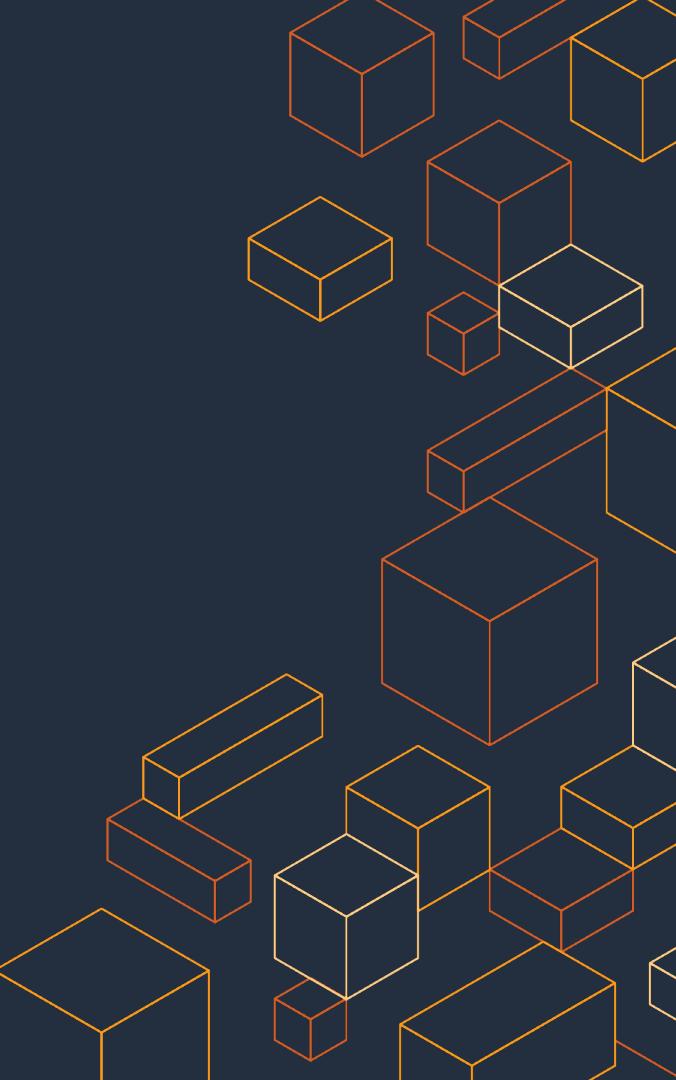




Databases on AWS

Purpose-built databases,
the right tool for the right job



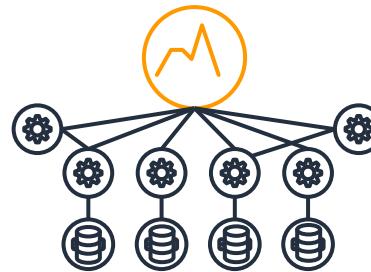
Unprecedented Data Growth Drives Innovation

Explosion of data



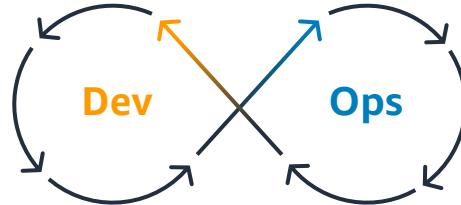
Data grows 10x every 5 years

Micro-services changes data and analytics requirements



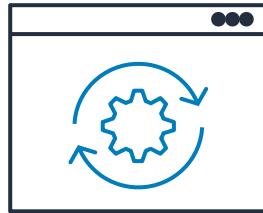
Purpose-built databases provide optimized performance and cost savings

Rapid rate of change



Transition from IT to DevOps increases rate of change

To get more value from their data, customers are...



Moving to fully
managed
database services

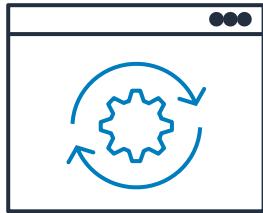


Building modern
applications with
purpose-built databases



Breaking free
from legacy
databases

To get more value from their data, customers are...



Moving to fully
managed
database services



Building modern
applications with
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Self managing databases and analytics services is complex, time consuming, and expensive

- Hardware & software installation, configuration, patching, backups
- Performance and high availability issues
- Capacity planning and scaling clusters for compute and storage
- Security and compliance

Fully managed services on AWS

Automate undifferentiated heavy lifting

Self Managed

Schema design

Query construction

Schema design

Automatic fail-over

Backup & recovery

Isolation & security

Industry compliance

Push-button scaling

Automated patching

Advanced monitoring

Routine maintenance

Built-in best practices

You



Fully Managed

Schema design

Query construction

Query optimization

Automatic fail-over

Backup & recovery

Isolation & security

Industry compliance

Push-button scaling

Automated patching

Advanced monitoring

Routine maintenance

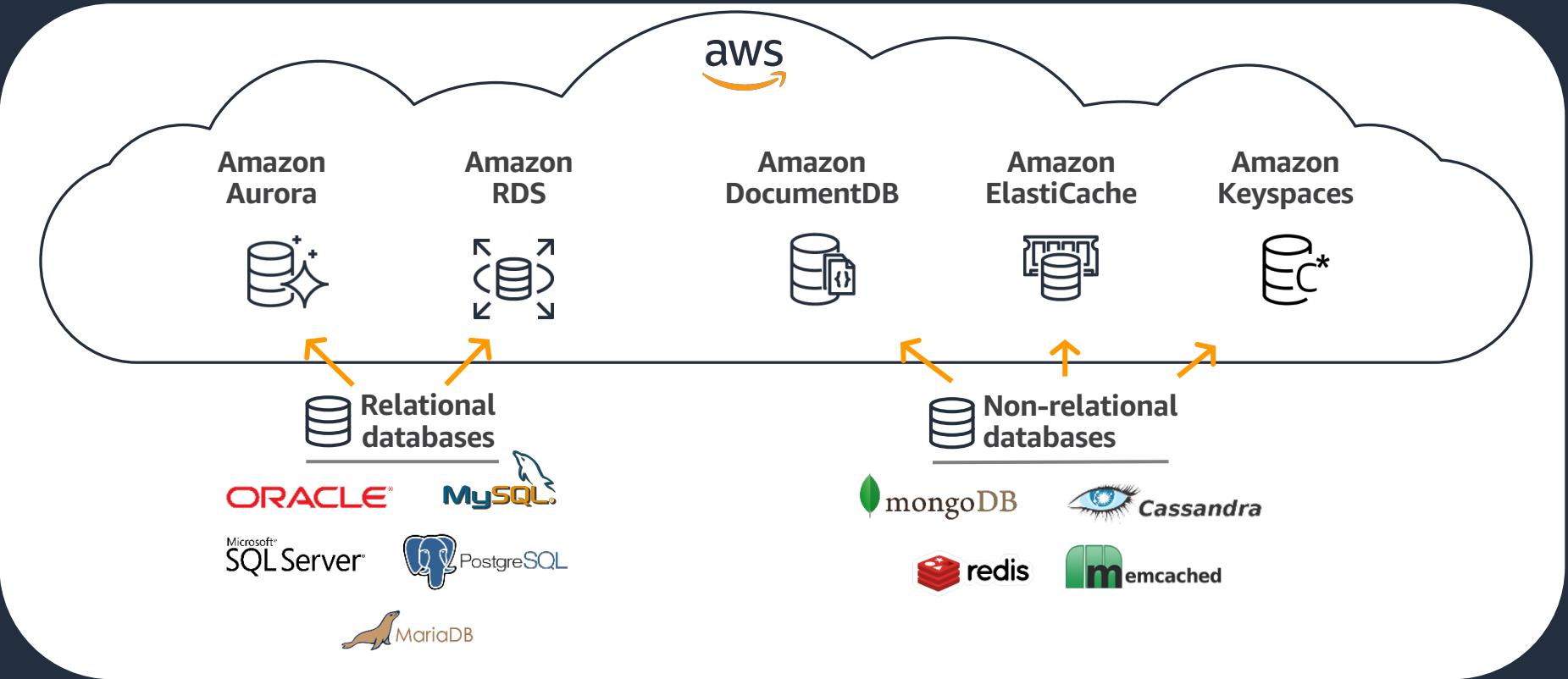
Built-in best practices

You

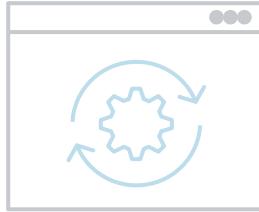


Move to fully managed databases

Migrate on-premises or self-managed databases to fully managed services



To get more value from their data, customers are...



Moving to fully
managed
database services



Building modern
applications with
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App architectures & patterns have evolved over the years...

Mainframe



Client Server



Three tier



Microservices



Modern Application Requirements

Requires more performance, scale, and availability



E-Commerce



Media streaming



Social media



Online gaming



Shared economy

Users	1M+
Data volume	Terabytes—petabytes
Locality	Global
Performance	Microsecond latency
Request rate	Millions per second
Access	Mobile, IoT, devices
Scale	Virtually unlimited
Economics	Pay-as-you-go
Developer access	Instance API access
Development	Apps & storage are decoupled

Developers are doing what they do best

- Break complex apps into smaller pieces and pick the best tool to solve each problem
- This ensures that the apps are well architected and scale effectively
- Developers are now building highly distributed apps using a multitude of purpose-built databases

Purpose-built databases



Relational

Referential integrity, ACID transactions, schema-on-write



Key-value

High throughput, Low latency reads and writes, endless scale



Document

Store documents and quickly access querying on any attribute



In-memory

Query by key with microsecond latency



Graph

Quickly and easily create and navigate relationships between data



Time-series

Collect, store, and process data sequenced by time



Ledger

Complete, immutable, and verifiable history of all changes to application data



Wide Column

Scalable, highly available, and managed Apache Cassandra-compatible service

AWS Service(s)



Aurora RDS



DynamoDB



DocumentDB



ElastiCache



Neptune



Timestream



QLDB



Keyspaces
Managed Cassandra

Common Use Cases

Lift and shift, ERP, CRM, finance

Real-time bidding, shopping cart, social, product catalog, customer preferences

Content management, personalization, mobile

Leaderboards, real-time analytics, caching

Fraud detection, social networking, recommendation engine

IoT applications, event tracking

Systems of record, supply chain, health care, registrations, financial

Build low-latency applications, leverage open source, migrate Cassandra to the cloud



FINRA uses different databases based on the purpose

Market data search: **Amazon DynamoDB**

- Massive data volume
- Need quick lookups for searches

Session state: **Amazon ElastiCache**

- In-memory store for sub-millisecond site rendering

Data collection: **Amazon DocumentDB**

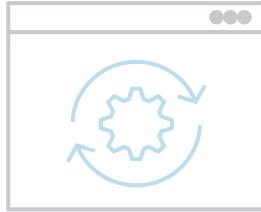
Fraud detection: **Amazon Neptune**

Relational data: **Amazon RDS, Amazon Aurora**

- Referential integrity
- Primary transactional database



To get more value from their data, customers are...



Moving to fully
managed
database services



Building modern
applications with
purpose-built databases



Breaking free
from legacy
databases

Old-guard commercial databases + tricks



Very
expensive



Proprietary



Lock-in



Punitive
licensing



You've
got mail

Customers are moving to open databases



Customers are moving to open databases



Commercial-grade performance and reliability?

Amazon Aurora: an open-source compatible, commercial-grade database

MySQL and PostgreSQL compatible relational database built for the cloud

Performance and availability of commercial-grade databases at 1/10th the cost



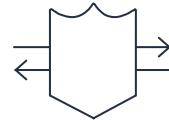
Performance & scalability

5x throughput of standard MySQL and 3x of standard PostgreSQL; scale-out up to 15 read replicas



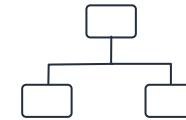
Availability & durability

Fault-tolerant, self-healing storage; six copies of data across three AZs; continuous backup to S3



Highly secure

Network isolation, encryption at rest/transit



Fully managed

Managed by RDS: no server provisioning, software patching, setup, configuration, or backups

Amazon Aurora

Enterprise database at open-source price

Delivered as a **managed** service

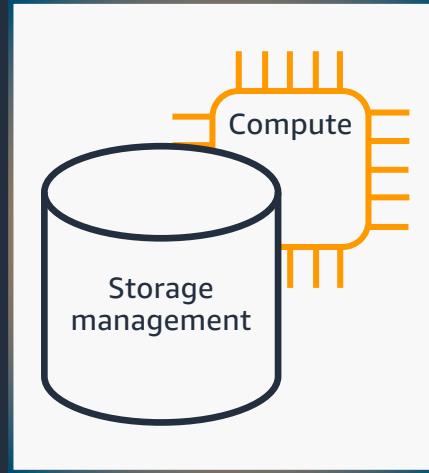
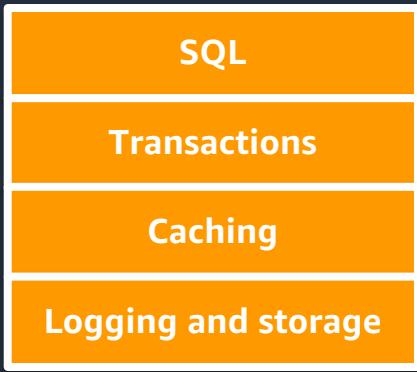


Build reliable applications with multi-AZ with a 99.99% uptime SLA and automatic global replication

Take advantage of automated database administration and innovative capabilities

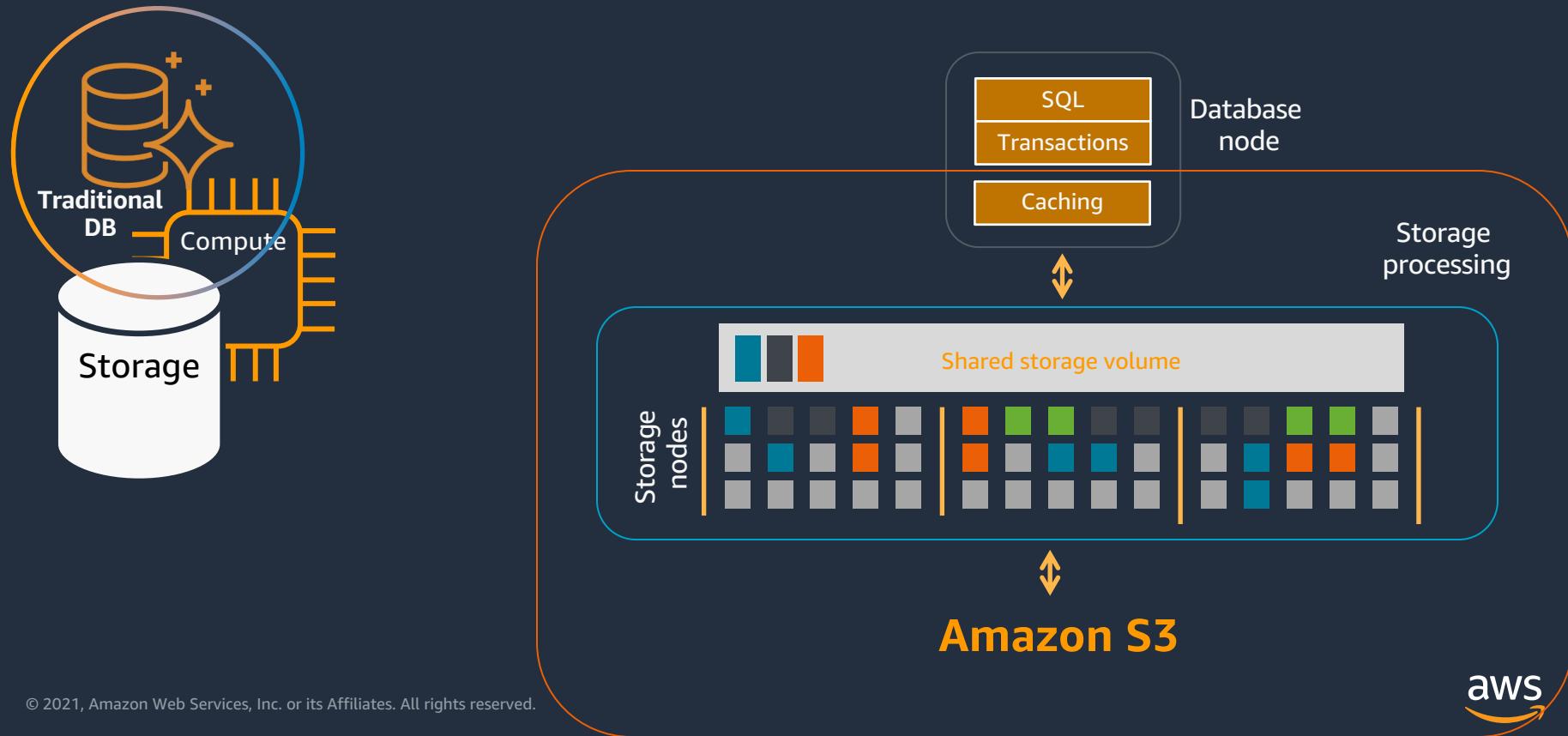
Easily migrate MySQL or PostgreSQL databases to and from Aurora

Database layers



Multiple layers
of processing,
all in a single
engine

Amazon Aurora decouples storage and query processing



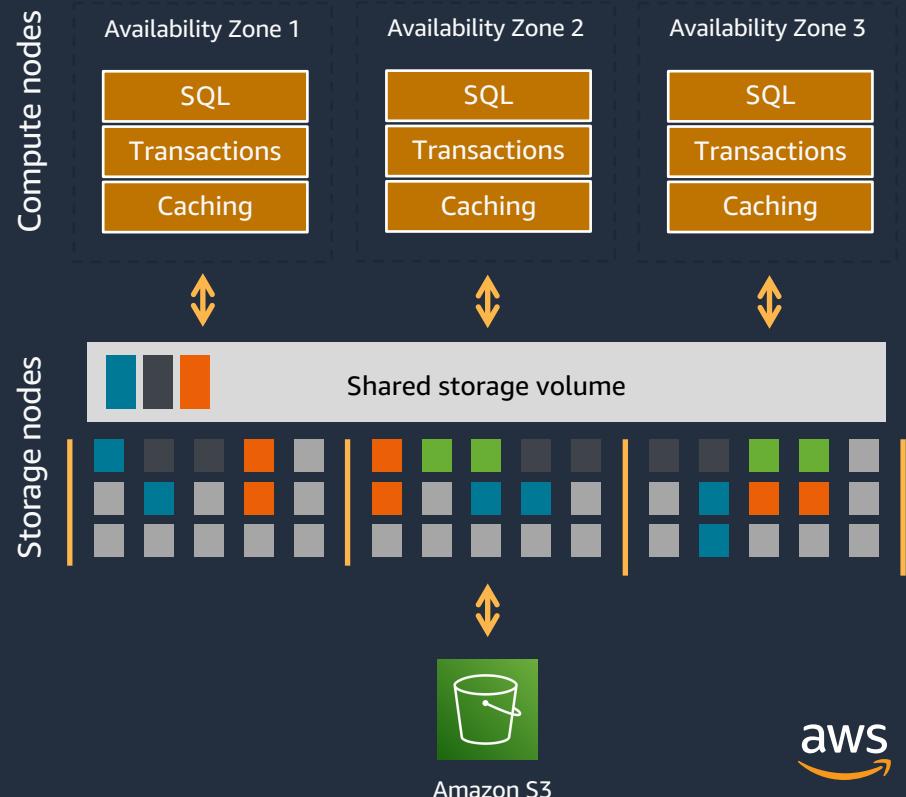
Scale-out, distributed storage processing architecture

Purpose-built log-structured distributed storage system designed for databases

Storage volume is striped across hundreds of storage nodes distributed over three different Availability Zones

Six copies of data, two copies in each Availability Zone to protect against AZ+1 failures

Data is written in 10 GB “protection groups,” growing automatically when needed



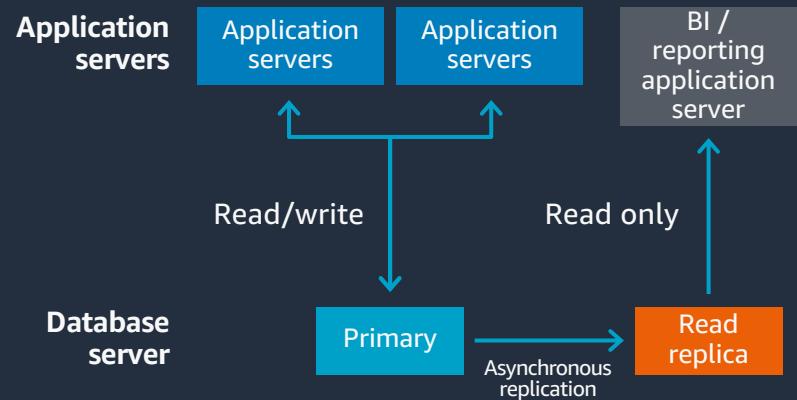
Amazon Aurora read scaling options

15 promotable read replicas per cluster

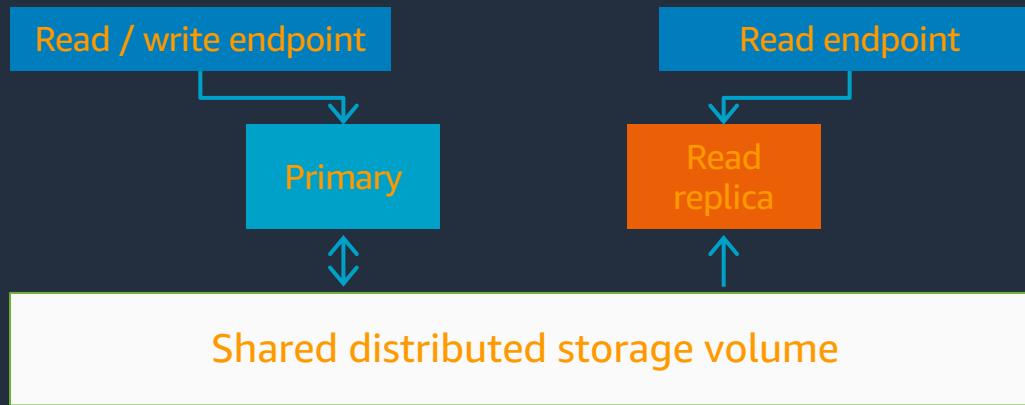
Auto-scaling to automatically add and remove replicas

Physical replication across Regions (Aurora Global Database)

Logical (binlog) replication to any MySQL database



Amazon Aurora read replicas



Aurora is the fastest growing service in AWS history

NASDAQ



DOW JONES



zendesk

AUTODESK



pumpkin



Blackboard



DOW JONES



FICO



PERSONAL CAPITAL

AstraZeneca



PAGELY



PeopleAdmin



NEW INNOVATIONS

SysAid



FIRST FUEL



CAL POLY



CourseStorm



TransNexus

Modernize your apps with Amazon DynamoDB



Performance at scale

Consistent, single-digit millisecond response times at any scale; build applications with virtually unlimited throughput



Serverless architecture

No hardware provisioning, software patching, or upgrades; scales up or down automatically; continuously backs up your data



Enterprise security

Encrypts all data by default and fully integrates with AWS Identity and Access Management for robust security



Global replication

Build global applications with fast access to local data by easily replicating tables across multiple AWS Regions

Modernize your data warehouse with Amazon Redshift



Best performance

Up to 3x faster than other cloud data warehouses



Best value

Up to 75% less than other cloud data warehouses & predictable costs



Most scalable

Virtually unlimited elastic linear scaling



Easy to manage

Easy to provision & manage, automated backups, AWS support, 99.9% SLAs

AWS offers flexible ways to help you migrate

Self Managed

DMS | SCT



AWS Professional
Services & Partners



Database Freedom
Program



ORACLE Microsoft[®] SQL Server[®]

Over 550,000 databases migrated to AWS

AUTODESK.



coursera

NTT docomo

3M



U.S. Department
of Veterans Affairs

zendesk



nielsen

Johnson & Johnson

pitney bowes

Amway

ancestry.com



asurion

dataxu.

Cerner

COMCAST

Atlassian

AMGEN

SIEMENS
Ingenuity for life

gogo

CapitalOne

Expedia®

Bristol-Myers Squibb

Liberty Mutual.

P Pearson

SCHOLASTIC

Agero

Adobe

ticketmaster



THOMSON REUTERS

Flipboard

Currencycloud

Globe®

shaadi.com™
The World's Largest Matrimonial Service

ORION HEALTH

intuit

SendGrid

meetup

fiverr®

Wave
accounting™

APPRIS®

SysAid

gumgum®



Pega

halodoc
Dokter Anda Kapan Saja.

Smile
Brands Inc.

b:
bazaar
voice™

hotelbeds

verizon®

oddity

YAPSTONE
ePayments as a Service

TP
Co. Inc.

CUPONATION

entradas.com

Sotheby's

Travelex
worldwide money

SnappCar®

TOTANGO

AWS database services

Purpose-built databases, the right tool for the right job

Relational



Aurora



RDS

MySQL

MySQL



PostgreSQL



PostgreSQL



MariaDB

ORACLE

Microsoft[®]
SQL Server[®]

Non-relational



DynamoDB



ElastiCache



Neptune



DocumentDB



Timestream



QLDB



Keyspaces



Amazon's consumer business moved off Oracle databases

Challenge:

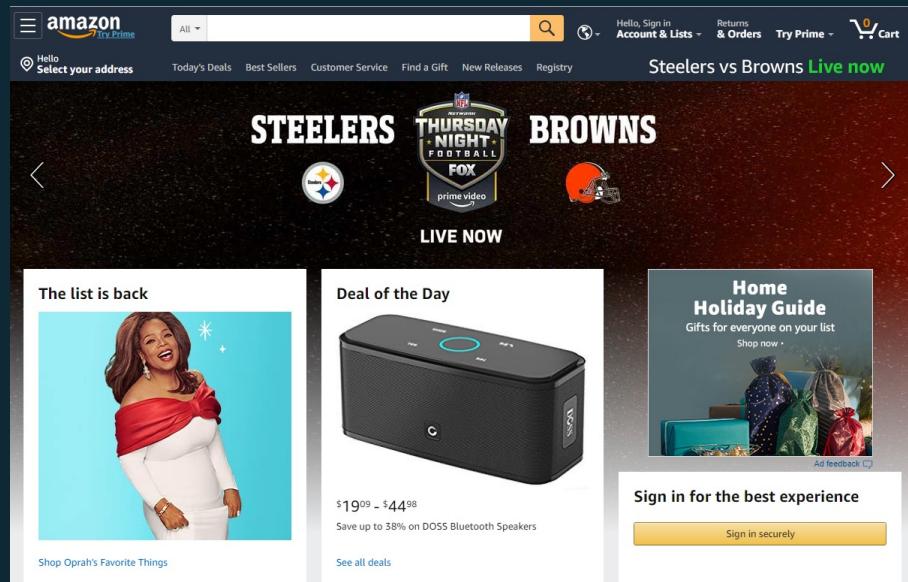
Instead of focusing on high-value differentiated work, DBAs spent a lot of time simply keeping the lights on while transaction rates climbed and the overall amount of stored data mounted. This included time spent dealing with complex and inefficient hardware provisioning, license management, and many other issues that are now best handled by modern, managed database services.

Solution:

Consumer brands like Alexa, Amazon Prime, Amazon Prime Video, as well as internal teams such as AdTech, Amazon Fulfillment Technology, and Ordering were migrated off 7,500 Oracle databases over to multiple AWS database services including Amazon DynamoDB, Amazon Aurora, and Amazon Relational Database Service (RDS).

Results:

- Cost reduction by 60% on top of the heavily discounted rate we negotiated based on our scale.
- Latency of our consumer-facing applications was reduced by 40%.
- The switch to managed services reduced database admin overhead by 70%.



ORACLE

..... MIGRATIONS →



Amazon
Aurora



Amazon
DynamoDB



Amazon
RDS

aws

Our approach to databases



Help you innovate faster through **managed** services



Architect **micro-services** ground-up for the cloud and offer a portfolio of **purpose-built** services, optimized for your workloads



Provide services that help you **migrate** existing apps and databases to the cloud