

aws INNOVATE

MODERN APPLICATIONS EDITION

20 October, 2022

Best practices to handle data in modern microservices architecture

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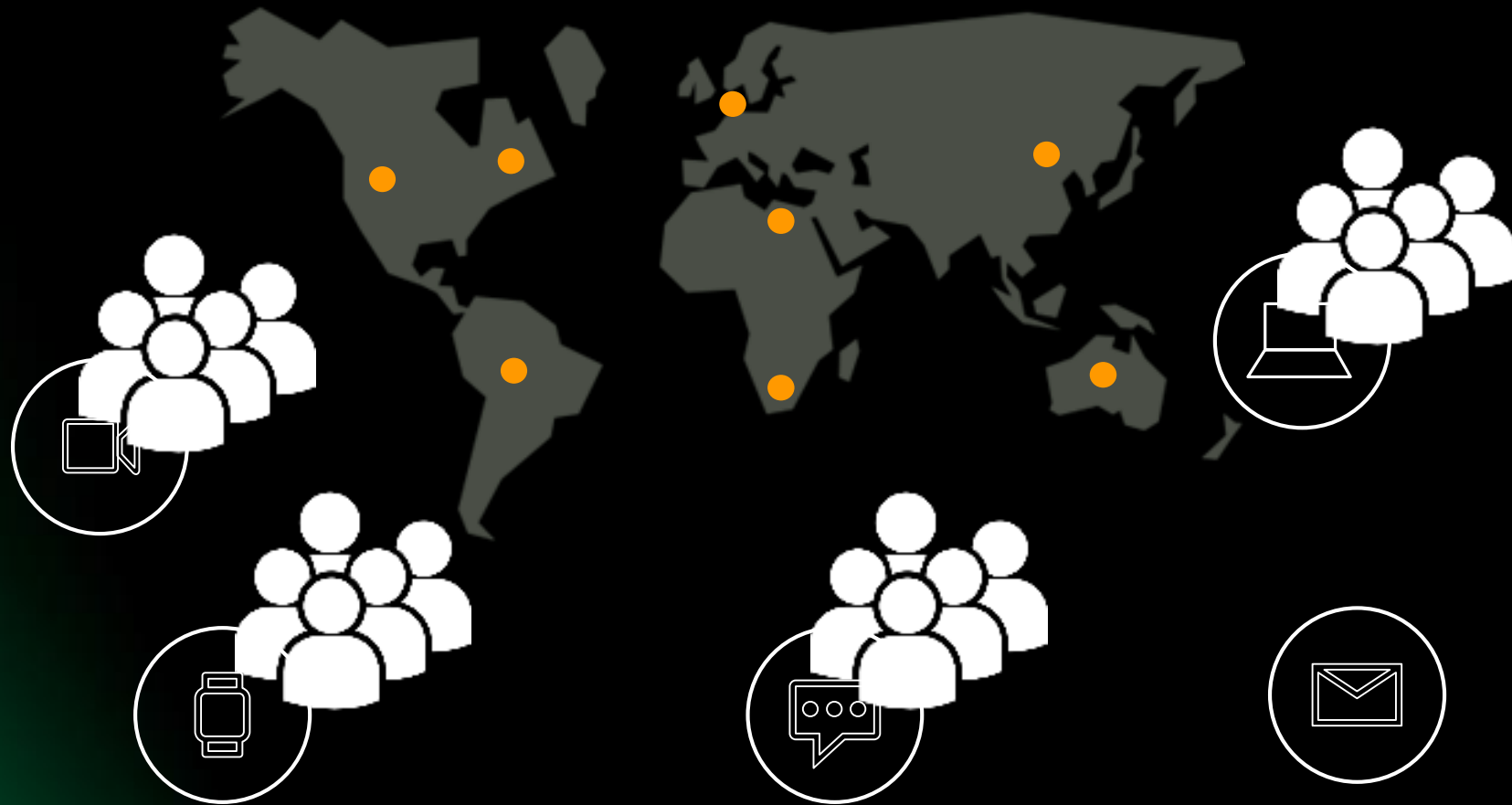
Amazon Web Services



Agenda

- Evolution of modern application architectures
- Evolution of purpose-built databases for modern architectures
- AWS purpose-built databases
- Customer story

Internet-Scale Applications



Modern application requirements

Requires more performance, scale, and availability



E-commerce



Media
streaming



Social
media



Online
gaming

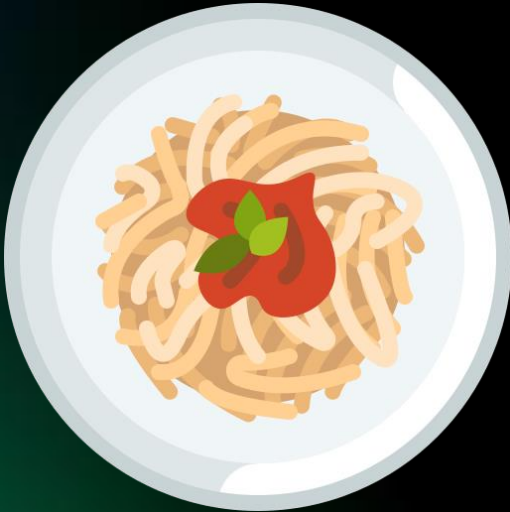


Shared
economy

| | |
|------------------|--------------------------------|
| 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 and storage are decoupled |

Evolution of Architectures

Monolithic



1990's

Service Orientated



2000's

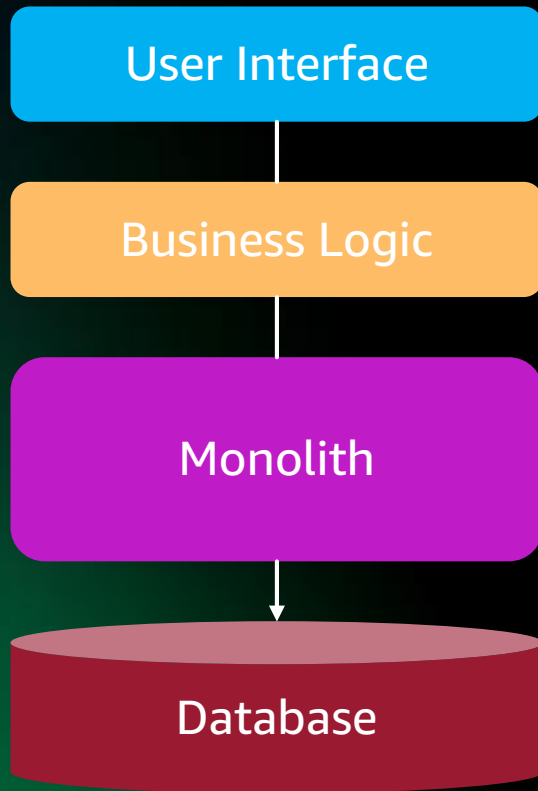
Microservices



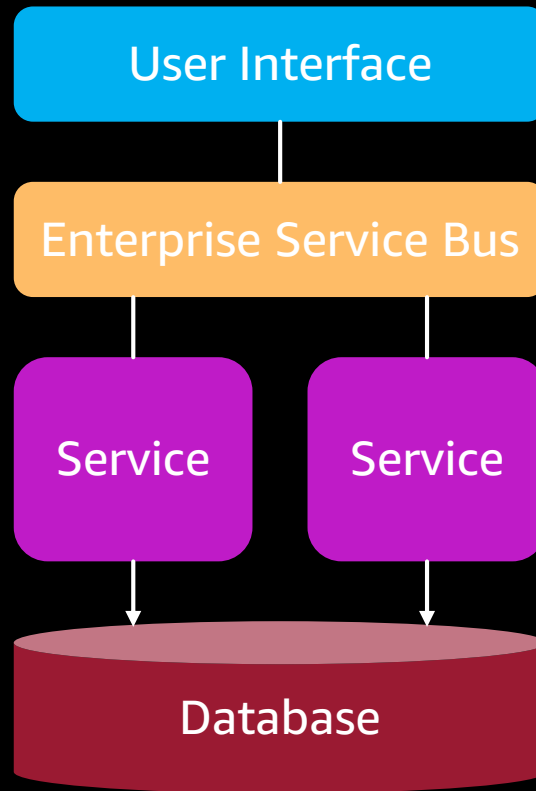
After 2010

Evolution of Architectures

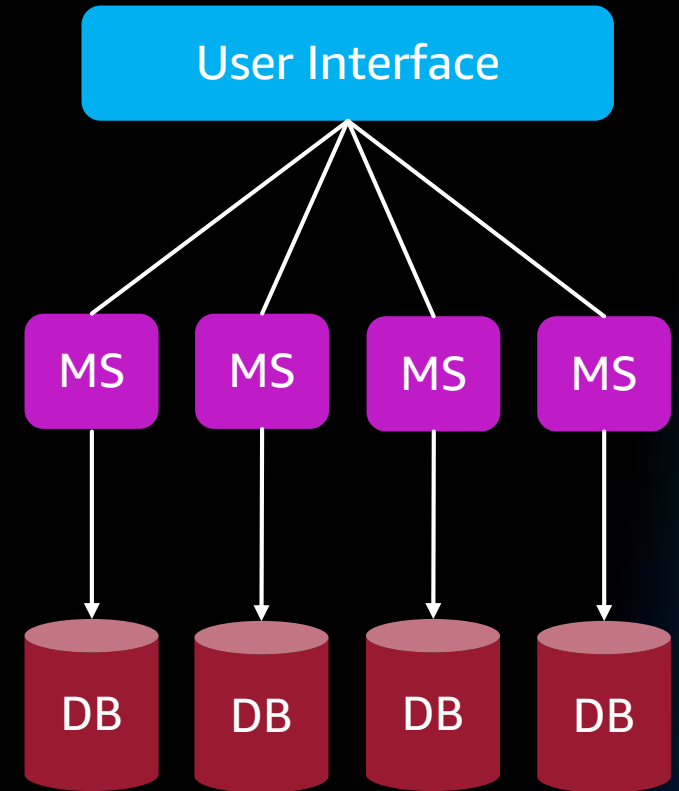
Monolithic



Service Orientated



Microservices



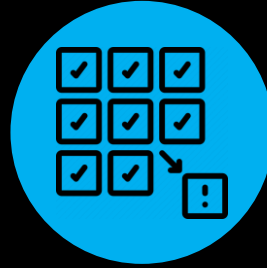
Benefits of Microservices



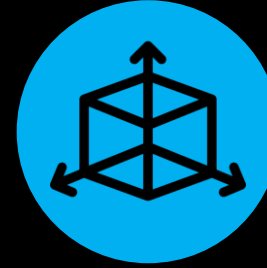
Continuous
Development and
Deployment



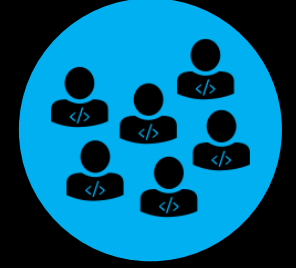
Better Scalability



Improved Fault
Isolation



Greater Flexibility



Smaller
Development Teams



Higher Software
Testability



Improved
Maintainability

Key attributes of modern database



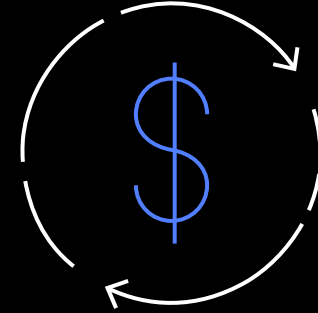
Designed for:

**Innovation
and agility**



Without limits on:

**Performance
and scalability**



Is:

**Highly available,
easily managed,
and cost-effective**

Modernizing with purpose-built tools

DEVELOPERS WANT THE RIGHT DATABASE TO MEET APPLICATION'S UNIQUE REQUIREMENTS

Lack of scalability



Lack of developer flexibility



Performance issues



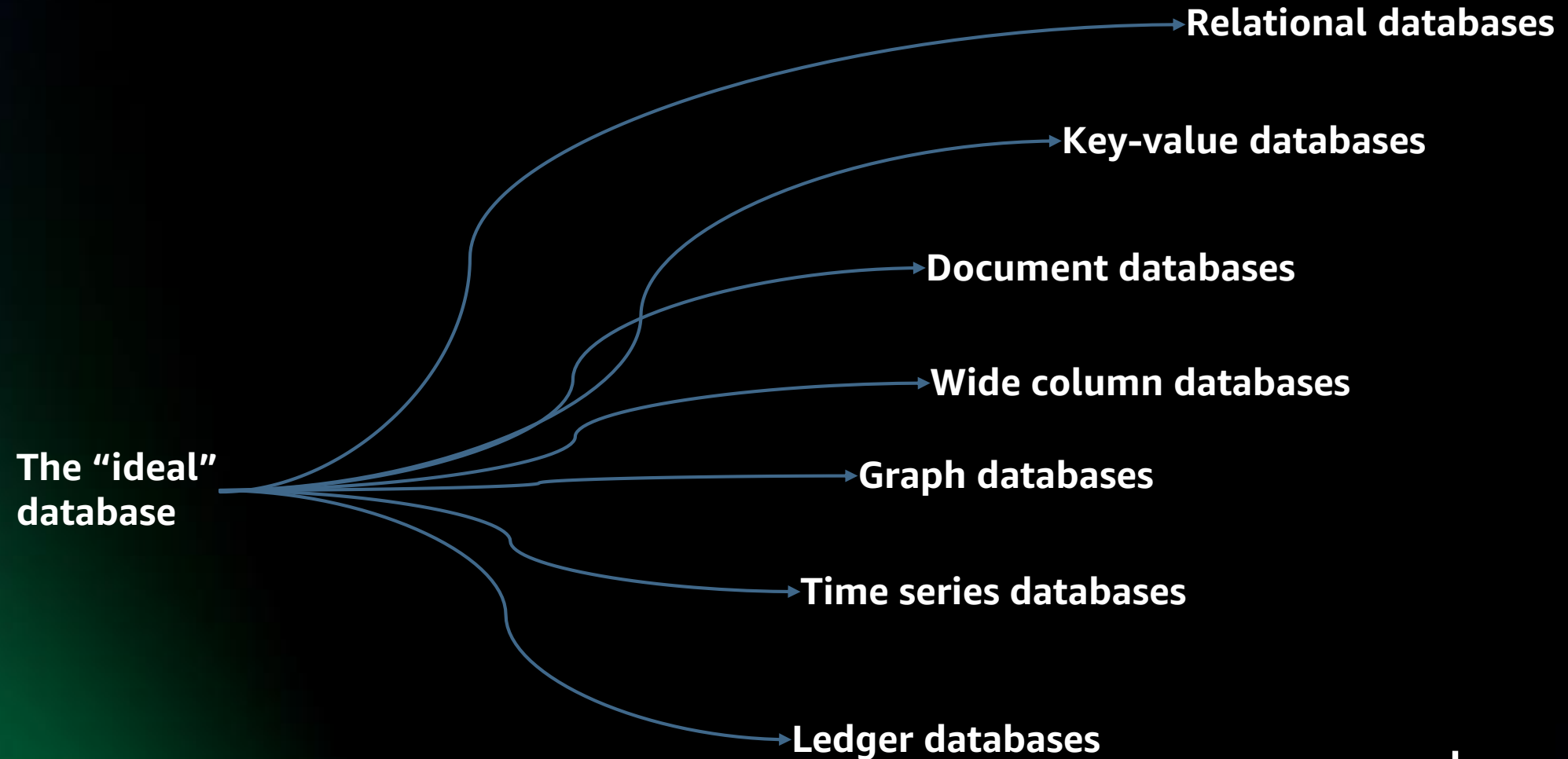
One-size-fits-all approach of using a relational database for everything is **no longer working**

Inability to integrate all data types



Purpose-built databases

USE THE RIGHT TOOL FOR THE JOB

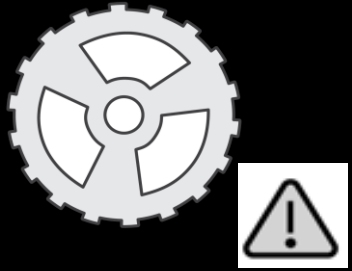


... and more!

Challenges with self-managed databases



**Hard to
set up**



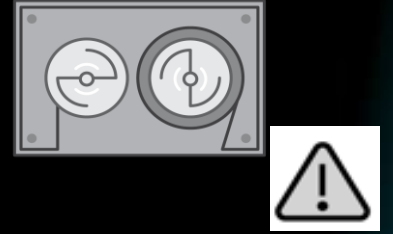
**Hard to
manage**



**Hard to
scale**

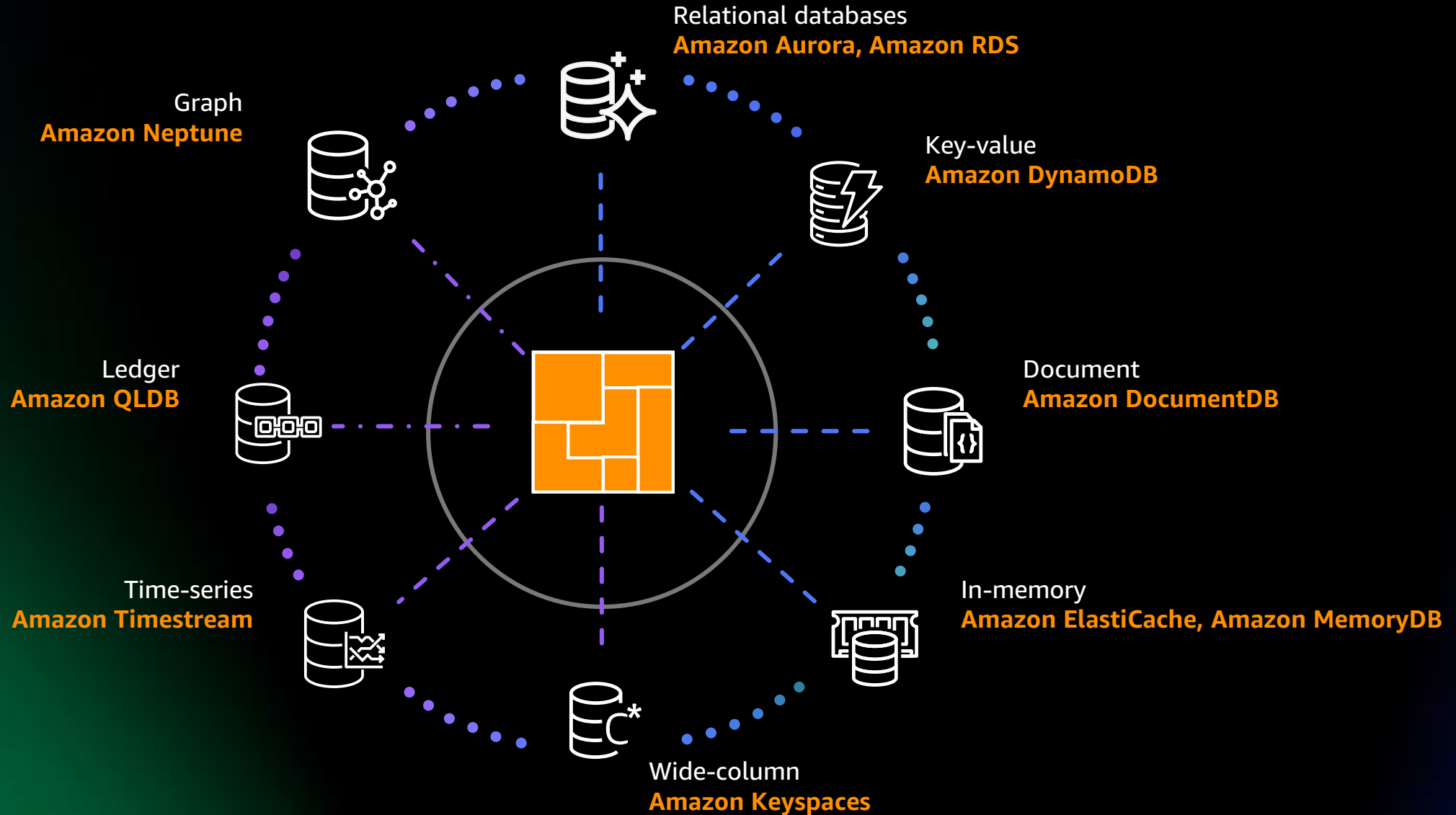


**Hard to
secure**



**Hard to
back up**

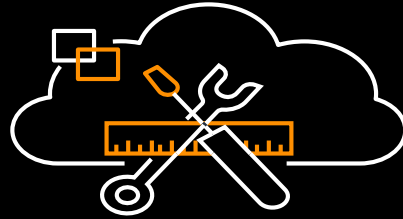
The right tool for the job



Database modernization....

So, where do we start?

Database modernization for microservices



Modernize with
purpose-built databases

Monolithic



Microservices

Oracle
SQL Server
MySQL
PostgreSQL
...



Amazon DynamoDB
Amazon Aurora
Amazon Neptune
Amazon DocumentDB
Amazon Timestream

...

Modernization using purpose-built databases

It's a journey!

Typical database modernization journeys start here



**Relational
database
application**

Existing business-critical applications

- Modernization of existing applications
- Typically monolithic
- Made to fit relational databases

But also

- Start up new applications
- Rapid prototyping, developed locally
- ORM/ODM heavy for agility

Amazon Aurora

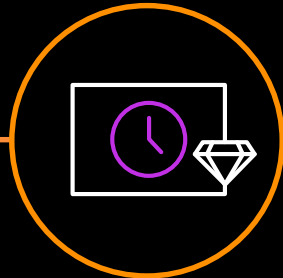
- MySQL and PostgreSQL-compatible relational database built for the cloud
- Performance and availability of commercial-grade databases at 1/10th the cost

Performance and scalability



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

Availability and durability



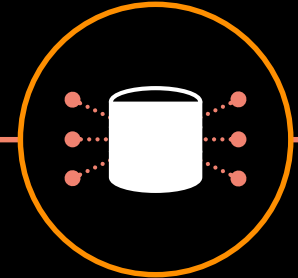
Fault-tolerant, self-healing storage; six copies of data across three Availability Zones; continuous backup to Amazon S3

Highly secure



Network isolation, encryption at rest/transit, compliance and assurance programs

Fully managed



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



Amdocs brings innovation and cloud benefits to RevenueONE by leveraging Amazon Aurora

Challenge

Amdocs needed to re-architect its RevenueONE solution to leverage the full benefits of the cloud and deliver the flexibility and scalability needed to support advanced monetization requirements in the 5G era.

Solution

Amdocs migrated RevenueONE from a legacy commercial database to Amazon Aurora PostgreSQL to deliver a cloud-native solution for their customers and derive the benefits of a fully managed, pay-as-you-go database service.

Results and benefits

- **Scalability** and cloud-native architecture to accelerate the launch of new 5G services
- **Reduced licensing costs** in favor of a pay-as-you-go model
- **Reduced operational overhead** by moving from self-managed to fully managed databases

“Prepping and getting a database cluster up and running took three weeks for installing, confirming network, testing for latency. On Amazon Aurora we’re now able to effectively do it in a day.”

Jay Deen
CTO, Amdocs Media

[Learn more](#)



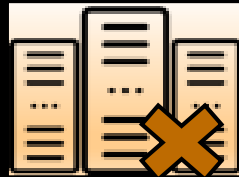
Amazon DynamoDB

Fast and flexible key-value database service for any scale



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



[Learn More](#)

FanFight Cuts Costs by 50%, Boosts Daily Revenue by Four Times Using Amazon DynamoDB

Primary database: **DynamoDB**

- Scale up to one million writes per second with no service disruption.
- FanFight also provided users nearly lag-free real-time transactional push notifications.
- Migrated 80 million records with no downtime
- Reduced costs by 50%

Amazon DocumentDB

Fast, scalable, highly available MongoDB-compatible database service



Millions of requests per second,
millisecond latency



Same code, drivers, and tools
you use with MongoDB



Simple and
fully managed



Secure and
compliant



2x throughput of
managed MongoDB services

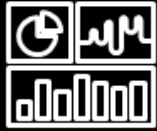


Deeply integrated
with AWS services

In-memory databases: Usage patterns



Caching



Real-time
analytics store



Gaming
leaderboards



Geospatial



Media
streaming store



Session
store



Chat apps
pub/sub



Job
queue



Machine learning
real-time model scoring

Amazon ElastiCache and Amazon MemoryDB

Managed Redis or Memcached-compatible in-memory data



Unlimited scale

Read scaling with replicas. Write and memory scaling with sharding.
Nondisruptive scaling.



Consistent high performance

In-memory data store and cache for sub-millisecond response times



Fully managed

AWS manages all hardware and software setup, configuration, and monitoring



[Learn More](#)

Boost performance during high-activity periods on the app, when users check for real-time updates on delivery status or driver location with Amazon ElastiCache

Primary database: **Amazon Aurora**

- Auto scales for spikes in user traffic up to 400%
- Maintains 99.95% uptime

In-memory caching: **Amazon ElastiCache**

- Enables real-time driver matching and status updates

Graph database use cases



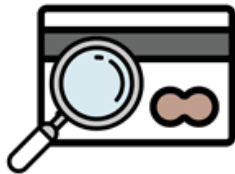
Social networking



Recommendations



Knowledge graphs



Fraud detection



Life sciences



Network and IT operations

Amazon Neptune

Fast, reliable graph database built for the cloud

Open



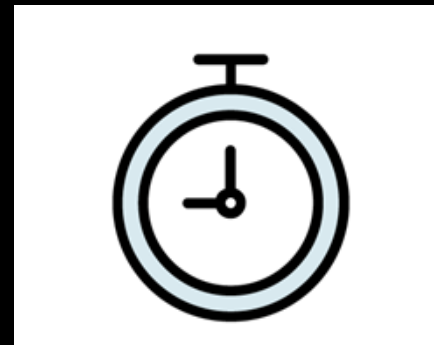
Supports Apache TinkerPop and W3C RDF graph models

Fast



Query billions of relationships with millisecond latency

Reliable



Six replicas of data across three Availability Zones with full backup and restore

Easy



Build powerful queries easily with Gremlin and SPARQL



[Learn More](#)

DREAM11 driving towards developing more relationships and enhancing the social aspect in order to retain users and provide the best possible sports engagement experience

Primary database: **Amazon Neptune**

- Graph database containing more than 20 million nodes and 200 million edges
- Enables social connections among users
- Personalizes recommendations for users based on past activities
- Detects fraud and collusion attempts

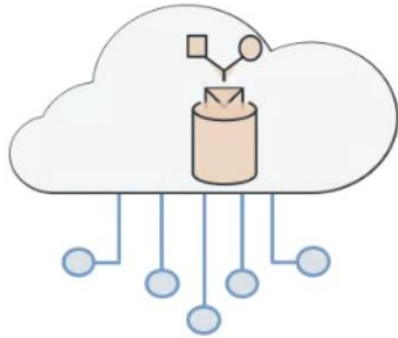
In-memory caching: **Amazon ElastiCache**

- Instance access to find family and friends who are active participants
- Ensures 99.99% uptime with single-digit millisecond latency

Characteristics of time-series data



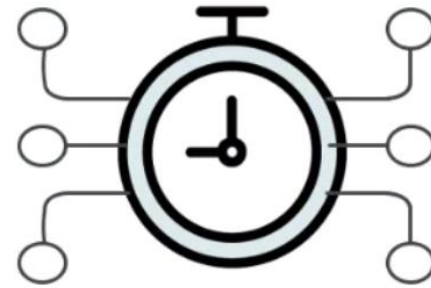
High
Volume



Append-Only
and Data
lifecycle
Management



Query by Time
Intervals



Collected Over
Time



Analyzed to find
Trends

Amazon Timestream

Fast, scalable, fully managed time-series database

**1,000x faster and 1/10th
the cost of relational
databases**



Collect data at the rate of
millions of inserts per
second (10M/second)

**Trillions of
daily events**



Adaptive query processing
engine maintains steady,
predictable performance

**Time-series
analytics**



Built-in functions for
interpolation, smoothing,
and approximation

Serverless



Automated setup,
configuration, server
provisioning, software patching

Immutable and verifiable data

Risk reduction

Ensure safeguarding of critical system-of-record applications where data loss could be expensive

Data tracking improvements

Track data's entire lineage quickly and accurately, improving efficiency in identifying source of issues

Auditing and compliance

Reduce downtime caused by audit and compliance issues

Amazon Quantum Ledger Database

Fully managed ledger database

Track and verify the history of all changes made to your application's data

Immutable and
transparent



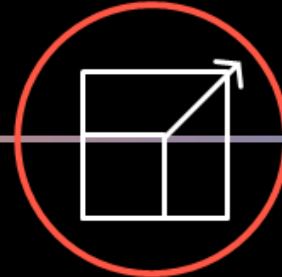
Append-only, immutable journal tracks history of all changes that cannot be deleted or modified; get full visibility into entire data lineage

Cryptographically
verifiable



All changes are cryptographically chained and verifiable

Highly scalable



Executes 2–3X as many transactions as ledgers in common blockchain frameworks

Easy to use



Flexible document model, query with familiar SQL-like interface

Amazon Keyspaces (for Apache Cassandra)

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

Apache Cassandra-compatible



Use the same Cassandra drivers and tools

No servers to manage



No need to provision, configure, and operate large Cassandra clusters

Single-digit-millisecond performance at scale



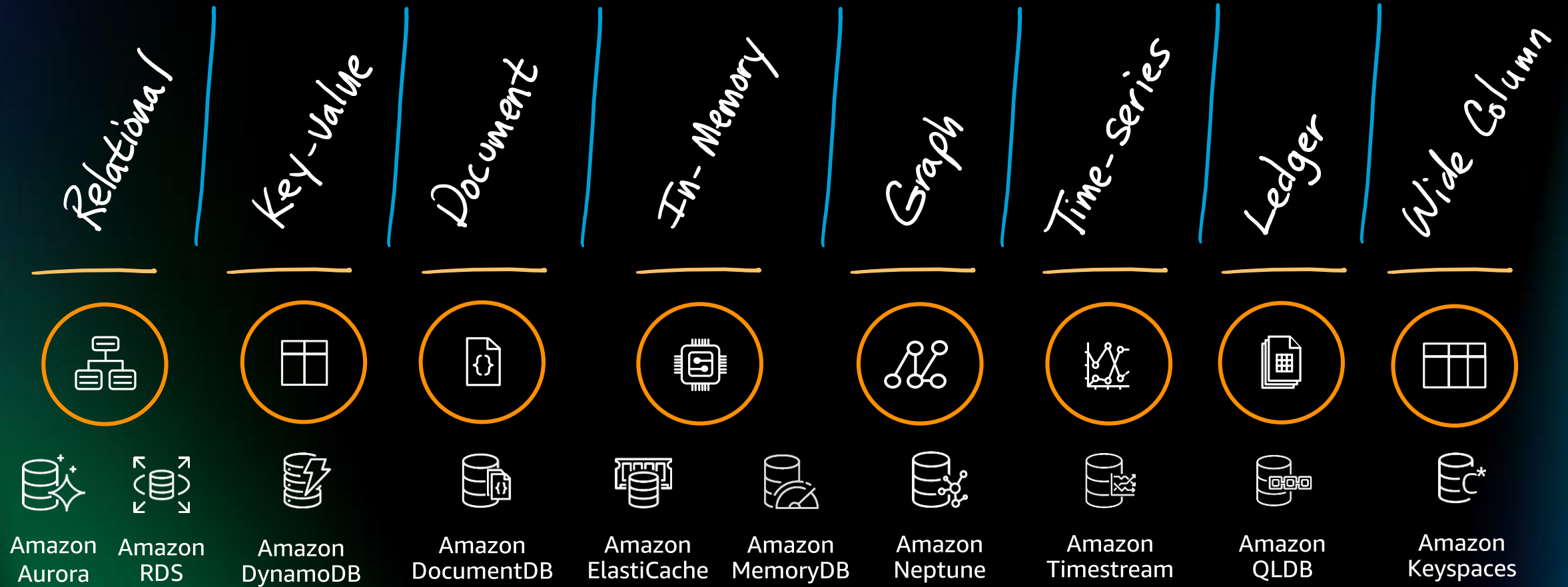
Scale tables up and down automatically
Virtually unlimited throughput and storage

Highly available and secure



99.99% availability SLA within an AWS Region
Data encrypted at rest; integrated with IAM

AWS Purpose-Built Databases



Customer Story: Biofourmis

AWS Purpose-Built Databases

Relational

Lift and shift,
ERP, CRM,
finance



Amazon
Aurora



Amazon
RDS

Key-value

Real-time bid,
shopping cart,
customer
preferences



Amazon
DynamoDB

Document

Content
management,
articles,
mobile



Amazon
DocumentDB

In-Memory

Leaderboards,
real-time
analytics,
caching



Amazon
ElastiCache

Graph

Fraud detection,
social networks,
recommendation
engines



Amazon
Neptune

Time-Series

IoT, event
tracking,
market
trading



Amazon
Timestream

Ledger

Supply chain,
health care,
registrations



Amazon
QLDB

Wide Column

Low-latency
writes,
Cassandra



Amazon
Keyspaces

Resources

For more information visit:
<https://aws.amazon.com/products/databases/>

Visit the Modern Applications resource hub

Dive deeper with these resources to help you develop an effective plan for your modernization journey.

- Build modern applications on AWS
- Business value of cloud modernization
- An introduction to event-driven architectures
- Accelerate full-stack web and mobile app development
- Determining the total cost of ownership: Comparing serverless and server-based technologies
- Building event-driven architectures with AWS
- Continuous learning, continuous modernization



<https://tinyurl.com/modern-apps-aws>

Visit resource hub

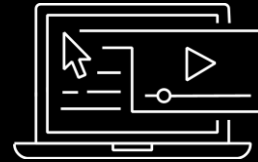


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Thank you!