



Cloud Computing in the Public Sector

Use Cases, Policy Challenges, Implementation Strategy

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Agenda



Discuss some interesting use scenarios

Notes from the field: Challenges

Some suggested strategies and tools

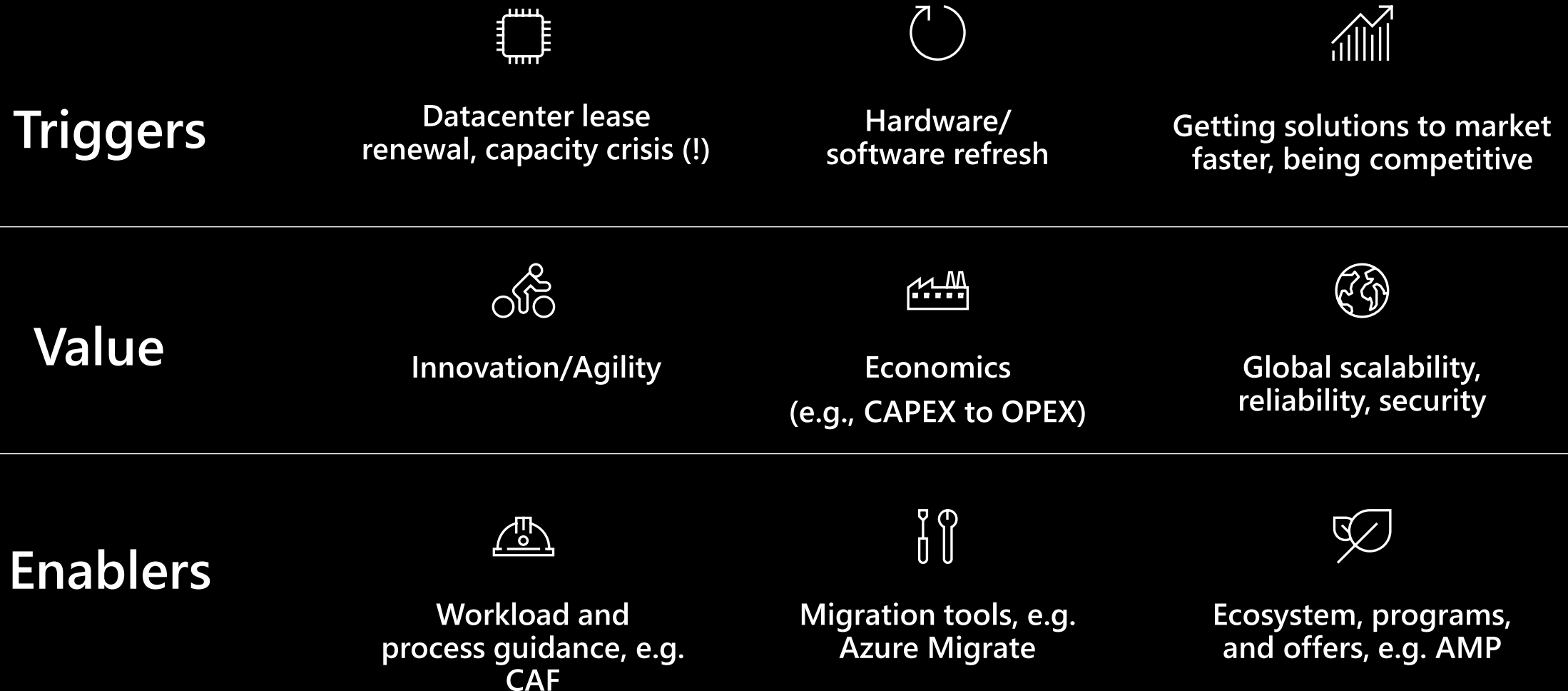
Microsoft mission

Empower every person and
every organization on the
planet to achieve more

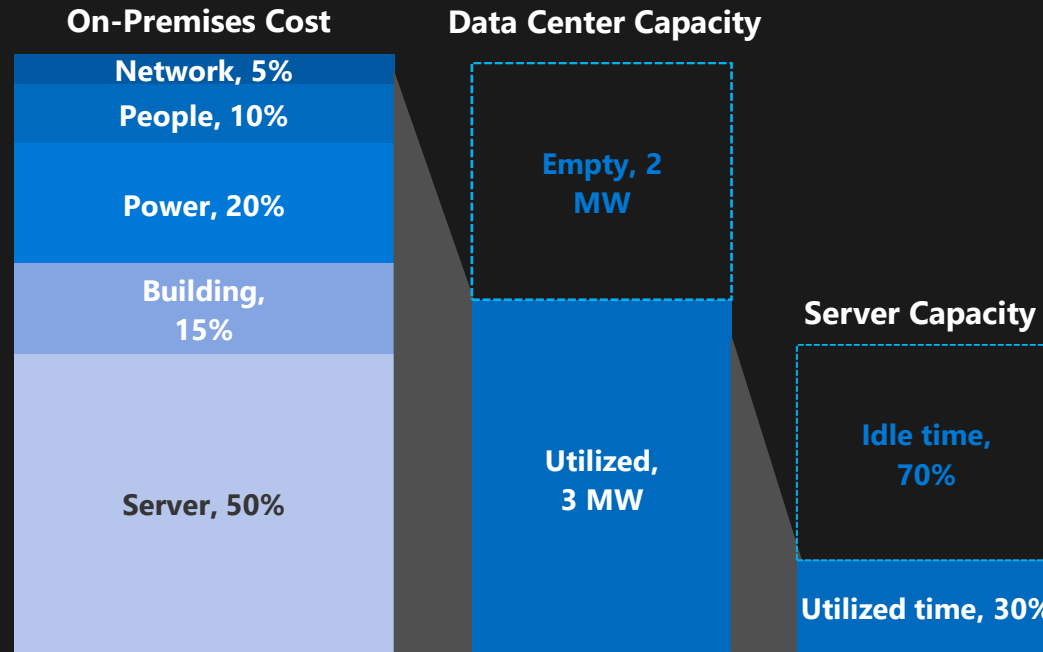


Why Cloud?

What's driving customers to migrate to public cloud?



Economic benefit: Optimize data center costs to generate value



MW = Megawatts

On-prem data centers (DCs) are frequently overbuilt for peaks, resulting in excess capacity and excess spend.

Acquiring on-prem data-center and server capacity has a significant lead-time. As a result customers frequently invest significantly in advance of underlying demand, resulting in under-utilized capacity.

Economic benefit: Well-optimized cloud usage can free-up excess capacity and allows customers to optimize spend



- C** Unused Capacity – Extra usage which is rarely if ever used

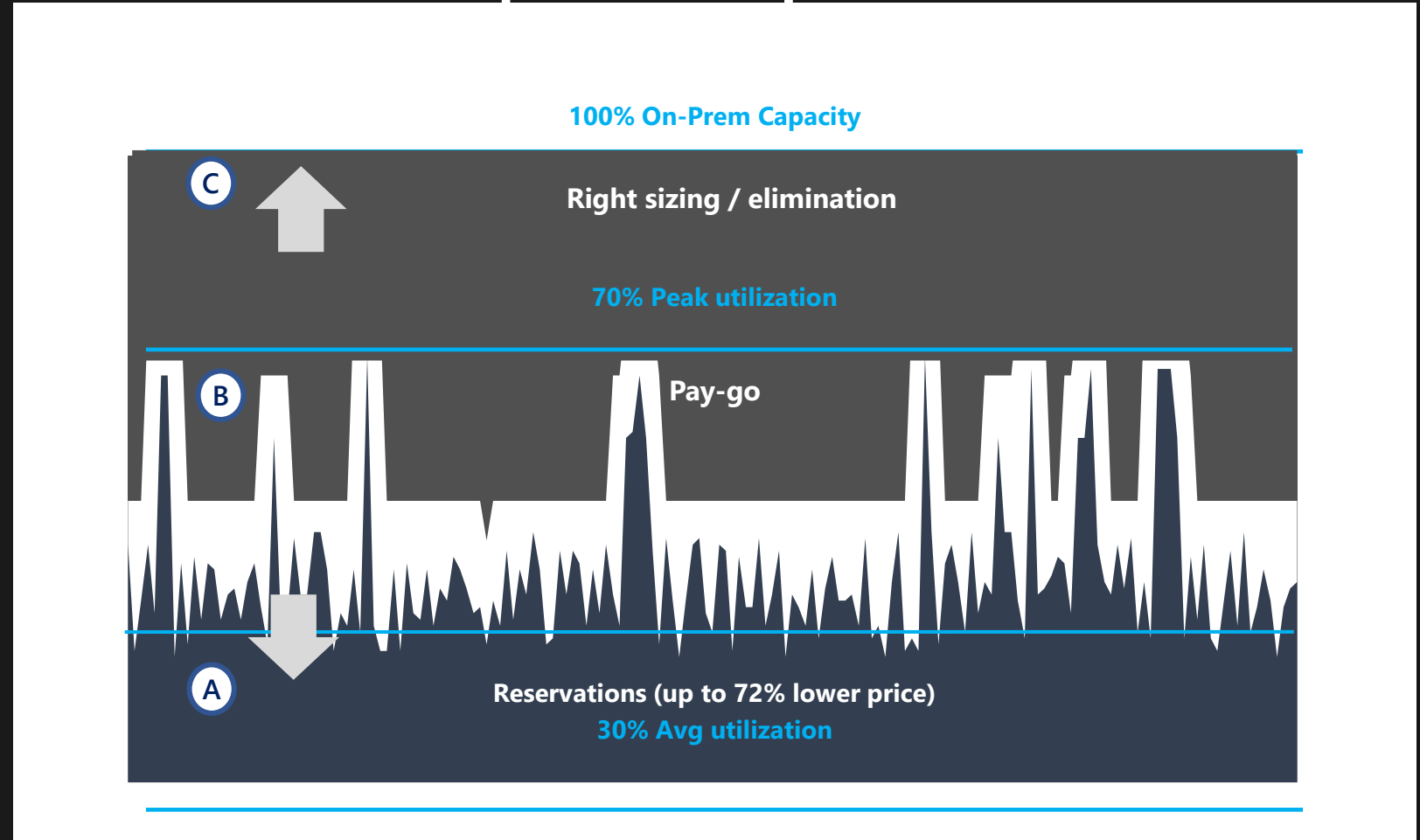
Immediate Savings

- B** Fluctuations on top of base workloads – seasonal patterns or occasional bursts






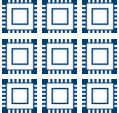




Hourly pricing for the hours or days needed

- A** Base workloads – steady state, typically covers all day everyday use.

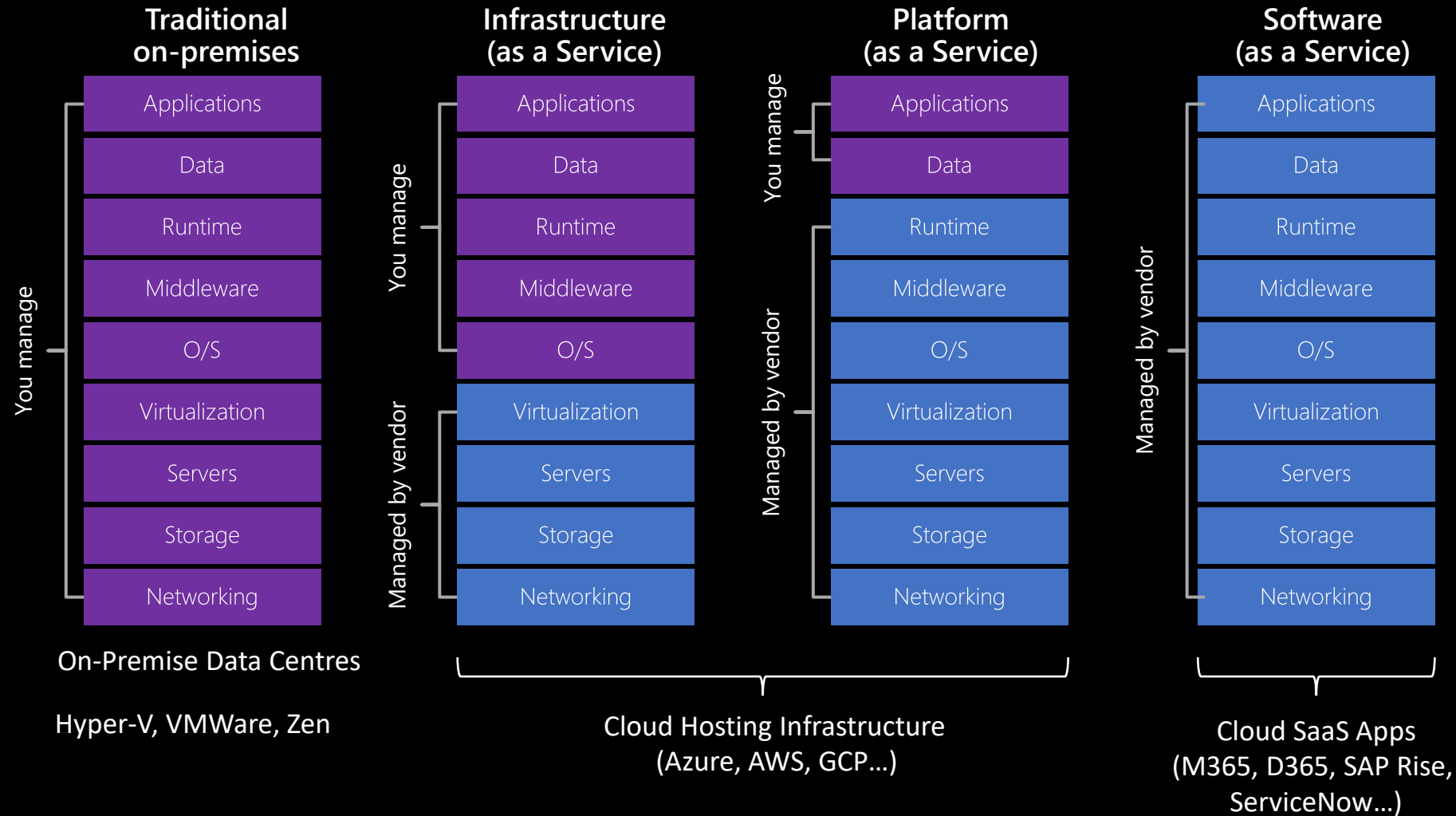
Use Reserved Instances



IT & business transformation benefit: Agility

	Traditional IT	Cloud supported
Time to provision	 Weeks/months to provision resources	 Minutes/hours to provision resources via self-service access
Hardware usage	   1 CPU for 100 hours	   100 CPUs for 1 hour
Location	 Location dependent	 Accessible everywhere

Cloud service models





Microsoft Cloud
for Financial Services



Microsoft Cloud
for Healthcare



Microsoft Cloud
for Manufacturing



Microsoft Cloud
for Nonprofit



Microsoft Cloud
for Retail



← Microsoft Cloud for Sustainability →

Microsoft Cloud



Modern
work



Business
applications



Infrastructure



Digital and
app innovation



Data & AI



Security

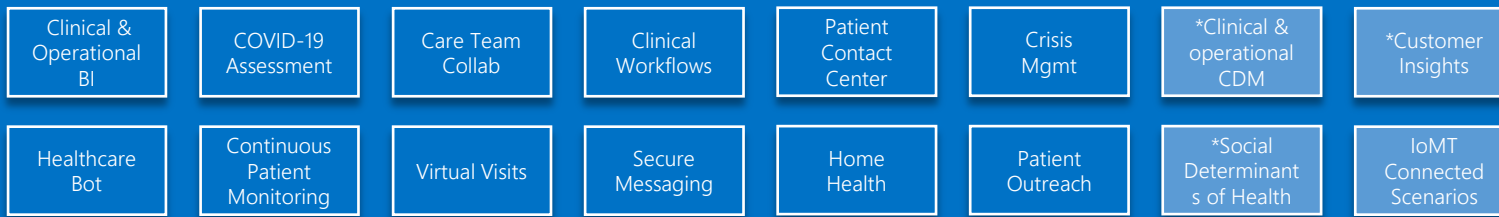
The most trusted and comprehensive cloud

Microsoft Cloud for Healthcare - building blocks

Partner Ecosystem



SaaS



PaaS



IaaS



Microsoft Cloud for Healthcare



Applications & Infrastructure



Data & AI



Modern Workplace



Business Applications

Unlock

Unlock revenue and services opportunities

Unlock new revenue opportunities by delivering high-value services for implementation, data governance, and adoption and use

Accelerate

Accelerate development and time to market

Accelerate development and time to market for vertical and LOB specific applications and IoT wearables that bring the cloud capabilities to life

Build

Build on an HL7 healthcare-aligned platform

Enable AI-inspired experiences and outcomes for care, collaboration, communication, and insights, building on healthcare-specific standards and capabilities



Hybrid

+60 Azure regions

Largest geographical footprint of any cloud provider operating regions in **28** countries on all continents.

Seamless integration and common management of resources across heterogenous and hybrid environments

>200 Azure Services



Secure



Microsoft Cyber Defense Operations Center

>8,500 full-time security professionals

43 trillion global signals daily

\$4 billion annual cybersecurity investment

<https://www.microsoft.com/en-us/security/blog/2022/12/14/cyber-signals-risks-to-critical-infrastructure-on-the-rise/>



Compliant

90+ 91 Compliance offerings Compliance Certifications

GLOBAL

- ISO 27001:2013
- ISO 27017:2015
- ISO 27018:2014
- ISO 22301:2012
- ISO 9001:2015
- ISO 20000-1:2011
- SOC 1 Type 2
- SOC 2 Type 2
- SOC 3
- CIS Benchmark
- CSA STAR Certification
- CSA STAR Attestation
- CSA STAR Self-Assessment
- WCAG 2.0 (ISO 40500:2012)

U.S. GOVT

- FedRAMP High
- FedRAMP Moderate
- EAR
- ITAR
- DoD DISA SRG Level 5
- DoD DISA SRG Level 4
- DoD DISA SRG Level 2
- DFARS
- DoE 10 CFR Part 810
- NIST SP 800-171
- NIST CSF
- Section 508 VPATs
- FIPS 140-2
- CJIS
- IRS 1075
- CNSSI 1253

INDUSTRY

- PCI DSS Level 1
- GLBA (US)
- FFIEC (US)
- Shared Assessments (US)
- SEC 17a-4 (US)
- CFTC 1.31 (US)
- FINRA 4511 (US)
- SOX (US)
- 23 NYCRR 500 (US)
- OSFI (Canada)
- FCA + PRP (UK)
- APRA (Australia)
- FINMA (Switzerland)
- FSA (Denmark)
- RBI + IRDAI (India)
- MAS + ABS (Singapore)
- NBB + FSMA (Belgium)
- AFM + DNB (Netherlands)
- AMF + ACPR (France)
- KNF (Poland)
- European Banking Authority (EBA)
- FISC (Japan)
- HIPAA BAA (US)
- HITRUST Certification
- GxP (FDA 21 CFR Part 11)
- MARS-E (US)
- NHS IG Toolkit (UK)
- NEN 7510:2011 (Netherlands)
- FERPA (US)
- CDSA
- MPAA (US)
- FACT (UK)
- DPP (UK)

REGIONAL

- Argentina PDPA
- Australia IRAP Unclassified
- Australia IRAP PROTECTED
- Canada Privacy Laws
- China GB 18030:2005
- China DJCP (MLPS) Level 3
- China TRUCS / CCCPPF
- EU EN 301 549
- EU ENISA IAF
- EU Model Clauses
- EU – US Privacy Shield
- GDPR
- Germany C5
- Germany IT-Grundschutz workbook
- India MeitY
- Japan CS Mark Gold
- Japan My Number Act
- Netherlands BIR 2012
- New Zealand Gov CIO Framework
- Singapore MTCS Level 3
- Spain ENS High
- Spain DPA
- UK Cyber Essentials Plus
- UK G-Cloud
- UK PASF

Reliable infrastructure for your innovation

On-demand
global scale

Best for Microsoft
workloads

Linux, Open Source,
and Red Hat

Purpose-built
infrastructure

+60 regions

Best hybrid cloud experience
for Windows Server

~50% of Azure VMs
run Linux



**Global
network** More than 160 edge
sites and 20,000
peering connections

Run SQL in Azure VMs
most cost-effectively

1.4x growth
of Linux

vmware®

ORACLE®

150 VM size
options

Comprehensive protection
for hybrid environments

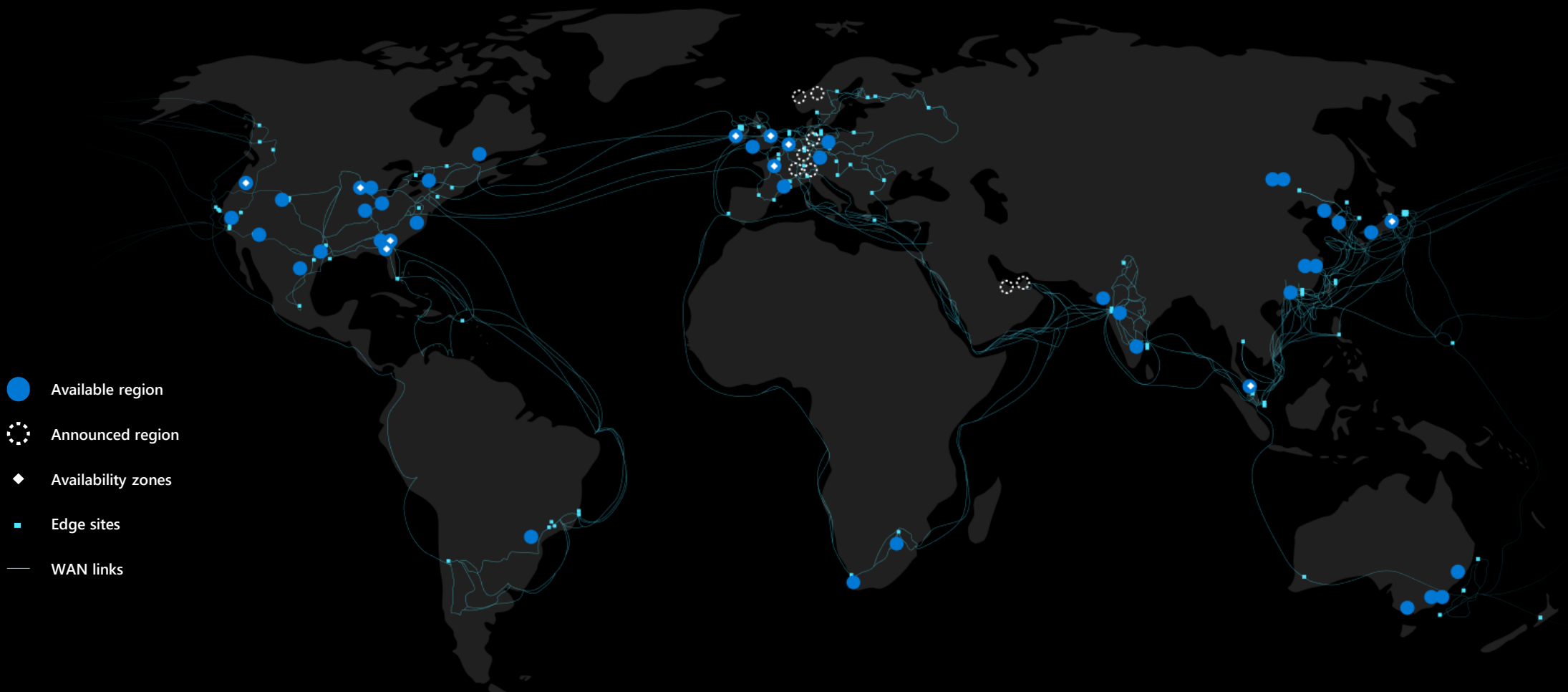


Co-located support
with Red Hat

NetApp®

CRAY

More regions than any other cloud provider



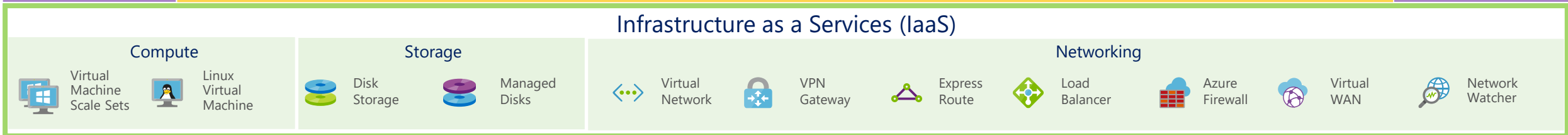
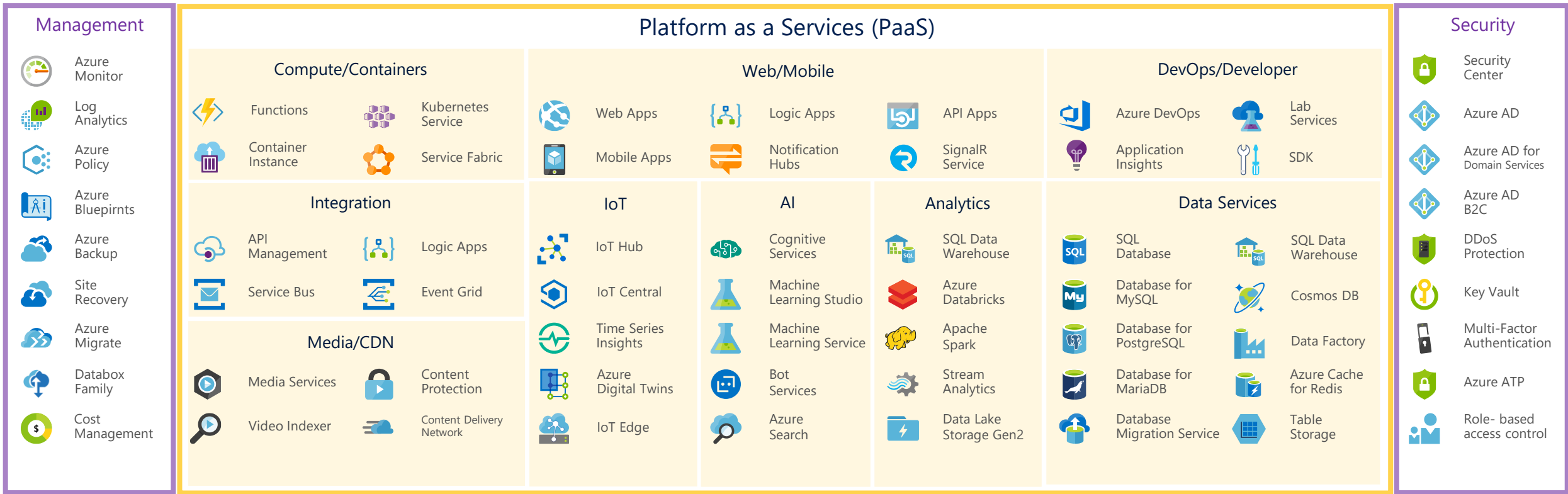
60+ Regions worldwide

130k+ Miles of fiber optic and undersea cable

170+ Network POPs

200+ ExpressRoute partners

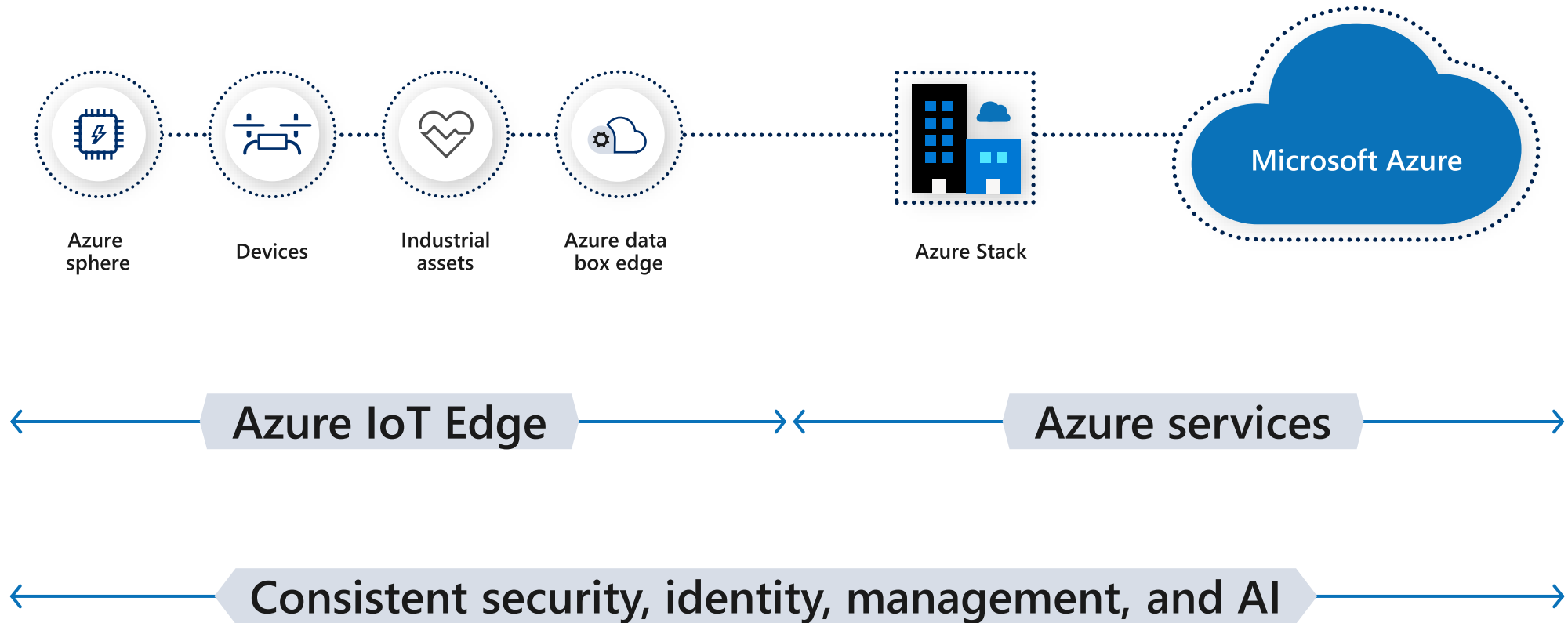
Azure ... the most extensive PaaS provider



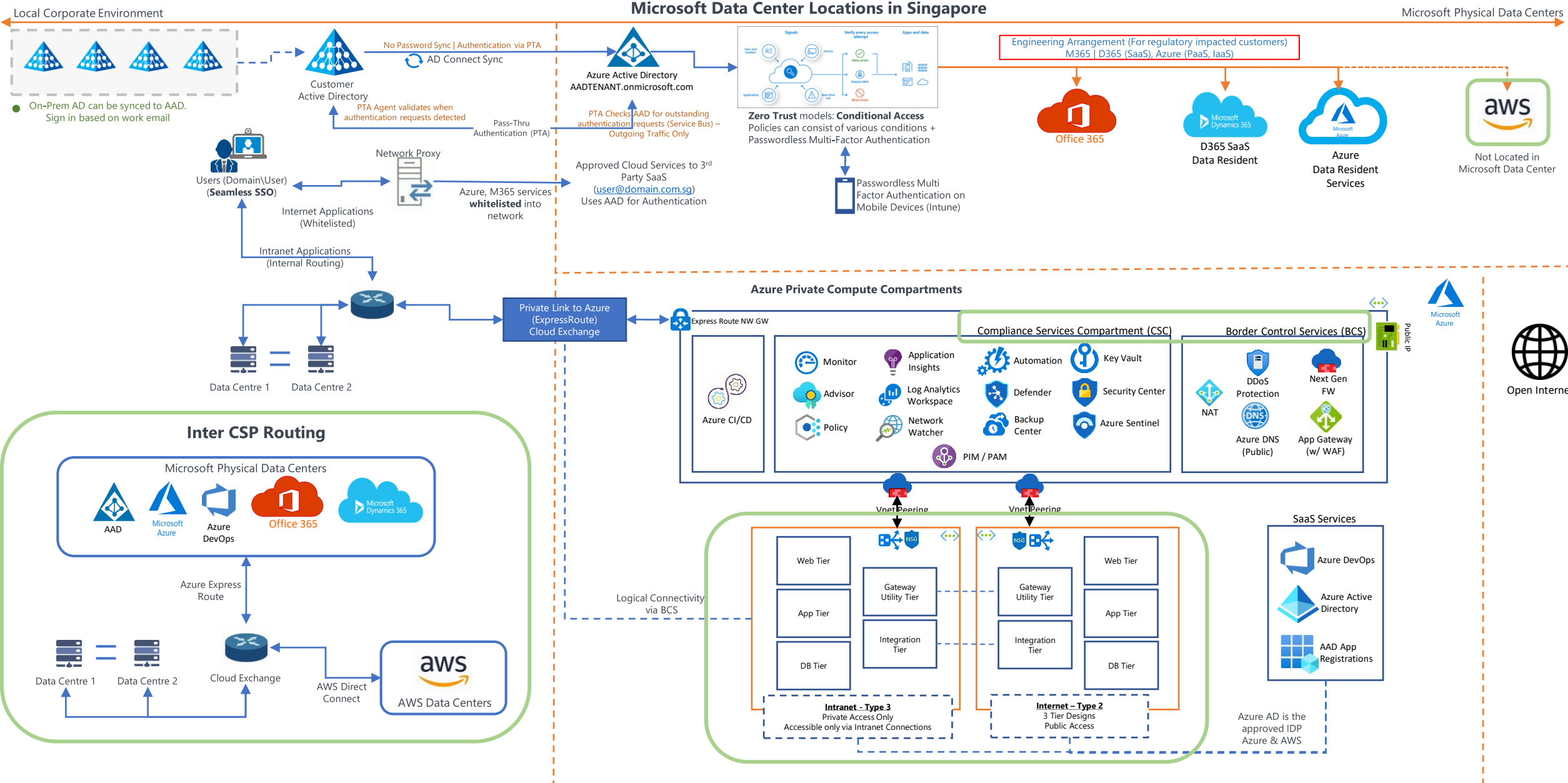
Azure Datacenter Infrastructure



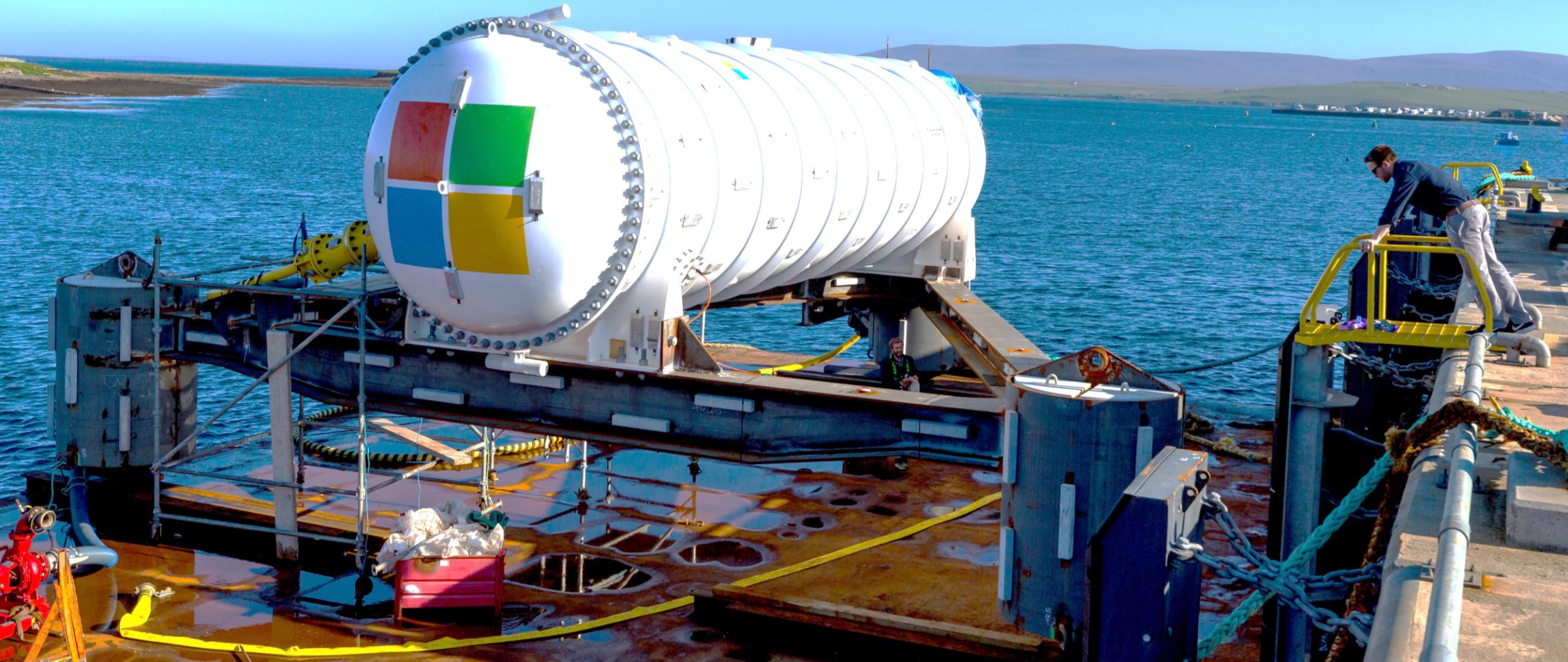
The cloud is an operating model: not just a place



Commercial Cloud Public Sector Architecture



Promotes long server life



Civil servants to soon use ChatGPT to help with research, speech writing

Civil servants will soon be able to tap the power of artificial intelligence (AI) tool ChatGPT to conduct research and draft reports and speeches from their existing work productivity tools.

A hackathon team from Open Government Products (OGP) has spent a month integrating research firm OpenAI's ChatGPT into Microsoft Word, the go-to writing platform for most public officers.

The team, called Pair, plan to be able to use the AI service, adding that it will be rolled out progres-

sively across agencies, starting with the Smart Nation and Digital Government Office (SNDGO), said Pair team member Moses Soh.

The project has also struck an agreement with Azure OpenAI to ensure that data handled by the Government is kept confidential and out of sight to Microsoft and OpenAI. Microsoft runs the cloud-based Azure platform, which hosts OpenAI as part of its investment in the San Francisco-based AI research firm that found fame with the rise of ChatGPT, or Chat Generative Pre-Trained



(Foreground, from left) Minister of State for Trade and Industry Low Yen Ling, Foreign Minister Vivian Balakrishnan and Minister for Communications and Information and Minister-in-charge of Smart Nation and Cybersecurity Josephine Teo viewing a demonstration at the Open Government Products Hackathon for Public Good last Thursday. PHOTO: LIANHE ZAOBAO

Transformer.

Pair was one of the highlight groups at the annual OGP Hackathon for Public Good finale last Thursday. The month-long event allows OGP staff to set aside non-essential duties to work on new tech ideas based on issues surfaced by the public.

OGP is an experimental development arm of the Government that builds technology for the public.

Mr Soh, 29, who is a senior project manager at OGP, said the software aims to ease the load on civil servants when they write and do research. "We want to free officers up for higher-level tasks. This bot can help them get over that tough first draft, or speed up their work by creating sample e-mails or even speeches," he added.

As seen in a demo session by the Pair team on Thursday, the chatbot is able to summarise long chunks of information and draft reports on policy-related topics within seconds. It can also recognise and instantly redact sensitive information to ensure it is not exposed.

Mr Soh estimated that an early

version of the Pair programme built into Microsoft Word will be rolled out across the civil service within two months. A subsequent version will be able to access and analyse information from official databases, but this is still in the works, with no launch date planned, he added.

Pair's project rides on a keen interest in AI bots, especially since the rise of ChatGPT from late 2022. ChatGPT is seen by many as the gold standard among AI bots today, due to its availability to the masses and ability to converse naturally and even craft essays.

Most recently, Microsoft announced its next-generation search engine – a revamped version of Bing – which incorporates OpenAI's chatbot. As part of Microsoft's Azure OpenAI Service, the chatbot software is available to enterprises, allowing them to integrate the AI into new apps.

Microsoft also offers some customers in highly regulated industries the option to prevent the Azure OpenAI Service from ever seeing the data processed, to protect sensitive data.

Osmond Chia

Azure OpenAI | Sample Use Cases

Playground

Deployments

text-davinci-002

Examples

Load an example

Code View

Customer conversation

Hi there I just had a car accident and wanted to report it. OK, I hope you're alright and in safe place to have this conversation.
Yes, I'm fine thank you. Can you please describe to me what happened? I was driving on the M23 and I hit another car. Are you OK? Yeah, I'm just a little shaken up. That's understandable. Can you give me your full name? Sure, it's Sarah Standl. Do you know what caused the accident? I think I might have hit a pothole. OK, where did the accident take place? On the M23 near junction 10. Was anyone else injured? I don't think so. But I'm not sure. OK, well we'll need to do an investigation. Can you give me the other drivers information? Sure, his name is John Radley. And your insurance policy number. OK. Give me a minute. OK, it's 546452.
OK, is there any damage to your car? Yes, Headlights are broken and the airbags went off. Are you going to be able to drive it? I don't think so. I'm going to have to have it towed. Well, we'll need to get it inspected. I'll go ahead and order you a tow van. I'll also start the claim and we'll get everything sorted out. Thank you.

Azure OpenAI Instruction

Extract the following from the conversation:

1. Main reason of the conversation
2. Sentiment of the customer
4. How did the agent handle the conversation?
5. what was the Final outcome of the conversation
6. create a short summary of the conversation

Output

1. The main reason of the conversation was to report a car accident.
2. The sentiment of the customer was shaken up but OK.
4. The agent handled the conversation well and was empathetic.
5. The final outcome of the conversation was that the agent started a claim and ordered a tow truck.
6. The customer was in a car accident and the agent started a claim and ordered a tow truck. The customer was shaken up but OK.

Example:
Extract
information
from text
and
summarize
it

Azure OpenAI | Sample Use Cases

Playground

Deployments

text-davinci-002

Examples

Summarize Text

[Code View](#)

**Azure OpenAI
Instruction in English**

You must extract the following information from the phone conversation below:

1. Call reason (key: reason)
2. Cause of the incident (key: cause)
3. Names of all drivers as an array (key: driver_names)
4. Insurance number (key: insurance_number)
5. Accident location (key: location)
6. Car damages as an array (key: damages)
7. A short, yet detailed summary (key: summary)

Make sure fields 1 to 6 are answered very short, e.g. for location just say the location name. Please answer in JSON machine-readable format, using the keys from above. Format the output as JSON object called "results". Pretty print the JSON and make sure that is properly closed at the end.

**Customer conversation in
English (or other language)**

Phone conversation:

Hi I just had a car accident and wanted to report it. OK, I hope you're alright, what happened? I was driving on the I-18 and I hit a car. The other car was in the middle of the road and I couldn't get up. That's understandable. Can you give me your full name? Sure, it's Sarah Standl. Do you know what caused the accident? I think I might have hit a pothole. OK, where did the accident take place? On the I-18 freeway. Was anyone else injured? I don't think so. But I'm not sure. OK, well we'll need to do an investigation. Can you give me the other drivers information? Sure, his name is John Radley. And your insurance number. OK. Give me a minute. OK, it's 546452. OK, what type of damages has the car? Headlights are broken and the airbags went off. Are you going to be able to drive it? I don't know. I'm going to have to have it towed. Well, we'll need to get it inspected. I'll go ahead and start the claim and we'll get everything sorted out. Thank you.

Output as JSON

```
results = {  
  "reason": "car accident",  
  "cause": "hit a pothole",  
  "driver_names": ["Sarah Standl", "John Radley"],  
  "insurance_number": 546452,  
  "location": "I-18 freeway",  
  "damages": ["headlights broken", "airbags went off"],  
  "summary": "Sarah Standl was driving on the I-18 when she hit another car. She thinks she hit a pothole. John Radley was the other driver. There were no injuries but both cars have damage."  
}
```

Azure OpenAI | Sample Use Cases (cont.)

Playground

Deployments: text-davinci-002
Examples: Load an example

[Code View](#)

Input - German
Wartungsfenster für den 14. Januar von 14 bis 15 Uhr geplant, erwarten Sie Ausfallzeiten.

Azure OpenAI Instruction - English
Generate a formal customer communication in English
- offer help at info@operations.com
- be apologetic where possible
- use 0:00 as time format
Please output in a letter format.

Output - English
Dear Customer,
We are writing to inform you that we have scheduled maintenance for January 14th from 14:00 to 15:00. We apologize for any inconvenience this may cause and offer help at info@operations.com should you have any questions.
Sincerely,
Your Operations Team

**Example:
Generate
auto text in
any
language**

1. wah lieu, that car kena langar from the back si bei cham. look bad, i hope the peeps ok.
2. alamak, kereta kemek sial. pple inside sure teruk. can see darah!
3. xiao gina. drive anyhow nearly langar my car.

Please classify the 3 cases above based on severity, urgency. then explain.


Case 1: Low Severity, Low Urgency - This case describes an incident of a car being rear-ended, but doesn't mention any injuries or fatalities. Therefore, it doesn't have high severity or urgency.

Case 2: High Severity, High Urgency - This case describes a car accident that appears to have caused serious injury or death, and requires immediate attention. Therefore, it has high severity and urgency.

Case 3: Low Severity, Low Urgency - This case describes an incident where someone was driving recklessly, but no accident occurred and no one was injured. Therefore, it doesn't have high severity or urgency.

Other uses around the world

For more publicly referenceable list - <https://customers.microsoft.com/>



Singapore's national healthtech agency, IHiS, empowers patients to take ownership of their health with Health Discovery+ on Azure



its information technology (IT) initiatives to address Singaporeans' growing needs.

IHiS deployed its in-house system known as Health Discovery Plus (HD+), which runs on the Microsoft Azure platform

Empowered more patients to take ownership of their health using HD+, which supports different vital signs monitoring programs across various settings such as polyclinics, hospitals, and senior activity centres.

The Met Office partners with Microsoft Azure to chart the UK's path to a Net Zero future



- The Met Office has a keystone role in predicting and dealing with the effects of climate change as well as charting the path to a net zero future.
- Charting the path to net zero and establishing what the weather is going to look like as the climate changes is a highly data-intensive task.
- Given these huge technological demands, The Met Office selected Microsoft as its partner using Microsoft Azure, Azure Data Lake and Cognitive Services (AI) to help it deliver the innovation and the compute resources needed to achieve its ambitious goals.
- The Met Office Director of Technology, CIO Charlie Ewen, states, “Our new supercomputer is not just innovative from a technology perspective, it’s also innovative in the way we are going to partner with Microsoft over the next ten years to receive supercomputing as a service.”

A photograph showing a man in a grey Red Cross vest and a black cap with 'adidas' and 'CICR' logos, wearing sunglasses and a watch, standing next to a white van. He is talking to a woman in a white polo shirt with '165' on the back. They are both looking towards a woman in a colorful patterned dress who is smiling. The background shows a rural setting with mud-brick buildings and children in the distance.

The International Committee of the Red Cross reunifies families separated by conflicts and disasters, keeping data secure in the Microsoft Cloud

Every year, thousands of people around the world are separated from their families because of conflicts, natural disasters, or migration. The International Committee of the Red Cross (ICRC), and its Family Links Network, has the challenging mission of finding missing people and helping them reunite with their loved ones.

4 October 2022

- The ICRC engaged ELCA Informatique SA, a Microsoft Solutions Partner for Data & AI (Azure), Digital & App Innovation (Azure) and Business Applications, to transform the reunification process by creating an efficient digital platform.
- Its vision: streamline data collection by caseworkers, collect data directly from beneficiaries through an online portal, and keep families better informed about the status of their case throughout the process—all built with privacy by design to help keep the highly confidential data secure.



Easy-to-use tools help the UN “fast-forward in a crisis” and battle the coronavirus pandemic

When the COVID-19 pandemic began, the United Nations Departments of Political, Peacebuilding, Peace Operations and Operational Support (DPPA, DPO, and DOS) coordinated field operations for on-the-ground coronavirus response missions around the world. The organization needed precise, up-to-date data on everything from the number of respirators at a hospital to the distribution of handwashing stations.

Empowered by the Secretary-General's Data Strategy, the organization's embrace of Azure and Office 365, especially its self-service capabilities, facilitated a response that rose to the urgency of the pandemic.

4 August 2021

[Microsoft Customer Story-Easy-to-use tools help the UN “fast-forward in a crisis” and battle the coronavirus pandemic](#)



Microsoft Consulting Services helps create the world's first live interactive global event, connecting 60,000 delegates through a custom digital platform

- In 2020 during the COVID-19 pandemic, SFF x SWITCH continued to provide a combined online-offline platform for the global FinTech and deep tech communities to support their engagement and connection despite the challenges with international travel. The event expanded to become the world's first weeklong, round-the-clock, hybrid digital and physical event. SingEx worked with stakeholders to find and deploy an engaging digital platform that would run the event securely in real time so anyone could join from anywhere.
- MAS, ESG, and SingEx chose [Microsoft Consulting Services](#) to fulfil the vision of delivering the conference in a safe and compliant manner through a digital platform.



Telethon Kids Institute helps families keep kids safe online with Azure-hosted app

Telethon Kids Institute is one of the largest nonprofit medical research institutes in Australia. Telethon Kids partnered with Bankwest to create the Beacon app, created on Microsoft Azure.


Texting with friends. Following influencers on social media. Playing online video games. Falling down an online video rabbit hole. These have become a routine part of adults' lives, particularly since the beginning of the COVID-19 pandemic, but they have become more commonplace for children, too. The App target to prevent children exposure to the inappropriate content and cyber bullying.



International Organization for Migration better able to support migrants in crisis with help from cloud-based solutions

Since 1951, the International Organization for Migration (IOM) has promoted international cooperation and supported the orderly and humane management of displaced people, refugees, and migrant workers.

- IT has always played a key role in providing the agency's frontline workers with tools they can use to react quickly and effectively
- IOM had three on-premises datacenters and 500 old, overprovisioned virtual machines (VMs). Security, backups, and monitoring relied on systems administrators for oversight and deployment.
- IOM decide to exit their data center and migrate to Azure. In just six months, IOM became the only UN organization with nearly all of its resources in the cloud.



Nonprofit Anthony Nolan speeds life-saving stem cell donor matches through the cloud

The UK-based nonprofit Anthony Nolan collaborates with other stem cell donor registers worldwide to match people with blood cancer with donors


- It uses Microsoft cloud services—Dynamics 365, Azure, and Microsoft 365—to ensure patients can find the best donor match, no matter where they are in the world.
- Anthony Nolan stores information in two separate CRM (customer relationship management) systems. To get this single source of truth about everyone the nonprofit interacts with, Formus Pro built an Azure link to connect the separate systems. “Now it’ll see all interactions across the CRM systems to have a complete view of each person.”
- Anthony Nolan collects personally identifiable information (PII) along with sensitive medical data. That’s why Formus Pro built two layers of permissions to ensure staff see only the information they need to do their job—and no more

Make-A-Wish® continues its mission of hope and embraces innovation with help from Surface devices



Renowned around the world for creating life-changing wishes for children with critical illnesses, Make-A-Wish had a bold new vision to digitally transform its operations.

It needed to standardize its IT services and devices across geographically dispersed staff and volunteer teams, and portability and ease-of-use were paramount to maximizing productivity and streamlining operations. Make-A-Wish selected [Microsoft Surface Laptop 4](#) to help transform how it restores hope and joy for wish kids and their families when they need it most.



Improving farm productivity using data-driven agriculture

[Microsoft Customer Story-Improving farm productivity using data-driven agriculture](#)

Farmbeats is an end-to-end AI and IoT system for agriculture that enable precision agriculture techniques. In particular, Azure Farmbeats gathers data from sensors, cameras, and drones, to produce actionable insights for farmers.

Data Driven Agriculture.

Data driven agriculture techniques can help alleviate the world's food problem by reducing waste in resources, increasing yield, and ensuring sustainable farming practices. While the efficacy of data driven agriculture has been demonstrated, these techniques are sparsely adopted in today's farming practices. This is primarily due to the expensive cost of data collection and the challenging environment of typical farming locations. "To enable data driven agriculture, a seamless data collection system is needed," said Stewart. "However, enabling a system where sensors collect data, such as soil moisture or temperature, and stream to the cloud to perform data analytics for agriculture faces several significant challenges, those being power, connectivity, and overall system cost."

Notes from the field

[Some common challenges, not exhaustive]

Keep an open mind | Policy are set in the past | Appreciate the whys
and be prepared to modernize and contextualize

Cloud Fundamentals

The move to cloud is essential and urgent.

- Understanding of key Hyperscale Value Propositions is critical
 - Agility – “Reduce the cost of failure to near zero”
 - Innovation – “New technologies now come **first** to the cloud... and soon will come **only** to the cloud”
 - Cybersecurity – “Your data is not safe until it is in the cloud. Hyperscale threats require Hyperscale protection.”
- Other key benefits (Resilience, Redundancy, Cost Savings, Scalability, Compliance) are important, but can be tougher to communicate

There is no such thing as a private cloud.

- On-prem data centers cannot deliver the key cloud value propositions that a successful digital transformation requires
 - This is true even on IaaS, let alone PaaS and SaaS
 - Most struggle to deliver even basic self-service virtualization
- *What can your on-prem data center do that hyperscale cloud can't?*

Have you minimally taken care of these?



Cloud Mindset vs On-premise Mindset
Learn fast, act fast.
Embrace change.
Fail fast, Recover fast.
Build for resiliency, not availability.
Identify risks and revisit them often.
Automate wherever possible.

Identity Challenges

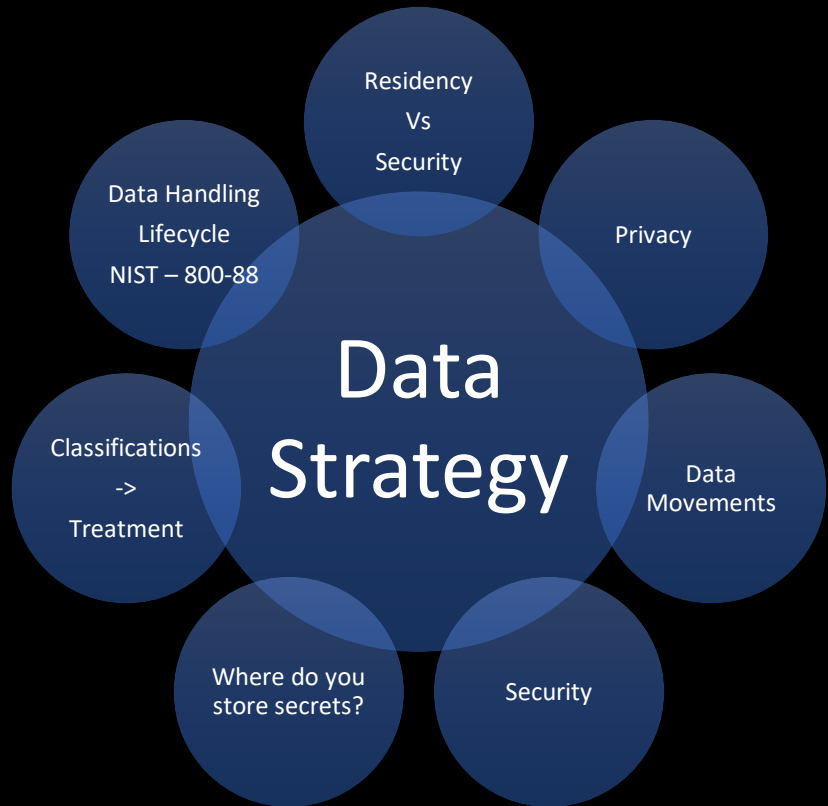


Important

- Localized (IaaS) vs globalized (SaaS)
- Using the service vs managing the service
- Phishing resistant MFA, Secure MFA options
- Store only necessary attributes or data
- Look for an identity service with cyber threat protection
- In cloud, your main line of defense centers around identity and accountability
- Think on lines of least privilege, and revisit needs often



Challenges with Data



Important:

- Data residency vs data security
- Focus on Customer's data-at-rest
- Modernize/Review data classifications
- Treatment of data
 - at-rest (e.g. bitlocker)
 - in-transit (e.g TLS/SSL),
 - in-use (e.g. Confidential Computing)
- Explore privacy preserving technology
- Understand and ensure data destruction process
- Secrets & Keys are not data. Keep them in FIPS compliant key vaults. Don't store in databases

Explore Hybrid Methods of data computation

- Tokenization
- Anonymization
- Privacy Preserving Tech

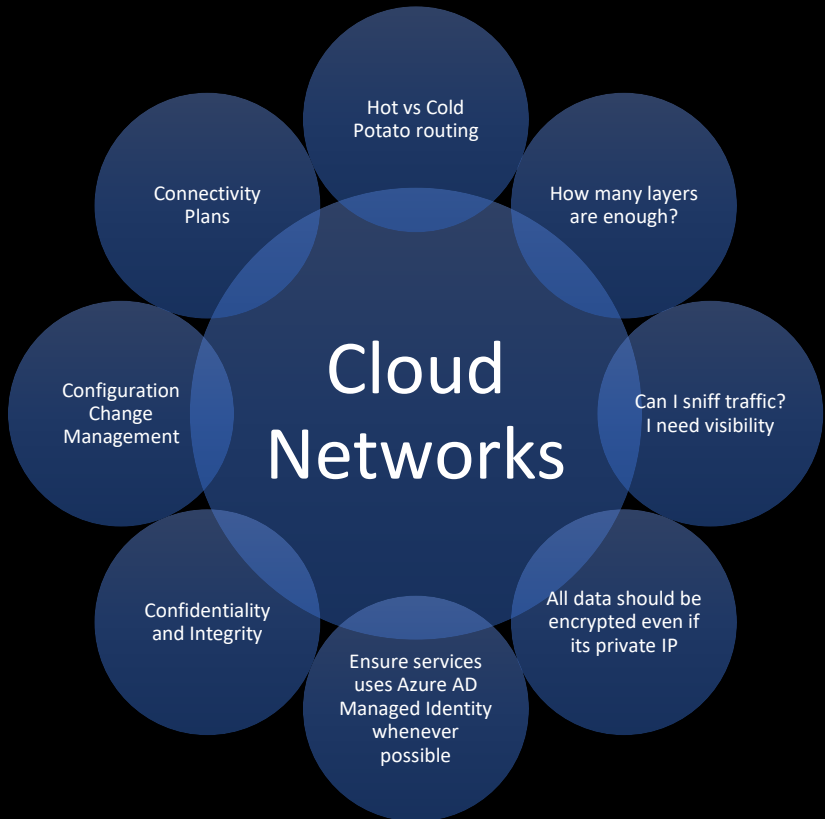


Data Privacy Exercise

These are some data extracted from a database, and to be use in an application. And perhaps you intercepted it, somehow

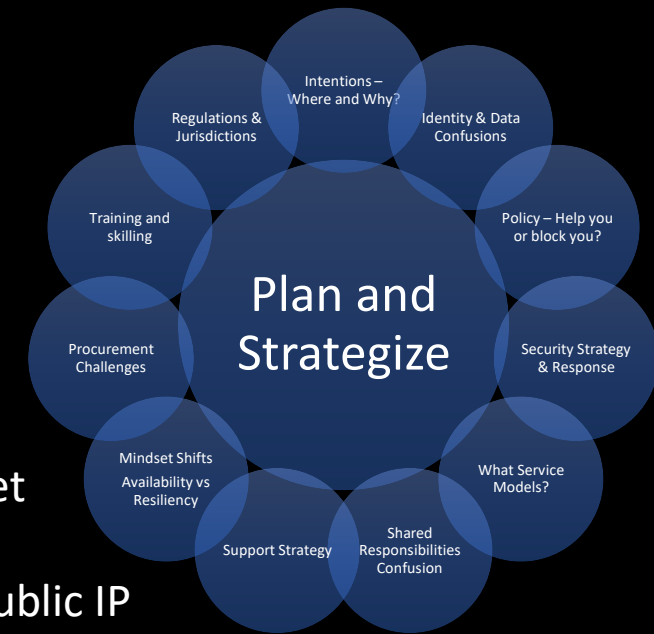
Deposit	Age	Location of Vessel	Race
US\$5400	45	Singapore	Chinese
Height	Weight	Color	Sport
1.84m	88kg	Blue	Run
Industry	Role	Lease length	
Marine	Harbour Pilot	6	
Name			
Johnnie To			
Email	Mobile	Rental Address	Customer since
johnnie@outlook.com	+65 91234567	123, Marine Terrace S123456	12 th Jan 1984
Nation ID			
S1234567A			

Challenges with Network



Important:

- Hot and cold potato routing (Avoid Internet exposure)
- N-Tiering on network (Private IP type or Public IP type) – Beware of latency
- Data in transit – residency requirements
- Treat Data network plane and Control network plane differently
- Hybrid networks **MUST** harmonize local addressing schemes



Challenges with Security



Important:

- Always take up the Assume Breached mindset
- Air-gap is NOT ALWAYS SAFE
- Experience on-prem rarely applies to cloud
- Cyber Hygiene and Governance are crucial
- NEVER bring on-prem security products and expect same level of protection in cloud
- Hyperscale threats need Hyperscale platform to defend
- Challenge your policy where needed. Don't hide behind it
- Ensure you plan for security ops/response plan
- Be clear about the Shared Responsibility Model



Government Security Program



The GSP is designed to provide participants with the confidential security information and resources they need to trust Microsoft's products and services.

Our purpose is to help governments protect themselves and their citizens by:

Enabling **trust & transparency**

Providing access to security information about Microsoft products and services

Providing data to improve protection of government information technology against cyber threats

Fostering collaboration between Microsoft security teams and government cybersecurity experts

Are my servers safe in cloud?

My policy requires cloud provider to cage up the servers (for security reasons)

Guess what were the security reasons were?

Let's imagine in mind this simple game – Locate my server

Information on Physical Security @ Microsoft DC locations

<https://learn.microsoft.com/en-us/azure/security/fundamentals/physical-security#physical-security>

<https://learn.microsoft.com/en-us/azure/security/fundamentals/infrastructure>

<https://learn.microsoft.com/en-us/azure/security/fundamentals/shared-responsibility>

Challenge - Locate Your Server

Situation –

Assuming you have an insider snitch at the DC. And he makes arrangement to let you enter physically;

- You skipped the crash proof barriers
- Legitimately enrolled and approved you into our DC
- I leave you with no escort, I'll turn off all my CCTV Cams
- Unlocked every door for you with free movements

Will cloud service provider be able to freely access my data?

Short answer No.

All data are encrypted at rest, in transit
You can adapt further encryption downstream
Consider BYOK, and also DKE

You can also do Customer Lockbox and be part of the support process.

▼ Data security, encryption, and storage

Azure Certificate Authority details

Data security and encryption

Key management in Azure

Double encryption

Sunset for SHA-1 OCSP signing

TLS certificate changes

> Disk encryption

> Database security

Storage security guide

Customer Lockbox

Security baseline for Customer Lockbox

Trusted Hardware Identity Management

Information about encryption on Azure

<https://learn.microsoft.com/en-us/azure/security/fundamentals/encryption-overview>

<https://learn.microsoft.com/en-us/azure/security/fundamentals/key-management>

<https://learn.microsoft.com/en-us/azure/security/fundamentals/double-encryption>

<https://learn.microsoft.com/en-us/azure/security/fundamentals/customer-lockbox-overview>

Controls and Standards

90+ 91

Compliance offerings
Compliance Certifications



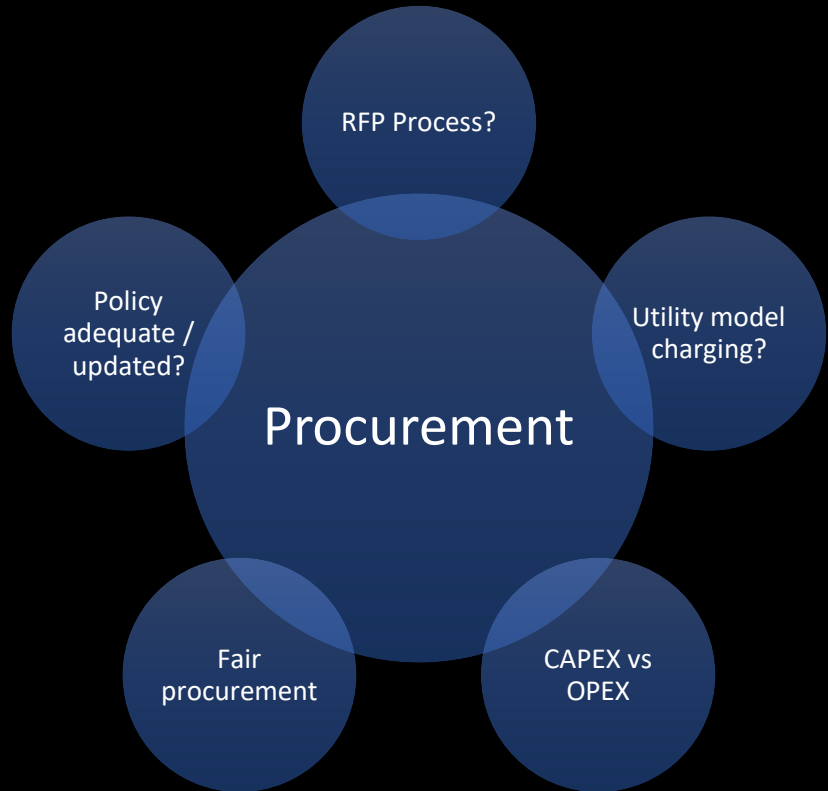
Global	Global	US Government	US Government
<ul style="list-style-type: none"> CIS Benchmark CSA-STAR attestation CSA-STAR certification CSA-STAR self-assessment CyberGRX ISO 20000-1:2011 ISO 22301 ISO 27001 	<ul style="list-style-type: none"> ISO 27017 ISO 27018 ISO 27701 ISO 9001 SOC 1 SOC 2 SOC 3 WCAG 	<ul style="list-style-type: none"> CJIS CNSSI 1253 DFARS DoD IL2 DoD IL5 DoE 10 CFR Part 810 EAR (US Export Adm. Reg.) 	<ul style="list-style-type: none"> FedRAMP FIPS 140-2 IRS 1075 ITAR NIST 800-171 NIST CSF Section 508 VPATS
Industry	Industry	Industry	Industry
<ul style="list-style-type: none"> 23 NYCRR Part 500 AFM + DNB (Netherlands) APRA (Australia) AMF and ACPR (France) CDSA CFTC 1.31 (US) DPP (UK) EBA (EU) FACT (UK) FCA + PRA (UK) FDA CFR Title 21 Part 11 	<ul style="list-style-type: none"> FERPA FFIEC (US) FINMA (Switzerland) FINRA 4511 (US) FISC (Japan) FSA (Denmark) GLBA (US) GSMMA GxP HDS (France) HIPAA / HITECH 	<ul style="list-style-type: none"> HITRUST KNF (Poland) MARS-E (US) MAS + ABS (Singapore) MPA NBB + FSMA (Belgium) NEN-7510 (Netherlands) NERC OSFI (Canada) PCI-3DS PCI-DSS 	<ul style="list-style-type: none"> RBI + IRDAI (India) SEC 17a-4 SEC Regulation SCI (US) Shared Assessments SOX TISAX TruSight
Regional	Regional	Regional	Regional
<ul style="list-style-type: none"> ABS OSPAR (Singapore) BIR 2012 (Netherlands) C5 (Germany) Canadian Privacy Laws CCPA (US-California) Cyber Essentials Plus (UK) IRAP (Australia) 	<ul style="list-style-type: none"> DJCP (China) ^ℹ EN 301 549 (EU) ENISA IAF (EU) ENS (Spain) EU Model Clauses GB 18030 (China) ^ℹ GDPR (EU) G-Cloud (UK) 	<ul style="list-style-type: none"> IDW PS 951 (Germany) ^ℹ ISMAP (Japan) ISMS (Korea) IT-Grundschutz workbook (Germany) LOPD (Spain) MeitY (India) MTCS (Singapore) My Number (Japan) 	<ul style="list-style-type: none"> National Information Assurance (Qatar) NZ CC Framework (New Zealand) PASf (UK) PDPA (Argentina) Personal Data Localization (Russia) TRUCS (China) ^ℹ VCDDPA (US-Virginia)

Important:

- Do not create your own standards unless necessary. Leverage existing first.
- Some common ones. ISO 27017/18, SOC, CSA-STAR, MTCS
- SOC2 Type 2 reports provides a lot of information about the service

<https://learn.microsoft.com/en-us/compliance/regulatory/offering-home>

Challenges with Procurement

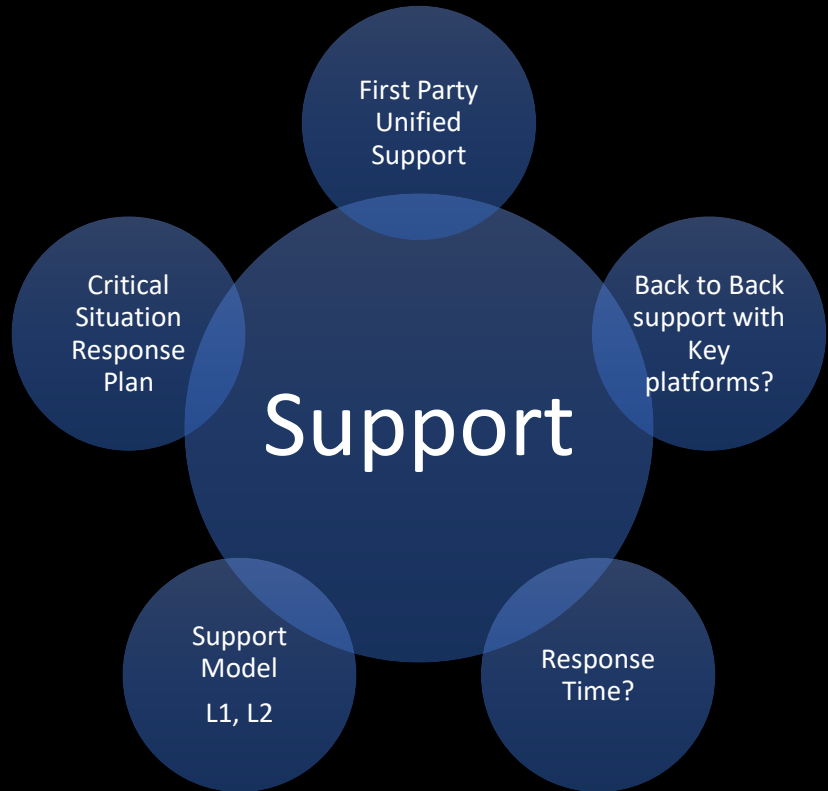


Important:

- Modernize procurement practices.
- Use the utility-based model - PAYGO
- Leverage licensing advantage, Savings plans, Reservations..etc
- Focus on project/application/professional services
- Leverage your Enterprise agreement where possible



Challenges with Support



Important:

- Establish chain for line of support
 - Partners? Principals?
- Ensure you are always in a supported architecture / setup by the principal
- Not every CSP support statement is the same. Ensure principals have back to back.



E.g. Redhat – Microsoft Joint Engineering and Support ([Click Here](#))

- Integrated enterprise-grade support spanning hybrid environments. Customers will be offered cross-platform, cross-company support spanning the Microsoft and Red Hat offerings in an integrated way, unlike any previous partnership in the public cloud. By co-locating support teams on the same premises, the experience will be simple and seamless, at cloud speed.

Another similar is Oracle on Azure

Cloud Adoption Framework

<https://docs.microsoft.com/en-us/azure/cloud-adoption-framework/strategy/>

Define and document motivations

Meet with key stakeholders and executives to document the motivations behind cloud adoption

<https://docs.microsoft.com/en-us/azure/cloud-adoption-framework/strategy/motivations>

Document business outcomes

Engage motivated stakeholders and executives to document specific business outcomes

<https://docs.microsoft.com/en-us/azure/cloud-adoption-framework/strategy/business-outcomes/>

Evaluate financial considerations

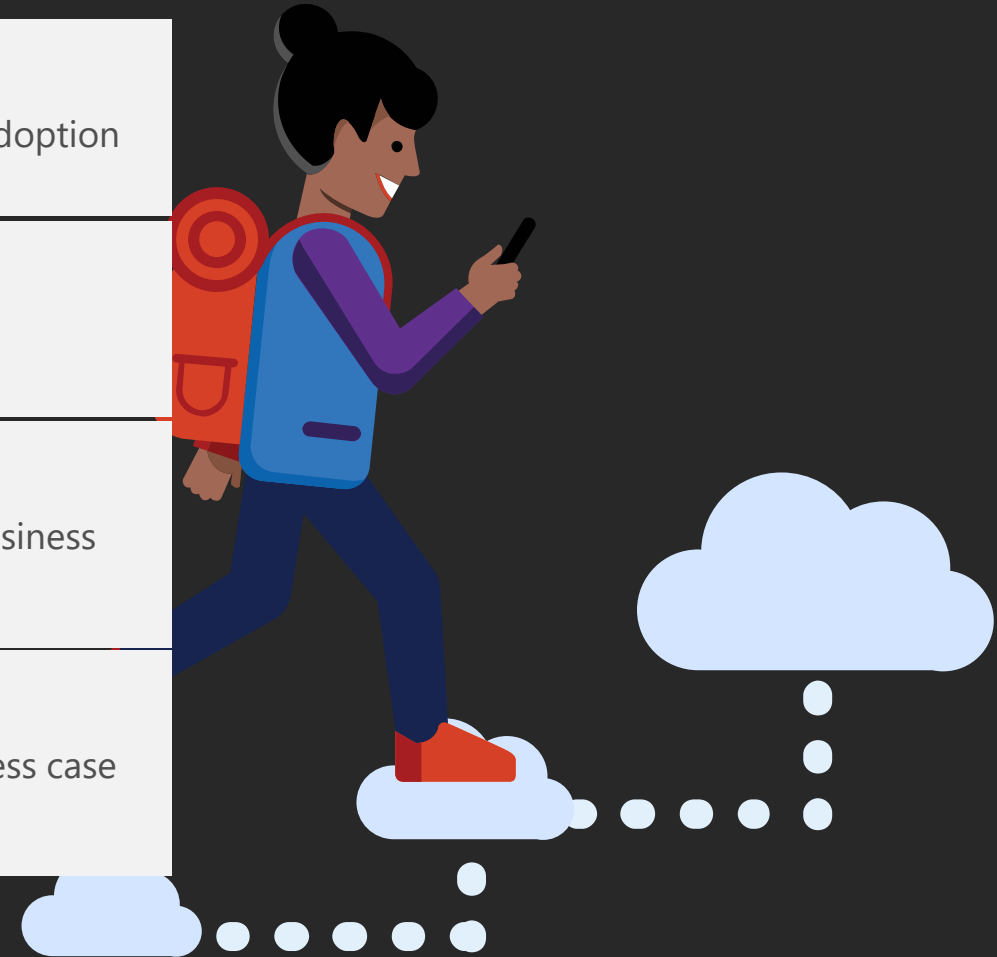
Learn how to use the cloud to make your IT cost structure more flexible. Then, build a business case to adopt the cloud.

<https://docs.microsoft.com/en-us/azure/cloud-adoption-framework/strategy/financial-considerations/>

Understand technical considerations

Discover the technical flexibility, efficiencies, and capabilities that help you build a business case to adopt the cloud

<https://docs.microsoft.com/en-us/azure/cloud-adoption-framework/strategy/technical-considerations/>



Use the Cloud Adoption Strategy Evaluator assessment – build a business case to enable the cloud journey

<https://docs.microsoft.com/en-us/assessments/?mode=pre-assessment&id=8fefc6d5-97ac-42b3-8e97-d82701e55bab>

Strategy and Planning Template

<https://raw.githubusercontent.com/microsoft/CloudAdoptionFramework/master/plan/cloud-adoption-framework-strategy-and-plan-template.docx>

Motivations / Drivers

When thinking motivations/drivers; keep in mind:

- Industry Trends / Forces
- Organization strategy / Imperatives / Vision
- Innovation opportunities
- Optimization opportunities

Some example adoption motivations/drivers

Public Pressure to modernize and digitize

Losing Young Talents - Retain talents within Public service

Expiration of data center contract, and limited compute growth capacity

Compliance with Architectural Standards

Manage costs of compute -> Pressure to stretch public dollars, and also better spending forecasts

Political pressure to increase response velocity

Adoption goals

Some example adoption goals

Access to leading ICT capabilities

Develop better solutions to improve citizen and businesses services and experiences

Achieve and maintain compliance to design standards

Achieving Secure Access & connectivity with Central Visibility

Better financial economics and planning

(Reduce / remove Capex, Go Opex)

Resource savings

(\$\$\$ but Human Resources too)

Facilitate innovations and speed up go to market

Grow and retain talent pool

5 Year Adoption Directive/Mandate

All applicable systems are to move into CC within 5 years.

Year 1 to 2 – Lift and Shift (80%), Digital Transformation (20%)

Year 3 to 4 – Lift and Shift (20%), Digital Transformation (80%)

Year 5 – Digital Transformation Only

Significant Change in directions

New Solutions -> Cloud First. At SRB - "WHY NOT CLOUD".

Existing Solutions -> Classification review exercise.

Some Suggestions

Executive Directions (Most important)

Cloud first strategy – Executive Directions are most important

Establish a steering committee to drive it

Target Milestones and create pressure

Leadership establishes targets and metrics for organization on cloud adoption, review on 1/2 yearly basis.

New Solutions - Go Cloud First

Where possible, all solutions being sourced, acquired or built, to budget and operate cloud first.

Technical Feasibility on existing

Set goals and targets for aggressive move to cloud – to maximize costs economics and benefits

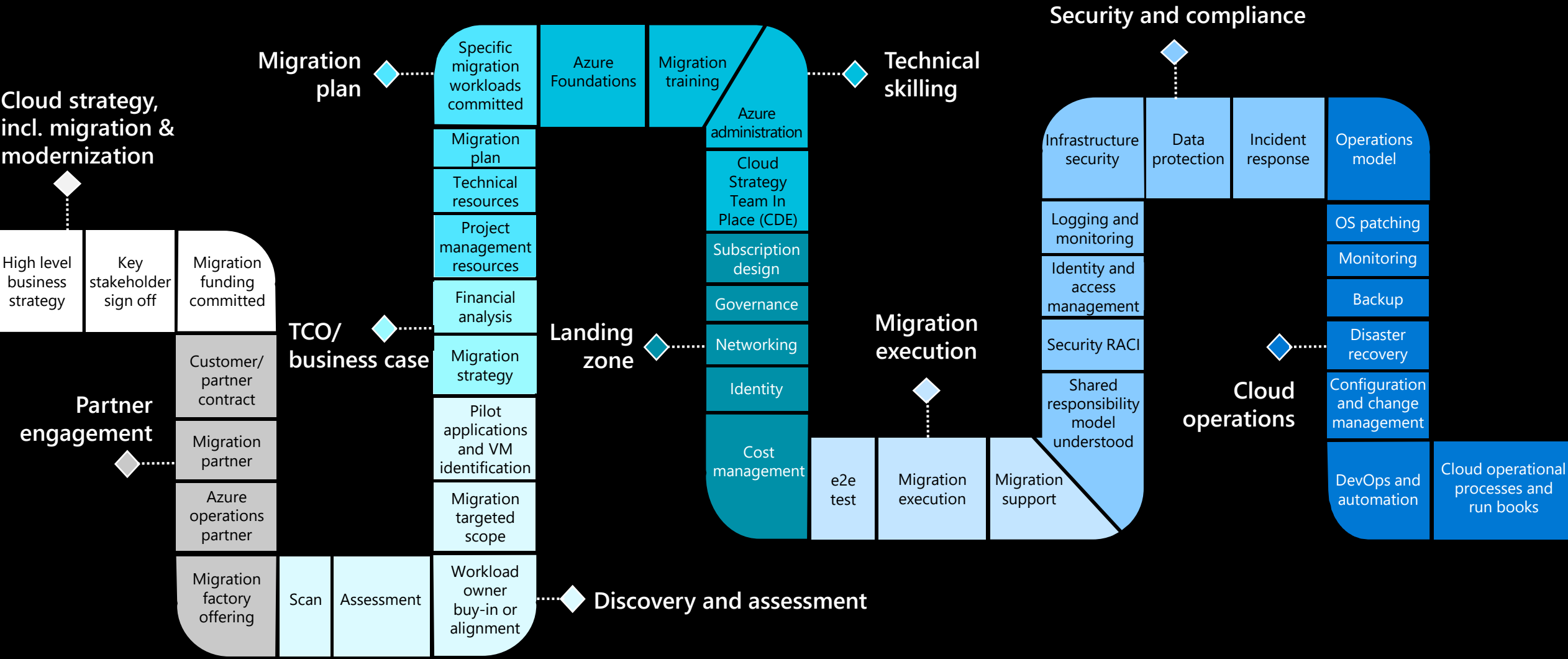
Conduct technical study and feasibility on adoption approach (technical, impact, change efforts). Consolidate where possible

Enablement / Skilling / Innovation and Rewards

Aggressive skilling plans. Define learning metrics and measurements. Drive Innovations throughout organizations and rewards where feasible.

No migration or modernization is linear or simple...

Drawn from 1000s of engagements by FastTrack for Azure



Key programs to help you move with confidence



Well Architected Framework
Microsoft Cloud Adoption Framework

Proven guidance to accelerate your cloud adoption journey



Azure Migration Program
FastTrack for Azure

Best practices and resources, including Azure engineering and specialized partners



Azure Migrate
Azure Arc
Azure Automanage

Tools and automation to drive efficiencies and management capabilities

Use Azure Migration and Modernization Program

Get expert help migrating and modernizing
your apps, data, and infrastructure



Proven
guidance



Cost
effective



Technical
skill
building



Free
migration
tools



In-depth
assistance



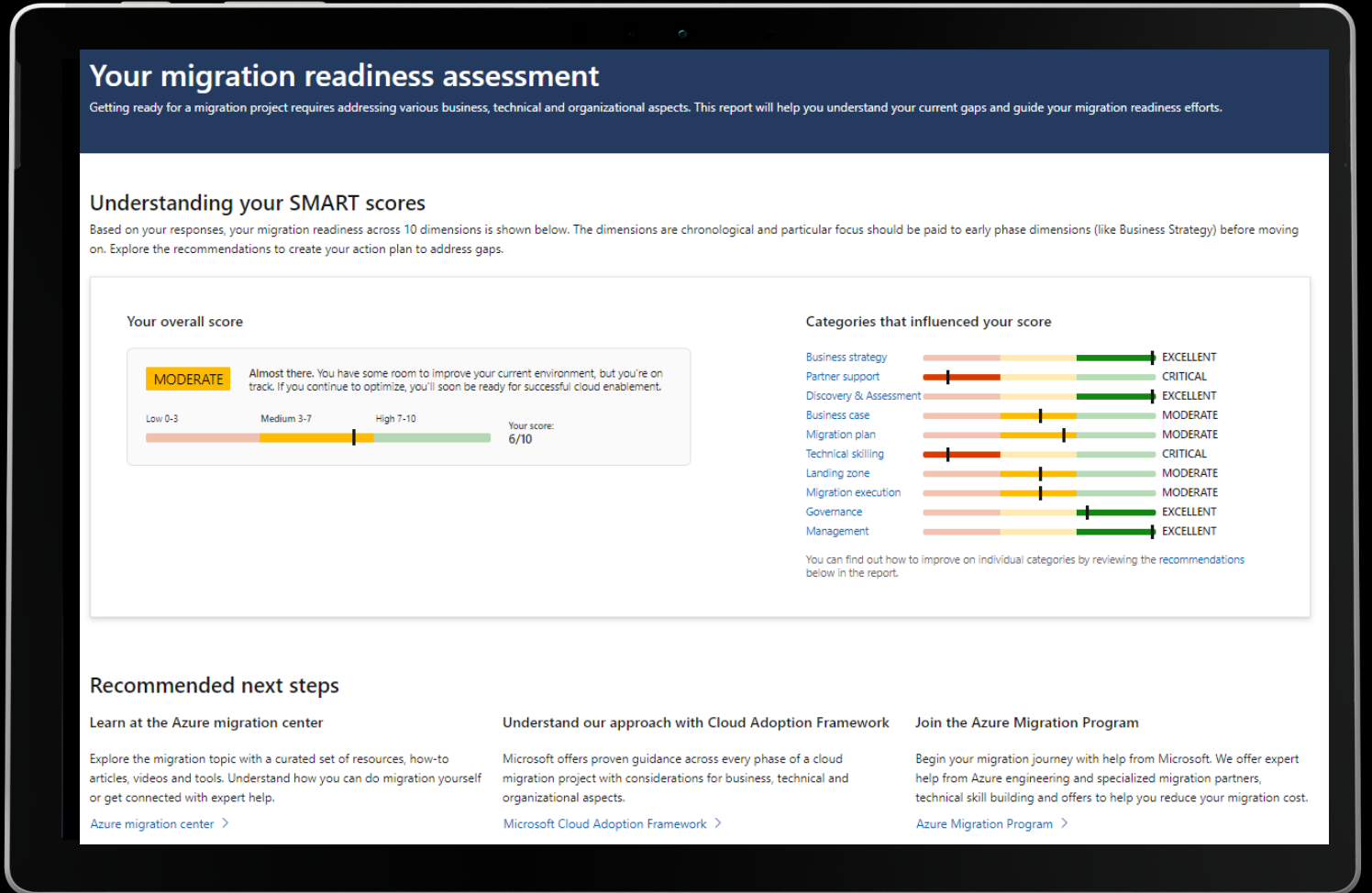
Expert
help

Learn more | azure.com/AMP

Your migration readiness assessment

Be SMART
migrate
with a plan

<https://aka.ms/smarttool>



Explore the Azure Migration and Modernization Program

Flexible to meet your unique needs. Cost-effective to meet your budget.

1

Sign up

Tell us about your project at Azure.com/AMMP.

2

Learn more

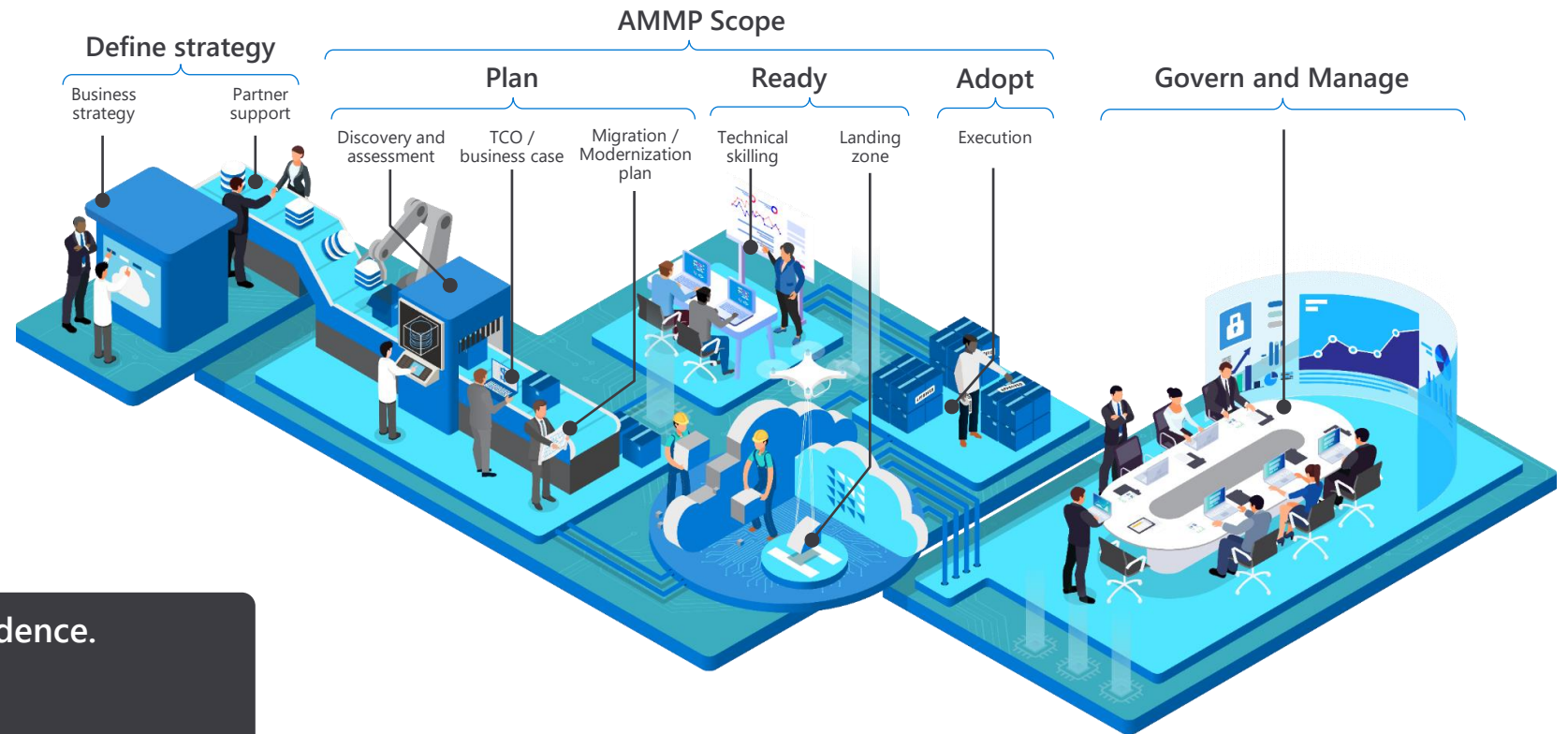
A Microsoft expert will define the right mix of resources and advise you on next steps.

3

Migrate or modernize and maximize your ROI

We will help you assess your migration and modernization projects. In addition, we'll provide you with guidance to ensure your workloads are secure, well-managed and kept cost-optimized on an ongoing basis.

Get help at every stage of your cloud migration and modernization journey



Let's move forward together with confidence. We're here to help at every step.

➔ [Sign up at Azure.com/AMMP](https://Azure.com/AMMP)

Defining migration strategies

Applications | Data | Infrastructure

Migrate and modernize

Rehost Refactor Rearchitect

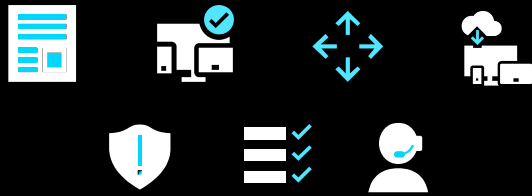
Cloud-native

Rebuild/New

Software as a service

Replace

IT-oriented triggers
(driven by timelines)



Migration

Operational efficiency,
enhanced security, scale

Application-oriented triggers
(driven by application prioritization)



Modernization

Innovation,
productivity, scale

Migration paths

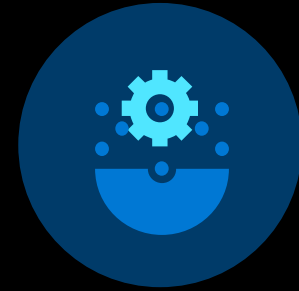
Best practices to accelerate cloud migration



**Prioritize
assessments**



**Anticipate and
mitigate
complexities**



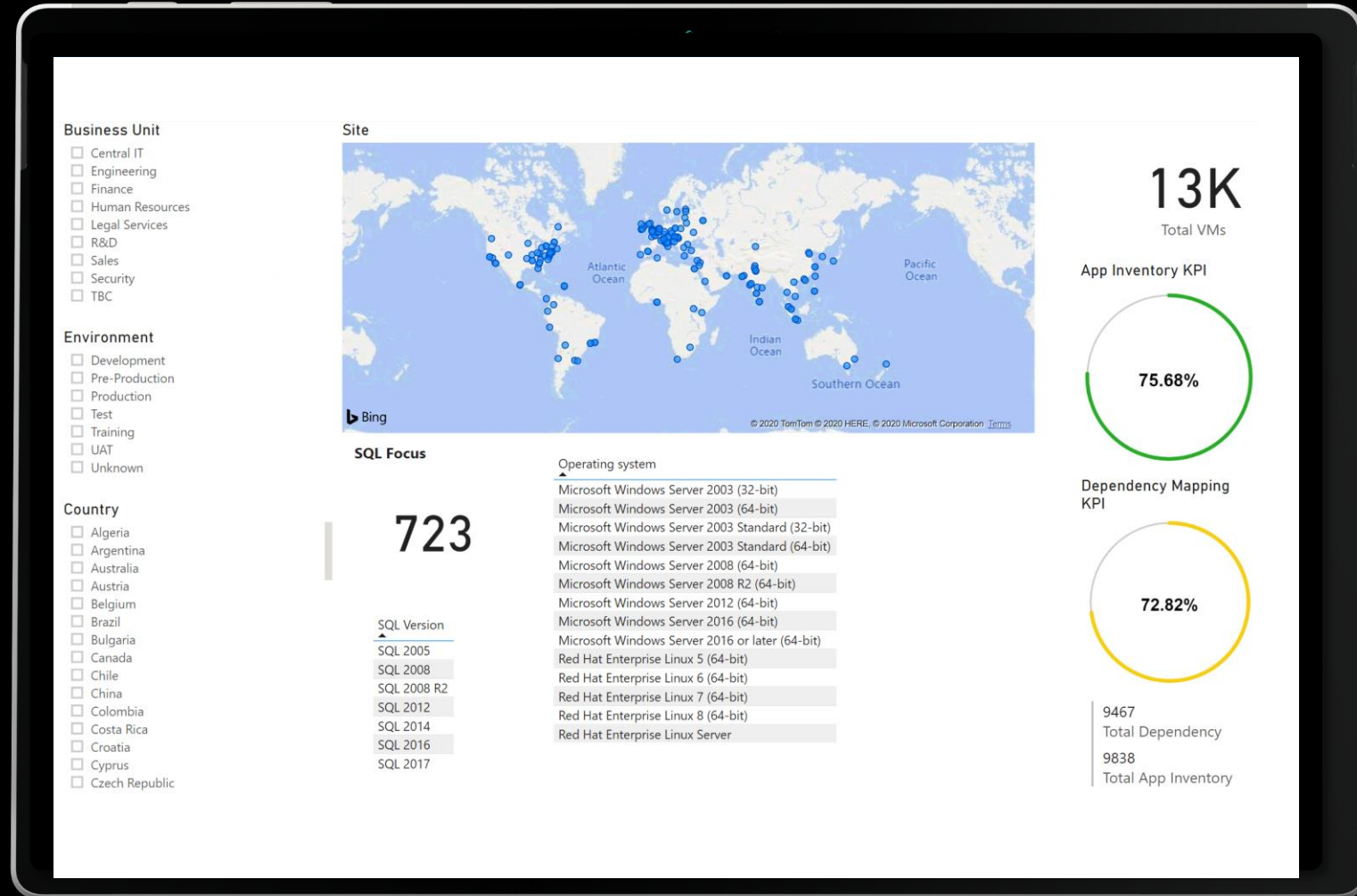
**Execute
iteratively**

Prioritize assessments:

Identify quick wins among discovered servers

Aggregate/Visualize discovered assets centrally to inform migration planning across multiple business units and datacenters

Infrastructure that's due for hardware refresh, software end-of-support, OS end-of-support, or capacity constrained are great 'quick win' candidates

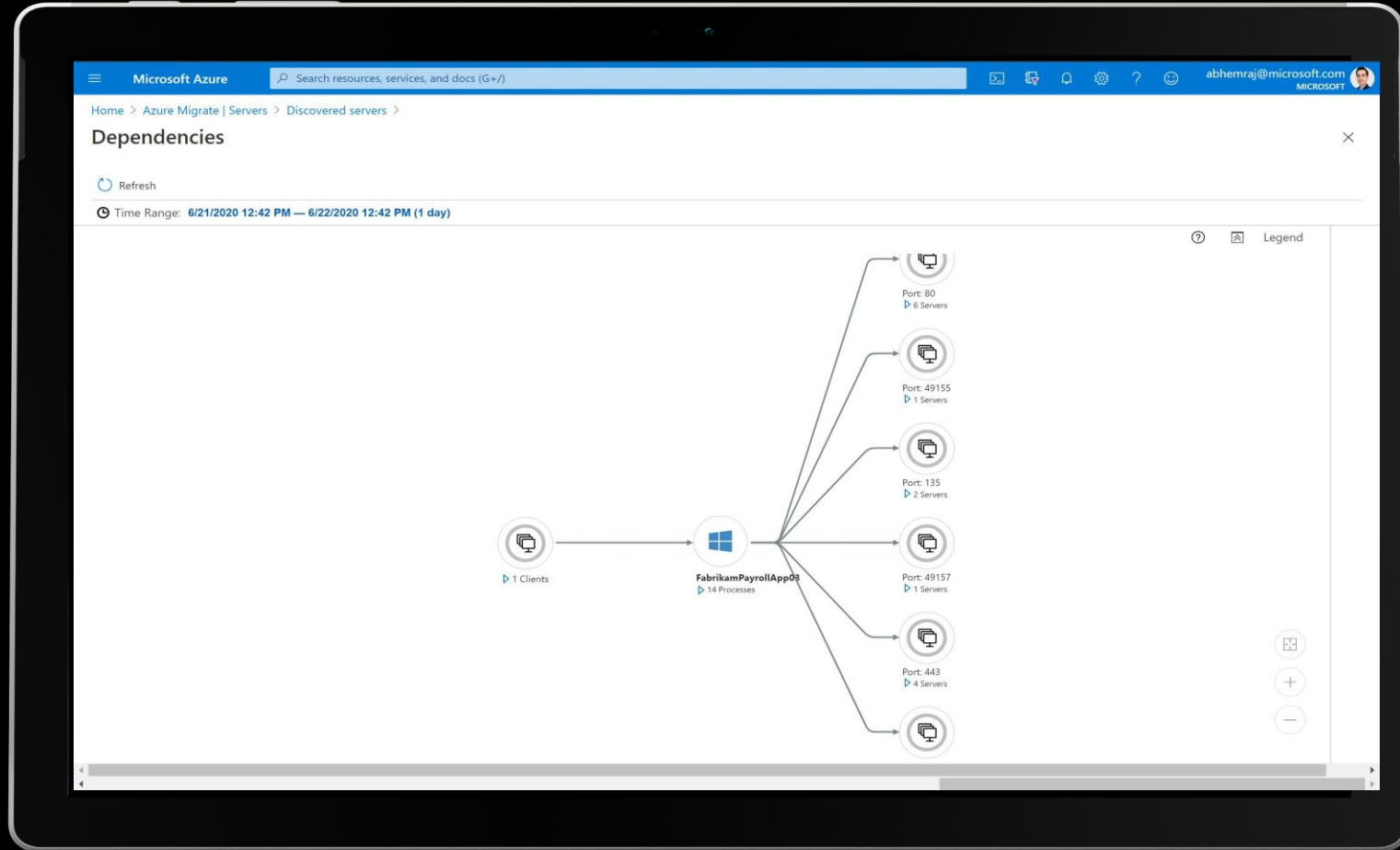


Prioritize assessments:

Gain rich right-sizing and app dependency insights with Azure Migrate

Right-size Azure resources based on utilization and performance history of your on-premises workloads

Use agentless dependency mapping to ensure no application component is left behind during the migration



Anticipate and mitigate complexities:

Alignment is key



Executive Sponsorship

Secure top down support to drive organizational change



Stakeholder Alignment

Align application owners, IT & security/compliance teams



Partner Engagement

Identify expert partners and engage them early-on

Anticipate and mitigate complexities:

Landing zone



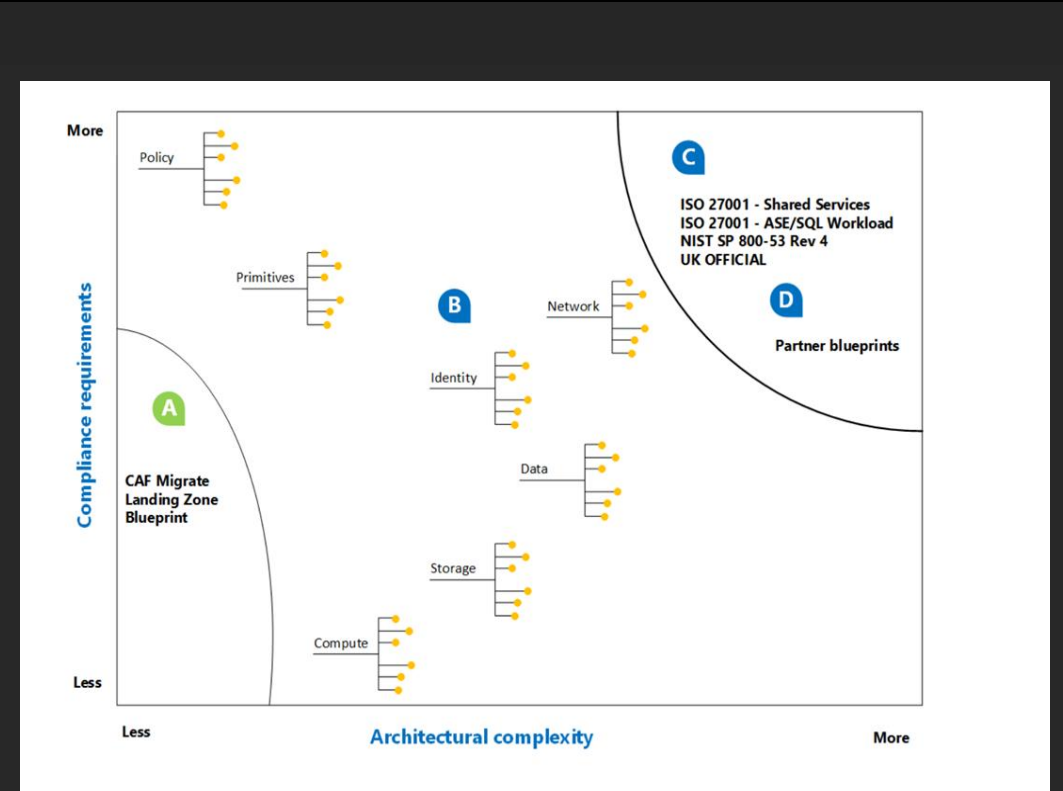
Your applications and workloads need a robust foundation as they move to Azure



Ensure greater agility, compliance with enterprise requirements, and success with scale migration efforts



Use Cloud Adoption Framework (CAF) for Azure: [Enterprise-scale Landing Zone architecture](#) & [reference implementation](#)



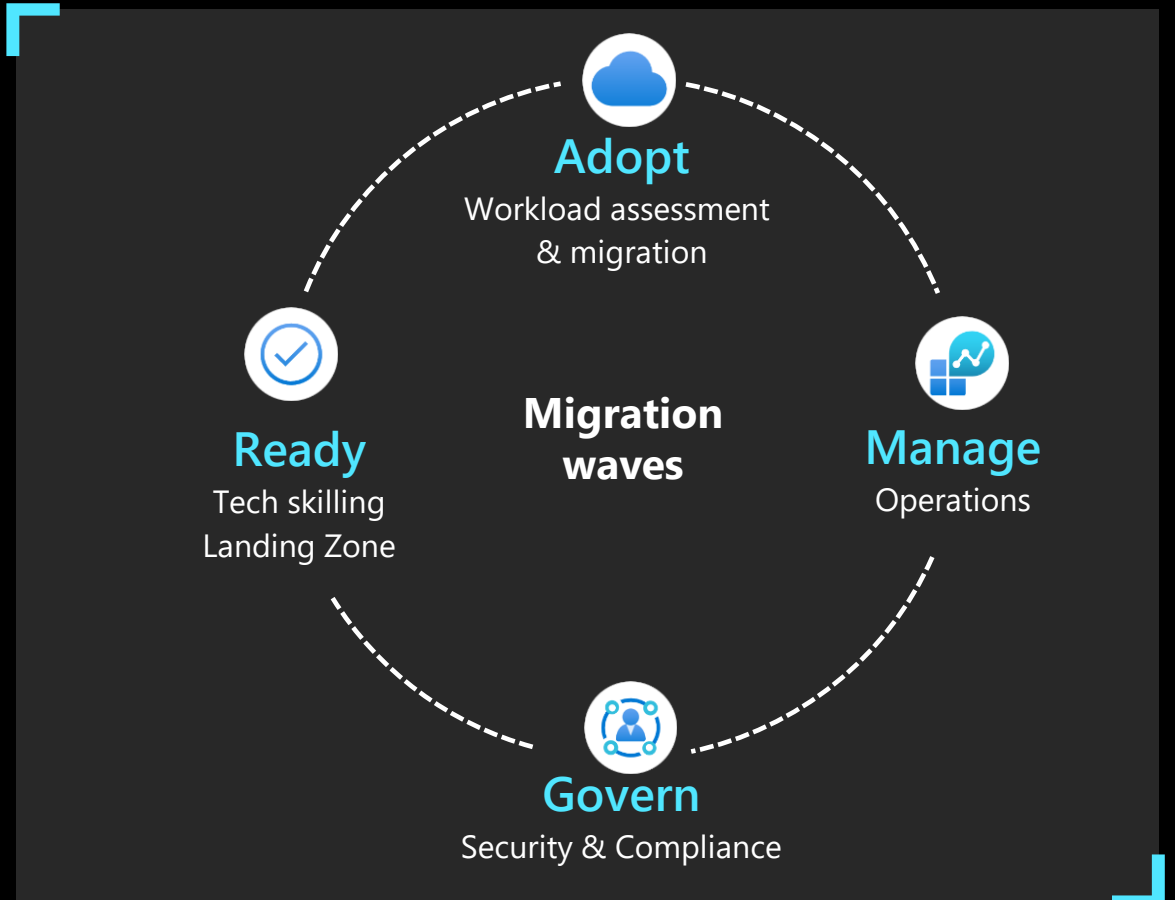
Landing Zone schema (illustrative)

Execute iteratively:

Move workloads in waves, ensure they are well-managed and cost-optimized

Migration plan

Priority workloads | Timelines
Migration approach (IaaS vs. PaaS) |
Tech resources



Azure Migrate | Azure Backup | Azure Monitor | Azure Security Center | Azure Arc
Azure Cost Management | Azure Blueprints | Azure Policy | Azure Advisor

Cloud Migration and Modernization Strategies

Rehost



Refactor



Rearchitect



Rebuild



Description

Redeploy as-is to cloud

Minimally alter to take better advantage of cloud

Materially alter/decompose application to services

New code written with cloud native approach

Drivers

- Reduce Capex
- Free up datacenter space
- Quick cloud ROI

- Faster, shorter, updates
- Code portability
- Greater cloud efficiency (resources, speed, cost)

- App scale and agility
- Easier adoption of new cloud capabilities
- Mix technology stacks

- Accelerate innovation
- Build apps faster
- Reduce operational cost

Technologies

IaaS

Containers
PaaS

PaaS
Serverless
Microservices

Assess

Plan & Strategize

Migration

Target Services

Assess VMs & Apps

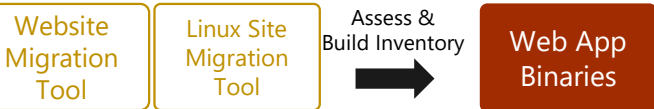
online only



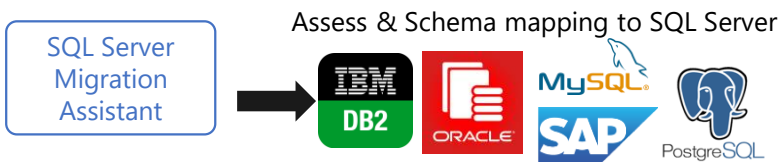
online/offline



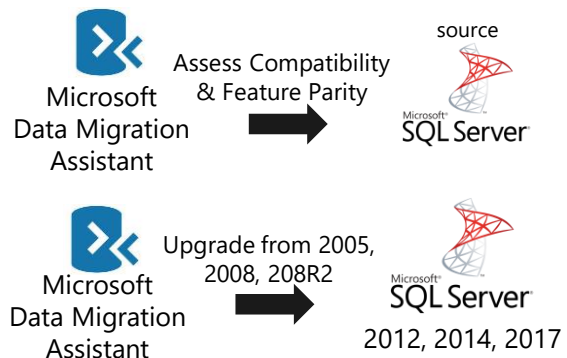
web apps only



Assess Non-SQL Servers

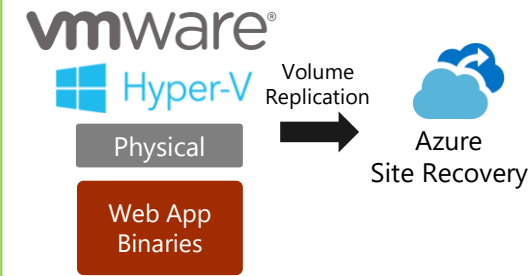
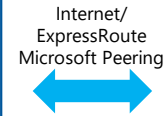


Assess SQL Servers/Upgrade Legacy SQL Server



- Build an inventory
- Plan the systems to migrate based on Inventory
- Consider Rehost, Replatform, Rearchitect and Rebuild strategies for each system shortlisted for migration
- Plan for migration in phases
- Decide for systems that can afford downtime or mission-critical
- Consider external interfacing systems
- Identity Management for the systems, ways that users authenticate and access the systems in Azure
- Consider licenses mobility
- Plan for Azure & on-premise co-existence
- Design Azure architecture for each shortlisted system
- Establish Azure training plans and certification paths
- Define IT team roles & structure to govern Network, Compute, Storage & PaaS services

Migrate Rehosted VMs & Apps



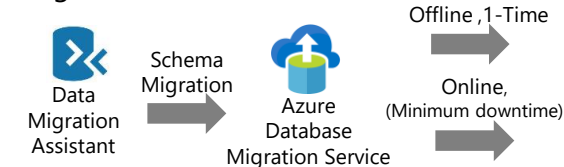
Deploy Replatform/Rearchitect VMs & Apps



Migrate Non-SQL Server



Migrate SQL Servers



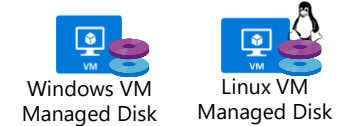
Offline Data Migration



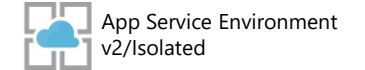
Migrate Rehosted Oracle, DB2, My, SAP ASE



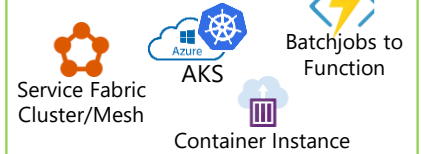
Rehost VMs & Apps



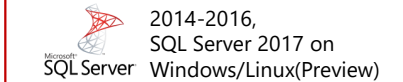
Replatform with PaaS



Rearchitect with PaaS



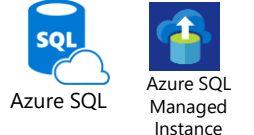
Rehost Non-SQL Server to VM SQL



Replatform to PaaS DB



Replatform with PaaS



Azure Storage



Database in VMs



Migration Tools and Services

- Tools for managing different stages of an Azure migration



- Microsoft solution providers



<https://azure.microsoft.com/en-us/migration/partners/>

Some important resources/info

- Trust Center (Security, Privacy, Compliance) - <https://www.microsoft.com/en-us/trust-center/product-overview>
- Government Security Program - <https://www.microsoft.com/en-us/securityengineering/gsp>
- Cyber Defence Ops Center - <https://www.microsoft.com/en-us/msrc/cdoc>
- Azure Cloud Adoption Framework - <https://learn.microsoft.com/en-us/azure/cloud-adoption-framework/>
- CAF Strategies and Assessments (Tools and Templates) - <https://learn.microsoft.com/en-us/azure/cloud-adoption-framework/resources/tools-templates>
- CISO Workshop Training - <https://learn.microsoft.com/en-us/security/ciso-workshop/the-ciso-workshop>
- CISO Cyber Security Briefing - <https://learn.microsoft.com/en-us/security/ciso-workshop/ciso-workshop-module-1>
- Training and Skills building - <https://learn.microsoft.com/en-us/>

- Azure well architected framework - <https://learn.microsoft.com/en-us/azure/architecture/framework/>
 - Reliability, Security, Cost Optimization, Operational Excellence, Performance Efficiency

Lastly, connect with your local Microsoft Account Team.
email me (dchung@microsoft.com)

THANK YOU