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Migration Business Case

Example Corp

Migration Evaluator

November 2024
v2.5.0

Agenda

- Analysis & Insights
- Financial Summary
- Business Value
- Deployment Summary
- Supplementary AWS Services
- Next Steps

Migration Customer Journey

Assess


Rapid discovery


TCO report


Business case
Mig. Evaluator/OLA


Migration Readiness Assessment


Accelerators


Briefings & workshops


Immersion day

Mobilize

Portfolio


Discovery & planning


Migration plan

Migrate


Migration & modernization experience


Skills/center of excellence

People

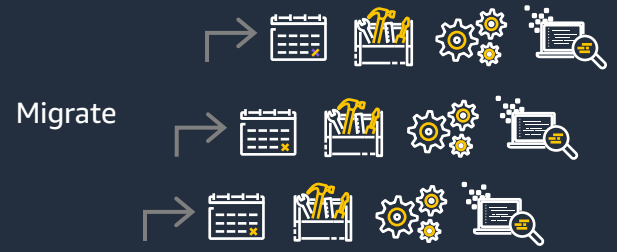

Landing zone


Operating model


Security & compliance

Platform

Migrate & Modernize


Migrate


Operate & optimize


Modernize

Create a case for change

Build readiness through experiences

Accelerate transformation at scale

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Analysis & Insights

On-Premises Overview

On-Premises Environment 651 Total Instances

- Windows Servers In Scope:	**172**	- Linux Servers In Scope:	**373**
- Provisioned Storage (TB)	**689**	- Assumed Storage Utilization (TB):	**345**
- Windows Desktops in Scope	**44**	- SQL Servers	**21**
- Excluded From Assessment Scope	**62**	- Enterprise Edition	12
- Zombie Machines	54	- Standard Edition	9
- Windows Desktops	8	- Web Edition	0

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These are fictitious numbers for the purpose of example/illustration.

Executive Summary

Scoping

- Results based on a scope of 545 servers and 44 desktops
- Collected Data
- 18 days data collection

Insights

- 8% zombies
- 92% of servers right-sized
- 49% servers used less than 20% of time
- 0% servers have less than 20% CPU utilization

Results

- Right-sized & optimized models
- $973,215 annualized spend on AWS

Next Steps

- Server Dependency Mapping
- Licensing Health Check
- Storage Assessment

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Detailed Assessment Overview

Assumptions & Modeling Details

- Cost model: 3 YR / 1 YR NURI
- Region: Virginia
- Right-sized
- Zombies removed from scope
- Licensing optimized
- Application/Environment groupings provided

Infrastructure	Count
VMware	634
Hyper-V	0
Bare Metal	17
Total	**651**

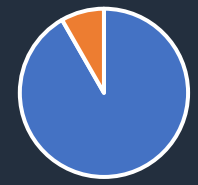
Environment & Licensing	
Windows Servers	193
Windows Desktops	52
Linux	298
RHEL	108
Zombies	54 (8%)
Total	**651**

SQL Servers	Count
Enterprise	12
Standard	9
Web	0
Total	**21**

Time-In-Use

Time In Use %	
In-Use	38.06%
Idle	61.94%

Zombies



Zombies	
Zombies	54
Utilized	597

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Financial Summary

Financial Overview

		Option 1	Option 2	Option 3	Option 4
	On Demand - LI	3 Year NURI - BYOL WS + SQL	3 Year NURI - BYOL SQL	3 Year NURI - LI	1 Year NURI - LI
Compute	$1,212,011	$475,625	$563,999	$768,459	$927,175
Amazon WorkSpaces	$44,735	$44,735	$44,735	$44,735	$44,735
Storage	$338,730	$338,730	$338,730	$338,730	$338,730
Network	$47,093	$47,093	$47,093	$47,093	$47,093
Infrastructure Total	$1,642,569	**$**906,183	**$**994,557	**$**1,199,017	**$**1,357,733
AWS Business Support	$104,928	$67,032	$72,527	$82,750	$90,686
Annual Total	**$1,747,497**	**$973,215**	**$1,067,084**	**$1,281,767**	**$1,448,419**
Annual Savings	-	44%	38%	26%	17%

- Modeled to Shared Tenancy
- On Demand Instances with Windows & SQL Server License included (LI)
- Assumed storage utilization = 50% of provisioned storage
- Servers running Windows Desktop OS modeled to Amazon WorkSpaces

- Mixed Tenancy - SQL and Windows Server modeled to Dedicated Hosts with BYOL when cost effective
- Remaining modeled to Shared Tenancy
- All Reserved Instances (RIs)
- Assumed storage utilization = 50% of provisioned storage
- Servers running Windows Desktop OS modeled to Amazon WorkSpaces

- Modeled to Shared Tenancy
- Reserved Instances (RIs) with Windows Server license included (LI)
- BYOL SQL Server - Requires active Software Assurance (SA)
- Assumed storage utilization = 50% of provisioned storage
- Servers running Windows Desktop OS modeled to Amazon WorkSpaces

- Modeled to Shared Tenancy
- Reserved Instances (RIs) with Windows & SQL Server License included (LI)
- Assumed storage utilization = 50% of provisioned storage
- Servers running Windows Desktop OS modeled to Amazon WorkSpaces

- Modeled to Shared Tenancy
- Reserved Instances (RIs) with Windows & SQL Server License included (LI)
- Assumed storage utilization = 50% of provisioned storage
- Servers running Windows Desktop OS modeled to Amazon WorkSpaces

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An AWS Migration Evaluator assessment is a directional estimate that provides an approximate cost of using AWS services based on the collected, provided, and assumed usage parameters. It is not a quote, and does not guarantee the cost for your actual use of AWS services.

These are fictitious numbers for the purpose of example/illustration.

5 Year Steady State Cash Flow Summary

On-Premises

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Compute	$5,893,833	$592,277	$592,277	$592,277	$592,277	**$8,262,937**
Storage	$1,413,524	$33,600	$33,600	$33,600	$33,600	**$1,547,924**
Networking	$260,038	$52,008	$52,008	$52,008	$52,008	**$468,068**
On-Premises Total	$7,567,393	$677,884	$677,884	$677,884	$677,884	**$10,278,928**

AWS: 3 Year NURI LI

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Compute	$768,459	$768,459	$768,459	$768,459	$768,459	**$3,842,295**
Amazon Workspaces	$44,735	$44,735	$44,735	$44,735	$44,735	**$223,675**
Storage	$338,730	$338,730	$338,730	$338,730	$338,730	**$1,693,650**
Networking	$47,093	$47,093	$47,093	$47,093	$47,093	**$235,465**
AWS Support	$82,750	$82,750	$82,750	$82,750	$82,750	**$413,750**
AWS Total	$1,281,767	$1,281,767	$1,281,767	$1,281,767	$1,281,767	**$6,408,835**

AWS: 3 Year NURI BYOL SQL

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Compute	$563,999	$563,999	$563,999	$563,999	$563,999	**$2,819,995**
Amazon Workspaces	$44,735	$44,735	$44,735	$44,735	$44,735	**$223,675**
Storage	$338,730	$338,730	$338,730	$338,730	$338,730	**$1,693,650**
Networking	$47,093	$47,093	$47,093	$47,093	$47,093	**$235,465**
AWS Support	$72,527	$72,527	$72,527	$72,527	$72,527	**$362,635**
AWS Total	$1,067,084	$1,067,084	$1,067,084	$1,067,084	$1,067,084	**$5,335,420**

These are fictitious numbers for the purpose of example/illustration.

Financial Summary - 3 YR NURI - BYOL

Option	Compute *(annual)*	Amazon Workspaces *(annual)*	Storage *(annual)*	Network *(annual)*	Total *(annual)*	Savings Plan Rate Estimate *(per hour)*
Shared Tenancy	$563,999	$44,735	$338,730	$47,093	$994,557	$64.38
Mixed Tenancy (Recommended)	$475,625	$44,735	$338,730	$47,093	$906,183	$54.3

BYOL Quantities

Product	Shared Tenancy	Mixed Tenancy
Win Server Datacenter Cores	n/a - Win License Included	240
Win Server Standard Cores	n/a - Win License Included	0
SQL Enterprise Cores	52	52
SQL Standard Cores	32	32
Windows 10/11 Licenses	0	0

*Cores are listed as total cores, NOT core packs

Modeling:

- Pricing Model: 3 Year No Upfront RI (NURI)
- Region-Virginia; Currency-USD
- Storage Assumptions:
  - Storage Utilization = 50% of Provisioned Storage
  - All Amazon EBS volumes are modeled to General Purpose SSD (gp3) with baseline performance of 3000 IOPS & 125 MBps throughput for SSD.
- Networking Assumptions = 10% of base compute Shared Tenancy 1 YR NURI costs
- Licensing:
  - Windows: License Included on Shared Tenancy; BYOL on Mixed Tenancy
  - SQL: Bring Your Own License (BYOL)
  - Amazon Workspaces: Licenses Included

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Financial Summary - 3 YR NURI - LI

Option	Compute *(annual)*	Amazon Workspaces *(annual)*	Storage *(annual)*	Network *(annual)*	Total *(annual)*	Savings Plan Rate Estimate *(per hour)*
Shared Tenancy	$768,459	$44,735	$338,730	$47,093	$1,199,017	$87.72

Modeling:

- Pricing Model: 3 Year No Upfront RI (NURI)
- Region-Virginia; Currency-USD
- Storage Assumptions:
  - Storage Utilization = 50% of Provisioned Storage
  - All Amazon EBS volumes are modeled to General Purpose SSD (gp3) with baseline performance of 3000 IOPS & 125 MBps throughput for SSD.
- Networking Assumptions = 10% of base compute Shared Tenancy 1 YR NURI costs
- Licensing:
  - Windows: License Included
  - SQL: License Included
  - Amazon Workspaces: Licenses Included

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Financial Summary - 3 YR AURI - BYOL

Option	Compute *(annual)*	Amazon Workspaces *(annual)*	Storage *(annual)*	Network *(annual)*	Total *(annual)*	Savings Plan Rate Estimate *(per hour)*
Shared Tenancy	$522,557	$44,735	$338,730	$47,093	$953,116	$59.65
Mixed Tenancy (Recommended)	$429,946	$44,735	$338,730	$47,093	$860,504	$49.08

BYOL Quantities

Product	Shared Tenancy	Mixed Tenancy
Win Server Datacenter Cores	n/a - Win License Included	240
Win Server Standard Cores	n/a - Win License Included	0
SQL Enterprise Cores	52	52
SQL Standard Cores	32	32
Windows 10/11 Licenses	0	0

*Cores are listed as total cores, NOT core packs

Modeling:

- Pricing Model: 3 Year All Upfront RI (AURI)
- Region-Virginia; Currency-USD
- Storage Assumptions:
  - Storage Utilization = 50% of Provisioned Storage
  - All Amazon EBS volumes are modeled to General Purpose SSD (gp3) with baseline performance of 3000 IOPS & 125 MBps throughput for SSD.
- Networking Assumptions = 10% of base compute Shared Tenancy 1 YR NURI costs
- Licensing:
  - Windows: License Included on Shared Tenancy; BYOL on Mixed Tenancy
  - SQL: Bring Your Own License (BYOL)
  - Amazon Workspaces: Licenses Included

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Financial Summary - 3 YR AURI - LI

Option	Compute *(annual)*	Amazon Workspaces *(annual)*	Storage *(annual)*	Network *(annual)*	Total *(annual)*	Savings Plan Rate Estimate *(per hour)*
Shared Tenancy	$727,017	$44,735	$338,730	$47,093	$1,157,576	$82.99

Modeling:

- Pricing Model: 3 Year All Upfront RI (AURI)
- Region-Virginia; Currency-USD
- Storage Assumptions:
  - Storage Utilization = 50% of Provisioned Storage
  - All Amazon EBS volumes are modeled to General Purpose SSD (gp3) with baseline performance of 3000 IOPS & 125 MBps throughput for SSD.
- Networking Assumptions = 10% of base compute Shared Tenancy 1 YR NURI costs
- Licensing:
  - Windows: License Included
  - SQL: License Included
  - Amazon Workspaces: Licenses Included

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Cloud-Native VDI with Amazon WorkSpaces

Modernize your legacy VDI with Amazon's cloud-native virtual desktops and streamed app services. Key benefits of migrating to Amazon's cloud-native services include reducing VDI solution costs, improving uptime, increasing IT productivity, and greater desktop provisioning/deprovisioning agility. Amazon WorkSpaces is a persistent desktop service. Non-persistent VDI is available with Amazon AppStream 2.0.

Amazon WorkSpaces Always On		Count	Avg. Monthly User Cost	Annual Cost
Standard	2vCPU, 4GB RAM	10	$44	$5,280
Performance	2 vCPU, 8 GB RAM	5	$56	$3,360
Power	4 vCPU, 16 GB RAM	18	$78	$16,848
Power Pro	8 vCPU, 32GB RAM	11	$140	$18,480
Additional EBS Storage		799 GB		$767
Estimated Annual TCO				**$44,735**

On-Prem VDI Input Costs	Included with Amazon WorkSpaces
Physical Servers for User Hosts	**Yes**
Physical Servers Management Plane	**Yes**
Storage for Root Volumes	**Yes**
Storage for User Volumes	**Yes**
Networking – Access Gateways	**Yes**
VDI software	**Yes**
Database servers	**Yes**
Microsoft software	**Yes**
Hypervisor software	**Yes**
Datacenter operations	**Yes**
Server & VM Administration	**38% savings**
Storage Administration	**88% savings**

Modeling Details

- Region: Virginia
- Costs in USD
- 52 License Included Windows Desktops (modeled to Windows 10 Experience)
- Amazon WorkSpaces Storage Included; mapped based on lowest cost & best-fit
- Amazon WorkSpaces Auto Stop hourly pricing is also available
- GPUs (if any) excluded from the assessment, but can be included upon further input

If you would like to explore the broad portfolio of options to help you reduce costs, please let us know and we will engage you with one of our experts from our AWS End User Computing Team.

Review the 2022 Forrester Study, to learn how Amazon WorkSpaces customer reduce infrastructure costs.

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Cost effective database management with Amazon RDS

Amazon Relational Database Service (Amazon RDS) is a collection of managed services that makes it simple to set up, operate, and scale Microsoft SQL Server databases in the cloud. RDS allows you to create, configure, and manage a database with minimal administrative effort. RDS also includes features such as automatic backups and software patching. RDS also provides support for replication and failover, ensuring that your database is always available.

Service	Count	Cost
RDS Instances [1]	21	$416,563
RDS Storage (EBS GP3)	39,496.0 GB	$100,215
Total RDS cost		$516,778
Remaining Infrastructure to EC2+ EBS [2]	526 Instances	$1,115,175
Total Annual Cost		**$1,631,953**

[1] Directional cost estimate based on Migration Evaluator collection. RDS Team can collect further data to optimize.
To find the least expensive cost model, recommendations may include a mix of purchase options.

[2] EC2 and EBS modelling is based on a 1 Year No Upfront Reserved Instances Cost Model
Microsoft Windows Desktops are excluded from this modelling

This estimate is based on right sized compute and memory provisioning discovered through the Migration Evaluator assessment for Microsoft SQL Servers (Enterprise/Standard/Express/Web)

Note: SQL Server Developer Edition is excluded from this modeling.

Assumptions

- RDS Database Engine: Microsoft SQL Server
- Deployment Option:
  - Multi-AZ for Production servers
  - Single-AZ for Non-Production servers
- Storage Utilization = 50% of Provisioned Storage (based on historical averages)
- SQL Server License Included
- Database server characteristics including IOPS, Throughput, and feature restrictions in RDS have not been considered in this modelling.
- Costs in USD
- Region – Virginia

If you would like to explore this option further, please let us know and we will engage you with one of our experts from our AWS Relational Database Service team.

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Storage Insights

0.4% of your servers (2 out of 545) account for **17.0% of the modelled storage** (59 TB out of 345 TB total), each having >= 2.5 TB of used storage.

Servers with large amounts of attached storage are commonly used to host file shares or backup storage. AWS managed storage services such as Amazon FSx and S3 offer significant advantages over self-managed file and backup storage using Amazon EC2 with Amazon EBS. Managed storage services provide seamless scalability, high availability, durability, optimized performance, cost efficiency, and reduced operational overhead.

Modeling file and backup servers to the appropriate service will increase the accuracy of your business case. Directional estimates for common use cases are shown below.

If these servers are primarily...	... app or database servers	... file servers	... backup servers
	Amazon EC2 and Amazon EBS	**Amazon FSx for NetApp ONTAP**	**Amazon S3**
Annual Cost	$60,588 EC2 $2,988 + EBS $57,600	$17,085	$11,534
Annual Savings	-	72%	81%

- Default scenario considered in the Business Case
- EC2 instances modelled to 3 YR NURI LI excluding any Microsoft SQL servers
- EBS modelled to General Purpose SSD storage (gp3)
- Baseline performance:
  - Throughput: 125 MBps
  - IOPS: 3000

- Capacity Ratio:
  - 13%: SSD
  - 87%: Capacity Pool
- Deduplication + compression savings: 45%
- Total FSx size: 37,735 GB
- Baseline performance:
  - Throughput: 128 MBps
  - IOPS: 3 IOPS per GB of SSD

- Capacity Ratio:
  - 20%: S3 Standard
  - 30%: S3 Standard Infrequent Access
  - 50%: S3 Glacier Instant Retrieval
- API requests: 20% overhead

If you would like to explore this option or other potential storage use cases, please let us know and we can initiate a complimentary Storage Assessment.

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Storage Assessment

File/NAS Storage Overview

Array Name	Array Vendor	Family/ Model	Total Provisioned Capacity (TB)	Total Used Capacity (TB)	Access Protocols	Peak IOPS	Peak Throughput (MBps)
Array1	NetApp	FAS	209	181	NFS, CIFS and MIXED	843.1133	2.8844
Array2	NetApp	FAS	373	326	NFS, CIFS and MIXED	872.3567	2.5566
Array3	NetApp	FAS	192	126	NFS, CIFS and MIXED	798.2811	2.58
Array4	NetApp	FAS	97	82	NFS, CIFS and MIXED	963.6622	2.1957
Array5	NetApp	FAS	300	286	NFS, CIFS and MIXED	924.3767	3.9319
Array6	NetApp	FAS	311	279	NFS, CIFS and MIXED	490.0656	2.6532
Array7	NetApp	FAS	363	299	NFS, CIFS and MIXED	945.5545	3.3587
Array8	NetApp	FAS	359	300	NFS, CIFS and MIXED	1,003.8578	2.3481
Array9	NetApp	FAS	102	83	NFS, CIFS and MIXED	906.26	3.1385
Array10	NetApp	FAS	26	4	NFS, CIFS and MIXED	729.9213	9.3389
Array11	NetApp	FAS	119	92	NFS, CIFS and MIXED	1,053.6178	3.3933

Discovery Details and Assumptions

- **Discovery Period**: 7 Days
- **NAS Array/s**: NetApp
- **File Servers:** N/A

- All NAS Volumes have been mapped to Amazon FSx for NetApp ONTAP.
- Inactive volumes have been mapped to Capacity Pool.
    - Inactive volumes are those where IO operations were not detected during the discovery period.
- Detailed volume/shares level mapping is shared in a separate excel sheet.

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These are fictitious numbers for the purpose of example/illustration.

Sample: Amazon FSx for NetApp ONTAP (Single-AZ)

Collector data has been leveraged for storage analysis. Amazon FSx for NetApp ONTAP file system automatically replicates your data within AWS Availability Zone (AZ) for Single-AZ and across AZs for Multi-AZ to enable high availability and durability. The prices below are based on a **Single-AZ** Amazon FSx for NetApp ONTAP deployment.

Parameter	Pricing *(Monthly)*
SSD storage *Usable SSD capacity: 68.31 TiB* *Price: $0.125 per GiB-month*	$8,744
Additional SSD IOPS *Additional SSD IOPS over-provisioned: 0 IOPS* *Price: $0.017 per GiB-month*	$0
Capacity pool storage *Average capacity pool storage: 690.69 TiB* *Price: $0.022 per GiB-month*	$15,489
Throughput capacity *Provisioned throughput: 128 MB/s* *Price: $0.72 per MBps-month*	$92
Total monthly cost	**$24,325** **($0.031 per GiB-month)**
Total annual cost	**$291,900 (List Price)**

Modeling

- Total used storage capacity: 759 TB (including system and metadata)
- Percentage of data on SSD storage: 9%
- Percentage of data on capacity pool: 91%
- Savings from compression + deduplication: Like to like
- IOPS: 3,478
  *SSD provides 3 IOPS per GiB: 160K per FS
- Throughput capacity: 128 MB/s
- Region: US East (N. Virginia)
- # of FSx filesystems: 1
- Protocols: NFS, CIFS and iSCSI

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Block Storage Volumes - Overview

Volume Type	Total Volumes	In Scope	Array Vendor	Total Provisioned Capacity (GB)	Total Used Capacity (GB)
Virtual Machine Volumes	400	268	NetApp	76,419.00	62,977.21
Physical/Bare Metal Volumes	15	5	NetApp	9,374.08	9,374.08

Discovery Details and Assumptions

- **Discovery Period**: 7 Days
- **SAN Array/s**: Dell EMC Unity
- **Virtualization Platform**: VMware
- **Region:** US-EAST-1

- Only active volumes are in scope of target mapping. Inactive volumes have been mapped to Amazon Elastic Block Storage (EBS) SC1, but no pricing is provided.
    - Inactive volumes are those where IO operations were not detected during the discovery period.
- Physical/Bare metal volumes are those which are allocated to physical servers or as RDMs to Virtual Machines (VMs).
- Detailed volume level mapping is shared in a separate excel sheet.

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Sample Disks: Mapping to Amazon Elastic Block Storage (EBS)

Amazon EBS – Boot Disks

Target EBS Volumes	VM Count	Volumes Used Capacity (GB)	AWS Directional Cost Estimation (Monthly)	AWS Directional Cost Estimation (Annually)
AWS EBS GP3	537	16,110	$1,288.80	$15,465.60

Amazon EBS - Data Disks

Target EBS Volumes	Volumes Count	Volumes Used Capacity (GB) Post Buffer & Min Quota	AWS Directional Cost Estimation (Monthly)	AWS Directional Cost Estimation (Annually)
AWS EBS GP3	160	70,054.14	$6,313.02	$75,756.18
AWS EBS IO2 Block Express	2	8,599.17	$4,178.15	$50,137.85
AWS EBS SC1	238	58,713.42	$1,451.90	$17,422.77
AWS EBS ST1	137	31,830.97	$1,761.19	$21,134.30

Modeling

- Mapping to Amazon EBS is based on adjusted used capacity, peak IOPS, and peak throughput
- Adjusted capacity has 10% buffer on actual used capacity
- 30GB of boot disks have been considered for all in-scope servers as directional costing
    - All boot disks are mapped to Amazon EBS GP3
- Disks with high capacity and performance requirements are mapped to EBS IO2 and EBS IO2 Block Express

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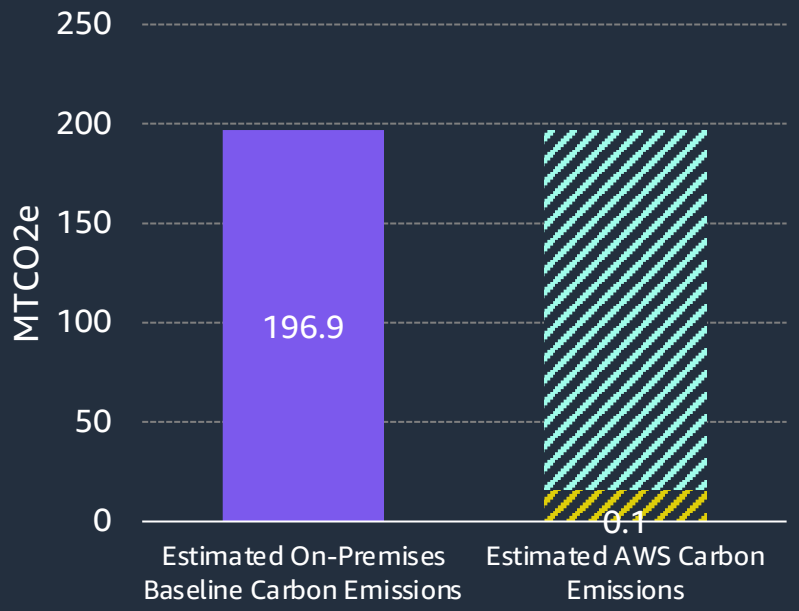
Business Value

Sustainability: Directional Carbon Footprint

AWS can help lower the carbon footprint of your average on-premises data center workload



Projected carbon emissions of running workloads on AWS vs. your on-premises environment

On-Premises Data Centre Location: SRVC, United States

Up to **196.8** MTCO2e Carbon emission reduction in year one vs. your on-premises environment

Up to **100.0%** Carbon emission reduction in year one vs. your on-premises environment

- **91.8%** of carbon reduction is attributable to higher server utilization, more efficient servers, and efficient data centers.
- **8.2%** of carbon reduction is attributable to renewable energy usage.

The unit of measurement for carbon emissions is metric tons of carbon dioxide-equivalent (MT CO2e), an industry-standard measure. This report covers AWS Scope 1 & Scope 2 emissions. A comparable AWS region may supplement data in these calculations due to limited carbon emission information being available for new or GovCloud regions.

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Business Value

Hackett's Global 1000 study results showed that companies in your industry were able to yield improvements in three key areas after migrating to AWS. These estimates reflect a directional perspective on value benefits beyond cost savings.

Staff Productivity

- 66% more Virtual Machines (VMs) managed by a VM Administrator at AWS
- 101% more TBs managed by a Storage Administrator at AWS

Operational Resilience

- 69% reduction in unplanned downtime
- 50% reduction in monthly critical incidents

Business Agility

- 29% application developer efficiency allowing for increased innovation
- 43% reduction in time to market for feature releases

Scope and Assumptions for Business Value

Business value estimates are based on industry benchmarks derived from Hackett's Global 1000 study for organizations of similar size and industry. These estimates reflect a directional perspective on annual value benefits.

General Input

Item	Value
Organization annual revenue (USD)	$26,601,540
Organization number of employees	160
% of workloads in scope	100%

Staff Productivity

Item	Value
Total number of storage admin & DBA FTEs	1
Total number of server & VM admin FTEs	1
Fully burdened annual cost per IT FTE (USD)	135,000

Operational Resilience

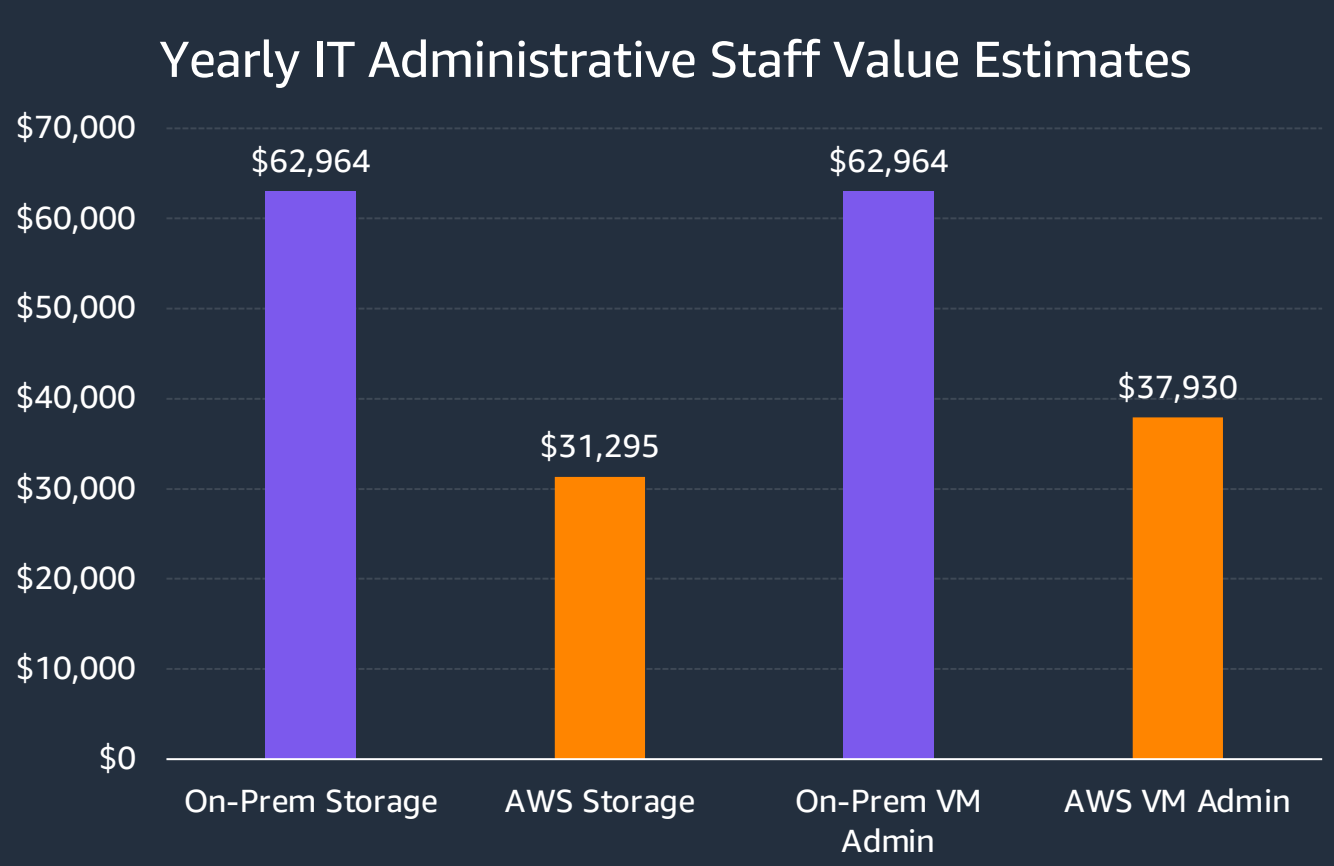
Item	Value
Average annual unplanned downtime (hours)	44
Availability	99.50%

Business Agility

Item	Value
Total number of application development FTEs	3

These are fictitious numbers for the purpose of example/illustration.

Staff Productivity Summary



Cost Benefit %	45%
Cost Benefit $	$56,703

Our G1000 survey results showed that companies in your peer set (similar size and industry) yielded two key drivers for this estimate:

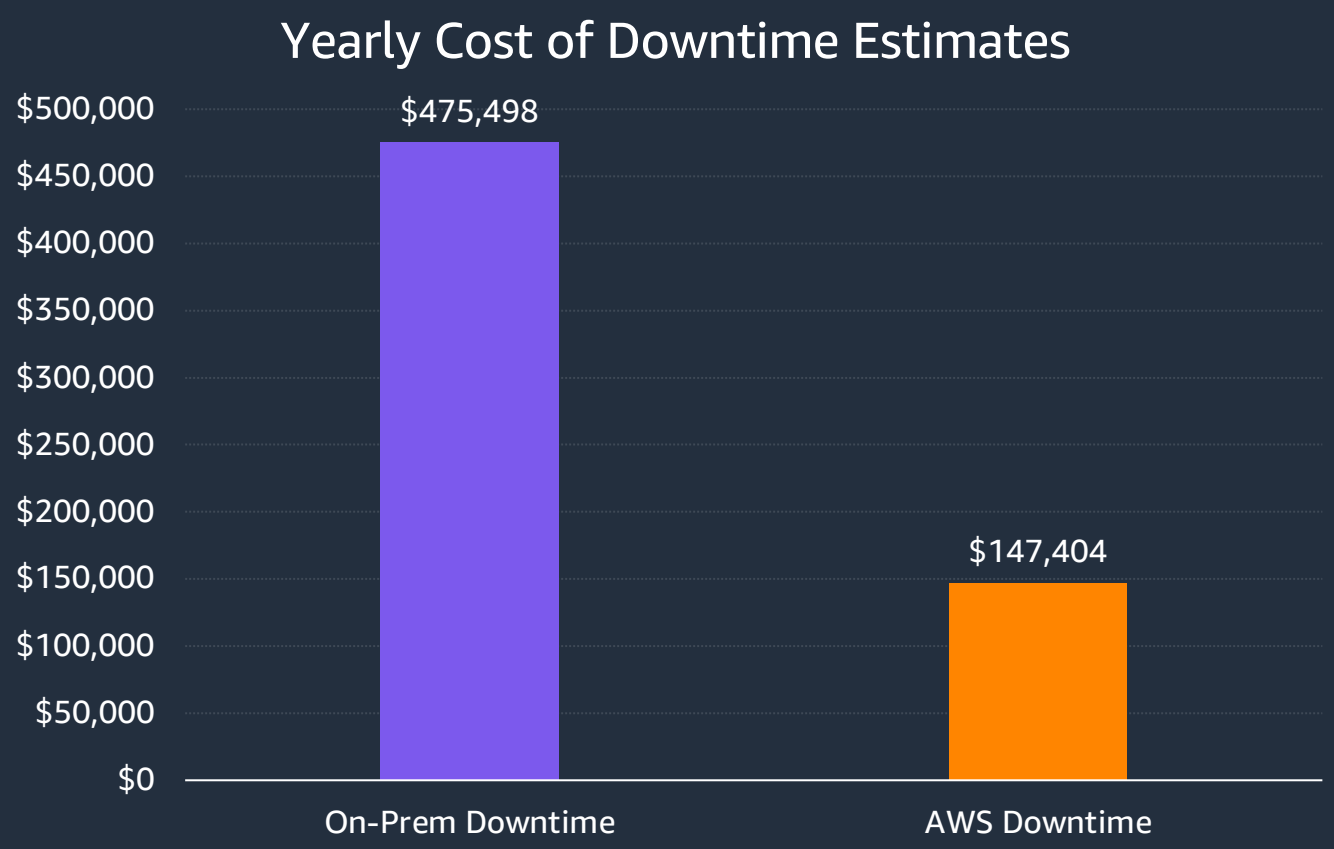
- The same Storage Administrator could manage 101% more TBs of storage on AWS than On Prem.
- The same VM Administrator could manage 66% more VMs on AWS than On Prem.

We assumed a landed FTE salary of $135,000 per year.

aws migrations

These are fictitious numbers for the purpose of example/illustration.

Operational Resilience Summary



Cost Benefit %	**69%**
Cost Benefit $	**$328,094**

Our G1000 survey results showed that companies in your peer set (similar size and industry) experience a reduction of unplanned downtime of 69% after migrating to AWS.

Value is calculated as the loss abatement indicated by the G1000 survey and the heuristic from the Ponemon Institute study. Reducing unplanned downtime decreases lost sales, lost productivity, and reputational impacts of these events.

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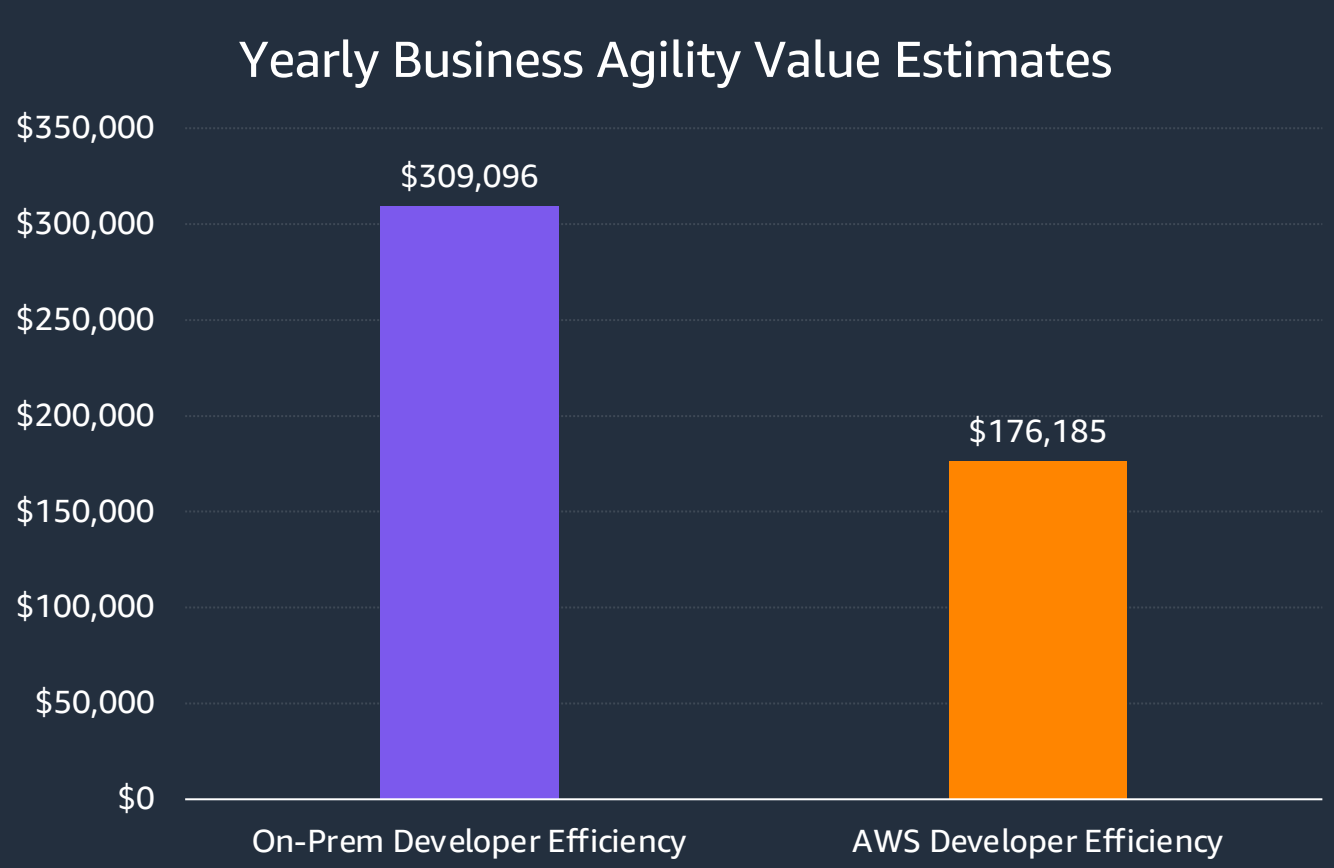
These are fictitious numbers for the purpose of example/illustration.

Business Agility Summary



Cost Benefit %	**43%**
Cost Benefit $	**$132,911**

Our G1000 survey results showed that companies in your peer set (similar size and industry) yielded the key driver for this estimate:

- The same Application Developer becomes 43% more efficient.

We assumed a landed FTE salary of $135,000 per year.

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These are fictitious numbers for the purpose of example/illustration.

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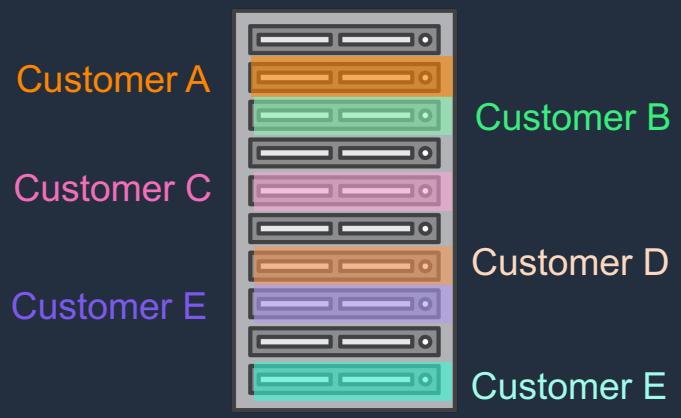
AWS Deployment Summary

EC2 Instances: Shared Tenancy and Dedicated Hosts

Shared Tenancy



Multi-tenant servers host instances for multiple customers

AWS determines which host instances run on

You ***pay per-instance***

Dedicated Hosts

Single-tenant servers host instances dedicated to ***one AWS customer***

Launch instances to same physical server through targeted ***placement***

You ***pay per-host, per-hour***

EC2 Deployment Summary

Shared Tenancy Blueprint

Region	EC2 Fam	Instance Type	QTY
Virginia	c7a	c7a.2xlarge	15
Virginia	m5zn	m5zn.xlarge	6
Virginia	c7a	c7a.large	17
Virginia	r5a	r5a.large	62
Virginia	r7a	r7a.large	14
Virginia	c5a	c5a.2xlarge	24
Virginia	t3a	t3a.small	5
Virginia	c7a	c7a.medium	49
Virginia	t3a	t3a.large	20
Virginia	c5a	c5a.large	26
Virginia	r7a	r7a.medium	38
Virginia	c6a	c6a.2xlarge	16
Virginia	m7a	m7a.medium	59
Virginia	r6a	r6a.large	21
Virginia	c5a	c5a.xlarge	25
Virginia	m7a	m7a.xlarge	6
Virginia	c6a	c6a.xlarge	19
Virginia	c5	c5.2xlarge	5
Virginia	t2	t2.xlarge	10
Virginia	m6a	m6a.large	17
Virginia	c6a	c6a.large	14
Virginia	t3	t3.small	3
Virginia	c7a	c7a.xlarge	20
Virginia	m7a	m7a.large	6
Virginia	m6a	m6a.xlarge	9
Virginia	t3a	t3a.medium	7
Virginia	t3	t3.large	6
Virginia	m5	m5.xlarge	1
Virginia	c5	c5.xlarge	6
Virginia	m5zn	m5zn.large	4
Virginia	t3	t3.medium	1
Virginia	r5a	r5a.2xlarge	2
Virginia	x2iezn	x2iezn.2xlarge	4
Virginia	r5a	r5a.8xlarge	2
Virginia	r5a	r5a.4xlarge	1
Virginia	r5a	r5a.xlarge	1
Virginia	m6a	m6a.2xlarge	1
Virginia	r7a	r7a.xlarge	1
Virginia	c5a	c5a.4xlarge	1
Virginia	m7a	m7a.2xlarge	1
Virginia Total			545
Grand Total			545

Mixed Tenancy Blueprint

Region	Tenancy	Deployed On	EC2	OS Lic Model	OS Lic's Used	QTY	Instances Packed
Virginia	Dedicated	DH	c5	WS BYOL	DC Cores	2	30
Virginia	Dedicated	DH	x2iezn	WS BYOL	DC Cores	1	4
Virginia	Dedicated	DH	r5	WS BYOL	DC Cores	1	35
Virginia	Dedicated	DH	c6a	WS BYOL	DC Cores	1	15
Virginia	Dedicated Total					5	84
Virginia	Shared	Instance	t3a.medium	Linux		5	0
Virginia	Shared	Instance	m7a.xlarge	Linux		3	0
Virginia	Shared	Instance	m7a.xlarge	WS LI		3	0
Virginia	Shared	Instance	t3a.small	WS LI		2	0
Virginia	Shared	Instance	r5a.2xlarge	Linux		1	0
Virginia	Shared	Instance	r5a.4xlarge	Linux		1	0
Virginia	Shared	Instance	r5a.8xlarge	Linux		2	0
Virginia	Shared	Instance	r5a.large	Linux		51	0
Virginia	Shared	Instance	r6a.large	Linux		12	0
Virginia	Shared	Instance	r7a.large	Linux		10	0
Virginia	Shared	Instance	r7a.large	WS LI		4	0
Virginia	Shared	Instance	r7a.medium	Linux		27	0
Virginia	Shared	Instance	r7a.medium	WS LI		11	0
Virginia	Shared	Instance	m7a.medium	WS LI		11	0
Virginia	Shared	Instance	t2.xlarge	WS LI		10	0
Virginia	Shared	Instance	t3.large	WS LI		6	0
Virginia	Shared	Instance	t3.medium	Linux		1	0
Virginia	Shared	Instance	t3.small	Linux		2	0
Virginia	Shared	Instance	t3.small	WS LI		1	0
Virginia	Shared	Instance	t3a.large	Linux		8	0
Virginia	Shared	Instance	t3a.small	Linux		3	0
Virginia	Shared	Instance	t3a.large	WS LI		12	0
Virginia	Shared	Instance	t3a.medium	WS LI		2	0
Virginia	Shared	Instance	r7a.xlarge	Linux		1	0
Virginia	Shared	Instance	m7a.large	WS LI		1	0
Virginia	Shared	Instance	m7a.large	Linux		5	0
Virginia	Shared	Instance	c5.2xlarge	Linux		5	0
Virginia	Shared	Instance	c5.xlarge	Linux		6	0
Virginia	Shared	Instance	c5a.2xlarge	Linux		15	0
Virginia	Shared	Instance	c5a.4xlarge	Linux		1	0
Virginia	Shared	Instance	c5a.large	Linux		19	0
Virginia	Shared	Instance	c5a.xlarge	Linux		14	0
Virginia	Shared	Instance	c6a.large	Linux		8	0
Virginia	Shared	Instance	c6a.large	WS LI		5	0
Virginia	Shared	Instance	c6a.xlarge	Linux		16	0
Virginia	Shared	Instance	c6a.xlarge	WS LI		2	0
Virginia	Shared	Instance	c7a.2xlarge	Linux		9	0
Virginia	Shared	Instance	c7a.2xlarge	WS LI		6	0
Virginia	Shared	Instance	c7a.large	Linux		13	0
Virginia	Shared	Instance	c7a.large	WS LI		4	0
Virginia	Shared	Instance	c7a.medium	Linux		36	0
Virginia	Shared	Instance	c7a.medium	WS LI		13	0
Virginia	Shared	Instance	c7a.xlarge	Linux		16	0
Virginia	Shared	Instance	c7a.xlarge	WS LI		4	0
Virginia	Shared	Instance	m5.xlarge	Linux		1	0
Virginia	Shared	Instance	m5zn.large	Linux		1	0
Virginia	Shared	Instance	m5zn.xlarge	Linux		3	0
Virginia	Shared	Instance	m6a.large	Linux		11	0
Virginia	Shared	Instance	m6a.large	WS LI		3	0
Virginia	Shared	Instance	m6a.xlarge	Linux		6	0
Virginia	Shared	Instance	m7a.2xlarge	WS LI		1	0
Virginia	Shared	Instance	m7a.medium	Linux		48	0
Virginia	Shared Total					461	0
Virginia Total						466	84
Grand Total						466	84

aws migrations

These are fictitious numbers for the purpose of example/illustration.

Potential SQL Server Core Reductions – Shared Tenancy

Product	On-premises Cores	Cores on Right-sized Instances	Cores after applying CPU Optimization	Cores after SQL Consolidation	Final AWS Cores
SQL Enterprise	86	52	52	44	**44**
Incremental reduction		34	0	8	42
SQL Standard	42	32	32	24	**24**
Incremental reduction		10	0	8	18

These SQL Server core reductions may lead to savings on future SQL Server purchases and Software Assurance renewals.

1) Right-sized Instances
Recommended AWS instances are “right-sized” based on each server’s technical specs and utilization.

2) CPU Optimization
The core count of the recommended AWS instance may be further reduced based on the server’s CPU utilization using AWS’s Optimize CPUs. Find more information on AWS’s “Optimize CPU” functionality here. This applies to BYOL SQL Server cores only.

3) SQL Consolidation
SQL Server licensing requires a minimum of 4 core licenses per server. Therefore, 2 core SQL Servers consume 2 additional SQL Server cores licenses that are not used. By consolidating 2 core SQL Servers into 4 core servers, no licenses are wasted and the total required licenses is reduced.

4) SQL Enterprise Downgrade
SQL Server licensing costs can be reduced by up to 73% on average if SQL Server Enterprise features are not required. To validate whether or not common SQL Server Enterprise features are being used, you can run this script here.

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These are fictitious numbers for the purpose of example/illustration.

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Supplementary AWS Services

Cloud-Based Disaster Recovery with AWS Elastic Disaster Recovery

Achieve reliability and availability based on top-tier recovery objectives by using AWS Elastic Disaster Recovery (DRS) as a simple and flexible Disaster Recovery Service. This service continuously replicates your machines (including operating system, system state configuration, databases, applications, and files) into a low-cost staging area in your target AWS account and preferred region. This reduces the need for duplicate infrastructure and licensing. In the case of a disaster, you can instruct AWS Elastic Disaster Recovery to automatically launch thousands of your machines in their fully provisioned state in minutes.

AWS DRS pricing	Monthly
DRS Replication Cost (monthly)	$11,140

AWS EC2/EBS estimated costs	Monthly	Amount of Data (GB)
EBS General Purpose storage (gp3)	$28,228	352,844
EBS Magnetic (standard)	$0	0
Total Snapshots New Data (base + new)	$23,817	476,339

Monthly TCO	$63,184
Annual Consumption	$758,211

Modeling Details

AWS Region	US East (N. Virginia)
Number of replicated servers	545
Storage capacity in GB	352,844
Total number of disks	545
Estimated Replication Servers	37
Incremental Snapshot Retention Period	7

- Candidates: All active workloads
- Daily change rate assumed: 5%
- Costs in USD

If you would like to explore this option further, please let us know and we will engage you with one of our experts from our AWS Elastic Disaster Recovery team.

aws migrations

These are fictitious numbers for the purpose of example/illustration.

Microsoft Windows and Microsoft SQL Server Support

When a Windows Server or SQL Server version reaches end-of-support, Microsoft will no longer release updates to address bugs and security vulnerabilities. AWS Application Migration Service (MGN) allows you to upgrade Windows Server operating systems (OS) during migration, streamlining the modernization effort and reducing the time and complexity of your overall migration.

WS Version	Servers	OS Support Cycle	EOS	T-Days	Risk	% of Estate
<= WS 2008 R2	1	Unsupported (2008/R2)	01/14/20	-1661	High	1
WS 2012	0	Extended Support (2012/R2)	10/10/23	-296	High	0
WS 2012 R2	0	Extended Support (2012/R2)	10/10/23	-296	High	0
WS 2016	87	Extended Support (2016)	01/12/27	894	Med	46
WS 2019	101	Mainstream Support until 01/2024	01/09/29	1622	Low	53
WS 2022	0	Mainstream Support until 10/2026	10/14/31	2630	Low	0
WS Total	**189**					

SQL Version	SQL Instances	DB Support Cycle	EOS	T-Days	Risk	% of Estate
<= SQL 2008 R2	0	Unsupported (2008/R2)	07/09/19	-1744	High	0
SQL 2012	7	Extended Support (2012)	07/12/22	-645	High	33
SQL 2014	0	Extended Support (2014)	07/09/24	83	Med	0
SQL 2016	5	Extended Support (2016)	07/14/26	818	Med	24
SQL 2017	0	Extended Support (2017)	10/12/27	1273	Med	0
SQL 2019	9	Mainstream Support until 01/2025	01/08/30	2092	Low	43
SQL 2022	0	Mainstream Support until 10/2028	01/11/33	3191	Low	0
SQL Total	**21**					

aws migrations

These are fictitious numbers for the purpose of example/illustration.

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Next Steps

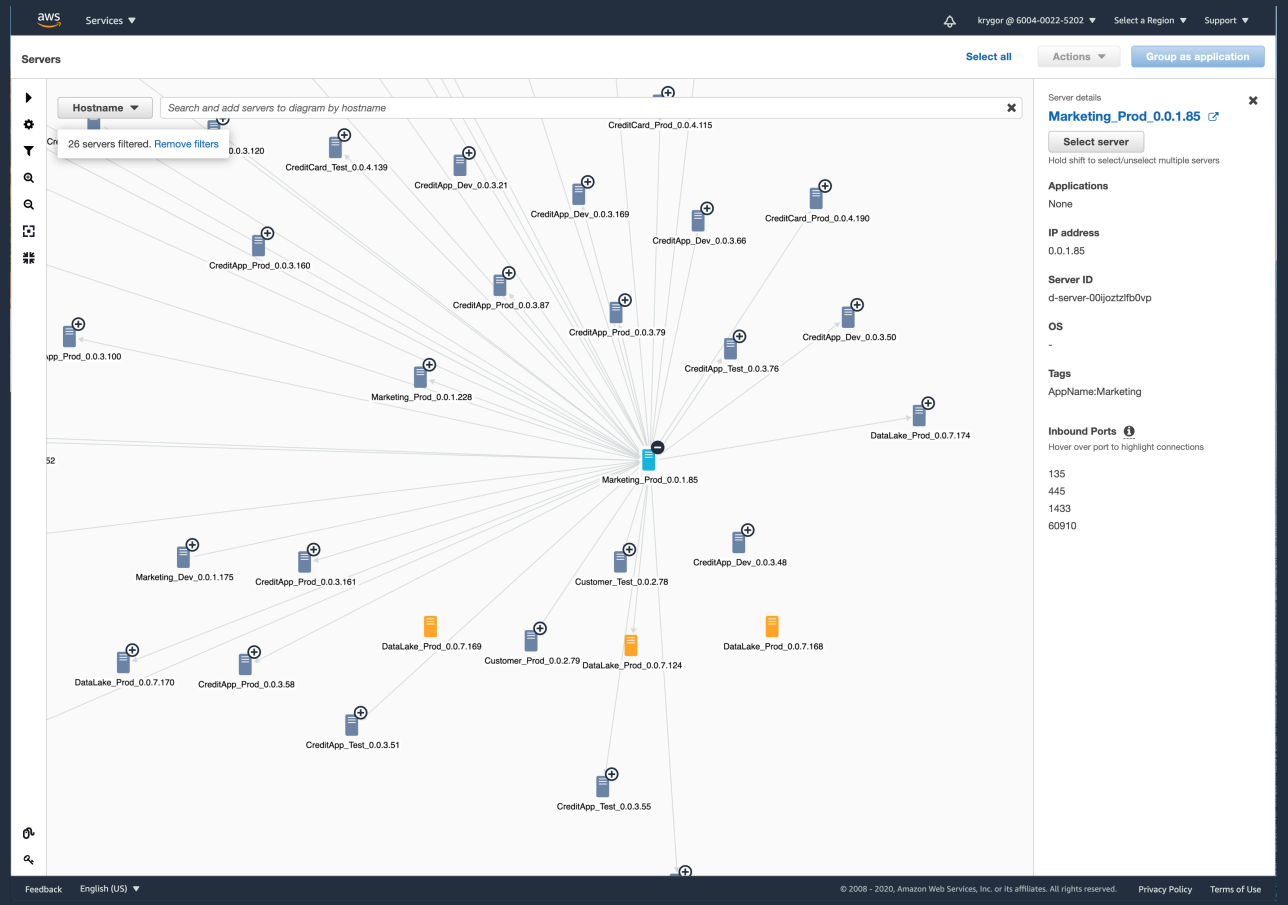
Next Steps – Server Dependency Mapping

Migration Evaluator integrates the discovery of on-premises resources used for a business case with Migration Hub's Server Dependency Mapping. By collecting network Transmission Control Protocol (TCP) connections you can identify server-to-server dependencies which provides the needed foundation to make sound digital transformation decisions.

1. Setup your AWS Migration Hub account

2. Install and deploy the Migration Evaluator Collector (or add configuration to your existing installation)

3. Use AWS Migration Hub to visualize, group and tag servers



aws migrations

Next Steps – Acceleration Programs

Simplify cloud adoption and gain cloud benefits sooner with tools and proven methodologies based on AWS's experience of migrating thousands of enterprise customers. Work with your account team to engage with these (and other) programs to accelerate your cloud journey.

Migration Acceleration Program (MAP)

- For customers with incremental AWS adoption exceeding $500K annually
- A comprehensive and proven methodology based on the experience of migrating hundreds of enterprise customers.
- Tools that reduce costs and automate and accelerate execution, tailored training approaches and content

AWS Windows Migration Accelerator

- Up to $200 credit per migrated Windows server (min. 40 servers migrated per month, including partner-assisted)
- Offset double bubble migration costs
- Automated qualification when using AWS Application Migration Service (MGN)

aws migrations

Next Steps – Run a Complimentary Storage Assessment

Simplify storage discovery and map workloads to the best-fit AWS services. Realize potential savings up to 69% of on-premises storage costs by running a Storage Assessment.

- Are you running Network Attached Storage or File Servers (Windows/Linux)?
- Do you have SAN attached storage for Application and Database workloads?
- Want recommendations for the most appropriate AWS Storage service for your workloads based on capacity and performance?

Consider running a **complimentary** storage assessment with **Migration Evaluator** that includes your block, file, object and backup requirements.

How does it work?

1 Source Devices

- SAN arrays
- Network storage
- Object storage
- Backup appliances/tapes
- Virtual environment
- Physical/virtual file servers
- HPC environment

2 Data Collection

- Agentless data collection or provide existing data in a simple template
- Leverage data from Migration Evaluator, RVTools, Cloudamize, ModelizeIT and other tools
- 7-60 days discovery

3 Report Out

- Directional cost analysis
- Detailed Excel report
- Storage mapped to services including:
  - Amazon EBS
  - Amazon FSx
  - Amazon S3
  - AWS Backup
  - AWS Storage Gateway
- Inactive volumes identified

Engage your AWS Account team to initiate a storage assessment or contact us at migration-assessment@amazon.com.

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Next Steps – Licensing Health Check

- Need help determining your BYOL use rights for Windows & SQL Server?
- Understand the Pros/Cons & costs of bringing existing Microsoft volume licenses versus using AWS License Included
- Optimize your Windows & SQL footprint in AWS
- Consider running an independent AWS funded “Licensing Health Check” assessment with one of our expert licensing consulting partners

Next Steps – Other Recommendations

AWS Training & Certification

Build confidence by validating your cloud expertise with an industry-recognized credential to lead cloud initiatives using AWS.

AWS Managed Services (AMS)

Optimize your cloud infrastructure and security operations through 24x7 proactive monitoring, incident management, automation, and execution of operational best practices.

Microsoft on AWS Cost Optimization (MACO)

A collection of cost optimization strategies for Microsoft workloads running on AWS services and for tracking cost optimization with AWS tags.

Datacenter Divest

Learn how we can make the transition to AWS as stress free as possible by creating innovative deals for customers through Data Center, Colo, IT and IPv4 Divestiture.

Thank you!

Appendix

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On-Premises Annual Cost Estimation

Included in On-Premises Cost Estimation

- Compute: Server, OS and SQL licensing
- VMware (if applicable): VMware Cloud Foundation
- Storage: Server volume
- Network: Hardware, software, and bandwidth
- Facilities and Maintenance costs

Excluded in On-Premises Cost Estimation

- Employee costs
- Migration tools
- Professional services
- Shared storage

Parameter	On-Premises Cost
Compute	$1,652,588
Storage	$309,585
Network	$93,614
Annual Total	**$2,055,786**

Currency is in USD, annually, based on a 5-year hardware refresh cycle. Industry average benchmark costs were used for calculating on-premises estimations.

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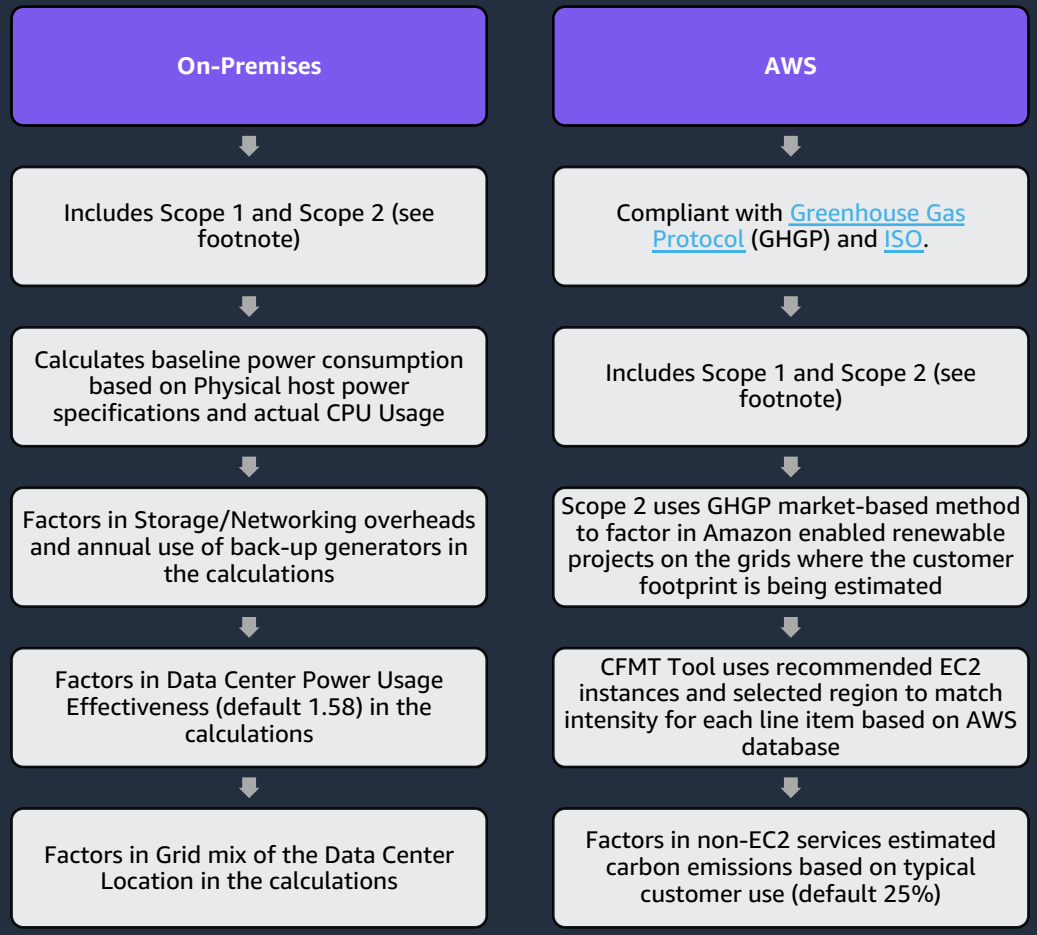
These are fictitious numbers for the purpose of example/illustration.

Sustainability: Carbon Estimation Methodology



The GHG Protocol Corporate Standard classifies a company's GHG emissions into three 'scopes'. Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy.

Windows & SQL Server Licensing Rules on AWS

*Licensing options on AWS for Microsoft Migrations

Licenses purchased **BEFORE Oct 1, 2019**, or as part of a true up on an Enterprise enrollment with an effective date prior to 10/1/2019

	Windows Server	SQL Server
If the licenses **have** Software Assurance		
1. Move licenses to default (shared) tenant EC2?	✗	✓
2. Move licenses to EC2 Dedicated Hosts?	✓	✓
If the licenses **Do Not have** software Assurance		
1. Move licenses to default (shared) tenant EC2?	✗	✗
2. Move licenses to EC2 Dedicated Hosts?	✓	✓

*Based on Microsoft's publicly available Product Terms

Licenses purchased **AFTER Oct 1, 2019**, that are not part of a true up on an Enterprise enrollment with an effective date prior to 10/1/2019*

	Windows Server	SQL Server
If the licenses **have** Software Assurance		
1. Move licenses to default (shared) tenant EC2?	✗	✓
2. Move licenses to EC2 Dedicated Host?	✗	✓
If the licenses **Do Not have** Software Assurance		
1. Move licenses to default (shared) tenant EC2?	✗	✗
2. Move licenses to EC2 Dedicated Host?	✗	✗

- Renewing software assurance on a perpetual Microsoft license as part of a renewal will not change the “purchase date” for any server license purchased prior to 10/1/19
- SQL Server, Exchange, SharePoint & Remote Desktop Services retain their License Mobility Rights and can run in any AWS environment with active software assurance

aws migrations

SQL Server Edition Downgrade Recommendations

Review SQL Enterprise features in use for potential downgrade:

- SQL feature detection script created by AWS (Supports workloads on-premises or Amazon EC2)
- AWS Compute Optimizer Commercial License Recommendations (Supports workloads on Amazon EC2 only)

SQL Enterprise features that are queried:

- Online index rebuild used outside DB maintenance plan
- Read replicas of availability group
- Asynchronous replica of availability group
- Resource governor
- R and python extension
- Memory optimized tempdb metadata
- More than 128 GB of memory
- More than 48 vCPUs
- Asynchronous mirroring
- Database level features

SQL License cost comparison on r6i.xlarge*	
Enterprise vs Standard	55% cost reduction
Enterprise vs Web	77% cost reduction
Enterprise vs Developer	100% cost reduction

Consider leveraging SQL Server Developer edition for 100% cost reduction in Microsoft Licensing for SQL Server in Development Environments (52% reduction with compute costs factored in).

**Cost reductions shown for Virginia*

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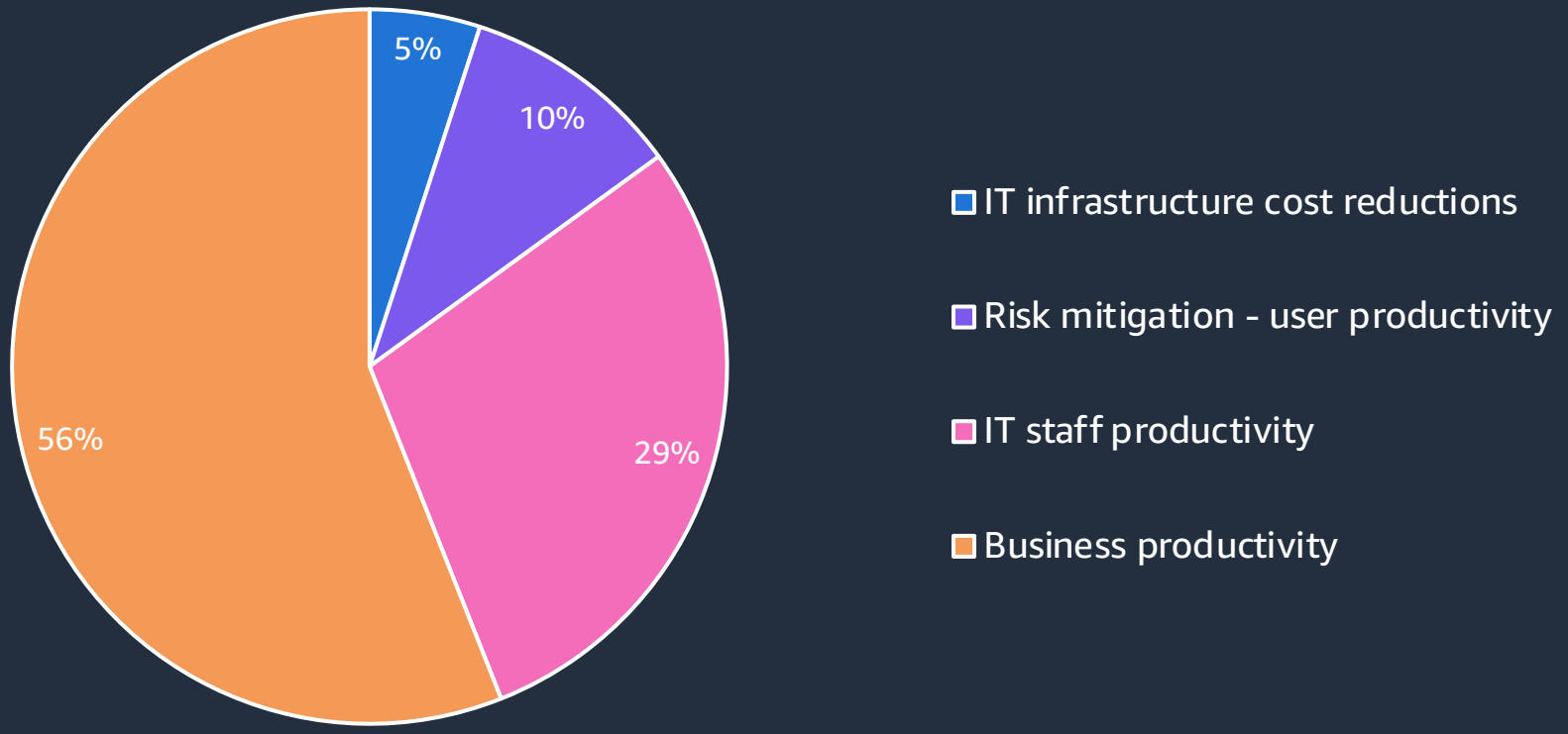
Where does Cloud Business Value come from?

IDC: NON-TCO DRIVERS CONSTITUTE OVER 90% OF ECONOMIC BUSINESS VALUE

Distribution of economic benefits from moving to AWS



The Business Value of Amazon Web Services, IDC Research, Inc., June 2022

AWS Premium Support Plans

Business	Enterprise
Case Severity/Response Times General guidance: < 24 hours System impaired: < 12 hours Production system impaired: < 4 hours Production system down:< 1 hour	**Case Severity/Response Times** General guidance: < 24 hours System impaired: < 12 hours Production system impaired: < 4 hours Production system down: < 1 hour Business-critical system down: < 15 mins
Infrastructure Event Management (Available for additional fee)	**Infrastructure Event Management**
AWS Service Guidance Contextual guidance based on your use case	**AWS Service Guidance** Consultative review and guidance based on your applications
	Account and Billing Full Concierge Support (proactive)
	Architecture Review
	Cost Optimization
	Operational Review
	Strategic Business Review
	Technical Account Manager (Designated TAM**)**
	TAM-assisted case escalation
	TAM Office Hours

Pricing	
Business	Enterprise
Minimum spend of $100 - or - 10% of monthly AWS charges for the first $0 – $10K 7% of monthly AWS charges from $10K – $80K 5% of monthly AWS charges from $80K – $250K 3% of monthly AWS charges over $250K	Minimum spend of $15,000 - or - 10% of monthly AWS charges for the first $0 – $150K 7% of monthly AWS charges from $150K – $500K 5% of monthly AWS charges from $500K – $1M 3% of monthly AWS charges over $1M

To learn more about AWS Support, reach out to your AWS account team or visit the [AWS Support page]

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Glossary

Right-Sizing	A key mechanism and process of matching instance types and sizes to your workload performance and capacity requirements at the lowest possible cost. It's also the process of looking at deployed instances and identifying opportunities to eliminate or downsize without compromising capacity or other requirements, which results in lower costs.
Direct Match	A direct match or "lift and shift" is an Amazon EC2 deployment strategy where you migrate to an EC2 instance that closely matches the on-prem servers current provisioning specifications.
NURI	No Upfront Reserved Instances – a purchase option for AWS Reserved Instances (https://aws.amazon.com/aws-cost-management/aws-cost-optimization/reserved-instances/)
AURI	All Upfront Reserved Instances – a purchase option for AWS Reserved Instances (https://aws.amazon.com/aws-cost-management/aws-cost-optimization/reserved-instances/)
Shared Tenancy	Shared tenancy is the default tenancy for Amazon EC2 instances that launch in a virtual private cloud (VPC). It means that multiple EC2 instances from different customers may reside on the same piece of physical hardware. You can change the default tenancy of a virtual private cloud (VPC) from default (shared) to a Dedicated Host.
Dedicated Host	Allow you to use your eligible software licenses from vendors such as Microsoft and Oracle on Amazon EC2, so that you get the flexibility and cost effectiveness of using your own licenses, but with the resiliency, simplicity and elasticity of AWS. An Amazon EC2 Dedicated Host is a physical server fully dedicated for your use, so you can help address corporate compliance requirements. You can use your existing per-socket, per-core or per-VM software licenses.
Mixed Tenancy	An EC2 deployment strategy to combine both Shared (Default) tenancy along with Dedicated Hosts.
BYOL	If you've already purchased Microsoft software, you have the option to bring your own licenses (BYOL) to the AWS Cloud (subject to Microsoft license terms). With the BYOL experience, customers can easily bring and manage their existing licenses for Microsoft Windows Server and SQL Server to AWS.
LI	License Included - allows you access to fully compliant Microsoft software licenses bundled with Amazon EC2 or Amazon RDS instances and pay for them as you go with no upfront costs or long-term investments. You can choose from Amazon Machine Images (AMIs) with just Microsoft Windows Server, or with Windows Server and Microsoft SQL Server pre-installed.
Zombie	Zombies are servers that did not exceed the minimum CPU utilization threshold (5% for bare metals or 300 MHz for VMs) for any 15 minute period duration data collection. Often these are machines that can be excluded from migration scope as they may not need to move to AWS.
Licensing Health Check	Refer to Slide 33 - Comparison of owned licenses versus required licenses - to be included in upcoming vendor license agreement discussion. Microsoft License Statement required
EC2	Amazon Elastic Compute Cloud - over 600 instance types and choice of the latest processor, storage, networking, operating system, and purchase model to help you best match the needs of your workload (https://aws.amazon.com/ec2/)
EBS	Amazon Elastic Block Store - an easy-to-use, scalable, high-performance block-storage service designed for Amazon EC2 (https://aws.amazon.com/ebs/)
SSD	Solid-state storage device
HDD	Hard disk drive