in larger organizations.

Organization: Teams are organized around workloads or business processes, which contrasts with the other three operating models.

Portfolio scope: The portfolio's scope is also isolated to workload levels. When an organization is entirely decentralized, the organization is unlikely to invest much time in management of portfolio alignment.

Accountability (separation of duties): The workload team is entirely accountable for operations, governance, and security decisions. There is no shared accountability model in decentralized operations.

Standardization: Best practices and deployment automation (continuous integration/continuous delivery pipelines) are critical to create any degree of standardization across workloads. Without centralized functions, standardization probably won't last long.

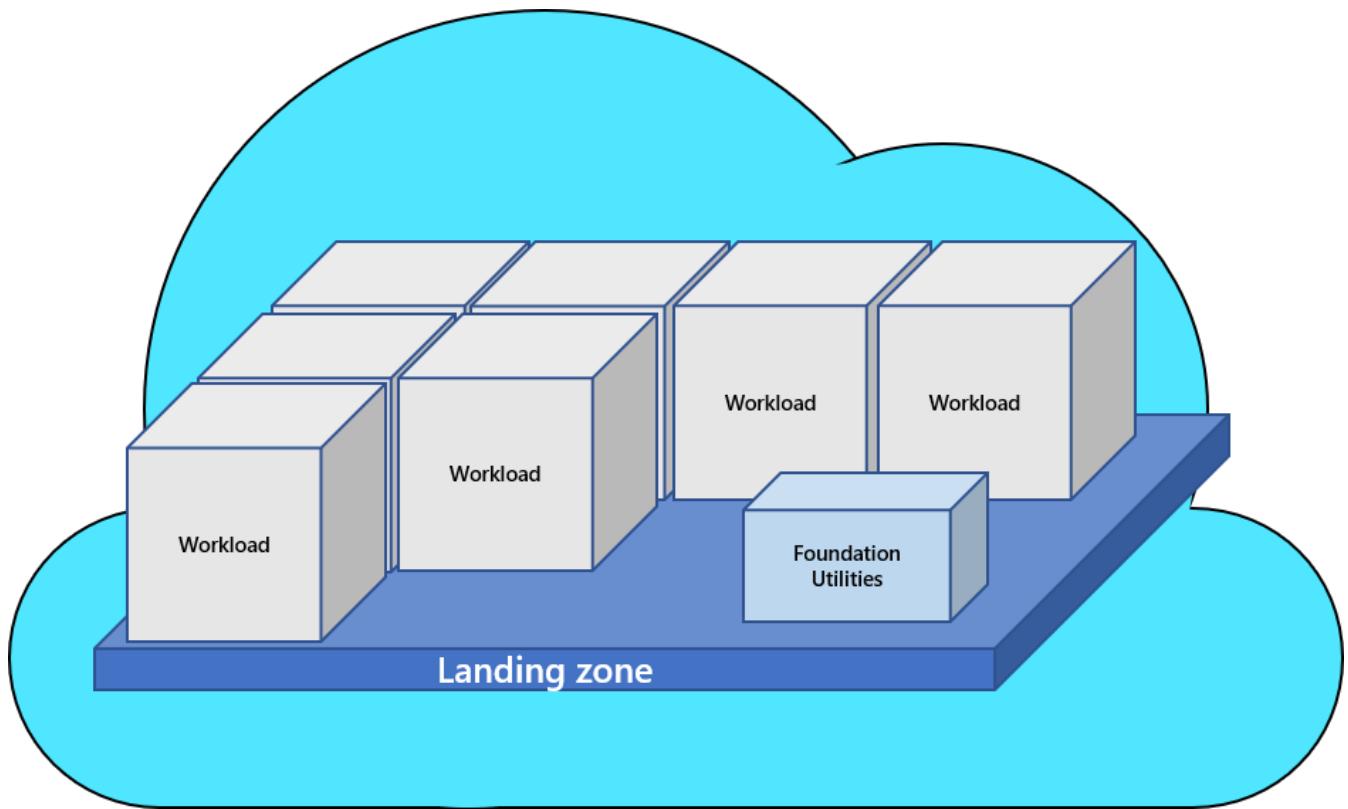
Operations priority: A decentralized operations team is more likely to prioritize cloud-first operations by using software as a service (SaaS) or platform as a service (PaaS) tools to automate operations.

Platform development velocity: Decentralized operations might share deployment scripts across workloads, but there are few or no central resources shared across workloads.

[Compare more pros, cons, and characteristics of decentralized operations in the Cloud Adoption Framework.](#)

Centralized operations

A centralized model is the most common operations model in IT. This model is highly focused on a controlled production environment that's managed solely by centralized operations. Centralized operations focus on a smaller number of landing zones with embedded foundational utilities.



Management of nonproduction environments varies from organization to organization. But in a centralized operations model, even the nonproduction environments are likely to be constrained by governance and security requirements.

Strategic priority: When control and stability in the business are more important than innovation, this model tends to be the highest trend. Larger organizations or stable organizations often use centralized operations. This model is common when third-party compliance requirements drive environmental decisions.

Organization: Teams are organized around functions or processes first. In smaller organizations, central IT is home for team members who focus on security, governance,

operations, and infrastructure. As organizations grow, those functions might spin out into teams that are dedicated to each function.

Portfolio scope: Centralized operations teams tend to focus on one landing zone or a small number of landing zones. Within those landing zones, the organization deploys foundational utilities to support a combination of workloads in each landing zone. This operations model tends to create scale challenges when the organization supports robust cloud foundations and multicloud portfolios.

Accountability (separation of duties): In this operations model, central IT or central operations teams are typically accountable for all assets in production. Separation of duties tends to focus on environment isolation, which prevents workload-specific teams from interacting with production assets.

Standardization: Standardization across workloads is likely high. However, as the portfolio grows to span multiple landing zones or multiple cloud platforms, that standardization might break down and require significant modifications to the environment.

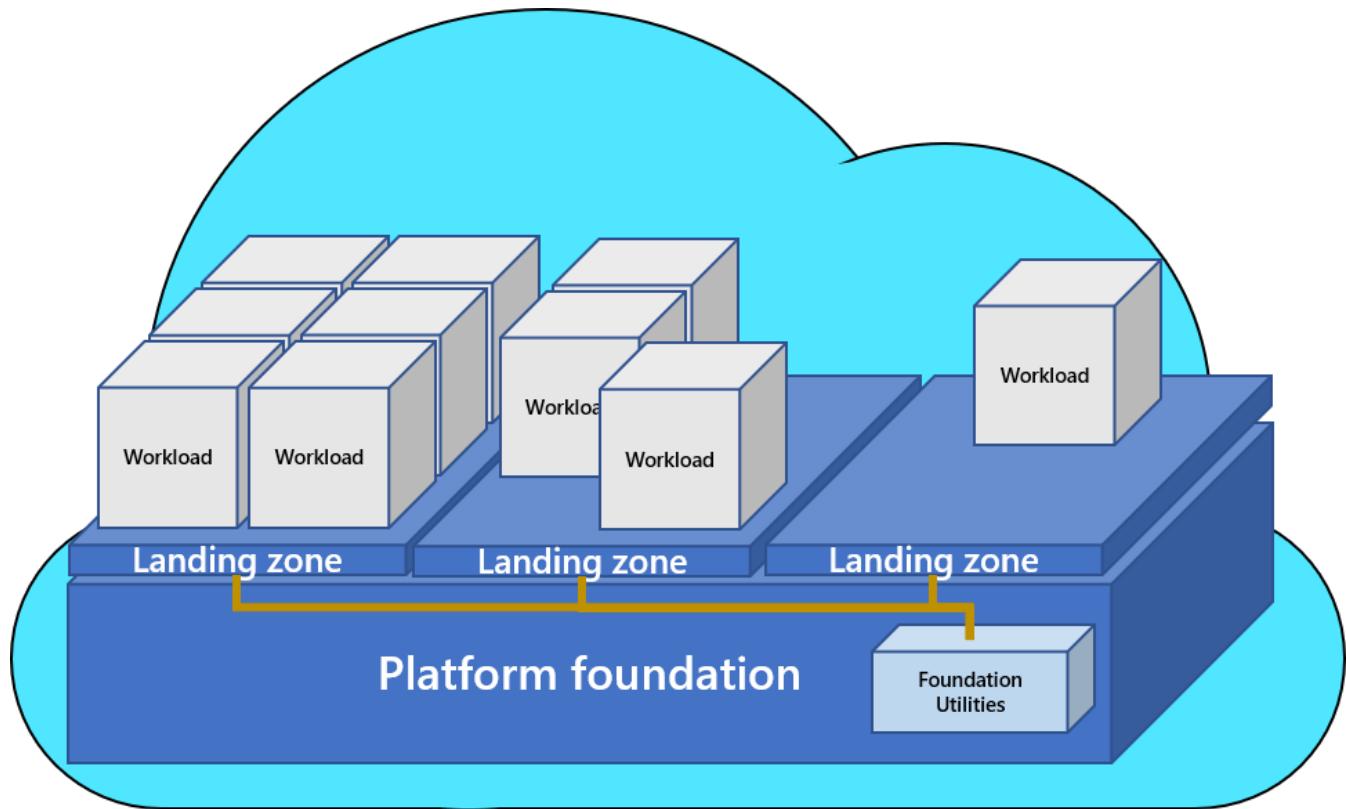
Operations priority: Organizations commonly use centralized operations when they consider their cloud operating model to be a secondary operating model. Because the existing on-premises or private cloud operations are the primary model, these organizations tend to carry forward existing operations tools and limit primary usage of modern cloud-first operations tools.

Platform development velocity: Central operations teams typically need a start-small approach to address common utilities. Over time, the teams will focus on building best-of-breed solutions into the environment.

[Compare more pros, cons, and characteristics of centralized operations in the Cloud Adoption Framework.](#)

Enterprise operations

An enterprise model is appropriate for customers who are migrating entire datacenters or large portfolios to the cloud. Enterprise operations focus on a larger number of landing zones with foundational utilities centralized into a platform foundation.



Strategic priority: The enterprise model focuses on democratizing decisions and delegated responsibilities to balance the need for innovation in some landing zones and tighter control in others. This is a strategic priority for large organizations that need to protect existing interests while empowering innovation to keep pace with market changes.

Organization: Enterprise operations empower build-and-operate capabilities in each workload team. Workload teams are aligned by function, such as governance, security, and operations. A dedicated cloud center of excellence (CCoE) team unites the workload and supporting teams to coordinate activities and help ensure operational excellence across the cloud foundation.

Portfolio scope: The scope of enterprise operations focuses on the holistic cloud foundation to ensure that foundational utilities are centralized and available to all landing zones. Landing zones and dedicated workload environments can then be deployed in a self-service capacity, with the cloud foundation providing all the required dependencies.

Accountability (separation of duties): The CCoE team is responsible for maintaining the necessary centralized resources and creating visibility across the portfolio. Central operations or workload-specific operations teams are then accountable for the day-to-day support of the individual workloads.

Standardization: Standardization is highest in this operating model. The centralized cloud foundation ensures consistency in the configuration of all areas of landing zone design. Sound best practices favor automated deployment for all workloads. This automation allows for further standardization at the workload and asset levels.

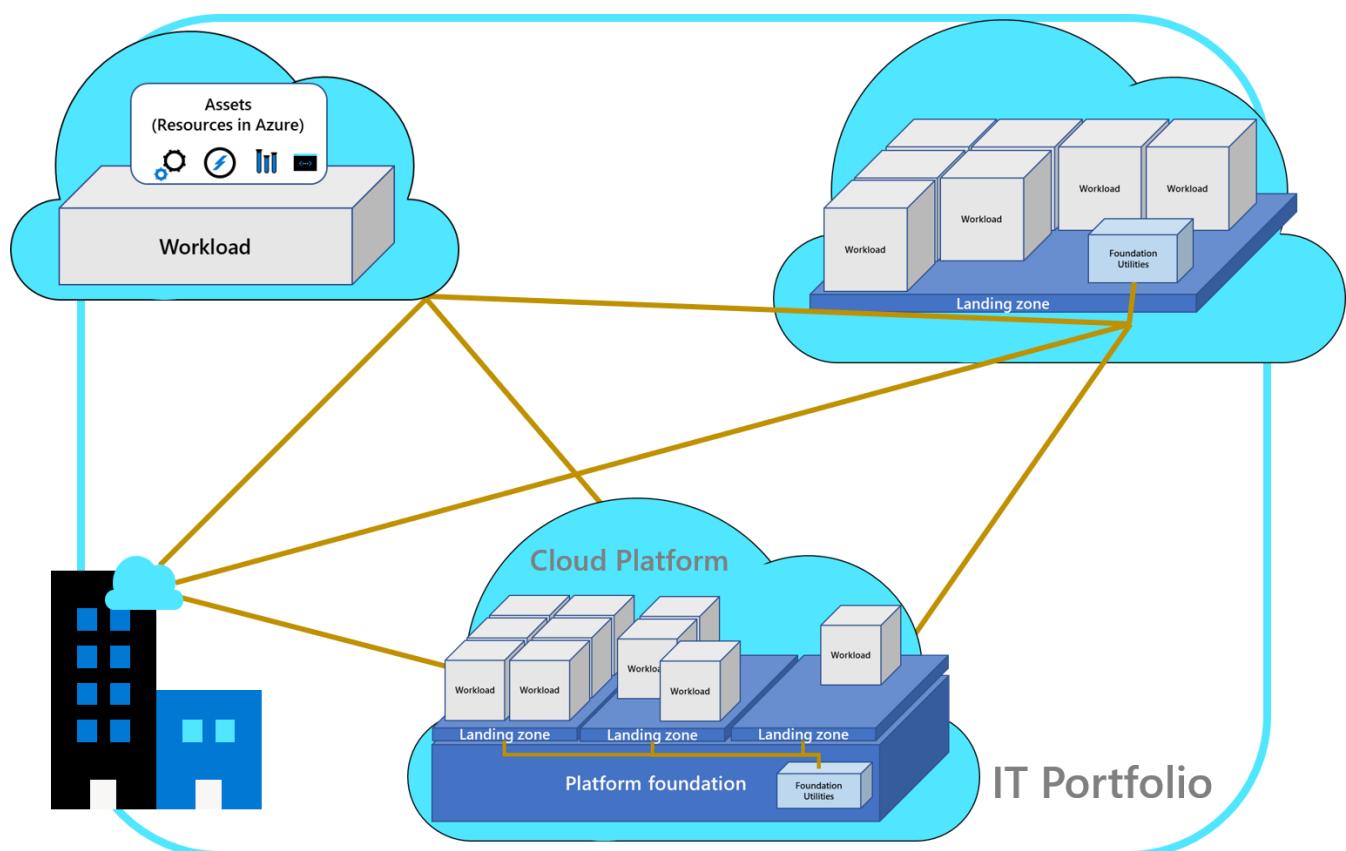
Operations priority: An enterprise operating model requires a cloud-first approach to operations. First-party cloud-based tools are essential to maintaining centralized operations in the cloud. This type of model must look to the cloud as the primary operating model to be effective. The organization views existing on-premises operations as secondary operations and should include them in a long-term transition plan.

Platform development velocity: To encourage centralization of governance, security, and operations across a fast-growing portfolio of workloads, the enterprise operations teams will require the implementation of an enterprise solution before adoption.

Compare more pros, cons, and characteristics of enterprise operations in the Cloud Adoption Framework.

Distributed operations

The distributed model is the most complex form of operations. It blends the other models.



Companies commonly take this approach when they grow through rapid acquisition, resulting in a distributed mixture of the previous three operating models. Companies can exist in this state for extended periods. But to minimize redundancy and promote more efficient operations, they should consider developing a plan to transition to one of the less complex models.

Strategic priority: Organizations use this model when they favor integration of acquired business units over innovation or control. This is often a temporary or bridge strategy that's required to move to a more efficient operating model in the future. This model tends to persist when the organization wants to maintain autonomy and is considering a near-term exit strategy, as is commonly seen in private equity or holding companies.

Organization: A centralized structure for the organization is challenging to maintain in this operating model. It's wise for organizations to start with the formation of a CCoE virtual team early in the process to create visibility and awareness of operations around the organization.

Portfolio scope: Distributed operations focus on a complex portfolio. Over time, that focus can narrow down to more granular levels of the portfolio.

Accountability (separation of duties): Accountability will vary among business units. Separation of duties from a central perspective is hard to achieve.

Standardization: The first step toward standardization in a distributed operations model is to gain a clear view of the digital estate for the full portfolio. A data-driven approach will start to identify commonalities in the portfolio that lean toward a centralized or enterprise operations model.

Operations priority: Operations priority in this model is around data. Centralizing data by using tools designed for unified operations will allow a CCoE team to coach and mentor the various business units during transitions or maturity efforts. Before you force a consistent operations priority, evaluate the portfolio of workload operations to ensure proper tooling and baselines.

Platform development velocity: Evaluation of the portfolio of workload operations should identify an acceptable velocity for platform development that aligns to start-small or enterprise-scale approaches. The primary data point to determine direction will depend on the most common approach to operations management across the portfolio.

Compare more pros, cons, and characteristics of distributed operations in the Cloud Adoption Framework.

Check your knowledge

1. Which of the following answers best describes the operating model at Tailwind Traders?

- Decentralized operations
- Centralized operations

✓ Correct!

- Enterprise operations
- Distributed operations

2. In the customer narrative, there's a controlled process for release of the solutions that come from the retail innovation team. If that process improves to allow that team to manage its own workloads in a controlled landing zone, which operating model would best describe the new arrangement?

- Decentralized operations
- Centralized operations
- Enterprise operations

✓ Correct!

- Distributed operations

3. The retail innovation team was entirely workload focused before Tailwind Traders acquired it. Based on what you know, what operating model best describes how that team operated before the acquisition?

- Decentralized operations
- Enterprise operations

✗ Enterprise operations would require centralized operations and innovative workload teams. There were no centralized support services before the acquisition.

- Distributed operations

Next unit: Design areas for Azure landing zones

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Design areas for Azure landing zones

5 minutes

Before you deploy an Azure landing zone, it's important to understand what you'll need from your cloud environment to support your chosen operating model.

Design areas

Each implementation option for Azure landing zones provides a deployment approach and defined design principles. Before you choose an implementation option, you should carefully consider each design area. Your decisions affect the platform foundation on which each landing zone depends.

Design area	Objective	Relevant methodology
Azure billing and Active Directory tenant	Proper tenant creation, enrollment, and billing setup are important early steps.	Ready
Identity and access management	Identity and access management is a primary security boundary in the public cloud. It's the foundation for any secure and fully compliant architecture.	Ready
Network topology and connectivity	Networking and connectivity decisions are an important foundational aspect of any cloud architecture.	Ready
Resource organization	As cloud adoption scales, considerations for subscription design and management group hierarchy affect governance, operations management, and adoption patterns.	Govern

Compliance design areas

Security, governance, and compliance are key topics when you're designing and building an Azure environment. These topics help you start from strong foundations and ensure that solid ongoing processes and controls are in place.

The tools and processes that you implement for managing environments play an important role in detecting and responding to issues. These tools work alongside the controls that help maintain and demonstrate compliance.

As the organization's cloud environment develops, these compliance design areas will be the focus for iterative refinement. This refinement might be due to new applications that introduce specific new requirements or to changing business requirements. For example, refinement might be in response to a new compliance standard.

Design area	Objective	Relevant methodology
Security	Implement controls and processes to help protect your cloud environments.	Secure
Management	For stable, ongoing operations in the cloud, develop a management baseline to provide visibility and operations compliance, and to help protect and recover capabilities.	Manage
Governance	Automate auditing and enforcement of governance policies.	Govern
Platform automation and DevOps	Align the best tools and templates to deploy your landing zones and supporting resources.	Ready

ⓘ Note

As mentioned in the customer narrative, Tailwind Traders has chosen to focus only on the environmental design areas at this time. It will address compliance design areas in a future effort. Again, this is not the recommended path for most customers because it will require more effort later in the process.

Process for design areas

The design areas describe what to consider before you deploy a landing zone. Together, they establish a process to aid in exploring otherwise complex topics. These topics are typically

involved in making critical decisions about your environment. Evaluate each design area to help you understand any changes that you might need to make to the implementation options for Azure landing zones.

Evaluating each design area sequentially provides a process that simplifies the design of any complex environment. If you've already addressed one or more of the design areas to your satisfaction, move on to the next area.

In this process, you'll get a list of roles or functions that are typically required to make design decisions. You'll also see a series of considerations, recommendations, and scope boundaries to help shape the discussion and decision-making process.

You can implement these design areas over time so that you can grow into your cloud operating model. Review the methodologies related to each design area to understand in more detail the considerations and decisions involved with implementing a landing zone. These considerations include guidance to help align your journey to the conceptual architecture of Azure landing zones.

With an understanding of the modular design areas, your next step is to choose a landing zone implementation that best aligns with your cloud adoption plan and requirements.

Next unit: Design principles for Azure landing zones

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Design principles for Azure landing zones

5 minutes

The conceptual architecture for Azure landing zones is universally applied to any process or implementation of landing zones. At the foundation of the architecture is a set of core design principles that serve as a compass for subsequent design decisions across critical technical domains.

The principles help you strive for an optimum design of the target architecture. If you choose to deploy an Azure landing zone accelerator or any version of the enterprise-scale landing zone code base, build on the architecture by applying the design principles described here.

Using these principles as part of your implementation will serve as a useful guide for realizing the benefits of cloud technologies. This cloud-oriented perspective, often called *cloud native*, represents ways of working and technical options for your organization that legacy technology approaches typically don't offer.

Impact of design deviations

There might be valid reasons to deviate from the principles, such as in the case of Tailwind Traders. Organizational requirements might dictate specific outcomes or approaches in designing an Azure environment. In these cases, it's important to understand the impact that the deviation will have on the design and future operations. Carefully consider the tradeoffs outlined for each principle.

As a general rule, be prepared to balance requirements and functionality. Your journey to the conceptual architecture will evolve over time as requirements change and you learn from your implementation. For example, using preview services and taking dependencies on service roadmaps can remove technical blockers during adoption.

Subscription democratization

Use subscriptions as a unit of management and scale to accelerate application migrations and new application development. Align subscriptions with business needs and priorities to support business areas and portfolio owners. Provide subscriptions to business units to

support the design, development, and testing of new workloads and the migration of existing workloads.

To enable the organization to operate effectively at scale, support a subscription with a suitable [management group hierarchy](#). This support will allow the subscription to be managed and organized efficiently.

Impact of deviation

- One approach for implementing this principle is [decentralizing operations](#) by transitioning them to business units and workload teams. This approach allows workload owners to have more control and autonomy over their workloads within the guardrails that the platform foundation has established.

Customers who need [centralized operations](#), and who don't want to delegate control of production environments to workload teams or business units, might need to modify their [resource organization](#) design and deviate from this principle.

- The design of the conceptual architecture for Azure landing zones assumes a specific management group and subscription hierarchy for all operations management subscriptions. This assumption might not align with your [operating model](#).

With this deviation, as your organization grows and evolves, your operational model might change. This change can lead to a migration of resources into separate subscriptions again, followed by complicated technical migrations. Before you commit to an approach, review the [Align](#) guidance.

Policy-driven governance

Use Azure Policy to provide guardrails and ensure continued compliance with your organization's platform and the applications deployed onto it. Azure Policy also provides application owners with independence and a secure path to the cloud.

Impact of deviation

By not using Azure Policy to create guardrails within your environment, you increase the operation and management overhead of maintaining compliance. Azure Policy helps you restrict and automate your desired compliance state within your environment.

As part of your design considerations, review [how to use Azure Policy inside a landing zone implementation](#).

Single control and management plane

Avoid dependency on abstraction layers, such as customer-developed portals or tooling. We highly recommend having a consistent experience for both central operations and workload operations.

Azure provides a unified and consistent control plane that's subject to role-based access and policy-driven controls. This applies across all Azure resources and provisioning channels. You can use Azure to establish a standardized set of policies and controls for governing the entire enterprise estate.

Impact of deviation

Choosing a multiple-vendor approach to operate control and management planes might introduce complexity of integration and feature support. Replacing individual components to achieve a "best of breed" design or multiple-vendor operations tooling might have limitations and cause unintended errors due to inherent dependencies.

For customers who are bringing an existing tooling investment to operations, security, or governance, we recommend a review of the Azure services and any dependencies.

Application-centric service model

Focus on application-centric migrations and development rather than pure infrastructure lift-and-shift migrations, such as moving virtual machines. The design choices shouldn't differentiate between old and new applications, infrastructure as a service (IaaS) applications, or platform as a service (PaaS) applications.

Regardless of the service model, strive to provide a secure environment for all applications deployed on the Azure platform.

Impact of deviation

Segmenting workloads in a way that differs from the [implementation options](#) for management group hierarchy can create a complex policy and access control structure to govern your environment. Examples include deviation from the organizational hierarchy structure or grouping by Azure service. This tradeoff introduces the risk of unintentional policy duplication and exceptions, which add to operational and management overhead.

Another common approach that customers consider is the use of landing zones for dev/test/production workloads. For more information, see the FAQ question [How do we](#)

handle "dev/test/production" workload landing zones in enterprise-scale architecture?.

Alignment with Azure-native design and roadmaps

Use Azure-native platform services and capabilities whenever possible. Align this approach with Azure platform roadmaps to ensure that new capabilities are available within your environments. Azure platform roadmaps should help inform the migration strategy and the conceptual trajectory of Azure landing zones.

Impact of deviation

Introducing third-party solutions into your Azure environment can create a dependency upon those solutions to provide feature support and integration with Azure services.

Sometimes, bringing existing third-party solution investments into an environment is inevitable. Consider this principle and its tradeoffs carefully, in alignment with your requirements.

Recommendations

Be prepared to trade off functionality, because it's unlikely that everything will be required on day one. Use preview services and take dependencies on service roadmaps to remove technical blockers.

Keep in mind that not all aspects of the desired operating model will be in general availability when you're using this approach.

Next unit: Journey to the target architecture

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Journey to the target architecture

5 minutes

Adopting cloud technologies is a journey. Business priorities and the need to bring new technologies online to unlock capabilities or features influence the speed at which an organization deploys and scales out a cloud environment.

Over time, the organization iterates and matures the deployed technologies, processes, and skills needed to progress toward that destination. The time for the journey depends on the size of the organization, the current technical footprint, and the maturity of skills within technical teams.

On-ramps

Consider an analogy of a trip along a freeway. There might be multiple on-ramps that you can use to join the freeway, but the destination is the same. The following on-ramps represent where organizations are today in their cloud adoption plans. They also represent the specific guidance that you need to continue to develop the cloud environment.

On-ramp	Description	Further guidance
Start	<p>For organizations that are at the beginning of their cloud adoption journey (called <i>greenfield</i>) and want to implement a new cloud environment, based on best practices and proven architectural patterns.</p> <p>Start with the conceptual architecture of Azure landing zones to understand the recommended end state.</p> <p>Next, explore each of the design areas. Use the areas to understand the considerations and decisions that you need to design and implement the landing zone that best fits your requirements.</p>	<p>What is an Azure landing zone?</p> <p>Azure landing zone design areas</p>

On-ramp	Description	Further guidance
Align	<p>For organizations that have an existing environment that needs modification to align to the target architecture and best practices for an Azure landing zone (called <i>brownfield</i>).</p> <p>Use the transition from brownfield guidance to understand the decision points and technical approach to refactoring environments to align with the guidance in the Ready methodology.</p>	<p>Refactor a landing zone</p> <p>Transition existing Azure environments to the Azure landing zone conceptual architecture</p> <p>Scenarios: Transitioning existing Azure environments to the Azure landing zone conceptual architecture</p>
Enhance	<p>For environments that are already in line with best practices but the organization wants to add more controls or features.</p> <p>Explore articles about enhancing the key ongoing processes for cloud environments, such as management, governance, and security.</p>	<p>Enhance guidance for management</p> <p>Enhance guidance for governance</p> <p>Enhance guidance for security</p>

Landing zone review

The [landing zone review](#) helps you assess your current Azure environment. It also helps you get customized recommendations for remediating the current state to align with the conceptual architecture of Azure landing zones.

You can use the transition guidance from the output of the assessment, best practices, and automation guidance, export via Excel, and import to Azure DevOps.

Next unit: Choose an Azure landing zone option

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Choose an Azure landing zone option

10 minutes

Azure landing zones provide cloud adoption teams with a well-managed environment for their workloads. Each of the following options applies a predetermined set of design considerations for landing zones to provide an implementation and architecture to guide your environment configuration.

Basic implementation option

As outlined in the customer narrative, Tailwind Traders wants to start with a smaller implementation footprint. The company will then iterate on the implementation over time, with guidance from the Govern, Manage, and Secure methodologies.

For organizations where the conceptual architecture fits with the operating model and resource structure that they plan to use, there's a ready-made deployment experience called the *Azure landing zone accelerator*.

The accelerator is a deployment from the Azure portal that provides a full implementation of the conceptual architecture. It also provides opinionated configurations for key components such as management groups, policies, and management functions.

For each section of the deployment, the accelerator provides options for modifying the implementation to include or exclude specific capabilities, depending on what the business needs. This can enable organizations to start with a smaller footprint and add capabilities over time, in line with the methodologies in the Cloud Adoption Framework.

The Tailwind Traders team from the customer narrative will use the Azure landing zone accelerator to configure the initial environment. In the next unit, we'll walk through a step-by-step deployment based on the team's decisions. The Tailwind Traders deployment doesn't take full advantage of the operations management or governance components of the accelerator, so that unit will also outline how to deploy with those options.

Customized implementation options

Although the accelerator is the suggested starting point for all customers, it does assume full alignment with the conceptual architecture, adherence to the design principles, and tooling for cloud-native operations. For customers who need to customize their experience with Azure landing zones, the following implementation options might be a better fit:

- *Azure landing zone Terraform modules* are a third-party path for multicloud operating models. This path can limit Azure-first operating models. Review the [design principles](#) or [deploy](#) this solution to your Azure environment.
- **Bicep** is a domain-specific language (DSL) that uses declarative syntax to deploy Azure resources. In a Bicep file, you define the infrastructure that you want to deploy to Azure. You then use that file throughout the development lifecycle to repeatedly deploy your infrastructure. Your resources are deployed in a consistent way.

Bicep provides concise syntax, reliable type safety, and support for code reuse. Bicep offers an efficient authoring experience for your infrastructure-as-code solutions in Azure.

- *Enterprise-scale Azure Resource Manager (ARM) templates* can be deployed and customized by infrastructure teams as part of infrastructure-as-code pipelines to deliver the full conceptual architecture.

For more detail, see [Interactive guide: Prepare your cloud environments with Cloud Adoption Framework](#).

Partner implementation options

Configuration of your cloud environment can be one of the biggest enablers for cloud success. It can also be one of the biggest blockers if the configuration is misaligned with how you want to operate workloads in the cloud. If the success of your adoption project is critical and your team isn't sure how to proceed, [consult with a Microsoft partner](#).

Many of the top Microsoft partners provide offerings aligned to the Ready methodology of the Cloud Adoption Framework. Those offerings typically include a partner's own customized implementation of an Azure landing zone.

Before you engage a partner, review the [guide to evaluating partner implementation options for Azure landing zones](#).

Check your knowledge

1. Which implementation option should Tailwind Traders use to start its deployment of an Azure landing zone?

- Azure landing zone accelerator

✓ Correct!

- Bicep

✗ For this customer, the learning curve and complexity of an enterprise-scale approach might be too steep.

- Terraform modules

2. If all of the indicators in the prior question were observed, which would be a better starting point for Tailwind Traders?

- Azure landing zone accelerator

✗ Eventually, you could expand a start-small approach to meet all of those needs. An enterprise-scale approach would reduce risk and effort.

- Bicep

✓ Correct!

- Terraform modules

Next unit: Deploy the Azure landing zone accelerator

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Deploy the Azure landing zone accelerator

10 minutes

Based on the customer narrative, Tailwind Traders will start by deploying a few specific configuration options to meet its constraints. When you're deploying the Azure landing zone accelerator, the following options will mimic the process that Tailwind Traders follows.

Prerequisites

Before you deploy the Azure landing zone accelerator, you need to create two Azure subscriptions:

- A networking subscription to host networking and connectivity assets
- An identity subscription to host identity and access management assets

You might also want to create a management subscription, if you plan to deploy the operations management configuration. Tailwind Traders chose not to use that configuration option.

The article [Create an additional Azure subscription](#) can guide you through the process of creating these subscriptions.

Deploy the Azure landing zone accelerator

1. Open the [Azure landing zone accelerator in the Azure portal](#). This portal experience will guide you through deployment.

2. On the **Deployment location** tab:

a. For **Directory**, choose the appropriate Azure Active Directory tenant.

If you don't have proper permissions, an error appears below your tenant.

b. For **Region**, select a region from the dropdown list.

Tailwind Traders chooses the default option: **West Central US**.

3. On the **Azure core setup** tab:

a. For **Management Group prefix**, enter a prefix.

Tailwind Traders enters **tailwind-**.

b. For **Select dedicated subscriptions or single subscription for platform resources**, choose the **Dedicated** option to keep all platform resources in a dedicated subscription.

 **Note**

The choice of dedicated subscriptions for all platform resources will centralize any tools needed to manage the environment. As Tailwind Traders adds security, operations, and governance, it will use the dedicated subscription and management group structure that this dedication option has created. Choosing the option for a single subscription could require significant rework later in the adoption process.

4. On the **Platform management, security, and governance** tab, you choose whether to deploy a Log Analytics workspace and enable monitoring. Select **No**.

Tailwind Traders makes this choice because it will enhance its landing zone later to address security, management, and governance needs.

5. On the **Platform DevOps and automation** tab, you would normally select options that apply to your organization.

Because Tailwind Traders chose not to add any of the Log Analytics features, it can't add any of the DevOps and automation features. As such, there's nothing to choose here.

6. On the **Network topology and connectivity** tab:

a. Select the **Hub and spoke with Azure Firewall** option. This will create a dedicated subscription for connectivity.

Tailwind Traders selects this option. After the accelerator is deployed, the company's MPLS solution will connect to an Azure ExpressRoute instance deployed into that subscription. This setup will allow any application landing zone to connect over MPLS, but route traffic through Azure Firewall first.

b. After you choose the option for hub and spoke with Azure Firewall, more options appear so you can configure the connectivity subscription:

i. For **Subscription**, choose your connectivity subscription.

ii. For **Address space**, enter an address space for any IPs in your networking hub.

iii. For **Region for the first networking hub**, choose a region for your deployment.

Tailwind Traders selects **West Central US** to ensure that the networking hub is in the same region as the other deployments.

iv. For **Enable DDoS Protection Standard**, select **No**.

Tailwind Traders makes this choice because it doesn't want to enable DDoS at this time. The company is deferring security decisions and isn't ready to approve the cost of that service yet.

v. For **Create Private DNS Zones for Azure PaaS services**, select **Yes**.

Tailwind Traders will deploy some workloads as PaaS services, so it chooses to enable this free service.

vi. For **Deploy VPN Gateway** and **Deploy ExpressRoute**, leave the default selection of **No**.

Tailwind Traders makes this choice because it isn't ready to connect its MPLS to Azure ExpressRoute at this time.

vii. For **Deploy Azure Firewall**, leave the default selection of **Yes** to deploy Azure Firewall.

viii. For **Subnet for Azure Firewall**, set the subnet range for your Azure Firewall instance.

For any options not included in the preceding steps, leave the default values.

7. On the **Identity** tab:

a. For **Assign recommended policies to govern identity and domain controllers**, leave the default selection of **Yes (recommended)**.

Tailwind Traders isn't ready to adhere to the principle of policy-driven governance. However, it does choose to enable policies that govern its identity and domain controllers. This first step into governance automation will help keep the company's identity controllers safer in the cloud.

b. For **Subscription**, choose which subscription will host identity-related assets.

c. Leave all the policy-related options set to the default of **Yes (recommended)**.

- d. For **Virtual network address space**, enter the address space for the virtual network that will host identity-related assets.
8. On the **Landing zone configuration** tab:

- a. For **Connect corp landing zones to the connectivity hub**, select **Yes**.
- b. For **Corp landing zone subscriptions**, make a selection from the dropdown list.

Tailwind Traders has one existing subscription that will be used as the destination for most virtual machines and other assets being migrated. The company chooses that subscription here.

- c. For **Online landing zone subscriptions**, make a selection from the dropdown list.
- Tailwind Traders also has a subscription that was allocated to host any of its public-facing applications. The company chooses that subscription here.
- d. For the series of recommended policies, select **Audit only**.

Tailwind Traders sets all of the listed policies this way because it isn't ready to adopt policy-driven governance.

 **Note**

If Tailwind Traders wanted to adhere to the design principles of app-centric design or subscription democratization, there would be several additional subscriptions selected in the dropdown list (or added later).

If Tailwind Traders wanted to adhere to the design principle of policy-driven governance, it would leave all of the listed policies with the recommended option of **Yes (recommended)** to automatically enforce governance decisions via Azure Policy.

9. On the **Review + create** tab, select **Create** to deploy your environment.

You have successfully deployed an Azure landing zone by using the accelerator. If you followed the preceding process, that deployment should be aligned to the constraints of Tailwind Traders.

Next unit: Enhance your landing zone

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Enhance your landing zone

20 minutes

Information in the previous units helps you prepare for your first efforts toward cloud adoption, but no single implementation option for an Azure landing zone can meet all of your needs. To reach true scale in the cloud, you'll need to keep investing in your Azure landing zones to reach operating model requirements for governance, security, and operations management.

This unit builds on the principles of landing zone refactoring. As outlined in the article [Refactor landing zones](#), a refactoring approach to infrastructure as code removes blockers to business success while minimizing risk. That article assumes you've deployed your first landing zone and now want to expand that landing zone to meet enterprise requirements.

Shared architecture principles

Expanding your landing zone provides a code-first approach to embedding the following principles into the landing zone and more broadly into your overall cloud environment:



Azure Advisor, the [Microsoft Azure Well-Architected Framework](#), and the solutions in the [Azure Architecture Center](#) share these same principles.

Applying these principles to your landing zone improvements

To better align with the methodologies of the Cloud Adoption Framework, the preceding principles can be grouped into actionable improvements for landing zones:

- **Basic considerations:** Refactor a landing zone to refine hosting, fundamentals, and other foundational elements.
- **Operations expansions:** Add operations management configurations to improve performance, reliability, and operational excellence.
- **Governance expansions:** Add governance configurations to improve cost, reliability, security, and consistency.
- **Security expansions:** Add security configurations to improve protection of sensitive data and critical systems.

The Cloud Adoption Framework and its associated Learn modules for [Govern](#), [Manage](#), and [Secure](#) address each of these requirements in parallel methodologies. For more information, see the [Journey toward the target architecture](#) article.

Next unit: Summary

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How are we doing?

100 XP

Introduction

2 minutes

The Migrate methodology in the Cloud Adoption Framework guides you through migration to Azure by using repeatable processes and common tools.

Migration of any datacenter can involve migration of various technology platforms and workloads. Re-creating the architecture and configuration of workloads in the cloud is time consuming and produces diminishing returns.

The Migrate methodology in the Cloud Adoption Framework, the Azure migration center, and Azure Migrate tooling reduce that effort. They use repeatable processes and tools that facilitate a successful migration with minimal time and effort across all of your technology and workload needs.

In this module, you'll learn the tools, the processes, and the options used in migration. You can then apply that knowledge to the migration of all workloads and platforms in your current environment.

Learning objectives

In this module, you will:

- Understand the tools commonly used in migration
- Learn about the migration processes required to migrate effectively
- Demonstrate a migration (hands-on if possible)
- Understand options for properly migrating various platforms and workloads
- Choose the best learning path to migrate a specific platform or workload

Prerequisites

- Foundational understanding of cloud migration
- Understanding of your organization's migration plan and the types of workloads you'll need to migrate

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Customer narrative

10 minutes

In the getting-started module, we shared a few of Tailwind Traders' objectives. The Tailwind Traders cloud-strategy team has defined an executive-level strategy that addressed financial and technical considerations.

A cloud adoption plan is in place to manage the various projects that contribute to that strategic program. The central operations and infrastructure team has deployed an Azure landing zone that meets its short-term compliance and operations needs.

Most relevant to this module is the company's effort to migrate out of two leased datacenters before those leases expire. Those datacenters host a large portfolio of production workloads that support in-store and e-commerce operations. The second datacenter also hosts dev/test environments and other pre-production innovations from the retail innovation team.

We resume the Tailwind story just as the migration team is preparing to start migrating workloads into the cloud.

The Tailwind Traders migration plan

In the planning module, we rationalized the company's digital estate by using Azure Migrate and created a backlog to guide the migration in Azure DevOps. Now the migration team is ready to begin migrating the existing datacenters to the cloud. In the remaining 12 months, the team will migrate waves of workloads incrementally. Given the scope and timeline for this migration, the team has chosen the following migration-factory approach:

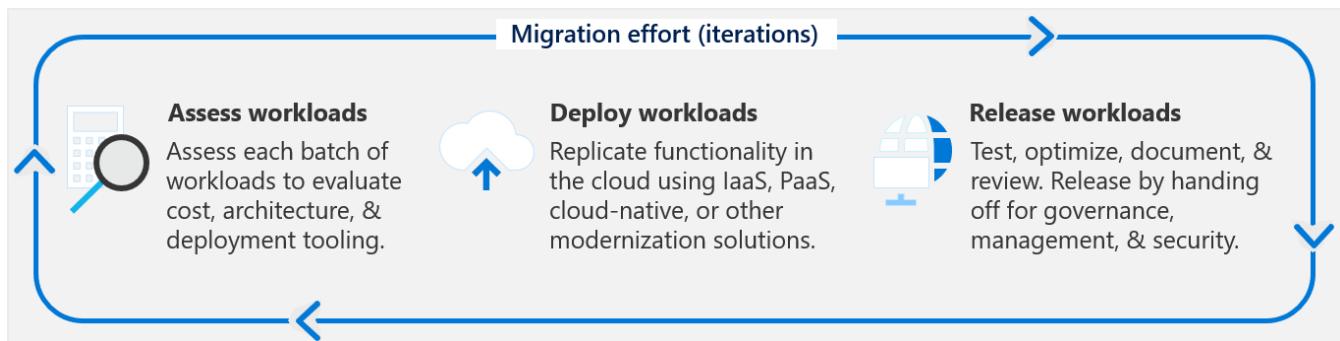


Figure 1: Common tasks required in each sprint of a migration process.

- One small team will focus on migrating a wave of workloads in each two-week sprint by using Azure Migrate.
- A second small team of architects will stay one to two waves ahead of the migration team. Its focus will be on the assessment and design of each workload to be migrated.

This team will discover and remediate any compatibility issues between the current-state application and the desired rationalization target. It will also evaluate sizing from the initial rationalization effort to ensure proper resource allocation.

- A third small team of Azure experts will work one to two waves behind the migration team. Its focus will be on the testing, fine-tuning, and architecture of the migrated workloads.

This team will test the migrated workloads with business users to validate performance before releasing production traffic to the migrated workloads. This team will also use the Azure Well-Architected Framework and Azure Well-Architected Review for any workloads that require architectural tuning before production release.

Important

This migration-factory approach is imperative for Tailwind Traders because of the volume of workloads and the limited time window to complete this first migration. Typically, organizations can operate all three functions within a single, self-organizing migration team. That team can complete the assessment, migration, and release of each workload wave in a single sprint.

Preparing for technology platform diversity

Like most customers, Tailwind Traders supports a diverse collection of technology platforms. The company's main concern is the large and growing collection of open-source solutions running on Linux and OSS data platforms. The company is also evaluating how to host its Azure Virtual Desktop solution in the cloud. At some point, the company will also need to migrate its SAP HANA solution to the cloud.

As the team prepares for this migration project, it will need to ensure that it has the skills required to migrate and modernize Windows and SQL Server assets. It must also be able to handle other technology platforms in the same processes.

The remaining units of this module will demonstrate processes, tools, and approaches for success in a variety of team structures and across several technology platforms.

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Migration process

10 minutes

Migration is a highly repeatable process. Today, you have a collection of binary assets (virtual machines, applications, and data) that reside in a local datacenter. Tomorrow, you want to replicate those binary assets to the cloud and shift your production traffic to use the new copy of the same assets.

Like most repeatable processes, most of the work can be automated to reduce repetitive human tasks. Automation of that process led to the first iterations of the Azure Migrate product.

But as most migration teams quickly discover, the repeatable process is the easy part. Hidden within this process is a change-management effort that requires decisions and human intervention. The following disciplines of migration outline how the Azure Migrate tool and the Cloud Adoption Framework work together to shape the required human intervention into a repeatable process.

Mass migration versus iterative migration

The binary assets being moved to the cloud can theoretically be migrated in one large batch. Some organizations have been successful in mass migrations of all assets by using Azure Migrate. Doing so requires a planned effort of analysis and remediation to ensure that all assets are compatible with the cloud. It also requires a detailed plan to test and certify performance for each of the workloads that run on those assets.

The degree of planning and the impact on business users make the mass-migration approach unattractive for most organizations. An alternative approach is to apply the principles of agile methodologies, such as Scrum, to break down the mass migration into waves: migrating a smaller collection of workloads on a regular cadence.

The iterative approach to migration allows the business to absorb the changes in smaller units and produces less business disruption. It also allows the team to measure and learn from each iteration. The team can gain speed and expertise progressively from one iteration to the next.

For the rest of this module, assume that Tailwind Traders will follow an iterative approach to migration.

Disciplines

In any iterative migration process, the team will complete three sets of tasks or disciplines to successfully migrate each workload to Azure:

- **Assess workloads:** During assessment of the workloads in each wave, the architects primarily look for cloud compatibility and dependencies between assets. They also look for compatibility with modernization and optimization opportunities. At times, they get close to the architecture of individual workloads to perform advanced optimization tasks by using the Azure Well-Architected Review.
- **Migrate workloads:** During migration, the team uses a migration tool to complete the replication of assets (virtual machines, applications, and data) to the cloud. In this step, the team is largely directing and supervising the repeatable process to ensure accurate replication of the selected workloads' assets.
- **Release workloads:** After each technology platform and workload is migrated to the cloud, the team needs to test, optimize, and release production traffic to its newly migrated workloads. Testing might also require an evaluation of user routing and optimization of the network path to the newly deployed workloads.

Repeating these three disciplines for each workload in the migration plan will help ensure a successful migration to the cloud.

Sprint planning

When you're planning migration efforts, one of the first steps is to break down the list of workloads to be migrated into smaller groups.

As you learn about your team's velocity (how many workloads they can move in a sprint), we suggest starting with the Power of 10 approach. In that approach, you consistently define groups of 10 common workloads in each wave. Then, map those groups of 10 workloads to two-week iterations or sprints by using your cloud-adoption plan in Azure DevOps. See the planning module for step-by-step guidance.

Before each sprint, the migration team should evaluate the next wave of workloads to be migrated. The objective of this evaluation is to ensure that the team has all of the necessary information and access to be successful in the current sprint. It also gives the team a chance to adjust the next 10 workloads based on what it has learned from past sprints. After the team is committed to the sprint, the actual work can begin.

Team organization

You can apply basic organizing principles to your team structure to maximize the output of each sprint, based on available velocity. These are the two most common forms of team organization:

- **Self-organizing teams:** Holding true to agile methodologies, self-organizing teams ensure that the members of the migration team can collectively deliver on each of the disciplines. In each sprint, the team identifies who performs the tasks associated with each of the disciplines across each workload in the wave.

In this organization, the objective is to complete all three disciplines for each workload in the current sprint.

- **Migration factory:** The repetitive nature of the migration disciplines lends them to a division of labor across highly specialized teams. In this approach, one team is dedicated to each of the migration disciplines. The assessment team is always one to two waves ahead of the migration team. The release team is always one to two sprints behind the migration team.

This approach can be effective in large migration efforts that include thousands of assets and hundreds of workloads.

Common blockers

Technology seldom blocks the migration process. Most of the blockers to migration come from steps missed in upstream or downstream dependencies on the migration process. The following blockers are listed from most common to least common:

- **Strategy and planning:** The most common blocker to a successful migration stems from missed steps during strategy or planning efforts. Failure to set the right expectations with executives, project managers, or technical staff can create blockers, even when all of the technical disciplines are running as planned.

Before you begin any migration effort at scale, ensure that a [cloud-adoption strategy](#) and [cloud-adoption plan](#) have been created and reviewed by stakeholders.

- **Environmental:** Improperly configured environments are the next most common blocker to migration success. Specifically, the migration effort will require a minimum of networking and identity configuration to allow for proper connectivity and access requirements.

For most migration efforts, governance and operations considerations should be addressed early in the migration, if not before migration. To ensure proper environmental configuration, see the Cloud Adoption Framework Learn module on preparing your environment.

- **Governance:** Most organizations have requirements for cost, security, consistency, and identity management that go beyond basic environment configuration. Many organizations don't understand those requirements until they try to migrate production traffic to the cloud.

We recommend that all migration teams review the Learn module for the [Govern methodology](#) in the Cloud Adoption Framework before beginning a scale migration effort, to avoid late-bound surprises.

- **Operations:** Most organizations have set operations requirements for their production workloads in the current datacenter. It's often assumed that those operations will work when they move production traffic to the cloud. Before the migration team begins any scale migration effort, it should review the Learn module about [developing a clear strategy](#) to understand basic expectations about operations management in the cloud.
- **Technical:** Occasionally, workloads might be blocked because of increased needs in remediation, modernization, or changes to the rationalization strategy. When individual workloads are blocked, they can be addressed by technical spikes, which remove problematic workloads from the standard flow.

Technical spikes are usually addressed in a parallel sprint by a separate team. A migration team can address many of the technical issues around remediation and modernization by using the Cloud Adoption Framework migration scenarios shared at the end of this module.

When a workload requires comprehensive changes that affect the application architecture, workload teams should review the [Well-Architected Framework](#) Learn module for more guidance.

Next unit: Migration tools

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Migration tools

10 minutes

Azure includes tools to facilitate the disciplines or phases of the migration process: assess workloads, migrate workloads, and release workloads ("cut over"). Those tools start with Azure Migrate, but they also include integrated Microsoft and partner tools.

Azure Migrate

Azure Migrate provides a unified migration platform: a single portal to start, run, and track your migration to Azure. In the Azure Migrate hub, you can assess and migrate:

- **Servers:** Assess on-premises servers or virtual machines (VMs) running on other clouds and migrate them to Azure Virtual Machines or Azure VMware Solution
- **Databases:** Assess on-premises databases and migrate them to Azure SQL Database or Azure SQL Managed Instance
- **Web applications:** Assess on-premises web applications and migrate them to Azure App Service by using App Service Migration Assistant
- **Virtual desktops:** Assess your on-premises virtual desktop infrastructure (VDI) and migrate it to Azure Virtual Desktop
- **Data:** Migrate large amounts of data to Azure quickly and cost-effectively by using Azure Data Box products

Integrated tools

The Azure Migrate hub includes the following tools. These tools help facilitate the technical aspects of each discipline or phase of the migration.

Tool	Assess or migrate	Details
Azure Migrate: Discovery and Assessment	Assess servers	Discover and assess on-premises VMware VMs, Hyper-V VMs, and physical servers in preparation for migration to Azure. You can also use this tool to assess servers from other cloud platforms with a view to migrate to Azure.

Tool	Assess or migrate	Details
Azure Migrate: Server Migration	Migrate servers	Migrate VMware VMs, Hyper-V VMs, physical servers, other virtualized machines, and public cloud VMs to Azure.
Data Migration Assistant	Assess SQL Server databases for migration to SQL Database, SQL Managed Instance, or Azure VMs running SQL Server	Data Migration Assistant helps pinpoint potential problems that block migration. It identifies unsupported features, new features that can benefit you after migration, and the right path for database migration.
Azure Database Migration Service	Migrate on-premises databases to SQL Database, SQL Managed Instance, or Azure VMs running SQL Server	This tool enables a seamless migration from multiple database sources to Azure data platforms with minimal downtime.
Movere	Assess servers	This tool helps to provide data and insights needed to plan cloud migrations.
Azure App Service Migration Assistant	Assess on-premises web apps and migrate them to Azure	Use this tool to assess on-premises websites for migration to Azure App Service. Use App Service Migration Assistant to migrate .NET and PHP web apps to Azure.
Azure Data Box	Migrate offline data	Use Azure Data Box products to move large amounts of offline data to Azure.

ⓘ Note

If you're in Azure Government, external integrated tools and independent software vendor (ISV) offerings can't send data to Azure Migrate projects. You can use tools independently.

Discovery and Assessment

Here are more details about what the Discovery and Assessment tool in Azure Migrate does:

- **Azure readiness:** Assesses whether on-premises machines are ready for migration to Azure
- **Azure sizing:** Estimates the size of Azure VMs or the number of Azure VMware nodes after migration
- **Azure cost estimation:** Estimates costs for running on-premises servers in Azure
- **Dependency analysis:** Identifies cross-server dependencies and optimization strategies for moving interdependent servers to Azure

Discovery and Assessment uses a lightweight Azure Migrate appliance that you deploy on-premises. The appliance runs on a VM or physical server. You can install it easily by using a downloaded template.

The appliance discovers on-premises machines. It also continually sends machine metadata and performance data to Azure Migrate. The discovery is agentless. Nothing is installed on discovered machines.

After appliance discovery, you can gather discovered machines into groups and run assessments for each group.

Server Migration

The Server Migration tool in Azure Migrate helps you migrate to Azure:

Migrate	Details
On-premises VMware VMs	Migrate VMs to Azure by using agentless or agent-based migration. For agentless migration, Server Migration uses the same appliance that the Discovery and Assessment tool uses for discovery and assessment of VMware VMs. For agent-based migration, Server Migration uses a replication appliance.
On-premises Hyper-V VMs	Migrate VMs running on Hyper-V hosts to Azure by using the Hyper-V replication provider.
Physical servers and VMs (in public or private clouds)	You can migrate physical machines to Azure. You can also migrate other virtualized machines, and VMs from other public clouds, by treating them as physical servers for the purpose of migration. Server Migration uses a replication appliance for the migration.

ISV integration

Azure Migrate also integrates with these ISV offerings:

ISV	Feature
Carbonite	Migrate servers
Cloudamize	Assess servers
Corent Technology	Assess and migrate servers
Device42	Assess servers
Lakeside	Assess VDI
RackWare	Migrate servers
Turbonomic	Assess servers
UnifyCloud	Assess servers and databases

Next unit: Common tech platforms

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Common tech platforms

10 minutes

During migration of any organization, you'll need to be prepared for various technology platforms. Most migrations start with Windows and SQL Server assets. But most datacenters in operation today also have several non-Windows-based platforms.

This unit will outline Microsoft's unified migration approach. This approach ensures that all workloads have a clear path to cloud migration, regardless of the underlying technology platform.

Unified migration focus

Most migration teams are aware of the capabilities of Azure Migrate and the Azure Migrate hub to facilitate migration of Windows and SQL Server assets. But before you begin a migration, it's important to familiarize yourself with the other technology platforms that can use the same migration factory approach or the same migration process.

The following diagram and table outline several scenarios that follow the same iterative Migrate methodology for migration and modernization. The summary at the end of this learn module will include links for continued learning on each of these technology platforms.

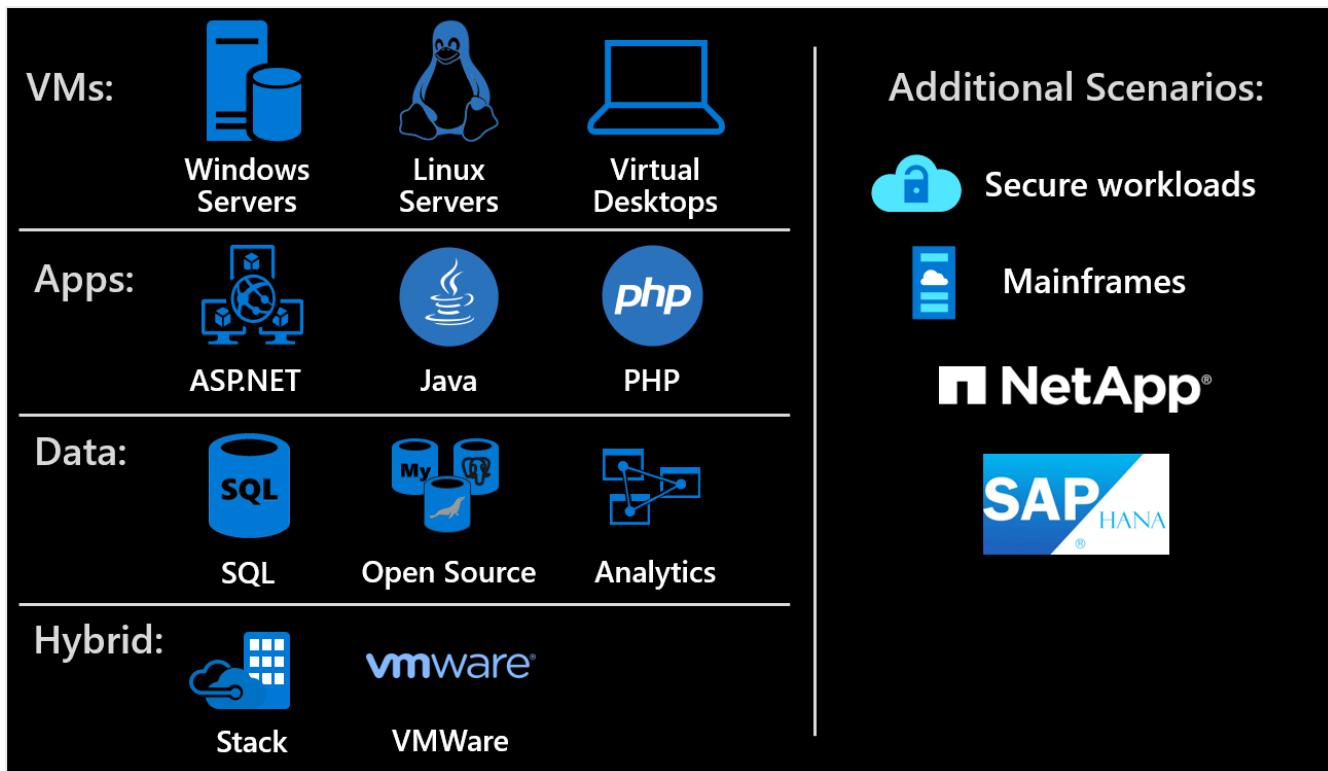


Figure 1: Technology platforms that the Migrate methodology supports.

Virtual machines	Applications	Data	Hybrid	Additional scenarios
Servers running Windows Server	ASP.NET	SQL Server	Azure Stack	Secure workloads
Linux servers	Java	Open-source systems (OSS) databases	VMware	Mainframes
Virtual desktops	PHP	Analytics	Containers	NetApp and SAP HANA

Preparing for common tech platforms

Each technology platform might have subtle differences in how the migration should be executed. Later in this module, you can bookmark the links in the summary for a reference on those considerations. For now, this unit can help you understand the ways a technology platform might affect your migration at a high level.

Here are a few examples to illustrate the impact:

- **Assess workloads:** During assessment of the workloads in each wave, the architects are looking primarily for Azure compatibility and dependencies between assets. But they should also look for compatibility with modernization and optimization opportunities.

In the Tailwind Traders story, the team will evaluate each of its databases for compatibility with Azure SQL Database to minimize the amount of infrastructure dedicated to data hosting. The OSS databases will provide several potential modernizations, thanks to the various database formats that Azure SQL Database supports.

- **Migrate workloads:** During migration, the team will primarily use the Azure Migrate tool to migrate the assets (VMs, applications, and data) to Azure. Some technology platforms might require complimentary tooling.

When the Tailwind Traders team migrates its SAP platform, it will add **SAP Database Migration Option (DMO)** to its migration toolbox to ensure a smooth migration to SAP HANA in Azure.

- **Release workloads:** After each technology platform and workload is migrated to Azure, the team will need to test, optimize, and release production traffic to its newly migrated workloads. Some platforms might require a bit of diversity in the monitoring tools to help the team gain clarity and get visibility into workload operations.

When the Tailwind Traders team migrates its virtual desktops, it will likely use one of the Azure Migrate partner solutions, like Lakeside Software. Using such a partner solution will help provide a great user experience by tracking performance and identifying additional workloads for migration.

Preparing for diverse tech platforms in your sprint plan

The same methodology applies to each of these technology platforms. During initial cloud-adoption planning, little effort is applied to prepare for these differences. The individual technology platforms typically don't materially affect that level of planning.

However, there are subtle differences in the underlying tasks required to be successful with some of these platforms. Those differences are addressed in the following critical planning activities, which will aid in sprint planning:

- **Priority alignment:** The overall cloud-adoption plan will outline the sequence of workloads to be migrated based on the business impact, but the priority must also consider the team's ability to execute.

Before migration teams begin any sprint, they should evaluate the technology platforms required to migrate each workload. When possible, rearrange migration priorities to group workload waves based on the technology platform. For example, migrate Windows and SQL Server instances in sprints 1-3, then migrate Linux servers and OSS data in sprints 4-6.

Caution

Realigning priorities in this way is not always applicable. There might be situations that require a mixture of Windows and OSS assets to migrate a workload. In those situations, it's best to keep the workload contained as a single deliverable. You might want to move more complex workloads to a later sprint to ensure that the team has time to develop the required skills.

- **Modernization review:** If your migration groups all three task areas (assess, migrate, and release) into a single migration team and single migration sprint, then you'll want to include a modernization review into each sprint plan.

In this type of review, the team will evaluate the assets to be migrated with a focus on modernization to platform as a service (PaaS) options. For example, should SQL Server or OSS databases be converted to Azure SQL Database to minimize dependence on infrastructure? Should the application be moved from an infrastructure as a service (IaaS) server to a web app or container instance? Each decision will shape how you engage each of the common technology platforms.

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Exercise - Server migration

20 minutes

In this unit, you'll review Azure Migrate and how to use it to migrate specific workloads to Azure.

Virtual machine replication

Add Server Migration to your Azure Migrate dashboard, which carries over machines and insights from the assessment completed during the Cloud Adoption Framework planning module. You can begin your replication by selecting **Replicate** in the tool window.

Azure Migrate performs concurrent replication for up to 500 virtual machines (VMs) and can manage up to 200 concurrent migrations. If you need to do more, we recommend that you create multiple batches. Times for replication will vary based on number and size of VMs, along with connection speeds between your datacenter and Azure.

During the replication setup phase, you can use the migration settings that your earlier Azure Migrate assessment suggested in terms of Azure Virtual Machines sizes, or you can specify the settings yourself. This step gives you the option to configure the VM size and storage-disk settings that you feel are appropriate to the workload being migrated.

Also at this stage, you're asked to specify the subscription, resource group, and virtual network where your VMs will reside after migration. You can also configure availability options such as Availability Zones or availability sets, helping to protect your applications and data from datacenter outages and maintenance events.

After you start the replication, you can track and monitor the replication of each of your VMs.

The screenshot shows the Azure Migrate - Servers page. On the left, there's a navigation menu with options like Overview, Migration goals, Servers (which is selected), Databases, VDI, Web Apps, Data Box, Manage, Discovered items, Support + troubleshooting, and New support request. The main content area has a title 'Azure Migrate: Server Migration' and four tabs: Discover, Replicate, Migrate, and Overview. Under 'Discover', it shows 56520 Discovered servers, 0 Replicating servers, 0 Test migrated servers, and 0 Migrated servers. A note at the bottom says 'Next step: You can start migrating the replicating servers to Azure'.

Figure 1: The Azure Migrate - Servers page in the Azure admin center.

Testing migrated virtual machines

After all your targeted VMs are replicated and migrated into Azure, and before you migrate them into production, you can test them to ensure that everything works. The process runs a prerequisite check, prepares for the test, creates a new test VM, and starts the test. This process will take a few minutes.

The test migration functionality in Server Migration runs without affecting on-premises machines. It allows you to test the migration process, perform any app testing, and address any issues before a full migration.

Testing your migration is a great feature that helps you become comfortable with the migration process and understand any tasks that need to happen after migration. You can carry out this test migration as many times as you need in order to refine the process and confirm the steps.

Important

After the test migration, clean up the test resources to ensure that you don't incur any additional costs.

Migrating the virtual machines into production

When you're ready for the production migration, select **Migrate** from the **Replicating machines** page of the Azure admin center.

The process will prompt you to shut down the machine before migration, which is an optional stage. If you shut down the machine, Azure Migrate will perform a planned migration with zero data loss (minimum data loss if you're using agent-based replication for the machine). If you choose not to shut down the machine, a final sync will be performed before the migration, but any changes that happen on the machine after the final sync is started won't be replicated.

Termination of the source machine is an important step, but you should evaluate which option is best suited to each workload.

Because this step might affect production systems, migration should be completed during off-peak hours to minimize disruption to the business.

The screenshot shows the Azure Migrate: Server Migration - Replicating machines page. The left sidebar has 'Replicating machines' selected. The main area lists four machines: PayrollWeb04 (Migrated, Not applicable), PayrollWeb01 (Delta sync, Healthy), PayrollWeb02 (Delta sync, Healthy), and PayrollWeb03 (Delta sync, Healthy). PayrollWeb03's row has a context menu open, with 'Migrate' highlighted. Other options in the menu include 'Test migration', 'Clean up test migration', 'Repair replication', 'Error Details', and 'Stop replication'.

Name	Status	Health	Migration phase	Last sync	Test migration status
PayrollWeb04	Migrated	Not applicable	Not applicable	11/3/2019, 7:38:46 AM	Never performed
PayrollWeb01	Delta sync	Healthy	Test clean up pending	2/10/2020, 9:42:35 AM	1/30/2020, 9:20:09 PM
PayrollWeb02	Delta sync	Healthy	Ready to migrate	2/10/2020, 10:00:00 AM	
PayrollWeb03	Delta sync	Healthy	Test migration pending	2/10/2020, 10:00:00 AM	

Now, Server Migration will run through the production migration process. You can check the status as it validates the prerequisites, prepares for migration, creates the Azure VM, and starts the Azure VM.

Release tasks

After the migration, you can release production traffic to the VM by rerouting network traffic to it. Before you reroute traffic, evaluate the workloads to ensure that each has a completed business-change plan, technical validation, and business validation.

Business change plan: Ensure that the following aspects of the business change plan are properly communicated to avoid business disruption:

- Complete (or at least plan) user training.
- Communicate about any outage windows and get approval.
- Synchronize production data and have users validate it.
- Validate promotion and adoption timing. Ensure that timelines and changes have been communicated to users.

Technical validation: In addition to the business change plan, you'll want to consider validation of the technical readiness for your workloads. Here are a few suggested tests to complete:

- **Network isolation testing.** Test and monitor network traffic to ensure proper isolation and no unexpected network vulnerabilities. Validate that any network routing to be severed during cutover is not experiencing unexpected traffic.
- **Dependency testing.** Ensure that all workload application dependencies have been migrated and are accessible from the migrated assets.
- **Business continuity and disaster recovery (BCDR) testing.** Validate that any service-level agreements (SLAs) for backup and recovery are established. If possible, perform a full recovery of the assets from the BCDR solution. At minimum, you'll want to add a backup schedule by using Azure Backup. For more advanced SLAs, you might also want to consider replication to a second region by using Azure Site Recovery.
- **User route testing.** Validate traffic patterns and routing for user traffic. Ensure that network performance aligns with expectations.
- **Final performance check.** Ensure that users have completed and approved performance testing. Execute any automated performance testing.
- **Additional technical readiness.** Restrict network access for unused services by using network security groups. Deploy Azure Disk Encryption to secure the disks from data theft and unauthorized access.

Final business validation: After the business change plan and technical readiness have been validated, the following final tasks can complete the business validation:

- **Cost validation (plan versus actual).** Testing is likely to produce changes in sizing and architecture. Ensure that deployment pricing still aligns with the original plan.
- **Communicate and execute cutover plan.** Prior to cutover, communicate the cutover and execute accordingly.

Complete cleanup tasks for the remaining on-premises servers. Such tasks might include removing the servers from local backups and removing their raw disk files from storage-area network (SAN) storage to free up space. Update documentation related to the migrated servers to reflect their new IP addresses and locations in Azure.