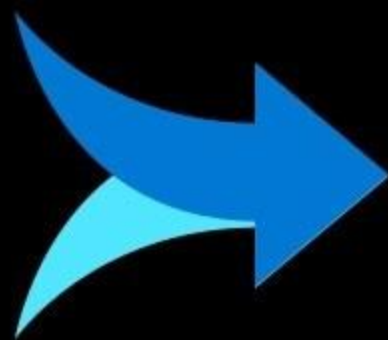


The value of running well-architected cloud workloads

- ✓ Manage budget
- ✓ Improve workloads security
- ✓ Increase incident response
- ✓ Streamline internal processes
- ✓ Avoid costly mistakes
- ✓ Efficient performance



Expenses, losses

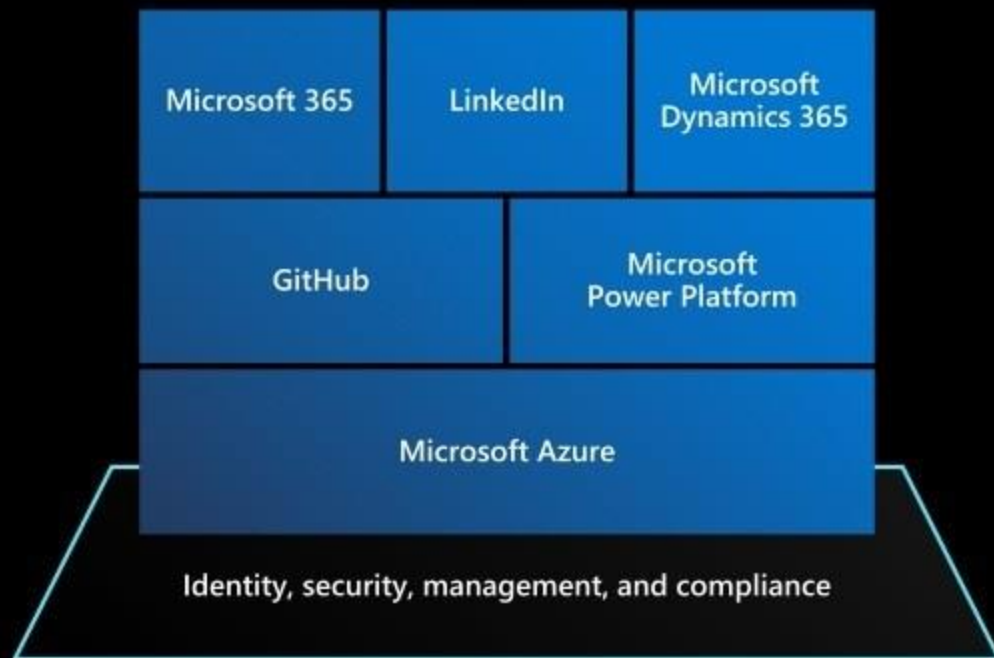


Trust



Damages

Microsoft Cloud



It's real. It's tangible. It happens.

The **average total cost per breach** has increased from \$3.54 million in 2006 to **\$8.19 million in 2019.**¹

Companies with incident response teams with testing of IR plans —**saved over \$1.2 million.**²

Customers expect their **cloud spend** to further **increase by 47%** in the next 12 months.²

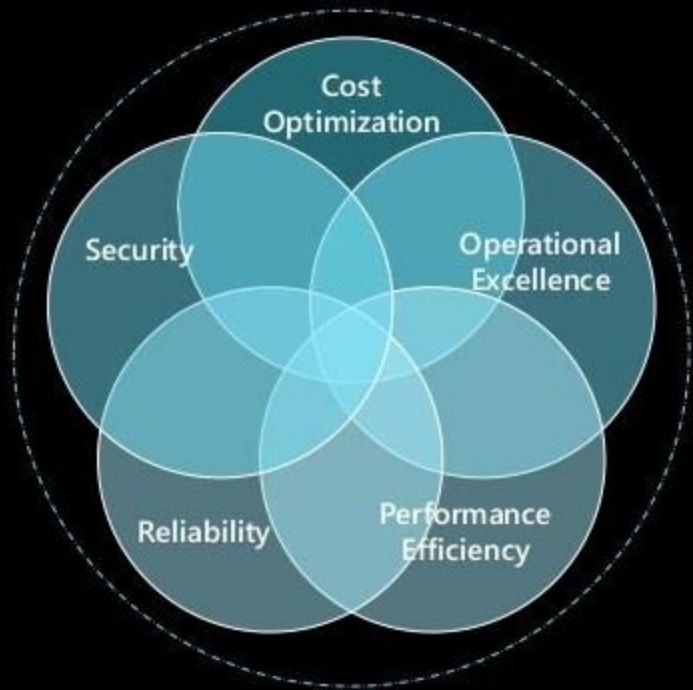
Encryption reduced breach costs by an average of \$360,000.³



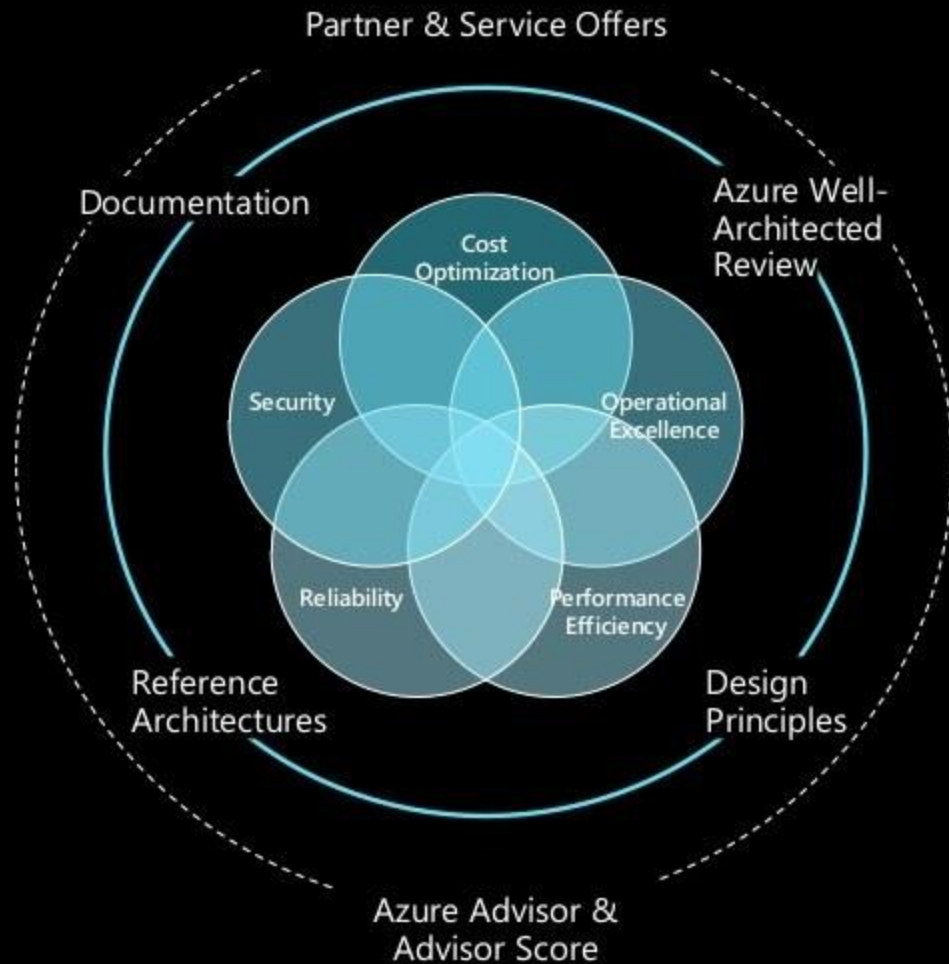
¹ What Is The Cost Of A Data Breach? By Marty Puranik. Forbes. Dec 2019

² Flexera 2020 State of the Cloud Report

Microsoft Azure Well-Architected Framework



Microsoft Azure Well-Architected



Microsoft Azure Well-Architected Framework

Architecture guidance and best practices, created for architects, developers and solution owners, to improve the quality of their workloads, based on 5 aligned and connected pillars

**Cost
Optimization**



**Operational
Excellence**



**Performance
Efficiency**



Reliability



Security



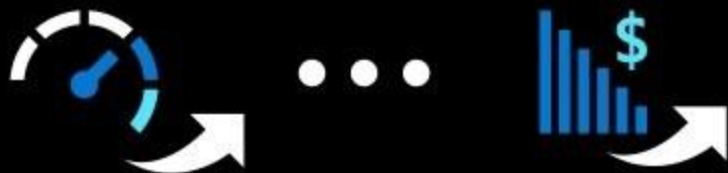
It's all about the trade-offs

Business requirements influence workload architecture decisions

DEV/TEST WORKLOADS



MISSION-CRITICAL WORKLOADS



SECURING ALL WORKLOADS



Overcoming workload quality inhibitors

Cost Optimization



- No cost and usage monitoring
- Unclear on underused or orphaned resources
- Lack of structure billing management
- Budget reductions due to lack of support for cloud adoption by LT/board

Operational Excellence



- Lack of rapid issue identification
- No deployment automation
- Absence of communication mechanisms and dashboards
- Unclear expectations and business outcomes
- No visibility on root cause for events

Performance Efficiency



- No monitoring new services
- No monitoring current workloads health
- No design for scaling
- Lack of rigor and guidance for technology and architecture selection

Reliability



- Unclear on resiliency features/capabilities for better architecture design
- Lack of data back up practices
- No monitoring current workloads health
- No resiliency testing
- No support for disaster recovery

Security



- No access control mechanism (authentication)
- No security threat detection mechanism
- Lack of security threat response plan
- No encryption processes

Best practices to drive workload quality

Cost Optimization



- ✓ Azure Hybrid Benefit
- ✓ Reserve Instances
- ✓ Shutdown
- ✓ Resize
- ✓ Move to PAAS

Operational Excellence



- ✓ DevOps
- ✓ Deployment
- ✓ Monitor
- ✓ Processes and cadence

Performance Efficiency



- ✓ Design for scaling
- ✓ Monitor performance

Reliability



- ✓ Define requirements
- ✓ Test with simulations and forced failovers
- ✓ Deploy consistently
- ✓ Monitor health
- ✓ Respond to failure and disaster

Security



- ✓ Identity and access management
- ✓ Infra protection
- ✓ App security
- ✓ Data encryption and sovereignty
- ✓ Security operations

When to think about getting well-architected?

- ✓ Leverage Azure Advisor Score to identify optimization opportunities
- ✓ Understand changes needed or incidents occurred
- ✓ Review Well-Architecture Framework
- ✓ Consider architecture design trade offs to achieve business goals
- ✓ Define and implement recommendations
- ✓ Establish a regular cadence for workload optimization



OPTIMIZE **EXISTING**
WORKLOADS

DESIGN & DEPLOY
NEW WORKLOADS



- ✓ Align workload architecture to business priorities
- ✓ Review Well-Architecture Framework
- ✓ Leverage the Azure Well-Architected Review to assess workload architecture design
- ✓ Consider architecture design trade offs to achieve business goals
- ✓ Build, deploy and manage workloads on Azure

Assessment

Microsoft Azure Well-Architected Review



<https://aka.ms/architecture/review>

Using the Azure Well-Architected Review

This web-based assessment helps improve the quality of a workload by

- **Examining the workload** pillars of the Azure Well Architected Framework (Reliability, Cost Optimization, Security, Operations Excellence, and Performance Efficiency)
- **Providing specific guidance** improve architecture and overcome detected hurdles effectively
- **Proactively focusing** on the pillar where most attention is needed

Microsoft Azure Well-Architected Review

Examine your workload through the lenses of reliability, cost management, operational excellence, security and performance efficiency (20 minutes).

Assessment name *

Microsoft Azure Well-Architected Review - workload #1

Choose your interests:

☐ Cost Optimization

An effective architecture achieves business goals and ROI requirements while keeping costs within the allocated budget.

☐ Operational Excellence

To ensure that your application is running effectively over time, consider multiple perspectives, from both an application and infrastructure angles. Your strategy must include the processes that you implement so that your users are getting the right experience.

☐ Performance Efficiency

Prioritize scalability as you design and implement phases. Scalability leads to lower maintenance costs, better user experience, and

☐ Reliability

In a cloud environment, to prevent all failures

☐ Security

Security is one of the pillars of the Azure Well-Architected Framework. It is a shared responsibility model where you are responsible for the security of your data and applications, and Microsoft is responsible for the security of the Azure services.

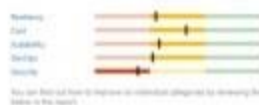
Recommendations for your workload

Automate tasks to consider implementing to improve your workload across the five pillars of the Azure architecture framework.

Your overall results



Categories that influenced your results



Next Steps

Review the pillars of a great Azure architecture learn module

You want to build great things on Azure, but you're not sure exactly what that means. Using key principles throughout your architecture regardless of technology choices can help you design, build, and continuously

Visit Microsoft Learn >

Review the Azure Architecture Framework

A successful cloud solution implementation requires focus on these five pillars of architecture excellence: Cost, DevOps, Reliability, Security, and

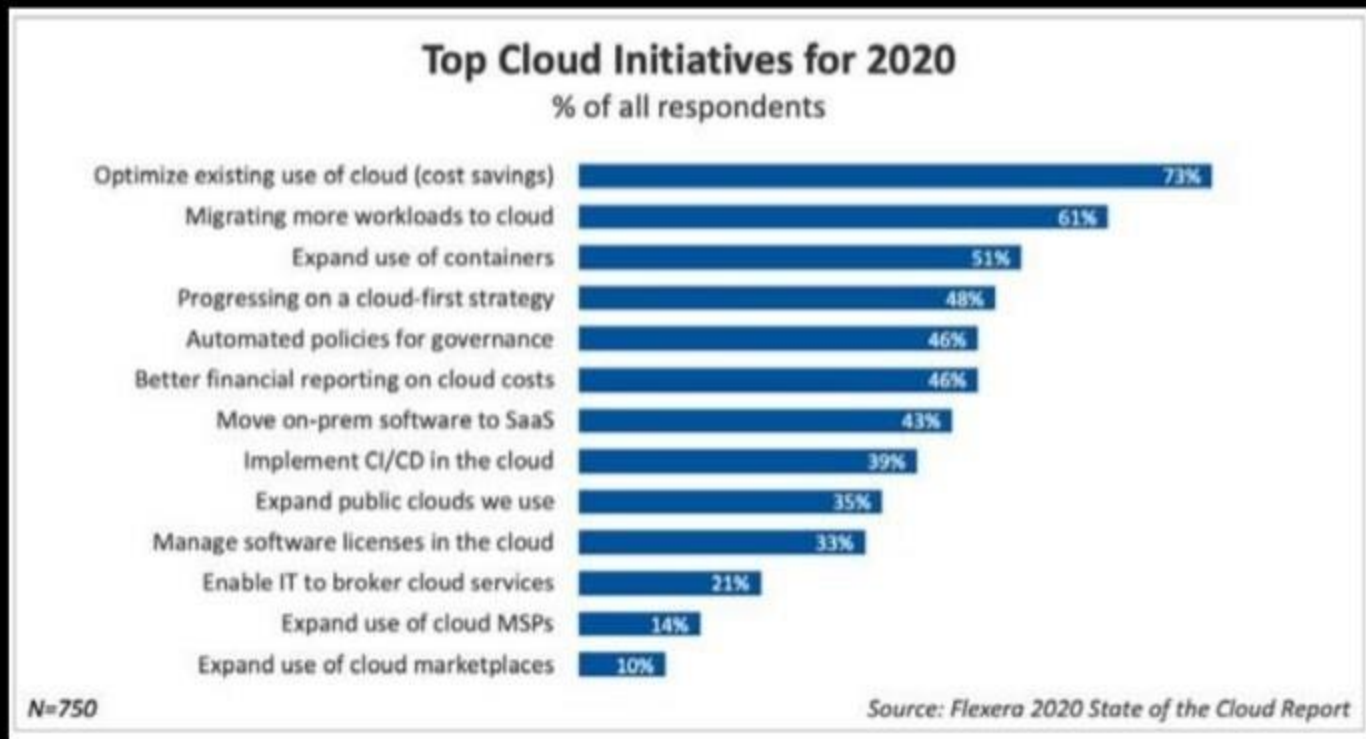
Visit Azure Architecture Center >

Review the 'How to incorporate security into your architecture design' learn module

Learn how to incorporate security into your architecture design. Discover the tools that Azure provides to help you secure your environment through all the layers of your architecture. Visit the design for security >

Cost optimization

Optimizing spend is top cloud initiative for the fourth year running



Manage and optimize your Azure costs with tools, offers, and guidance from Microsoft



Understand and forecast your costs

- Monitor your bill, set budgets, and allocate spending to teams and projects with [Azure Cost Management + Billing](#)
- Forecast costs for future investments with the [Azure pricing and TCO calculator](#)



Cost optimize your workloads

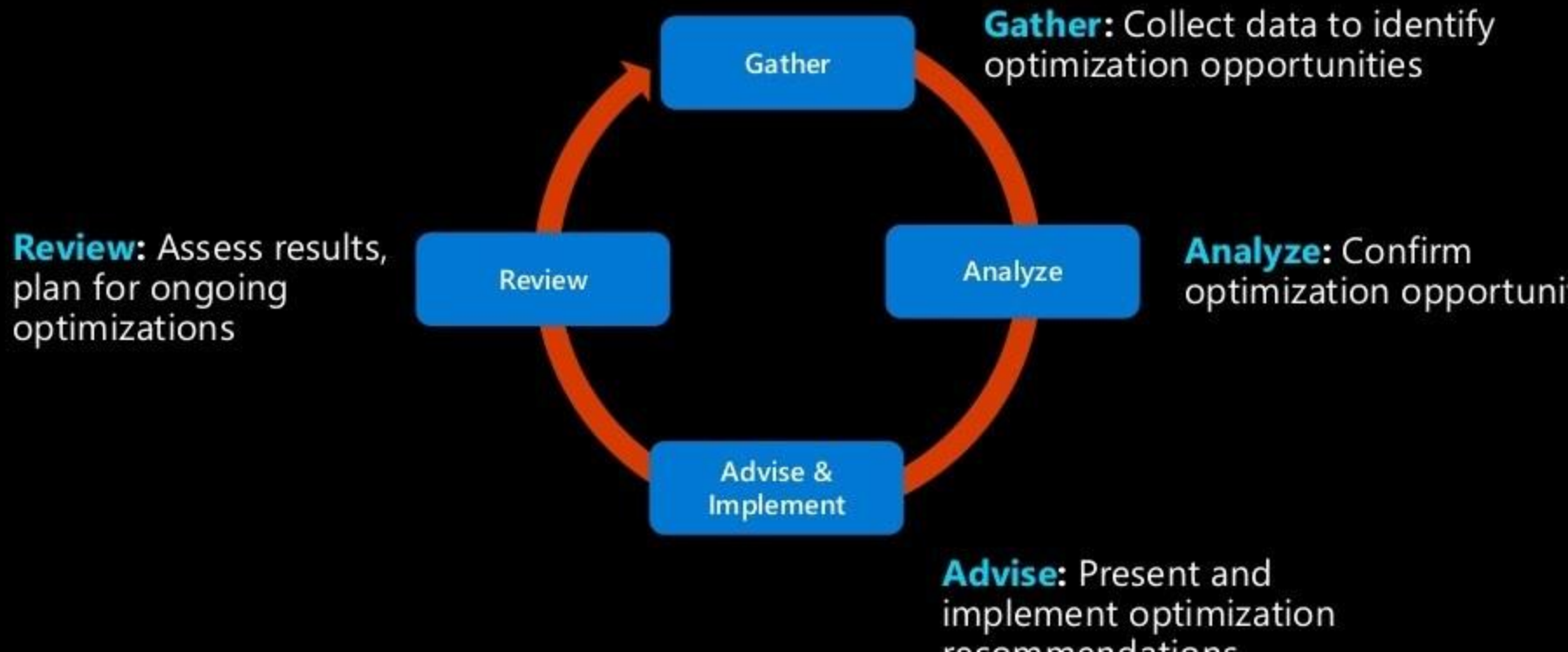
- Optimize your resources with [Azure Advisor](#)
- Follow workload design best practices with the [Azure Well-Architected Framework](#)
- Save with Azure offers and licensing terms like the [Azure Hybrid Benefit](#) and [Reservations](#)



Control your costs

- Establish spending objectives and policies using the [Microsoft Cloud Adoption Framework for Azure](#)
- Implement cost controls in [Azure Policy](#) so your teams can go fast while complying with policy

Cost optimization process



Cost optimization categories

Organizational

- Tagging
- Charge/Show back models
- ACM Budgets and Alerts

Architectural

- Azure Hybrid Benefit (AHB) for SQL and Windows
- PaaS and serverless considerations

Tactical

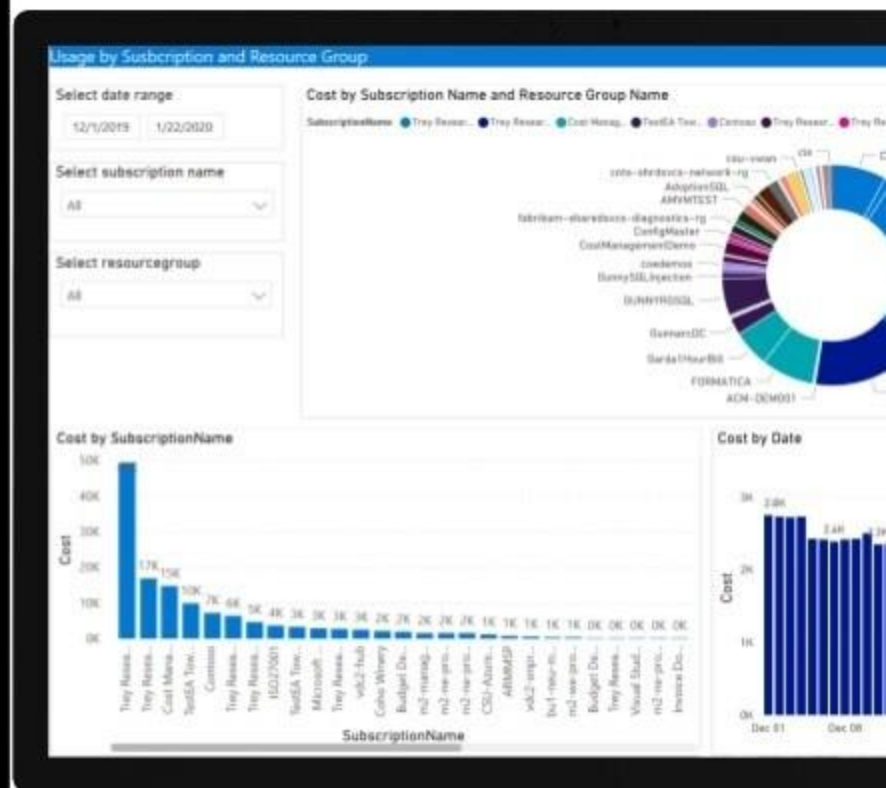
- Auto-shutdown
- Right Sizing
- Reserved Instances



Azure Cost Management + Billing Power BI App

Reports included:

- Account overview
- Usage by Subscriptions and Resource Groups
- Top 5 Usage drivers
- Usage by Services
- Windows Server AHB Usage
- VM RI Coverage (shared recommendation)
- VM RI Coverage (single recommendation)
- RI Savings
- RI Chargeback
- RI purchases
- Pricsheet





Reliability

Why is Reliability Important?

Avoiding failure is impossible in the public cloud, applications require *resilience* to respond to failures and deliver *reliability*

Reliability



Reliability is the 'what'.

It is the goal for production systems, to ensure availability of their services.

The goal is to maintain reliable systems, with the appropriate level of availability/uptime.

Resilience



Resilience is the 'how'.

It is the way in which production systems can achieve reliability.

The objective is not to avoid all failures – it is to **respond to failure in a way that avoids downtime and data loss.**

Building reliable systems is a shared responsibility

Scope of
Reliability
Reviews

Your application

Your **app** or **workload**, built on the Azure platform.

Resiliency features

Optional Azure capabilities **you enable as needed** – high availability, disaster recovery, and backup.

Reliable foundation

Core capabilities **built into the Azure platform** – how the foundation is designed, operated, and monitored to ensure availability

Building reliable systems is a shared responsibility

Your application

Your **app** or **workload** architecture, built on the below.

Resiliency features

Optional Azure capabilities **you enable as needed** – high availability, disaster recovery, and backup.

Resilient foundation

Core Azure capabilities **built into the platform** – how the foundation is designed, operated, and monitored to ensure availability

Resilient foundation

Our investments in global infrastructure, service management, and ensuring transparency



Design

Global network

Data center infrastructure

Storage protection

Operate

Safe deployment

Maintenance & control

ML & failure prediction

Observe

Communications philosophy

Service health & alerts

Scheduled events

What are Well-architected Reliability Reviews?

- Comprehensive end-to-end review of an existing application or proposed design, to identify critical reliability optimizations
 - Covers a range of technical topics from Compute, Data and Networking to DevOps, but always through a focused *reliability* lens
- Identify critical risks to the reliability of an application deployed to Azure
 - Have a set of prioritized and actionable recommendations to address each area of concern

Review Flow & Where to Start



1. Always start with the **big-picture** and work top-down

Understand the architectural context and business purpose of the application

Walk through the critical system flow and explore each component including shared services and dependencies



2. Explore expectations for reliability: RTO, RPO, NFRs, SLAs

Goal is to identify risks, especially those preventing the application from meeting expectations

Do these expectations apply to the whole application?



3. Failure-Mode Analysis

How will the system respond if any part(s) failed including application code; work level by level



4. Deep dive into key technical domains

Expectations for Reliability

- Goal is to identify aspects of the application that prevent it from meeting the expectations of reliability
 - That means knowing the expectations
 - Never move forward without a definition of goal state (e.g. Target SLA/SLO/RTO/RPO)
- Service Level Availability (SLA)
 - Azure service SLAs are specified in an availability percentage (e.g. 99.99%) over a month
 - Align these measurement details with the customer's SLA expectations
 - Some customers internally monitor their SLA/SLO measurements over a different period (e.g. Daily, Weekly, etc)
 - Understand the specifics of what is and is not covered by an Azure service SLA
- Calculating a Composite SLA Estimate for an Application
 - Composite platform SLA measurement for key operation flows
 - Does not account for poorly written application code
 - Provides an upper bounds for overall availability target
 - It points to specific places in the architecture that need attention

Pathwise Analysis of Operations



- Pathwise Analysis applied to Sample Architecture
- 99.9% Composite SLA Estimate

Key Outcomes



Identify key risks to the reliability of the application



Propose actionable and prioritized recommendations to address identified risks

P0 – Critical short-term remediation

P1 – Strongly recommended mid-term improvements

P2 – Long-term sustainability recommendations



Capture key findings and associated recommendations in a **reliability report** focused on the reviewed application



Assess your understanding on implementing critical short-term recommendations



Azure Advisor

Azure Advisor recommendations

Guides you to improve your Azure resources across four categories

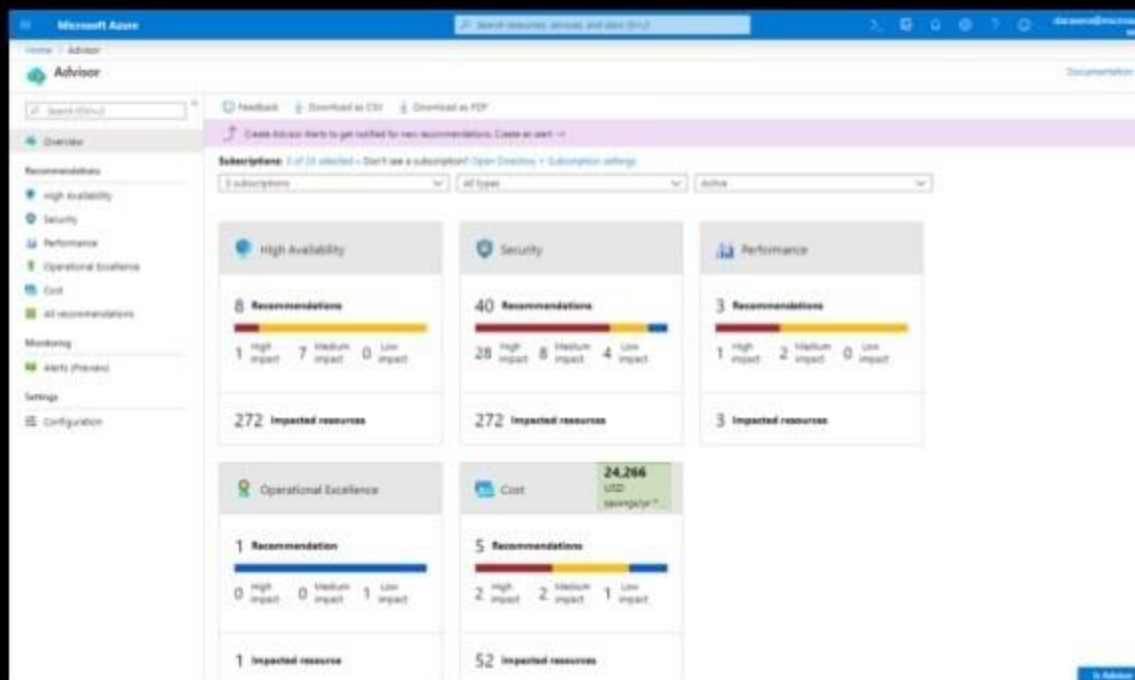
| High Availability | Security | Performance | Cost |
|--|--|--|---|
| Improve resource availability to ensure continuity of your mission critical applications | Enhance security to protect your deployments from potential security threats | Boost performance to make the most of your Azure resources | Optimize your Azure resource cost to get more from your IT budget |

Cost Optimization

Get cost recommendations based on your usage and configurations, such as:

- Shut down unused VMs
- Rightsize underused VMs
- Buy Reserved Instances for consistent resources
- Delete idle network gateways

Remediate recommendations easily with step-by-step guidance



Review your Advisor recommendations in the Azure portal: aka.ms/azureadvisor

Improve resource availability

The screenshot shows the Microsoft Azure Advisor Recommendations page. The top navigation bar includes 'Microsoft Azure', 'Advisor recommendations', and a search bar. Below the navigation bar, there are five tabs: ALL (10), HIGH AVAILABILITY (6), SECURITY (1), PERFORMANCE (1), and COST (2). The 'HIGH AVAILABILITY' tab is selected, showing a list of active recommendations. The recommendations are filtered by 'Subscriptions' (Contoso subscription) and 'Resource groups' (All resource groups). The table below lists the recommendations:

| IMPACT | DESCRIPTION | RESOURCES | UPDATED AT |
|--------|---|------------------------------|----------------------|
| Medium | This availability set is not configured for fault tolerance. To ensure high availability add one or more virtual machines to this availability set. | 2 Availability sets (show) | 3/26/2017 2:58:08 PM |
| Medium | This virtual machine is not configured for fault tolerance. For virtual machine redundancy, use availability sets. | 1 Virtual machine (show) | 3/26/2017 2:58:15 PM |
| Medium | Improve the fault tolerance of your application gateway. For application gateway redundancy, use two or more medium or large instances. | 1 Application gateway (show) | 3/26/2017 2:58:15 PM |
| Medium | This virtual machine is not configured for fault tolerance. For virtual machine redundancy, use availability sets. | 1 Virtual machine (show) | 3/26/2017 2:58:09 PM |
| Medium | Improve the reliability of your virtual machine disks. Upgrade to Premium Disks. | 2 Virtual machines (show) | 3/26/2017 2:58:15 PM |
| Medium | Improve the reliability of your virtual machine disks. Upgrade to Premium Disks. | 2 Virtual machines (show) | 3/26/2017 2:58:15 PM |

On the right side of the page, there is a detailed view of a recommendation. It includes a 'Snooze' button, a description of the issue, and recommended actions. The recommended actions are:

- Move the virtual machine into a new availability set.
- Move the virtual machine into an existing availability set.

Advisor identifies virtual machines that are not configured to meet current Azure SLA.

Recommendations with "inline actions" empower you to address potential issues within Advisor itself.

Advisor recommendations

PREVIEW

ALL

9

HIGH AVAILABILITY



4

SECURITY



1

PERFORMANCE



2

COST



2

Increase the performance and scalability of your Azure resources with these recommendations. [Learn more](#)

Subscriptions

Microsoft Azure Internal Con

Resource groups

All resource groups

Active or snoozed ⓘ

Active

[Get recommendations](#)

Active recommendations

Microsoft Azure Internal Consumption

IMPACT

DESCRIPTION

RESOURCE

UPDATED

High

Improve the performance of your SQL Azure database
Follow the recommendations from SQL DB Advisor

3 SQL databases

12/12/20
11:16:21

Medium

Improve the performance and reliability of your App Service
Follow the recommendations from App Service Advisor





1 App service

12/12/20
11:16:25

Performance recommendations

Automate View discarded Getting started Feedback

Recommendations

| ACTION | RECOMMENDATION DESCRIPTION | IMPACT |
|--|--|-------------|
|  CREATE INDEX | Table: [Employees] Indexed columns: [City], [State] | HIGH IMPACT |
|  PARAMETERIZE QUERIES (PREVIEW) | Scope: Entire database Reason: Non-parameterized queries are causing performance issues | HIGH IMPACT |
|  CREATE INDEX | Table: [DataPoints] Indexed columns: [Name], [Money], [Power] | LOW IMPACT |
|  FIX SCHEMA ISSUES (PREVIEW) | Error code: 208 Error message: Invalid object name 'dbo.Companies'. | LOW IMPACT |

Tuning history

| ACTION | RECOMMENDATION DESCRIPTION | STATUS | TIME |
|--|---|--|-------------------------|
|  CREATE INDEX Initiated by: User | Table: [DataPoints] Indexed columns: [Name], [Money] |  Success | 11/9/2016 7:17:28 AM |
|  DROP INDEX (PREVIEW) Initiated by: System | Index name: MyIndex123 Reason: Duplicate index |  Pending | 11/9/2016 7:17:28 AM |
|  DROP INDEX (PREVIEW) Initiated by: User | Index name: MyIndex321 Reason: Duplicate index |  Success | 11/9/2016 7:17:28 AM |
|  DROP INDEX (PREVIEW) | Index name: IX_FF |  | 11/8/2016 |

SQL DB Advisor recommendations help improve the performance of your application accessing a SQL Azure database

Implemented recommendations are monitored for an additional day and **auto-reverted** if a performance regression is discovered



Advisor recommendations

PREVIEW



ALL

9

HIGH AVAILABILITY



6

SECURITY



1

PERFORMANCE



0

COST



2



Advisor gets your security recommendations from [Azure Security Center](#). Security Center will help you monitor the security status of all your resources in a single place. It will also alert you when you're being attacked.

Subscriptions

Azure Supportability Demo Account One

[Get recommendations](#)

Active recommendations

Azure Supportability Demo Account One

IMPACT

DESCRIPTION

RECOMMENDATIONS

UPDATED

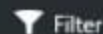
High

Improve the security of your Azure resources
Follow Security Center recommendations

[13 Recommendations](#)

12/12/20
12:17:47

Recommendations



Filter

| DESCRIPTION | RESOURCE | STATE | SEVERITY | |
|--|------------------|-------|----------|-----|
| Enable advanced security for subscrip... | 1 subscriptions | Open | High | ... |
| Enable VM Agent | vmwindows | Open | High | ... |
| Install Endpoint Protection | 2 virtual mac... | Open | High | ... |
| Add a Next Generation Firewall | 4 endpoints | Open | High | ... |
| Enable Network Security Groups on sub... | 3 subnets | Open | High | ... |
| Enable Network Security Groups on virt... | SIAvSetVM | Open | High | ... |
| Enable Auditing & Threat detection on... | advisorserver | Open | High | ... |
| Enable Auditing & Threat detection on... | 3 SQL datab... | Open | High | ... |
| Apply disk encryption | vmlinux | Open | High | ... |
| Restrict access through Internet facing... | 3 virtual mac... | Open | Medium | ... |
| Enable Transparent Data Encryption | 3 SQL datab... | Open | Medium | ... |
| Provide security contact details | 1 subscriptions | Open | Medium | ... |
| Remediate OS vulnerabilities (by Micros... | vmlinux | Open | Low | ... |

Advisor integrates with Azure Security Center to bring you security recommendations

Architect & optimize workloads for success, with these Microsoft resources



Leverage assessment
[Azure Well-Architected Review](#)
([aka.ms/wellarchitected/review](#))



Get trained
[Well-Architected Learning Path](#)
([aka.ms/wellarchitected/learn](#))



Browse Reference Architecture
[Azure Architecture Center](#)
([aka.ms/wellarchitected/referencearchitecture](#))



Review Design Principles
[Well-Architected Design Principles](#)
([aka.ms/wellarchitected/designprinciples](#))



Review the Documentation
[Azure Well-Architected Framework](#)
([aka.ms/wellarchitected/framework](#))



Azure Enablement Show
[Channel 9 Show](#)
([aka.ms/azenable](#))

NEW

A photograph of two women, one of Asian descent and one of Caucasian descent, standing on a city street at night. They are both looking down at a tablet computer held by the woman on the right. The woman on the left is pointing at the screen. The background is a blurred city street with warm, bokeh-style lights from buildings and streetlights. The overall mood is professional yet approachable.

Kehitä Azure osaamistasi ja tuo osaamisesi näkyväksi sertifioinnilla!

Marja Aho

Partner Enablement Lead, Microsoft

<https://www.linkedin.com/in/marjaaho/>

Lisää Well Architected Framework koulutusta

[Introduction to the Azure Well-Architect Framework \(VTS\)](#) on-demand

Azure Well Architected training 09Feb-10Feb: coming soon to aka.ms/kumppanikoulutukset

Browse all

Learn new skills and discover the power of Microsoft products with step-by-step guidance. Start your journey today by exploring our learning paths and modules.

Filter

☐ Hide completed

Products

Find a product

☒ Azure

Roles

- ☐ Administrator
☐ Security Engineer
☐ Solutions Architect

Levels

- ☐ Beginner
☐ Intermediate

Types

- ☐ Learning Path
☐ Module

well architected

Search

7 results for "well architected"



MODULE

Microsoft Azure Well-Architected Framework
- Security

1 hr 2 min ★★★★★ 4.7 (2,88)

Azure Solutions Architect Intermediate



MODULE

Microsoft Azure Well-Architected Framework
- Reliability

59 min ★★★★★ 4.7 (544)

Azure Solutions Architect Intermediate



MODULE

Microsoft Azure Well-Architected Framework
- Operational excellence

54 min ★★★★★ 4.7 (607)

Azure Solutions Architect Intermediate



MODULE

Microsoft Azure Well-Architected Framework
- Performance efficiency

48 min ★★★★★ 4.7 (569)

Azure Solutions Architect Intermediate



MODULE

Introduction to the Microsoft Azure Well-Architected Framework

1 hr 4 min ★★★★★ 4.7 (1,20)

Azure Solutions Architect Beginner



MODULE

Microsoft Azure Well-Architected Framework
- Cost optimization

51 min ★★★★★ 4.7 (1,18)

Azure Solutions Architect Intermediate



LEARNING PATH

Build great solutions with the Microsoft Azure Well-Architected Framework

1 hr 38 min

Muista Micros Learn!

microsoft.com

microsoft.com/certifications
microsoft.com/traincertposter

Benefits for an individual of getting certified



Stand out

Certified employees **get greater recognition** of skills due to validation ¹

Earn more

23% of Microsoft certified technologists **earn up to 20% more** ²

Advance

49% believe cloud certifications **increase employability** ³

¹ 2017 IDC-Microsoft Cloud Skills and Organizational Influence: How Cloud Skills Are Accelerating the Careers of IT Professionals white paper

² 2017 Pearson VUE Value of Certification white paper

Microsoft Azure certifications

Role-based

Expand your technical skill set

▼ Associate

- Azure Administrator (AZ-104)
- Azure Developer (AZ-204)
- Azure Security Engineer (AZ-500)
- Azure Data Scientist (DP-100)
- Azure AI Engineer (AI-100)
- Azure Data Engineer (DP-200 + DP-201)
- Azure Database Administrator (DP-300)
- Data Analyst (DA-100)

▼ Expert

- Azure Solutions Architect (DP-303 + AZ-304)
- DevOps Engineer (AZ-400)

Specialty

Deepen your technical skills and manage industry solutions

- Azure for SAP Workloads (AZ-120)
- Azure IoT Developer (AZ-220)

Fundamentals

Master the basics

- Azure Fundamentals (AZ-900)
- Azure AI Fundamentals (AI-900)
- Azure Data Fundamentals (DP-900)



Get started

1 Identify roles, skills and learning paths

aka.ms/Certification

2 Schedule an exam at a test center or online

(Good to have a deadline in studies)

3 Begin with self-studies
microsoft.com/learn

aka.ms/enablevilt

4 [Attend Microsoft Virtual Training Days \(Fundamentals\)](#)

Utilize learning partner's courses
e.g. Sovolto, Sulava, Zure, Tieturi

Utilize free [Microsoft exam preps and practice test sessions available in partner training calendar](#)

5 Link you personal Certification account to your organization in Partner Center
[Guide](#)