

Cloud migration for Higher Education

Fantasy, pipe dream or nightmare

A deeper look at the realities and challenges of migrating workloads to the cloud

- A (brief) personal story - My journey from sceptic to enthusiast
- LBS' story – Where we were, where we are
- Unintended benefits – Beyond the business case
- Resources to help – Funding and training
- Future unlocked – What's next for us

Poll – by show of hands

% of Workload or billing

- Option 1 – All on-prem (or in managed data centre)
- Option 2 – Some , but less than 25% in Cloud
- Option 3 – Between 25% and 75% in cloud
- Option 4 – More than 75% running in cloud

Follow up Poll – again by show of hands

Cloud adoption future

- Option 1 – No intent to migrate
- Option 2 – Some presence, but no active project
- Option 3 – In flight project or cloud-first strategy
- Option 4 – Already there

Our Data Centre ?



Fantasies, marketing and sales

I can reduce staff costs

Cloud is more secure

Cloud is faster

Cloud is **cheaper**

Everything is resilient
because it's in cloud

Cloud can't be hacked

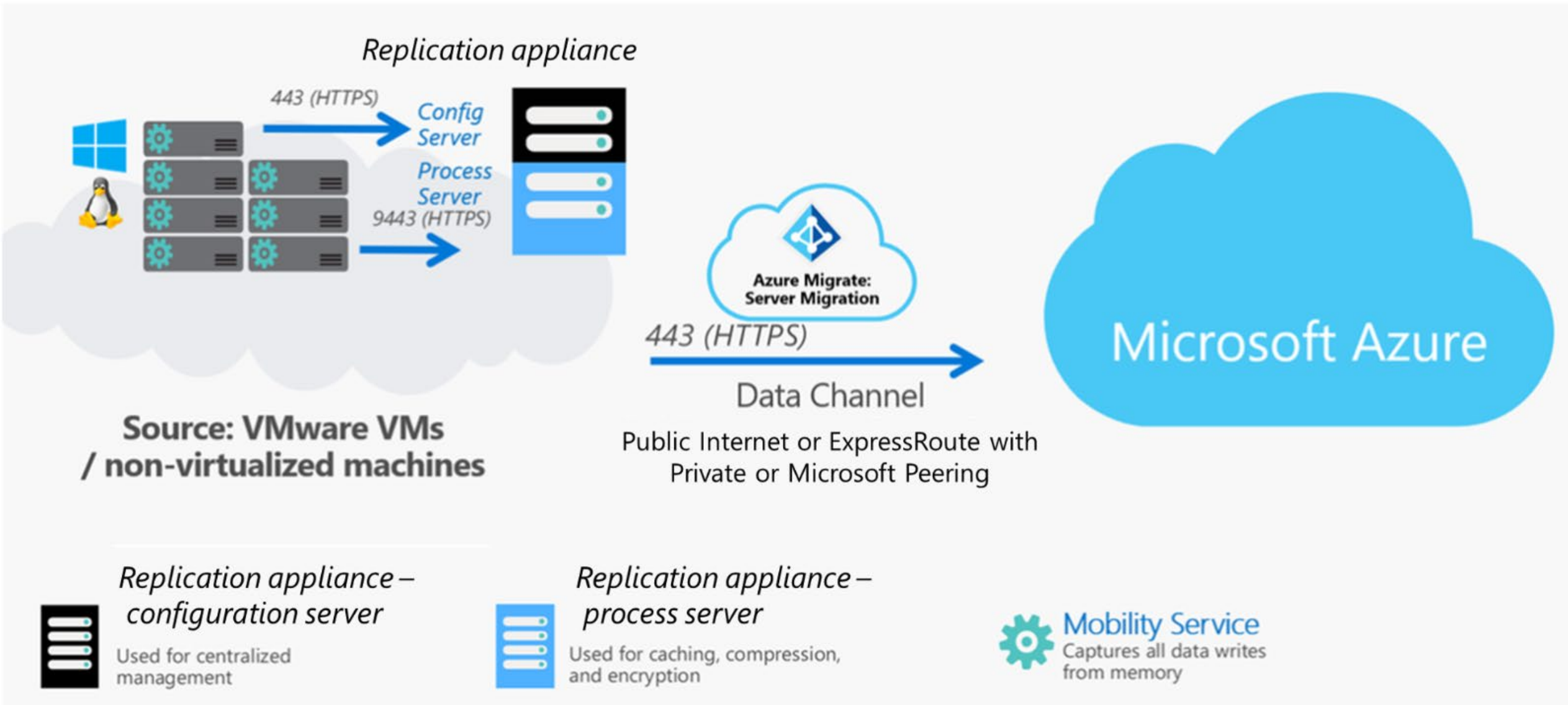
Cloud scaling is infinite

Everything is backed up

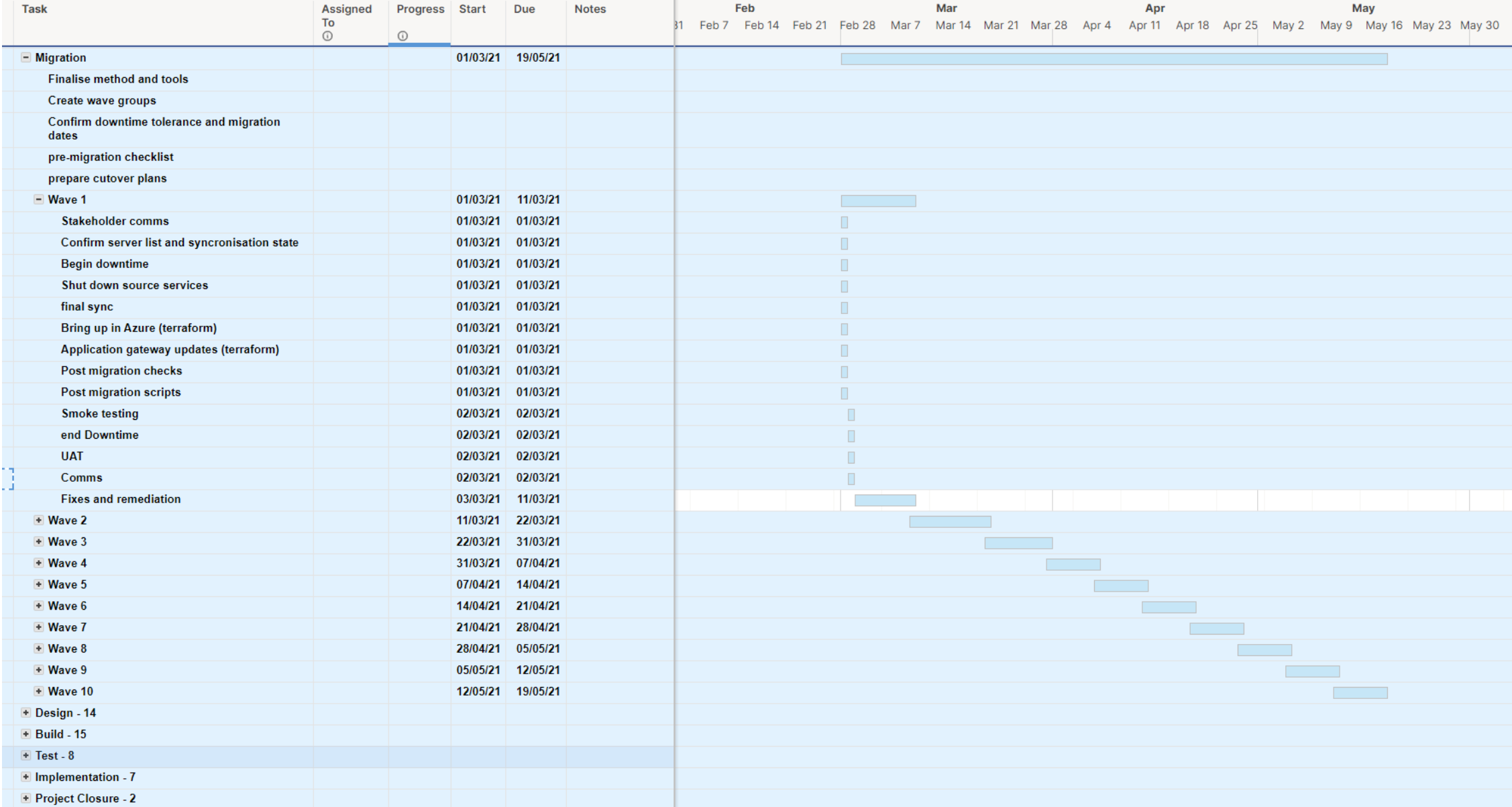
Challenges of cloud migration

	HE	All
Complexity of business and operational change	●	●
Security and compliance	●	●
Legacy applications	●	●
Regulatory (data sovereignty)	●	●
IPv4 address space migration	●	
Stakeholder engagement	●	●
Re-training costs	●	●

The core technology for migration



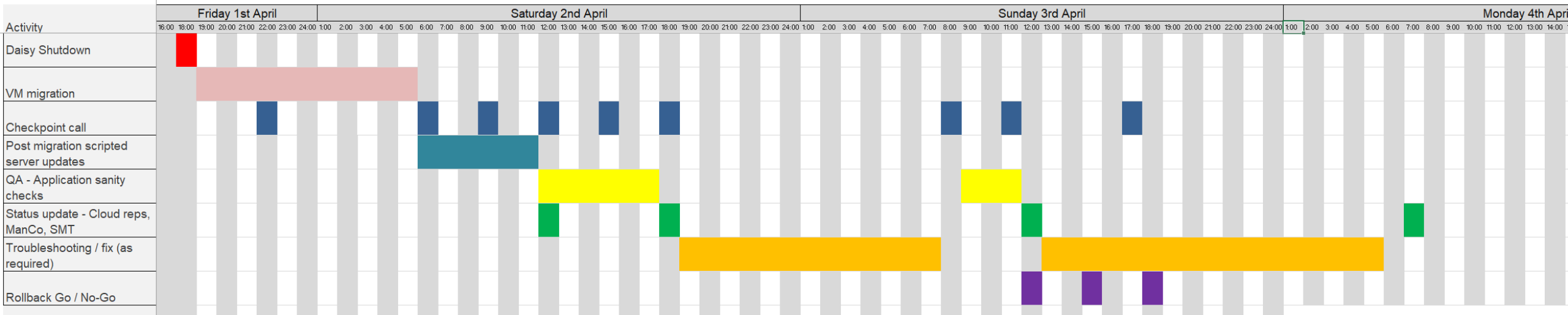
London Business School's original cutover plan



London Business School's final cutover plan

Migration timeline

Start date:	02/04/2022
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Business case delivery

- Close the legacy data centre
- De-risk the estate (aging hardware)
- Position for future maturity
- Cost neutral
- Break the cap-ex cycle (servers, storage, network, security)
- Access to improve application performance

Unintended / not promised consequences

Infrastructure as code

Azure DevOps azurereleasemanager / londonedu-infrastructure / Repos / Commits / londonedu-infrastructure-v2

Search

dlapps and usite11 sites change ip

14f87aba Huzalfah Balesaria committed Friday

Files Details

Parent 1 → This commit Filter agw-hub-liv-ext.tf -4 +4 /terraform/AGW/agw-v2/agw-hub-liv-ext.tf

Side-by-side

londonedu-infrastructure-v2

terraform/AGW/agw-v2

agw-hub-liv-ext.tf

agw-hub-liv-int.tf

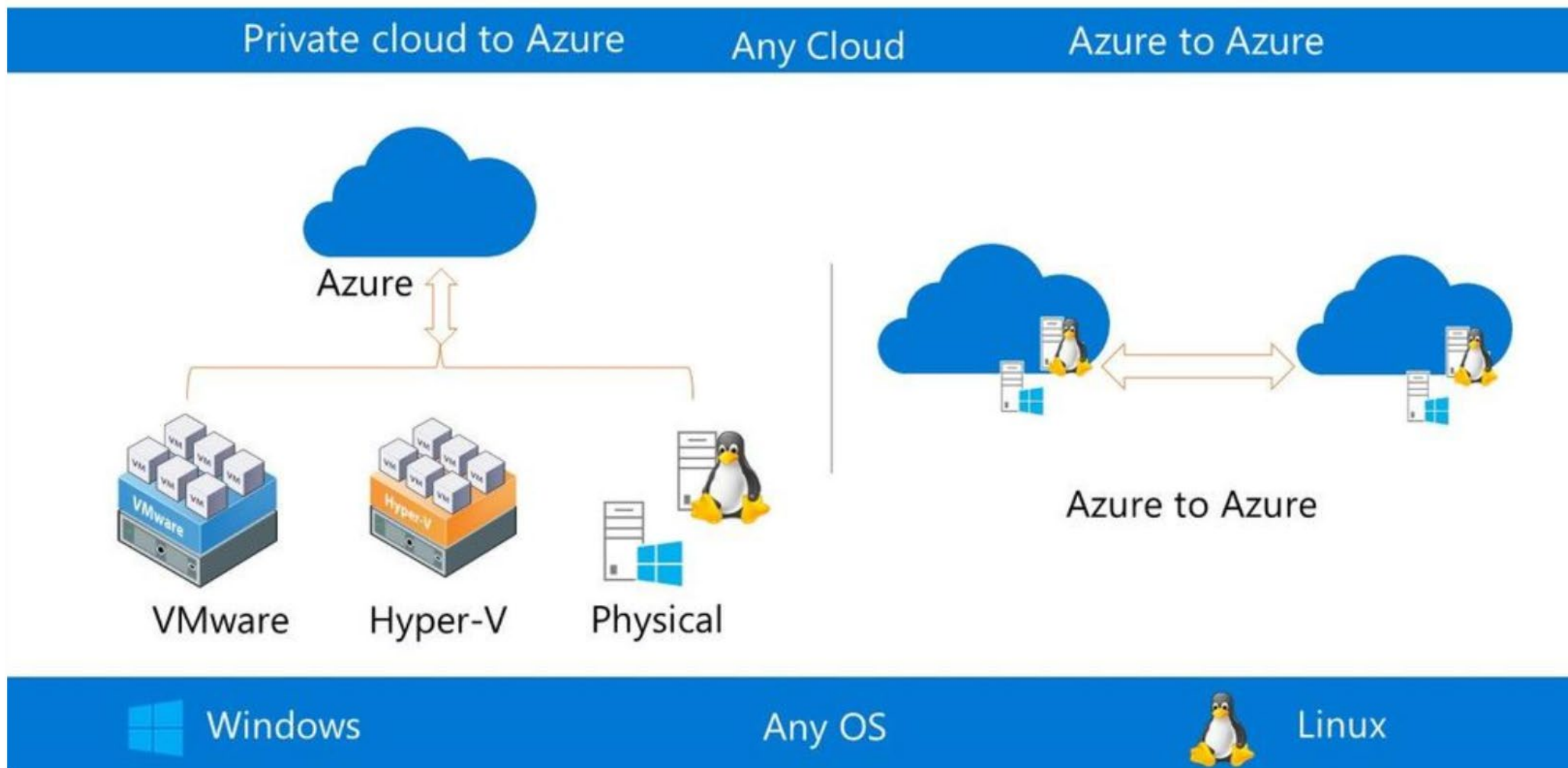
```
1 locals {
2   external_agw_name = "agw-${local.region-short}-hub-liv-ext"
3   external_subnet_id = var.agw_liv_ext_subnet_id
4   external_public_ip_address = var.agw_liv_ext_pip
5 }
6
7 resource "azurerm_application_gateway" "agw-hub-liv-ext" {
8   name = local.external_agw_name
9   location = var.location
10  resource_group_name = "rg-${local.region-short}-hub-agw-liv-ext"
11  tags = local.default_tags
12
13  # NOTE: Instruct Terraform to ignore changes to tags after the initial deployment.
14  # : This is to improve the SNR of the 'terraform plan' output.
15  # lifecycle {
16  #   ignore_changes = [
17  #     request_routing_rule,
18  #     tags,
19  #   ]#
20  # }
21
22  identity {
23    type = "UserAssigned"
24    identity_ids = [var.agw_msi_id]
25  }
26
27  sku {
28    name = "WAF_V2"
29    tier = "WAF_V2"
30    capacity = 2
31  }
32
33  waf_configuration {
34    enabled = true
35    firewall_mode = "Detection"
36    rule_set_type = "OWASP"
37    rule_set_version = "3.0"
38  }
39
40  gateway_ip_configuration {
41    name = "${local.external_agw_name}-ip-configuration"
42    subnet_id = local.external_subnet_id
43  }
44 }
```

```
1 locals {
2   external_agw_name = "agw-${local.region-short}-hub-liv-ext"
3   external_subnet_id = var.agw_liv_ext_subnet_id
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42    subnet_id = local.external_subnet_id
43  }
44 }
```

Unintended / not promised consequences

Disaster Recovery

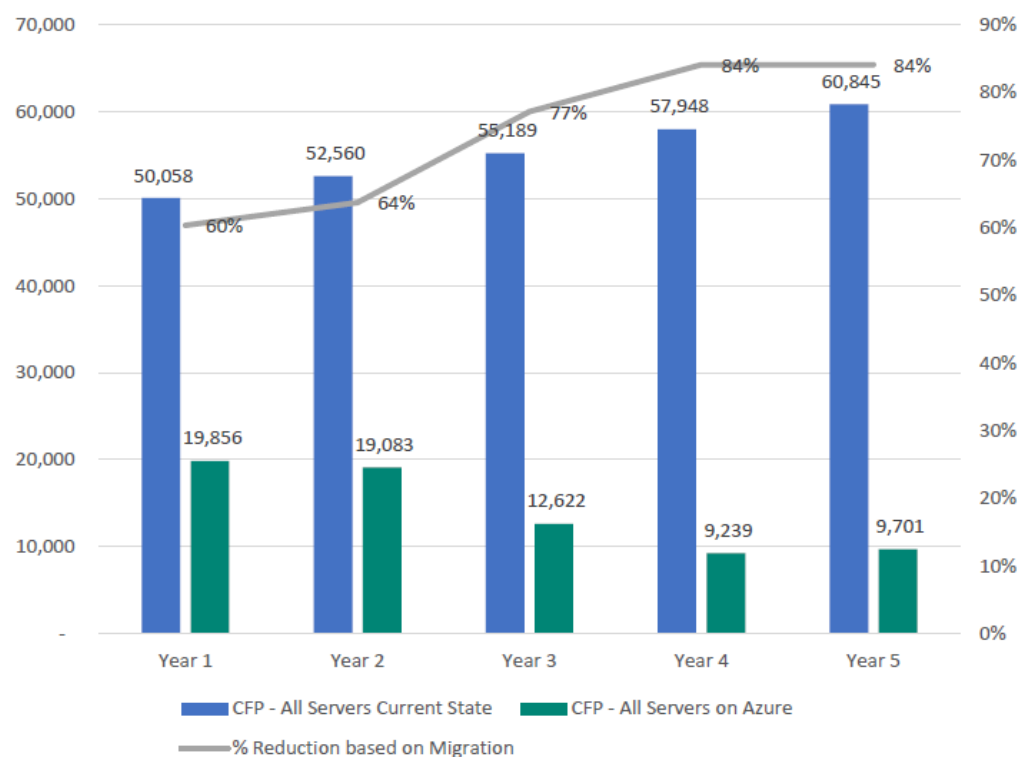
Azure Site Recovery



Unintended / not promised consequences

Sustainability proposition (courtesy of MS assessment)

Your Carbon Footprint – On-premise Vs Azure



On average over the next five years if you stayed on Premise, you would need 64 acres (about the area of The Vatican), of forest to absorb the carbon generated



You could drive on an average 22.4K miles in a passenger car



Using the average year, you could charge 6.7M mobile phones

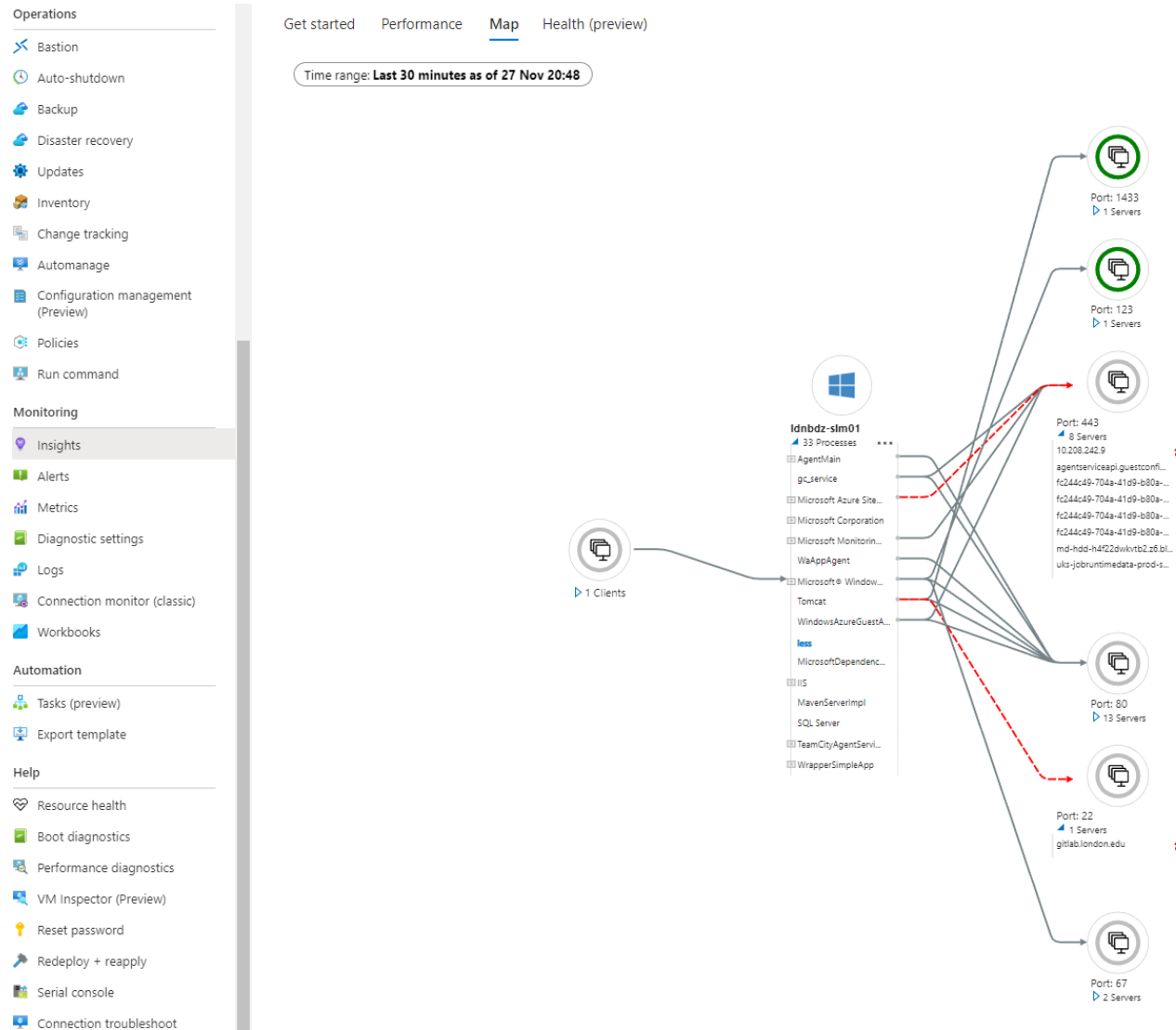
Unintended / not promised consequences

Greatly improved monitoring from analytics



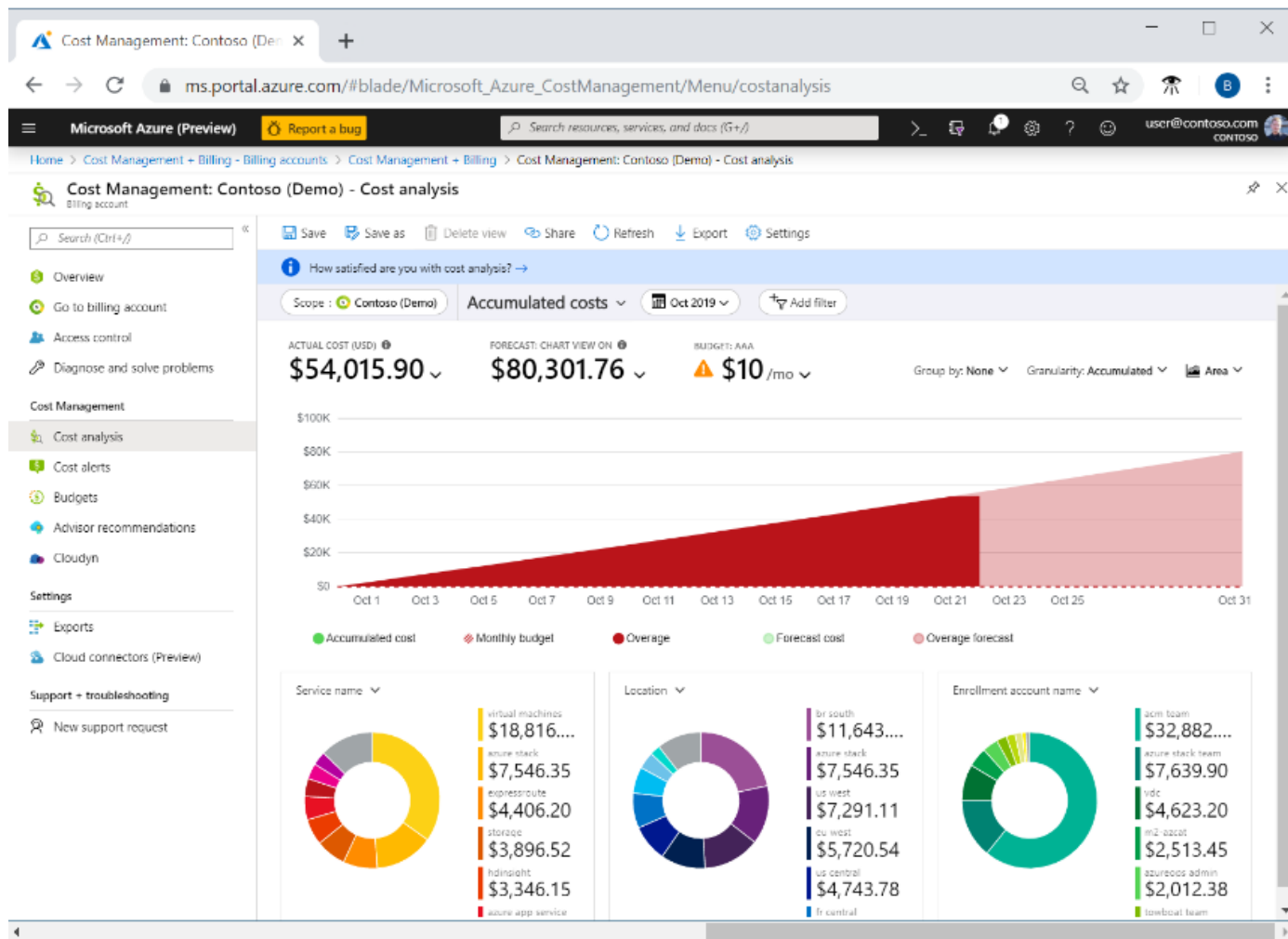
Unintended / not promised consequences

Greatly improved insights for troubleshooting



Unintended / not promised consequences

Cost visibility and prediction



Unintended / not promised consequences

Change Management

Unintended / not promised consequences

Further change management / Searchable infrastructure

Completed !1749 H8 Huzaifah Balesaria 6035-dlapps-usite11 into main

Overview Files Updates Commits

All Changes Filter agw-hub-liv-ext.tf -4 +4 /terraform/AGW/agw-v2/agw-hub-liv-ext.tf

Side-by-side

londonedu-infrastructur... :
terraform/AGW/agw-v2
agw-hub-liv-ext.tf
agw-hub-liv-int.tf

```
1699 # host = "gitlab.london.edu"
1700 # path = "/"
1701 # port = 443
1702 # protocol = "Https"
1703 # unhealthy_threshold = 3
1704 # interval = 30
1705 # timeout = 5
1706 # match {
1707 #   body = ""
1708 #   status_code = ["200-303"]
1709 # }
1710 # }
1711
1712 #####
1713
1714 # know-how.london.edu
1715 ssl_certificate {
1716   name = "know-how.london.edu-cert2"
1717   key_vault_secret_id = data.azurekey_vault_secret.know-how_london_edu.id
1718 }
1719
1720 backend_address_pool {
1721   name = "know-how.london.edu-bep"
1722   ip_addresses = ["10.209.246.105"] #, "10.214.246.105"]
1723 }
1724 backend_http_settings {
1725   name = "know-how.london.edu-bes"
1726   cookie_based_affinity = "Disabled"
1727   affinity_cookie_name = "ApplicationGatewayAffinity"
1728   port = 443
1729   probe_name = "know-how-london-edu-probe"
1730   protocol = "Https"
1731   host_name = "know-how.london.edu"
1732   request_timeout = 30
1733 }
1734 http_listener {
1735   name = "know-how.london.edu-listener"
1736   frontend_ip_configuration_name = "${local.external_agw_name}-frontend-ip"
1737   frontend_port_name = "${local.external_agw_name}-frontend-port"
1738   protocol = "Https"
```

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1699 # host = "gitlab.london.edu"
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1701 # port = 443
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1710 # }
1711
1712 #####
1713
1714 # know-how.london.edu
1715 ssl_certificate {
1716   name = "know-how.london.edu-cert2"
1717   key_vault_secret_id = data.azurekey_vault_secret.know-how_london_edu.id
1718 }
1719
1720 backend_address_pool {
1721   name = "know-how.london.edu-bep"
1722   ip_addresses = ["163.119.3.105"] #, "10.214.246.105"]
1723 }
1724 backend_http_settings {
1725   name = "know-how.london.edu-bes"
1726   cookie_based_affinity = "Disabled"
1727   affinity_cookie_name = "ApplicationGatewayAffinity"
1728   port = 443
1729   probe_name = "know-how-london-edu-probe"
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1733 }
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1736   frontend_ip_configuration_name = "${local.external_agw_name}-frontend-ip"
1737   frontend_port_name = "${local.external_agw_name}-frontend-port"
1738   protocol = "Https"
```

Microsoft Azure training

Check out the [ESI Azure Training Journey](#)

		Infrastructure and apps		Data & AI		
Courses related to certification	Fundamentals Foundational understanding of technology	Azure Fundamentals (AZ-900)		Azure Fundamentals (AZ-900)	Azure Data Fundamentals (DP-900)	Azure AI Fundamentals (AI-900)
	Role-based Technical skills required to perform a job	Azure Administrator (AZ-104)	Azure Developer (AZ-204)	Azure Database Administrator (DP-300)	Azure AI Engineer (AI-102)	
		Azure Solutions Architect (AZ-305)	DevOps Engineer (AZ-400)	Azure Data Engineer (DP-203)	Azure Data Scientist (DP-100 + DP-090)	
		Azure Security Engineer (AZ-500)	Azure Network Engineer (AZ-700)	Azure Enterprise Data Analyst (DP-500)		
		Azure Stack Hub Operator ¹ (AZ-600)	Windows Server Hybrid Administrator (AZ-800 + AZ-801)	Power BI Data Analyst (PL-300)		
Specialty Deep technical skills managing industry solutions	Azure for SAP Workloads (AZ-120) ¹	Azure IoT Developer (AZ-220)	Azure Cosmos DB Developer (DP-420)			
	Azure Virtual Desktop (AZ-140)	Azure Support Engineer for Connectivity (AZ-720)				
Other courses		Azure Stack HCI (WS-013) ¹		Migrate SQL Workloads to Azure (DP-050) ¹	Migrate NoSQL Workloads to Azure Cosmos DB (DP-060) ¹	
				Migrate Open Source Data Workloads to Azure (DP-070) ¹		

¹Training delivered only by Microsoft Learning Partners

Resources to help

 Microsoft

Delivered in partnership with 

Azure Migration and Modernization Program



Get the help you need to simplify and accelerate your cloud journey. We meet you wherever you are in your cloud journey and help you move forward with confidence.

Cloud migration and modernization assistance that can lower costs and reduce risk

A proven approach for all your needs

- Get support for breadth of migration and modernization scenarios across applications, data, and infrastructure
- Get assistance with assessing your environment and planning your migration to build a robust business case and TCO justification working with expert partners and tools
- Leverage Microsoft's Cloud Adoption Framework and Well Architected Framework for security, governance, data, and networking design

Optimize costs and drive sustainable outcomes

- Brush up cloud skills with subsidized Azure technical training delivered through Microsoft Learning and accredited partners
- Use free tools to move efficiently and stay cost-optimized once on Azure
- Contribute towards environmentally sustainable outcomes while driving operational efficiencies

Move confidently with expert help

- Use prescriptive, step-by-step guidance from Azure engineers and expert partners to mitigate risks and take full advantage of Azure security, scale, and innovation
- Build cloud skills and longer-term organizational readiness with the right mix of learning options
- Access personalized self-guided resources to support your unique needs

Program benefits



Count on a proven methodology and best practices



Access in-depth assistance from FastTrack for Azure engineering



Gain new skills with technical training courses



Receive offers for reducing migration costs



Get free cloud migration tools from Azure



Connect with specialized migration partners

Resources to help

Explore the Azure Migration and Modernization Program

Flexible to meet your unique needs.

Cost-effective to meet your budget.

Get started today

1

Sign up

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

2

Learn more

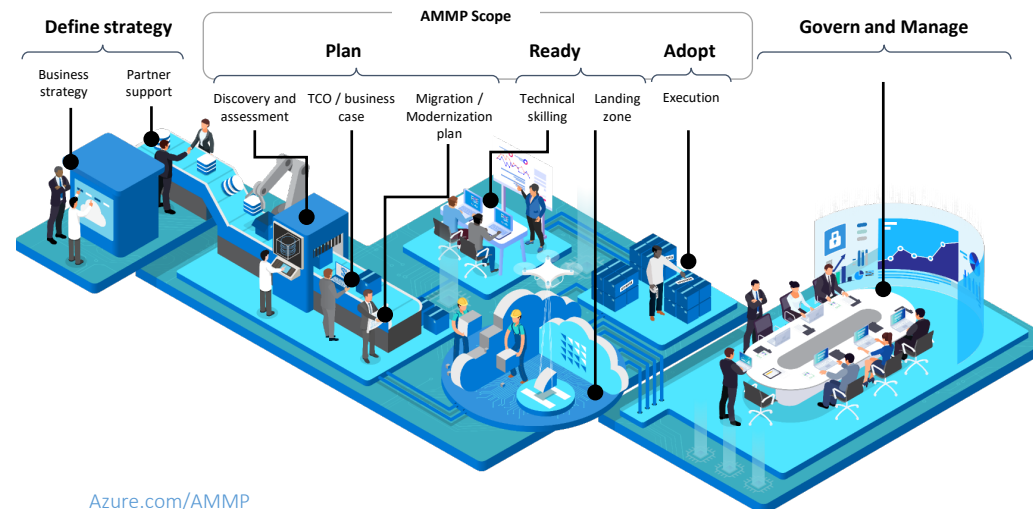
A Microsoft expert will define the right mix of resources and advise you on next steps.

3

Migrate and maximize your ROI

We will help you assess, migrate, and modernize your workloads to Azure. 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 journey



What's next for us

- Environment management – Auto-built, consistent environments
- Maturity on costs – Spin up / down
- A/B testing
- Automation for everything (patching, maintenance)
- Dev-Ops pipelines – Automated regression and functional testing
- Migration to PaaS and going deeper with Azure native function
- Building and developing the multi-skilled teams
- High Performance Compute

Questions ?