aws databases

Building Modern Applications

with Amazon DynamoDB and Amazon Keyspaces

Gautham Shanmugam – GTM Specialist
Pete Naylor – Tech Product Manager

aws databases

Gautham Shanmugam
GTM Specialist

Pete Naylor
Tech Product Manager

Data generation and consumption

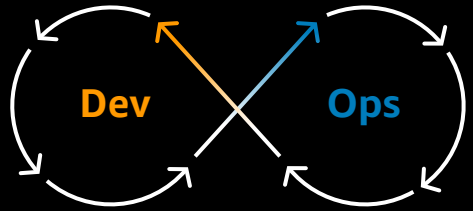
Explosion of data

Data grows 10 times every 5 years driven by network-connected smart devices

Microservices change data and analytics requirements

Microservices architecture decreases the need for one-size-fits-all databases and increases the need for real-time monitoring and analytics

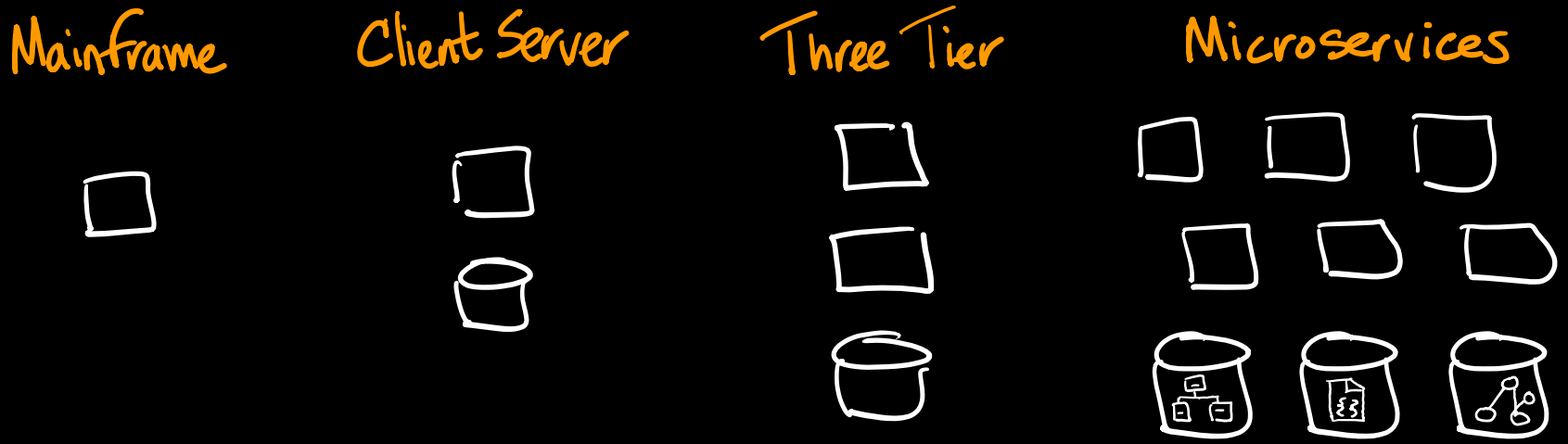
Rapid rate of change driven by DevOps



The transition from IT to DevOps increases the rate of change

Application architecture and patterns have evolved

Microservices change how applications are built in the cloud



aws databases

Build on a solid foundation

A modern data platform

Technology – Choosing a flexible platform that gives you the right tool for the job, scales with your business, and will evolve over time

Culture – Upskilling the team

Technology

The outcomes customers achieve from a modern data platform

- Serve any scale and never run slowly again.
- Increase reliability and reduce risk.
- Flexibility – Tools and use cases change. The platform also must change. Always have the right tool for the job.
- Unblock innovation – Apply the right tool as soon as a use case emerges.

Move faster **Reduce risk** **Reduce cost**

Culture

The outcomes customers achieve from a modern data platform

- Spend time on more valuable work
- Move faster delivering your strategic projects
- Learn new data models and new capabilities
- Focus on the learning and not on managing the infrastructure

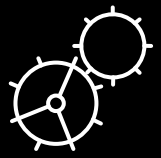
Challenges faced with traditional database infrastructure

Lack of flexibility and high cost prevent business growth

Scalable elasticity

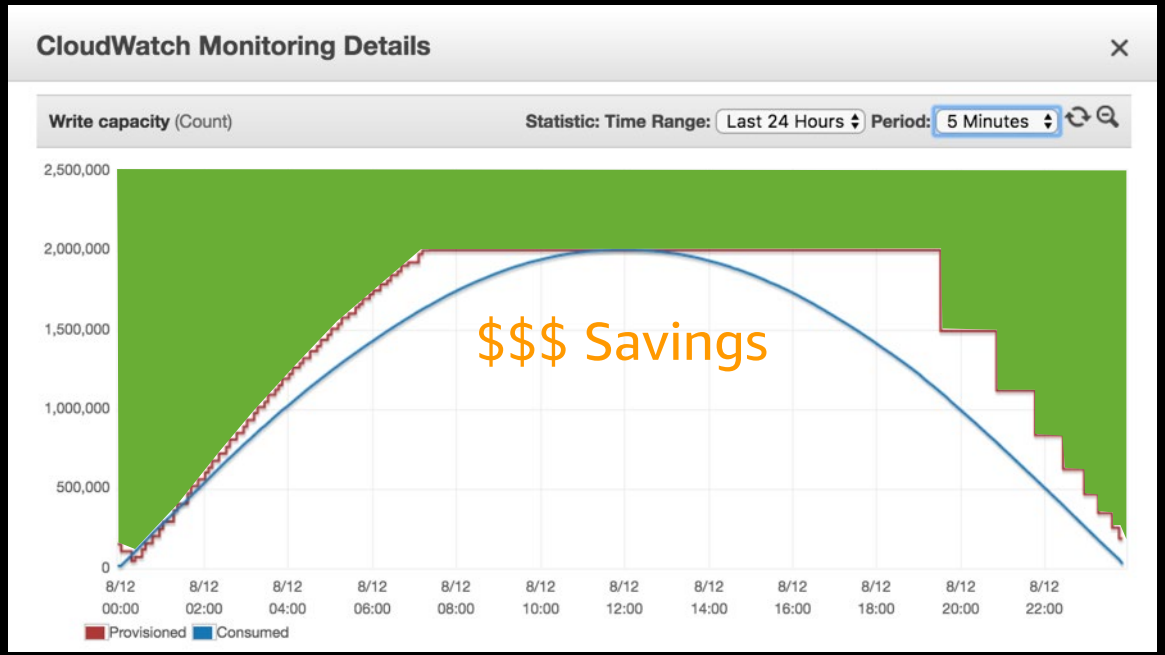
Performance

Developer efficiency



Scalable elasticity

Provisioned capacity mode: auto scaling, maintains performance

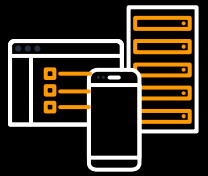


- Automated scaling policies
- Scales up when you need it
- Scales down when you don’t need it
- Scheduled auto scaling

PROVISIONED CAPACITY MODE

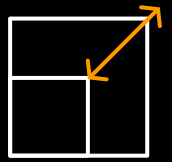
aws databases

On-demand capacity mode: rapid, flexible scaling



No capacity management

No need to specify how much read/write throughput you expect to use

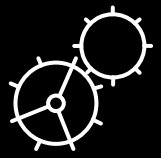


Ideal for unpredictable workloads

Ramp from zero to tens of thousands of requests per second on demand

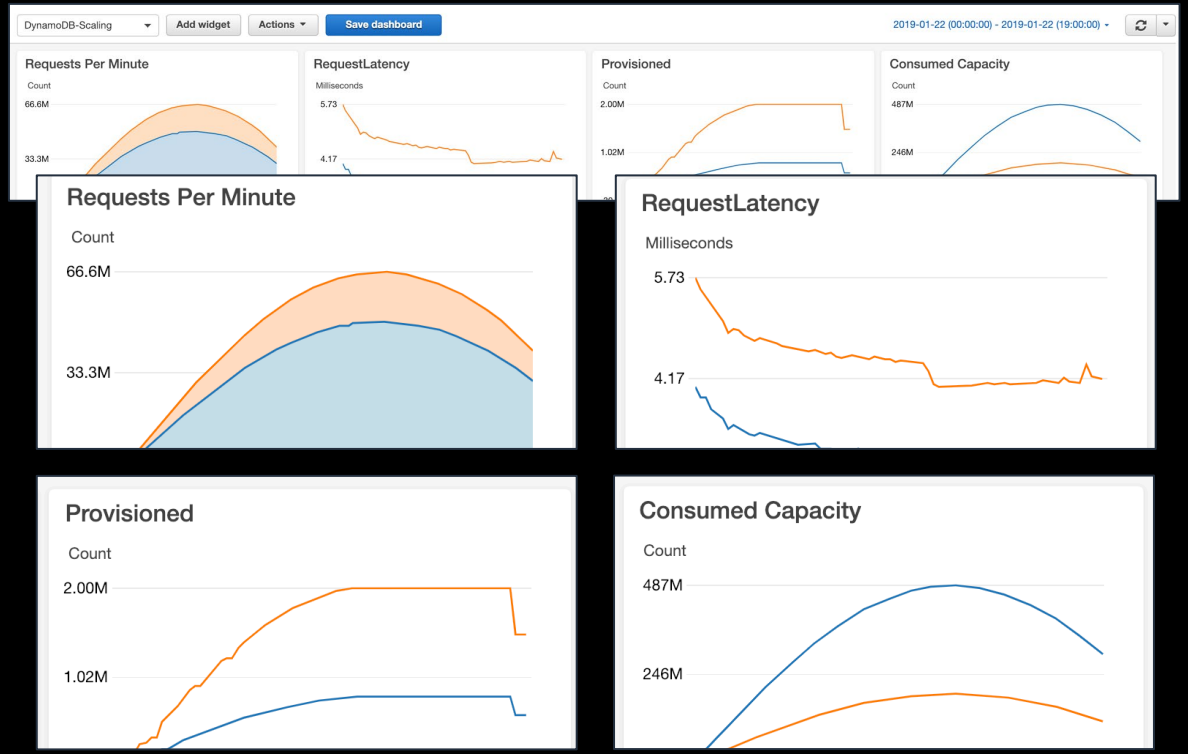
Pay only for what you use

Pay-per-request pricing



Performance

Single-digit-millisecond latency at petabytes of scale

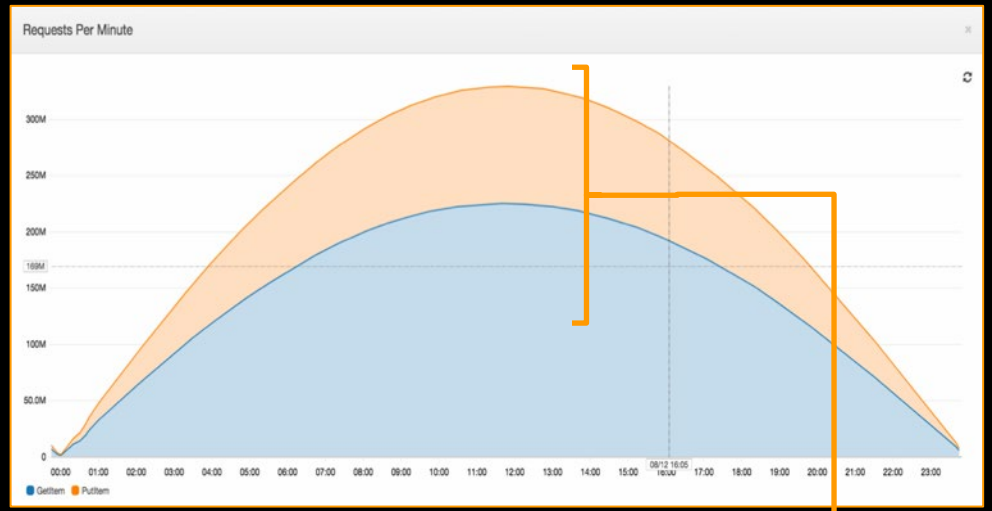


- Millions of requests per second
- Trillions of items
- Petabytes of storage
- Single-digit-millisecond read and write latencies

aws databases

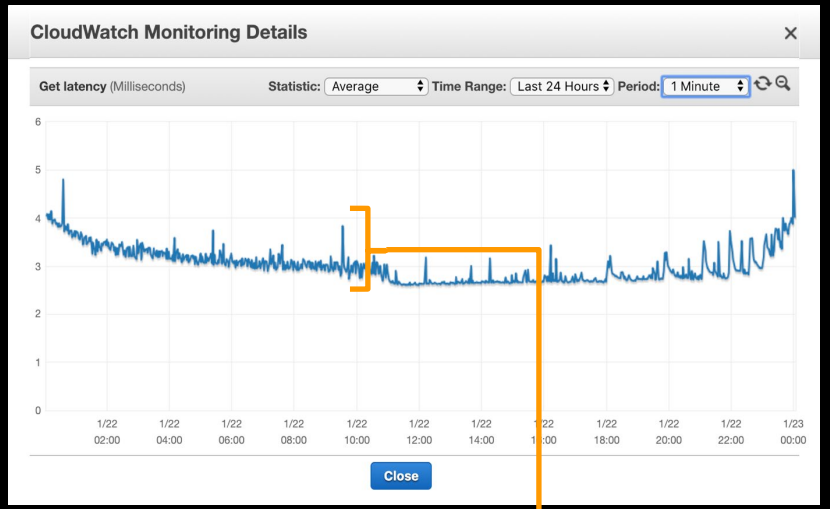
Consistent low latency, even during high request volume

High request volume



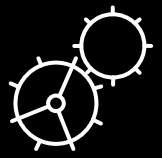
Millions of requests per second

Consistently low latency



Only **1 millisecond** variance

aws databases



Developer efficiency

Getting back valuable time for your business

As fully managed database services, DynamoDB and Keyspaces do the heavy lifting for you:

Security
- Operating-system patching
- Database patching
- Access control
- Audit
- Encryption
- Compliance

Durability
- Sustain server, rack, and datacenter outages
- Re-replicate data quickly upon hardware failure
- Manage backup and restore

Availability
- High availability configuration
- Monitoring
- Cross-Region replication

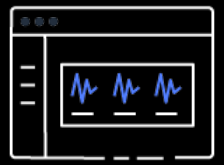
Performance
- Performance tuning
- Indexing
- In-memory caching

Scalability
- Host provisioning
- Host repair and retirement

Highly available

Data is replicated automatically across multiple AWS Availability Zones using a replication factor of 3

99.99% availability SLA within an AWS Region



Monitor performance using Amazon CloudWatch

Built-in security

- Data is encrypted at rest using encryption keys stored in AWS Key Management Service (AWS KMS)
- Secure connectivity from clients using TLS
- Manage access to individual keyspaces and tables by using AWS Identity and Access Management (IAM)
- Connect Keyspaces to resource in Amazon Virtual Private Cloud (Amazon VPC) through VPC Endpoints
- Administrative DDL actions are logged in CloudTrail

Point-in-time recovery (PITR)

Helps protect against accidental deletions and updates

Table data is backed up continuously

Table data can be restored to any second in time in the previous 35 days

No impact on table performance or availability

“Why build Keyspaces?”

Apache Cassandra

- Wide-column data store
- Designed for large-scale applications that need fast read and write performance
- SQL ”Like” Interface (CQL)
- Common use cases
  - User profiles
  - Device metadata
  - Event logging

Challenges of managing Cassandra

- Specialized expertise to deploy, configure, and manage software
- Scaling clusters down to optimize resources is complex
- Version upgrades are difficult due to clunky rollback features
- Restoring data is error prone
- No built-in encryption support to protect data
- Patching, updating, and maintaining cluster infrastructure

“Can you help us run Cassandra workloads more easily?”

Amazon Keyspaces (for Apache Cassandra)

A ***scalable***, ***highly available***, and ***fully managed*** Apache Cassandra–compatible database service

Compatible with Apache Cassandra

- **Use your existing Cassandra Query Language (CQL) code**
  - Create and manage keyspaces and tables
  - Read and write data

- **Works with most open-source Cassandra drivers and tools**
  - Step-by-step instructions for Java, Node.js, Python, Go, .NET, and Perl Cassandra drivers
  - Read, write, and copy data to / from existing clusters by using cqlsh

- **Amazon Keyspaces appears to be 9-node, 3.11.2 cluster**
  - Drivers and clients must be compatible with 3.11.2
  - Amazon Keyspaces offers same backwards compatibility as 3.11.2

When should you consider Amazon DynamoDB?

- Want innovative features such as atomic multi-item transactions, multi-region active-active storage, DynamoDB streams, and API-compatible, write-through, in-memory caching

- Want an operational database that offers the deepest integration with other AWS services: API Gateway, Amplify, triggered Lambda functions

When should you consider Amazon Keyspaces?

- Want to migrate existing CQL applications to a fully managed solution
- Want a highly scalable and serverless data store that supports an open-source API

Pace of innovation

DynamoDB

- CloudTrail logging of data-plane API activity
- Amazon Kinesis Data Streams for DynamoDB
- AWS Glue Elastic Views support for DynamoDB
- AWS Pricing Calculator
- CloudWatch Contributor Insights for DynamoDB
- Convert single-Region tables to global tables
- Cross-Region table restore
- Data export to Amazon S3
- Global table replicas
- Global tables 2019.11.21
- Instant adaptive capacity (and isolation of frequently accessed keys)
- NoSQL Workbench for DynamoDB (with support added for Linux and DynamoDB local)
- PartiQL (a SQL-compatible language) support for DynamoDB

Pace of innovation

Keyspaces

- Ordering clauses
- Provisioned capacity with auto scaling
- Altering tables
- Service Quotas support
- Authentication plugins for Java, Go, Python, and Node.js drivers
- Availability in 20 AWS Regions
- AWS CloudFormation support
- Tagging and tag-based access management
- Counters, Static Types
- AWS PrivateLink support
- Point-in-time recovery (PITR)
- NoSQL Workbench support
- JSON Support
- Supports PCI DSS compliance

Ready to get started?

1. **New workloads for modern applications**

2. **Existing workloads on relational or NoSQL databases**

- ✓ single-digit-millisecond latency performance
- ✓ 99.99%+ availability
- ✓ virtually unlimited scalability
- ✓ pay based on consumption
- ✓ serverless architecture

Amazon DynamoDB & Amazon Keyspaces

Q&A

Resources

Product-specific pages

aws.amazon.com/dynamodb

aws.amazon.com/keyspaces

Documentation Guides

docs.aws.amazon.com/dynamodb

docs.aws.amazon.com/keyspaces

Developer Forums

forums.aws.amazon.com

Search by AWS Forum, then Databases category for each forum .

AWS What's New Announcements:

aws.amazon.com/new

filter by "Database," then select DynamoDB or Keyspaces

AWS Databases Blog

aws.amazon.com/blogs/database

Search by tag for DynamoDB and Keyspaces – https://aws.amazon.com/blogs/database/category/database/amazon-dynamodb/