Amazon DocumentDB

Deep Dive

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Sr. DocumentDB GTM Specialists

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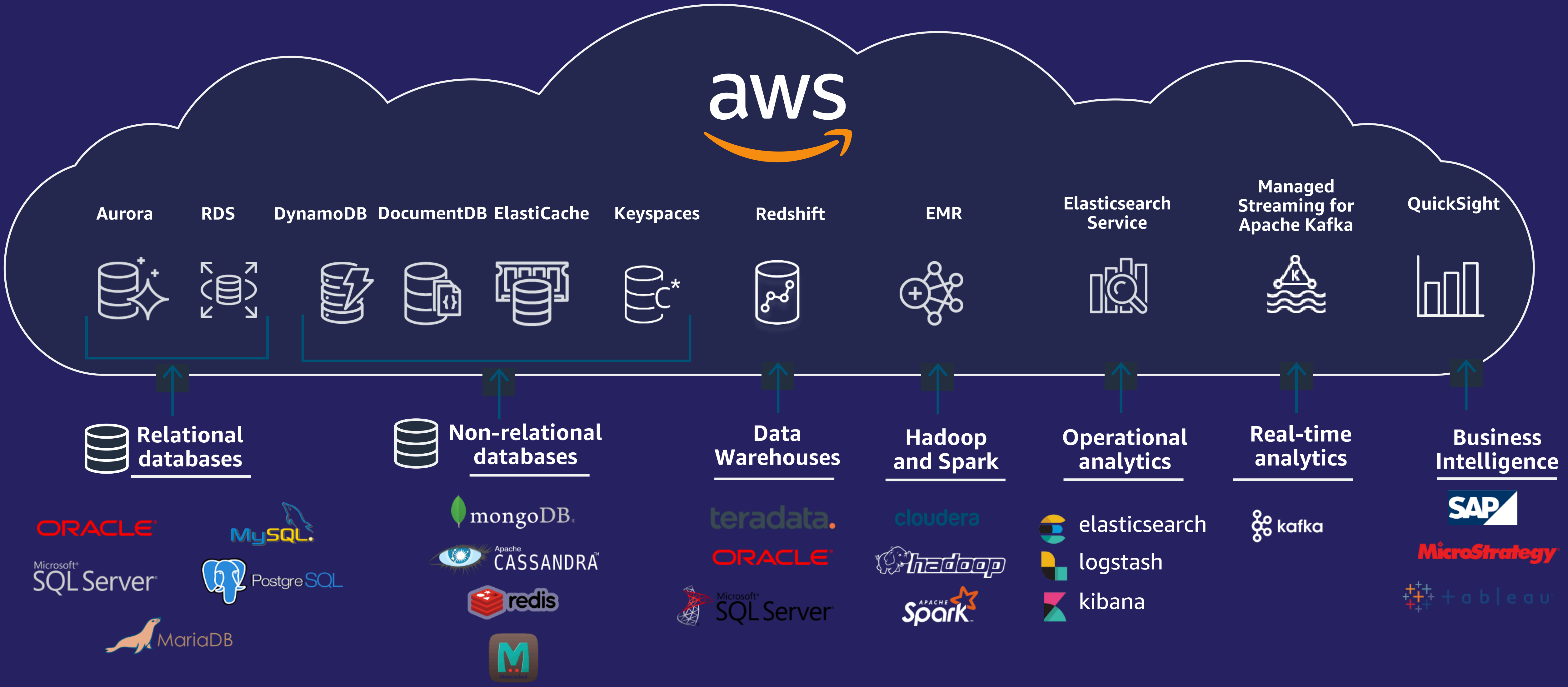
Comprehensive set of services across Databases & Analytics



What is Amazon DocumentDB?

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

- 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)

Scalable

Scale compute in minutes

Storage and IO autoscaling

Storage scales to 64TB

Scale out to 15 replicas for millions of reads

Iron.io

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

Amazon DocumentDB (with MongoDB compatibility)

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

MongoDB API compatible

freshworks

"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

Customers

BBC

Web publishing

woot!

Product catalog

SAMSUNG

IoT

FINRA

Regulatory documents

HABBY

Gaming

freshworks

Content management

Use Cases

Content Management

- News articles
- Blogs
- Recipes
- Patient records

Mobile

- Native JSON
- Easy to store data you're collecting back and forth between devices

Personalization

- Customize offers based on transaction history or financial data such as credit scores

Catalogs

- Outputs of ML experiments
- Inventory descriptions
- Pharmaceutical trials

Retail & marketing

- Track customers who purchase similar items
- Custom marketing campaigns

User profiles

- Collecting game data
- Game management
- Any online profile

Complex documents that are dynamic/changing and may require ad hoc querying, indexing, and aggregations

Case study: Rappi – LATAM unicorn startup

Problem Statement

Need database platform to address:

1. Frequent outages
2. Rapid pace of innovation
3. Slow Performance

Requirements

- Compatibility with MongoDB
- Independently scale microservices.
- Improve performance of complex ranking queries
- Seamlessly migrate to fully managed database service.

Solution advantages

- No. of Outages : Zero
- Latency : 500 ms to 80 ms ⬇
- Operational overhead: 50% ⬇
- 100+ migrations in three months ⬆

Solution

- One cluster per LOB to scale microservices with 55% fewer instances.
- Read replicas to reduce latency for ranking queries by 16 times.
- MongoDB compatibility for minimal code-change migration, resulting in 60% FTE cost savings.

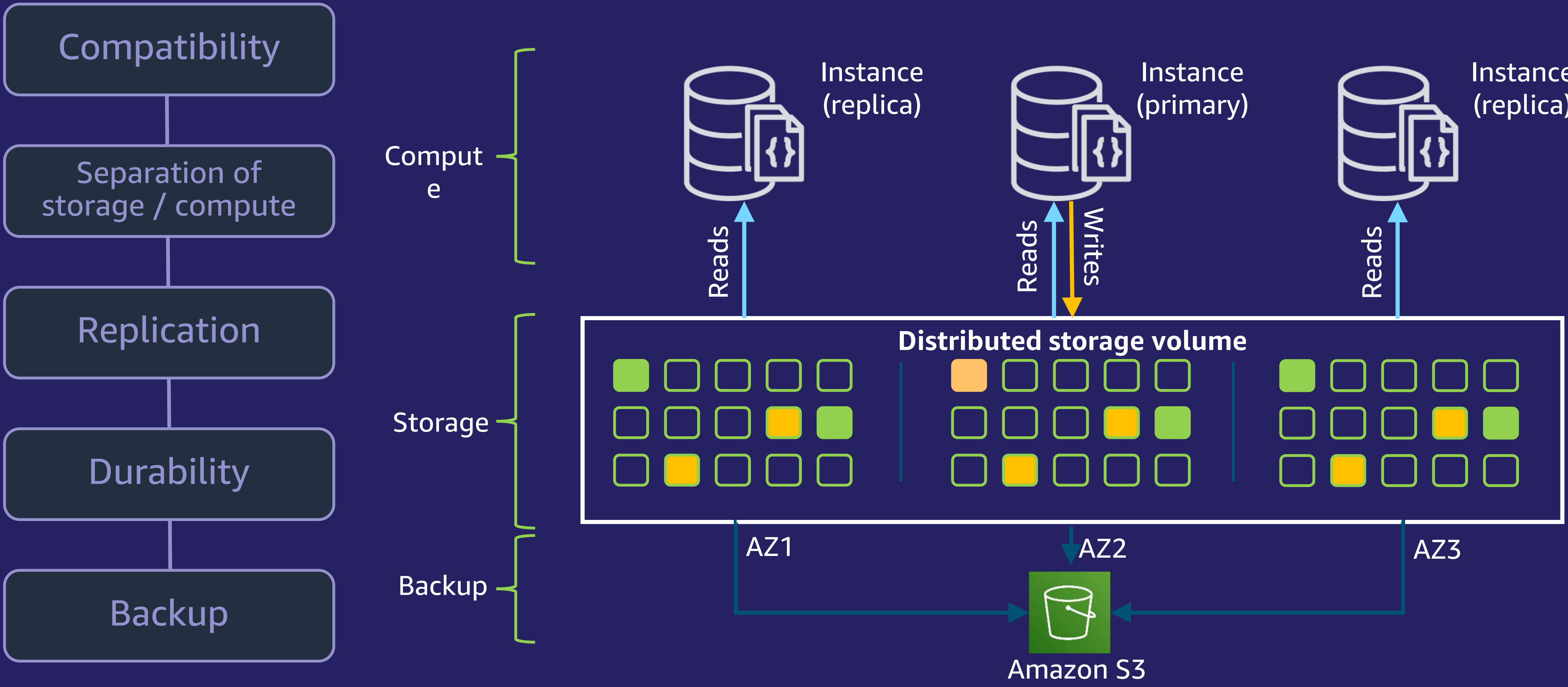
Amazon DocumentDB Architecture

Amazon DocumentDB Architecture

Compatibility	Compatible with existing MongoDB drivers and tools
Separation of storage / compute	Scale compute in minutes, regardless of storage size
Replication	Scale out reads on replicas
Durability	Durable by default – six-way replication across three AZs
Backup	Continual, no impact, streaming backups

Modern, cloud-native database architecture

Amazon DocumentDB Architecture



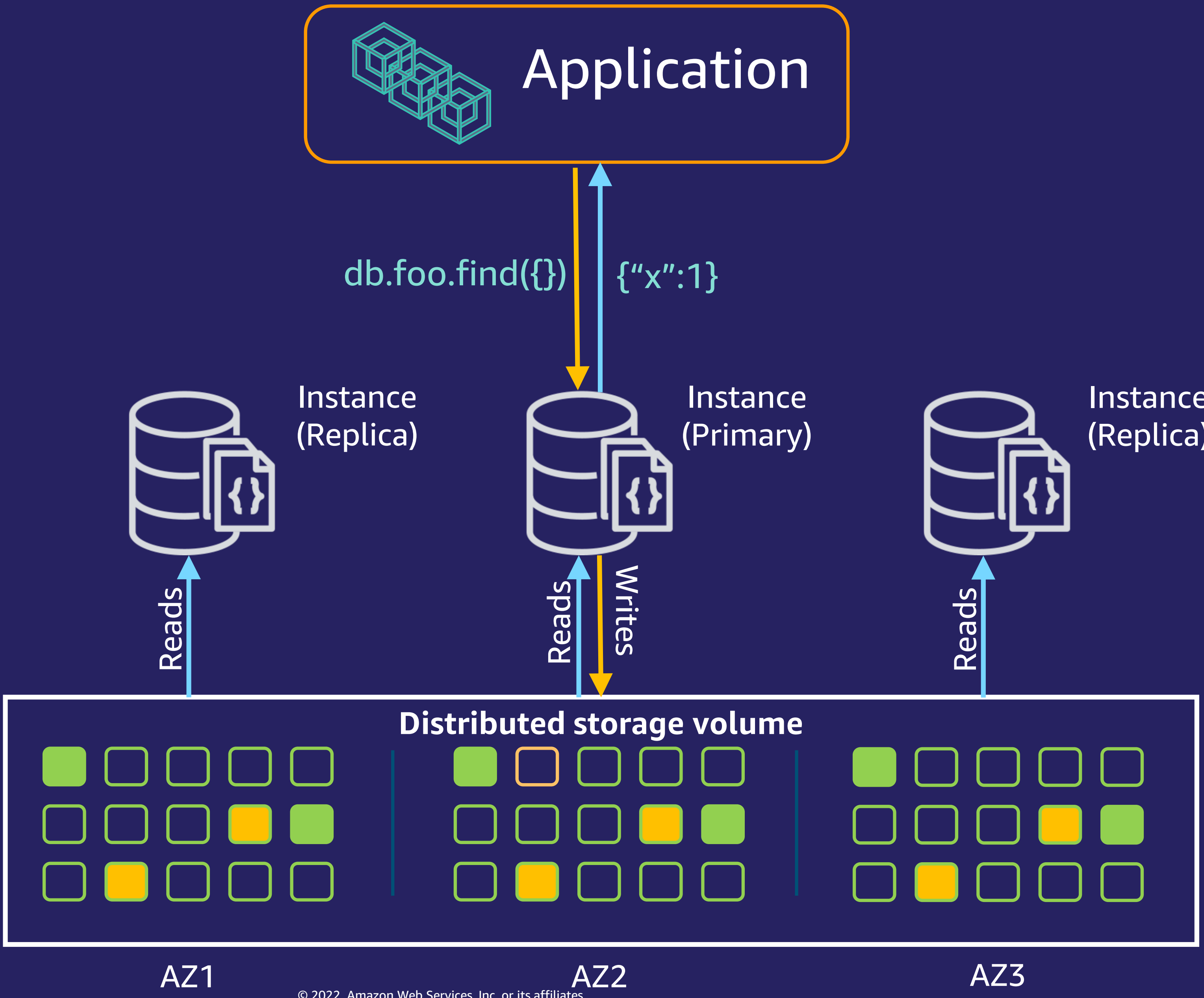
Demo: Console overview

Compatibility

Architecture

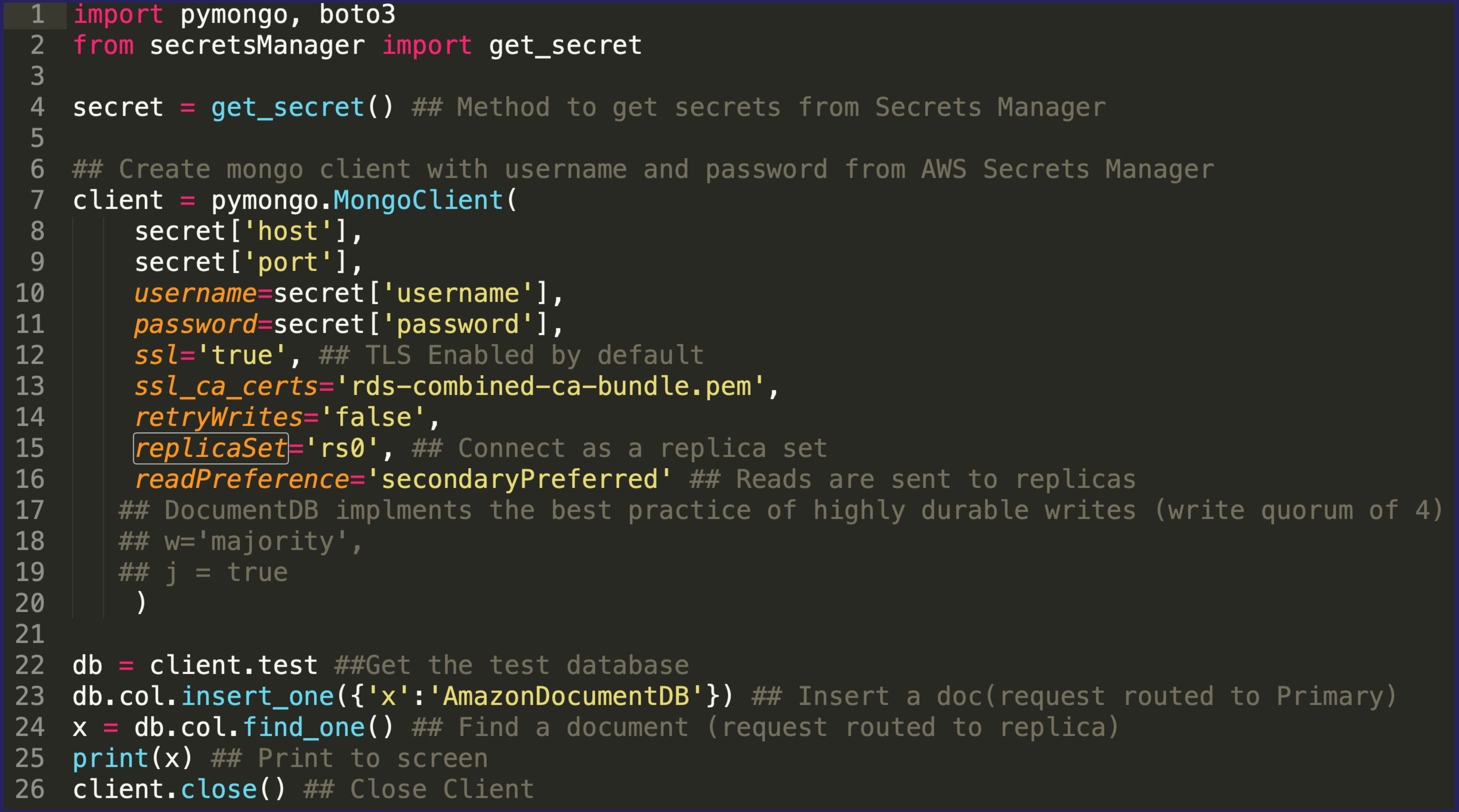
Compatibility

Amazon DocumentDB emulates the MongoDB API



Demo: Connecting to DocumentDB

Demo code



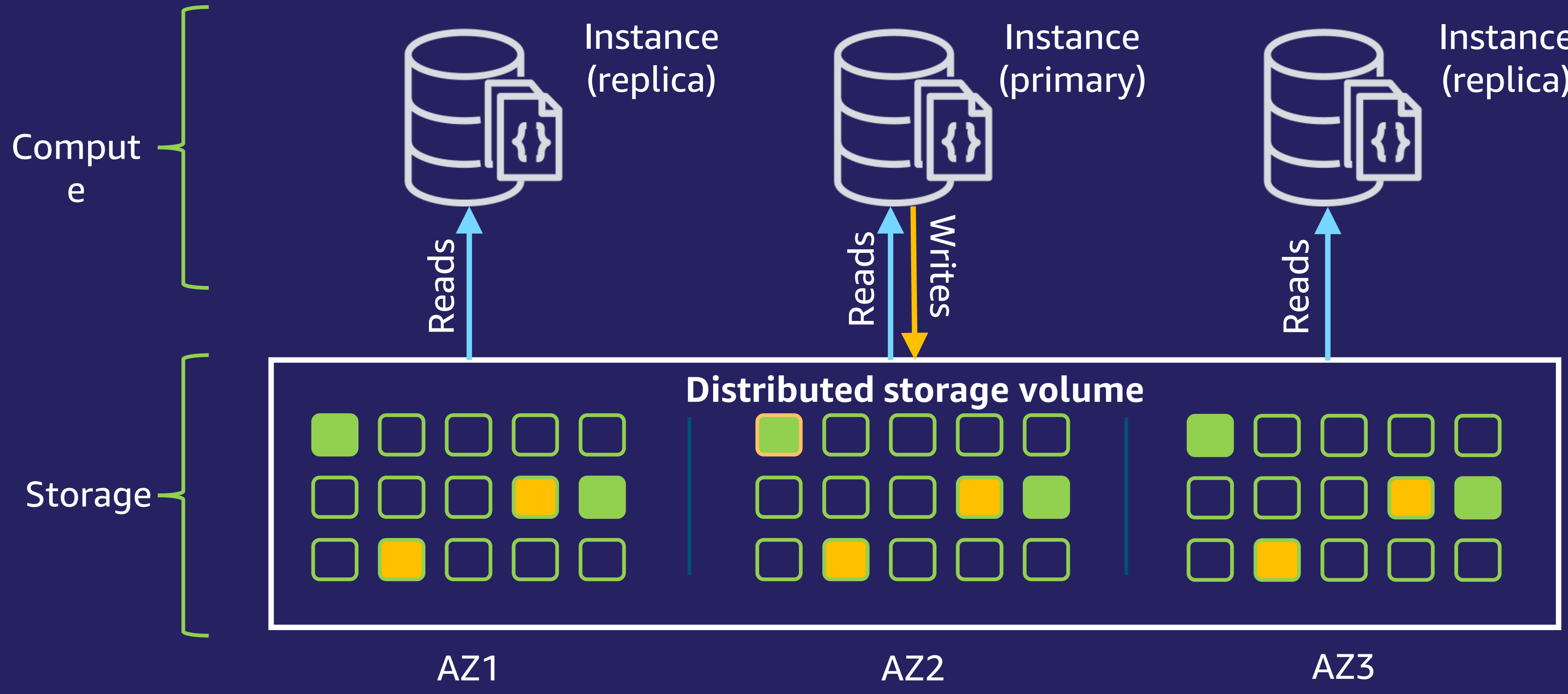
```python
import pymongo, boto3
from secretsManager import get_secret

secret = get_secret() ## Method to get secrets from Secrets Manager

## Create mongo client with username and password from AWS Secrets Manager
client = pymongo.MongoClient(
    secret['host'],
    secret['port'],
    username=secret['username'],
    password=secret['password'],
    ssl='true', ## TLS Enabled by default
    ssl_ca_certs='rds-combined-ca-bundle.pem',
    retryWrites='false',
    replicaSet='rs0', ## Connect as a replica set
    readPreference='secondaryPreferred' ## Reads are sent to replicas
   ## DocumentDB implments the best practice of highly durable writes (write quorum of 4)
   ## w='majority',
   ## j = true
    )

db = client.test ##Get the test database
db.col.insert_one({'x':'AmazonDocumentDB'}) ## Insert a doc(request routed to Primary)
x = db.col.find_one() ## Find a document (request routed to replica)
print(x) ## Print to screen
client.close() ## Close Client
```

Separation of storage and compute

Architecture

Separation of storage / compute

How would you build a cloud-native database architecture?

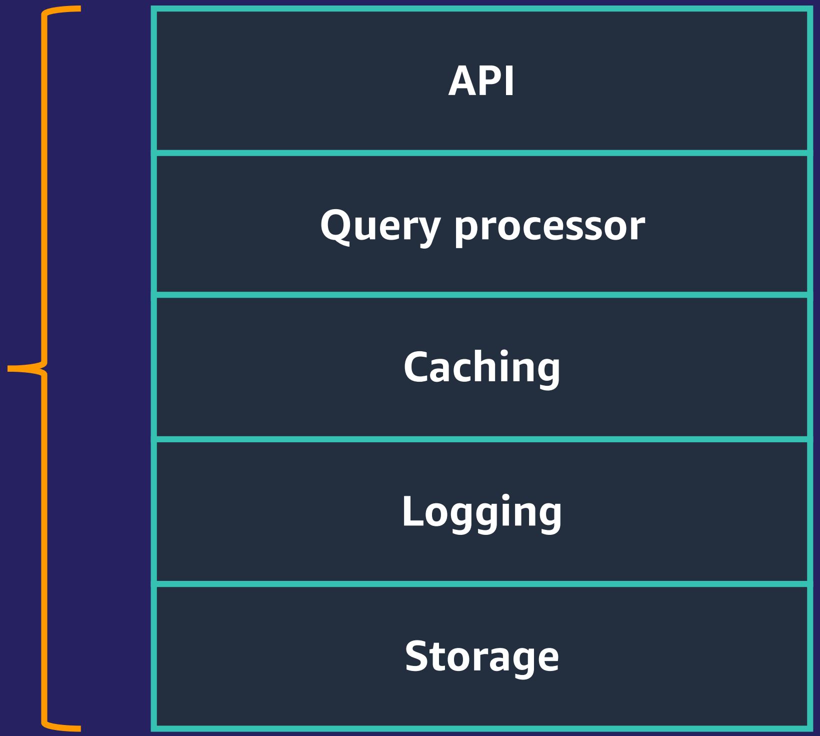


Architecture

Separation of storage / compute

Traditional database architecture

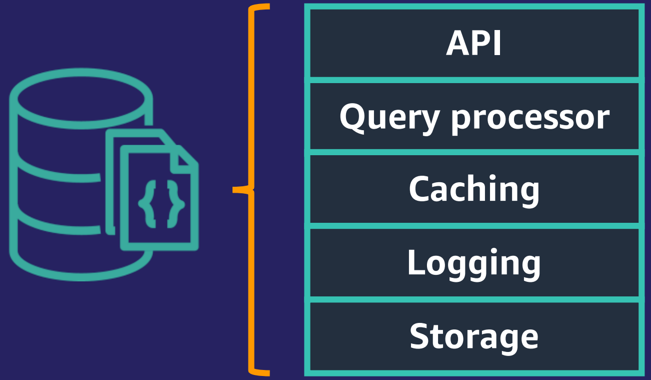
Monolithic, shared disk architecture



Architecture

Separation of storage / compute

Scaling requires copying the whole stack



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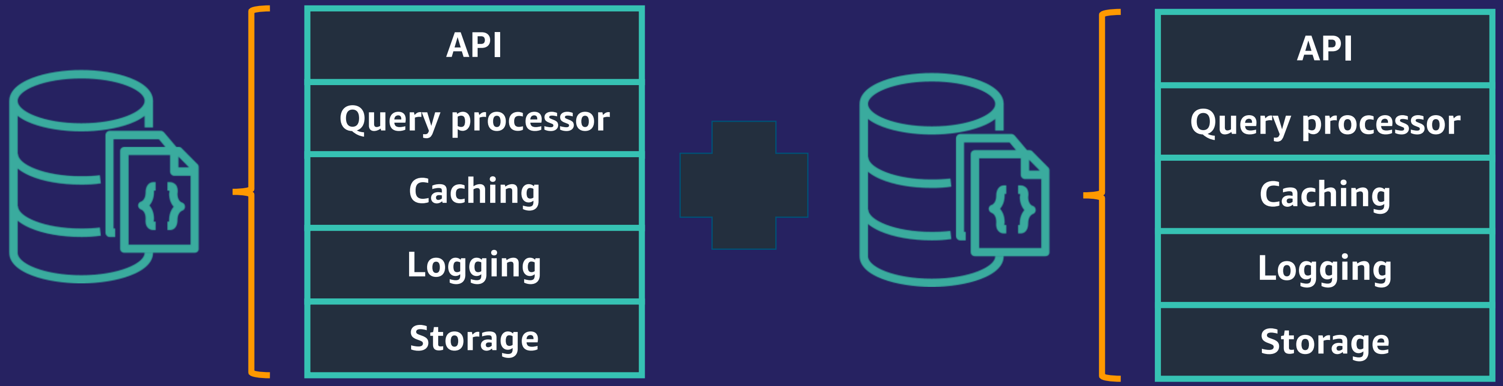

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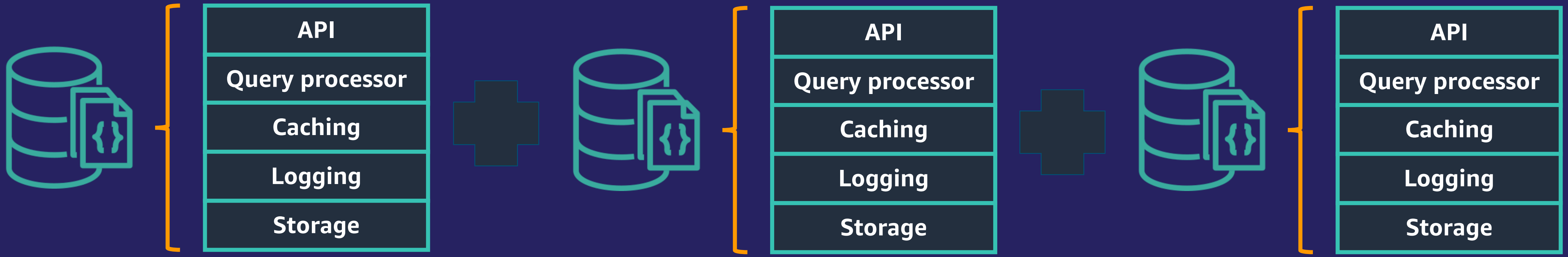

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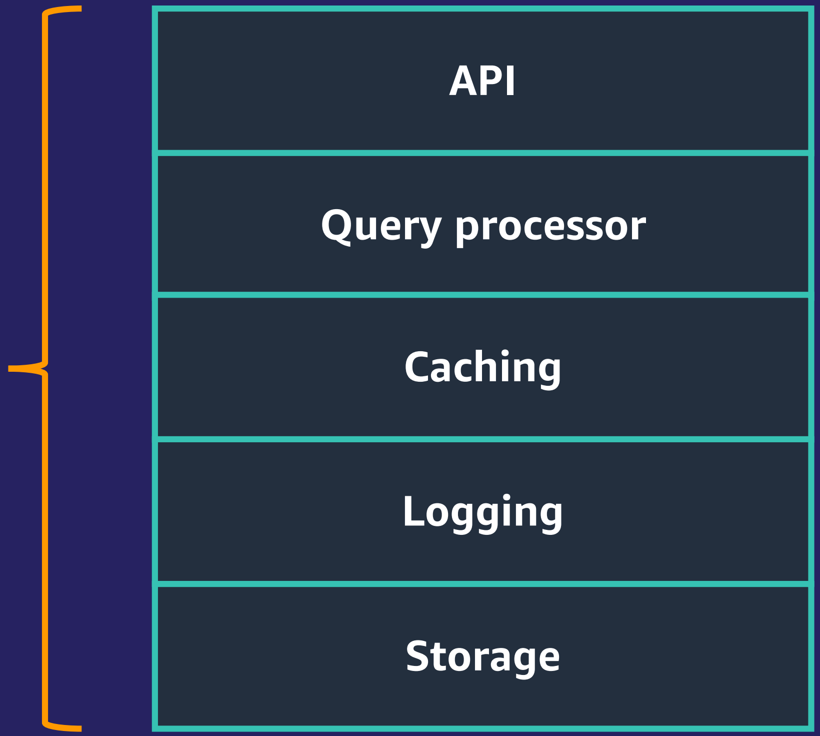

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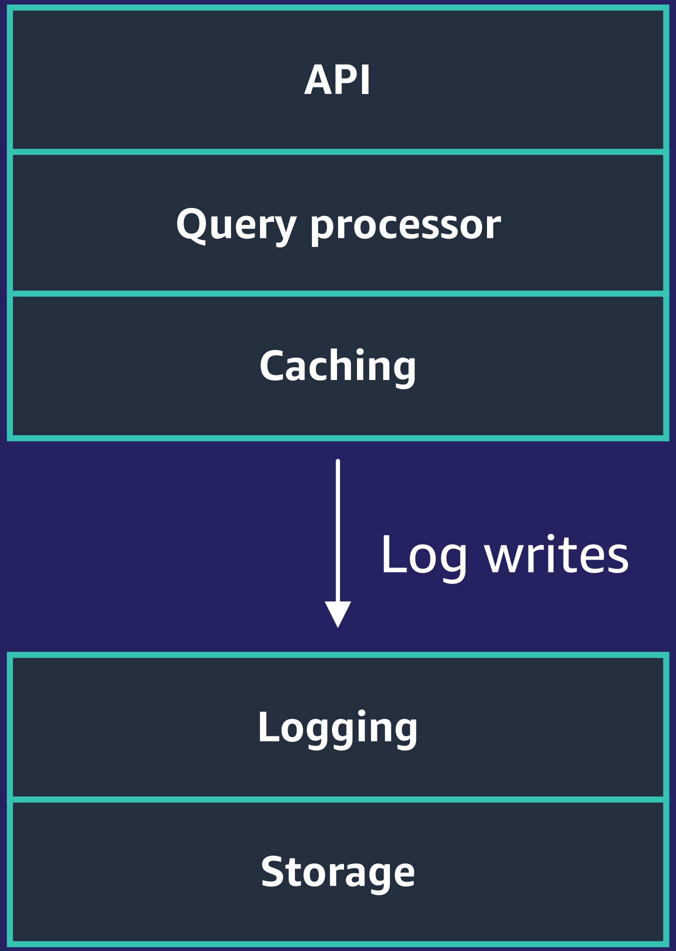

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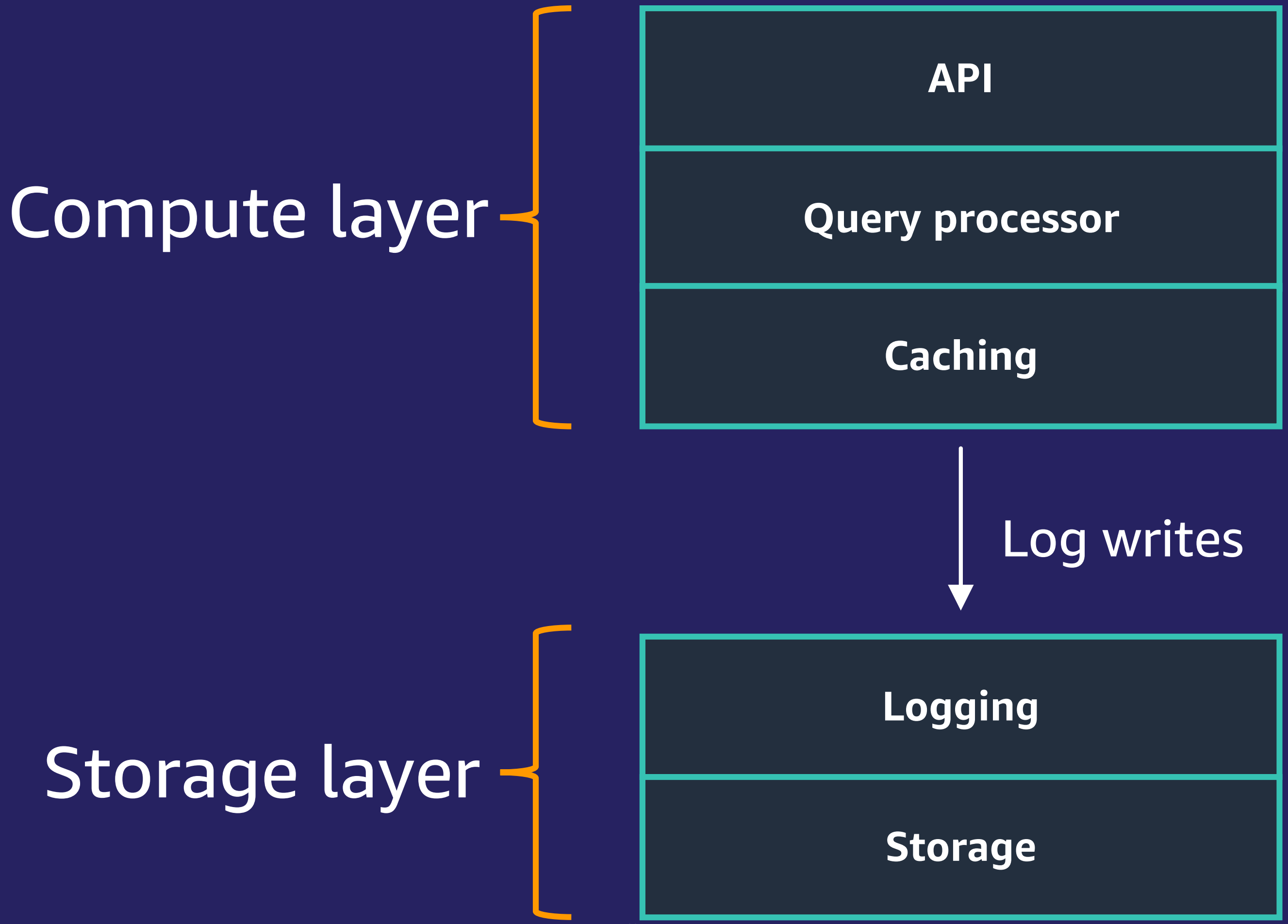

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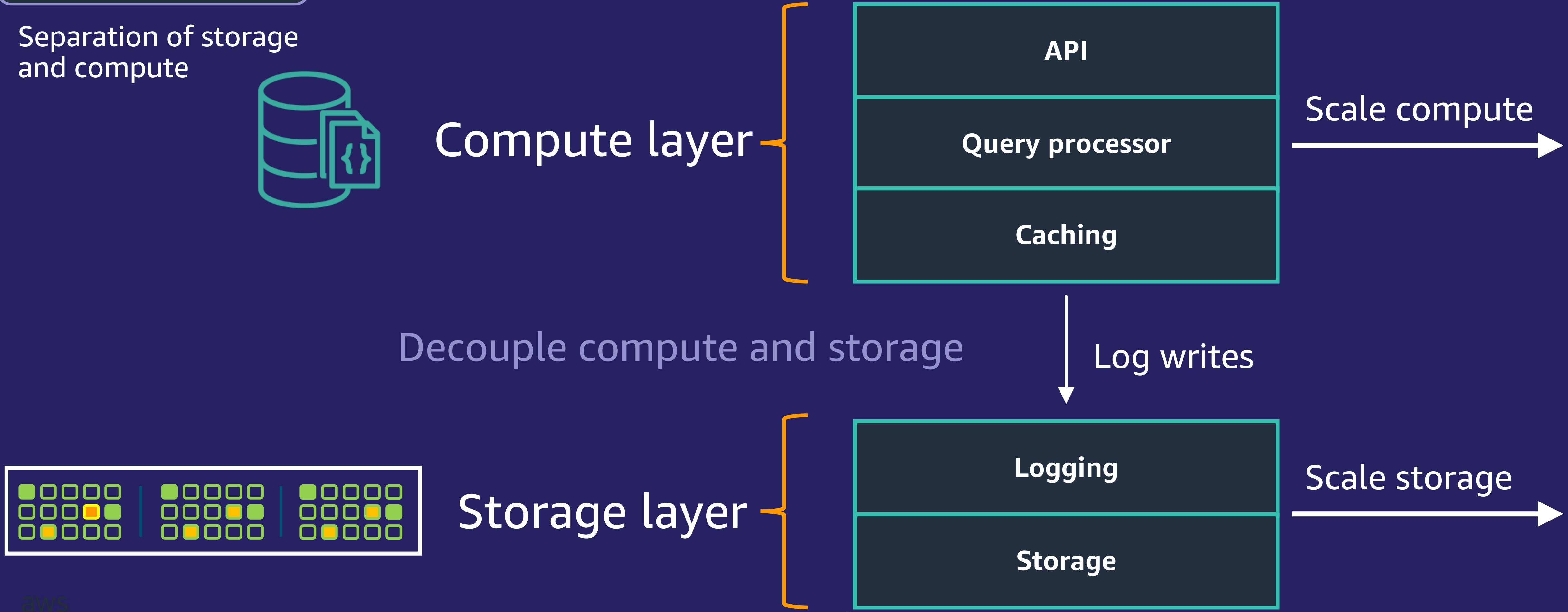
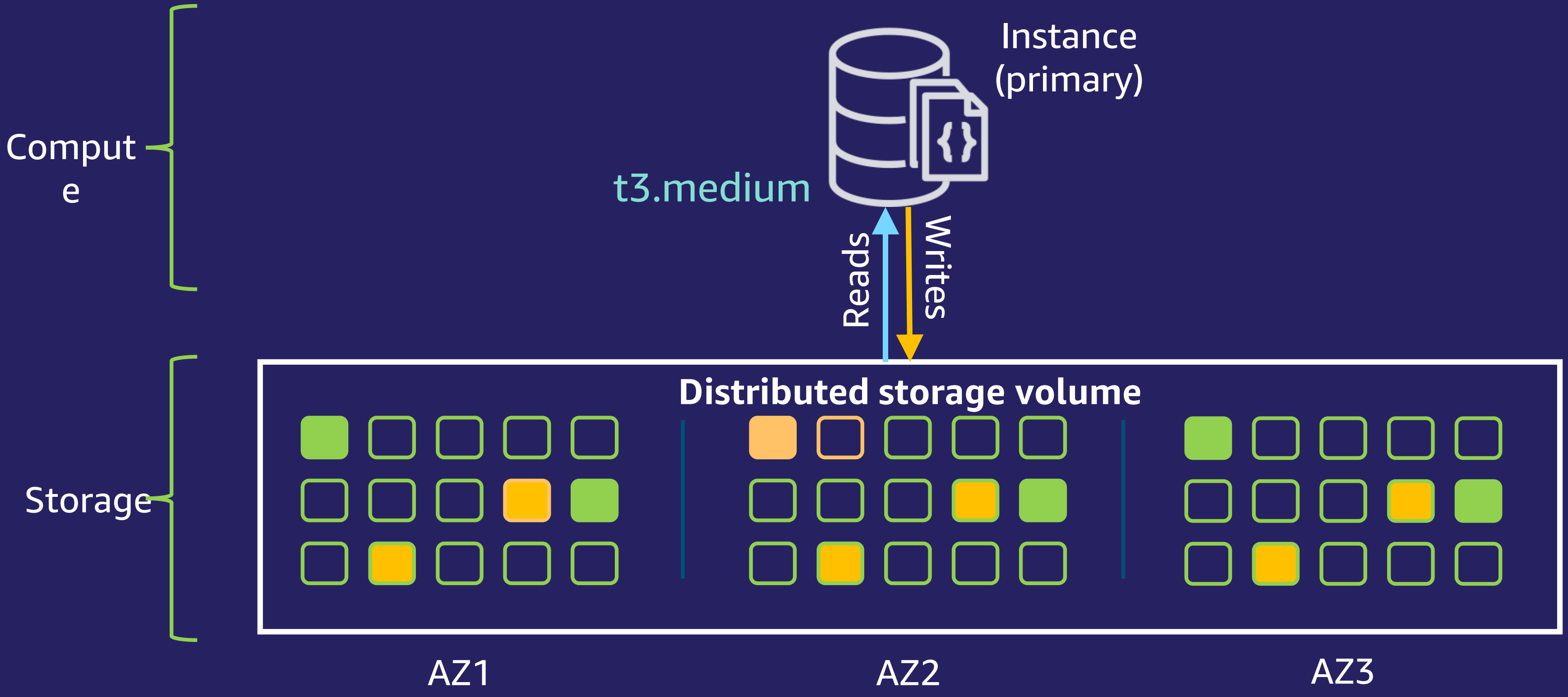


Architecture

Separation of storage / compute

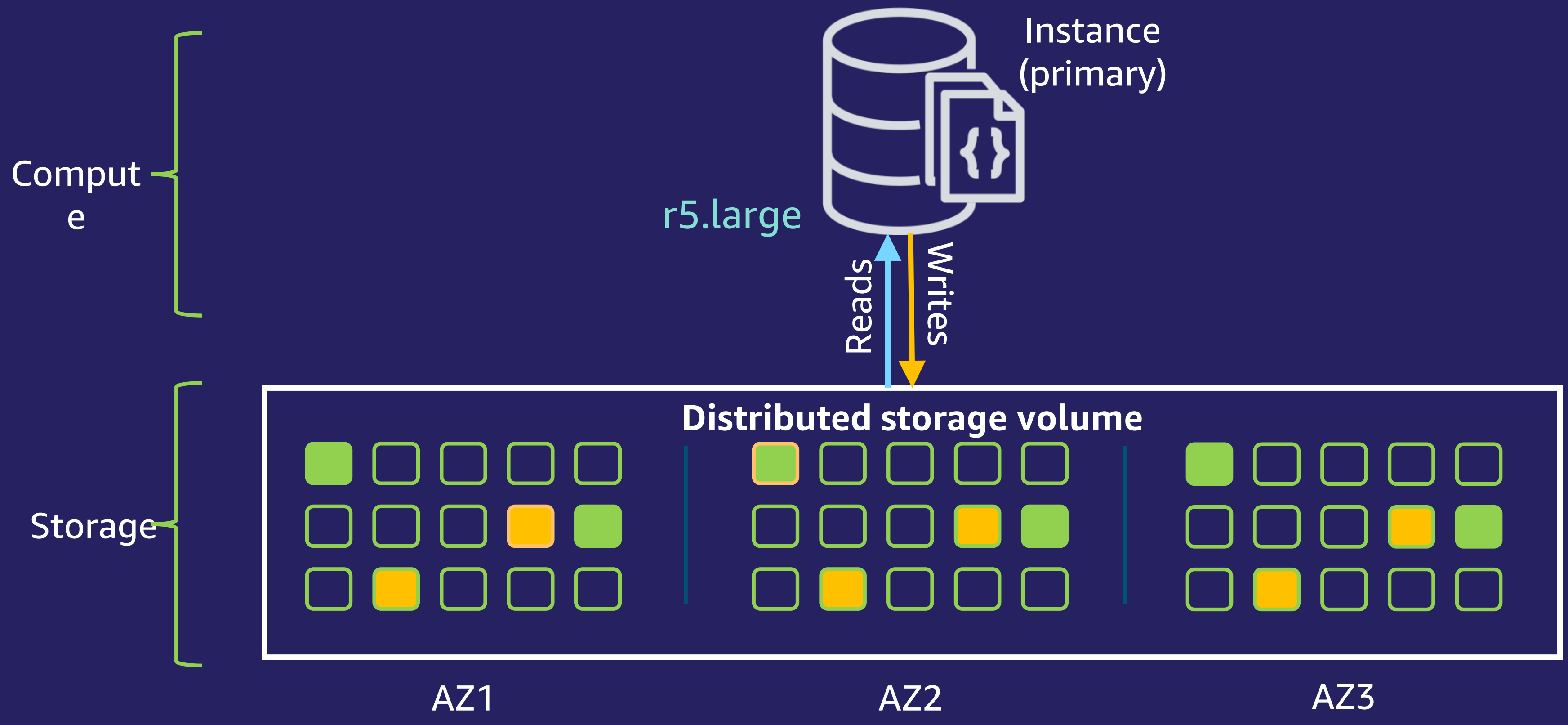
t3.medium: Dedicated single-instance cluster for dev / test ($0.078 / hour)



Architecture

Separation of storage / compute

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



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Separation of storage / compute

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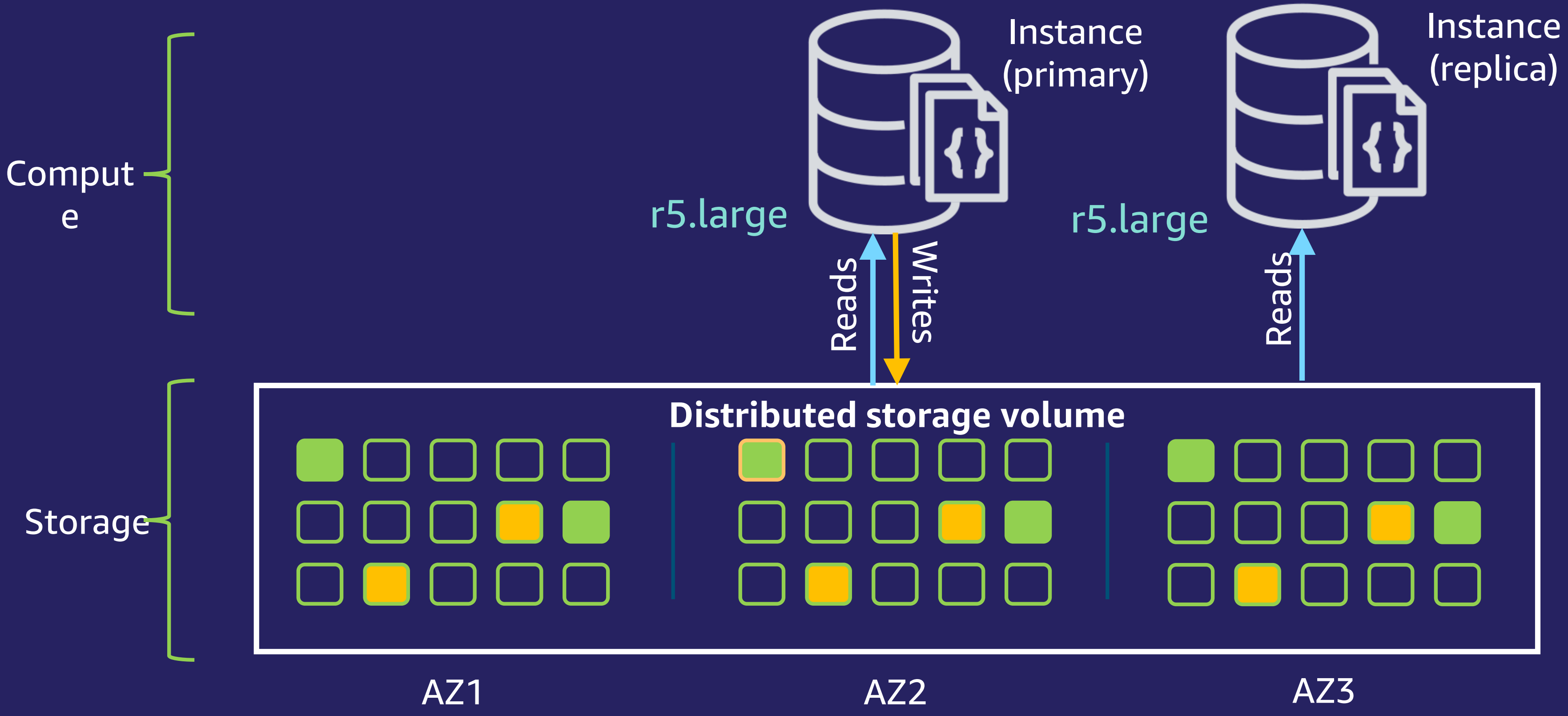

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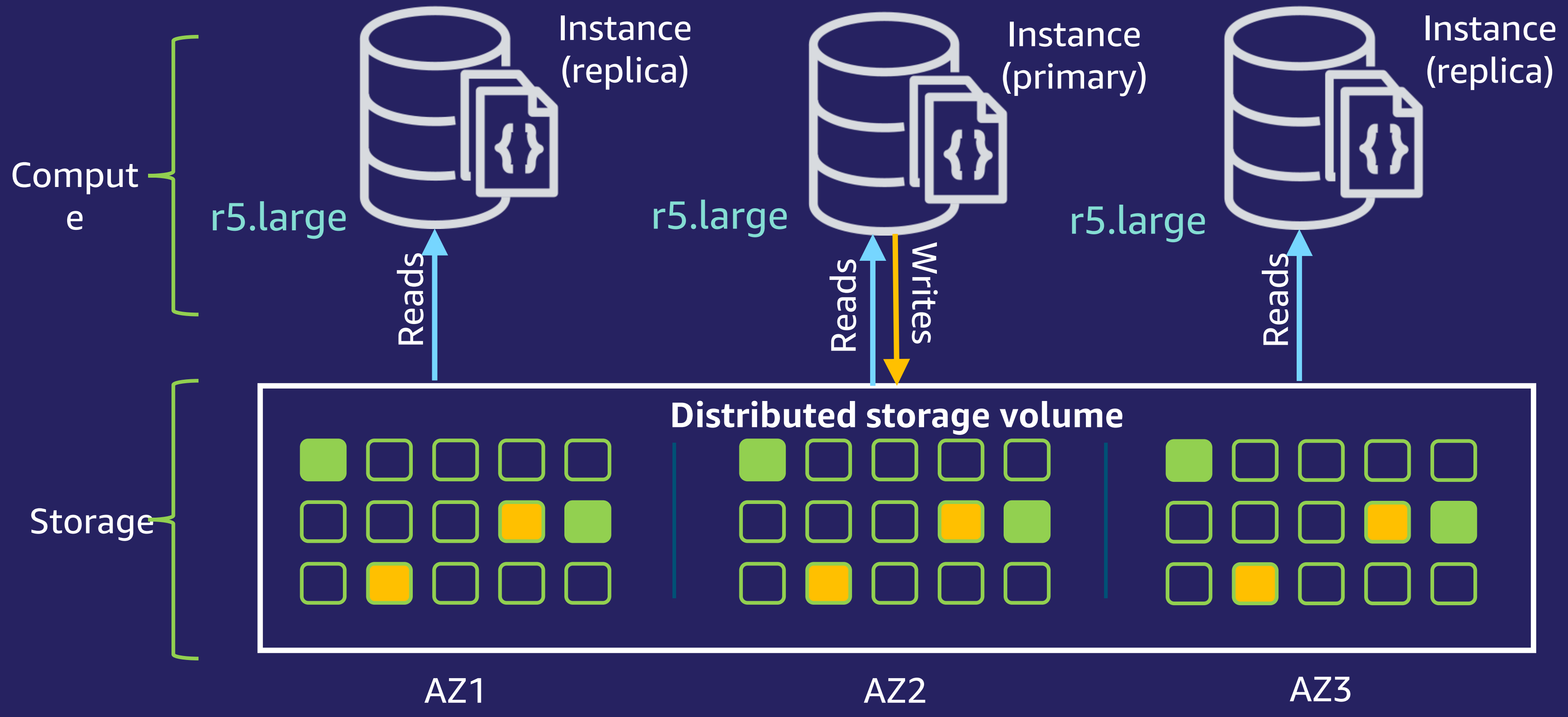

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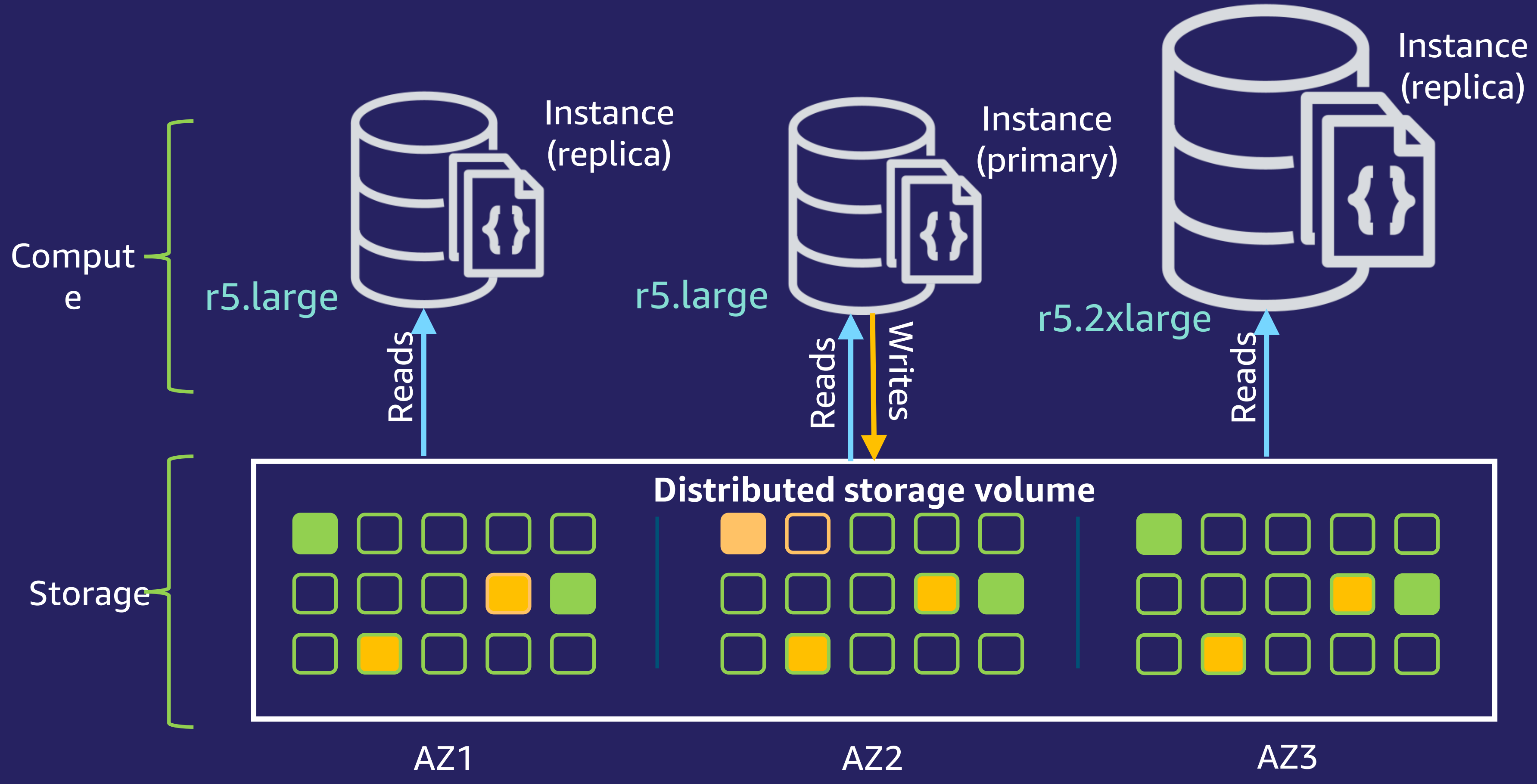

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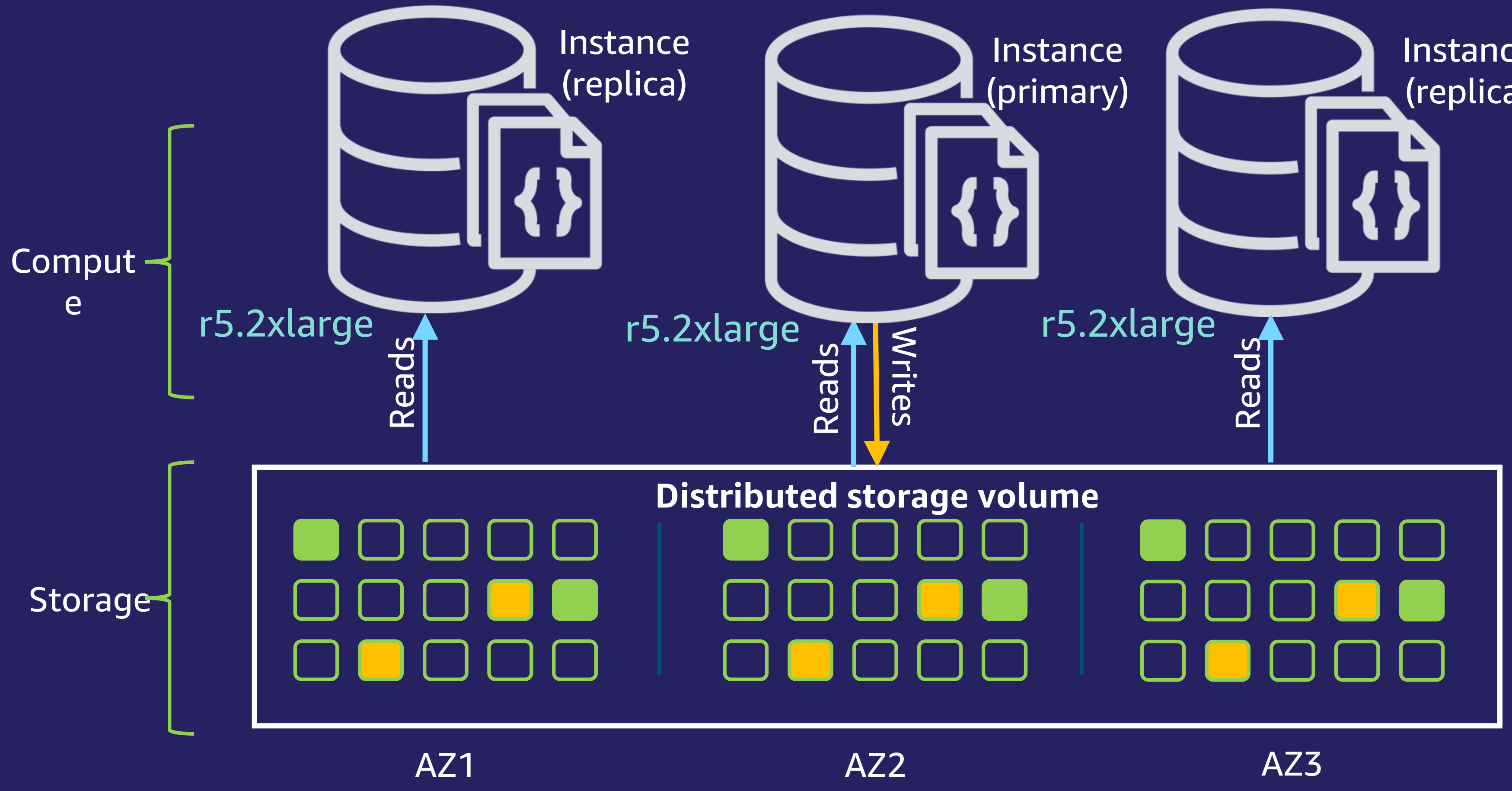
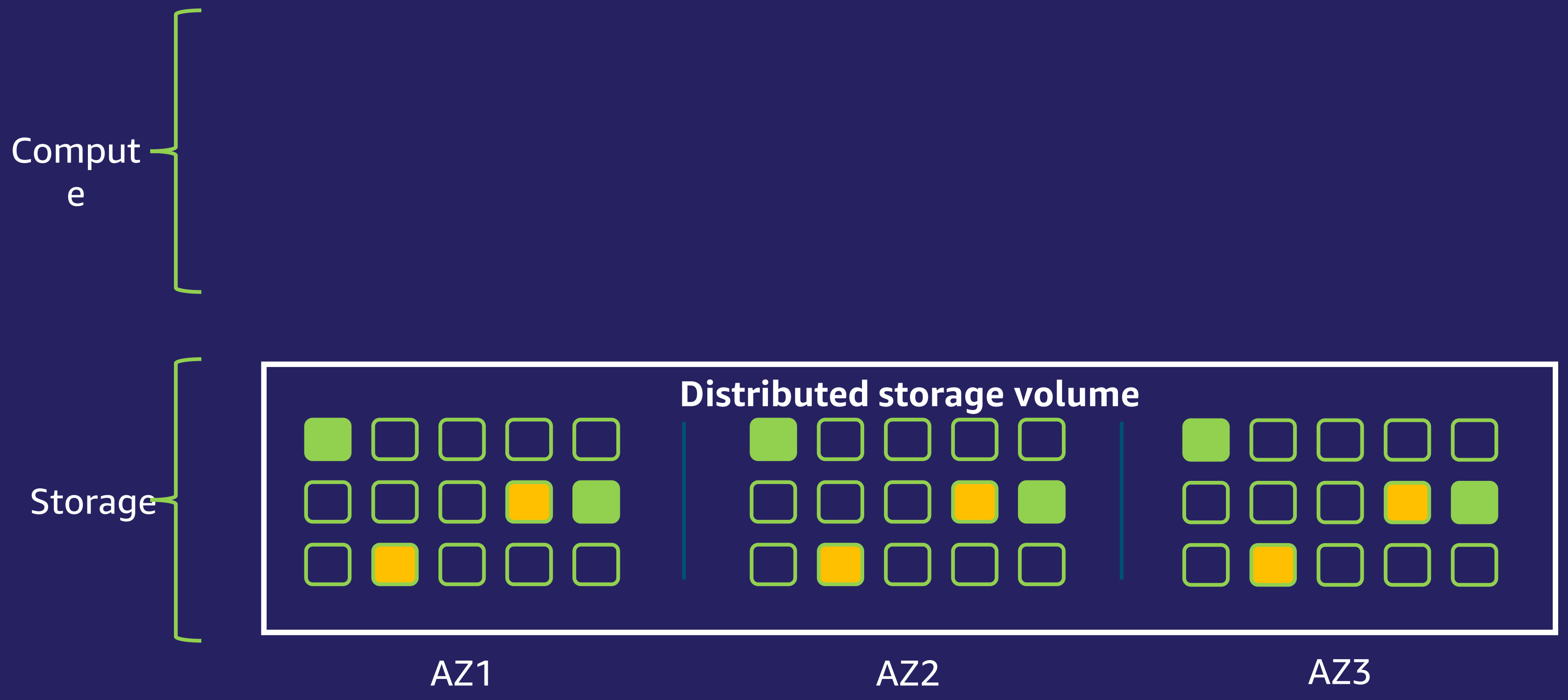


Architecture

Separation of storage / compute

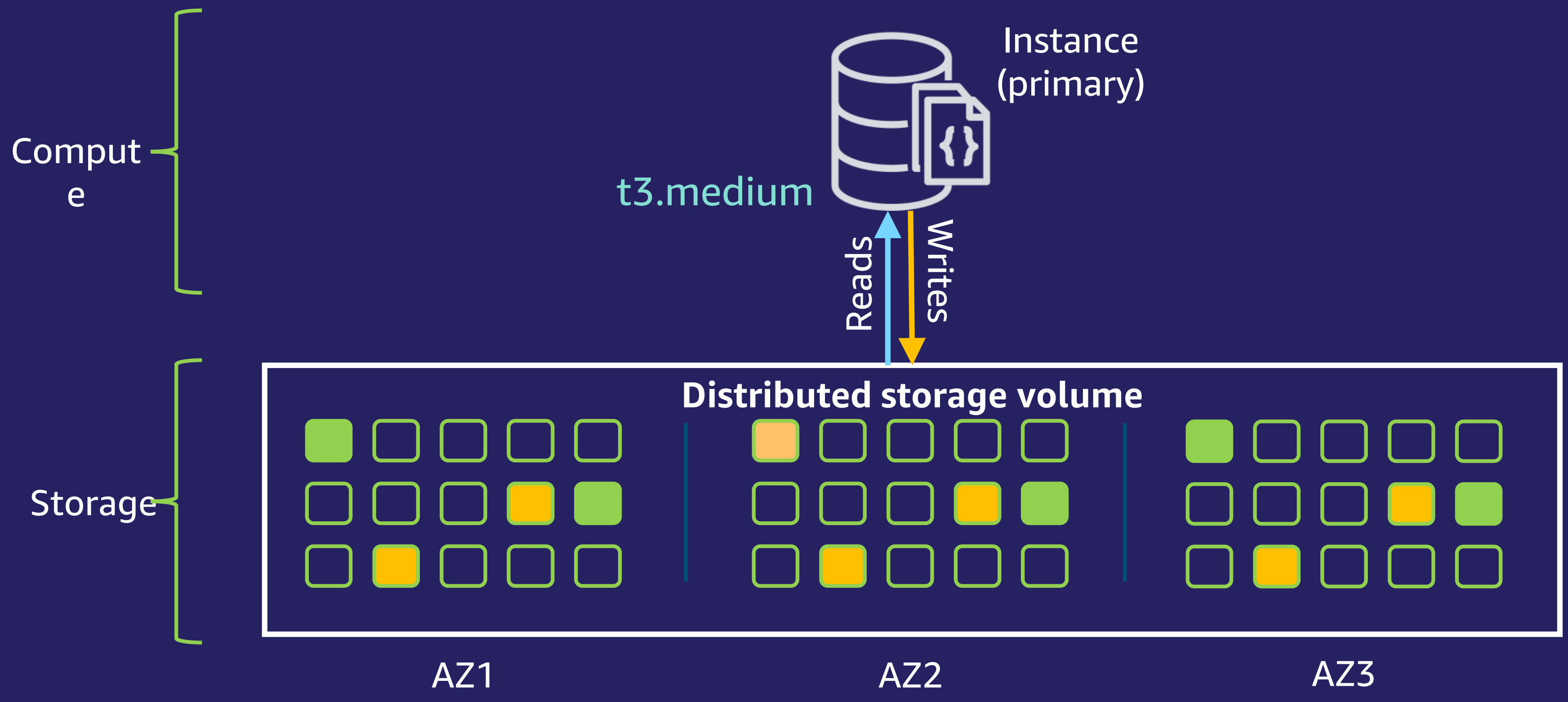
Compute and storage are separated to the degree that you can delete all compute and your data is still highly durable



Architecture

Separation of storage / compute

Single node cluster is still highly durable



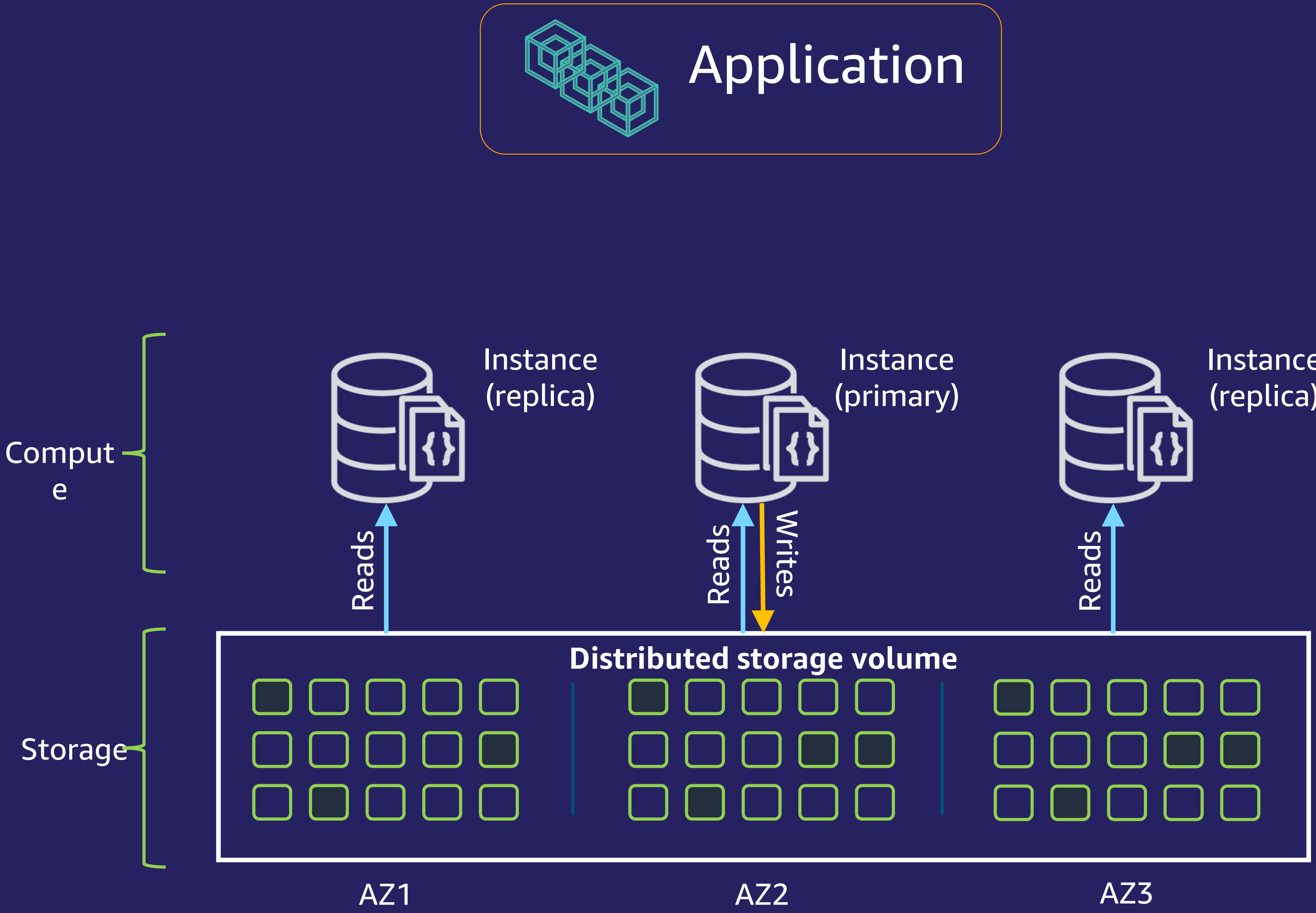
Demo: Adding a new instance to a 12 TB cluster + backup

Replication

Architecture

Replication

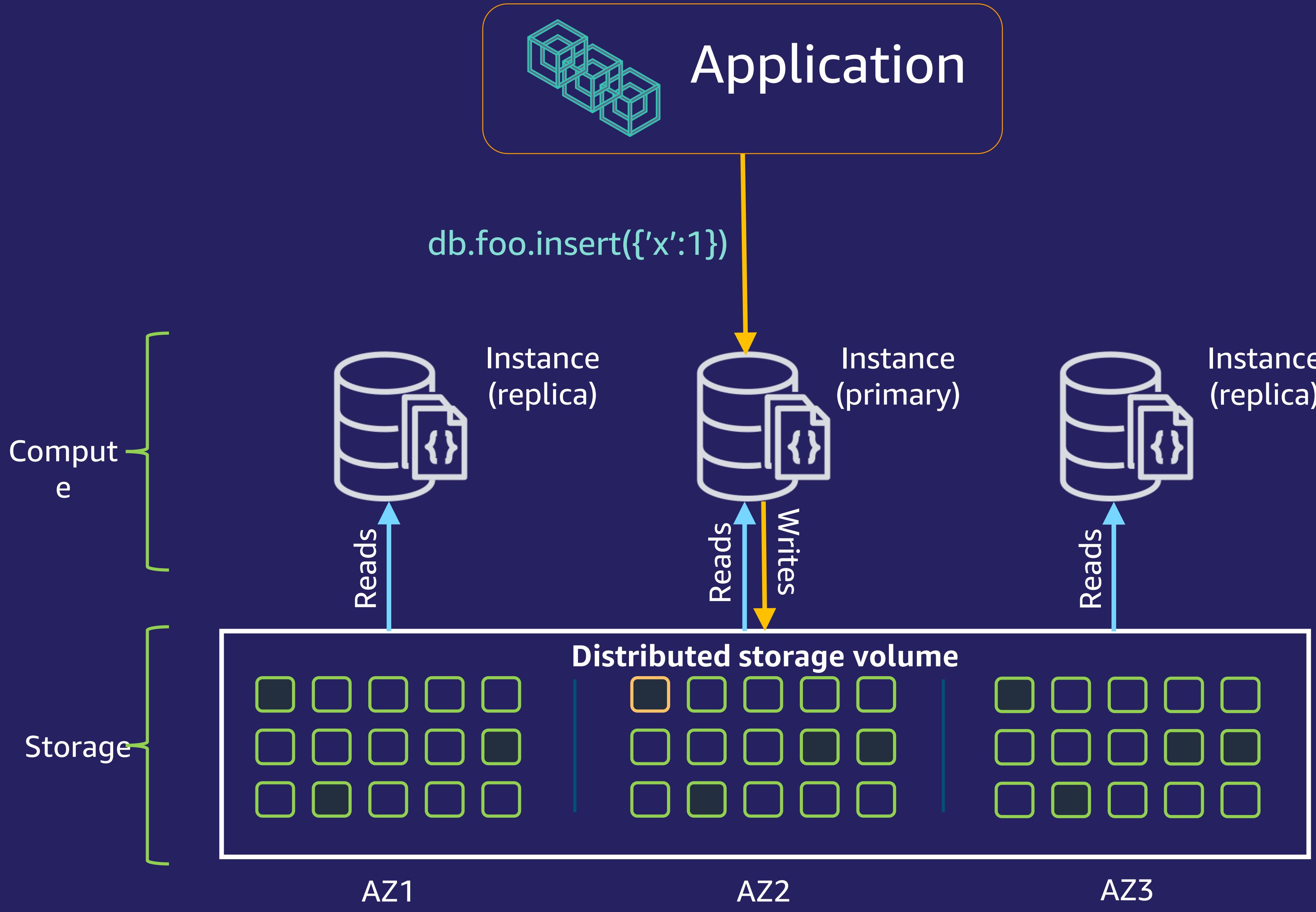
Default write concern is w:4 and j:true



Architecture

Replication

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



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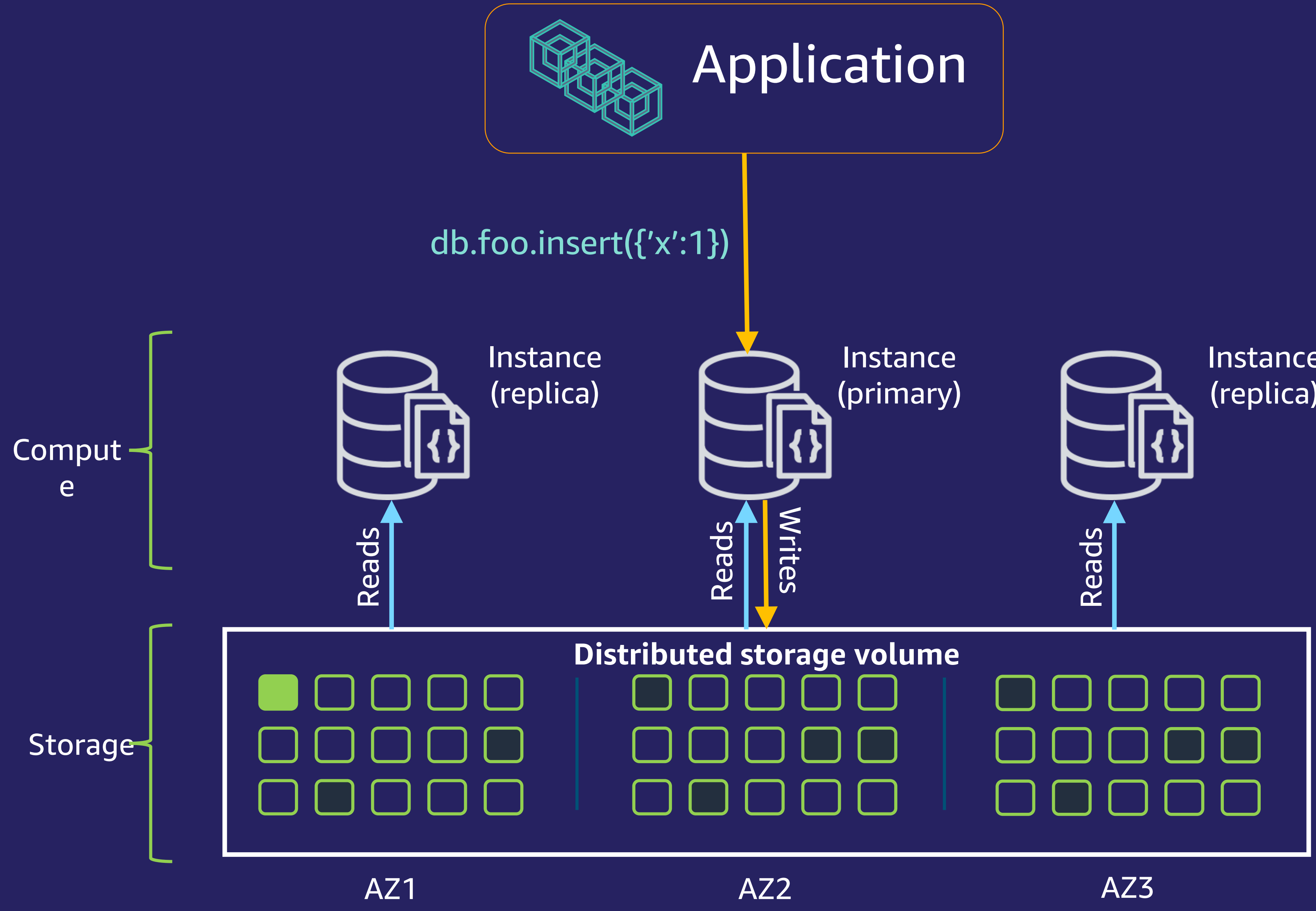

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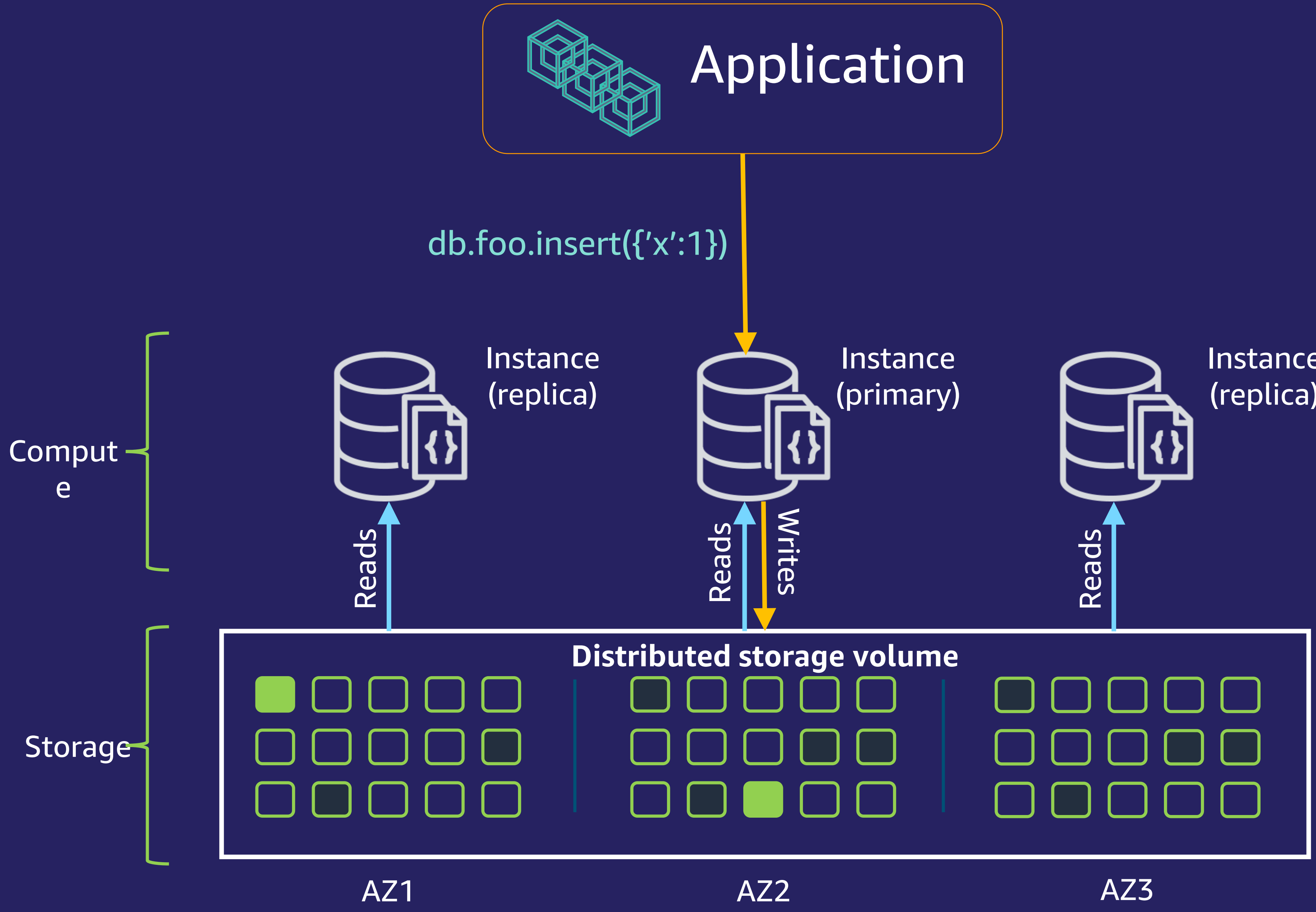

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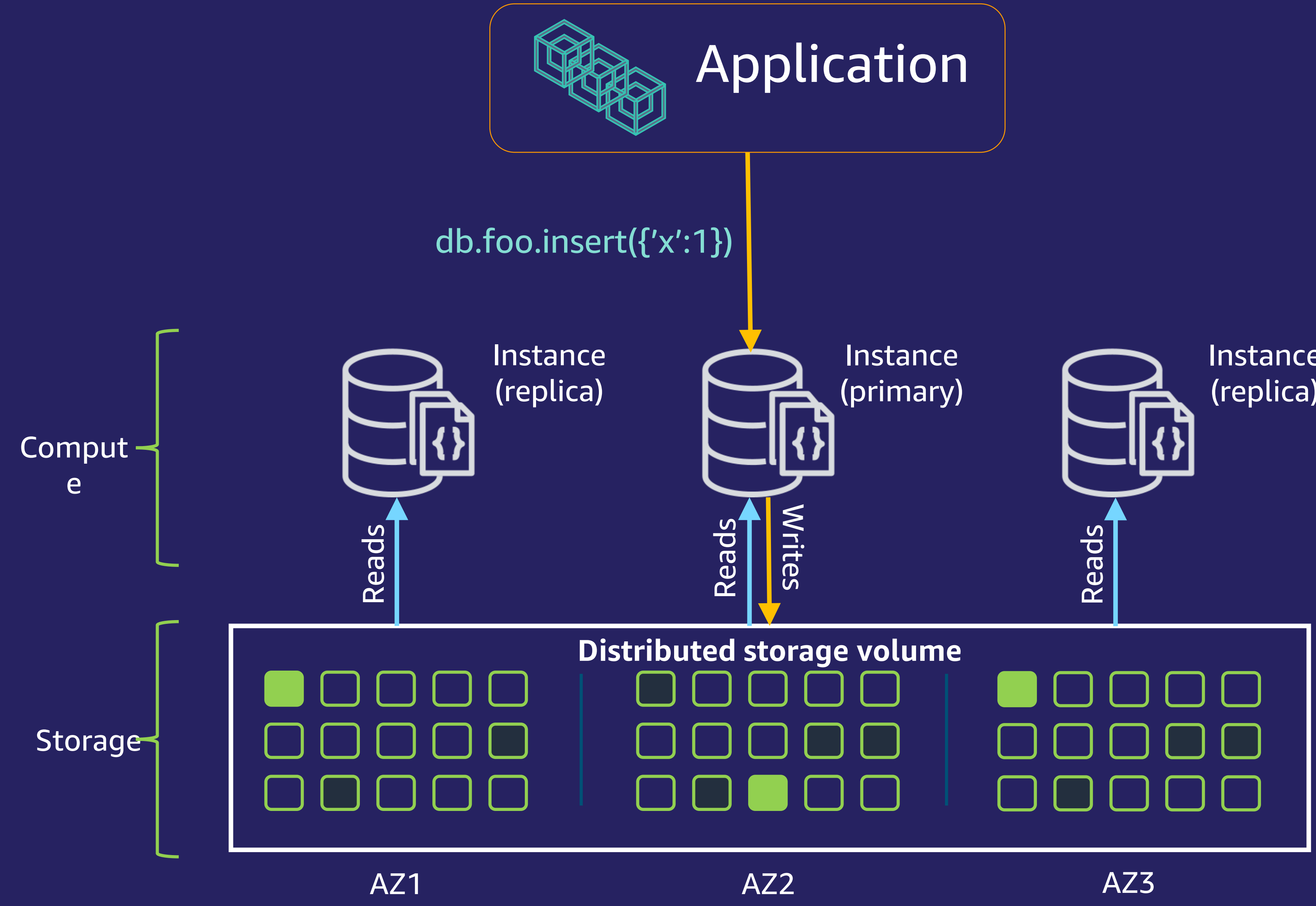

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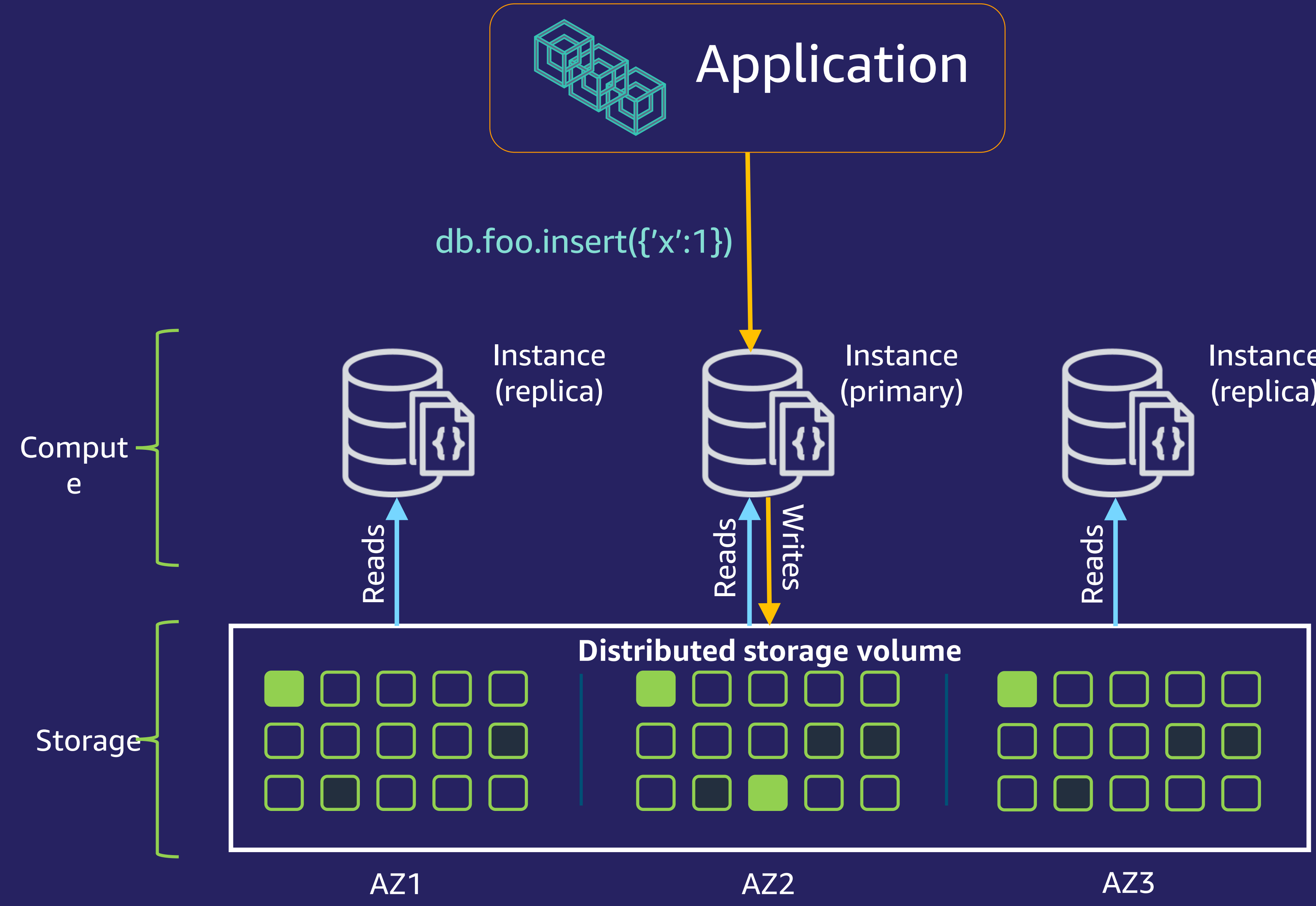

Architecture

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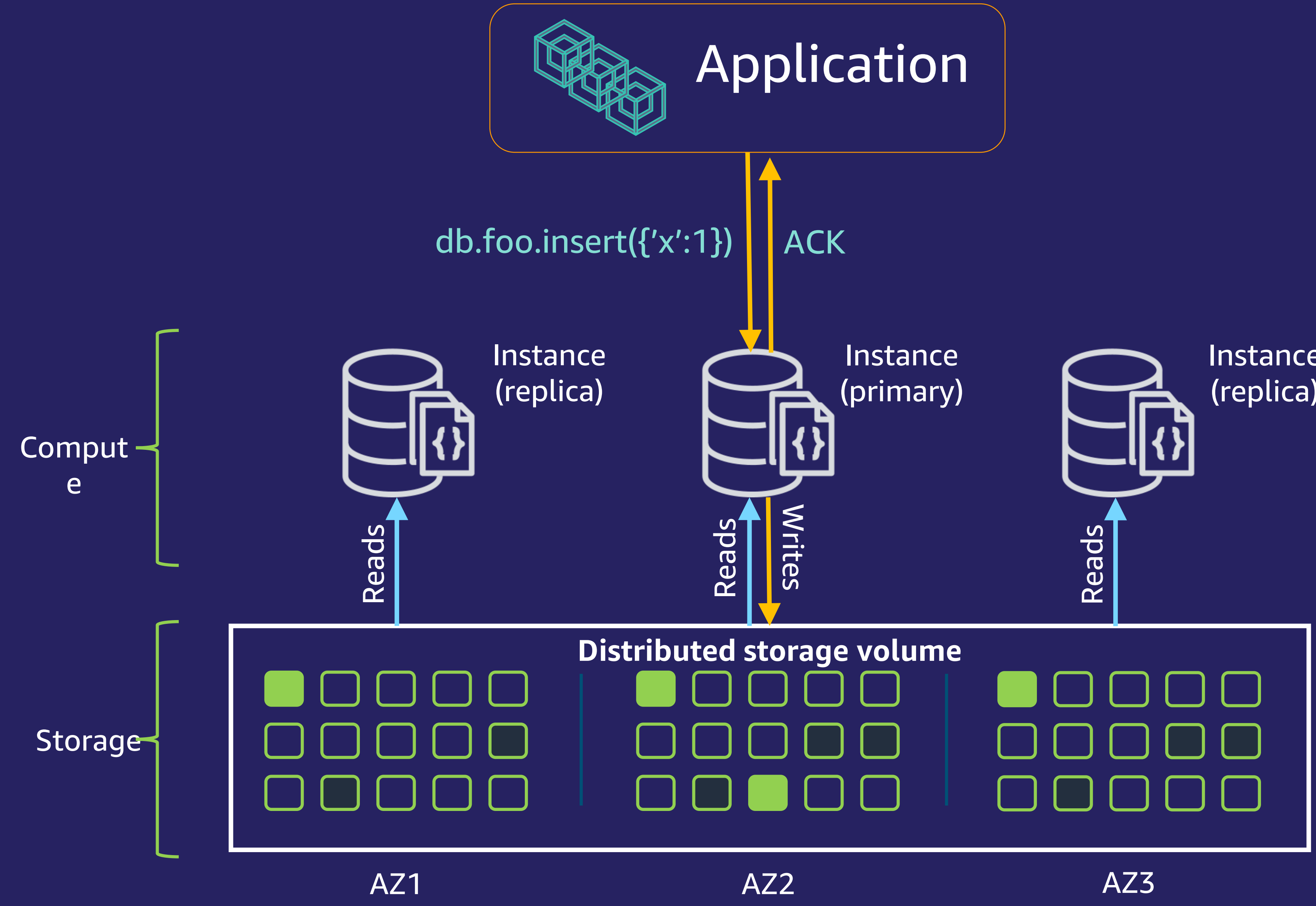
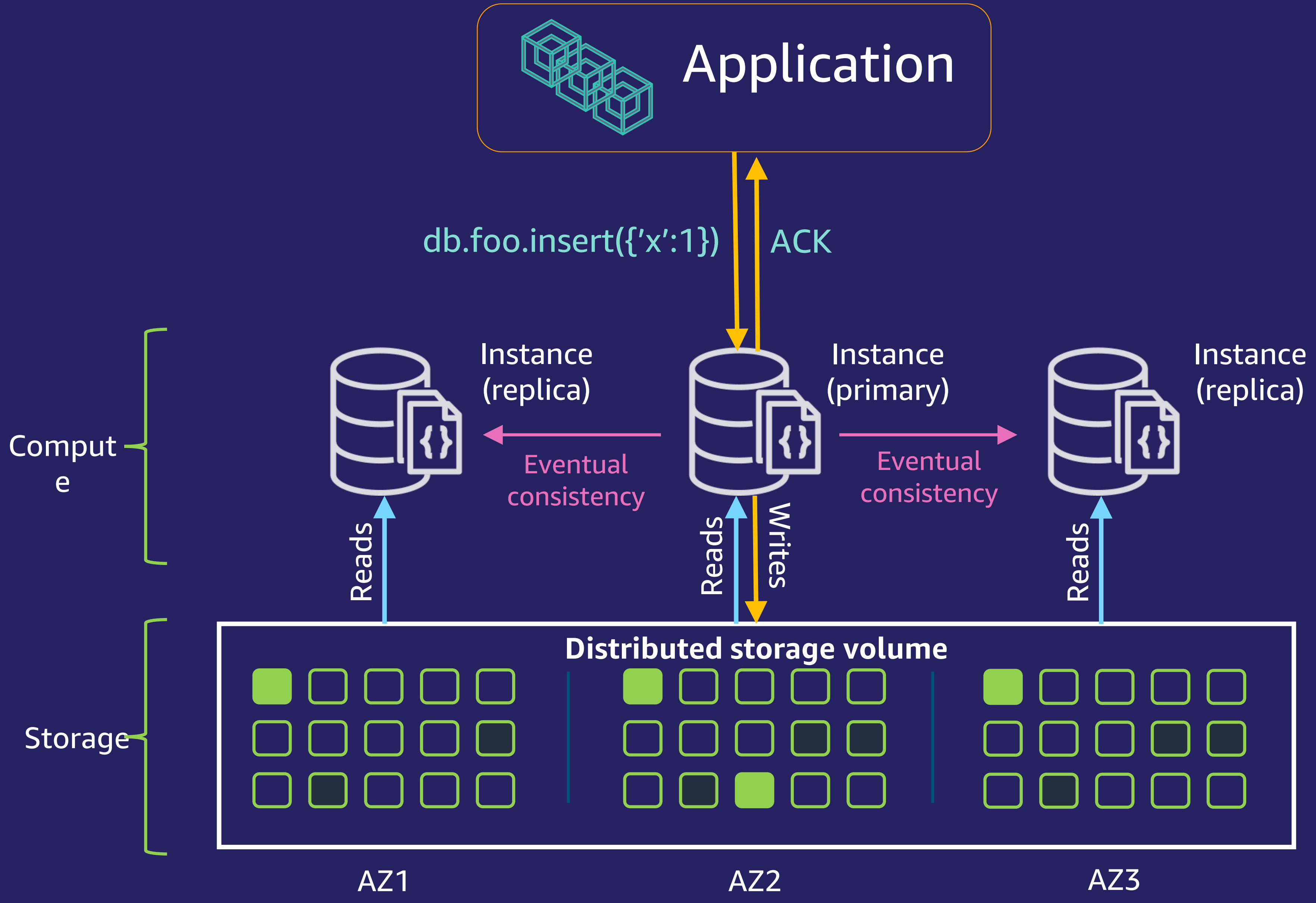


Architecture

Replication

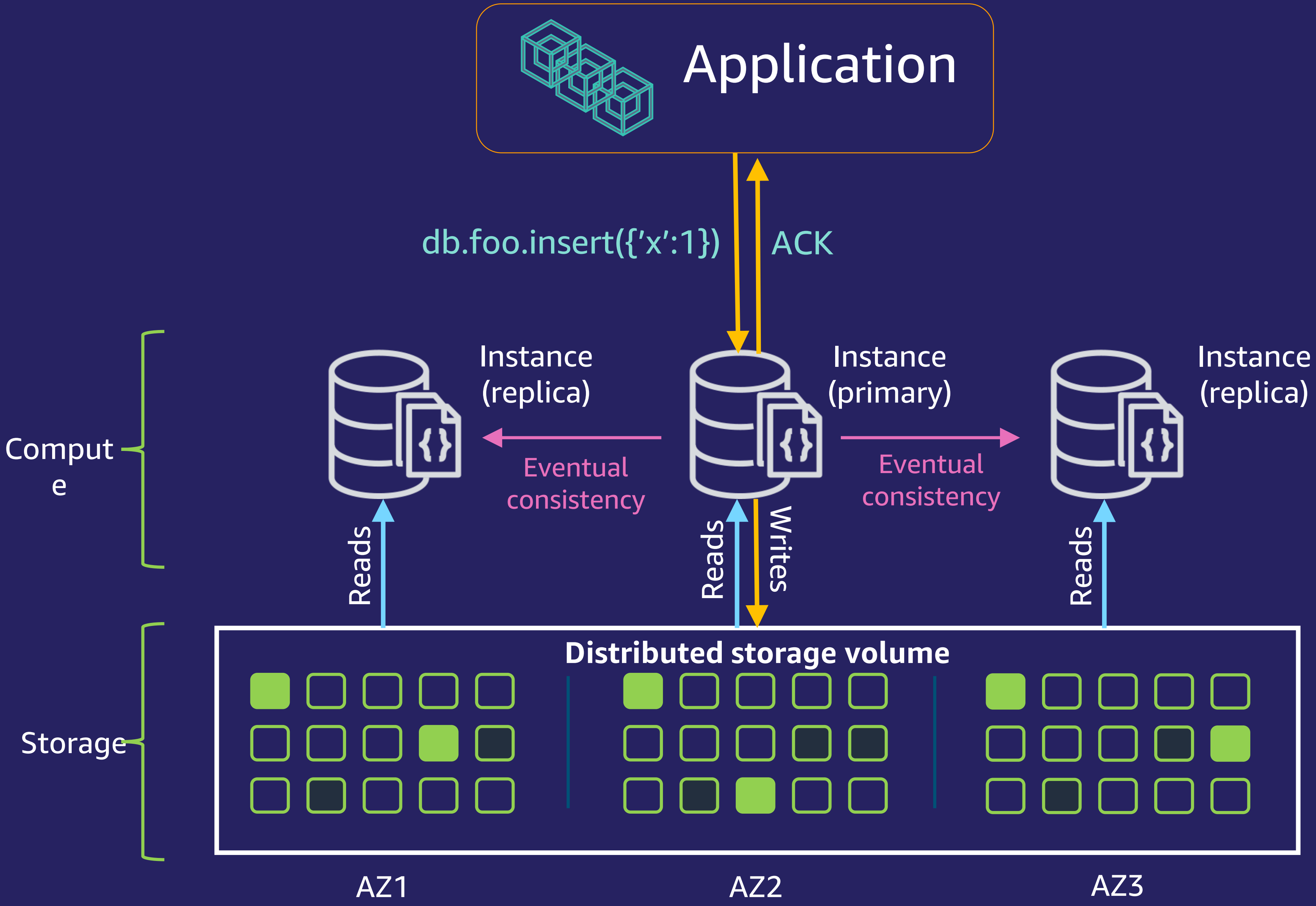
Data is further replicated to achieve 6 copies across three AZs (V=6)



Architecture

Replication

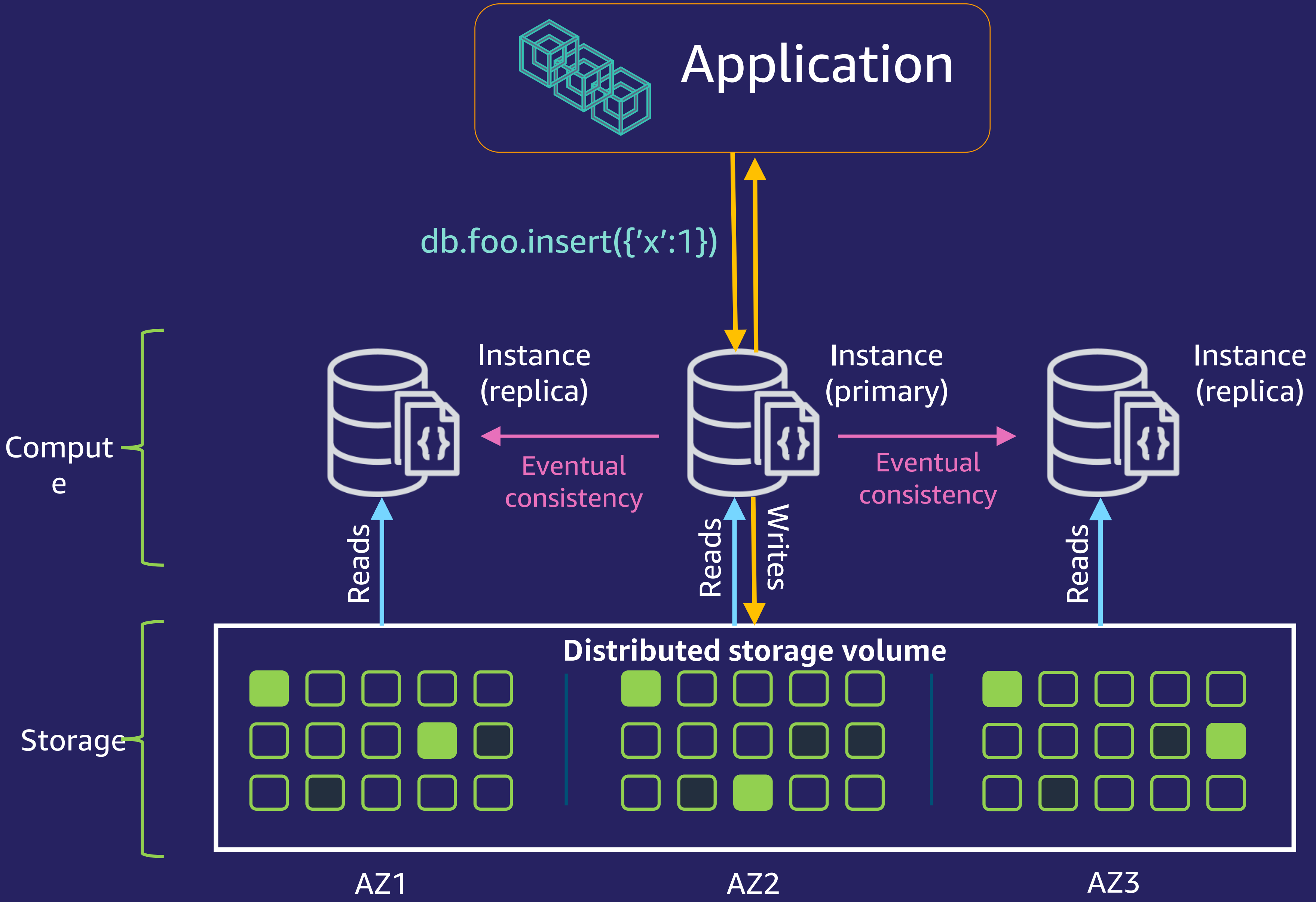
Replicas do not participate in data replication, freeing them up for reads



Architecture

Replication

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



Demo: Connecting as a replica set to scale reads

Durability

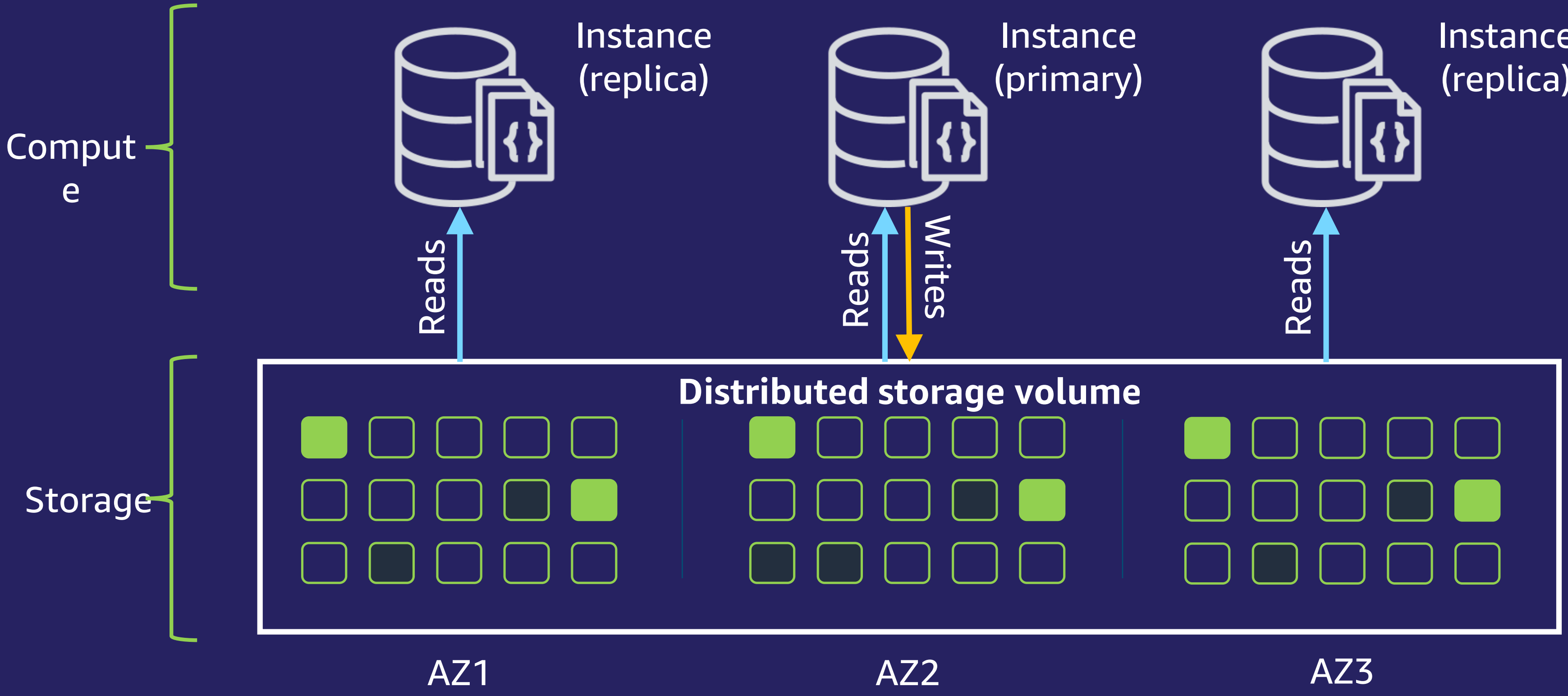
Architecture

Highly durable by default

AZ + 1 resilient

Durability

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



Architecture

Highly durable by default

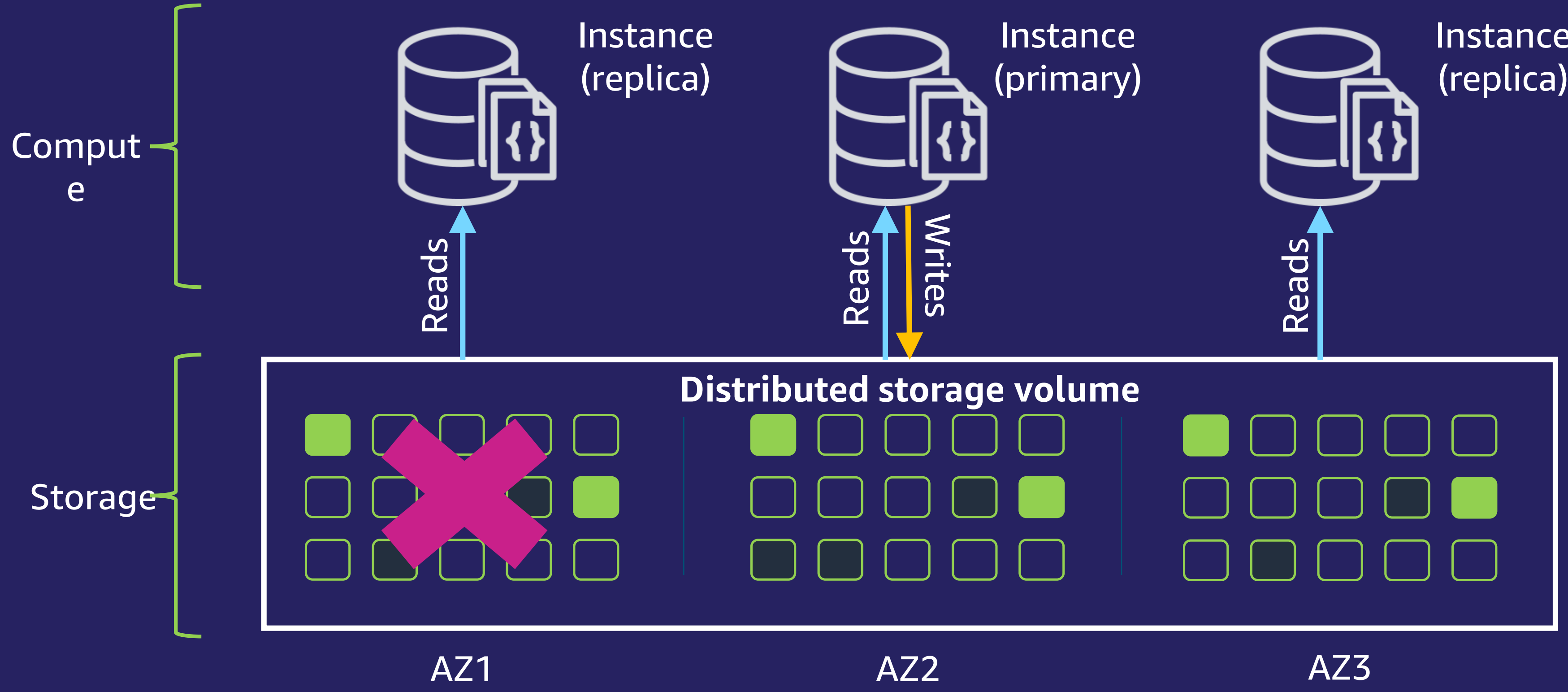
AZ + 1 resilient

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

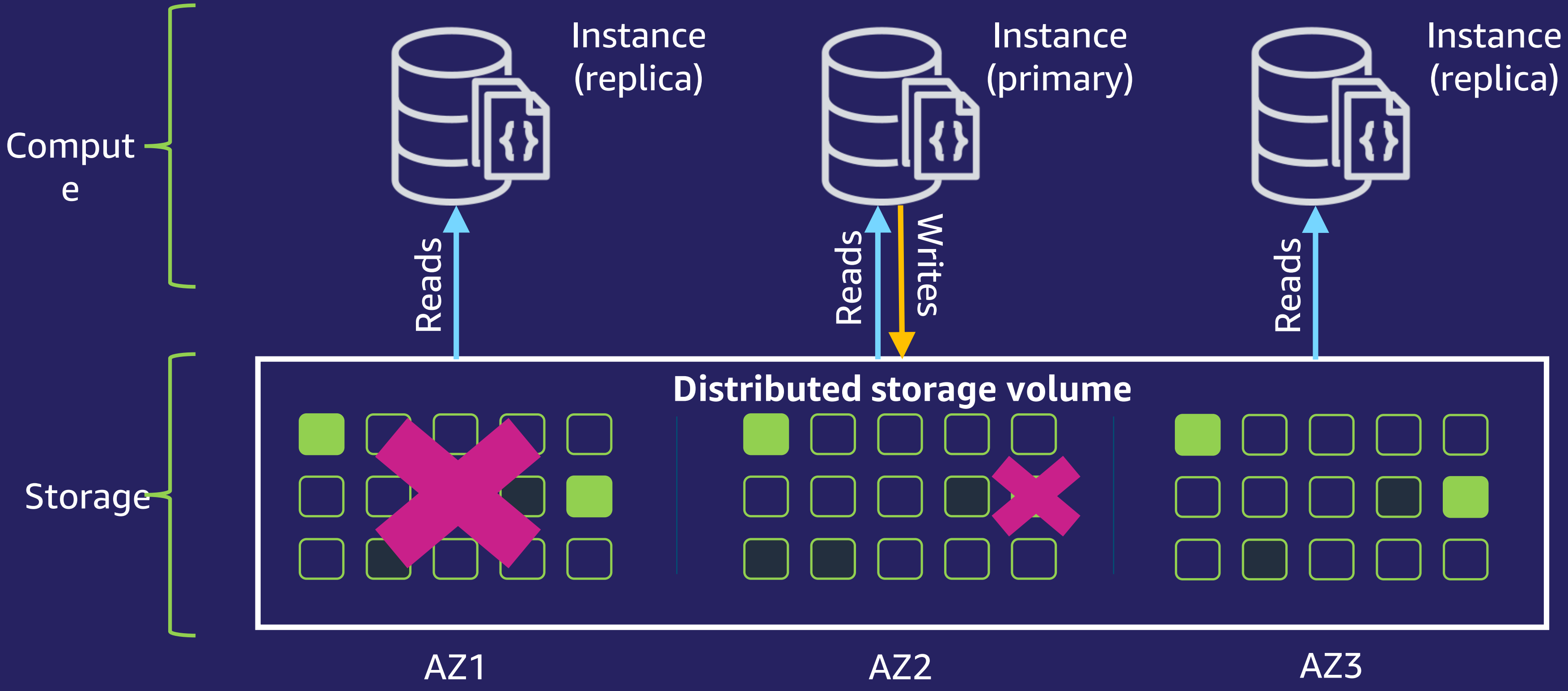
AZ + 1 resilient

Durability

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

$V_w=4$

$V_r=3$



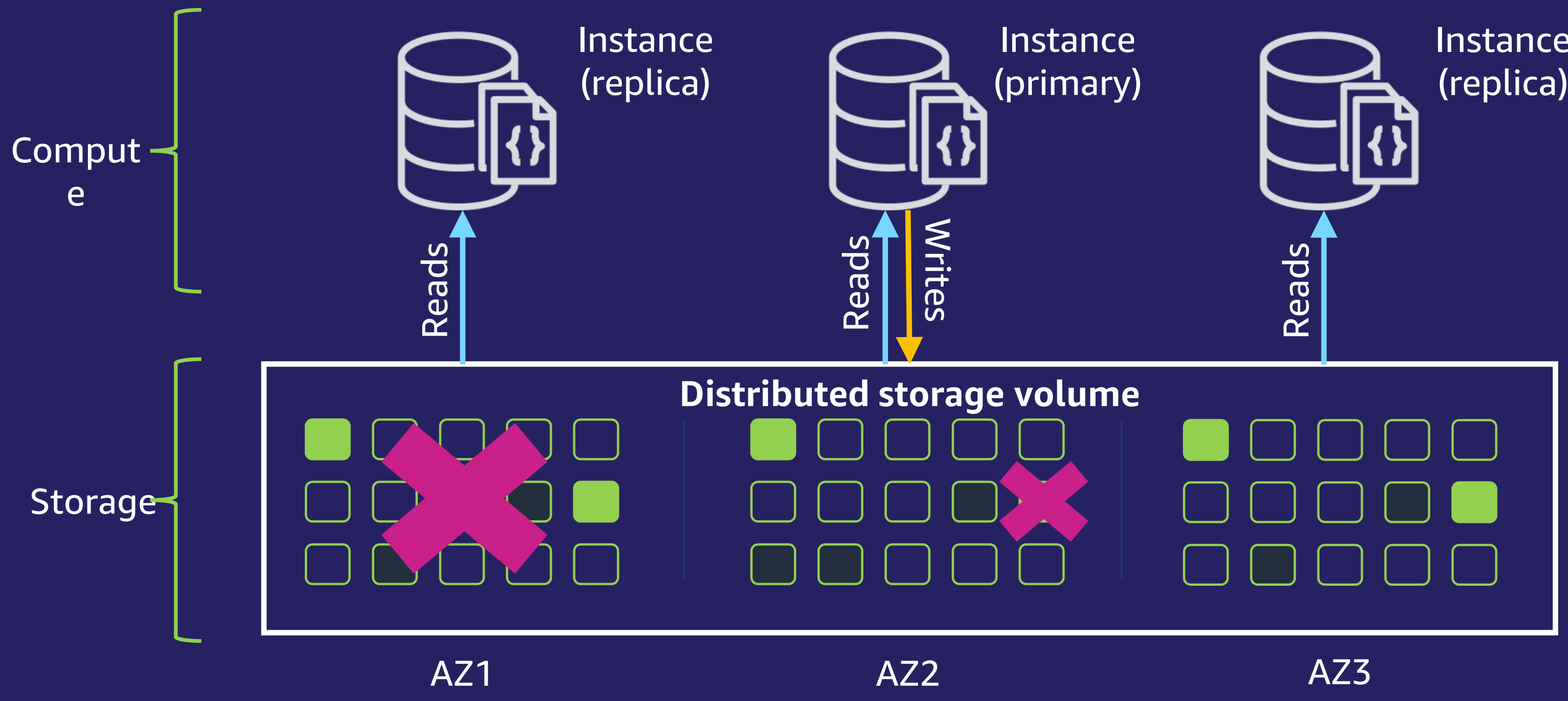
Architecture

Highly durable by default

AZ + 1 resilient

Durability

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



Architecture

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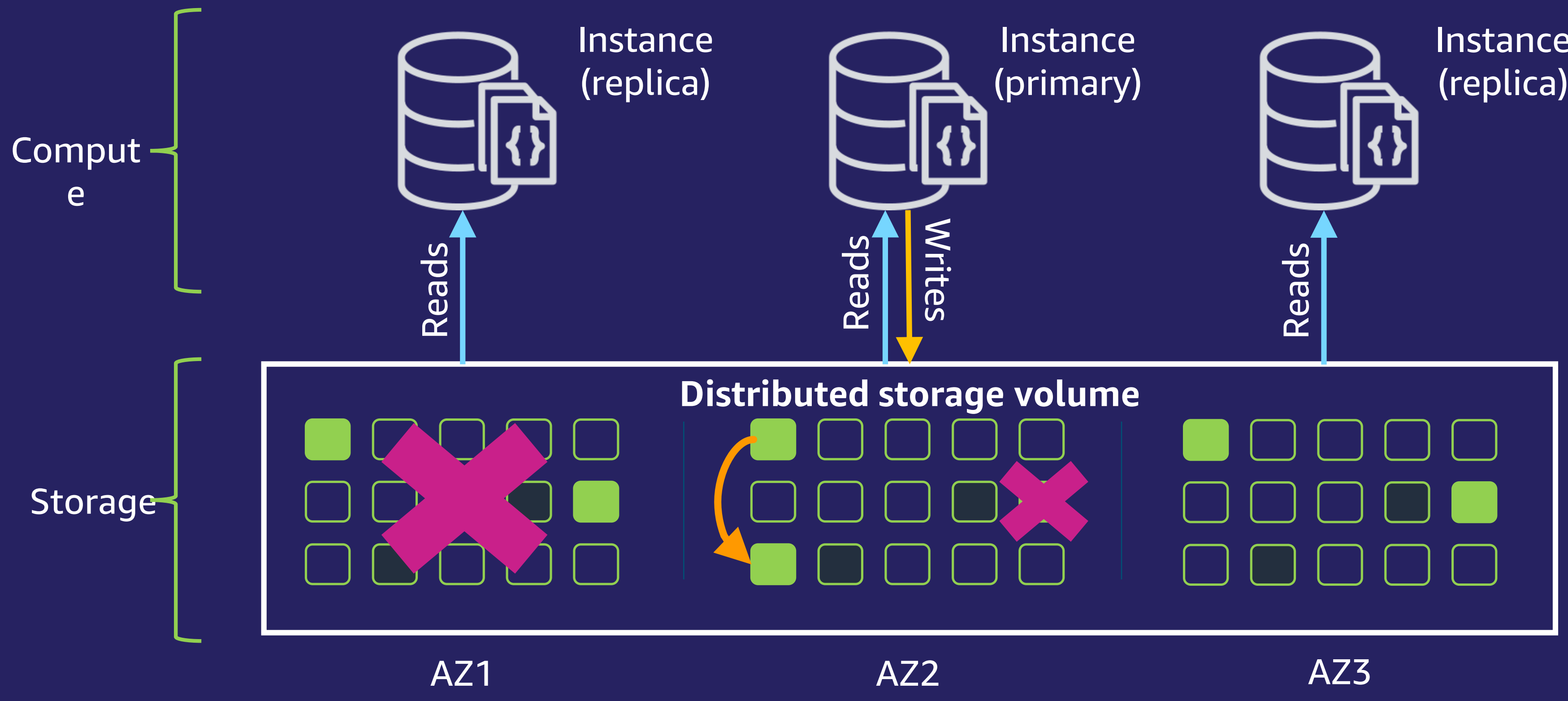


Demo: Write concern

Backup

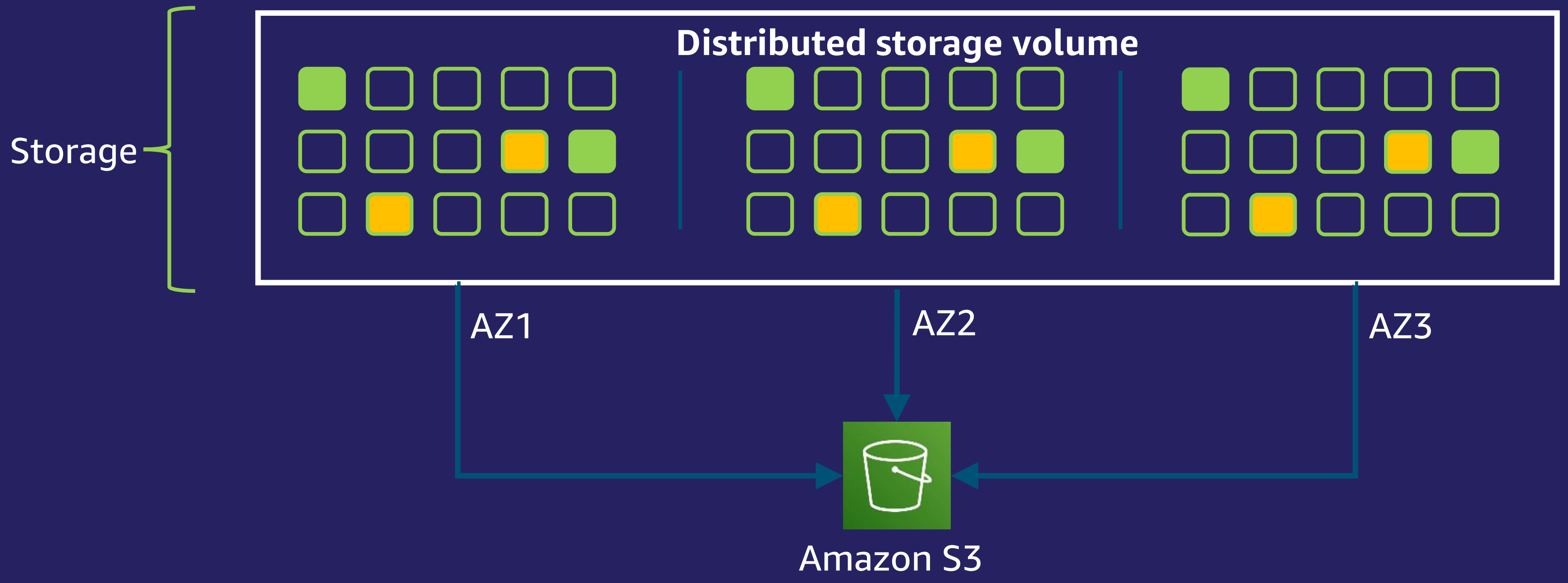
Architecture

No impact backups

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

Backup

Backup does not use your compute instances



Architecture

No impact backups

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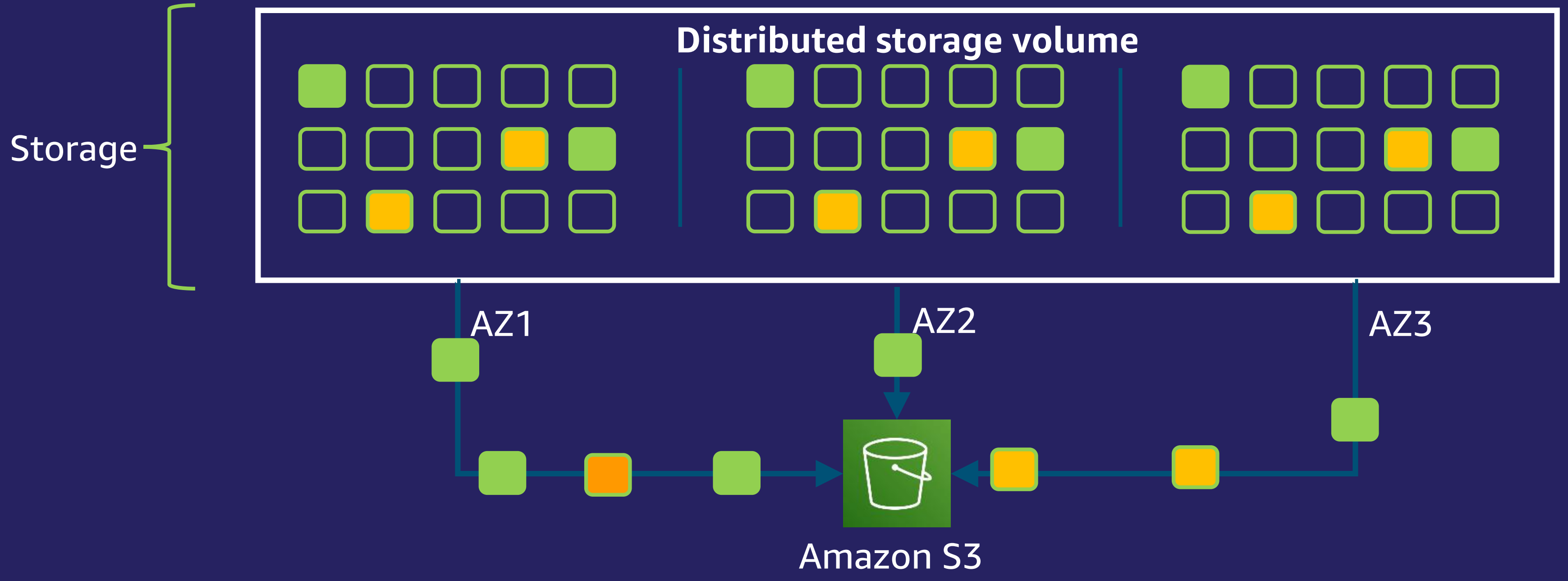
Backup

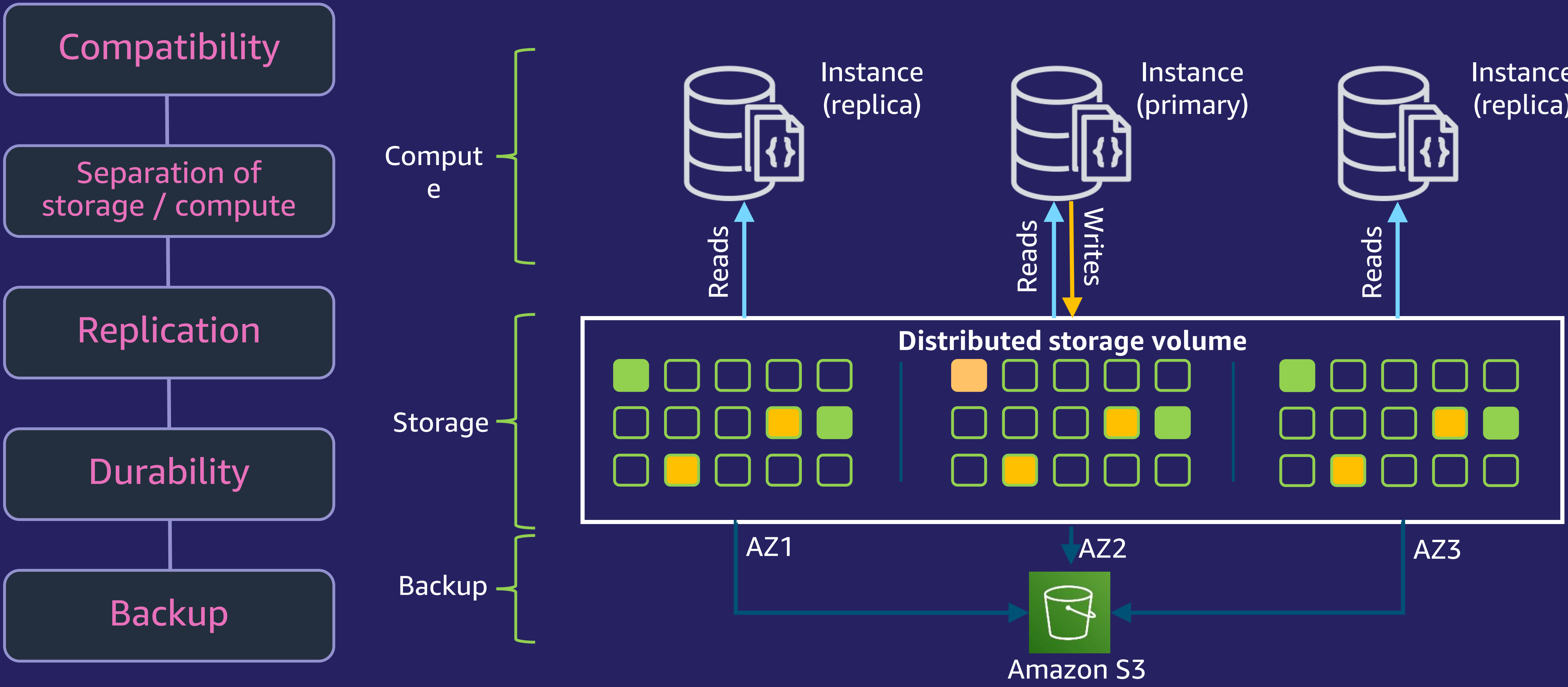
Continuous stream
to Amazon S3



Demo: Adding a new instance to a 12 TB cluster + backup

Summary

Amazon DocumentDB Architecture



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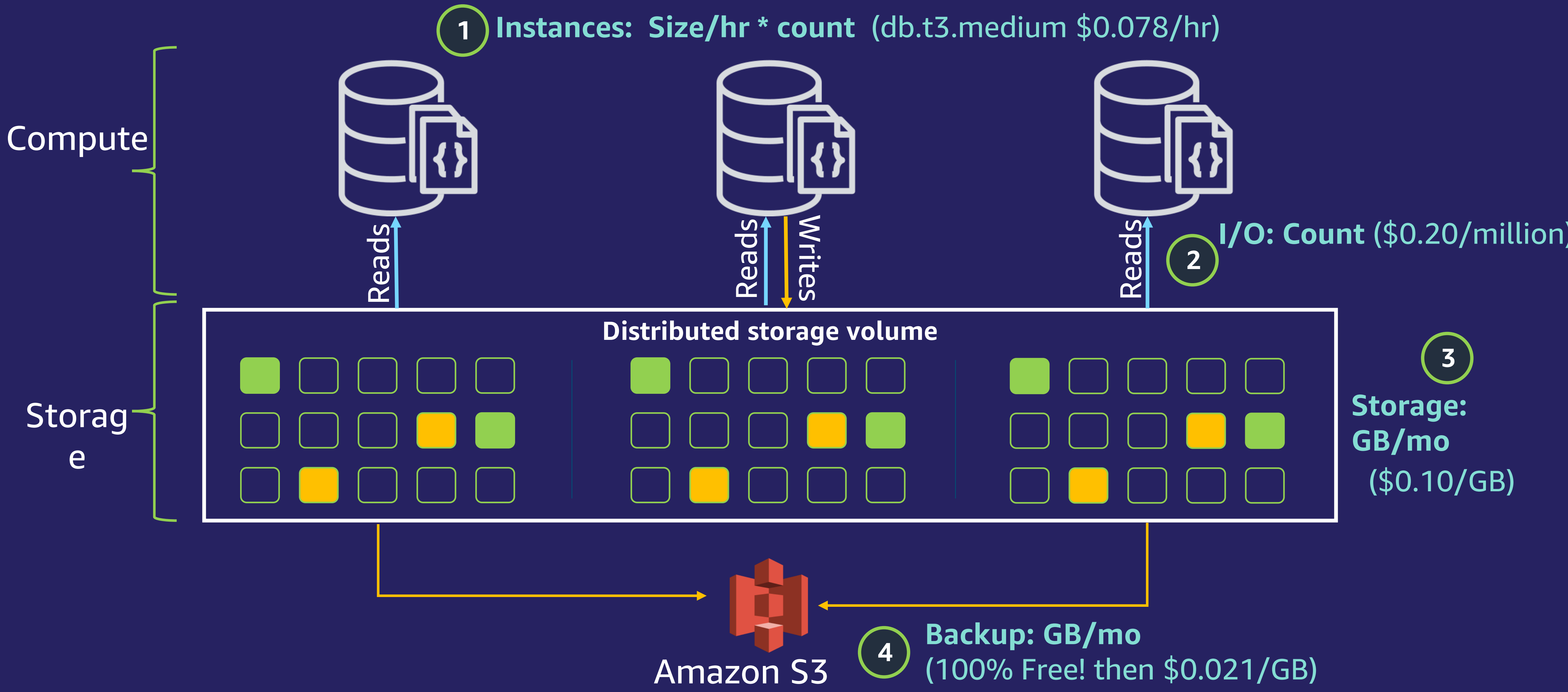
Modern, cloud-native database architecture

Pricing

Pricing (us-east-1)


1
Instances: Size/hr * count (db.t3.medium $0.078/hr)
Compute
Reads
Reads
Writes
Reads
2
I/O: Count ($0.20/million
Storag
e
Distributed storage volume
3
Storage:
GB/mo
($0.10/GB)
Amazon S3
4
Backup: GB/mo
(100% Free! then $0.021/GB)

What is new?

A few highlights from recent releases

- Global Clusters
- Graviton 2.0 instances
- MongoDB 4.0 + transactions
- Aggregation operators + stages + indexing improvements
- $$$ Free Trial

And so
much more!

What’s next?

“Amazon DocumentDB resources”
https://aws.amazon.com/documentdb/resources/

“Amazon DocumentDB immersion day workshop”
https://documentdb-immersionday.workshop.aws/

Q&A

- Ryan Thurston & Karthik Vijayraghavan

Thank you!