
AWS
re:Invent

DAT307

Amazon DocumentDB (with MongoDB compatibility) deep dive

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Principal Product Manager

AWS

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Agenda

- What is Amazon DocumentDB?
- What is unique about the modern, cloud-native architecture of Amazon DocumentDB?
- What's new?
- What's next?



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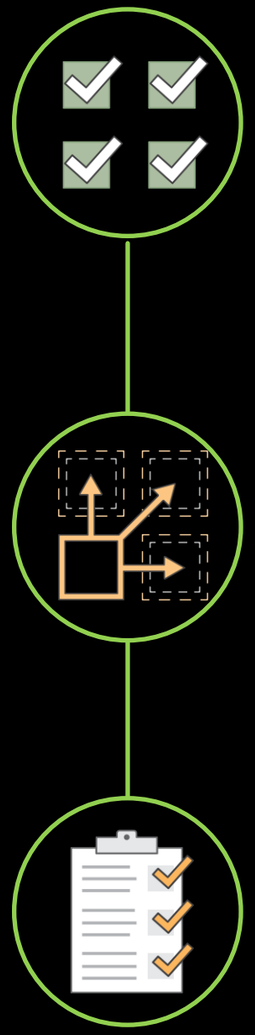
What is Amazon DocumentDB?



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Amazon DocumentDB (with MongoDB compatibility)



Fully managed

Scalable

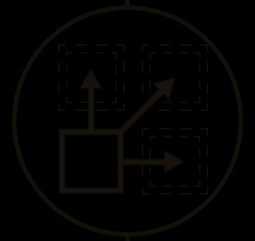
MongoDB API compatible

Fully managed and scalable document database service that supports MongoDB workloads

Amazon DocumentDB (with MongoDB compatibility)



Fully managed



Scalable



MongoDB compatible

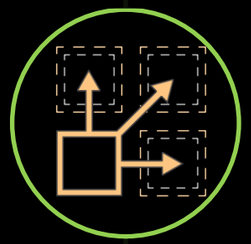
- Built-in high availability
- Backups enabled by default
- Durable by default
- Security best practices by default
- Automatic patching
- Monitoring and alerting

FINRA

“Because DocumentDB is a fully managed service, our databases are scalable, highly available, backed up, and encrypted without any overhead from our engineering teams”

Amazon DocumentDB (with MongoDB compatibility)

Fully managed



Scalable

Scale compute in minutes

Storage and IO autoscaling

Storage scales to 64TB

Scale out to 15 replicas for millions of reads

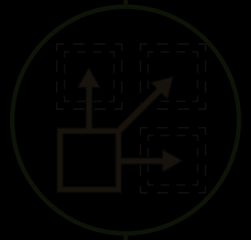
Iron

“With Amazon DocumentDB, we can add or scale instances in minutes, regardless of data size.”

Amazon DocumentDB (with MongoDB compatibility)



Fully managed



Scalable



MongoDB API compatible

Applications, drivers, and tools can be used with Amazon DocumentDB with little or no change

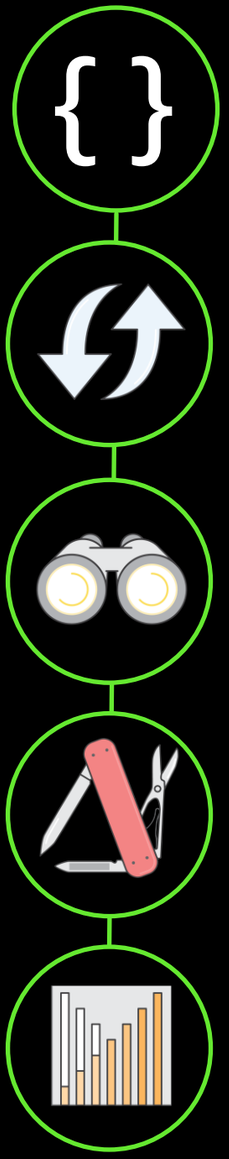
Supports hundreds of APIs, operators, and stages

Continually working backward from customers to deliver the capabilities they need



“We love that it’s compatible with MongoDB, so our applications didn’t require code changes, and we could easily spin up a DocumentDB cluster to test the MongoDB capabilities that we relied on.”

When should you use a document database?



JSON data

Flexible schema for fast iteration

Ad hoc query capabilities

Flexible indexing

Operational and analytics workloads

Amazon DocumentDB makes it easy to store, query, and index JSON data

Use cases



Web publishing



Product catalog



IoT



Regulatory documents



Gaming



Content management

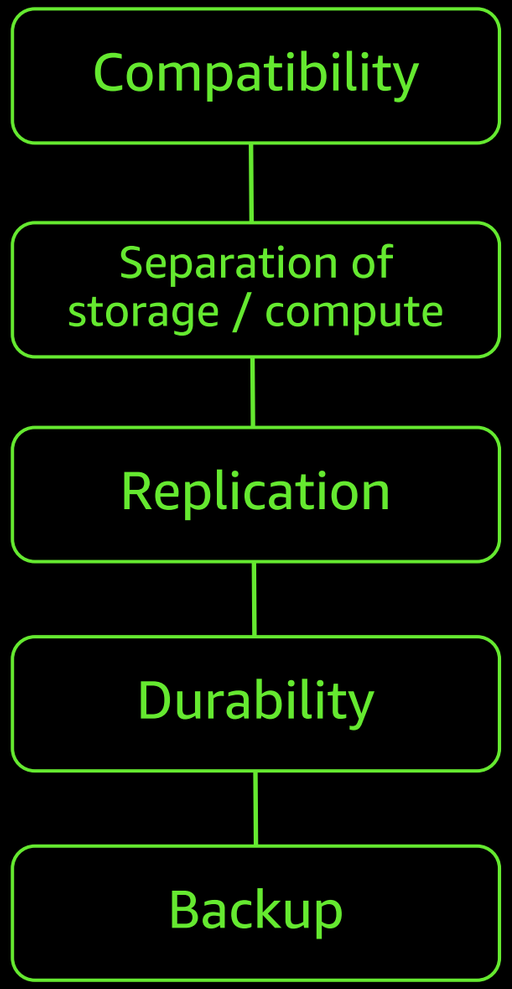
Amazon DocumentDB architecture



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Amazon DocumentDB Architecture



Compatible with existing MongoDB drivers and tools (Demo)

Scale compute in minutes, regardless of storage size (Demo)

Scale out reads on replicas (Demo)

Durable by default – six-way replication across three 3AZs (Demo)

Continual, no impact, streaming backups (Demo)

Modern, cloud-native database architecture

Amazon DocumentDB architecture

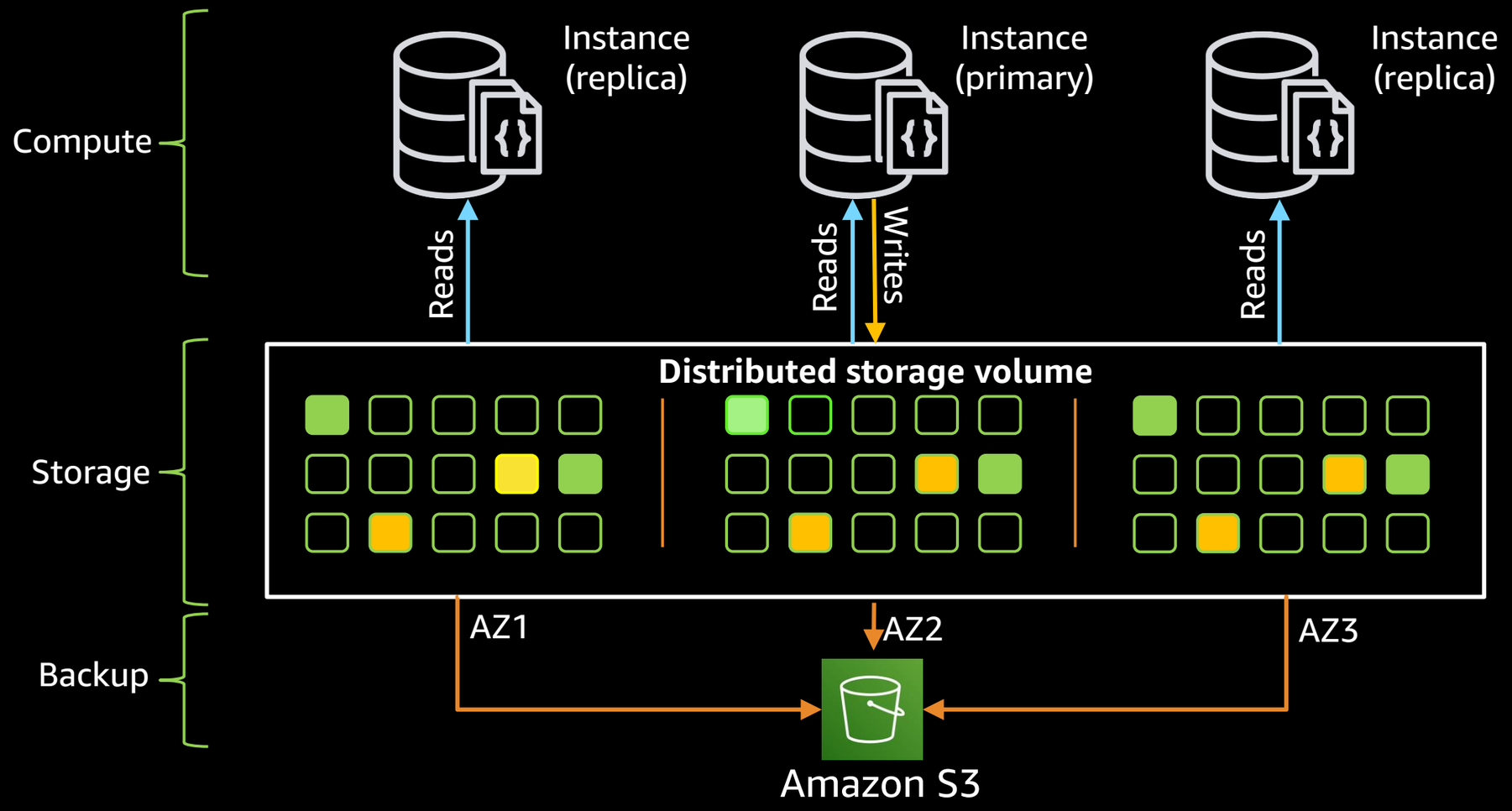
Compatibility

Separation of storage / compute

Replication

Durability

Backup



Compatibility



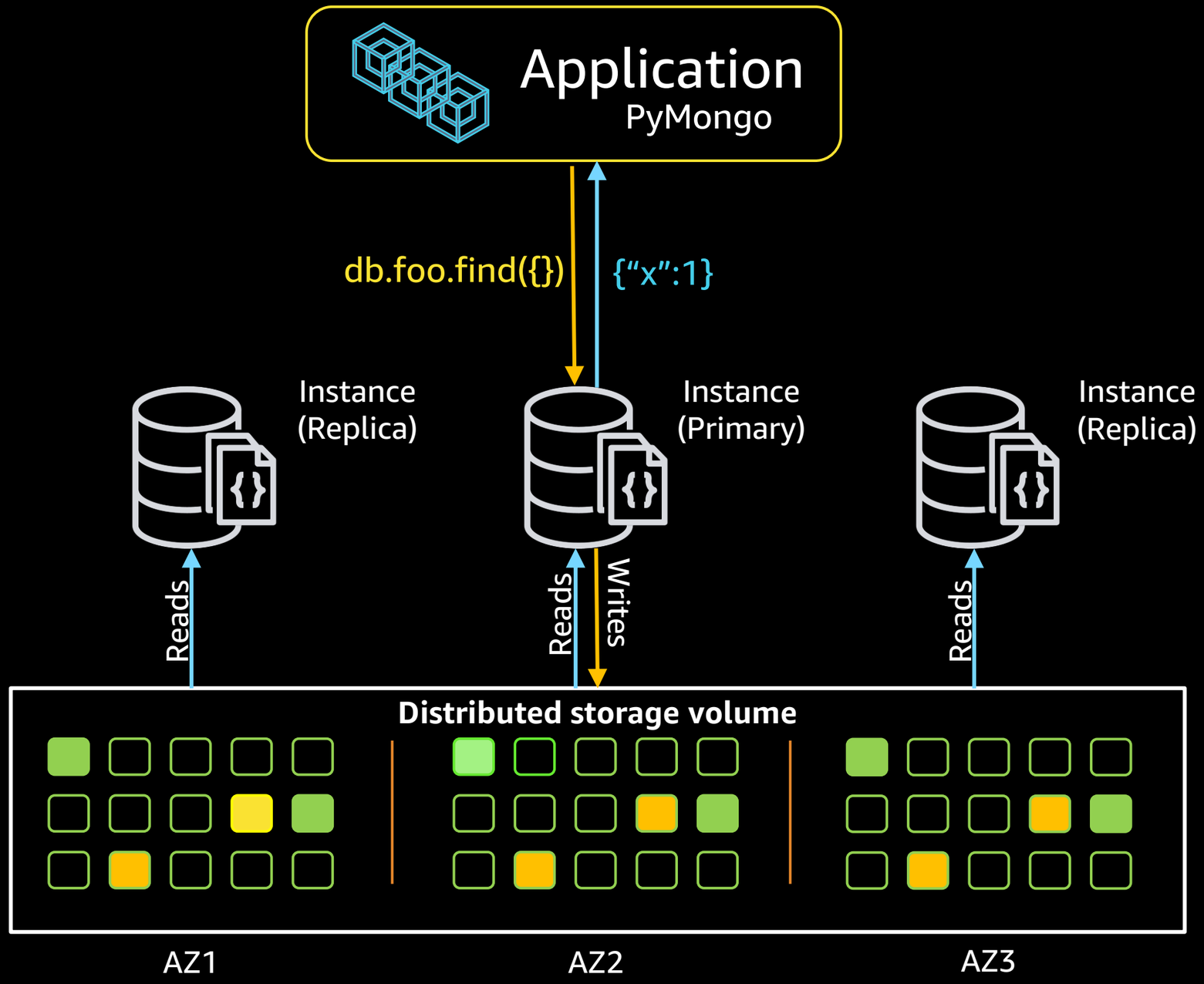
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Architecture

Compatibility

Amazon DocumentDB emulates the MongoDB API



Separation of storage and compute

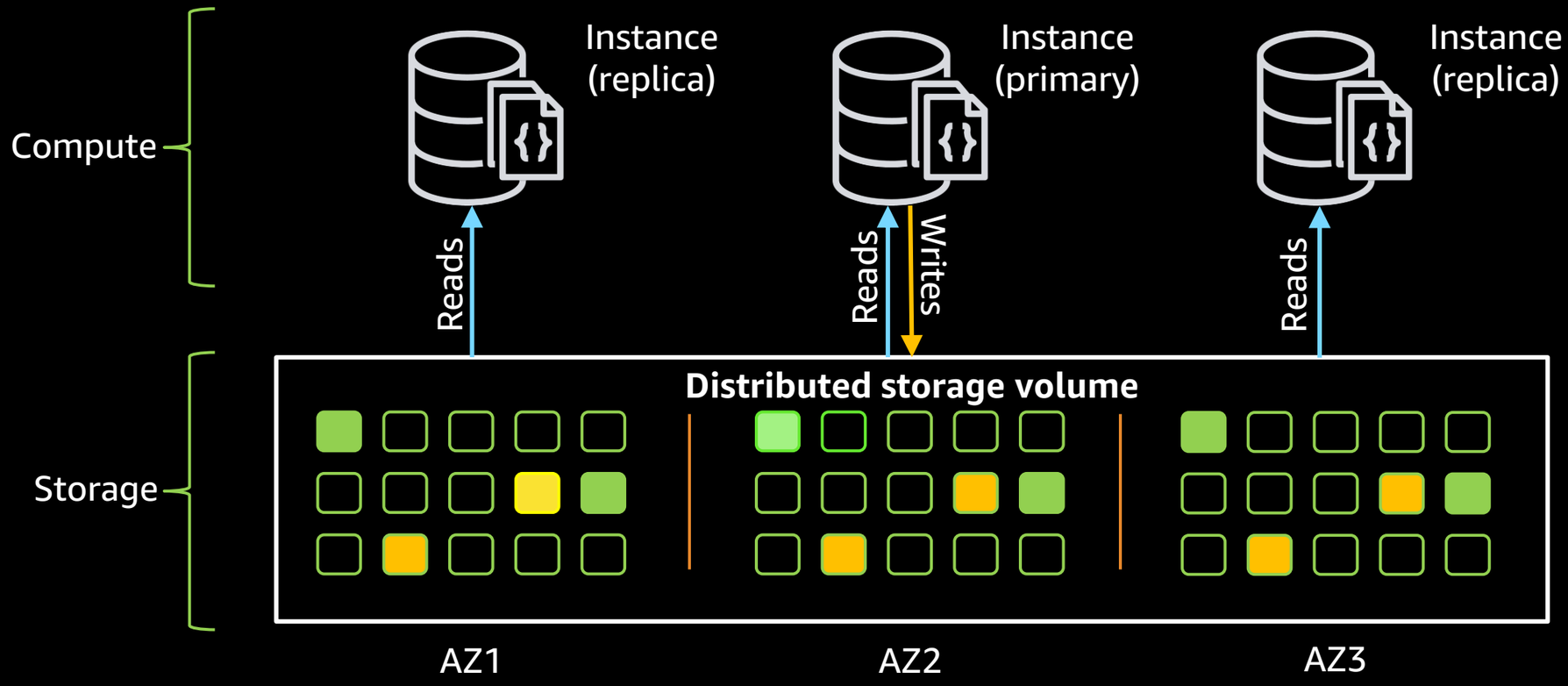


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Architecture

Separation of storage / compute

How would you build a cloud-native database architecture?



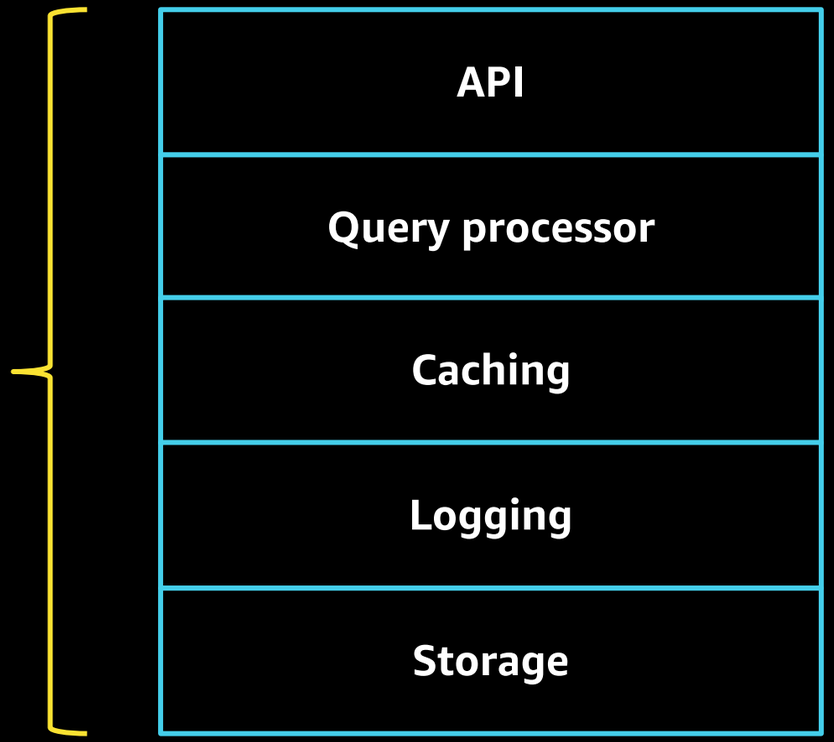
Architecture

Separation of storage / compute

Traditional database architecture

Monolithic, shared disk architecture

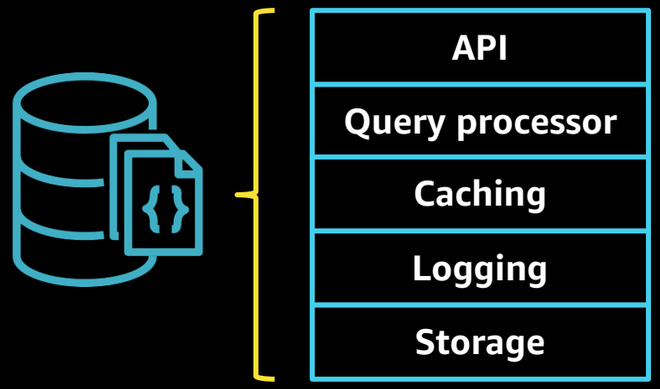




Architecture

Separation of storage / compute

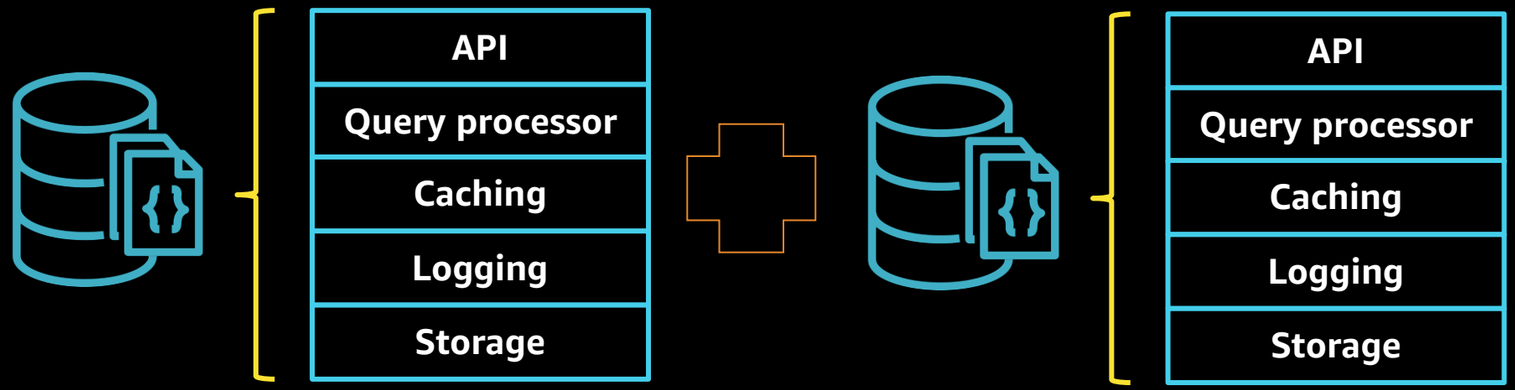
Scaling requires copying the whole stack



Architecture

Separation of storage / compute

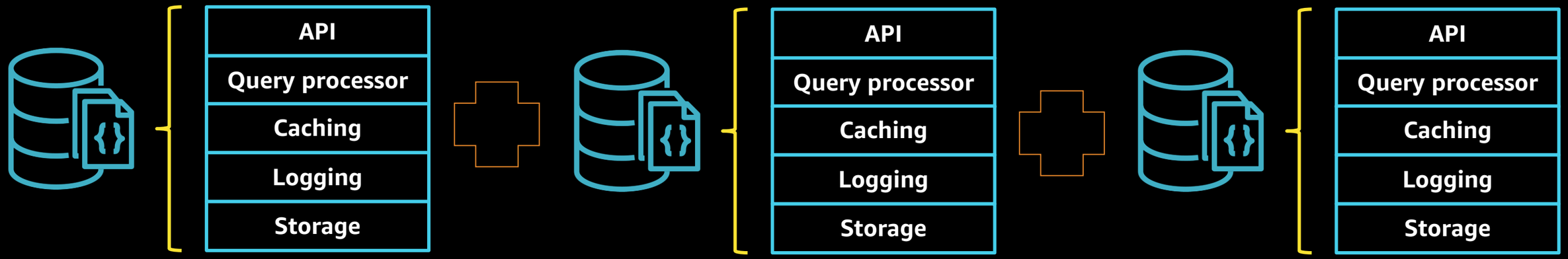
Scaling requires copying the whole stack



Architecture

Separation of storage / compute

Scaling requires copying the whole stack



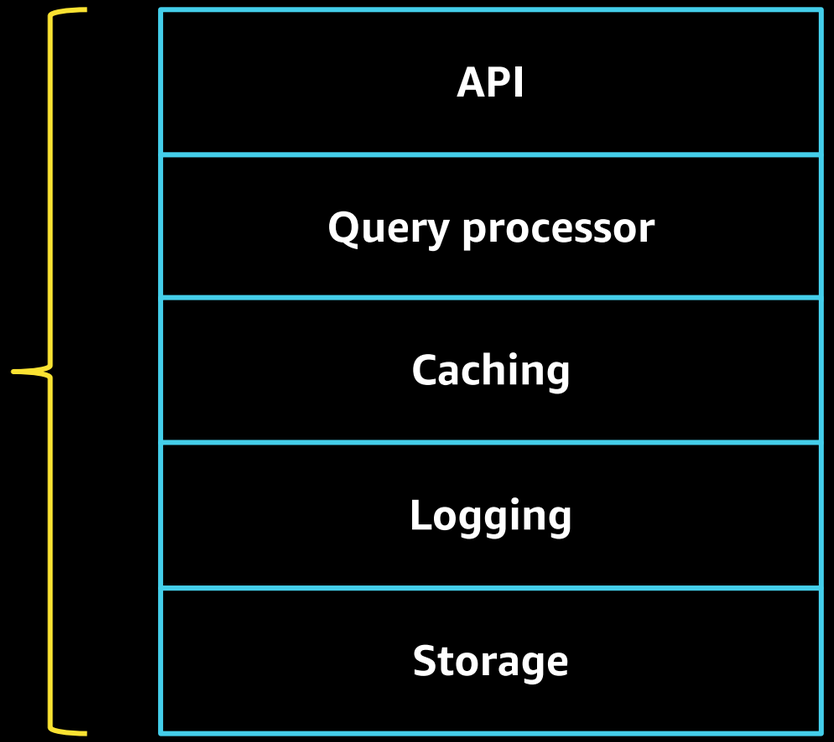
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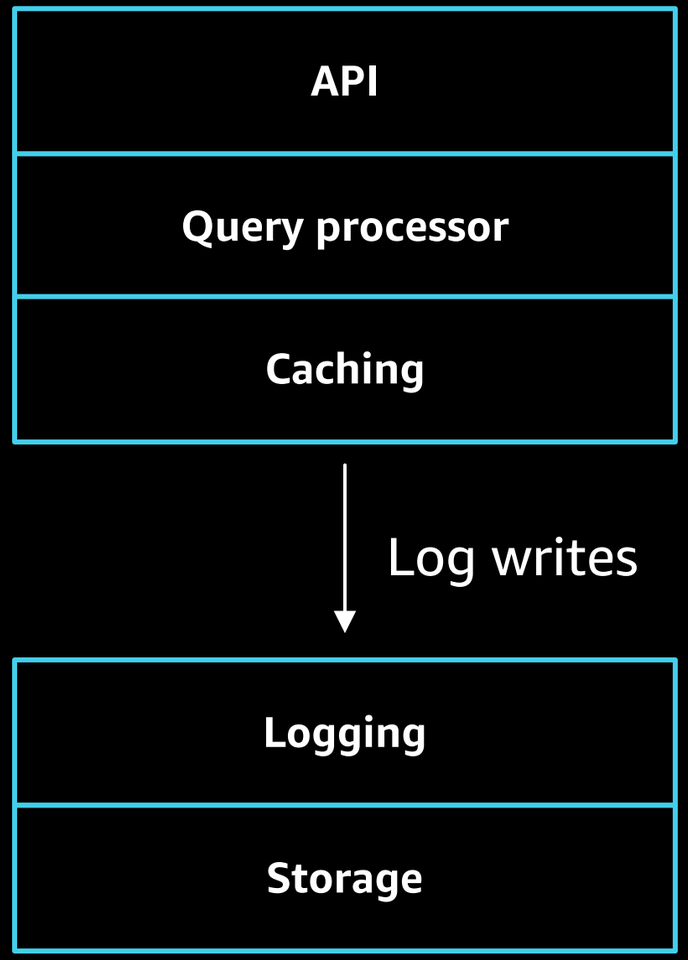




Architecture

Separation of storage / compute

Separation of storage and compute



Architecture

Separation of storage / compute

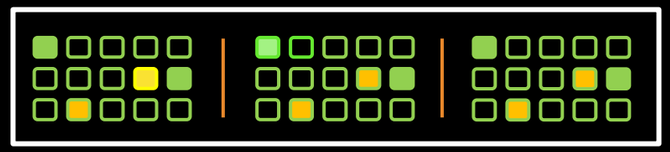
Separation of storage and compute



Compute layer

- API
- Query processor
- Caching

Log writes



Storage layer

- Logging
- Storage

Architecture

Separation of storage / compute

Separation of storage and compute



Compute layer

API

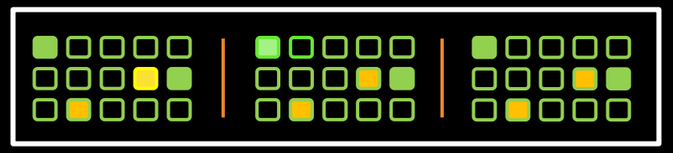
Query processor

Caching

Scale compute

Decouple compute and storage

Log writes



Storage layer

Logging

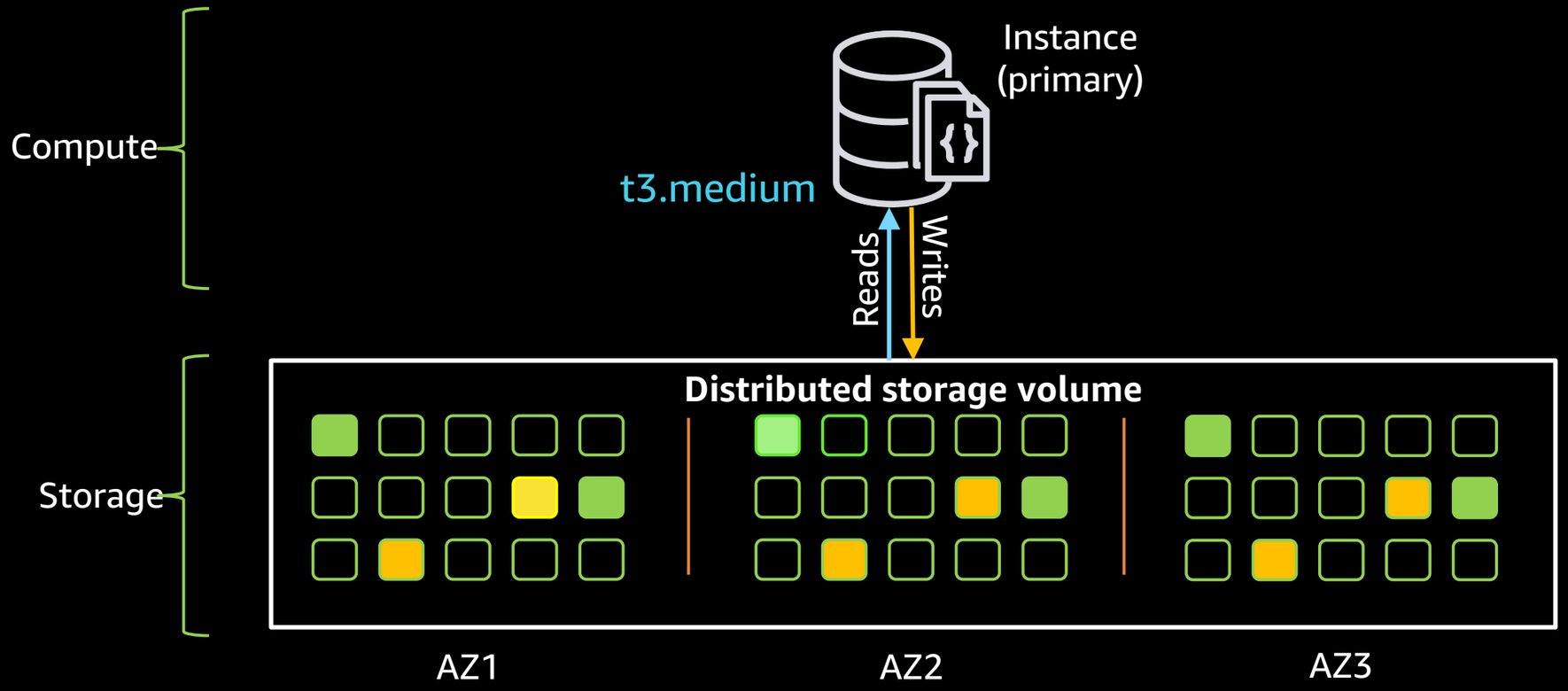
Storage

Scale storage

Architecture

Separation of storage / compute

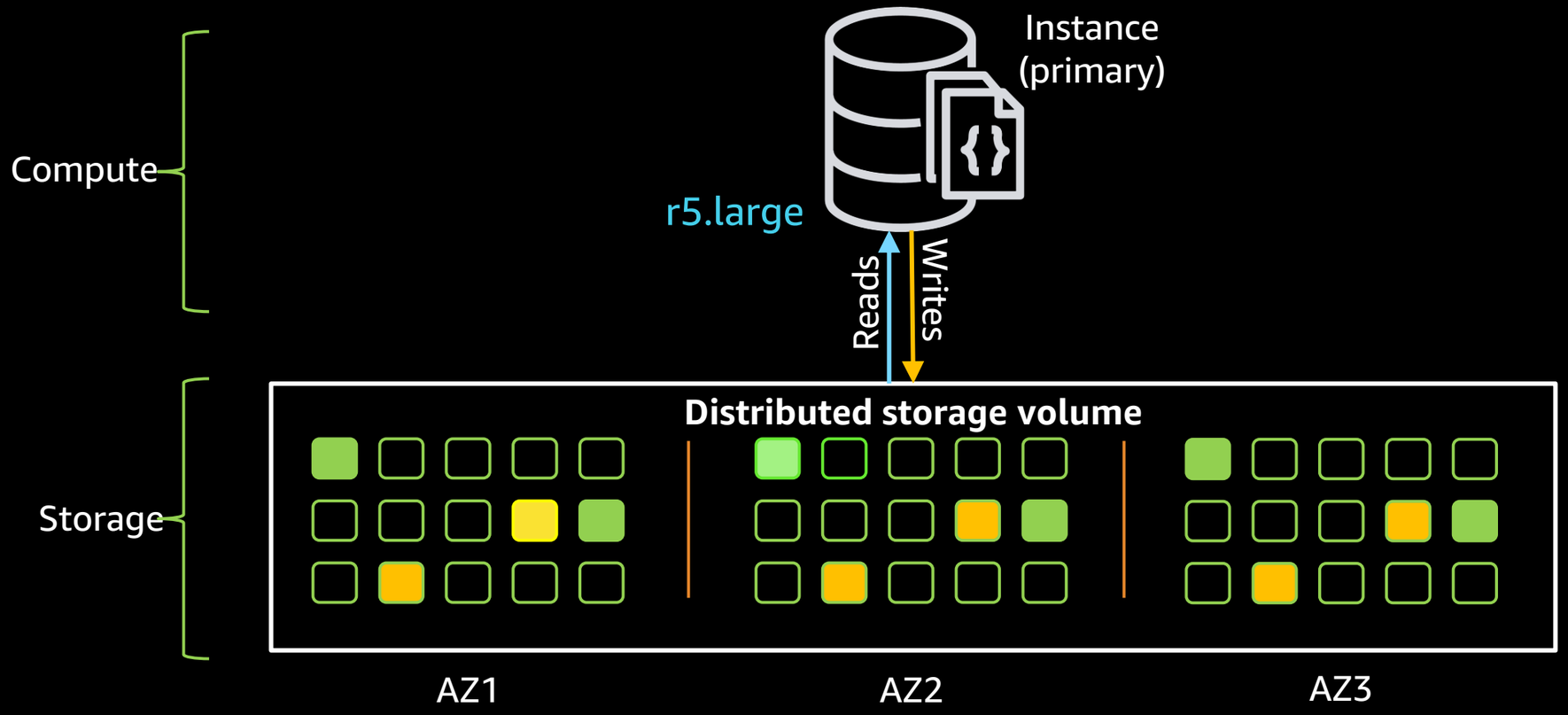
t3.medium: Dedicated single-instance cluster for dev / test ($0.08 / hour)



Architecture

Separation of storage / compute

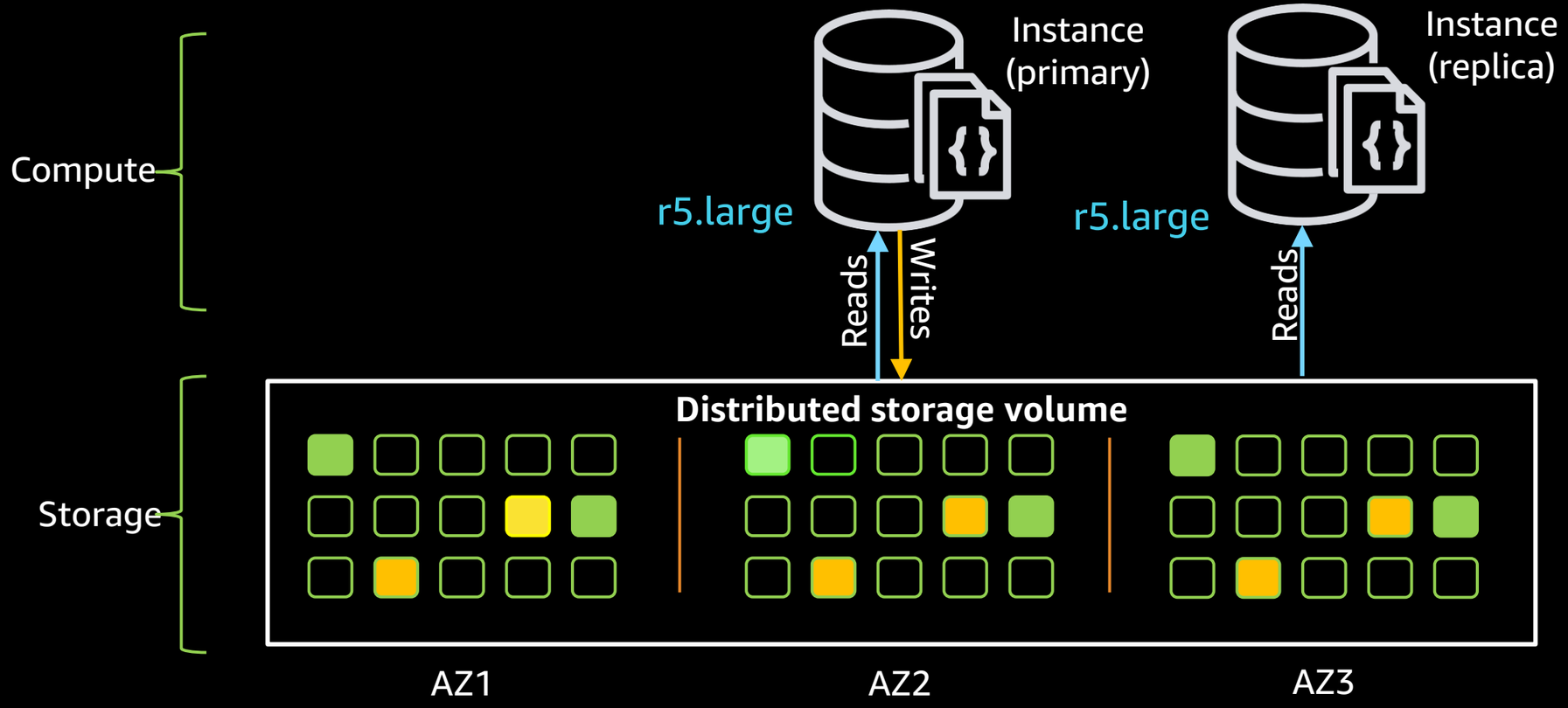
Scale-up your existing instance in minutes, regardless of storage size



Architecture

Separation of storage / compute

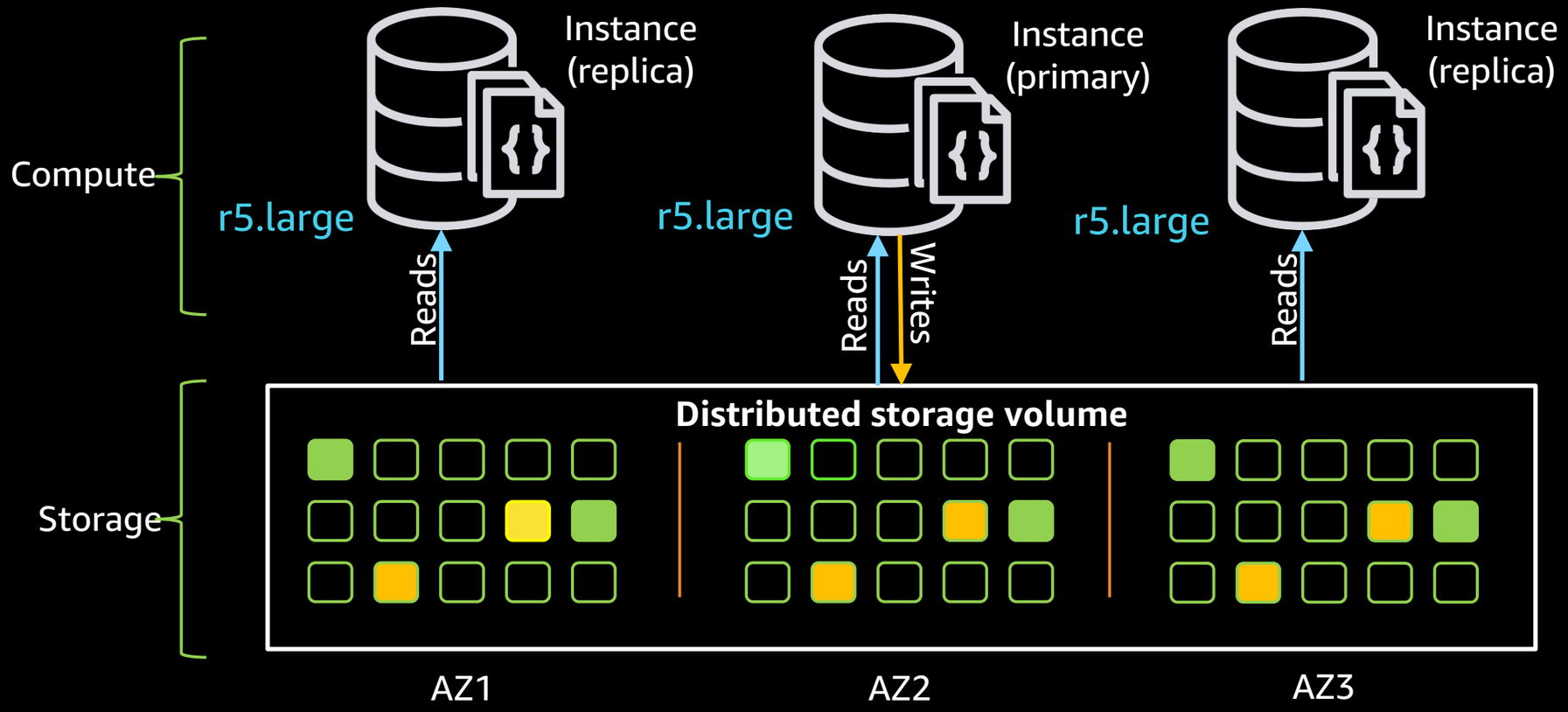
Add new instances in minutes, regardless of storage size



Architecture

Separation of storage / compute

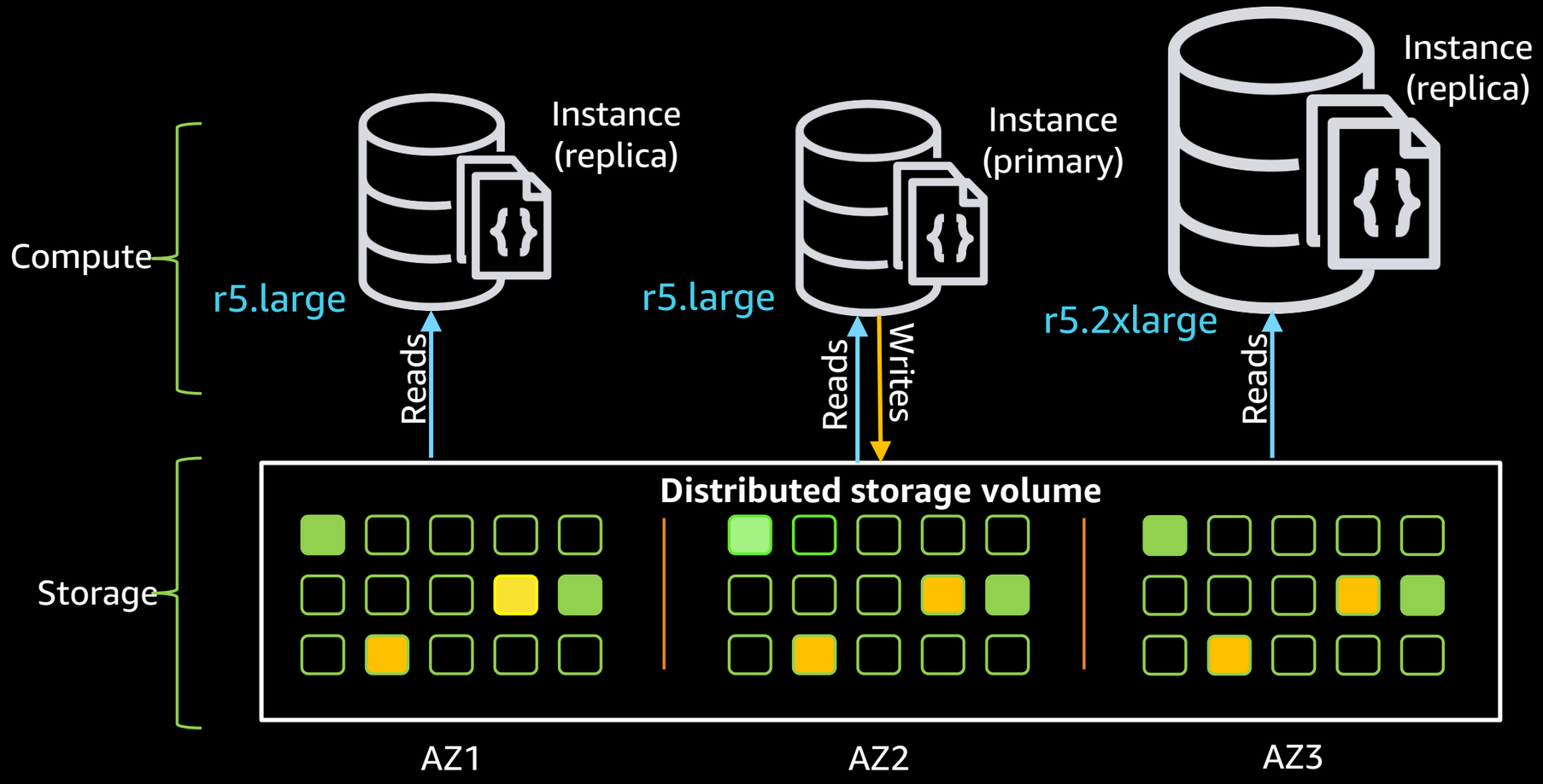
Add new instances in minutes, regardless of storage size



Architecture

Separation of storage / compute

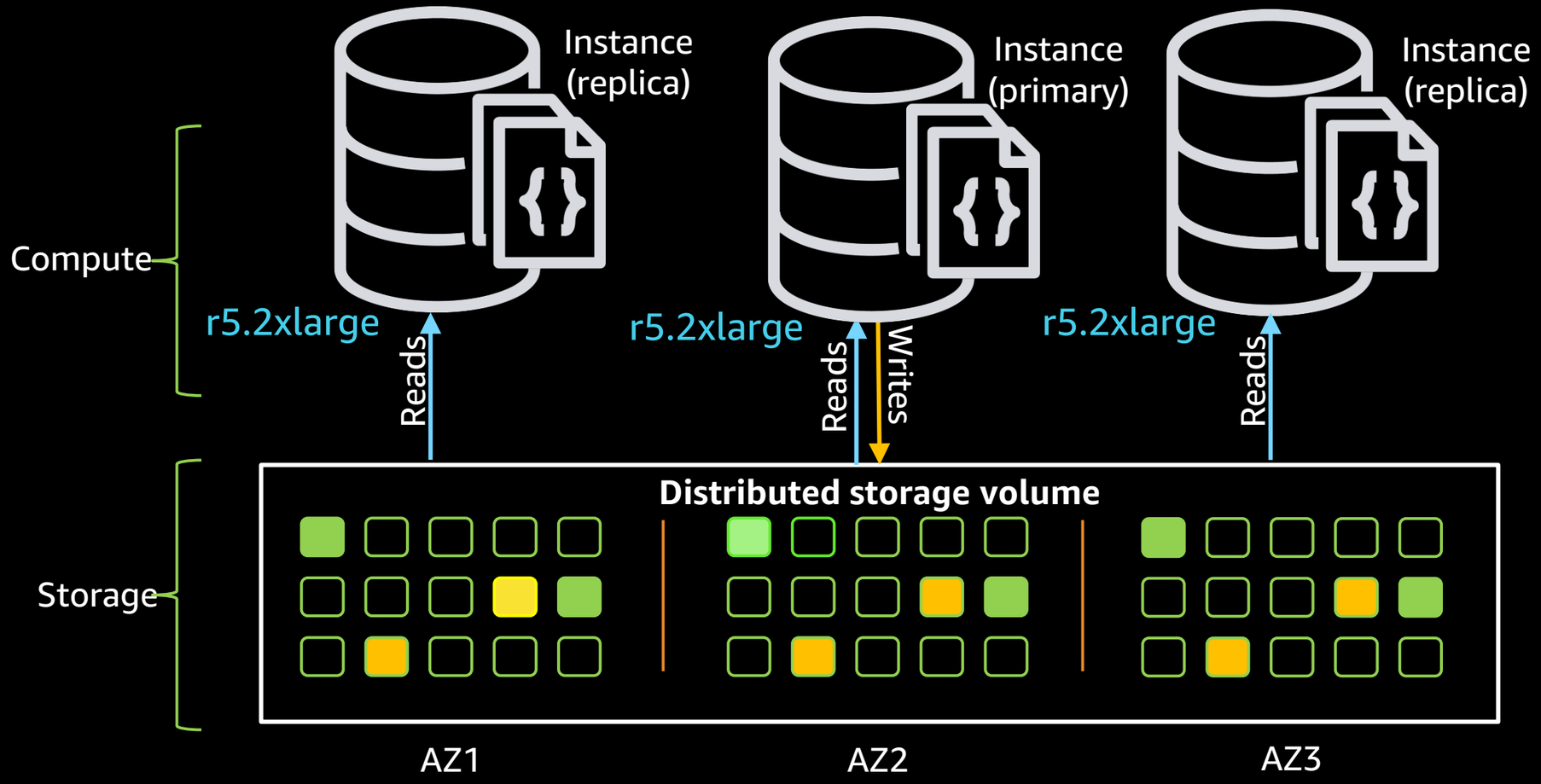
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Architecture

Separation of storage / compute

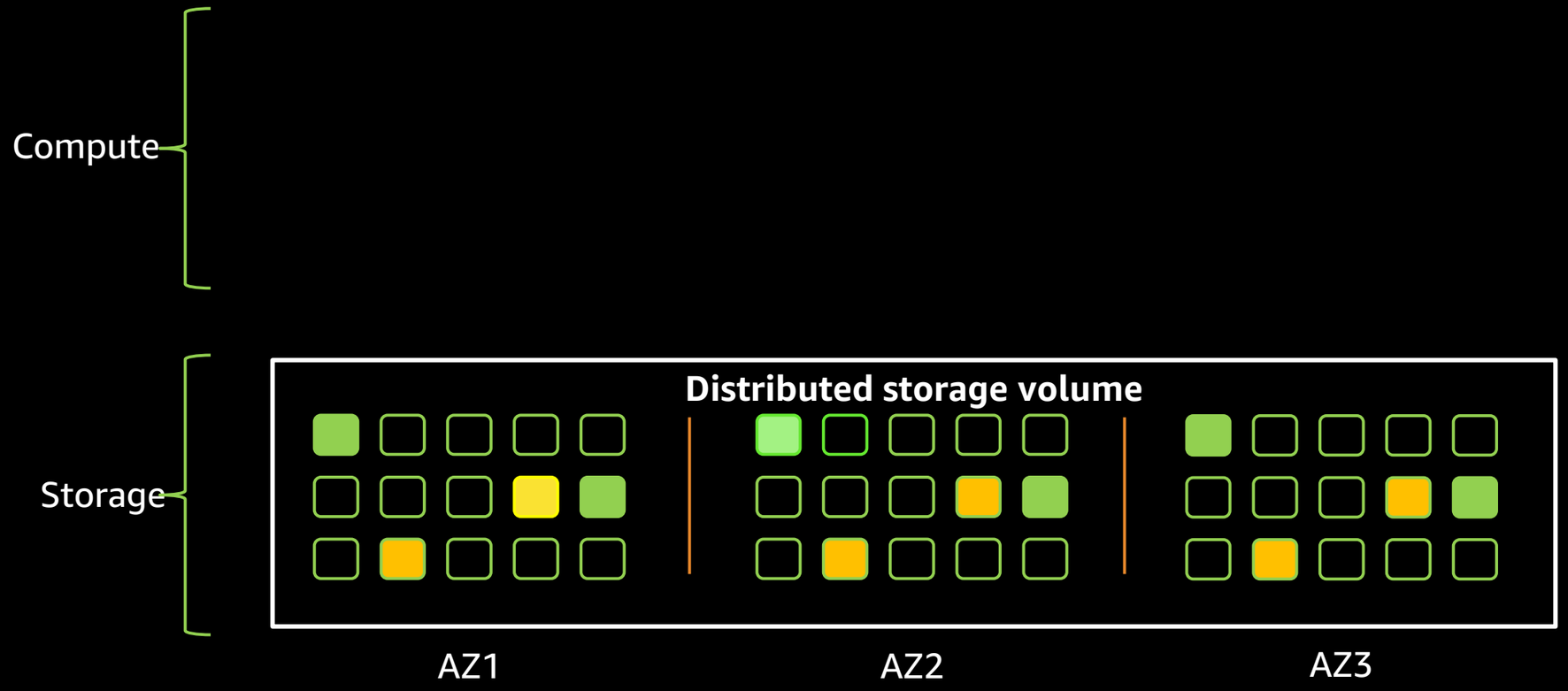
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Architecture

Separation of storage / compute

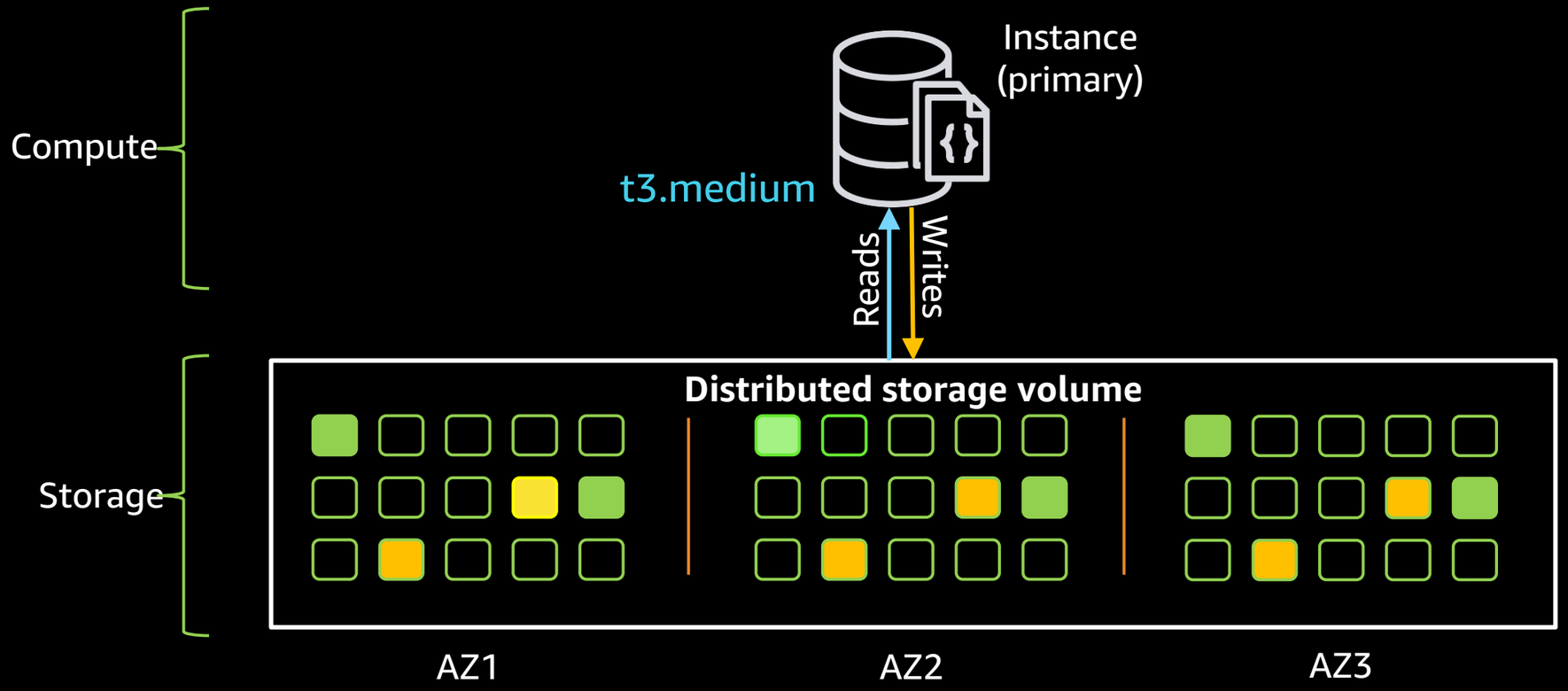
Compute and storage are separated to the degree that you can delete all compute and your data is still highly durable



Architecture

Separation of storage / compute

Single node cluster is still highly durable



Replication



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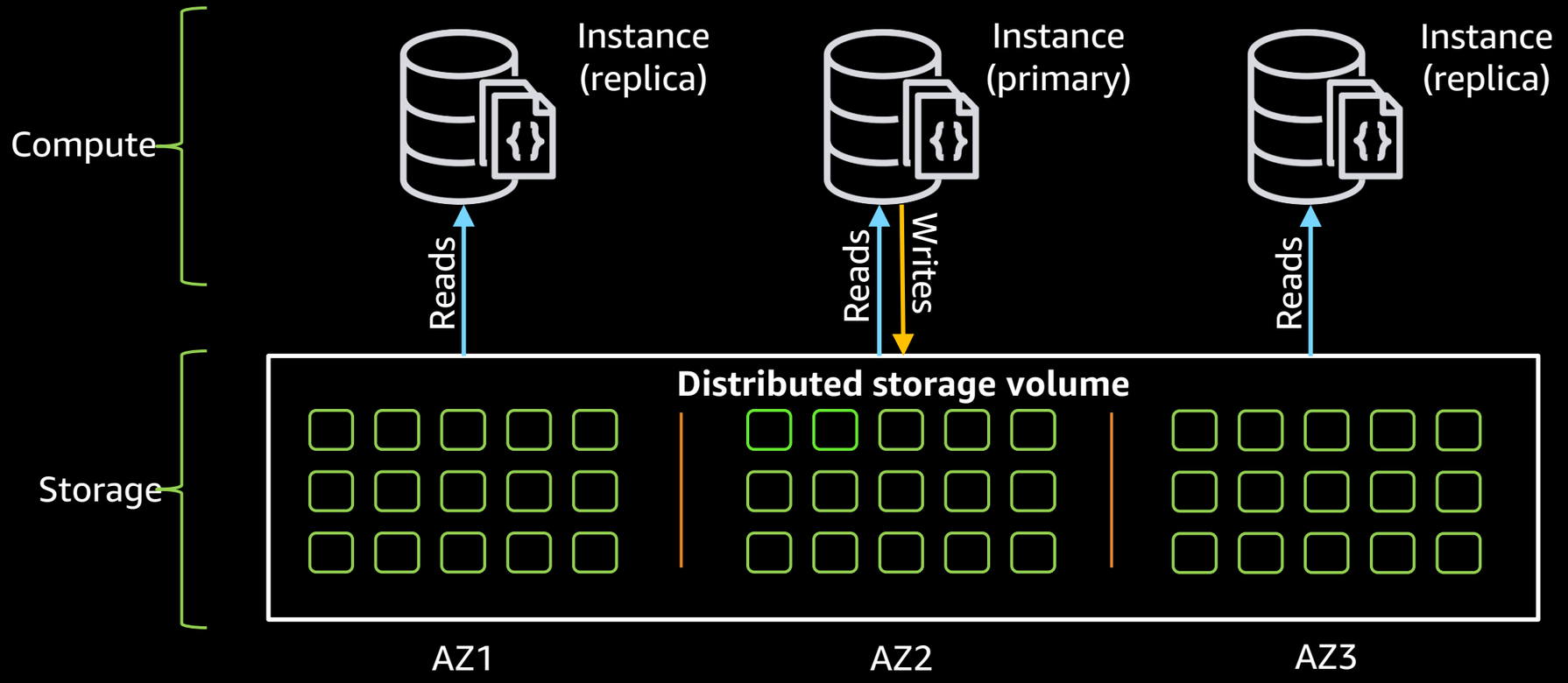
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Architecture

Application
PyMongo

Replication

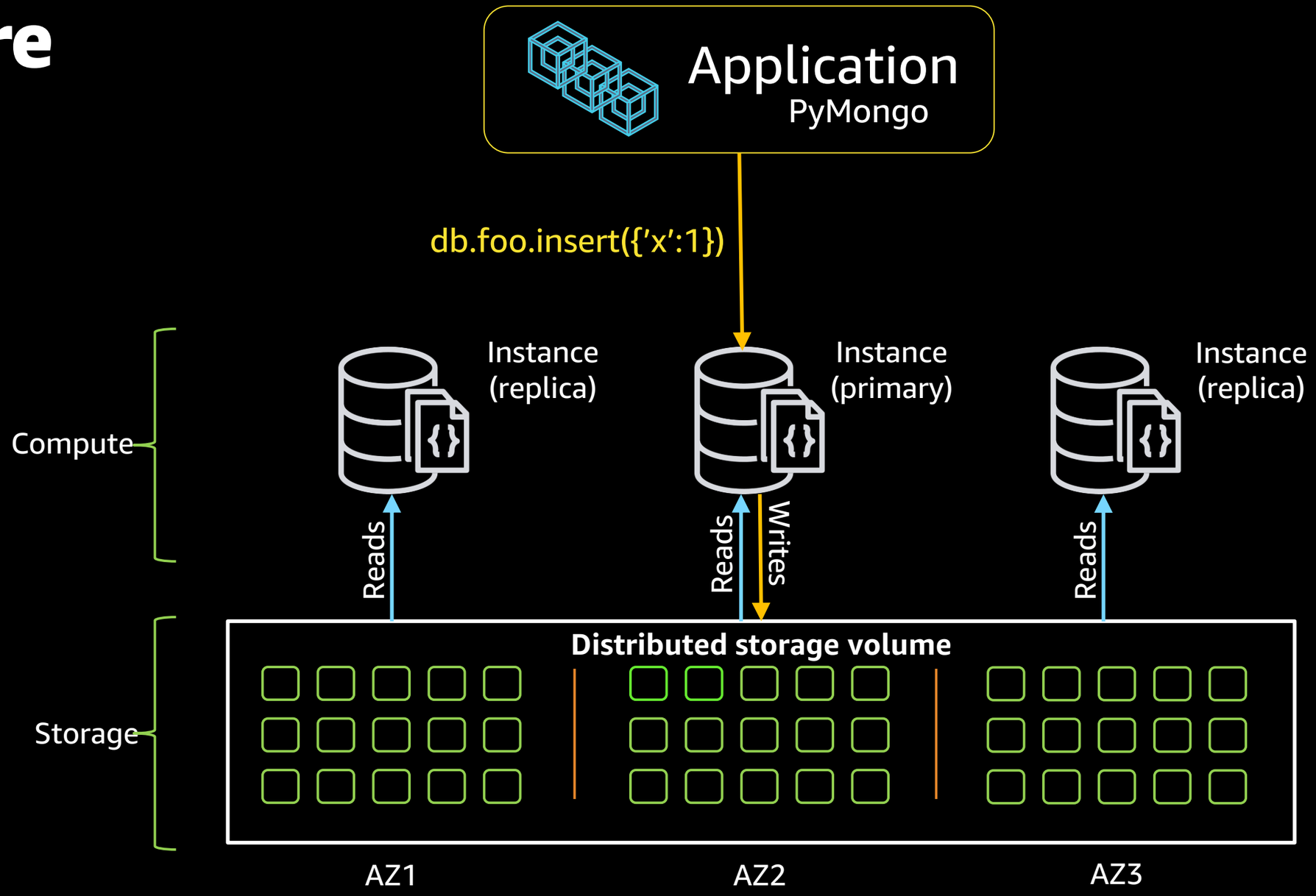
Default write concern is w:4 and j:true



Architecture

Replication

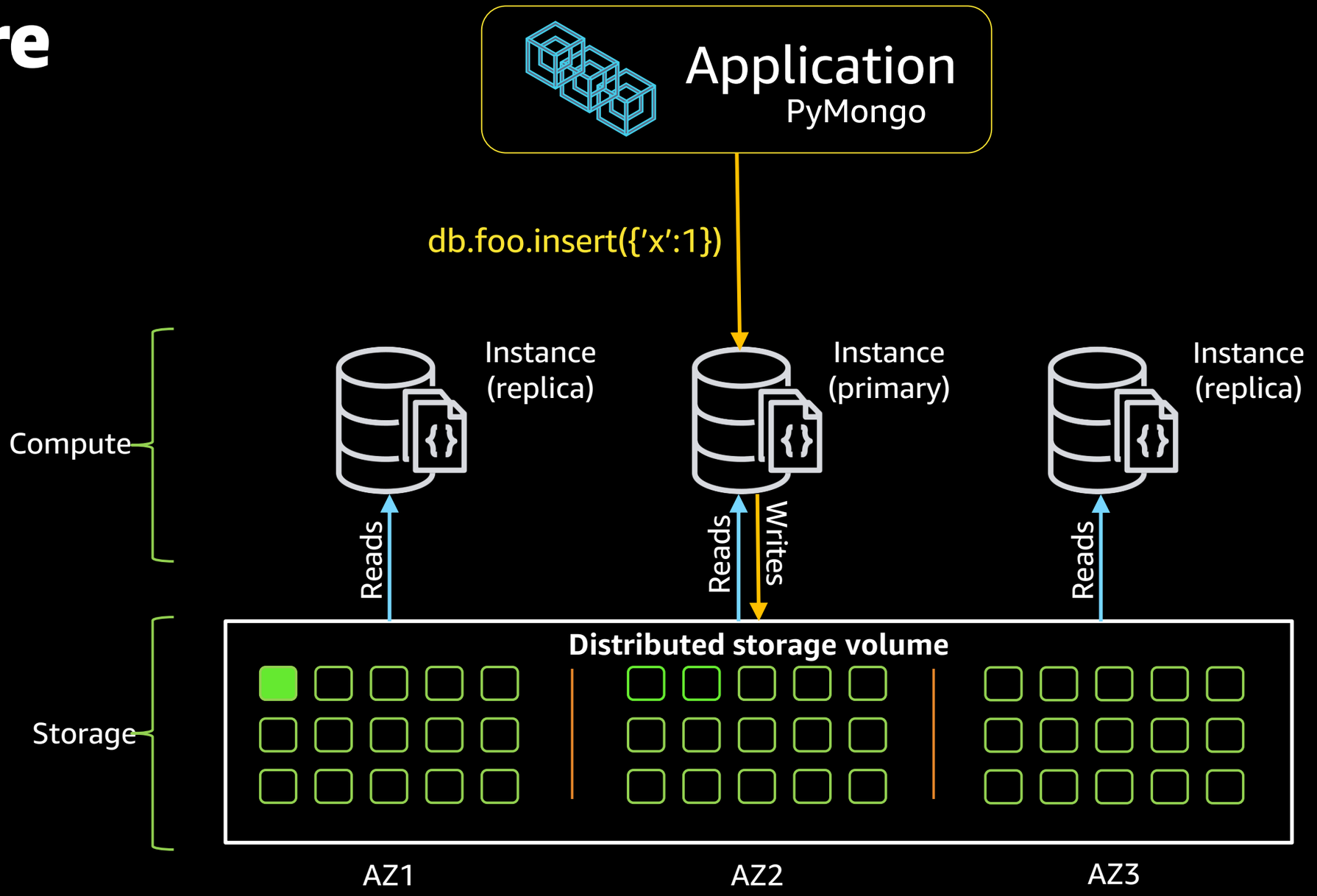
Writes are acknowledged after a quorum if (V_w=4)



Architecture

Replication

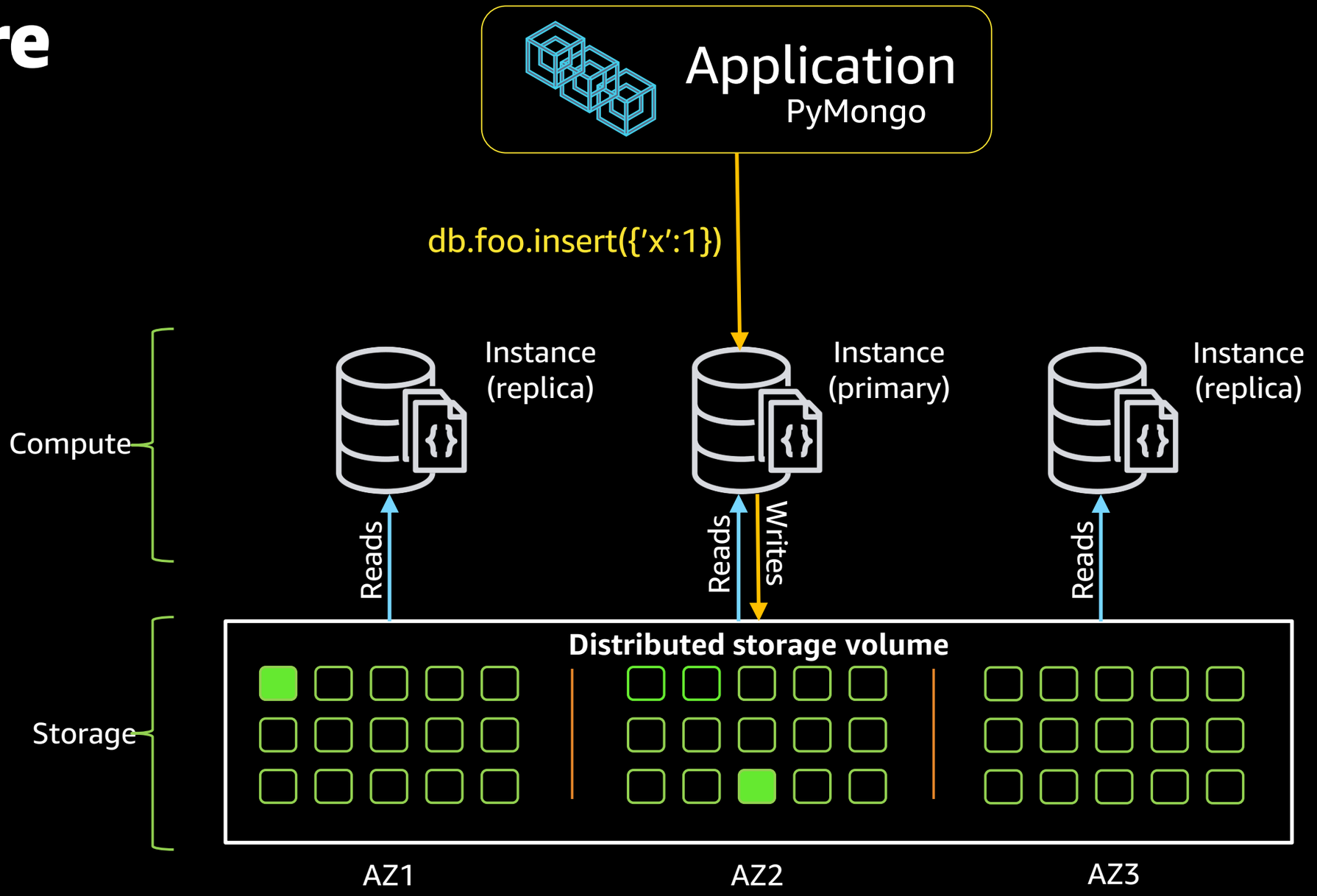
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Architecture

Replication

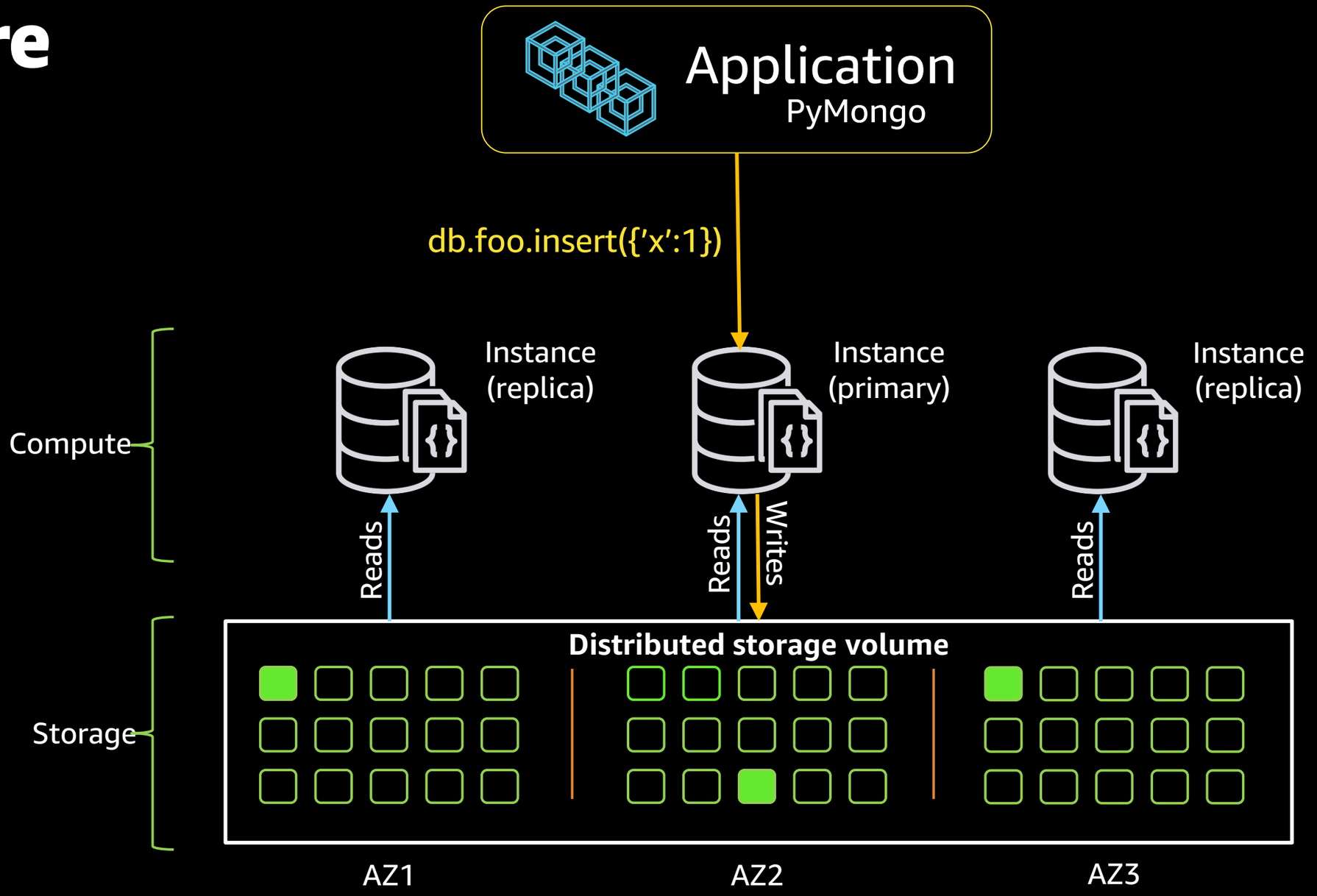
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Architecture

Replication

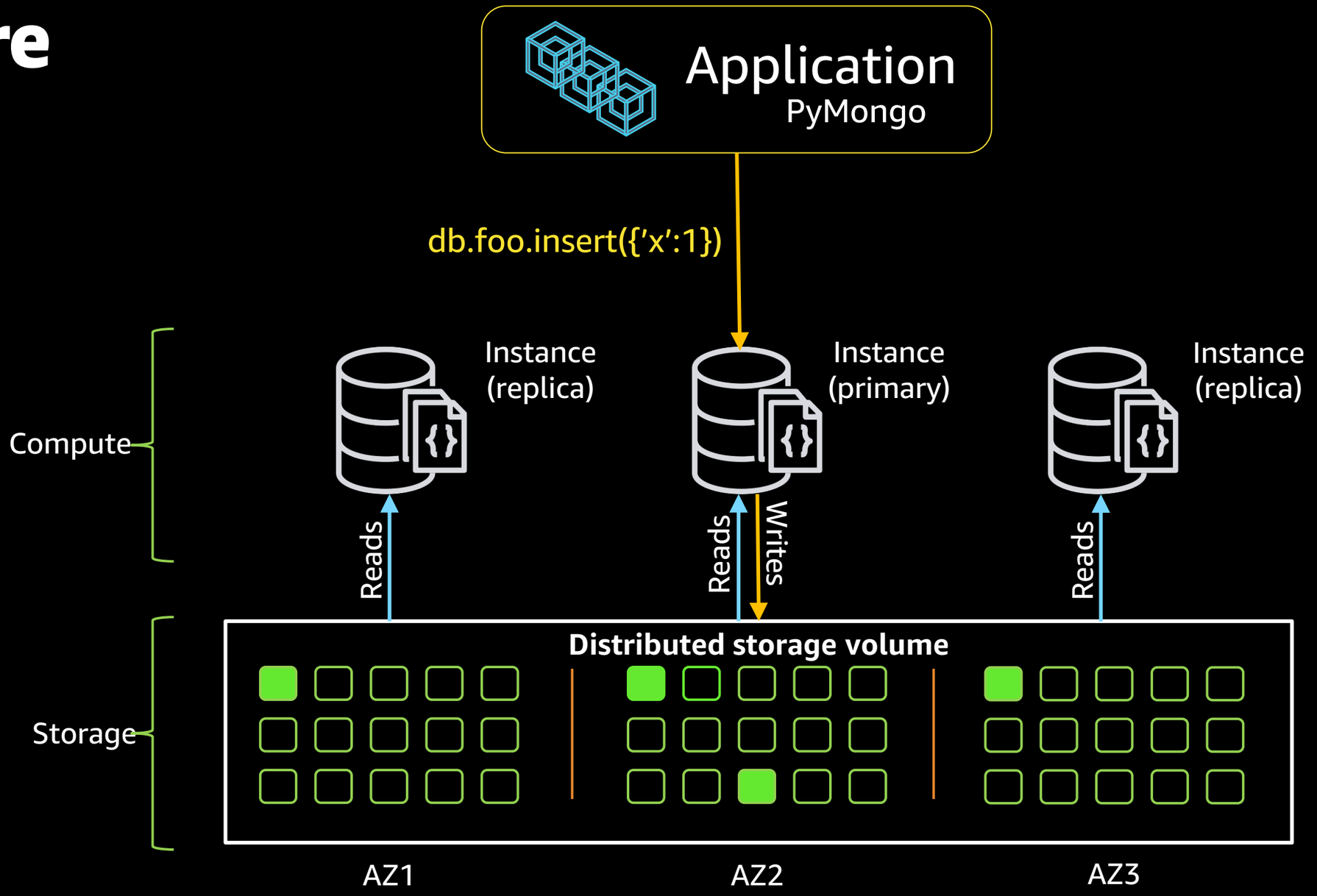
Writes are acknowledged after a quorum if (V_w=4)



Architecture

Replication

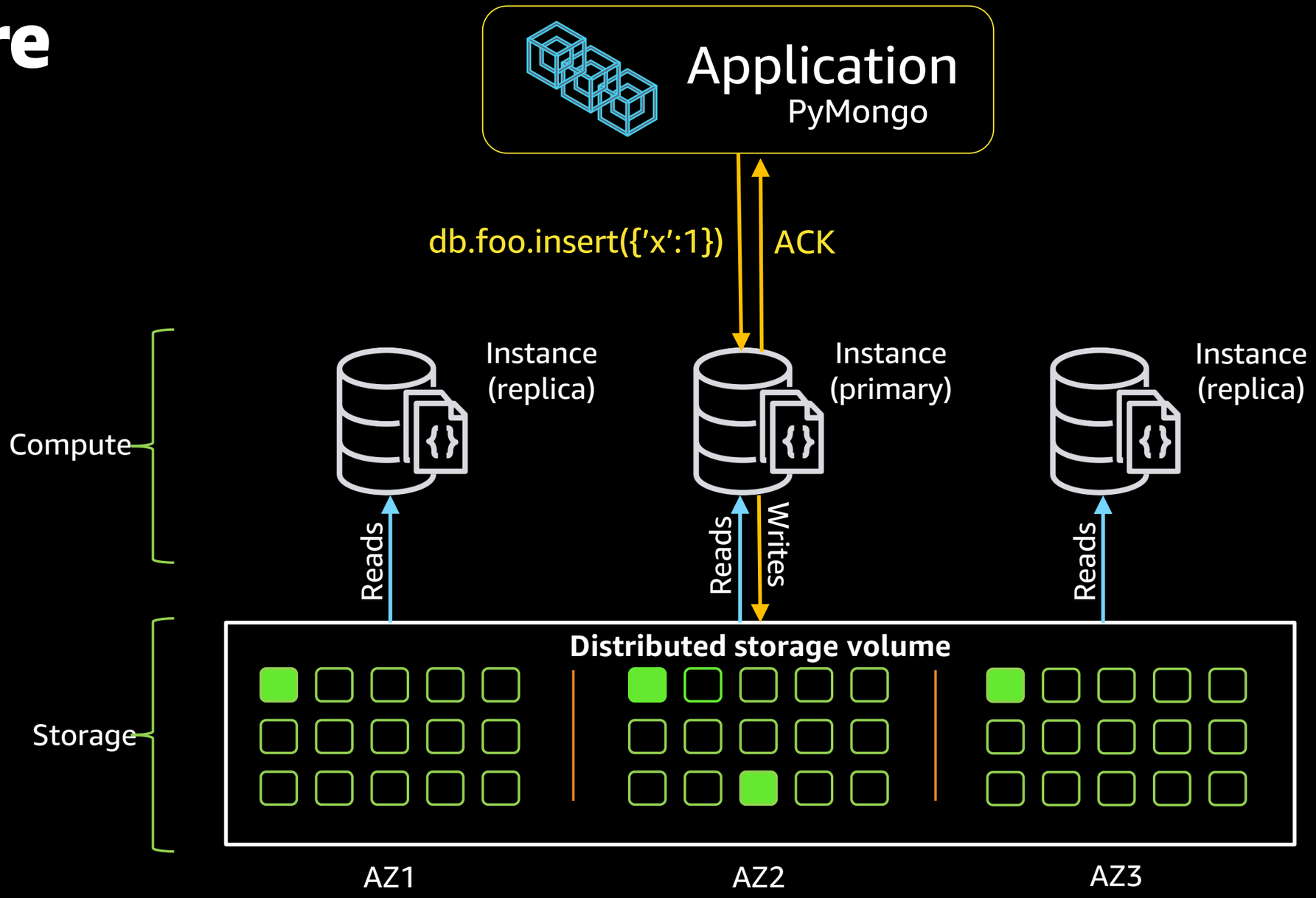
Writes are acknowledged after a quorum if (V_w=4)



Architecture

Replication

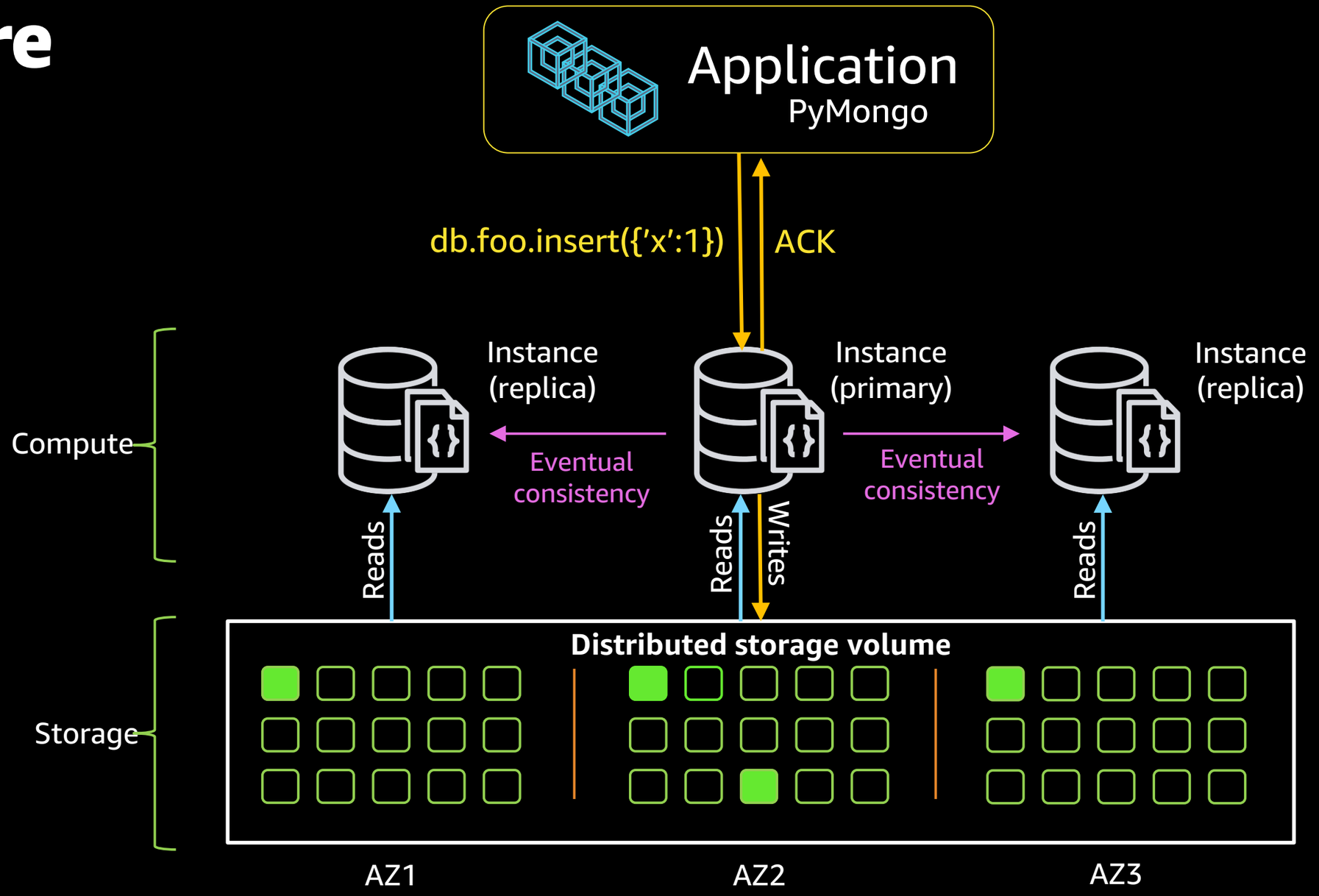
Writes are acknowledged after a quorum if (V_w=4)



Architecture

Replication

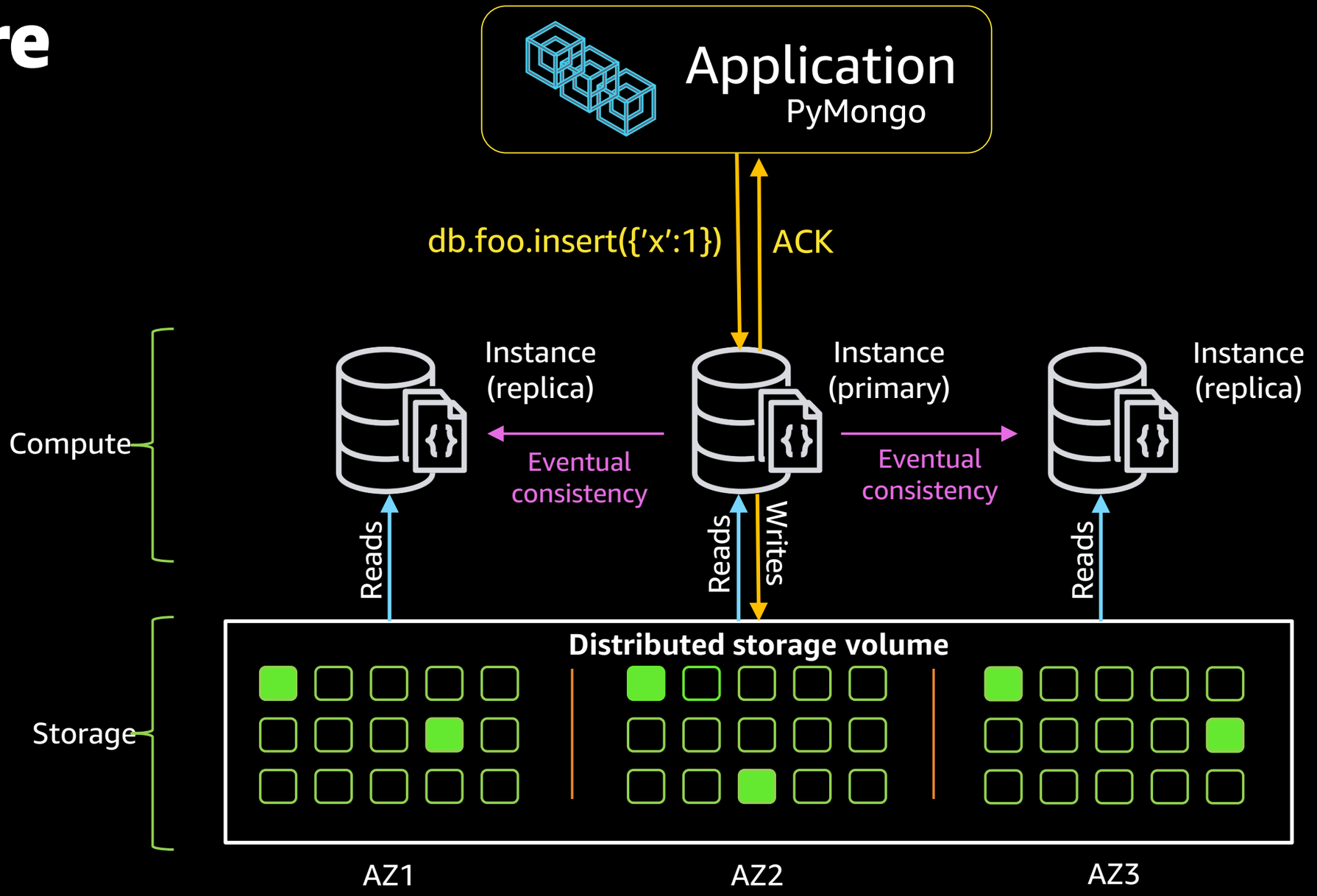
Data is further replicated to achieve 6 copies across three AZs (V=6)



Architecture

Replication

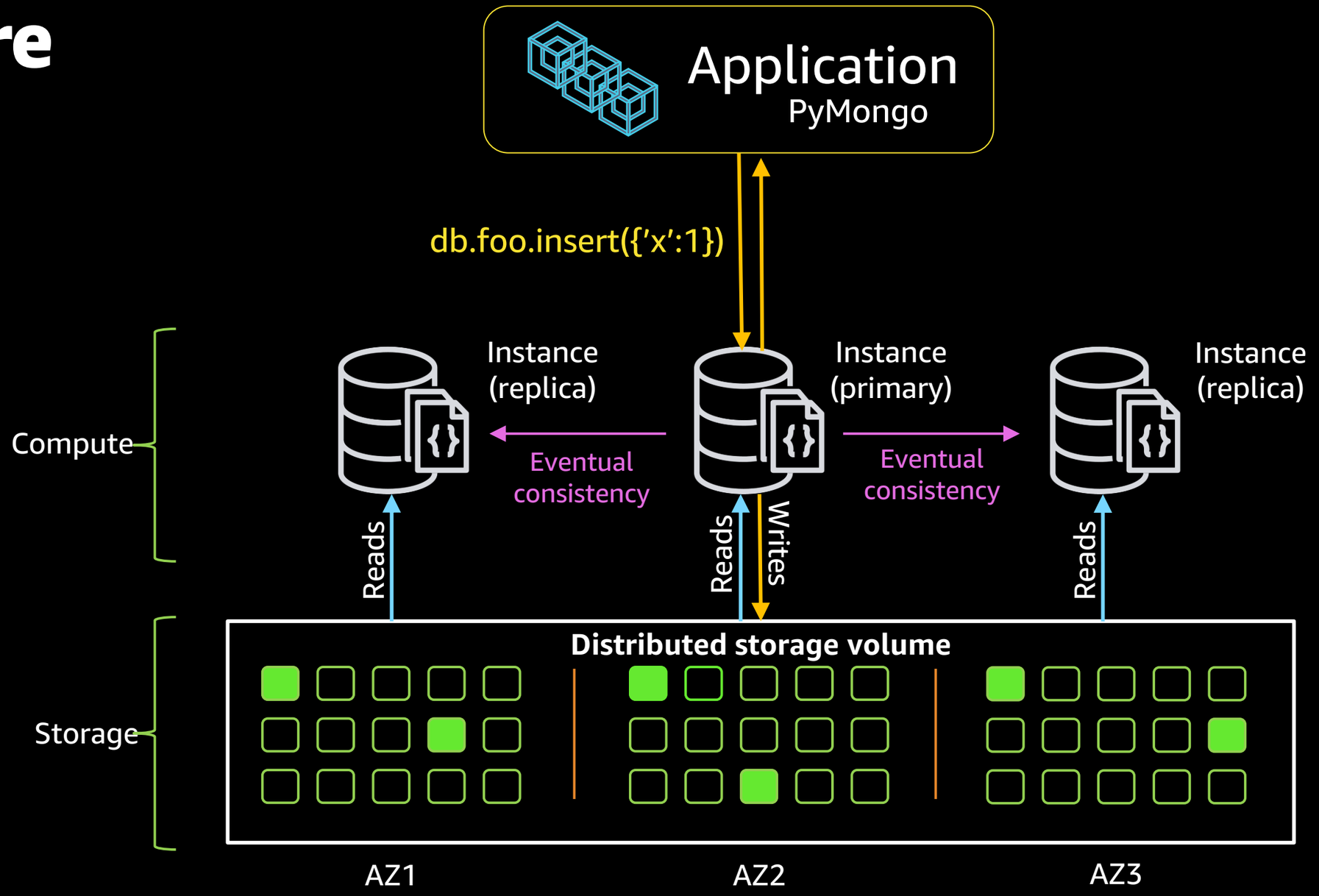
Replicas do not patriciate in data replication, freeing them up for reads



Architecture

Replication

As a best practice, we recommend connecting as a replica set (secondaryPreferred)



Durability



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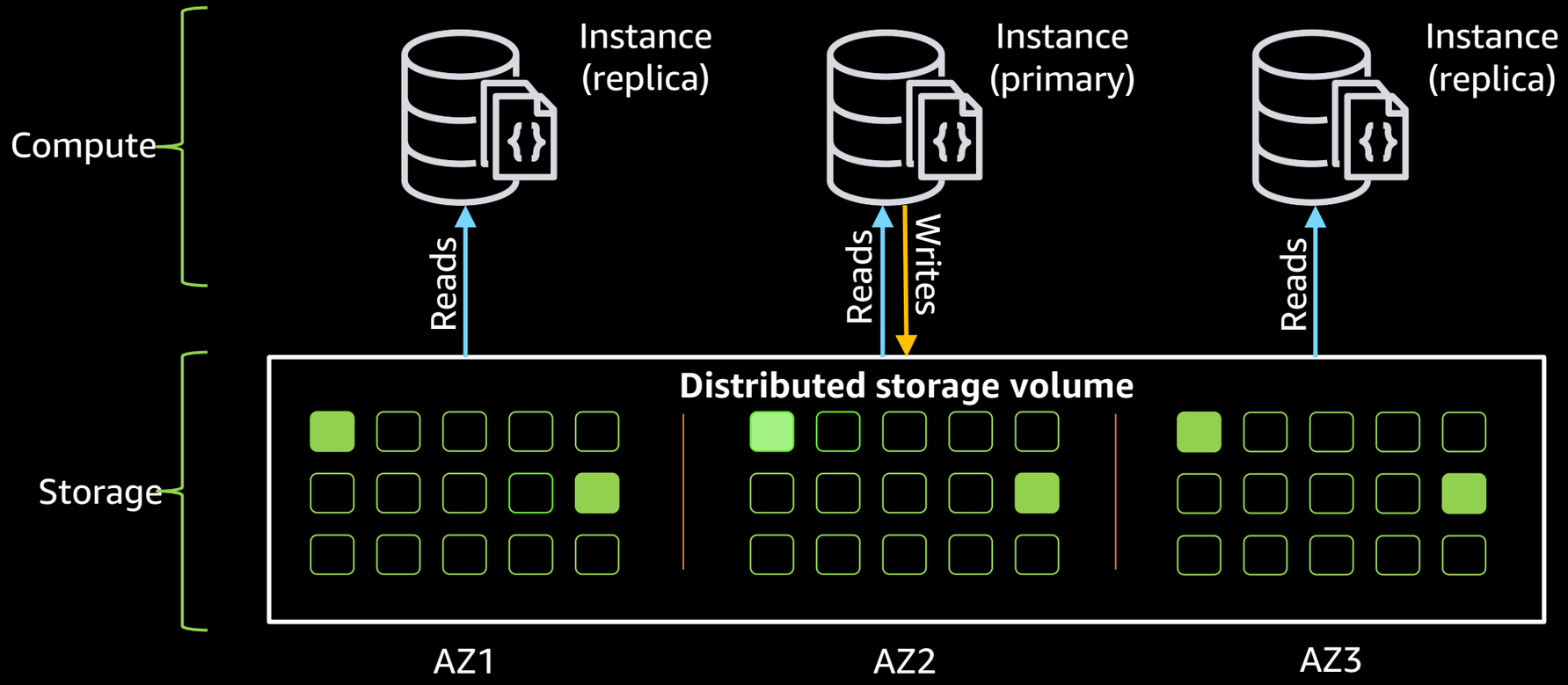
Architecture

Highly durable by default

AZ + 1 resilient

Durability

Storage is replicated six-ways across 3 AZs (10 GB partitions)



Architecture

Highly durable by default

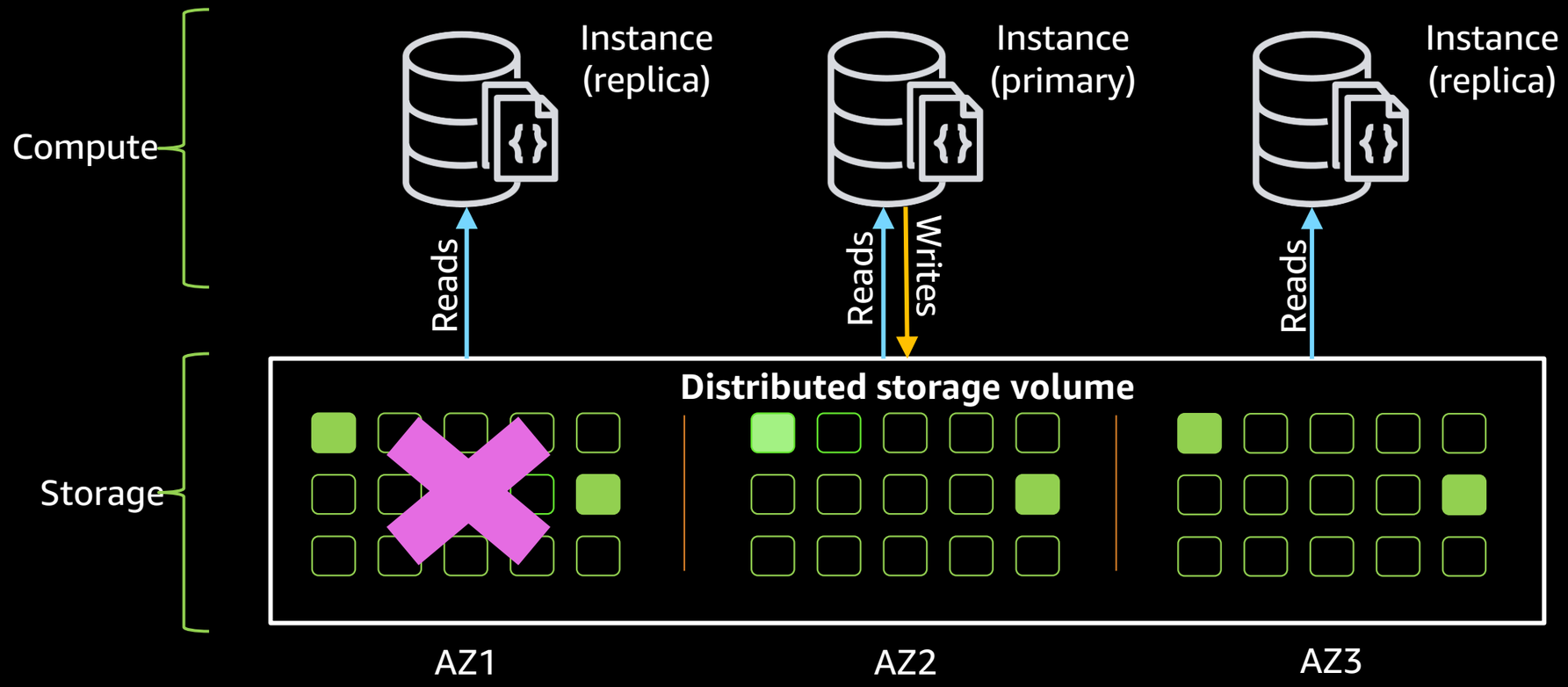
AZ + 1 resilient

Durability

Loss of an AZ:
Write quorum is still achieved with the loss of an AZ

V_w=4

V_r=3



Architecture

Highly durable by default

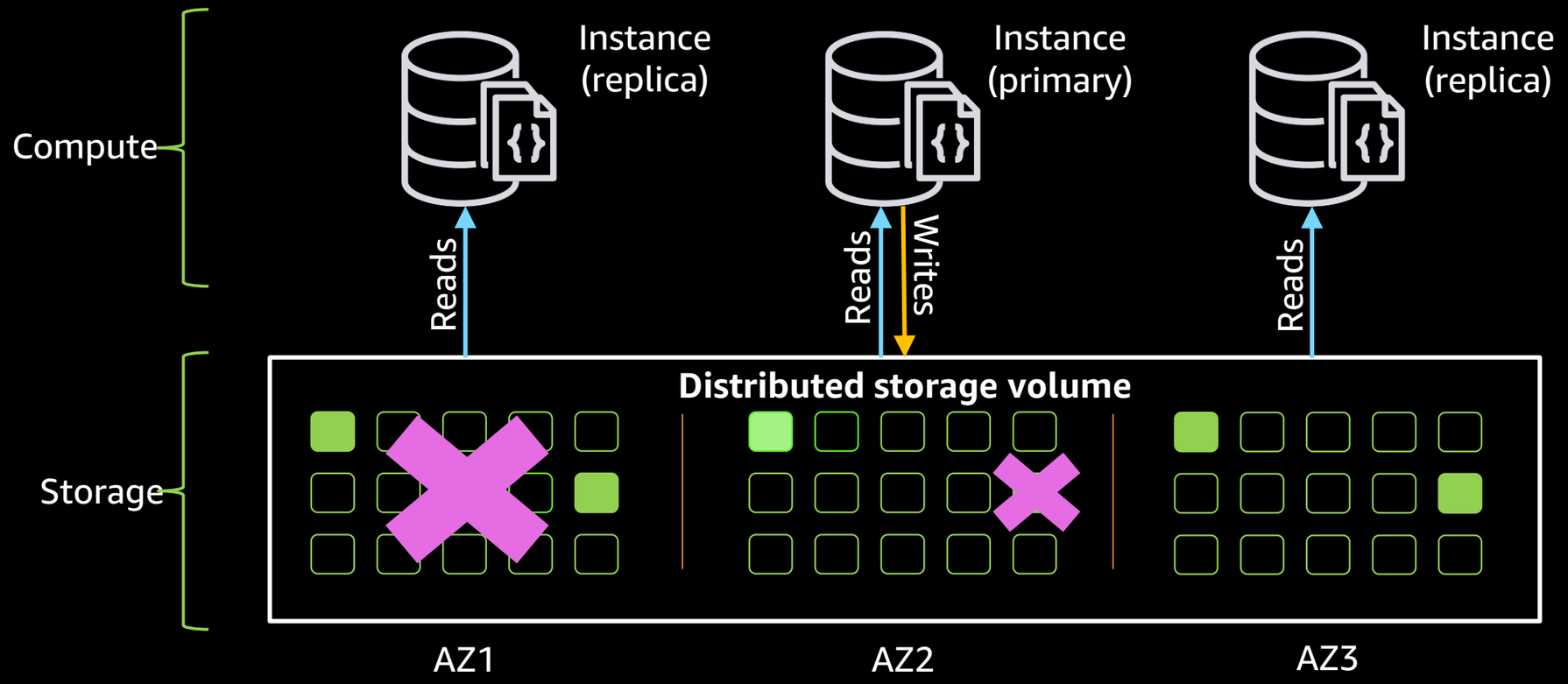
AZ + 1 resilient

Durability

Loss of an AZ +1:
Read quorum and durability are still achieved

V_w=4

V_r=3



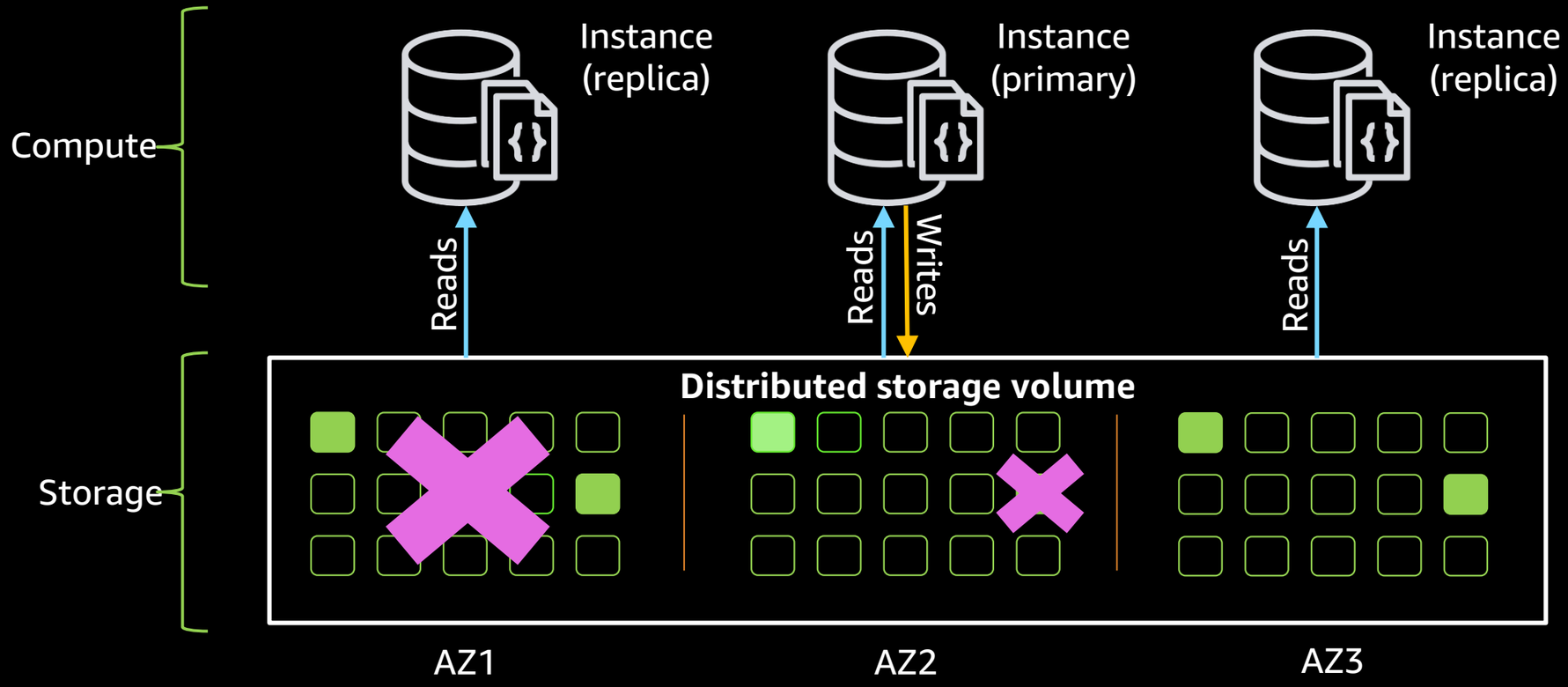
Architecture

Durability

Mean time-to-recovery is a function of replicating 10 GB

Highly durable by default

AZ + 1 resilient



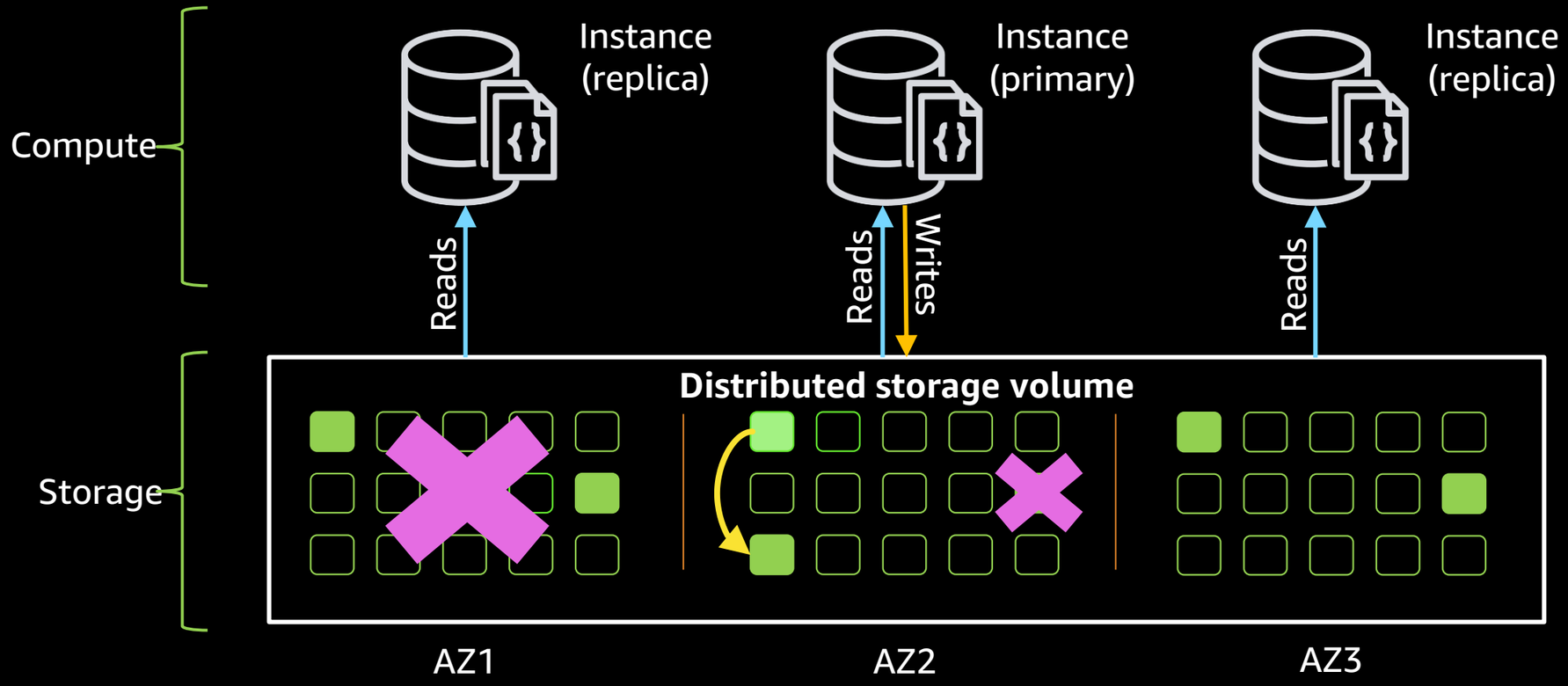
Architecture

Highly durable by default

AZ + 1 resilient

Durability

Mean time-to-recovery is a function of replicating 10 GB



Backup



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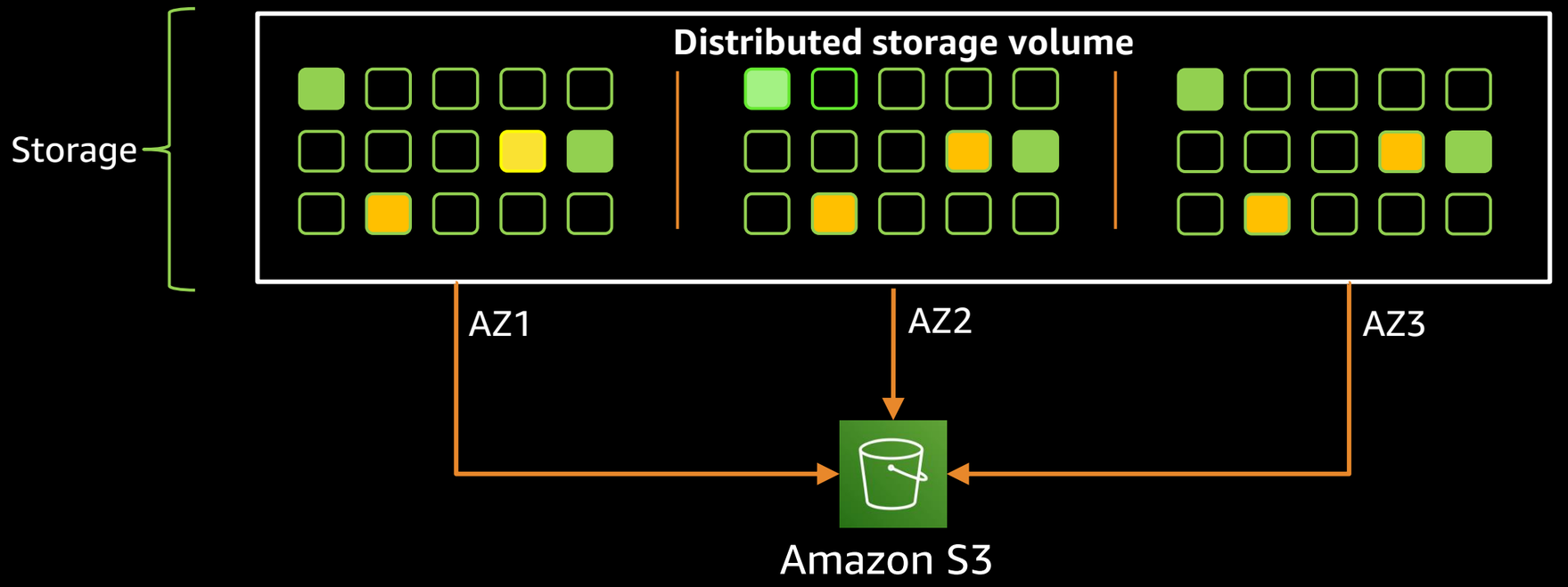
Architecture

No impact backups

Point-in-time restore
(35 days, second granularity)

Backup

Backup does not use your compute instances



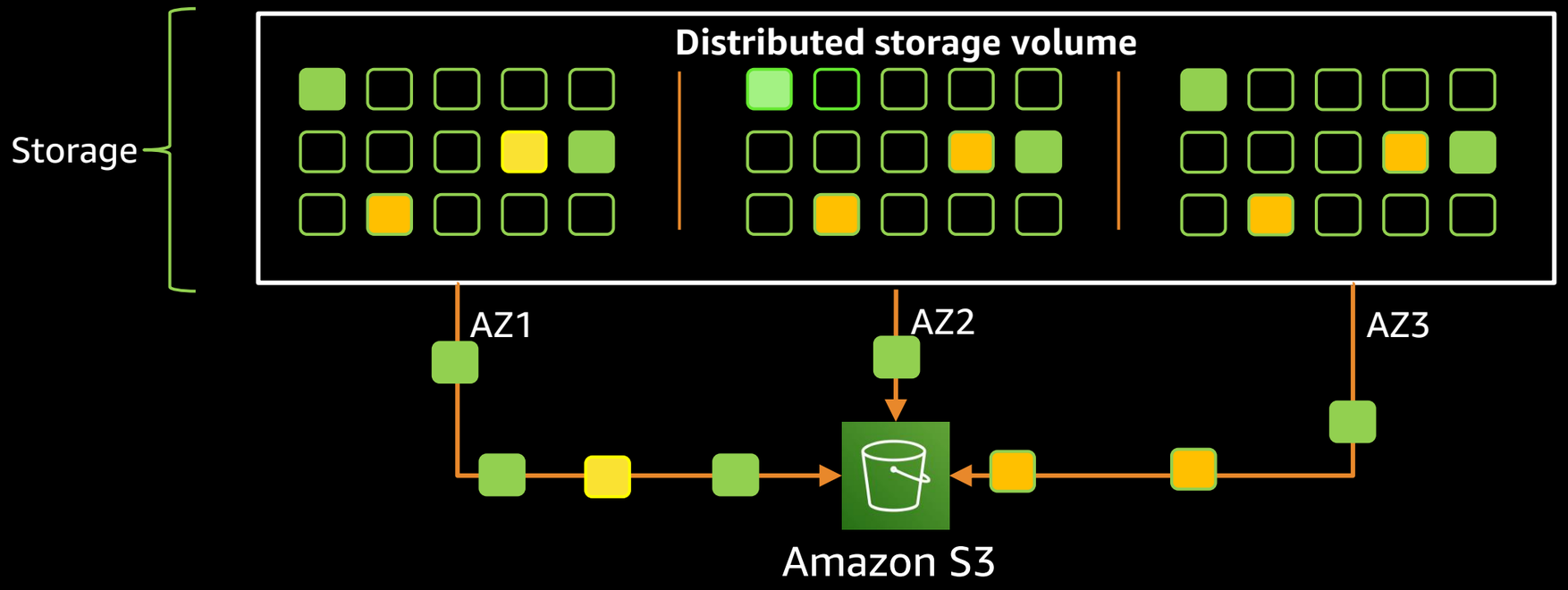
Architecture

No impact backups

Point-in-time restore
(35 days, second granularity)

Backup

Continuous stream
to Amazon S3



Summary



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Amazon DocumentDB Architecture

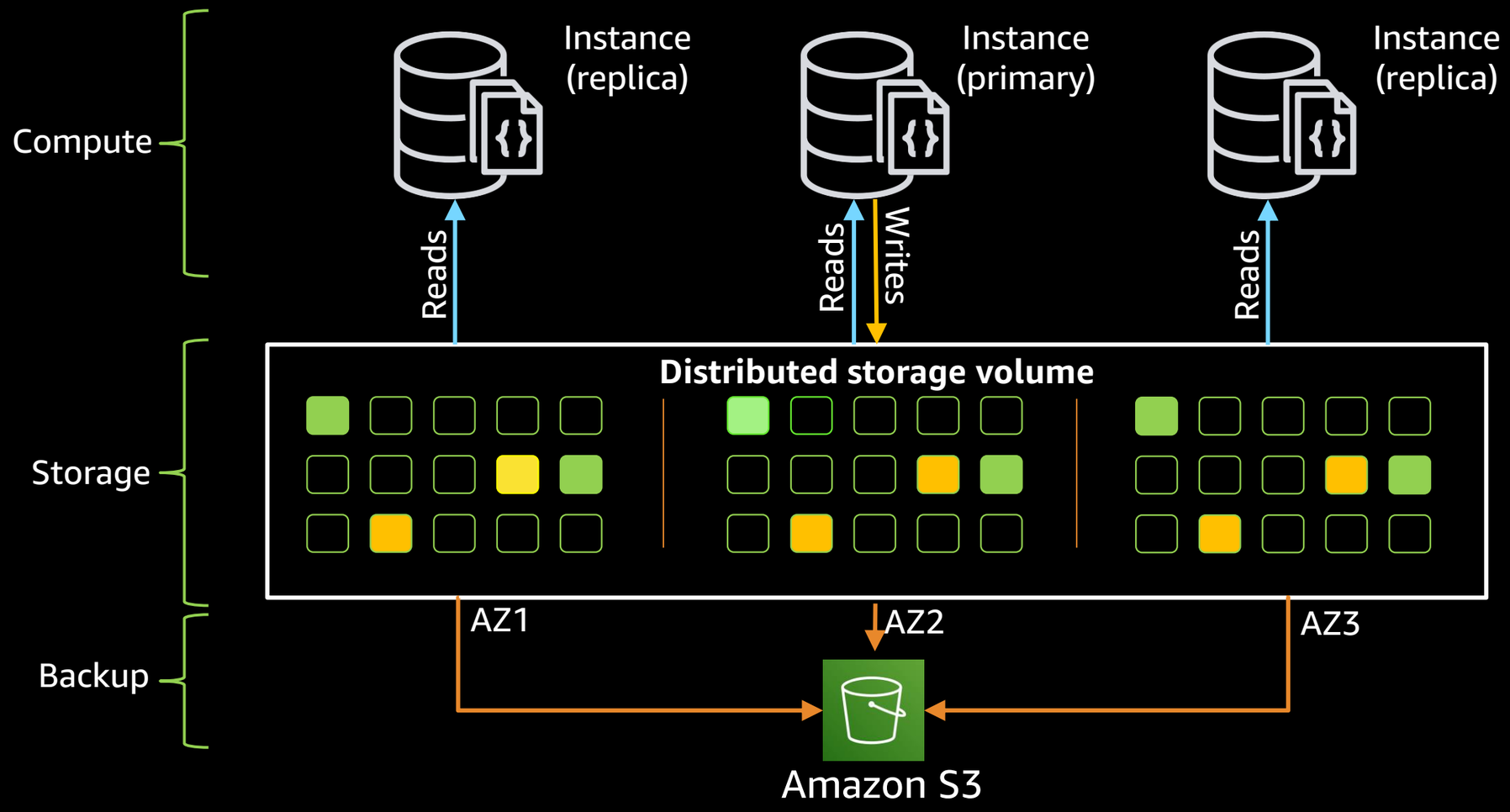
Compatibility

Separation of storage / compute

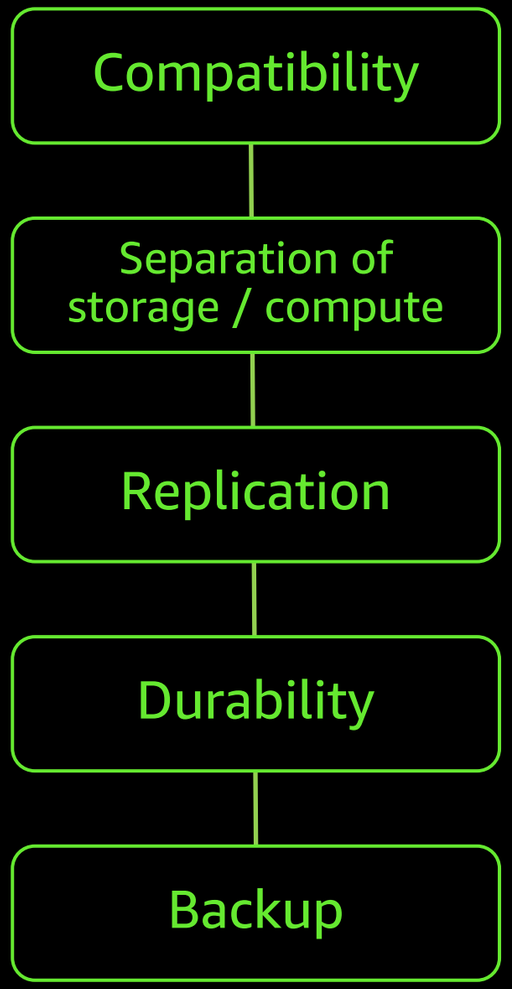
Replication

Durability

Backup



Amazon DocumentDB Architecture



Compatible with existing MongoDB drivers and tools (Demo)

Scale compute in minutes, regardless of storage size (Demo)

Scale out reads on replicas (Demo)

Durable by default – six-way replication across three 3AZs (Demo)

Continual, no impact streaming backups (Demo)

Modern, cloud-native database architecture

What is new?



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A few highlights from the past year



MongoDB 4.0 + transactions

t3.medium instances

Role-based access control (built-in roles)

Cross-Region snapshot copy

Aggregation operators + stages + indexing improvements

And so
much more!

What’s next?



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Thank you!

Joseph Idziorek

Principal Product Manager
AWS

@josephidziorek

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