

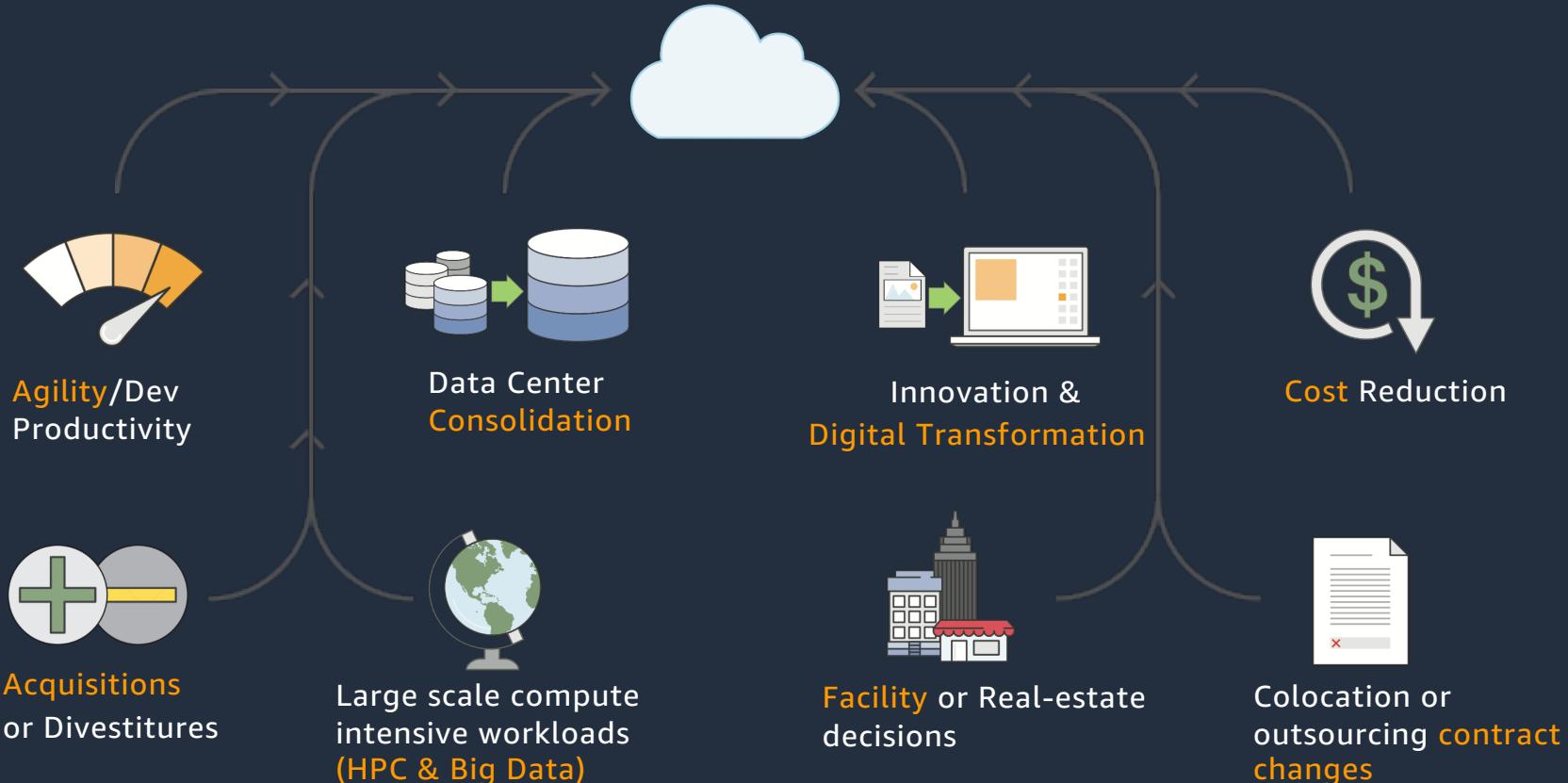


Cloud Migration Workshop

Clifford Duke
Solutions Architect
2019-10-29

Migrations overview

Common migration drivers



Potential barriers to cloud adoption

Possible challenges to migrating quickly and cost-effectively



Existing investments



Upfront expenses



Skeptical stakeholders



Application interdependencies



Concerns of downtime during migration



Lack of cloud expertise

Elements of a **Successful Journey**



Executive Sponsorship

Align on business requirements; bring all stakeholders with you



Cloud-First Strategy

Create your vision; incentivize team members to follow your lead



Organizational Change

Define new operating models, policies, processes, economics; provide training



Adoption Roadmap

Start small and iterate, measure, manage and update plan



Cloud Center of Excellence

Provide centralized expertise; guide decentralized innovations



Principles & Standards

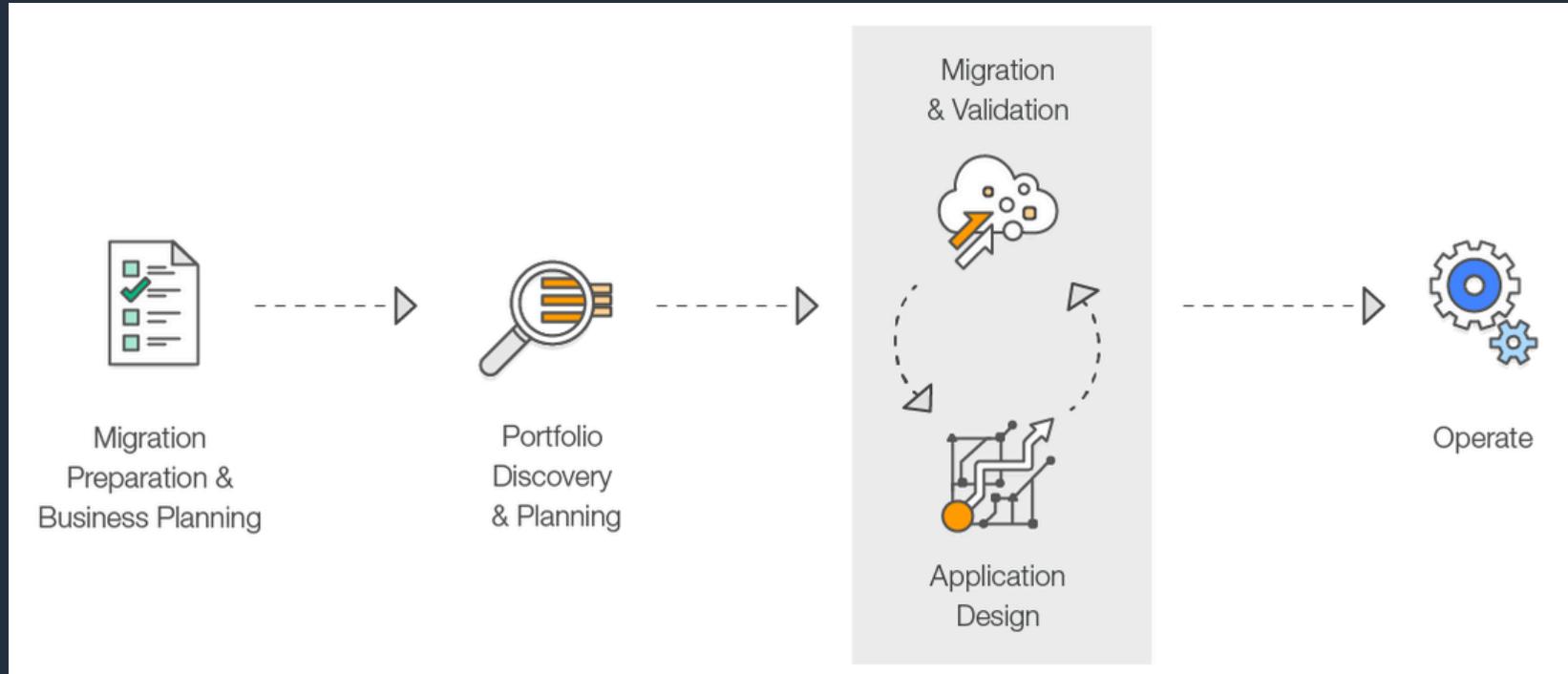
Publish guidance and guard rails for how to adopt cloud successfully



Experiment

Define Architectures, patterns, governance; measure, monitor, iterate

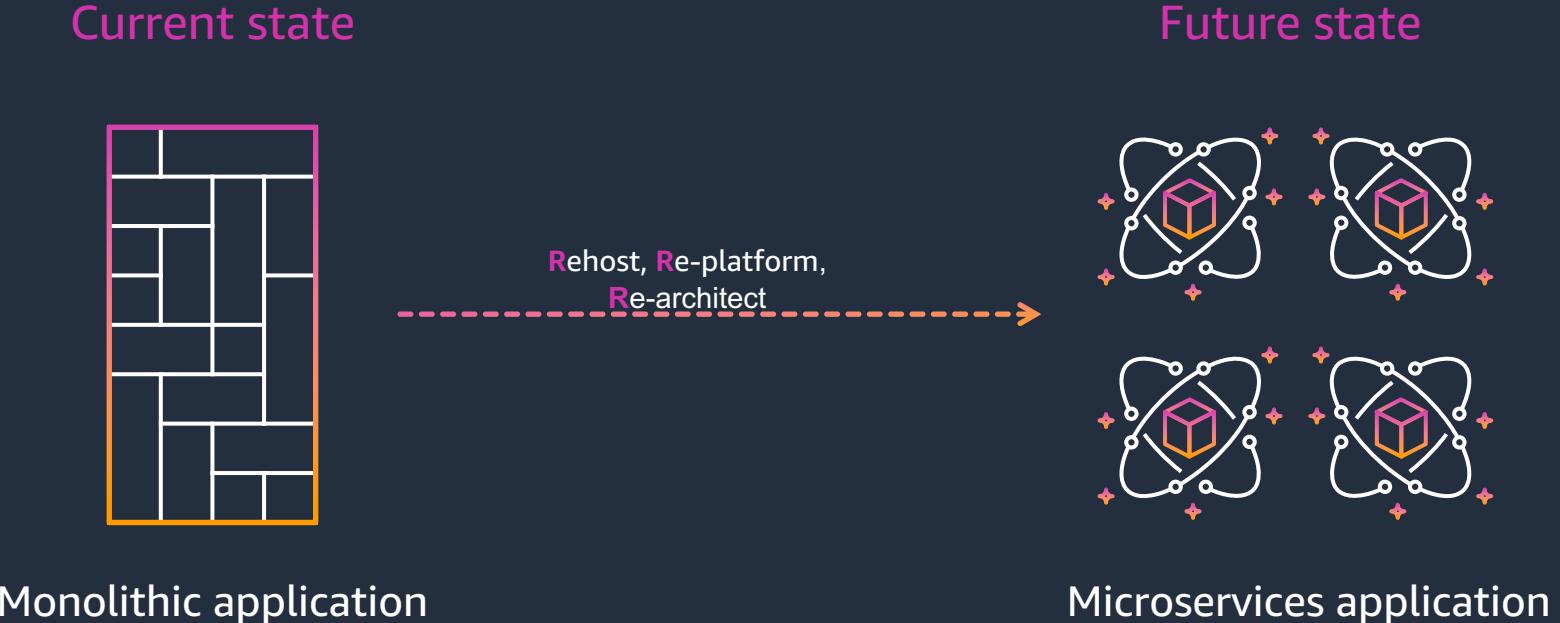
The Migration Process



How - Migration planning



Modernization



Re-host

Any VM to AWS EC2

Re-host



Virtual machines



Right size on AWS VMs

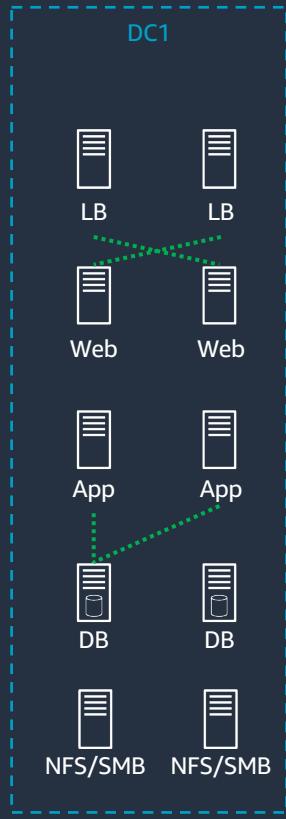
Pros:

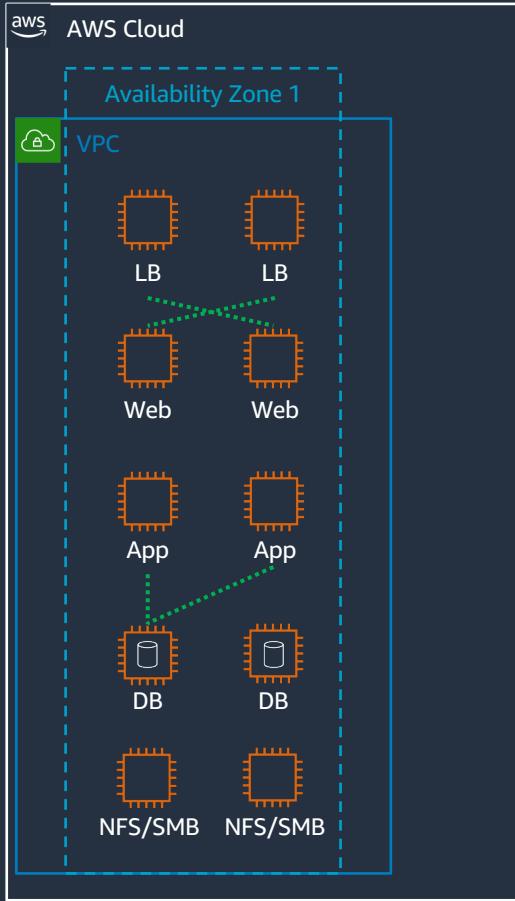
- Usually the fastest migration strategy
- No architectural modifications

Cons:

- Miss most “cloudy” benefits of target platform—both technical and financial

On-premise / Colocation





Capabilities

Choice of processor*
(AWS, Intel, AMD)

Fast processors
(up to 4.0 GHz)

High memory footprint
(up to 24 TiB)

Instance storage
(HDD and NVMe)

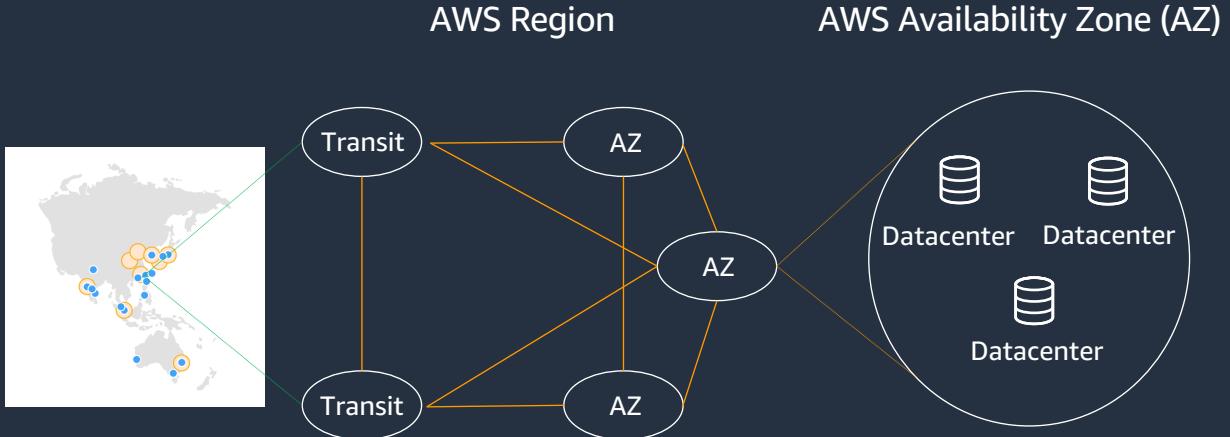
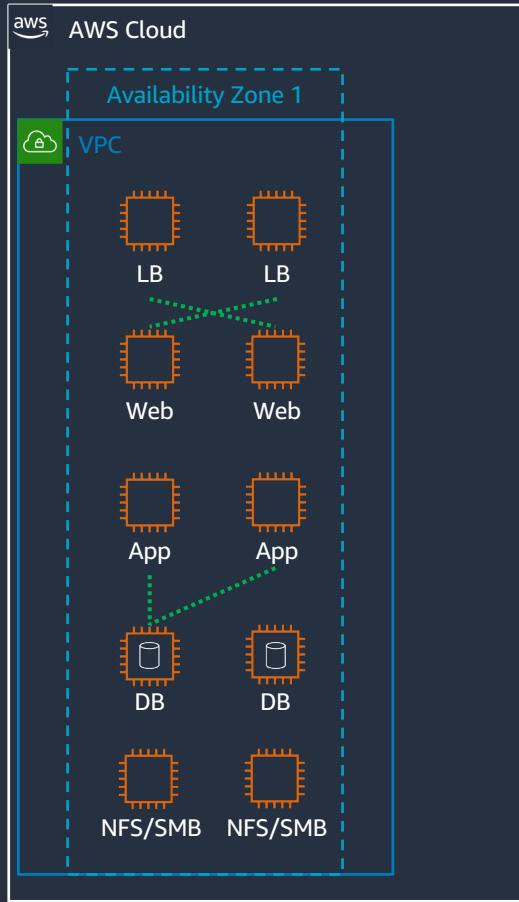
Accelerated computing
(GPUs and FPGA)

 Networking
(up to 100 Gbps)

Bare Metal

Size
(Nano to 32xlarge)

175
instance types
for virtually
every workload
and business need



AWS Region

AWS Availability Zone (AZ)

A Region is a physical location in the world where we have multiple **Availability Zones**.

Availability Zones consist of one or more discrete data centers, each with redundant power, networking, and connectivity, housed in separate facilities.



AWS Cloud



Re-platform

Load balancer to NLB/ALB, RDMS to AWS RDS

Re-platform options



Managed
virtual machines



Containers



Managed
Database



Managed
File server

.....

Pros:

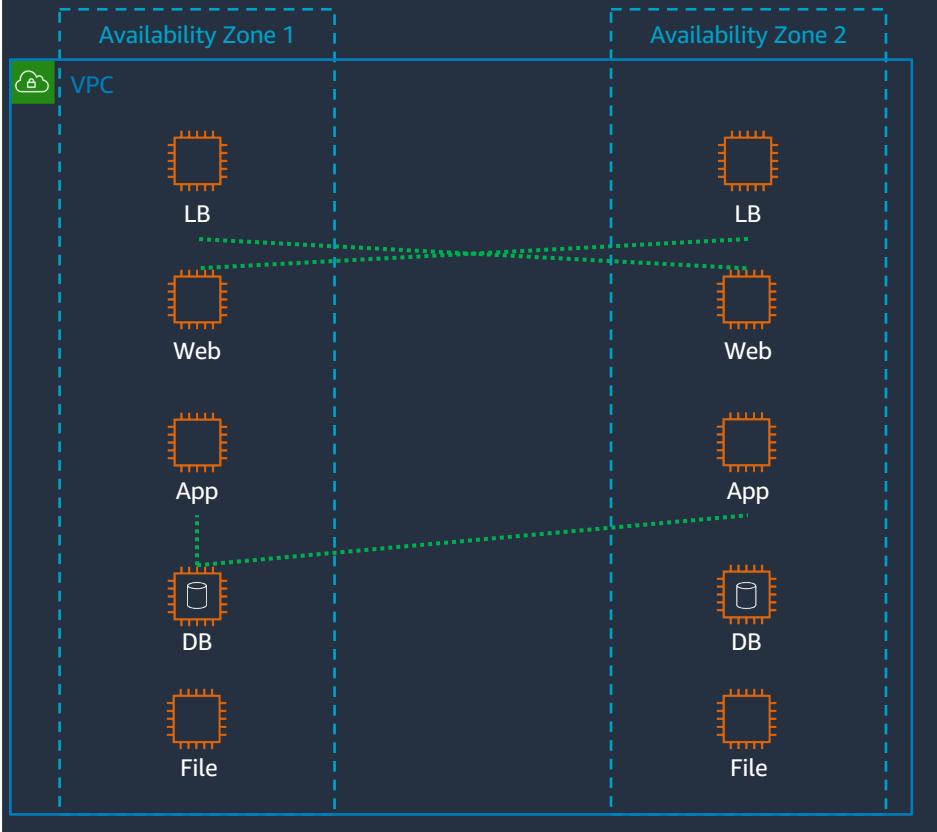
- Realize some benefits of cloud platform
- Minimal architectural modifications

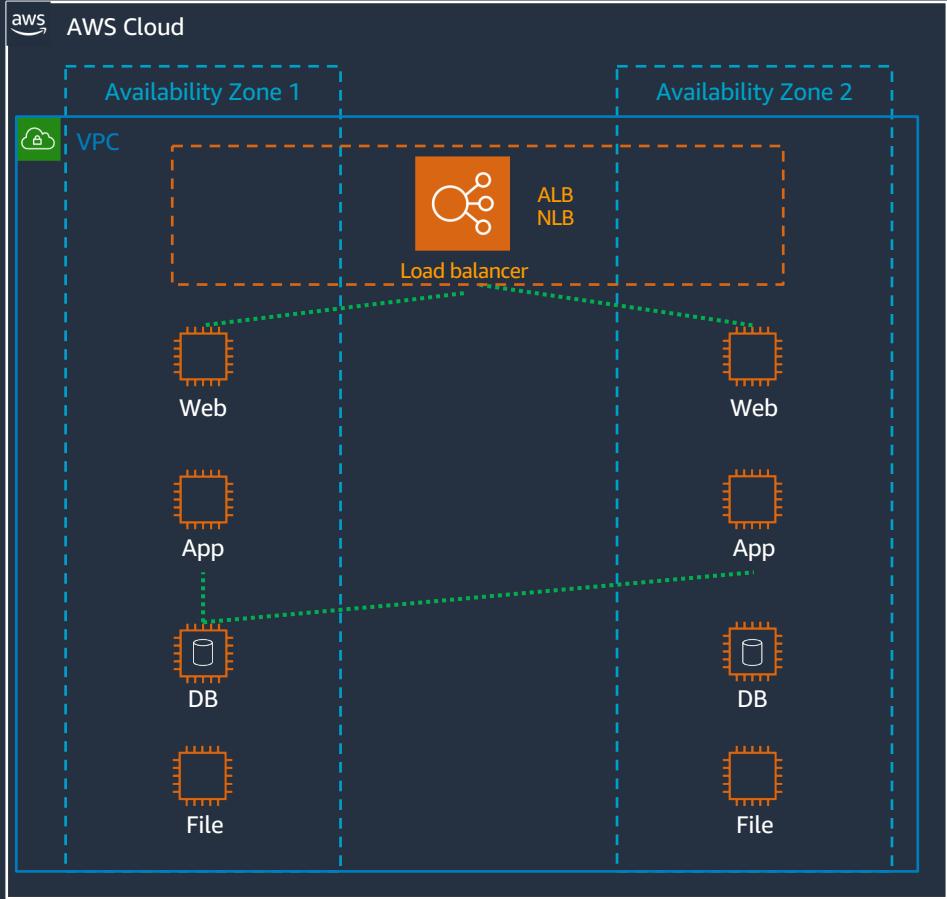
Cons:

- Can be some rework required



AWS Cloud

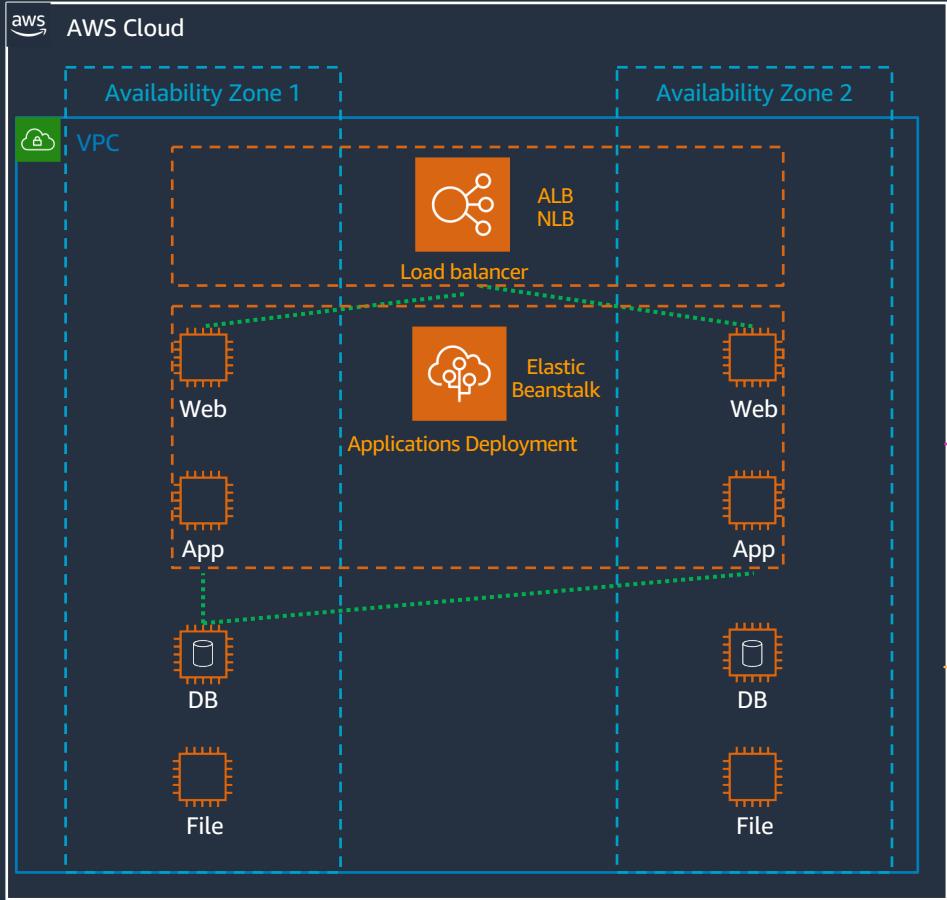




ALB/NLB

Application Load Balancer
Network Load Balancer

high availability, automatic scaling, and robust security



Elastic Beanstalk

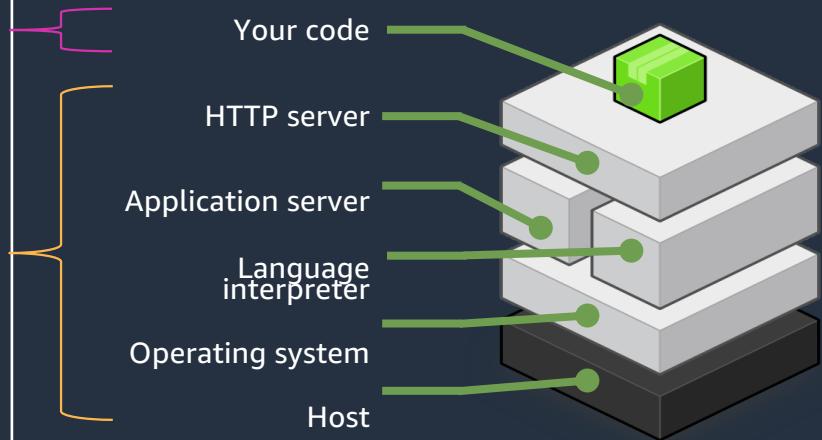


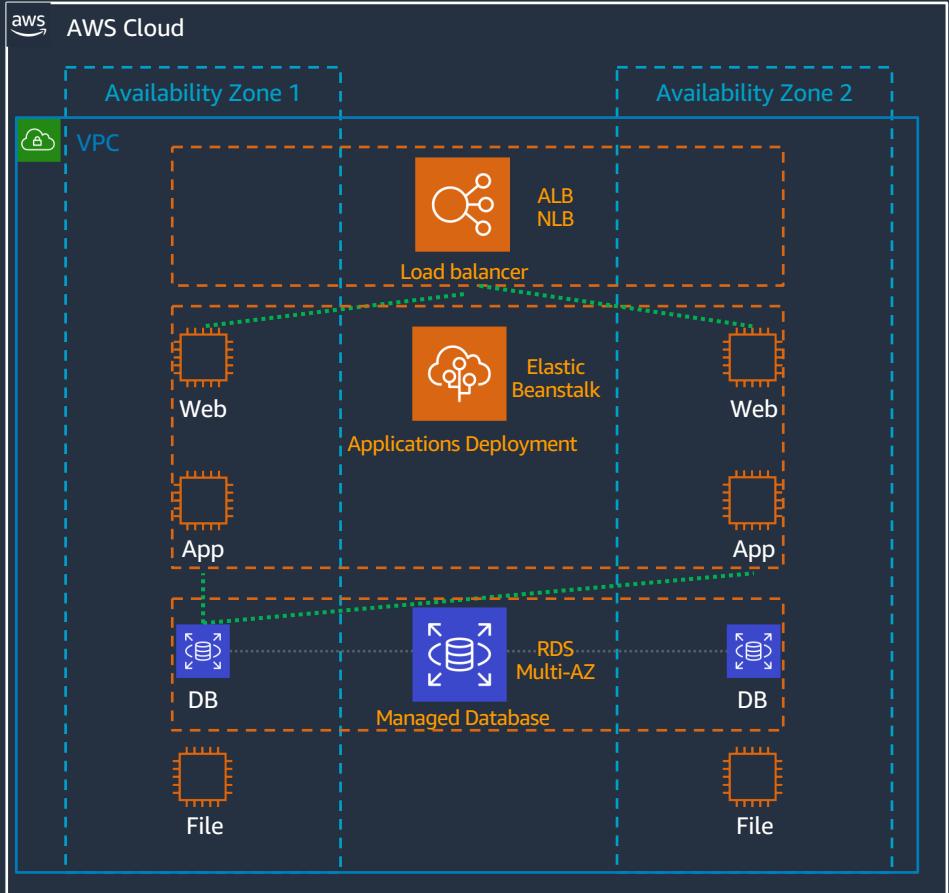
Provided by you



Provided and managed by Elastic Beanstalk

Runtime: Java, .NET, PHP, Node.js, Python, Ruby, Go, and Docker





RDS



Managed by you



Managed by AWS

You manage

EC2

App optimization
Scaling
High availability
Database backups
DB s/w patching
DB s/w install
OS patching
OS installation
Server maintenance
Hardware lifecycle
Power/HVAC/Network

AWS manages

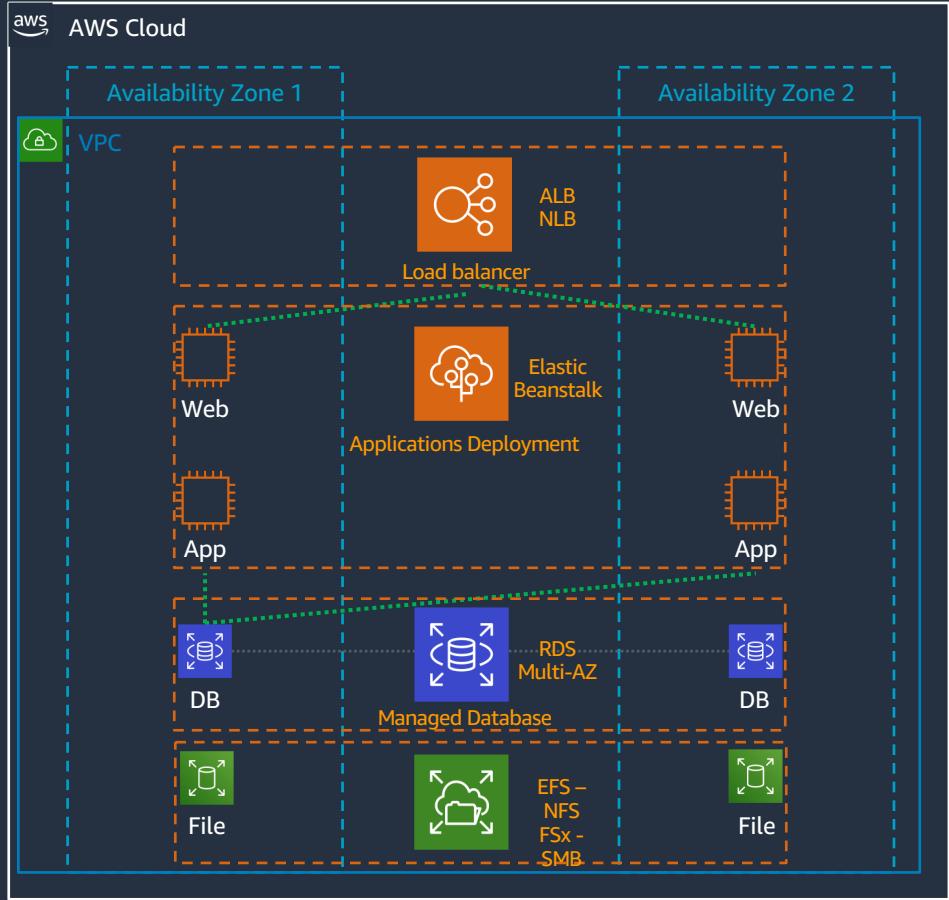
RDS

App optimization
Scaling
High availability
Database backups
DB s/w patching
DB s/w install
OS patching
OS installation
Server maintenance
Hardware lifecycle
Power/HVAC/Network

MAZ RPO = 0, RTO = 60-90 sec

Scale, patches with 60-90 sec downtime

Performance, single node mysql 5.6 16x 25k Write, 300k Read



EFS/FSX



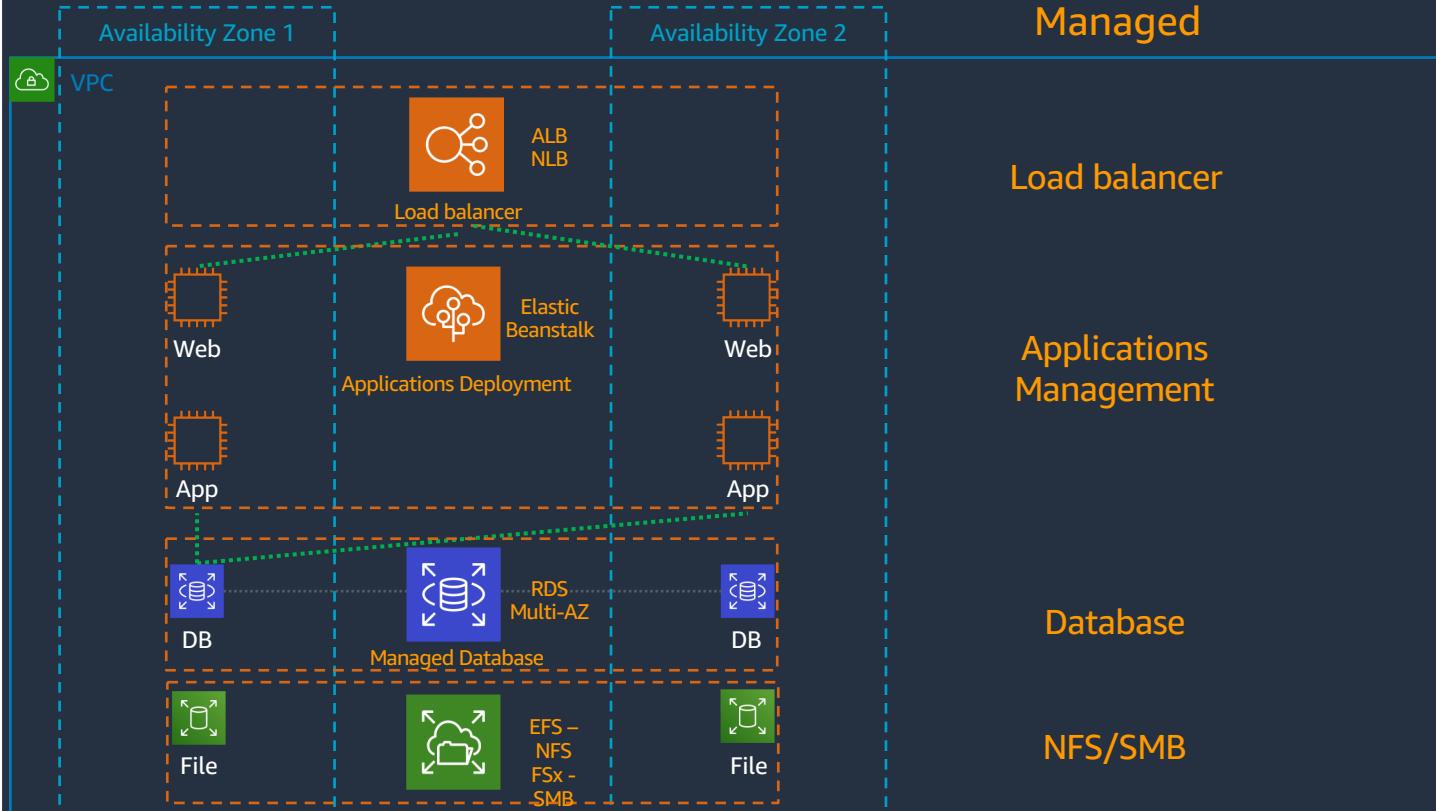
Amazon FSx for Windows
File Server



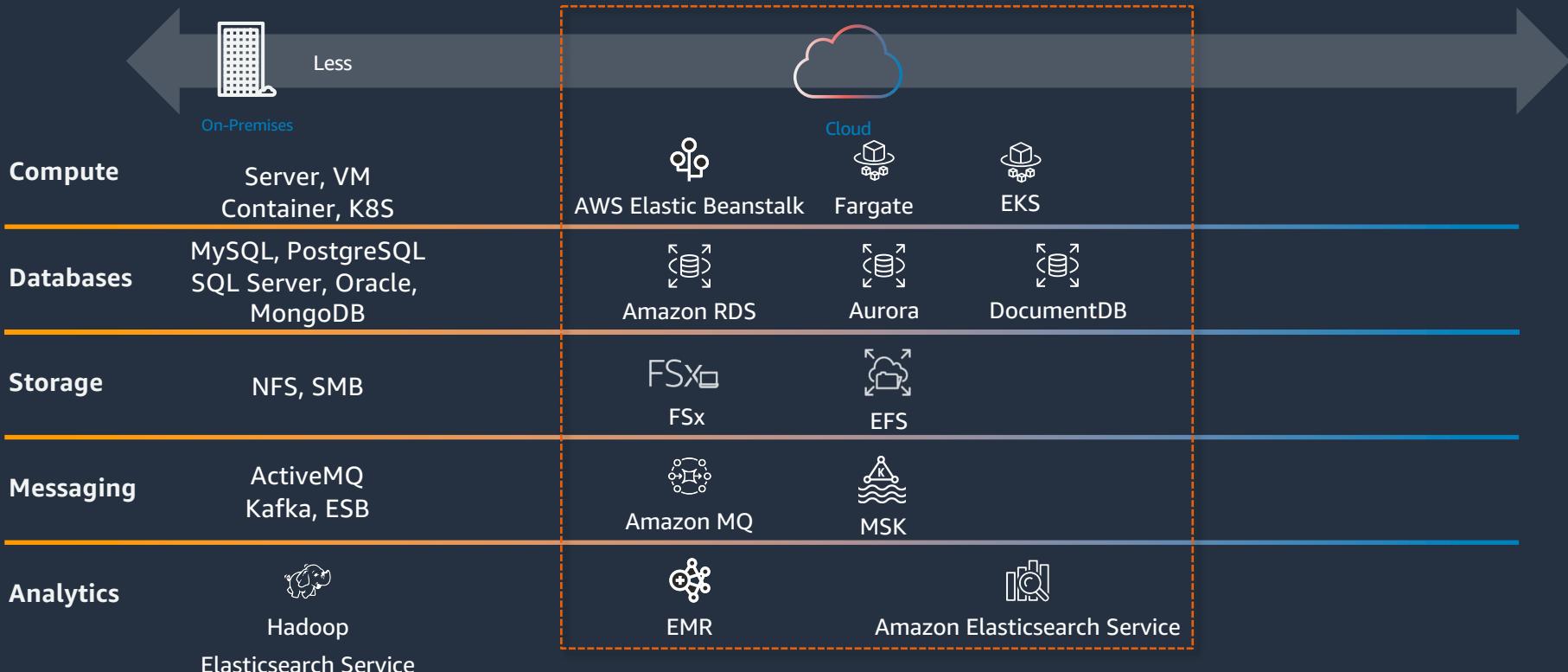
Amazon EFS
Linux/NFS File
Storage



AWS Cloud

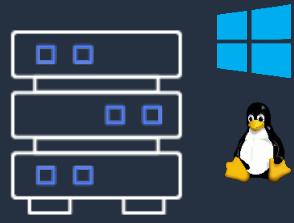


Re-platform options



Re-architect Cloud native architecture

Re-architect options



CONTAINERS



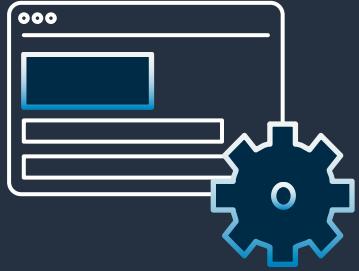
SERVERLESS

Pros:

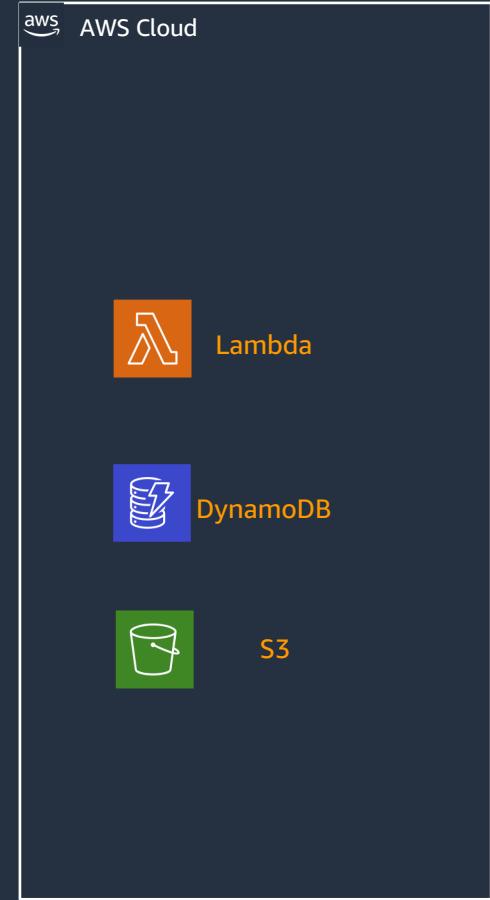
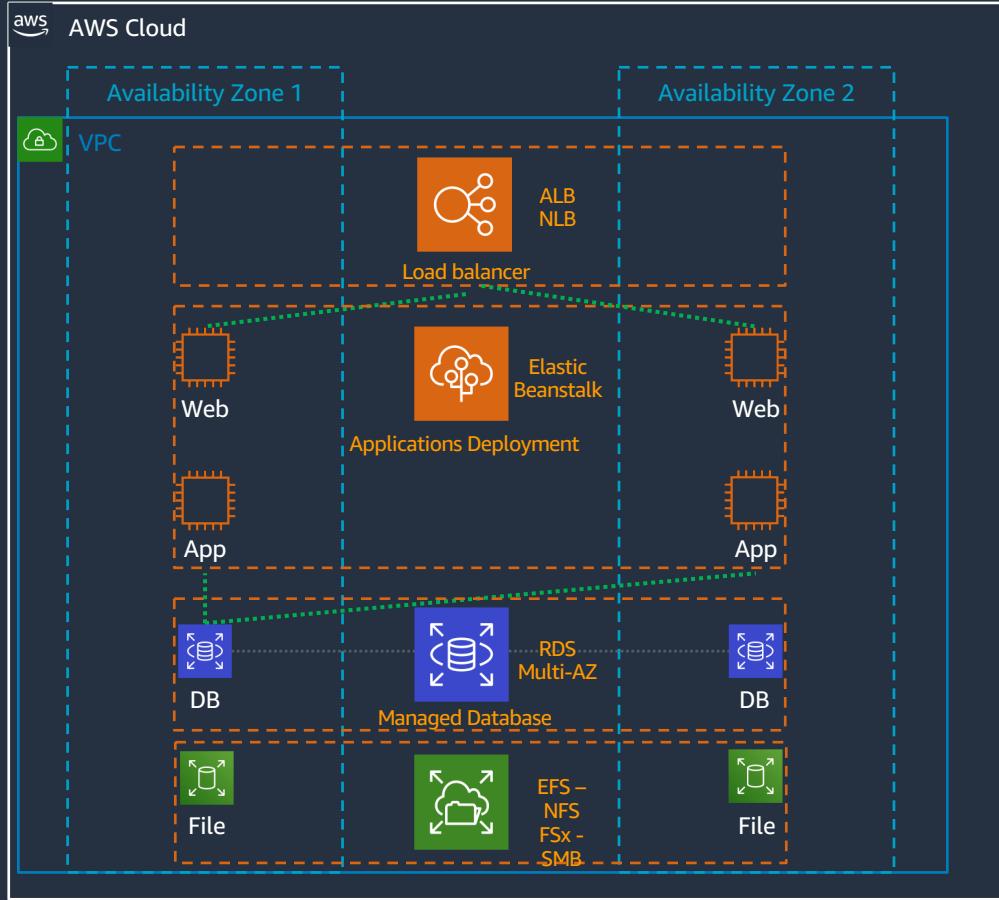
- Realize full potential of target cloud platform

Cons:

- Requires the largest investment and level of effort to realize

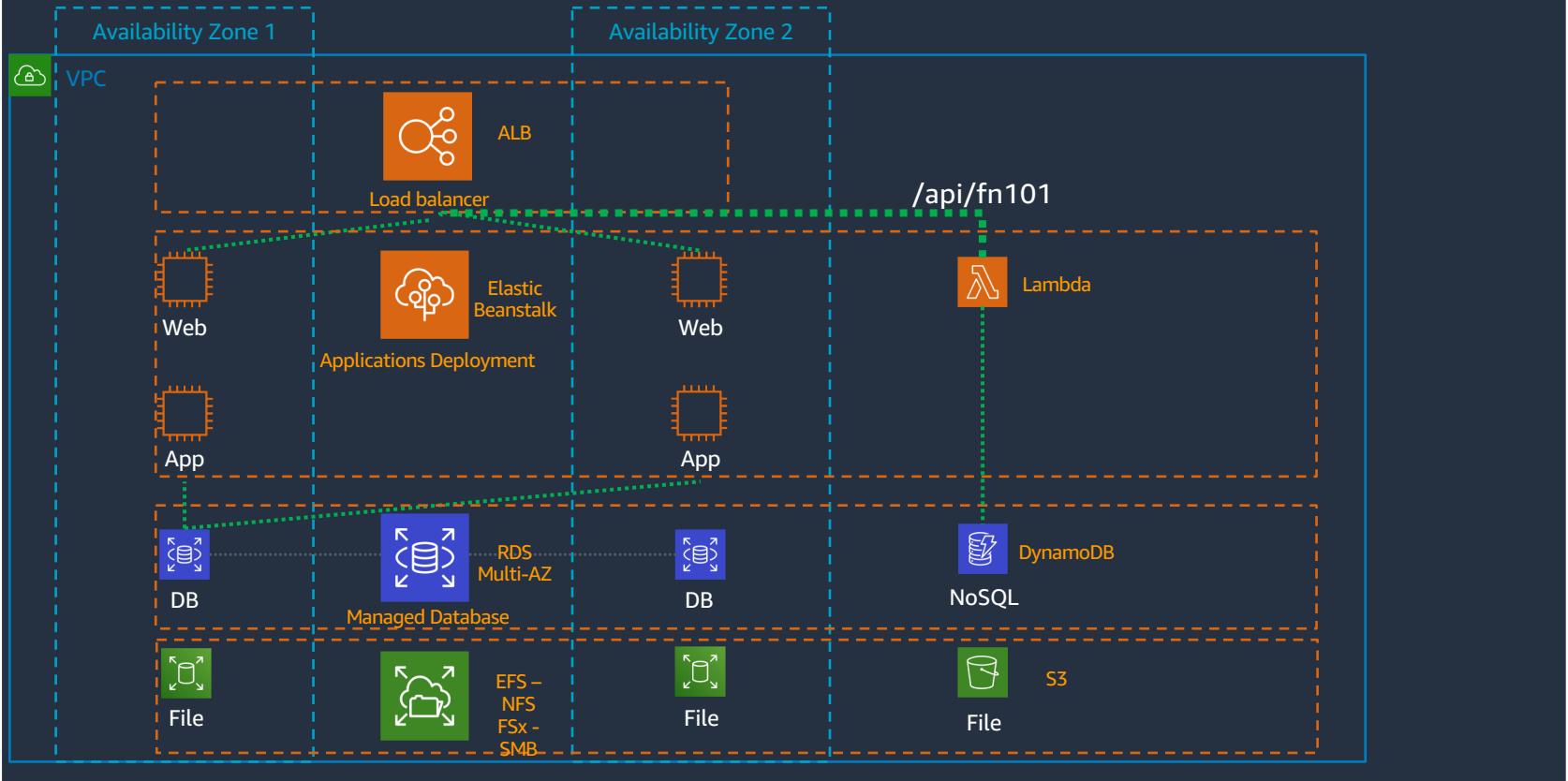


Modernize Compute and Operation



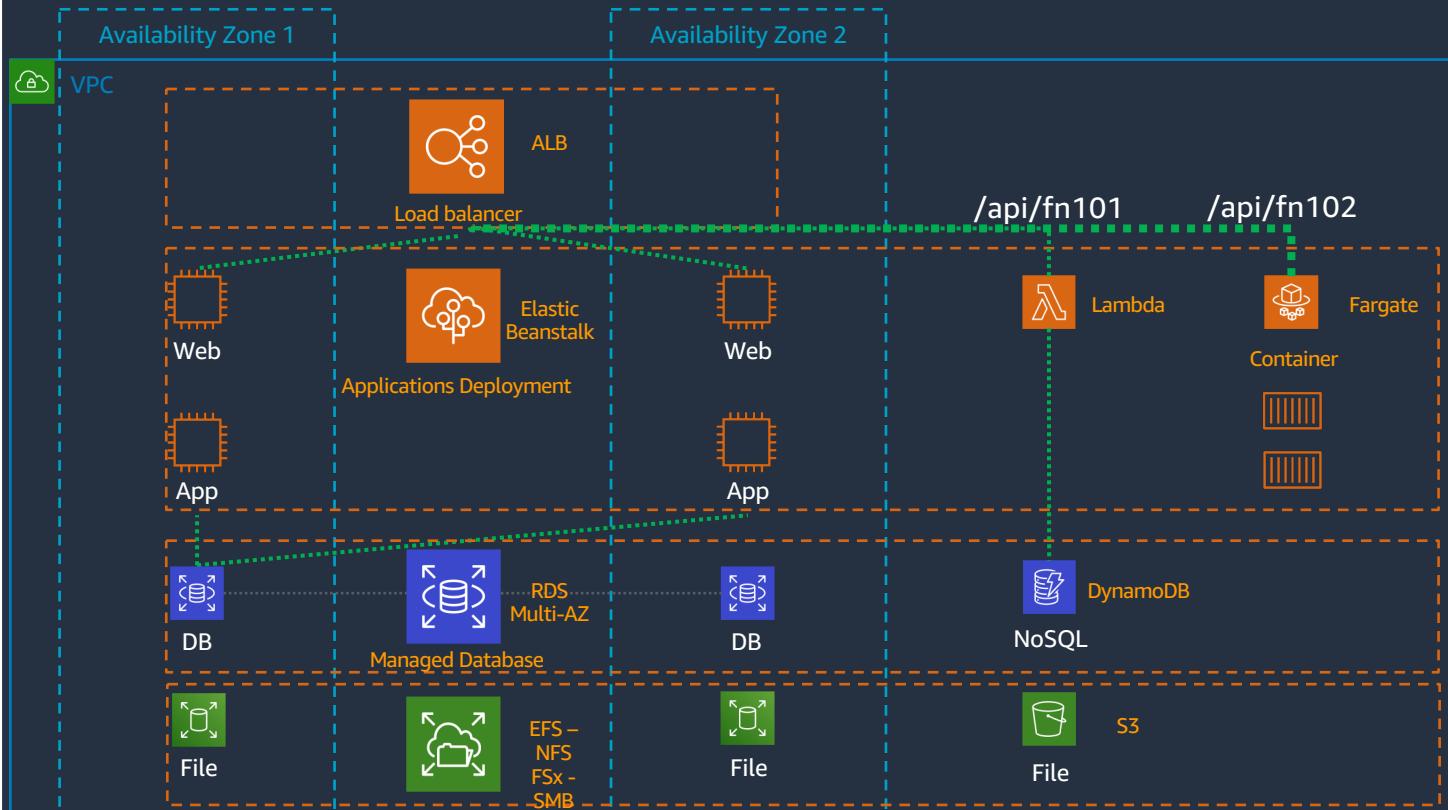


AWS Cloud





AWS Cloud



Decouple state from code using messaging

Messaging



Amazon Simple Queue Service



Amazon Simple Notification Service



Amazon CloudWatch Events



Amazon EventBridge

Queues

Simple
Fully managed
Any volume

Pub/sub

Simple
Fully managed
Flexible

Synchronization

Rapid
Fully managed
Real-time

Event bus

A serverless event bus service for SaaS and AWS services

Data stream capture



Amazon Kinesis Data Streams



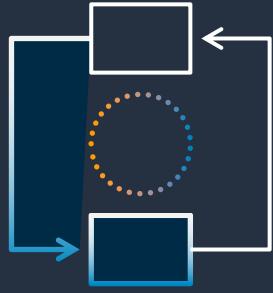
Amazon Dynamo DB

Ingest

Data streams
Data processing
Real-time

Data Store

Microservices
Performance at scale
Fast and flexible



Modernize Datastore

Customers are migrating their workloads to AWS



verizon

Trimble

RYANAIR

SAMSUNG

intuit

EQUINOX

D

DOW JONES

Verizon is migrating over 1,000 business-critical applications and database backend systems to AWS, several of which also include the migration of production databases to Amazon Aurora.

Trimble migrated their Oracle databases to Amazon RDS and project they will pay about 1/4th of what they paid when managing their private infrastructure.

By migrating from Microsoft SQL Server to Amazon Aurora, Ryanair can run one of the largest email campaigns in Europe with higher performance at a fraction of the cost, sending out 22 million emails daily to customers.

Samsung Electronics migrated their Cassandra clusters to Amazon DynamoDB for their Samsung Cloud workload with 70% cost savings.

Intuit migrated from Microsoft SQL Server to Amazon Redshift to reduce data-processing timelines and get insights to decision makers faster and more frequently.

Equinox Fitness migrated its Teradata on-premises data warehouse to Amazon Redshift. They went from static reports to a modern data lake that delivers dynamic reports.

Migrated their Market Data system from SQL Server to Aurora MySQL using AWS Database Migration Service(DMS) to replicate data nightly. Reduces their processing times from 8 hours to 3 hours.

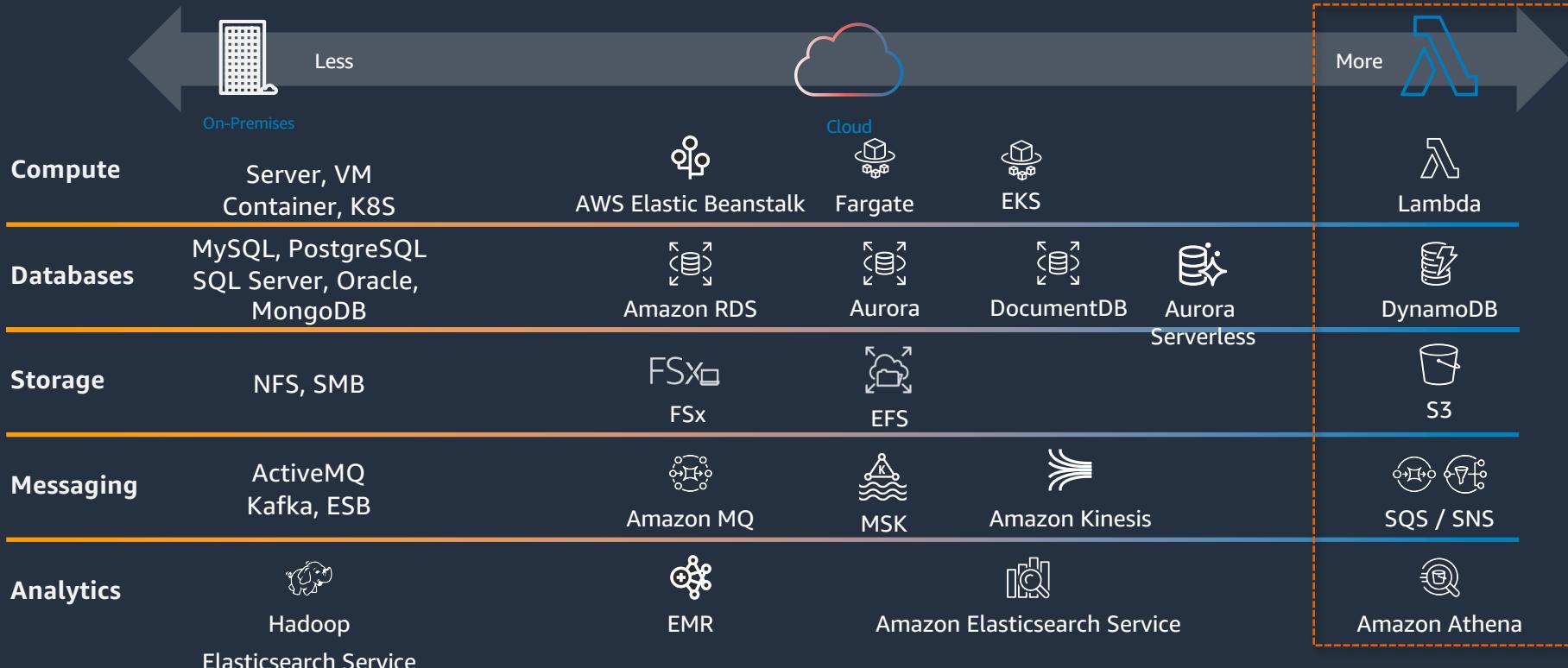
Amazon's Consumer Business Just Turned off its Final Oracle Database



- **75 petabyte** of internal data stored
- Nearly **7,500** Oracle databases
- Cost Reduction – over **60%**
- Performance Improvements - **40%** latency improvement
- Administrative Overhead - **70%**

<https://aws.amazon.com/blogs/aws/migration-complete-amazons-consumer-business-just-turned-off-its-final-oracle-database/>

Re-architect options





Comparing Migration Strategies



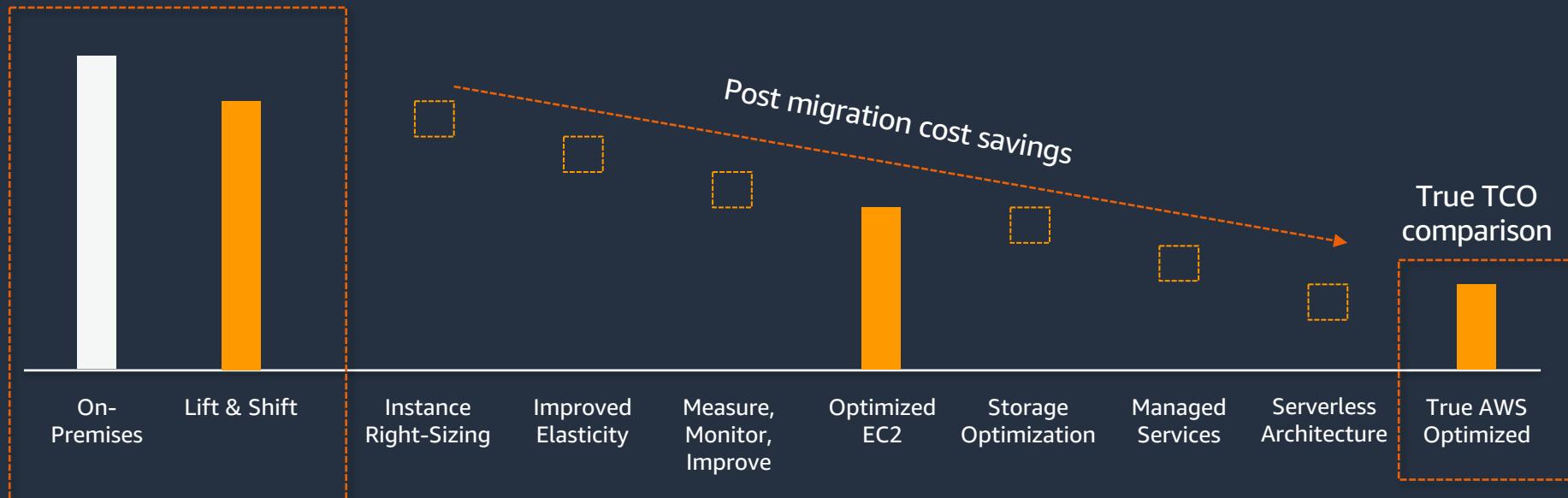
Strategy	Time	Cost	Business Value	# App
Retain	1	1 2 3 4	N/A	5
Retire	1	1	N/A	5
Relocate vmware to VMC	2	2 3	2 3	10
Re-host any to AWS EC2	2	2 3	2 3	20
Re-platform LB to ALB, DB to AWS RDS	3	3 4	3 4	30
Re-purchase SaaS	3	3 4 5	3 4	5
Re-architect Cloud native	5	5 6 7	5 6	30

Migration heatmap



Cost savings improve through optimizations

Typical TCO comparison



Break



AWS Migration Hub



Centralized Tracking



Migration Flexibility



Improved Visibility

AWS Migration Hub

The screenshot shows the AWS Migration Hub dashboard. On the left, a sidebar menu includes options like Dashboard, Discover, Migrate, Help & Support, and Feedback. The main content area features a central banner with the title "AWS Migration Hub" and a subtitle: "Migration Hub simplifies and accelerates discovery and migration from your data centers to the AWS Cloud. Learn more". Below this is a horizontal flow diagram with three steps: "Discover" (yellow), "Migrate" (green), and "Track" (blue). Each step has associated sub-options: "Discover" has "Deploy AWS discovery tools (Optional)"; "Migrate" has "Connect migration tools", "Migrate using connected tools", and "Group servers as applications"; "Track" has "Track status of migrations" and a "View example" link. Below the banner is a large text field asking "What would you like to do?", with two buttons: "Get started with discovery" and "Get started migrating". At the bottom, there are sections for "Integrated discovery tools", "Integrated migration tools", "AWS migration programs", and "Documentation & support". The footer contains links for "Feedback", "English (US)", and standard AWS footer links: "© 2006 - 2018, Amazon Web Services, Inc. or its affiliates. All rights reserved.", "Privacy Policy", and "Terms of Use".

- Migration Hub provides a single location to track the progress of application migrations across multiple AWS and partner solutions
- Using Migration Hub allows you to choose the AWS and partner migration tools that best fit your needs, while providing visibility into the status of migrations across your portfolio of applications

Integrated Migration Tools

With SMS, Import VM images from your existing environment to ready-to-use Amazon EC2 instances

DMS helps you migrate databases to AWS easily and securely

CloudEndure Live Migration provides automated migration to AWS from any physical or virtual infrastructure

ATAmotion auto-migrates live workloads directly to your VPC from any physical, virtual or cloud source, without installing agents.

RiverMeadow Server Migration SaaS provides high performance and secure workload migrations into AWS VPC environments.



AWS Server
Migration Service



AWS Database
Migration Service



CloudEndure®



AWS
Migration Hub

The screenshot shows the AWS Migration Hub console. On the left, there's a sidebar with 'Migration Hub' selected. Under 'Discover', 'Applications' is also selected. The main content area shows the 'Time Tracking App' with a status of 'In-progress'. A description states: 'This is an application to track employee time.' There are four tabs at the top: 'Servers - Inactive (1)', 'Servers - In-progress (4)', 'Servers - Completed (3)', and 'Servers - Error (0)'. Below each tab is a list of servers with their names and migration progress: 'time8.acme.com' (inactive), 'time4.acme.com Racemi' (19%), 'time1.acme.com SMS' (Completed), 'time5.acme.com DMS' (90%), 'time6.acme.com CloudEndure' (Completed), 'time2.acme.com SMS' (in-progress), and 'time3.acme.com SMS' (Completed). At the bottom, there's a table with columns: Server ID, Host/VM name, Tool, Status, Migration result, and Last updated time. The table lists the same seven servers with their respective migration details.

	Server ID	Host/VM name	Tool	Status	Migration result	Last updated time
<input type="checkbox"/>	...485dd3ee	time1.acme.com	SMS	✓ Completed, next run sched...	Latest AMI	2017-08-14 08:00 AM
<input type="checkbox"/>	...49770313	time4.acme.com	Racemi	⌚ 19% Deploying target wh...		2017-08-14 07:58 AM
<input type="checkbox"/>	...c14edd9a	time3.acme.com	SMS	✓ Completed, next run sched...	Latest AMI	2017-08-14 07:56 AM
<input type="checkbox"/>	...ed1c2be7	time5.acme.com	DMS	⌚ 90% In-progress	Target endpoint	2017-08-14 07:50 AM
<input type="checkbox"/>	...48556723	time6.acme.com	CloudEndure	✓ 100% Cut over	EC2 instance	2017-08-14 07:49 AM
<input type="checkbox"/>	...4nkerei9e	time2.acme.com	SMS	⌚ Preparing AMI		2017-08-14 07:48 AM
<input type="checkbox"/>	...09dfafdkr	time7.acme.com	SMS	⌚ Preparing AMI		2017-08-14 07:46 AM
<input type="checkbox"/>	...23fd19r3h	time8.acme.com		Not started		

Migration Tracking

- The migration tools, if authorized, automatically send status updates and results back to Migration Hub, for display on the migration status page for the application.

AWS Services Edit Oregon Support

Migration Hub

Dashboard Last updated: 2017-08-14 09:18 AM C

Most recently updated applications

- Sales Tracking App: 8 servers (Last updated: a few seconds ago)
- Inventory App: 10 servers (Last updated: 11 min ago)
- Marketing App: 4 servers (Completed) (Last updated: 13 min ago)

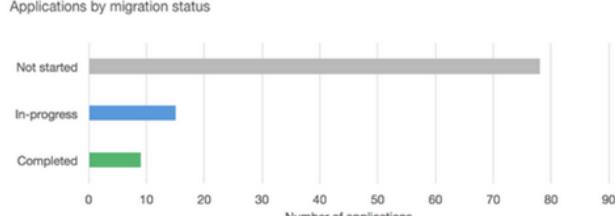
View all 102 applications

Discovery summary

Servers	Applications
825	102
Agents	Connectors
350	2

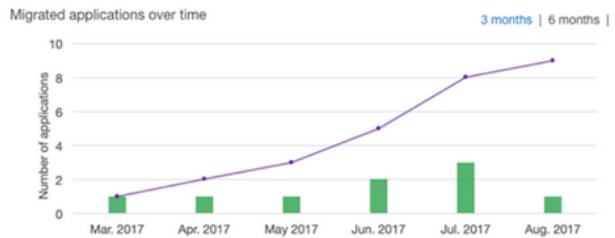
Not started In-progress Completed Error

Applications by migration status



Status	Number of applications
Not started	~80
In-progress	~15
Completed	~10

Migrated applications over time



Month	Number of applications
Mar. 2017	1
Apr. 2017	2
May 2017	1
Jun. 2017	2
Jul. 2017	3
Aug. 2017	1

Quick access

Integrated discovery tools

- AWS Discovery Connectors
- AWS Discovery Agents

Integrated migration tools

- AWS Database Migration Service
- AWS Server Migration Service
- CloudEndure Live Migration
- Racemi DynaCenter

Migration programs

- Professional Service
- Migration Acceleration Program
- Migration Partner Solutions

Documentation

- Getting Started Guide
- User Guide

Support

- Forums
- Contact us

Related links

- AWS Marketplace
- AWS Quick Starts

Feedback English

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Migration Tracking

- Track the status and key metrics of your application migrations by checking the Migration Hub Dashboard



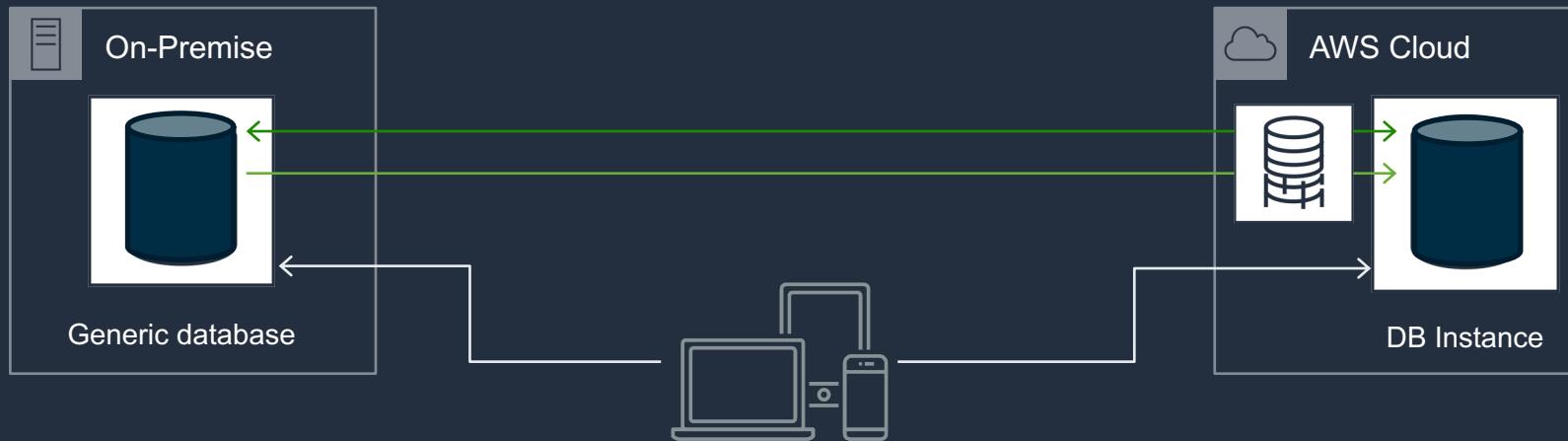
AWS Database Migration Service



- Start your first migration in *10 minutes or less*
- Keep your *apps running* during the migration
- *Replicate* from within, to, or from AWS
- Move data to the same or *different database engine*

Sources*	Targets*
Oracle	Oracle
SQL Server	SQL Server
Azure SQL	PostgreSQL
PostgreSQL	MySQL
MySQL	Amazon Redshift
SAP ASE	SAP ASE
MongoDB	Amazon S3
Amazon S3	Amazon DynamoDB
IBM DB2	Amazon Kinesis
	Amazon ElasticSearch

Keep your application running during migration



Start a replication instance

Connect to the source and target

Select tables, schemas, or databases

Let DMS create the target objects

Move data and synchronize objects

Switch applications when ready

Database Migration Options

Load is table by table

- Configurable number of tables in parallel

One time load or Change Data Capture (CDC)

- Read from database log on the source and apply to the target

Filter criteria available for selective loading

- Select only a few tables or a subset of data in your tables

Multiple sources and targets. Mix and match.

- One side of the migration must be in AWS

Ongoing replication support

- Keep your replication going until your application is ready to cutover

AWS Schema Conversion Tool

Makes heterogeneous database migrations predictable by automatically converting the source database schema and a majority of the database code objects, including views, stored procedures, and functions, to a format compatible with the target database



Features

- Database Migration Assessment report for choosing the right target engine
- Automatic conversion for eligible database objects and code
- Code browser to highlight places where manual edits are required

Support for the following conversions

Source* Database	Target* Database on AWS
Oracle database	Amazon Aurora, MySQL, PostgreSQL, Oracle
Oracle data warehouse	Amazon Redshift
Azure SQL	Amazon Aurora, MySQL, PostgreSQL
Microsoft SQL Server	Amazon Aurora, Amazon Redshift, MySQL PostgreSQL
Teradata	Amazon Redshift
IBM Netezza	Amazon Redshift
Greenplum	Amazon Redshift
HPE Vertica	Amazon Redshift
MySQL and Maria DB	PostgreSQL
PostgreSQL	Amazon Aurora, MySQL
Amazon Aurora	PostgreSQL
IBM DB2 LUW	Amazon Aurora, MySQL, PostgreSQL
Apache Cassandra	Amazon DynamoDB

CloudEndure

Simplify and Accelerate Migration With CloudEndure

Flexible



Migrate From Any Source



Wide Range of OS, Application, and Database Support



Option to Migrate Back

Reliable



Robust, Predictable, Non-Disruptive Continuous Replication



Short Cutover Windows With Minimal Downtime



Highly Secure for Regulated Environments

Highly Automated



Minimal Skill Set Required to Operate



Easy, Non-Disruptive Tests Prior to Cutover

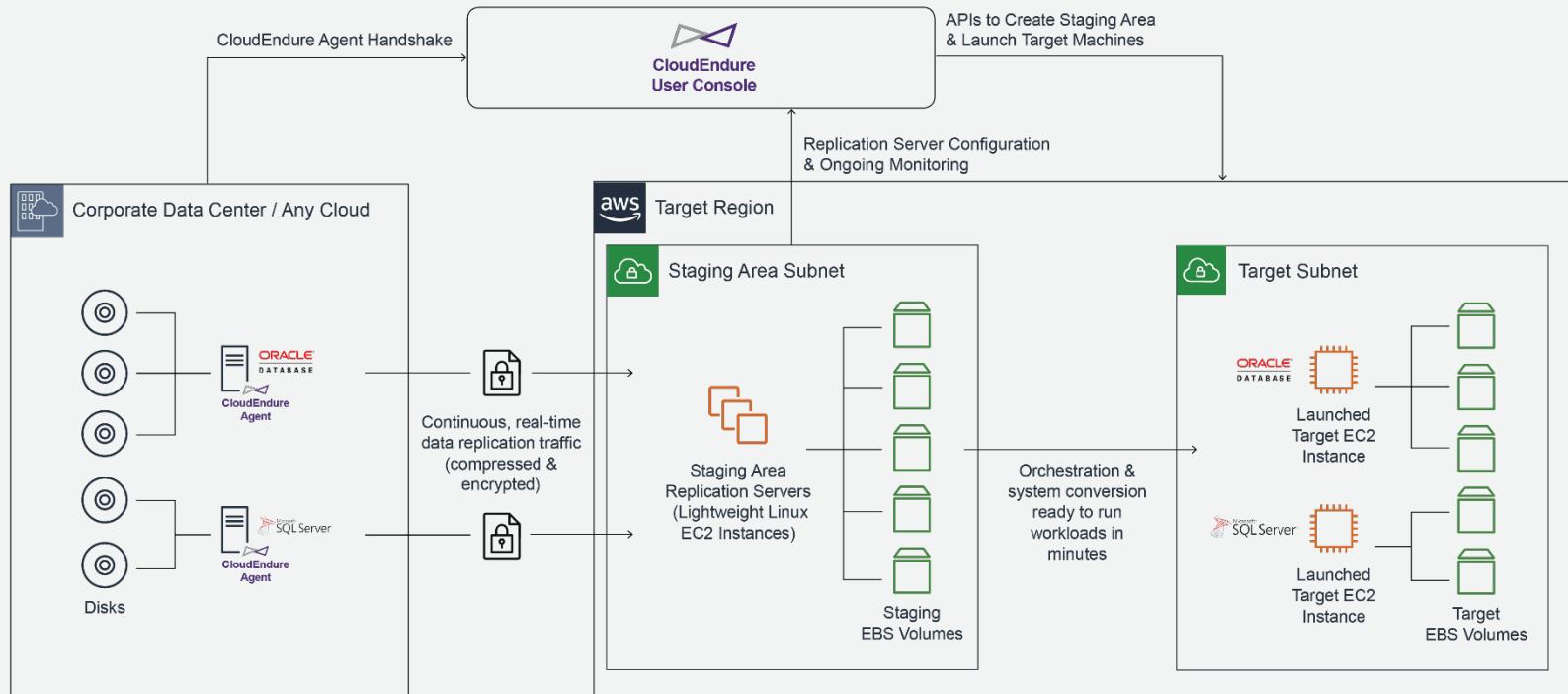


Easily Plugs Into Migration Factories and Cloud COEs

- Designed for rapid, large-scale migrations
- Simple setup lets you start in minutes
- Same highly automated process for any workload
 - Common workloads include databases such as Microsoft SQL Server, Oracle, and MySQL, and enterprise applications such as SAP
- Eliminates complexity and reduces risk
- Migrate with minimal business disruption

How CloudEndure Migration Works

- CloudEndure continuously replicates any application or database from any source into AWS
- Business outcome: Allow self-service, rapid, reliable migrations with minimal business disruption



Wide Platform Support*

Any Application



Any Database



x86 Operating Systems



Source Infrastructure



* See documentation or contact Support for a complete list.

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CloudEndure Migration Success Stories



- After deploying CloudEndure Disaster Recovery, Malibu Boats experienced an outage
- Failover to AWS in recovery mode resulted in 2x faster performance in the cloud
- Led to a business decision to significantly expedite migration to AWS



- Complete self-service migration as part of MAP program; finished on schedule
- Legacy applications running on ~1,000 Windows servers of various versions
- Automated lift-and-shift with no performance disruption
- 100% success in migrating all workloads



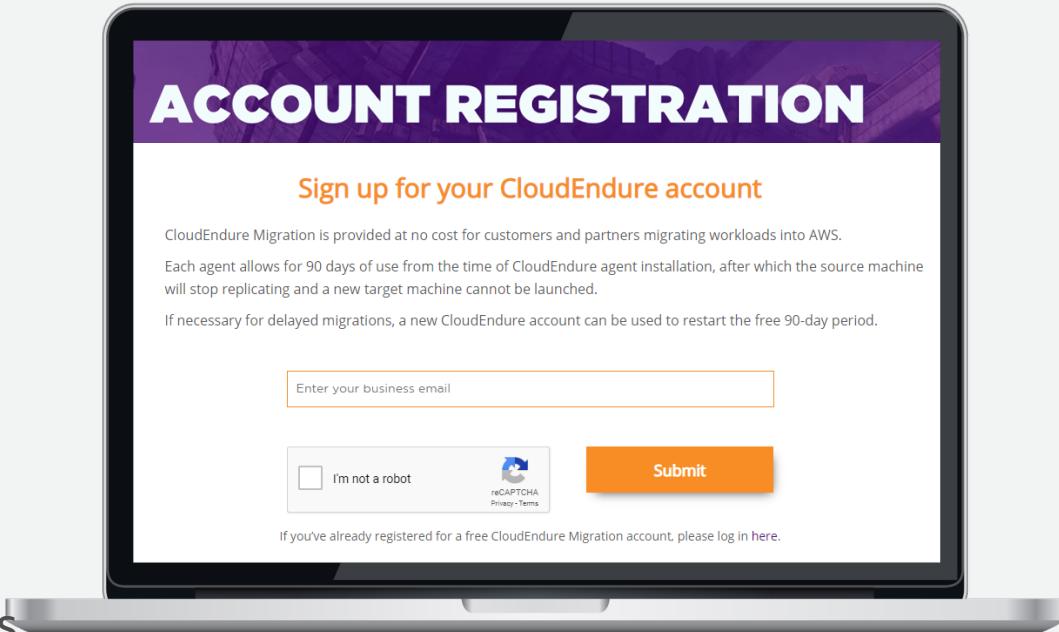
- Continuous replication of large servers, filers, and Oracle-based legacy applications
- Cutover was complete within minutes with no system disruption
- End users were unaware of the migration, and business continued as usual



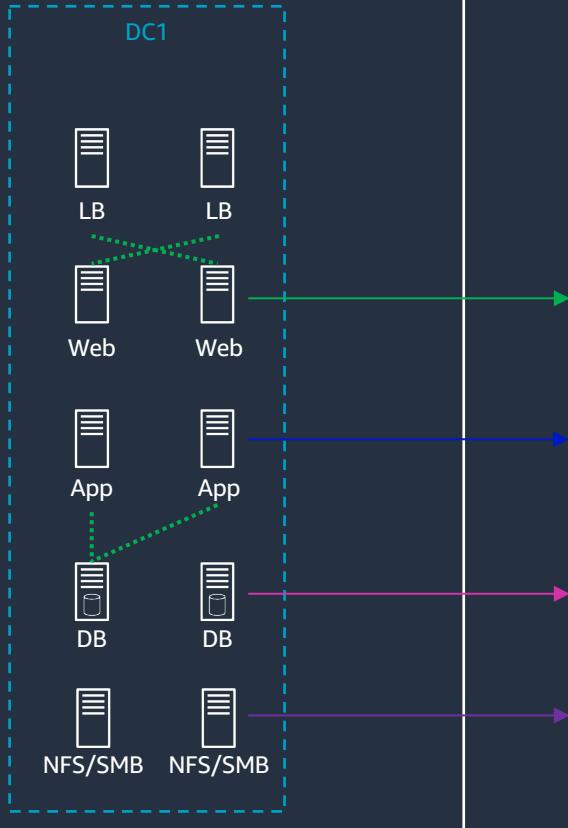
- Accelerated migration of ~3,000 servers with COTS applications
- Multiple sources (mix of virtual and physical, different OS types and versions)
- Significant cost savings by retiring legacy infrastructure
- ProServe provided cloud skills training

CloudEndure Migration License Model

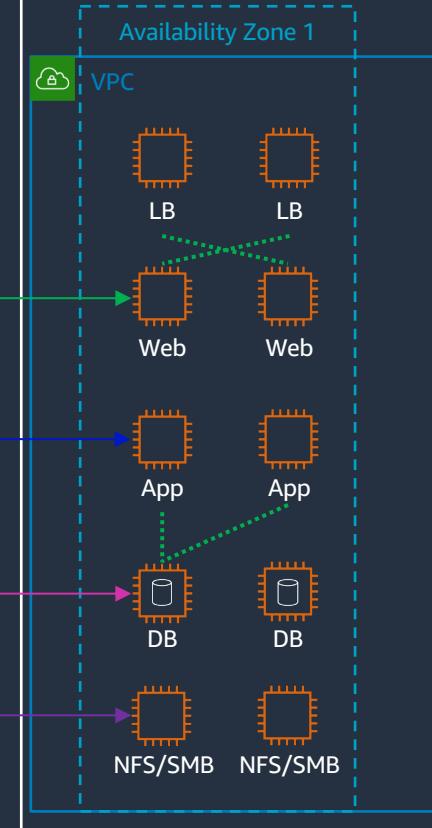
- Get started with [free migration licenses](#)
- Each license – one per source machine – is valid for 90 days
- For assistance, contact your consulting partner, account team, or AWS Professional Services
- Additional program benefits available to qualified customers and partners



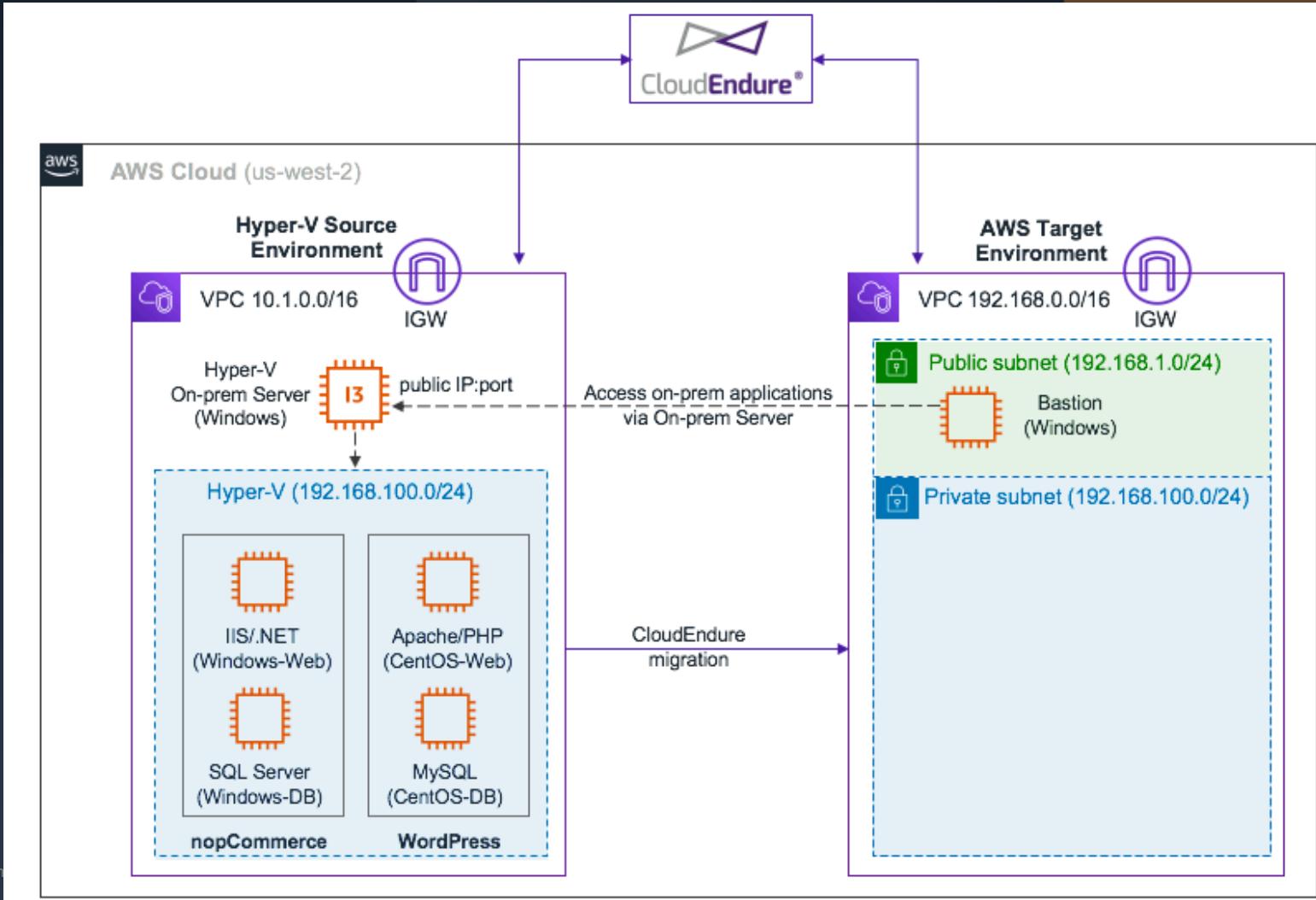
On-premise / Colocation



AWS Cloud



CloudEndure Lab



<https://dashboard.eventengine.run>

Summary

7R

Modernize through

- Re-host
- Re-platform
- Re-architect

Migration strategies and heatmap

AWS SMS

- Migrate

Experiment!

Thank you!

Fill in the survey and receive
\$25 USD AWS Credit!

