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Migrating Your Databases to AWS:

Deep Dive on Amazon Relational Database Service and AWS Database Migration Service

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Solutions Architect

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amazon web services

Agenda

The WHAT

The WHY

The HOW

The WHEN

The WHO

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The What : Amazon Relational Database Service

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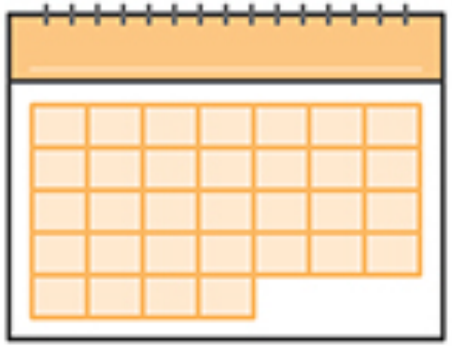
Amazon Relational Database Service (Amazon RDS)

- No infrastructure management

Cost-effective

Application compatibility



Instant provisioning

Scale up/down

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Why: Amazon Relational Database Service

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Highlights Amazon RDS

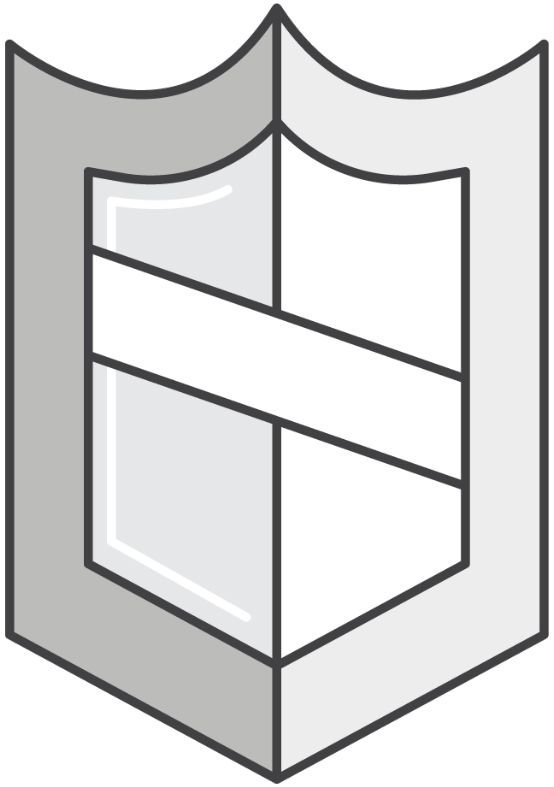
- Multi-engine support: Amazon Aurora, MySQL, MariaDB, PostgreSQL, Oracle, SQL Server

- Automated provisioning, patching, scaling, backup/restore, failover

- High availability with RDS Multi-AZ
  - 99.95% SLA for Multi-AZ deployments

Amazon Aurora PostgreSQL MySQL MariaDB ORACLE Microsoft SQL Server

Security



Amazon Virtual Private Cloud (Amazon VPC)

- Securely control network configuration

Manage connectivity

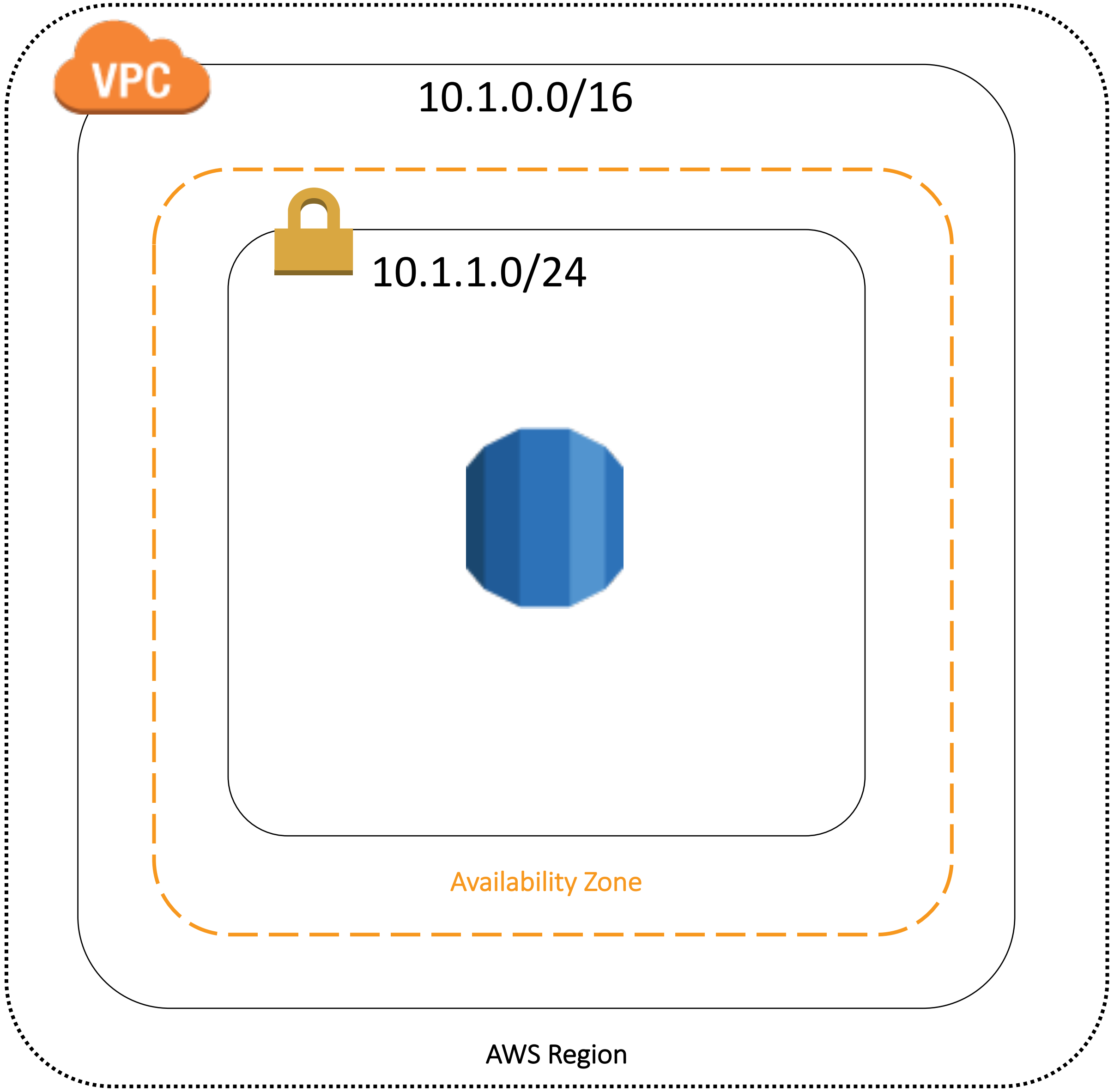
AWS Direct Connect

VPN connection

VPC peering

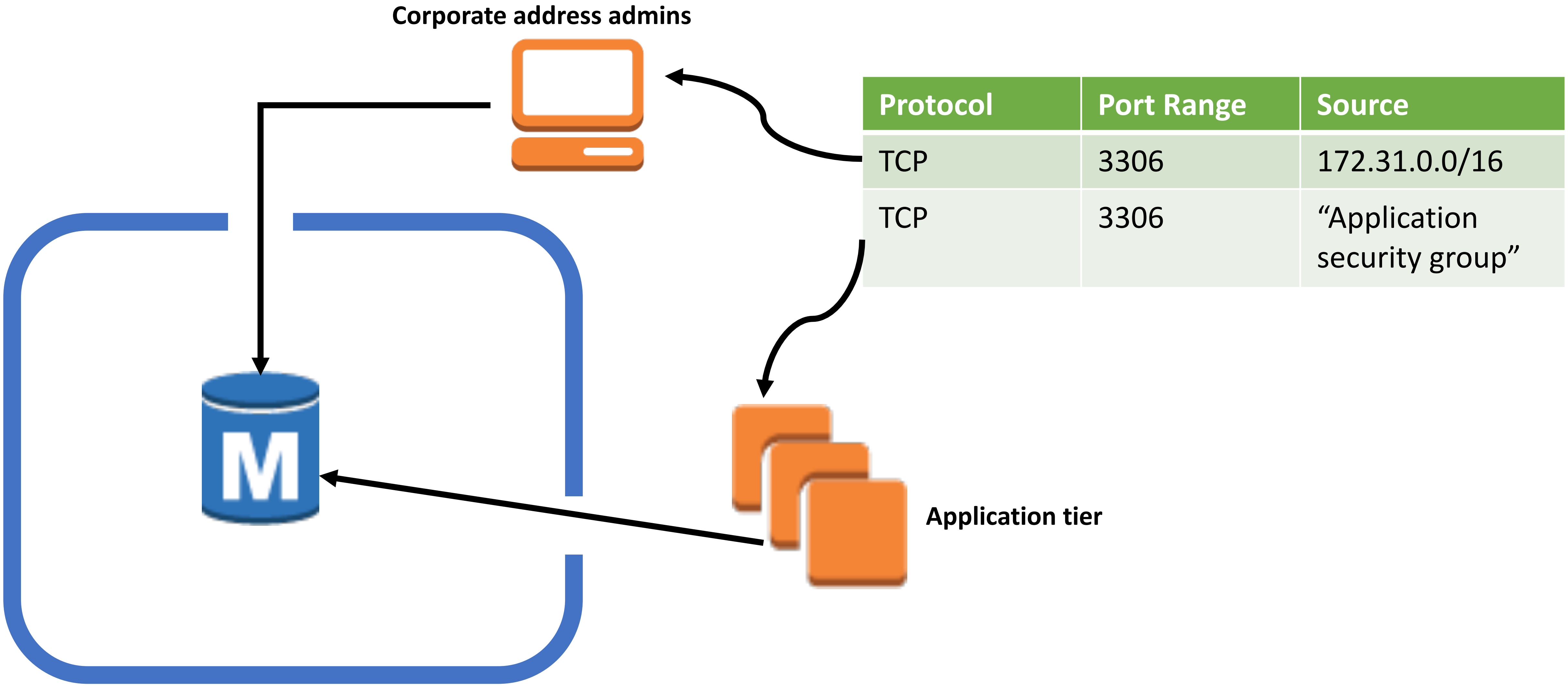
Routing rules

Internet gateway



Security groups

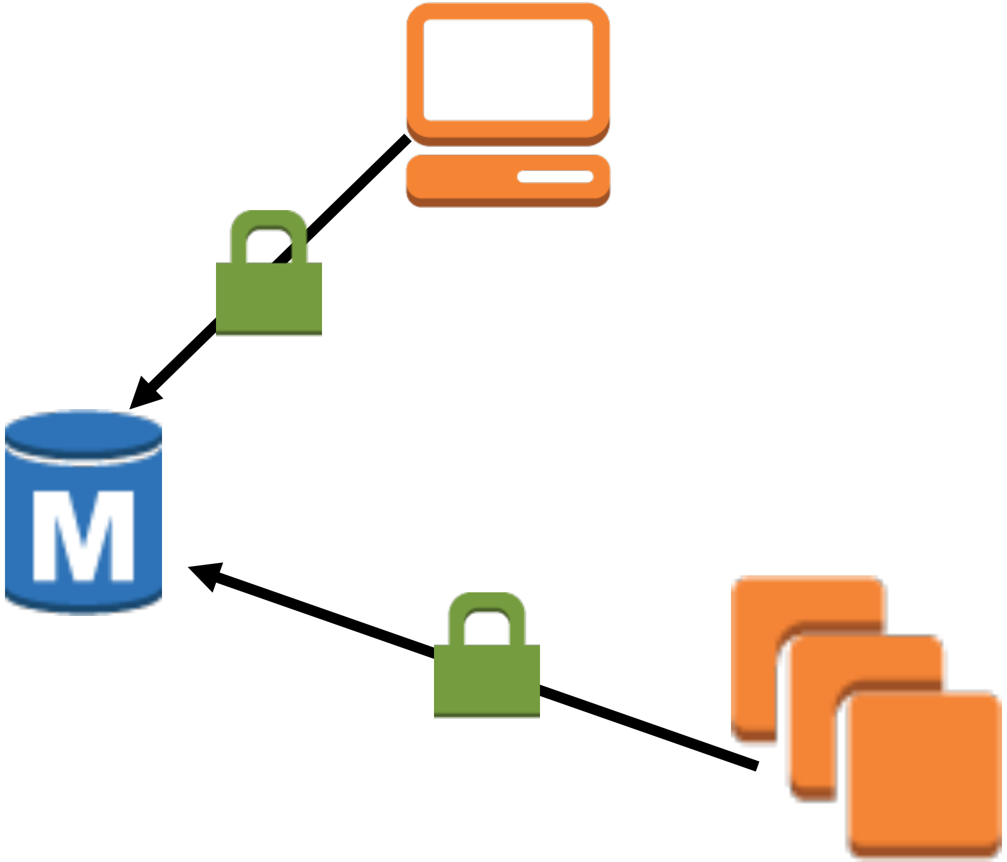
- Database IP firewall protection



Protocol	Port Range	Source
TCP	3306	172.31.0.0/16
TCP	3306	“Application security group”

Encryption in Transit

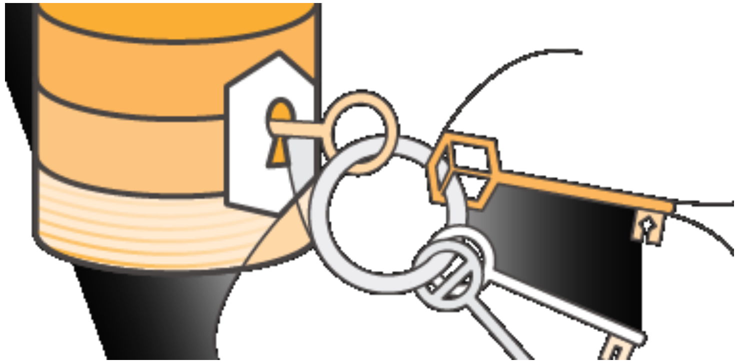
Database traffic encryption with SSL/TLS



Available for all six engines

Encryption At Rest

- DB instance storage
- Automated backups
- Read Replicas
- Snapshots

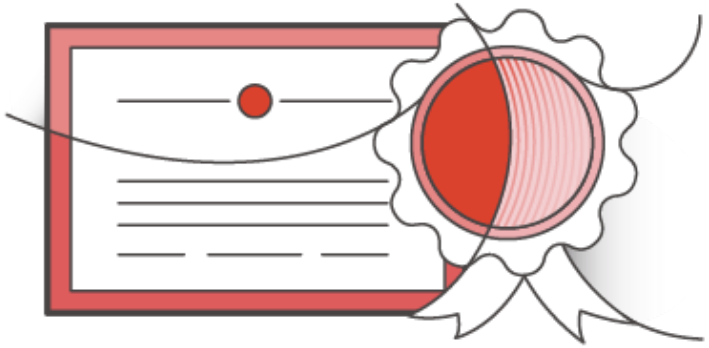


- Available for all six engines
- No additional cost
- Support compliance requirements

Compliance

AICPA Service Organization Control Reports
AICPA
SERVICE ORGANIZATIONS
SOC
aicpa.org/soc
Formerly SAS 70 Reports
®

FedRAMP
Federal Risk Authorization Management Program



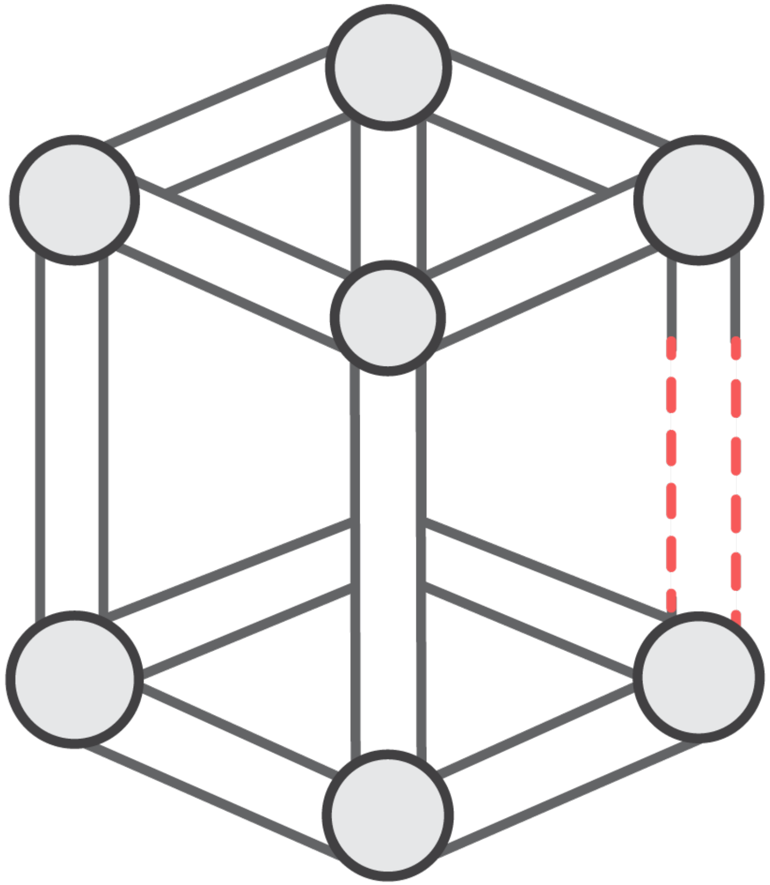
Singapore MTCS

pci
Security
Standards Council
®
PARTICIPATING ORGANIZATION™

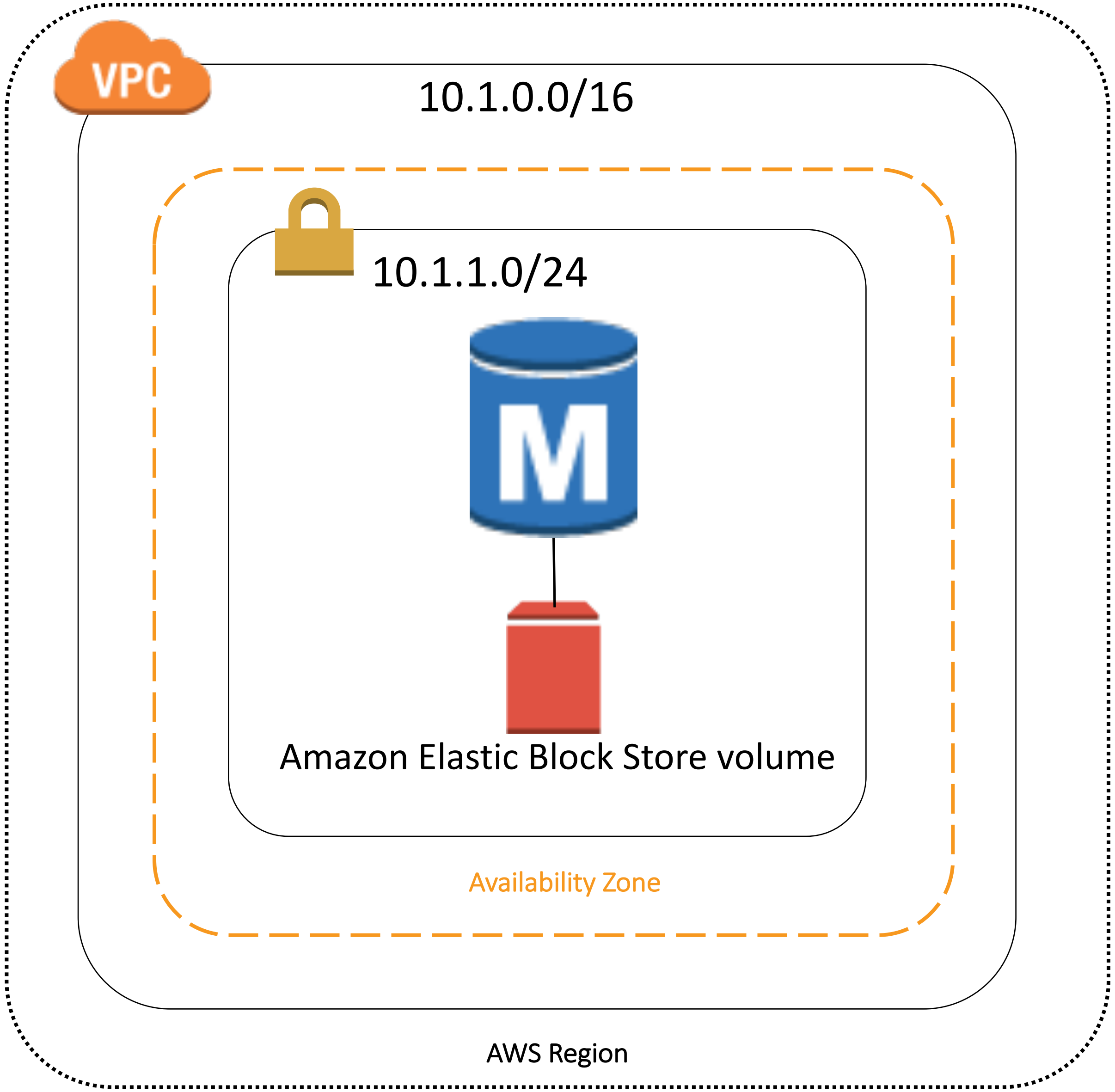
ITAR
Compliant
International Traffic in Arms Regulations

27001/9001
27017/27018

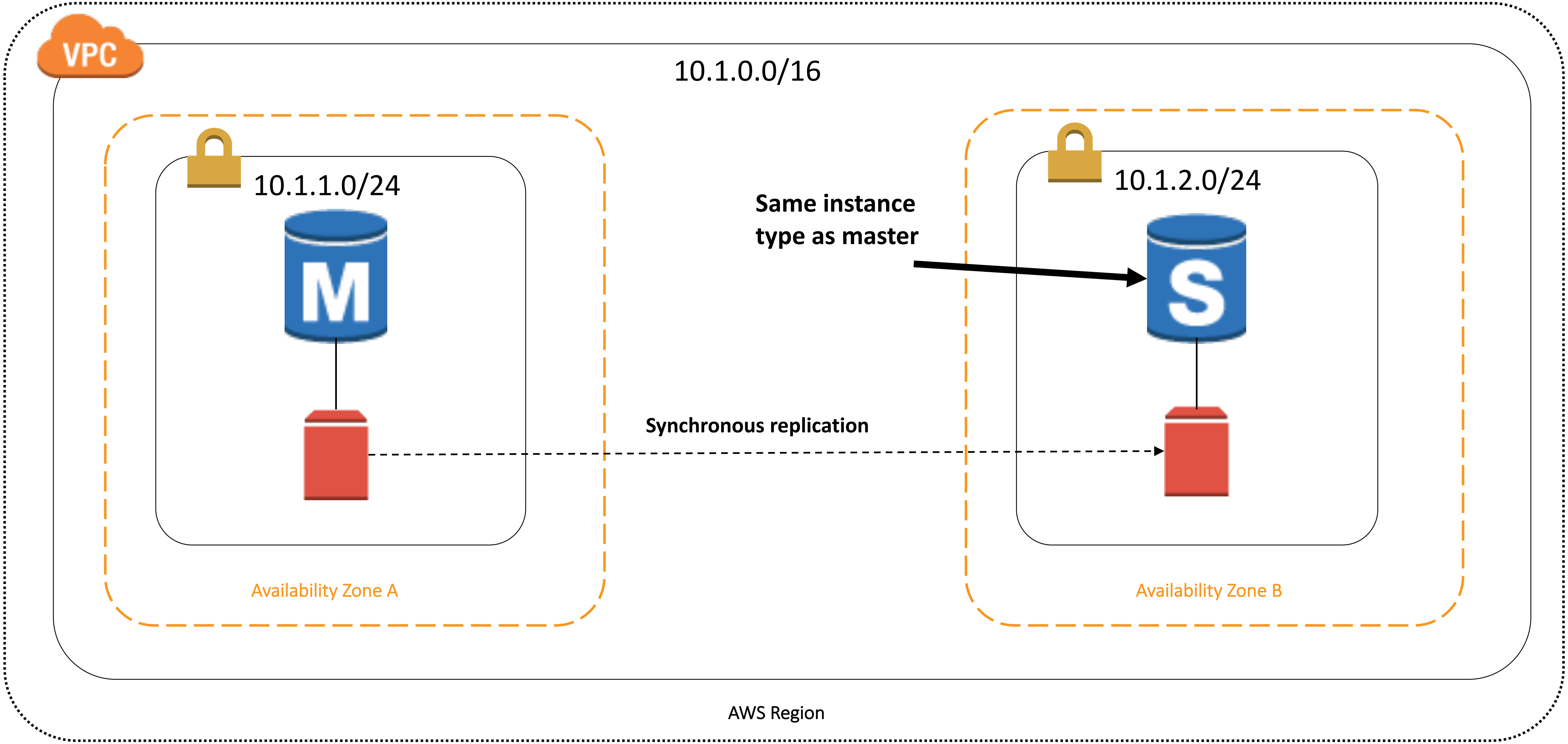
High availability



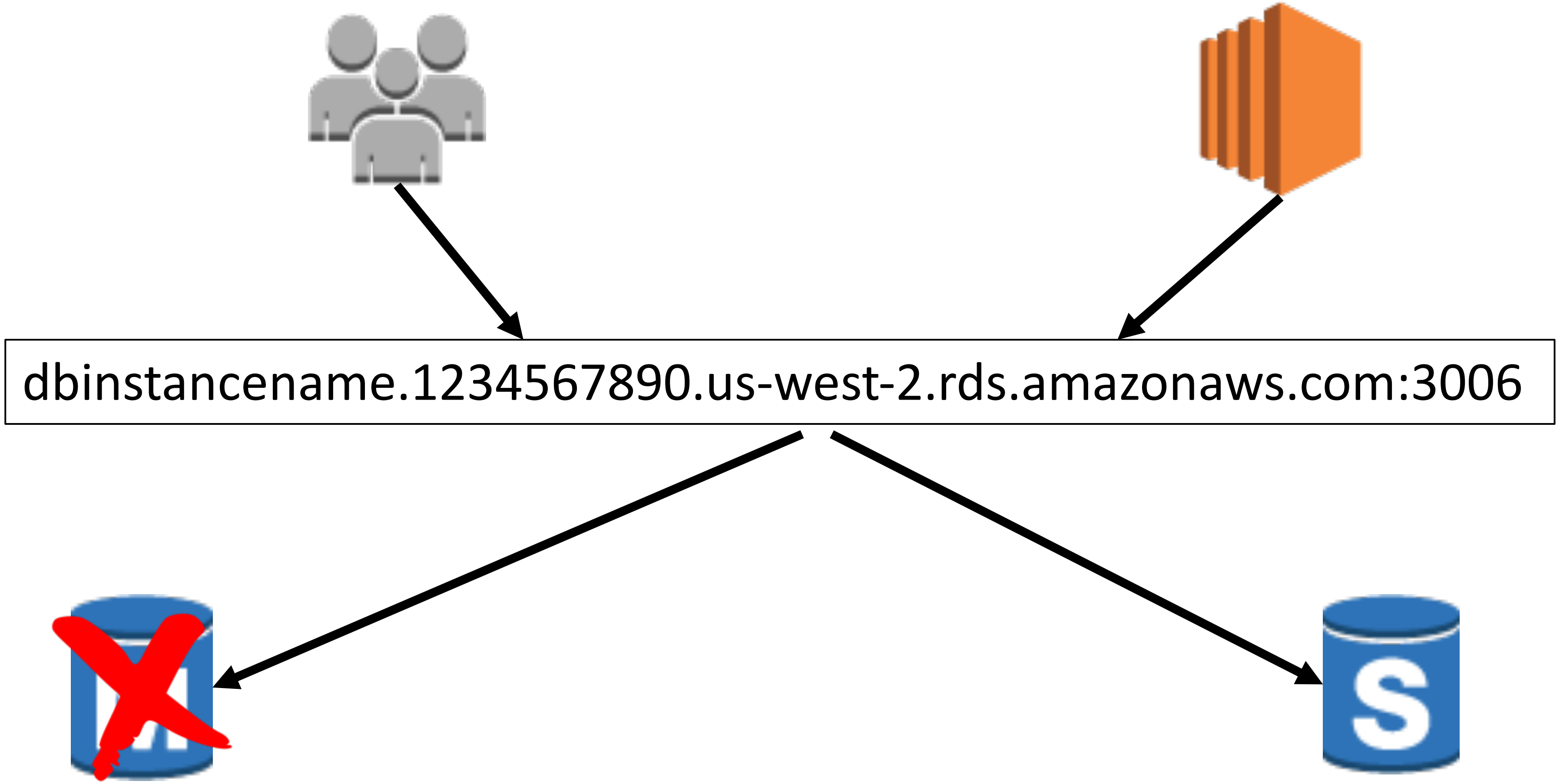
Minimal deployment - Single AZ



High availability - Multi-AZ



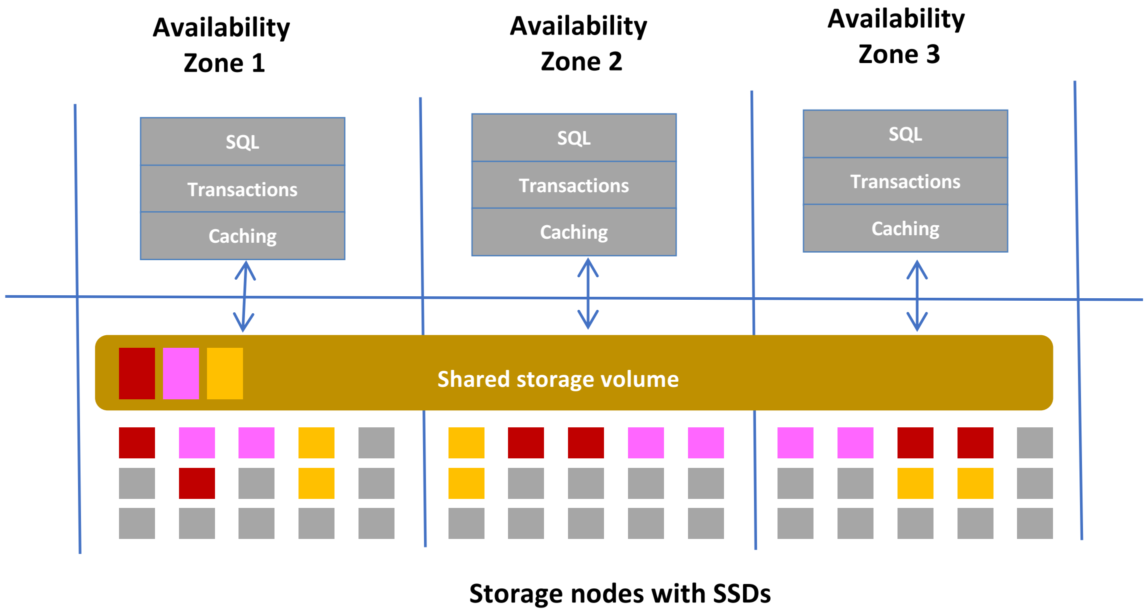
High availability - Multi-AZ to DNS



dbinstancename.1234567890.us-west-2.rds.amazonaws.com:3006

Amazon Aurora - High availability

- Purpose-built log-structured distributed storage system designed for databases
- Storage volume is striped across hundreds of storage nodes distributed over 3 different availability zones
- Six copies of data, two copies in each availability zone to protect against AZ+1 failures
- Plan to apply same principles to other layers of the stack



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The How: Getting onto Amazon Relational Database Service

Database Migrations ??

AWS Database Migration Service (DMS)

easily and securely migrates and/or replicate your databases *and* data warehouses to AWS

AWS Schema Conversion Tool (SCT)

converts your commercial database and data warehouse schemas to open-source engines, Amazon Aurora and Redshift. Converts and loads data warehouse data into Amazon Redshift

We have migrated over 26,000 unique databases using DMS. And counting…

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When: AWS Database Migration Service

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When to use DMS and SCT?

Modernize

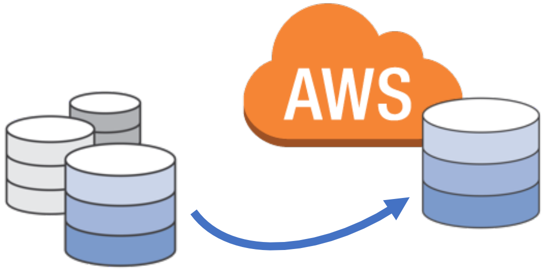
Modernise your database tier –

- Commercial to open-source
- Commercial to Amazon Aurora

Modernise your Data Warehouse –

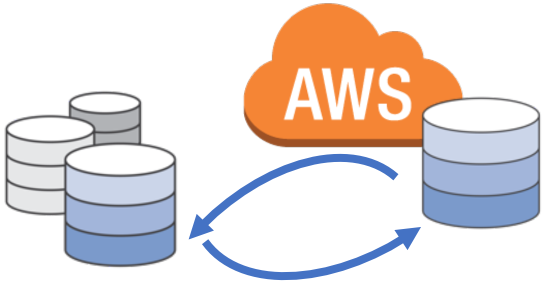
- Commercial to Redshift

Migrate



- Migrate business-critical applications
- Migrate from Classic to VPC
- Migrate data warehouse to Redshift
- Upgrade to a minor version
- Consolidate shards into Aurora

Replicate



- Create cross-regions Read Replicas
- Run your analytics in the cloud
- Keep your dev/test and production environment sync

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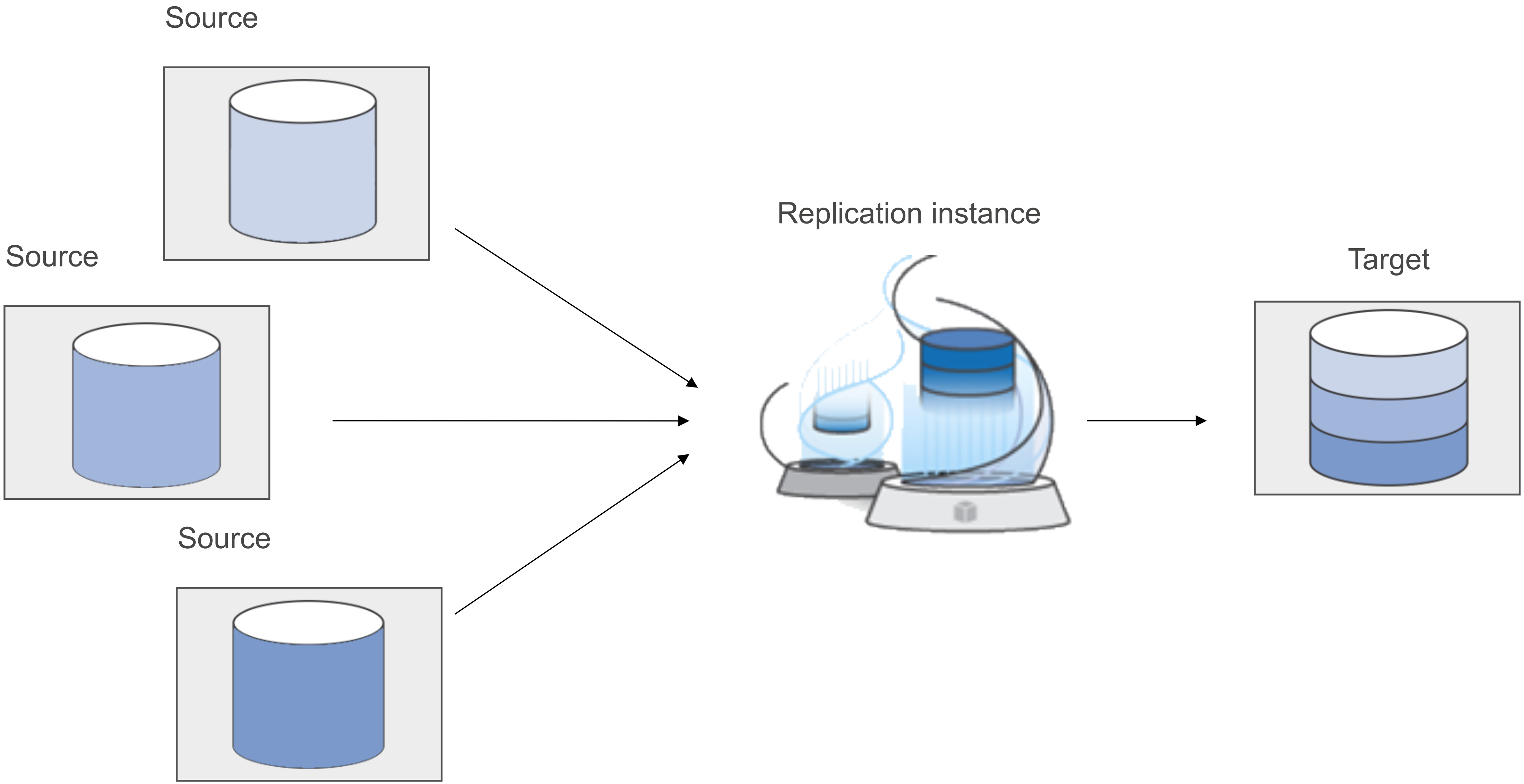
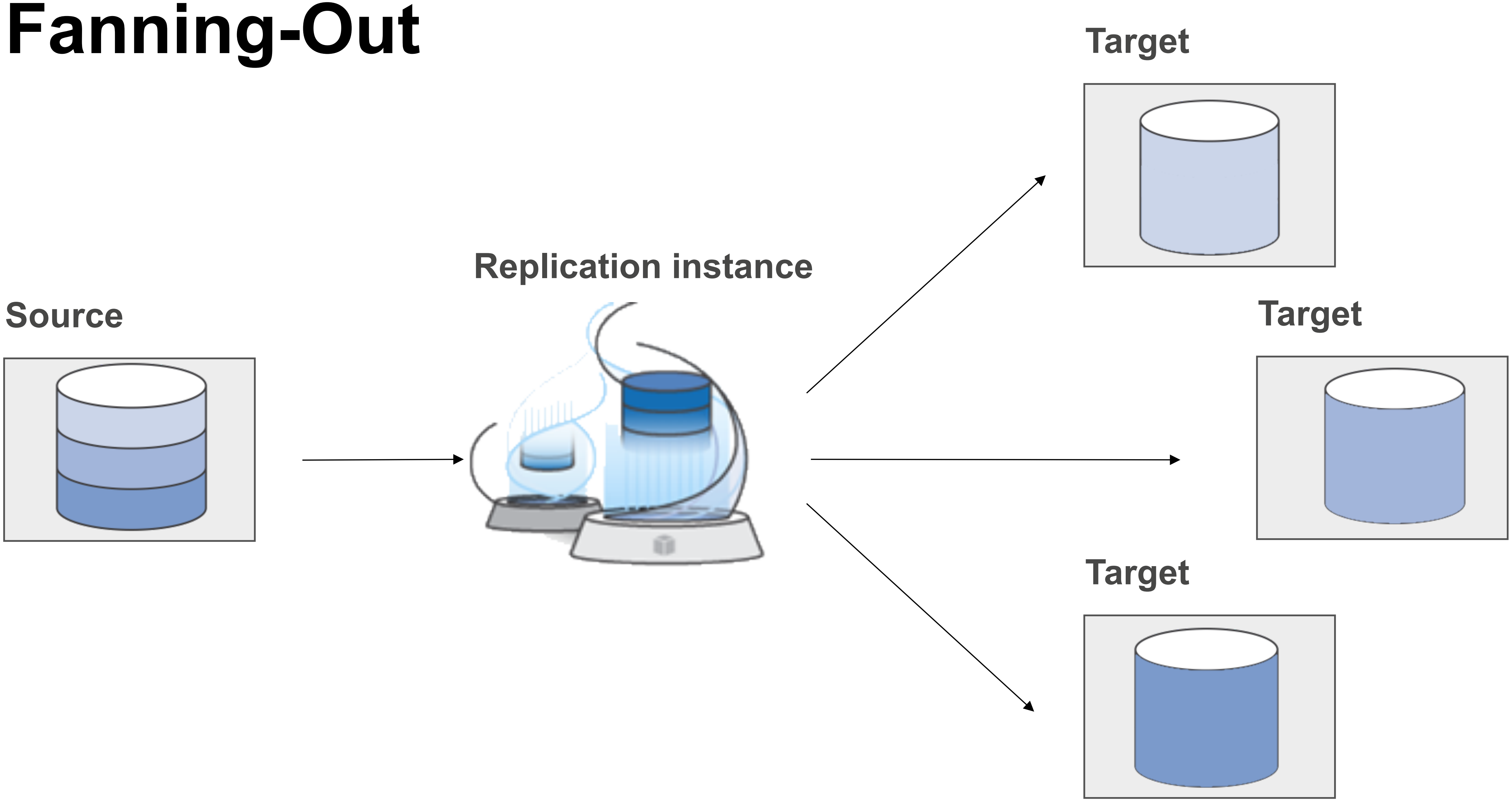
…. But there’s more!

Fanning-In



Fanning-Out



Source

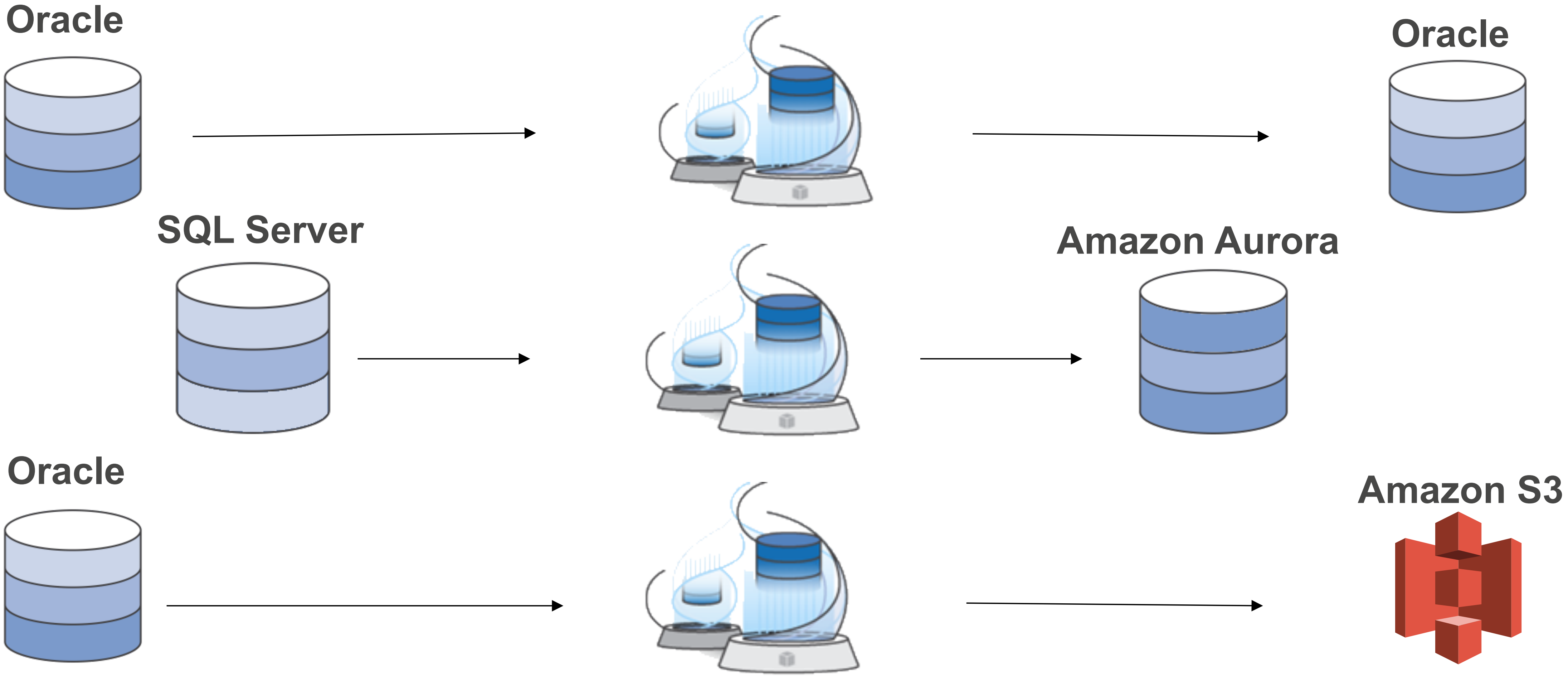
Replication instance

Target

Target

Target

Homogenous or heterogeneous



Oracle

Oracle

SQL Server

Amazon Aurora

Oracle

Amazon S3

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Why: AWS Database Migration Service

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Why use DMS and SCT?

Remove Barriers to Entry

Near-Zero Downtime

Secure

Easy to Use, but Sophisticated…

Allow DB Freedom

I ♥ ☁

Keep a Leg in the Cloud

Cost Effective

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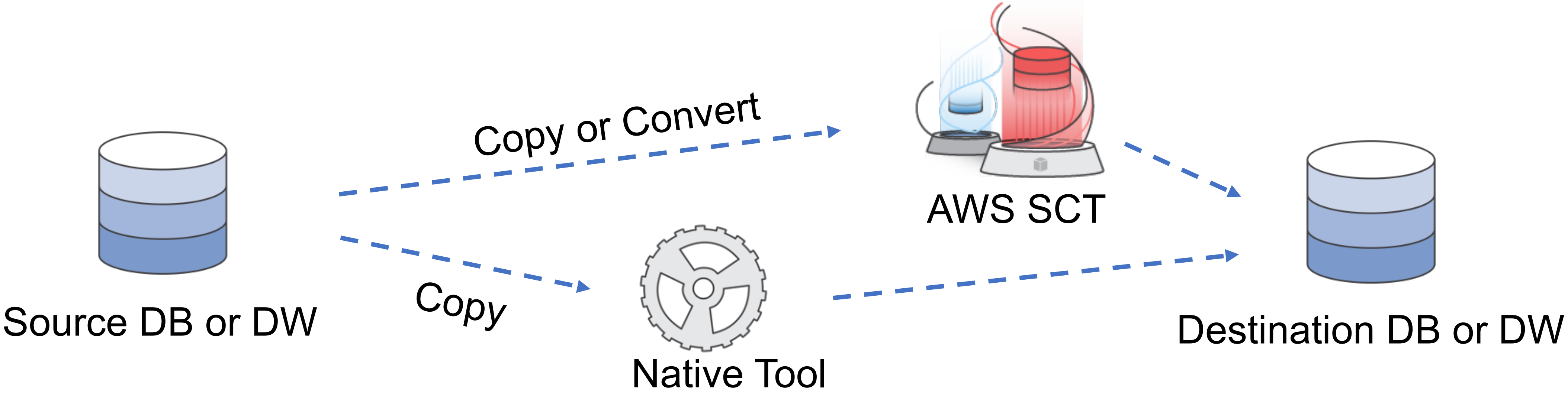
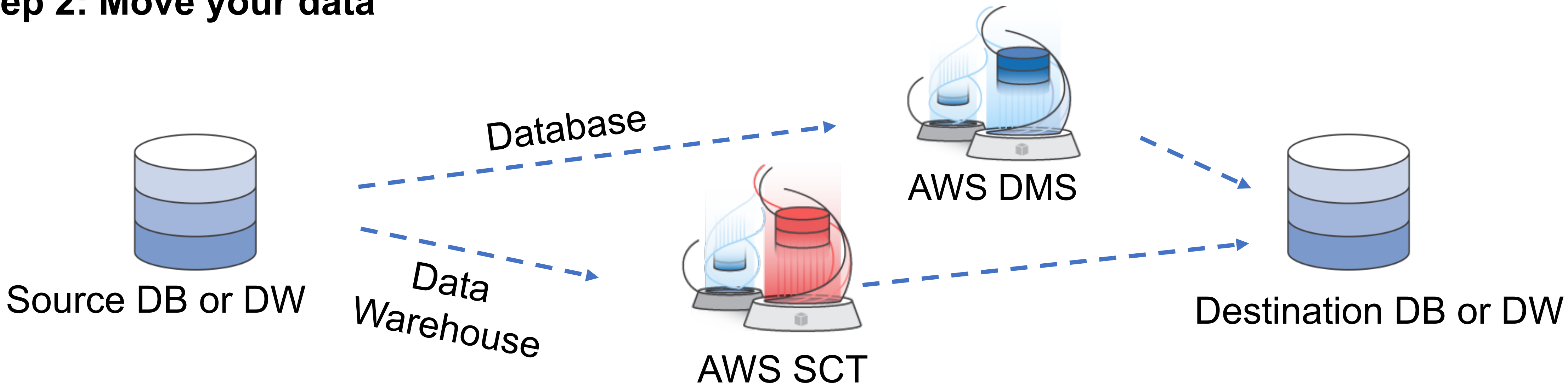
How: AWS Database Migration Service works

Database migration process

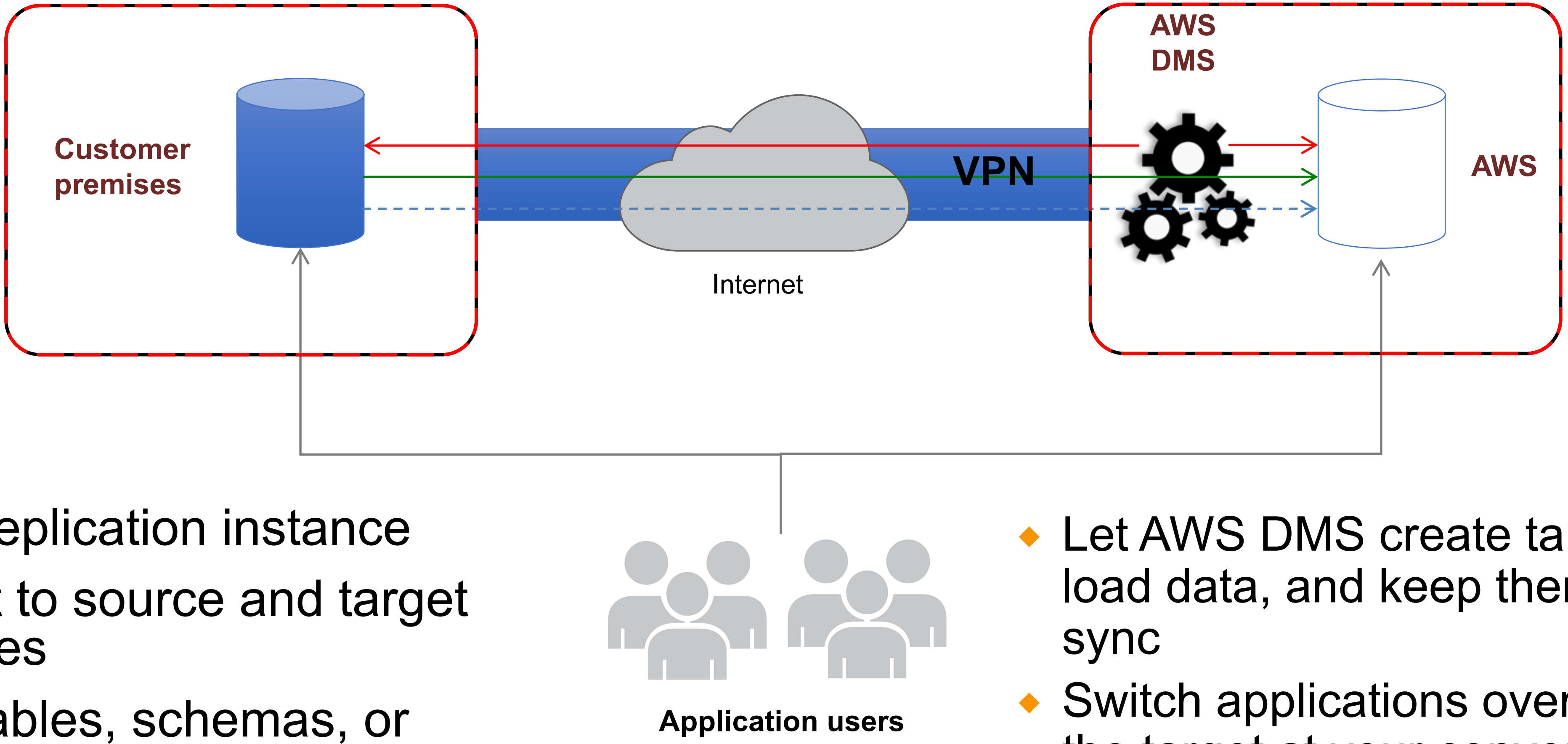
Step 1: Convert or Copy your Schema



Step 2: Move your data



Keep your apps running during the migration



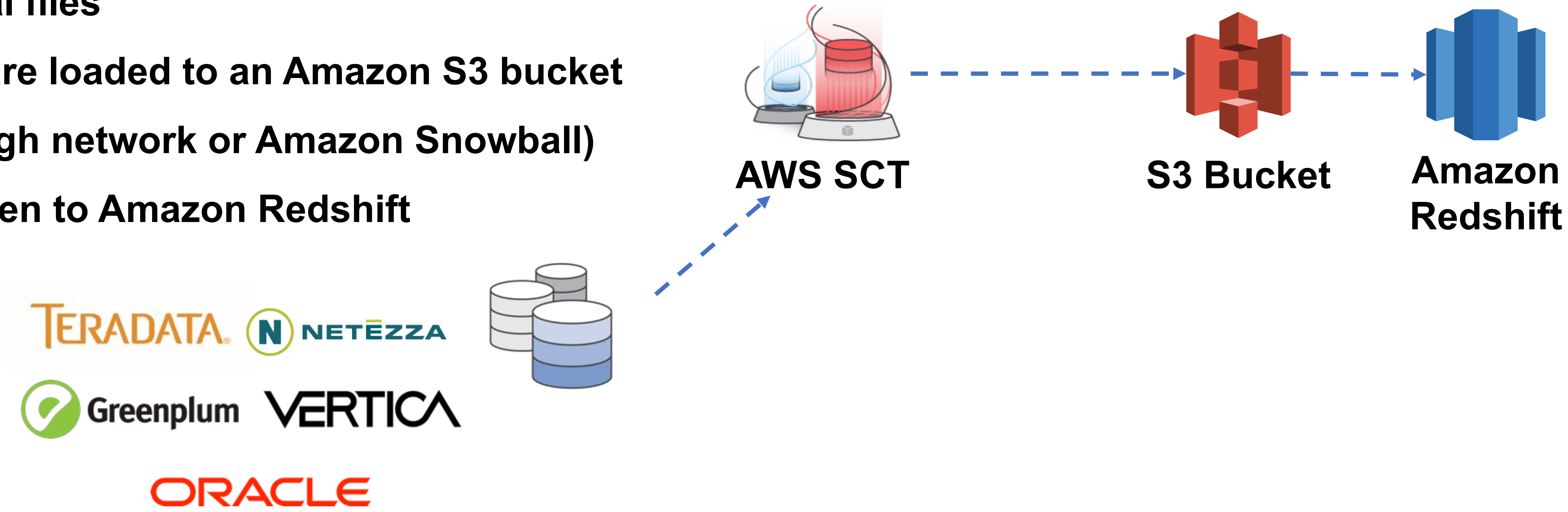
- Start a replication instance
- Connect to source and target databases
- Select tables, schemas, or databases

- Let AWS DMS create tables, load data, and keep them in sync
- Switch applications over to the target at your convenience

New SCT data extractors

Extract Data from your data warehouse and migrate to Amazon Redshift

- Extracts through local migration agents
- Data is optimized for Redshift and Saved in local files
- Files are loaded to an Amazon S3 bucket (through network or Amazon Snowball) and then to Amazon Redshift



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Who: Customer Use Cases

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Who is saying What about DMS and SCT?

Trimble

”The **SCT Assessment Report** was the key enabler to allow us to understand the scope of effort required to **complete an Oracle to PostgreSQL migration**. What was originally thought to be a largely manual task that no one was particularly excited about having to do became a **very straight-forward quick and easy process**."

VenTek International
engineering the future of automated payment systems

"We migrated hundreds of our clients from our in-house data-center to Amazon RDS Oracle 12c using the AWS Data Migration Service (DMS). Due to this service, we could live-replicate the databases between our data-center and RDS before the migration. That kept the migration **down-time to the very minimum**. We are very happy with DMS and are **planning to use it for Oracle to MySQL migration next**”.

Expedia

“We are in the process of migrating some databases to Amazon Aurora. **The ease by which we can do this using the AWS Database Migration Service has simplified this process for us and enabled us to accelerate our migration efforts**. The ability to closely monitor the process, the detailed logging feature, and the support we received from AWS have given us a great deal of confidence in a successful migration.”

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Currencycloud™

Duncan Wren
Head of Infrastructure

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Our migration to AWS

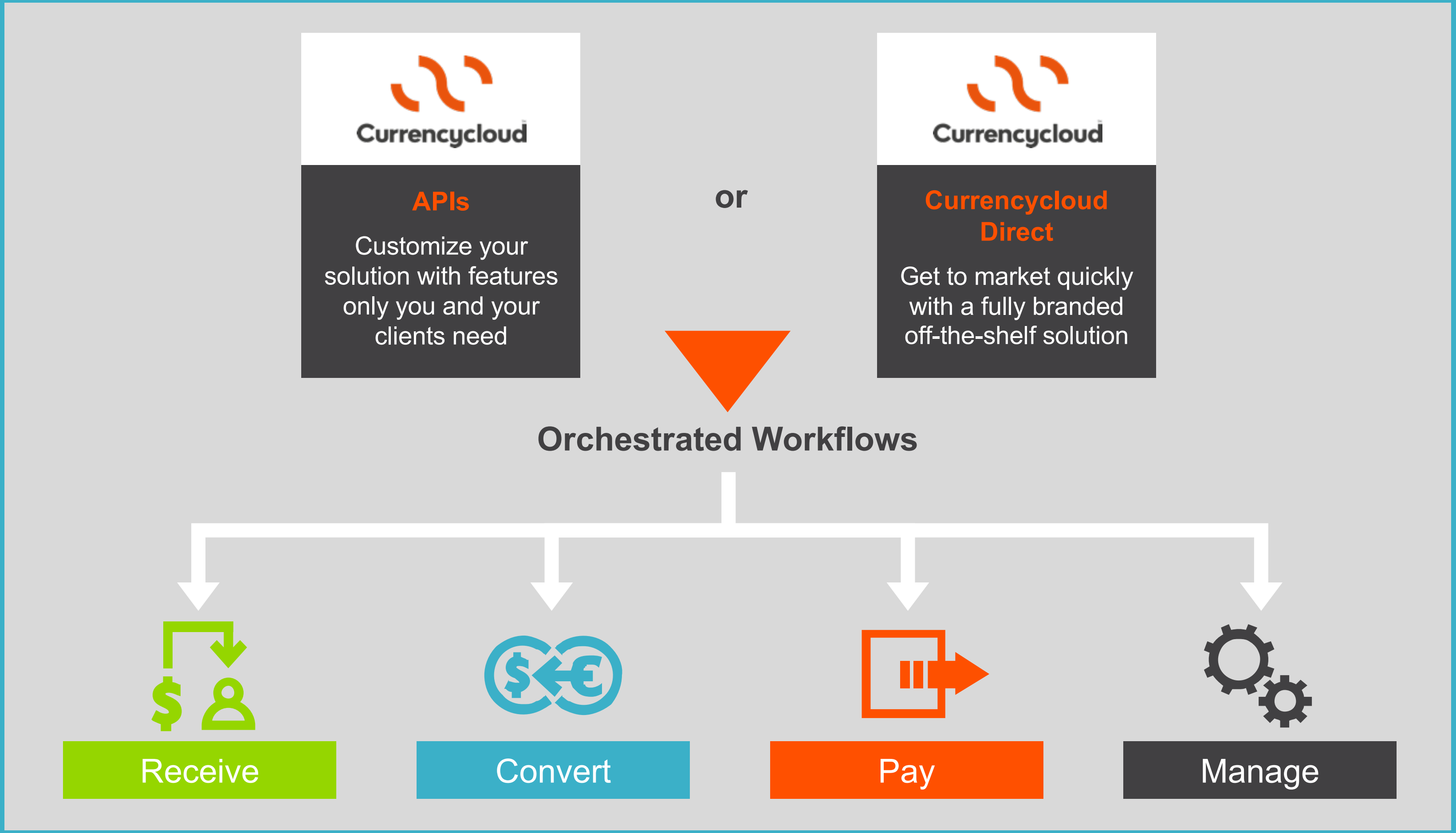
A migration to Aurora using DMS

29/06/2017
Proprietary Information

Currencycloud™

Who are Currencycloud

A complete cross border payment solution



Currencycloud

APIs

Customize your solution with features only you and your clients need

or

Currencycloud

Currencycloud Direct

Get to market quickly with a fully branded off-the-shelf solution

Orchestrated Workflows

Receive

Convert

Pay

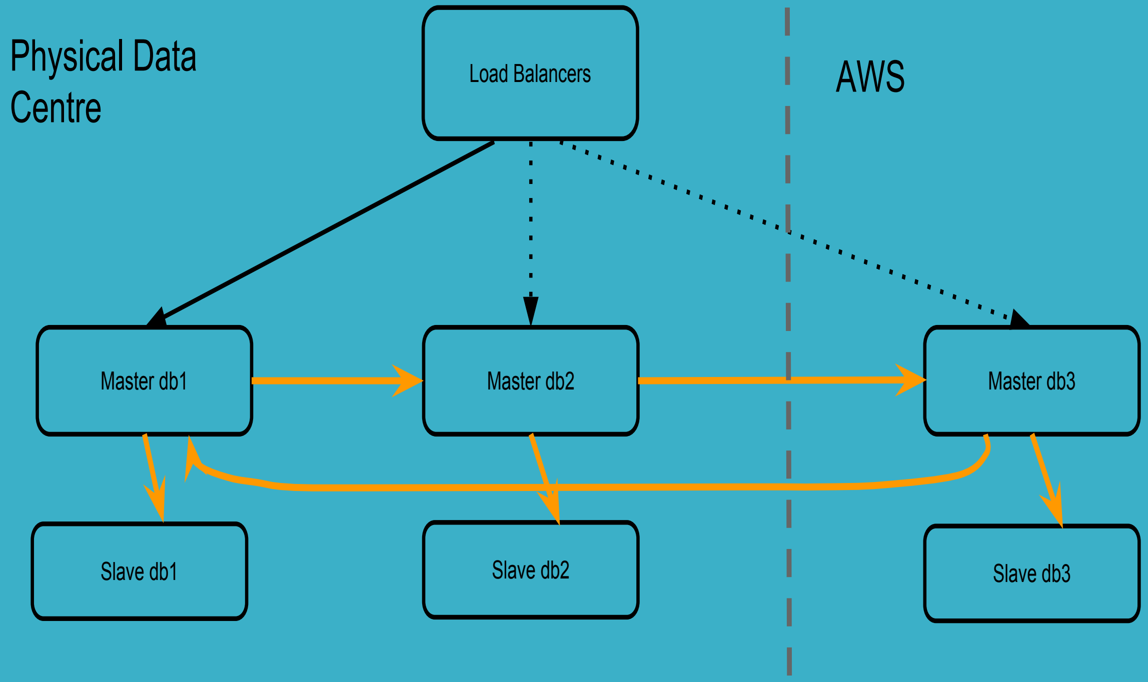
Manage

Our old tech stack

- Ruby, JRuby, TorqueBox, RabbitMQ, Redis, MySQL, Debian
- Apps on a mix of virtual & ec2 servers
- MySQL Databases on physical servers & ec2
- Overly complex multi master mysql replication setup

Why we needed a new approach to the database

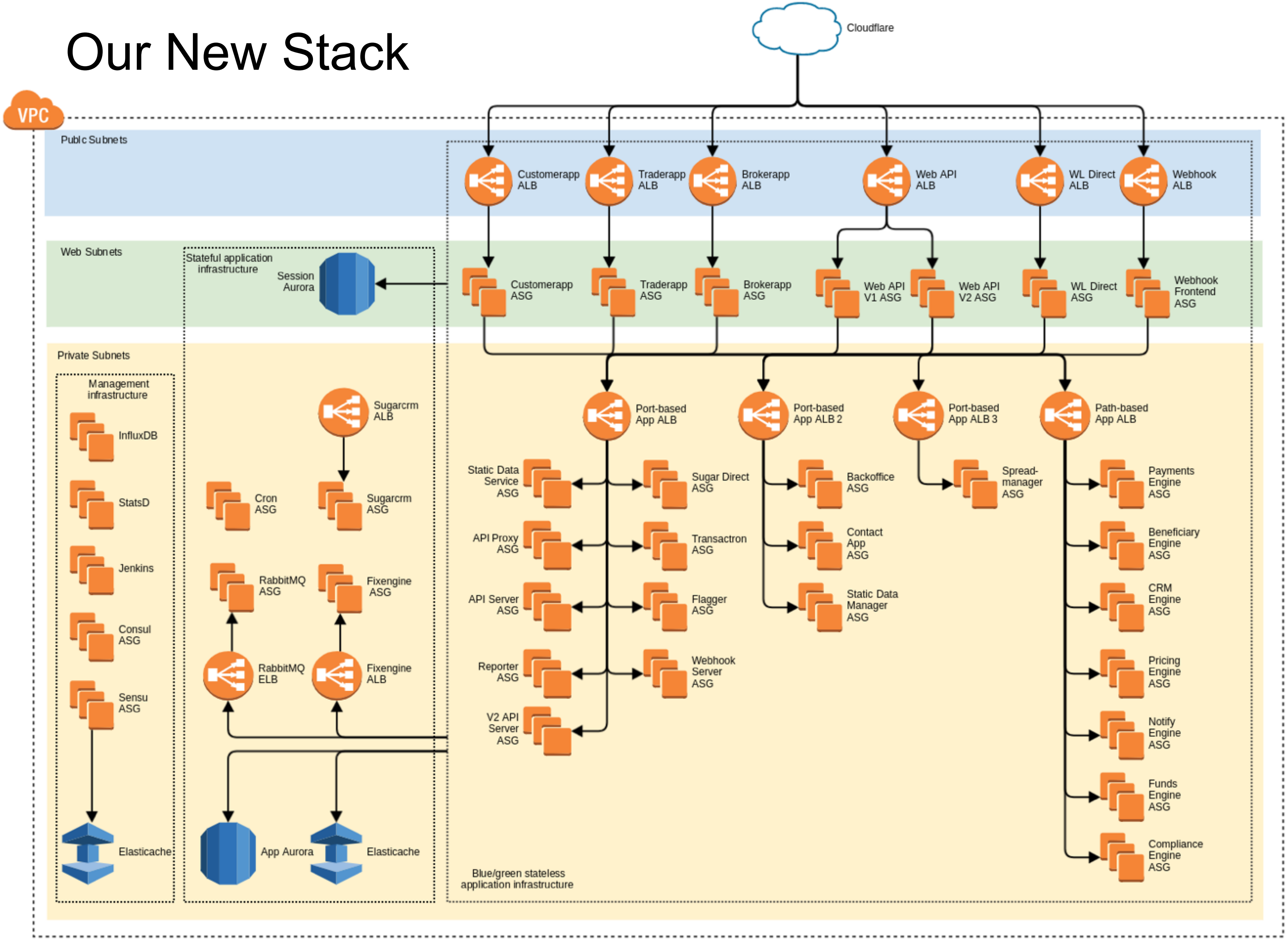
- Multi Master Replication was fragile
- Failover was manual & slow
- We needed simpler db management tools
- We were using large Physical and AWS instances
- Adding capacity was expensive (PIOPs or NVMe storage)



Our Requirements

- Data encrypted at rest and in flight
- Solution needs to be very scalable
- Must be flexible to enable fast changes to system design
- Failover should be automatic & faster
- Use a templated approach to ensure same db configuration is used on different environments

Our New Stack



How we used DMS

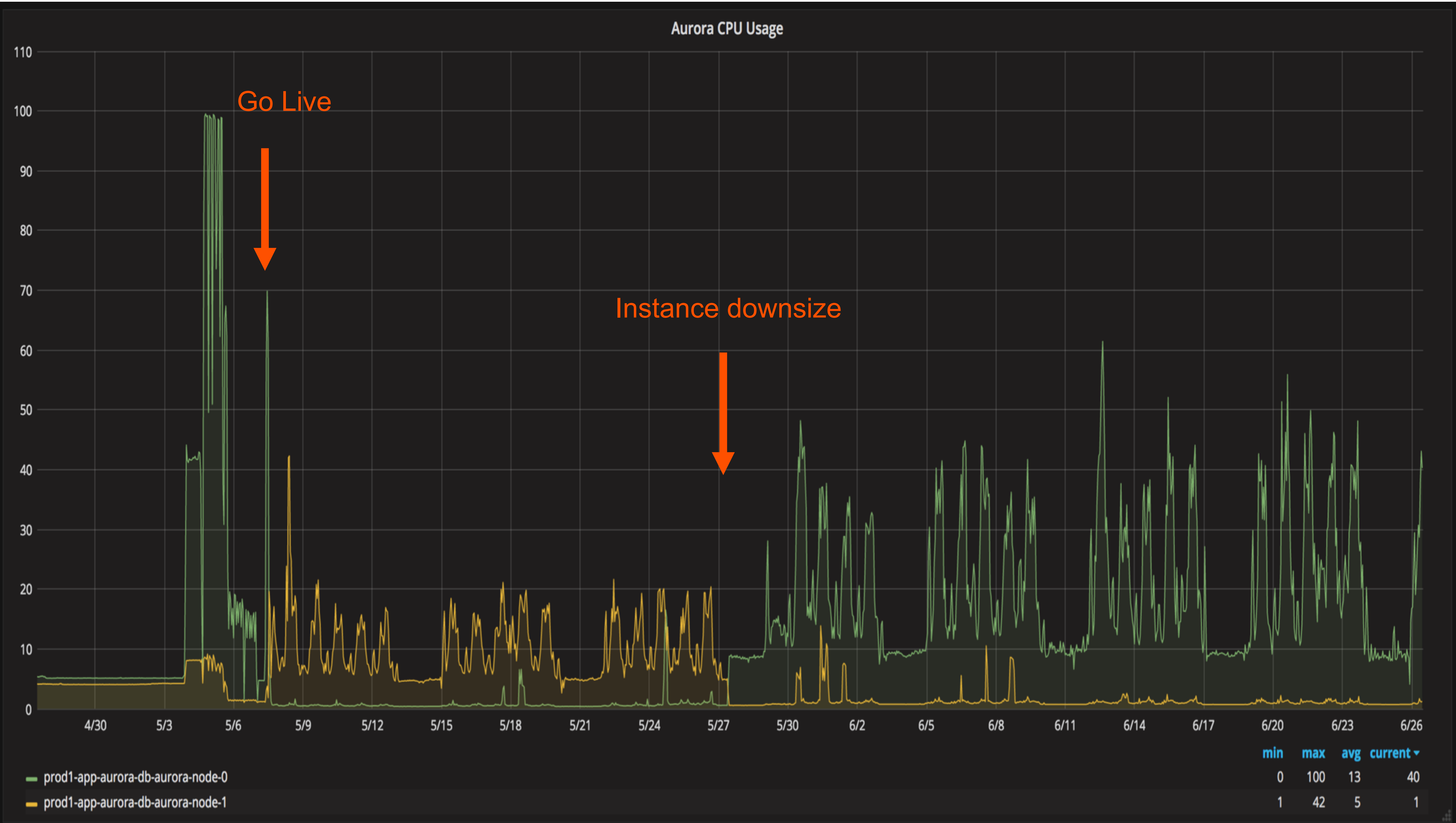
- We used 2 jobs
  - A repeatable snapshot job for testing the new system
  - A continuous job for cut-over to when we migrated
- Dry run before you move Production
- We imported the schema with only minor changes
- Upscale the db source instances for migration to speed things up.

Things we learned

- Monitor DMS job for errors
- Setup cloudwatch on Aurora instances & replication
- Check table character sets
- Talk to a AWS Solutions Architect
- Leverage the experience of a partner
- Don’t try to just lift and shift
- Code changes will be required

Results

- DDL changes are significantly faster
    - E.g 30 mins to 30 secs for alter table
- We have manged to reduce expected DB instance sizes.
- DB running costs are lower than expected
- Failover time’s significantly reduced.
    - ~60 secs from ~30 mins



Aurora CPU Usage

Go Live

Instance downsize

	min	max	avg	current ▾
🟩 prod1-app-aurora-db-aurora-node-0	0	100	13	40
🟨 prod1-app-aurora-db-aurora-node-1	1	42	5	1

Next steps

- Lots more schema changes to optimize the data storage structure.
- This is expected to further improve our performance on known slow queries
- Further usage of read replicas
- Which should result in instance size reductions
- Then we will move some machines to Reserved Instances

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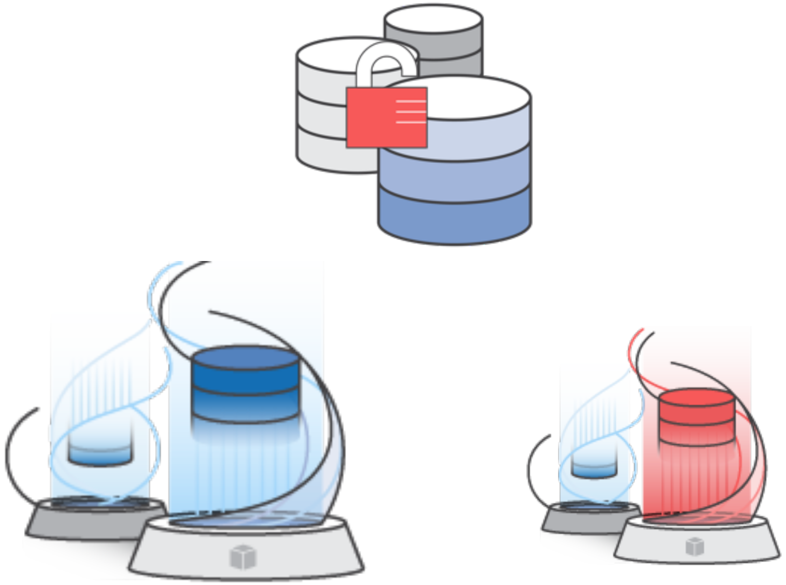
Wrapping up

Recap



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Minimal Operational Overhead

Reliable, Scalable and Secure deployments

Consistent Migrations

AWS database migration partners

clckwrk

COREXPERT

slalom

TRIANZ℠
Execution Matters.

DATAPIPE

KNOWARTH
DELIVERING EXCELLENCE

logicworks

apps
associates
extreme expertise

iTMethods.

Cloud Innovator
MZ MEGAZONE

DB BEST
TECHNOLOGIES

TriNimbus
Cloud Management Solutions

BRLink

BigData©
Systems

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2ND WATCH

REĀN
CLOUD

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