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DAT325

Managed Oracle Databases with Amazon RDS: New features & best practices

Michael Barras (he/him)

Principal Database SA
Amazon Web Services

Manish Mohite

Head of Cloud Engineering
Jefferies

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Agenda

Amazon RDS for Oracle new features

Amazon RDS Custom for Oracle new features

Choosing the right solution for Oracle Database workloads

Customer content: Jefferies' experience with Amazon RDS Custom for Oracle

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POLL: How many times have you attended re:Invent previously?



- 0: First-timer
- 1–2: Happy to be back
- 3–5: Frequent guest
- 5+: Expert re:Invent attendee

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Amazon RDS

Managed relational database service with a choice of popular databases

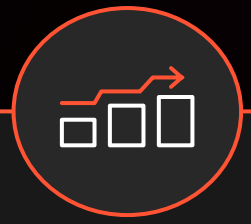
Amazon Aurora | MySQL | PostgreSQL | MariaDB | Microsoft SQL Server | Oracle

Easy to administer



- No infrastructure provisioning
- No software installation and patching
- Built-in monitoring

Performant and scalable



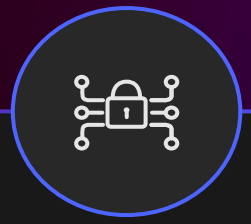
- Scale with an API call or a few clicks
- Read replicas for increased throughput

Available and durable



- Automatic Multi-AZ data replication
- Automated backup, snapshots, and failover

Designed to enable security and compliance

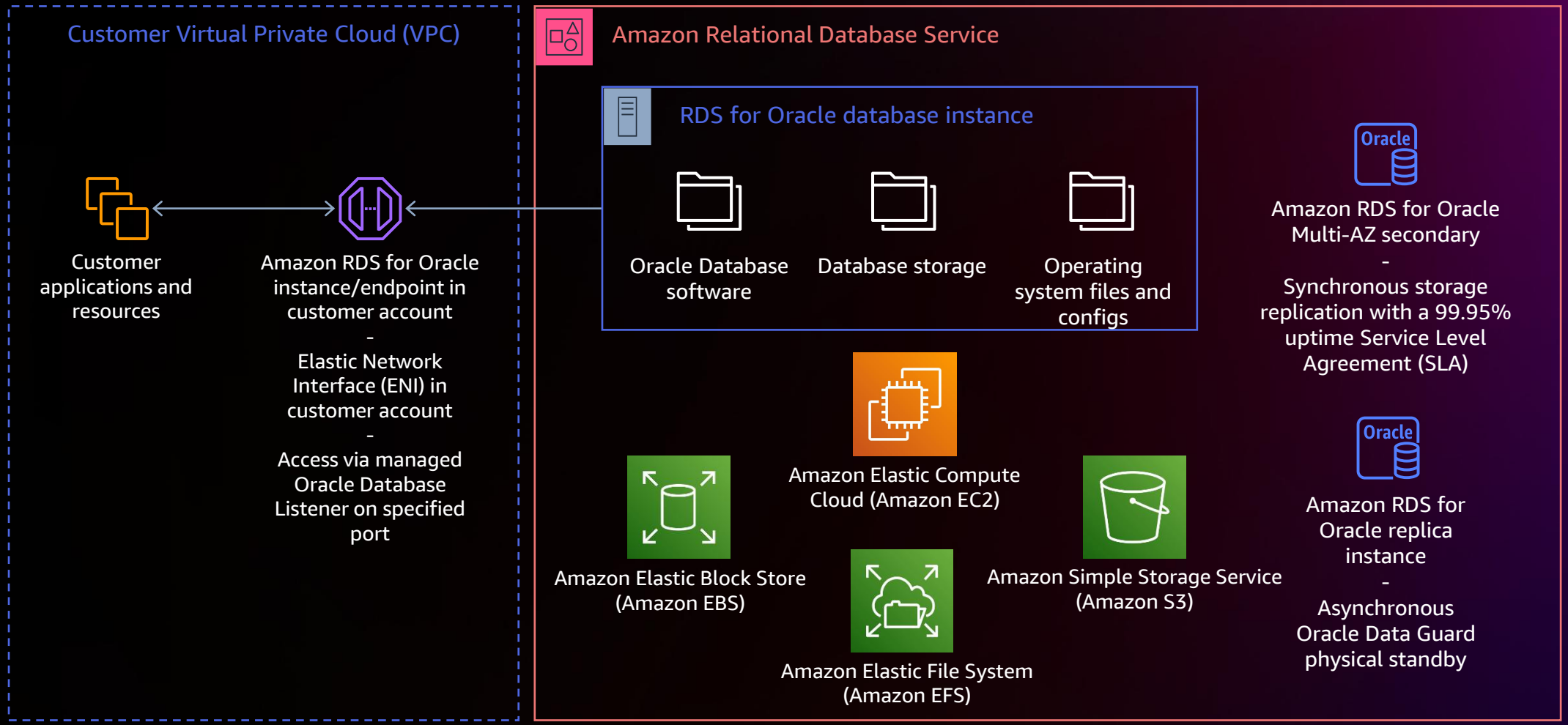


- Encryption at rest and in transit
- Network isolation and resource-level permissions

39% lower database operation costs

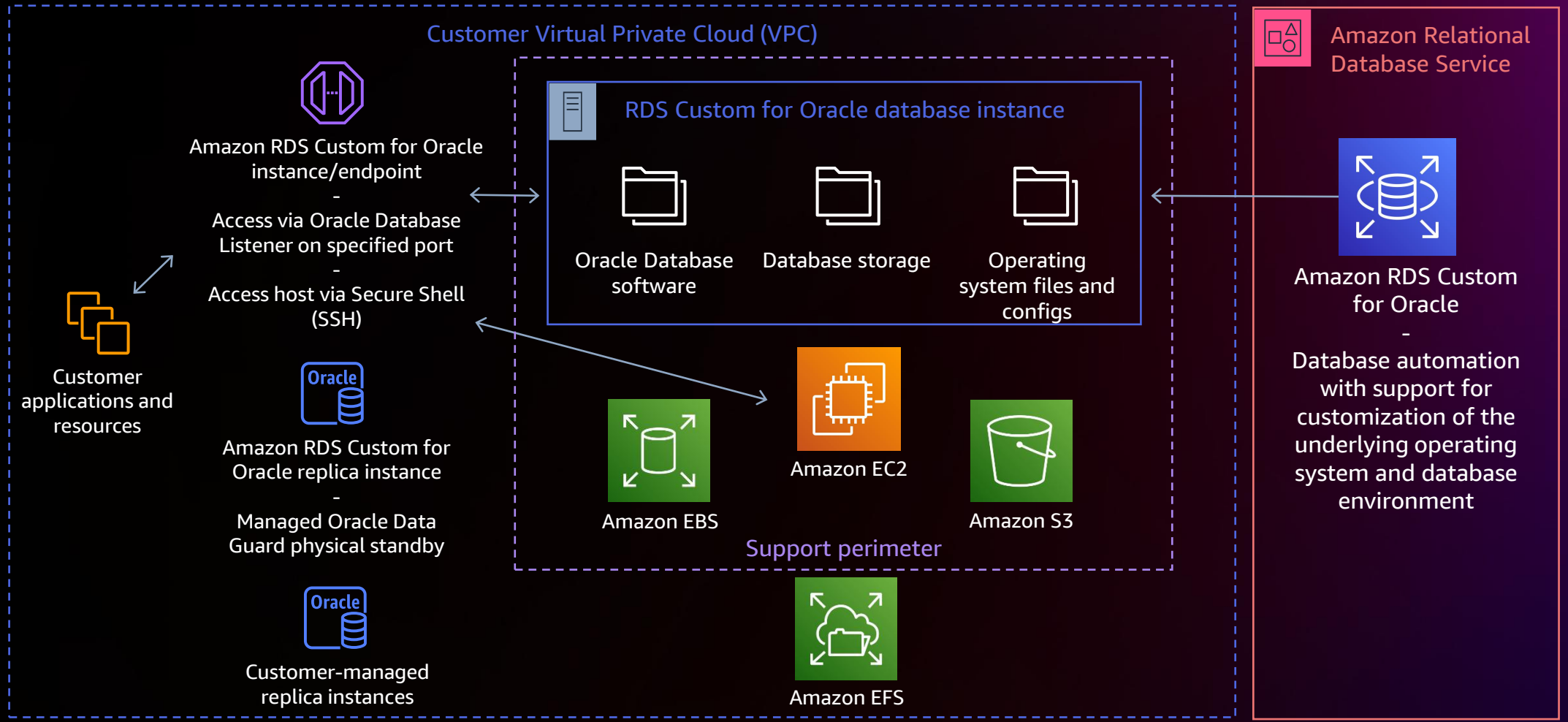
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Amazon RDS for Oracle



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Amazon RDS Custom for Oracle



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POLL: Which best describes your current experience running Oracle Database workloads on AWS?

- New to AWS and just getting started
- Self-managing lift-and-shift workloads on Amazon EC2
- Running most workloads on Amazon RDS for Oracle
- Modernizing workloads to Amazon Aurora, Amazon RDS open source, or other purpose-built databases

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Amazon RDS for Oracle new features

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RDS for Oracle database versions

Major Versions

Run the latest versions of Oracle Database

19c
21c

Version deprecations

- Based on Oracle Support end dates (MOS note 742060.1)
- Bring-your-own-license (BYOL) customers require support, including Extended Support (ES) where appropriate

March 31, 2022	**12.2.0.1 deprecated**
July 31, 2022	**12.1.0.2 deprecated**
April 30, 2024	19c end of Premier Support 21c deprecated (end of support)
April 30, 2025	19c end of fee-waived ES
April 30, 2027	19c deprecated (end of ES)

Minor versions

Stay up to date with quarterly security and bug fixes from Oracle
Required for customers using Oracle JVM

Oracle Release Update (January, April, July, October)
DST and additional patches (see Release Notes)
New RDSADMIN features and bug fixes

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RDS for Oracle option versions

Oracle Enterprise Manager Cloud Control Agent

- RDS-managed agent connects to customer-managed Oracle Management Server (OMS)
- Agent only has database access

12.1.0.4, 12.1.0.5
13.1, 13.2, 13.3, 13.4, 13.5

See documentation for additional details and requirements

Oracle Application Express (APEX)

- Low-code application development
- Application components customer-managed on EC2
- Upgrades automated by RDS

19.1, 19.2
20.1, 20.2
21.1, 21.2, 22.1

Oracle Database 21c supports APEX 21.1 and later

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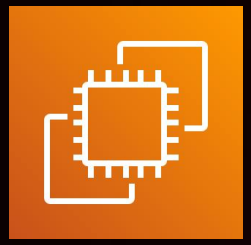
RDS for Oracle database instance types

Managed infrastructure

- Selection of recent-generation instance types ideal for database workloads
- Operating system configured for Oracle workloads and kept up to date
- Storage, networking, new instance capabilities tested and managed by RDS



Amazon RDS



Amazon EC2

Customer choice

- Balance vCPU, memory, and storage bandwidth requirements
- Right-size based on workload
- Change whenever you want with a quick failover with Multi-AZ
- Save money with Reserved Instances

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RDS for Oracle database instance types

Burstable Cost-effective instances for dev/test, burstable workloads	T3	Latest burstable family
General purpose Production workloads with balanced CPU and memory (4 GiB : 1 vCPU)	M5, **M6i** **M5d**	Latest general purpose family Adds local storage for TEMP and flash cache
High memory • More memory (8:1, up to 32:1) and I/O bandwidth per vCPU for data-intensive workloads • Choose memory-optimized instance types (BYOL) to choose the vCPU:memory (up to 64:1) configuration that suits your workload	R5, **R6i** R5b **R5d** **X2idn** **X2iedn** **X2iezn**	Latest memory-optimized family Adds 2-3x storage bandwidth (up to 2 GiB/s) Adds local storage for TEMP and flash cache High RAM (up to 2 TiB) and storage bandwidth Higher RAM (up to 4 TiB) and storage bandwidth High-frequency CPU

b = block storage optimization; d = instance store volumes; e =extra memory; i = Intel processors; n = network optimization; z = high frequency processors

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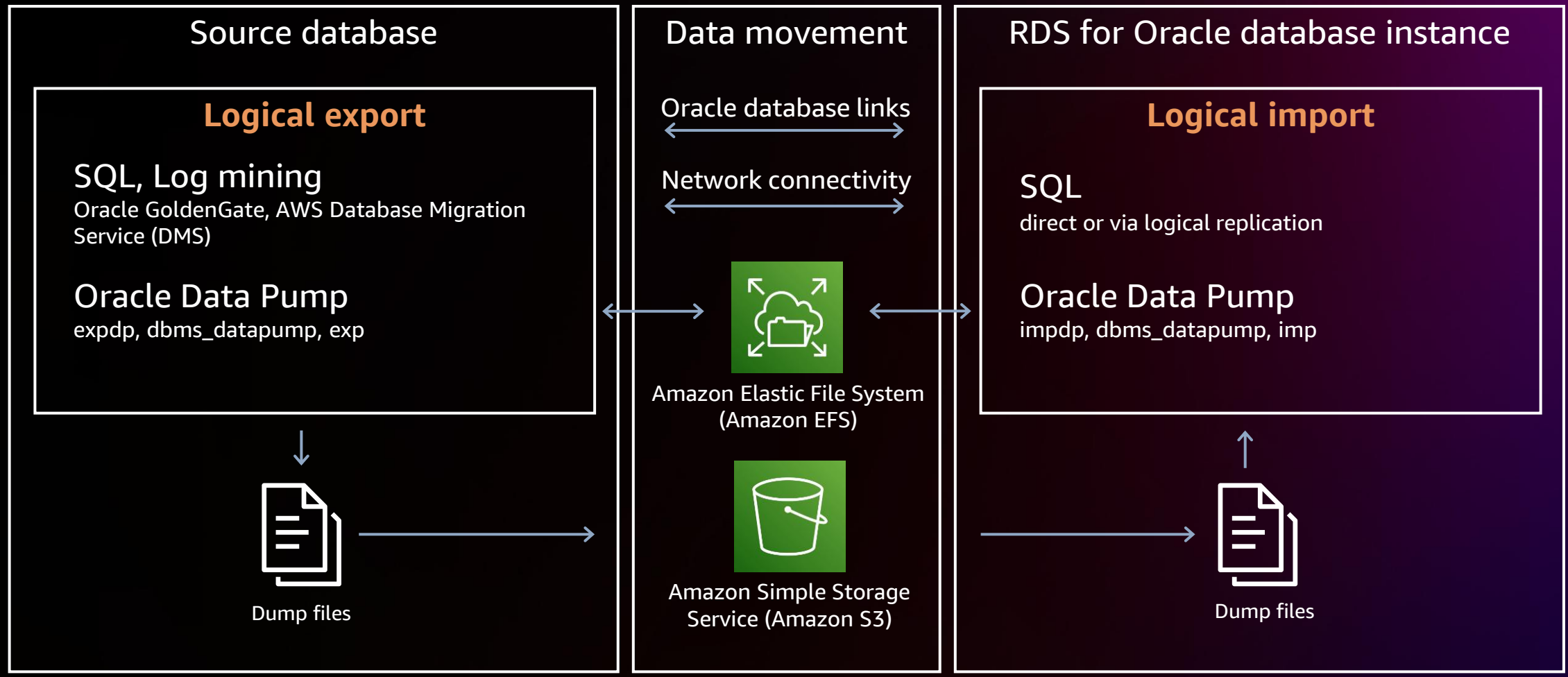
RDS for Oracle network and configuration

TCP/IP networking Software-defined networking and secure connectivity to on-premises with Amazon Virtual Private Cloud (VPC)	IPv4 **IPv6** (dual stack) Requires VPC and all subnets in associated subnet group have IPv4+IPv6 CIDR
Oracle SQL*Net configuration Listener and network configuration fully managed Set SQL*Net parameters, enable SSL/TLS or Native Network Encryption (NNE)	Use "**ALLOW_WEAK_CRYPTO**" option settings to block (FALSE) or allow (TRUE; Oracle's default) use of outdated cryptographic algorithms on the client or server with Native Network Encryption (NNE) Set "**remote_listener**" database parameter to proxy connections using customer-managed Oracle Connection Manager (CMAN)

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Data migration with RDS for Oracle



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Data migration with RDS for Oracle

New - Amazon Elastic File System (EFS) support

- Attach an EFS volume in your account to multiple EC2 and RDS Oracle instances
- Load data into/out of database without allocating extra RDS instance storage
- Easily share data between database and application servers



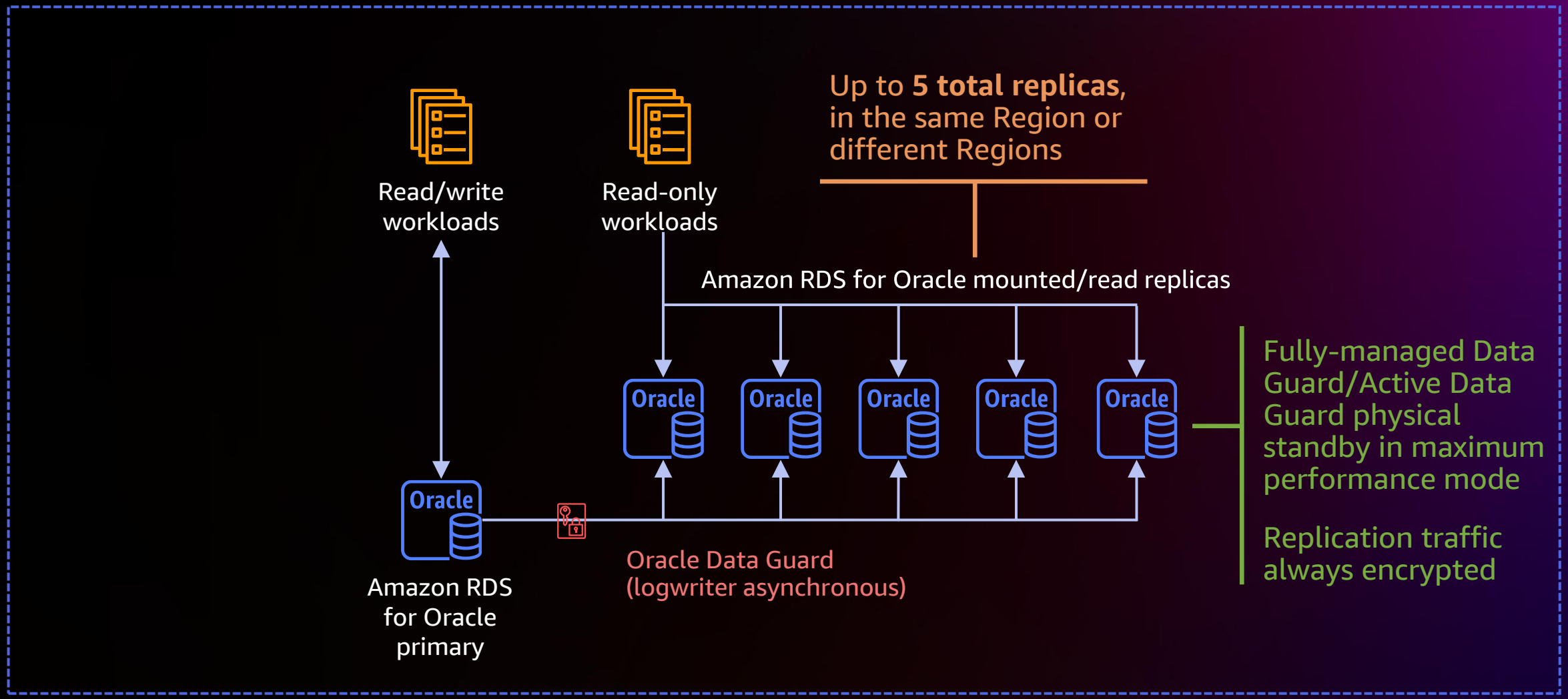
Amazon Elastic File System (Amazon EFS)

- Petabyte-scale NFS storage
- Designed for four 9s (99.99%) availability and eleven 9s durability

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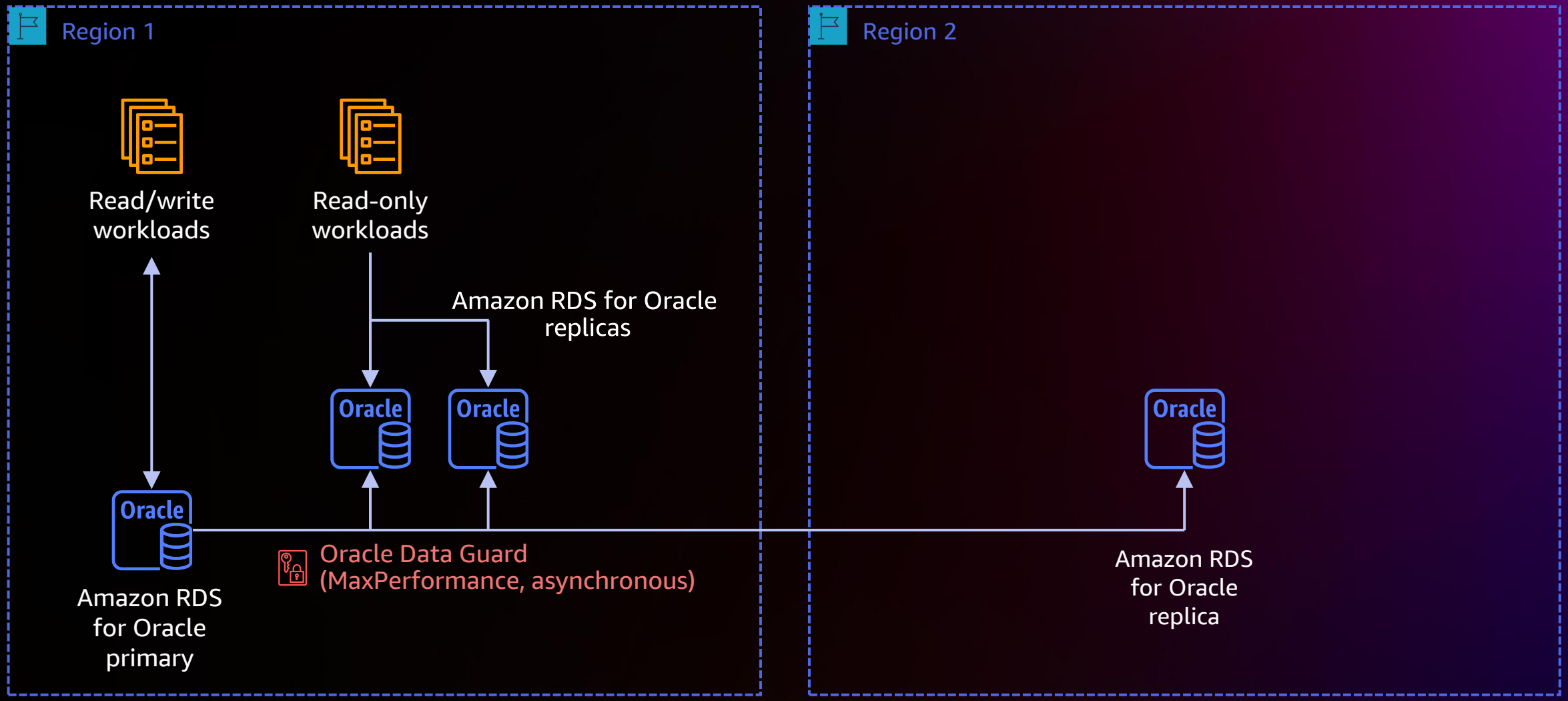
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Amazon RDS for Oracle replicas



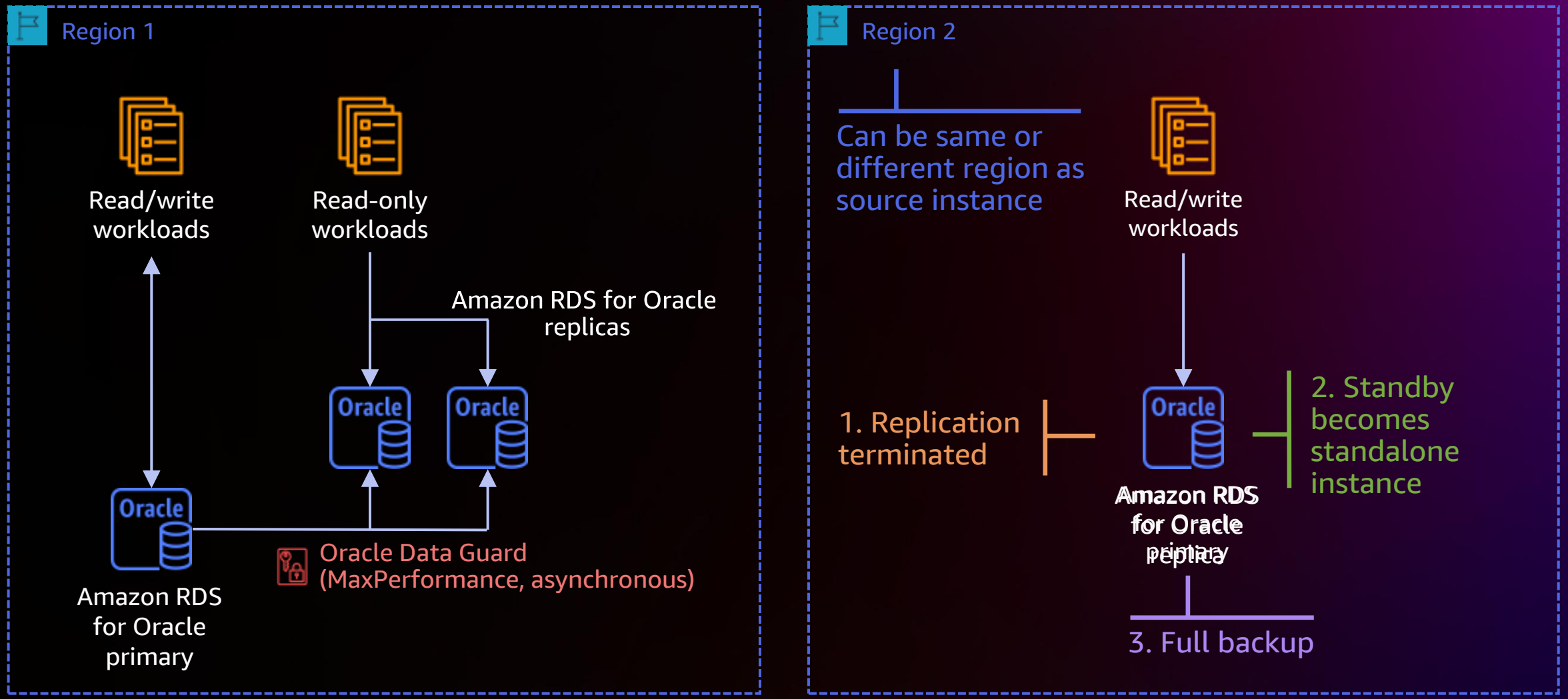
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RDS for Oracle replica promotion



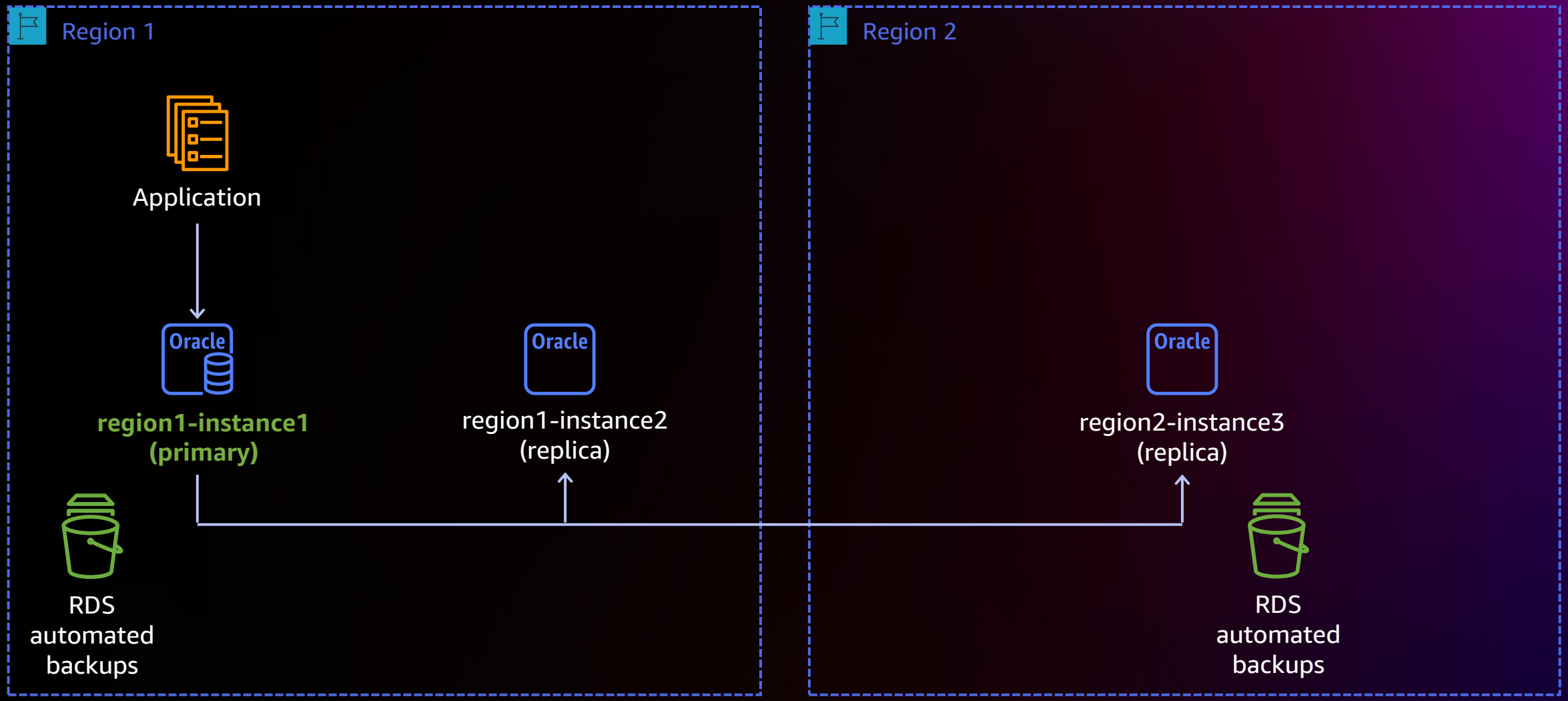
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RDS for Oracle replica promotion



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New - RDS for Oracle automated backups



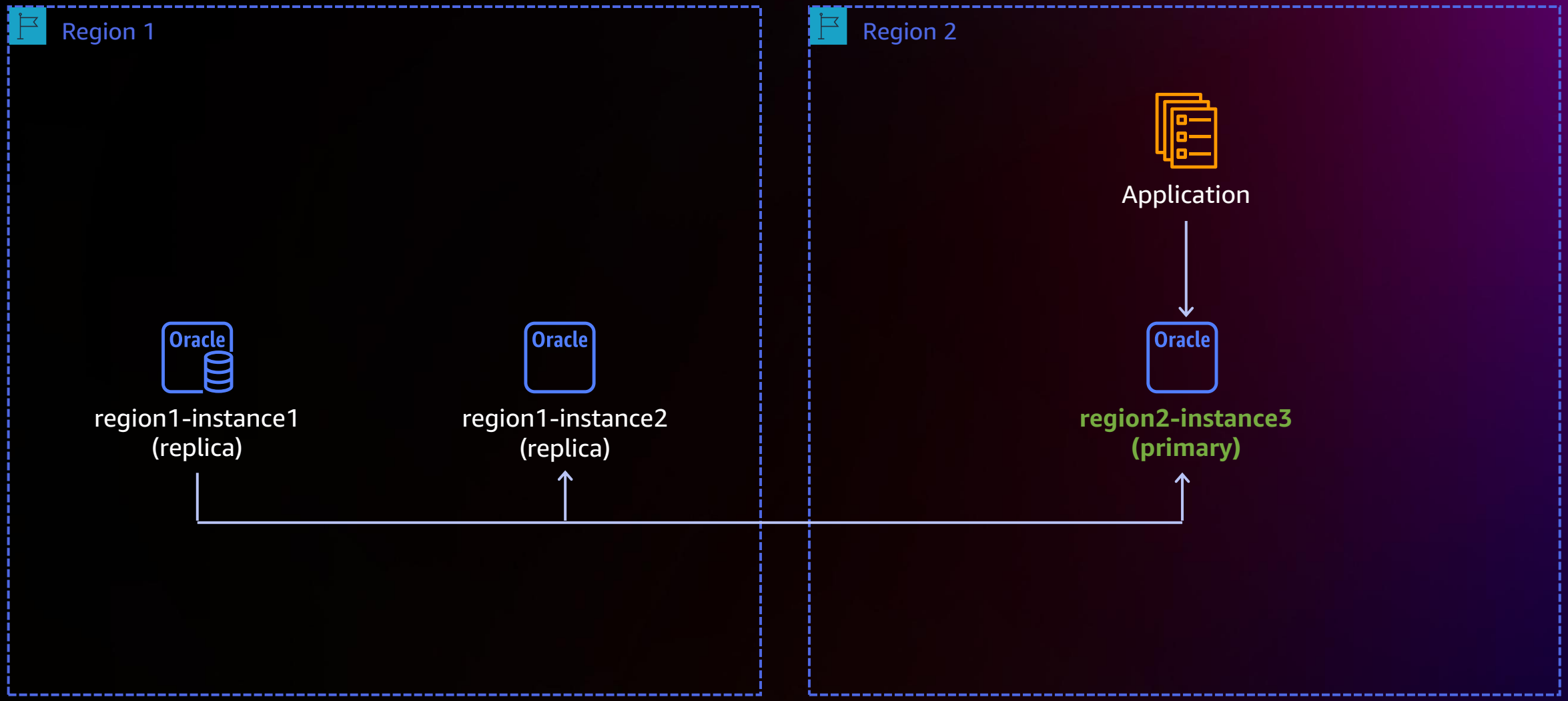
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New - RDS for Oracle replica switchover



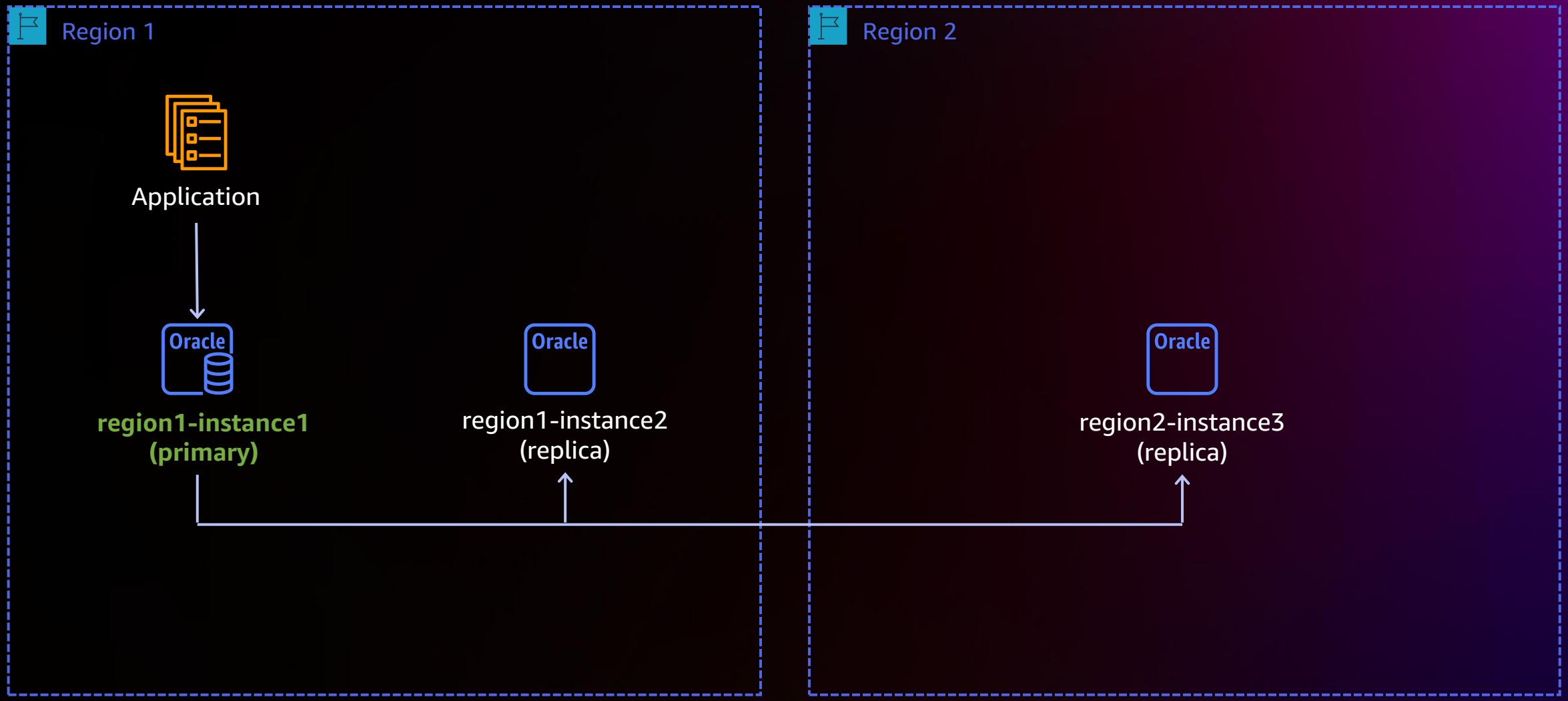
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RDS for Oracle replica switchover



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RDS for Oracle replica switchover (back)



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RDS for Oracle role transition use cases

Promotion

- Seed dev/test environments
- Seed logical replication
- Create new primary instance while preserving old primary
- Disaster recovery

Switchover

- Disaster recovery readiness drills
- Shift write traffic regionally (follow the sun)
- Migrate to a new region while maintaining replicas

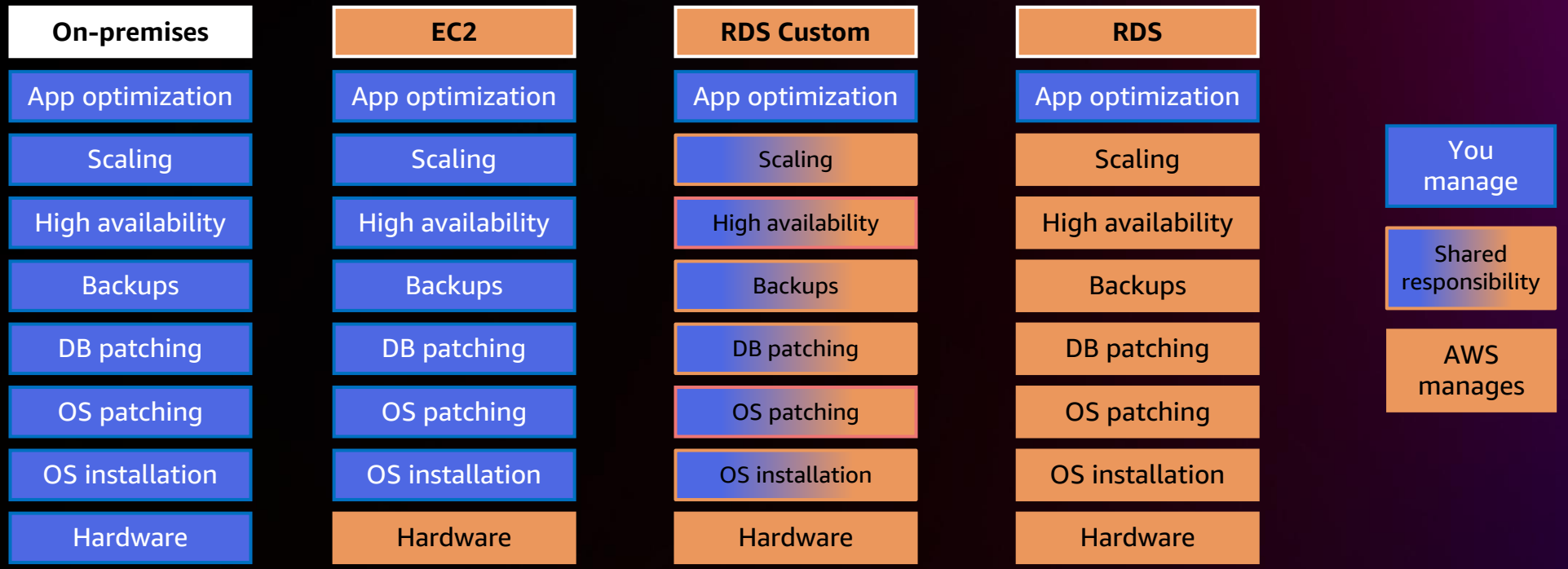
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Amazon RDS Custom for Oracle new features

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RDS Custom for Oracle shared responsibility model



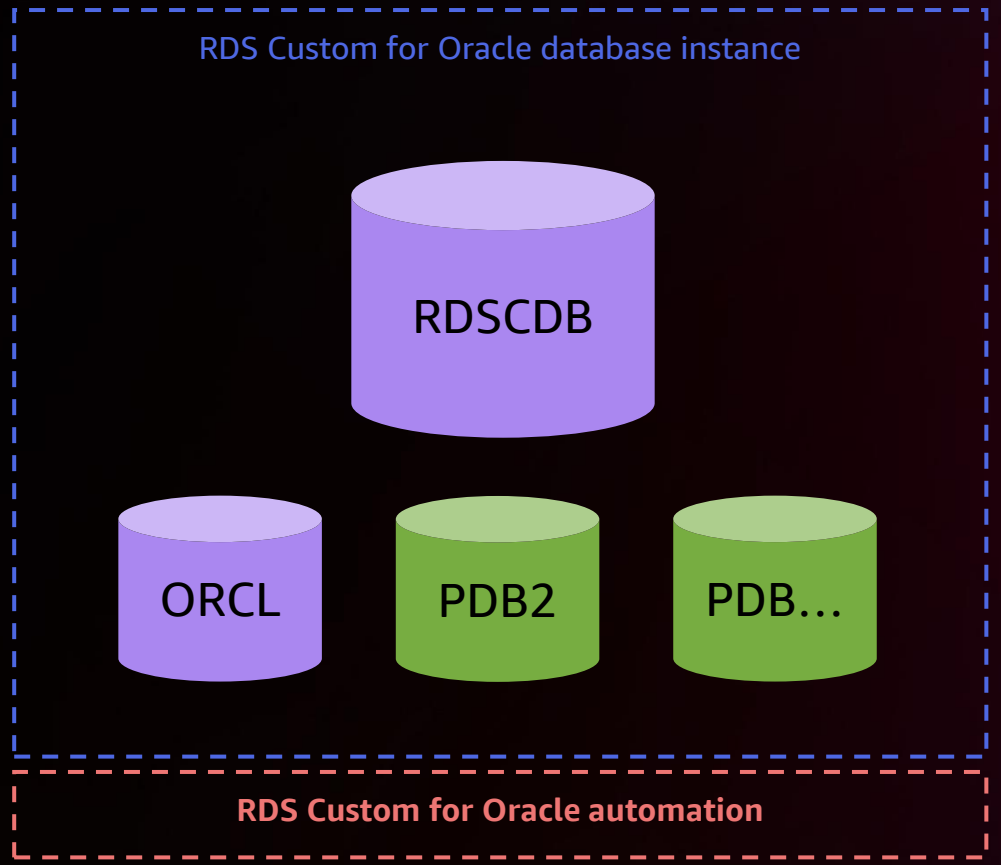
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RDS Custom for Oracle database versions

Major Versions Run the latest versions of Oracle Database	12.1.0.2, 12.2.0.1, 18c, 19c
Version deprecations	Customers choose when to deprecate versions that are no longer supported by Oracle
Minor versions Stay up to date with quarterly security and bug fixes from Oracle Use custom engine version (CEV) with bring your own media to build an Oracle Home with the **patches, owners, and path names of your choice**	Customers control patch composition RDS automation handles upgrade to new CEV

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New - RDS Custom for Oracle Multitenant



Container always named RDSCDB

First pluggable database created by RDS

`--db-name` (default ORCL)

RDS monitors and provides metrics on pluggable databases, ensures they remain open

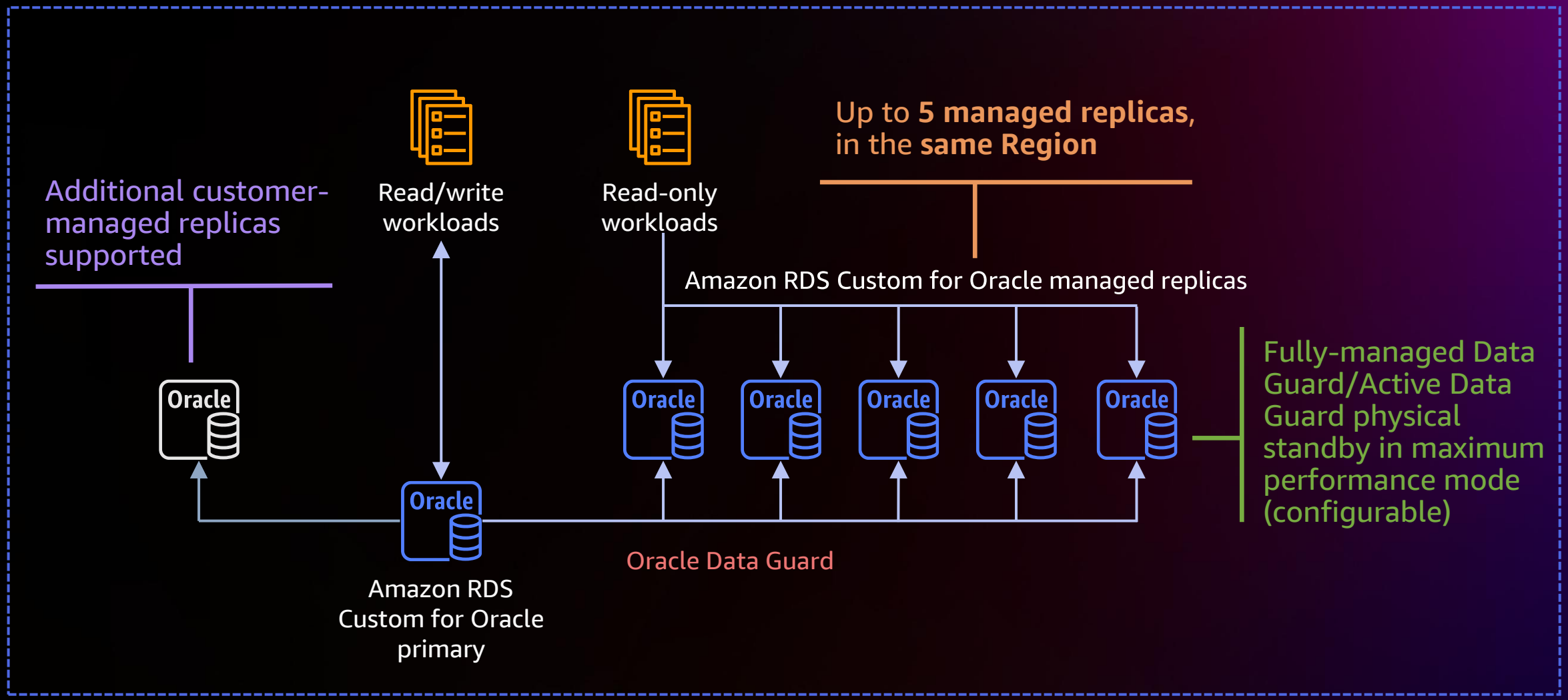
New database engine "custom-oracle-ee-cdb" for custom engine version (CEV) and instances

Additional pluggable databases created and managed by the customer

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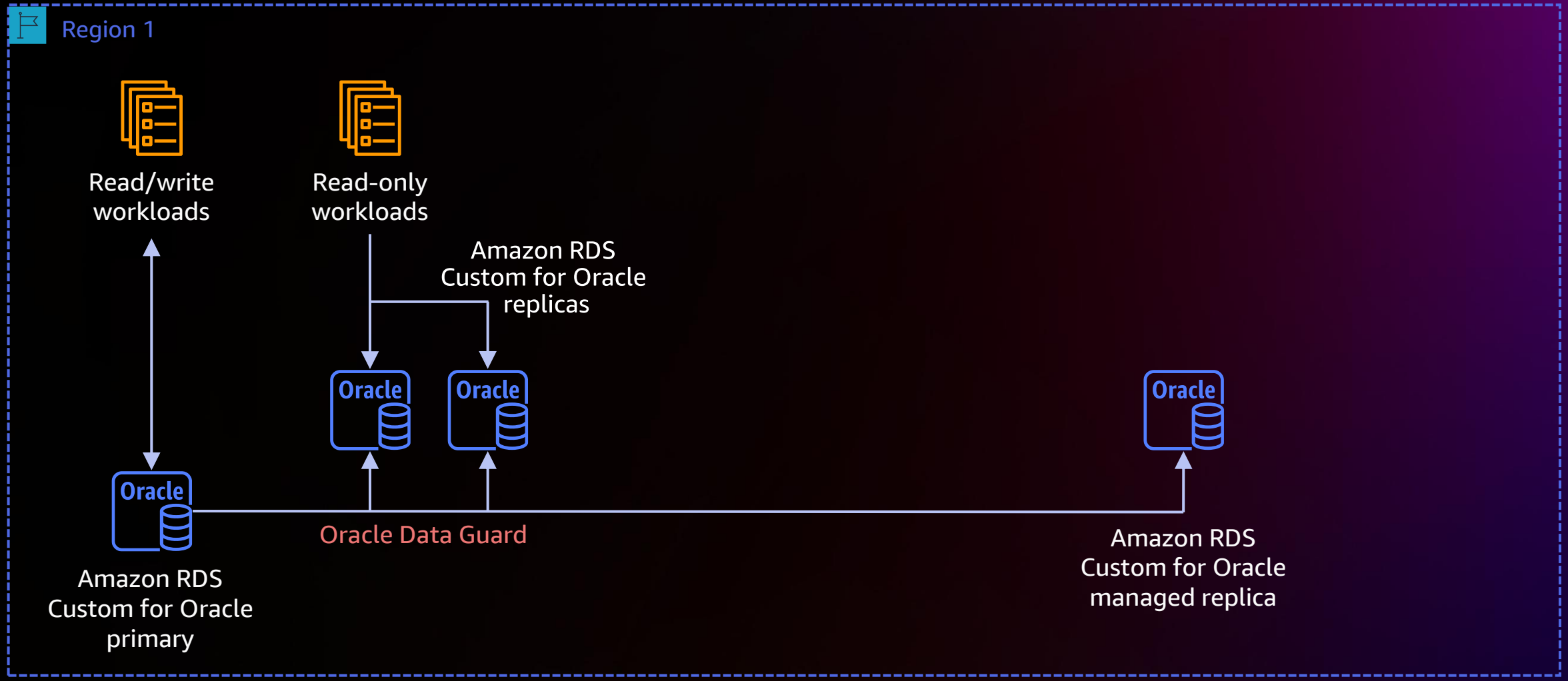
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RDS Custom for Oracle replicas



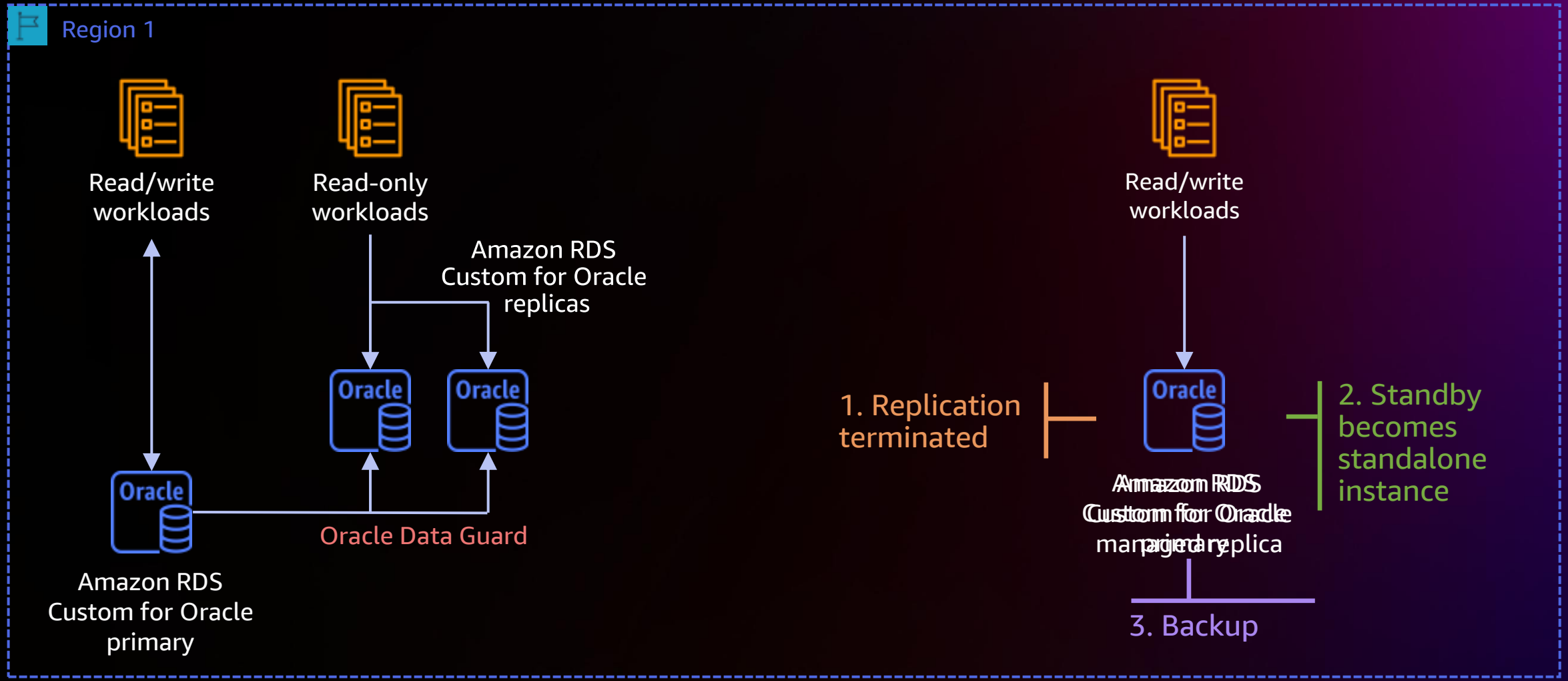
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New - RDS Custom for Oracle promote managed replicas



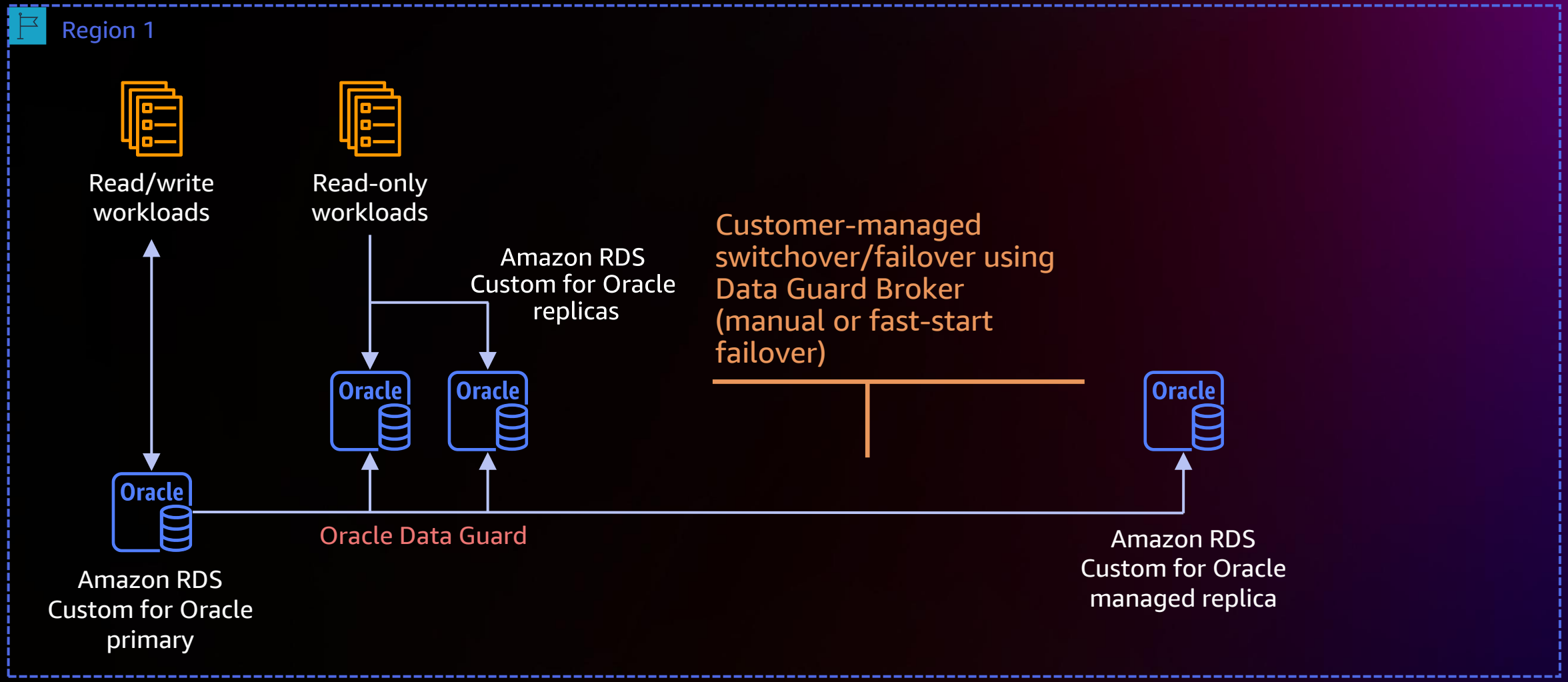
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RDS Custom for Oracle promote managed replicas



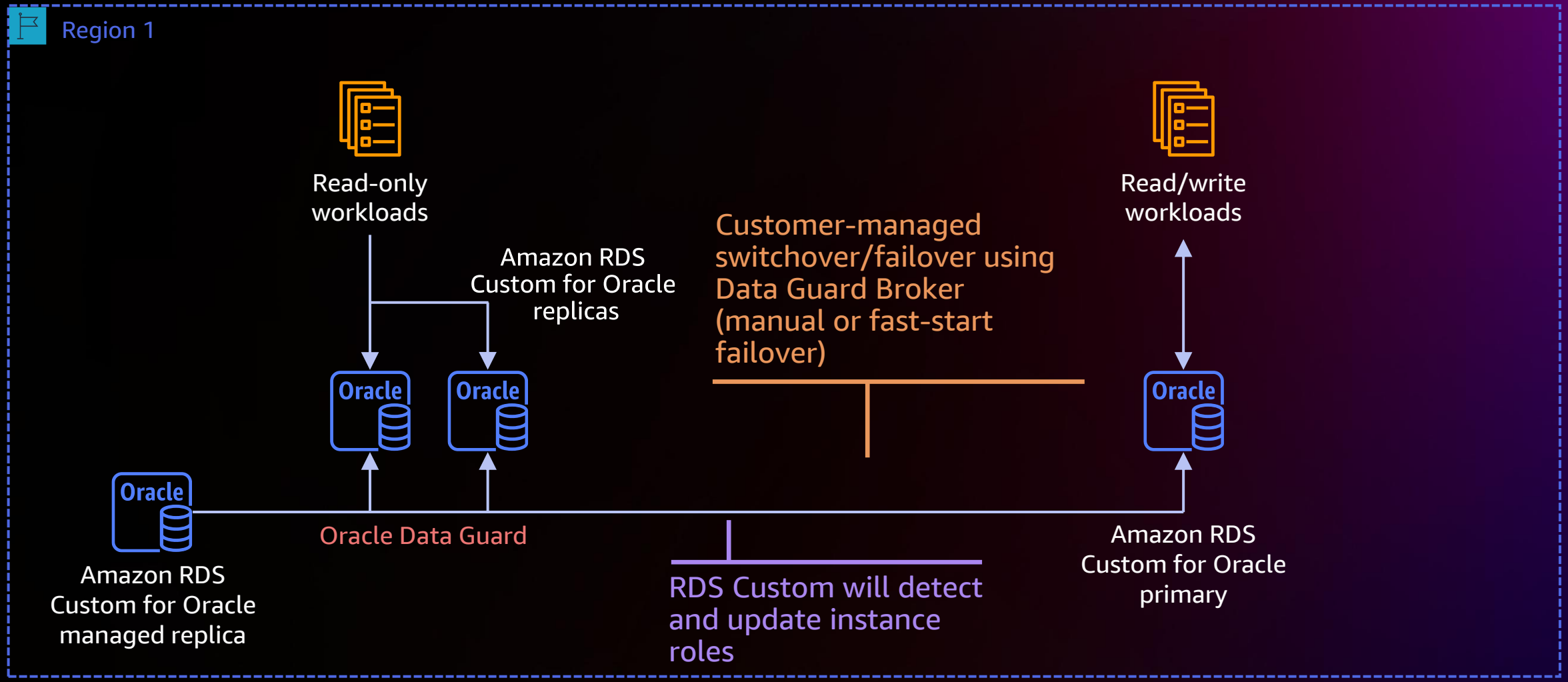
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RDS Custom for Oracle switchover/failover



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RDS Custom for Oracle switchover/failover



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Choosing the right solution for Oracle Database workloads

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Use case: Amazon RDS for Oracle

Application/requirements

- Custom and third-party applications that use standard database features

  Oracle Peoplesoft, Siebel CRM, JD Edwards

- Run major versions of Oracle Database actively supported by Oracle

  Minor version patch composition managed by RDS

- Database storage up to 64 TiB

Service experience

- Physical infrastructure managed by AWS
- Fully managed database infrastructure
  - High availability and disaster recovery
  - Host monitoring and replacement
  - Patching and feature management
- DBA-level access to the database via listener endpoint
  (no SYS, SYSTEM, or host access)

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Use case: Amazon RDS Custom for Oracle

Application/requirements

- Custom and third-party applications that require host access and/or elevated database privileges

  Oracle E-Business Suite

- Run recent Oracle Database versions (back to 12.1.0.2)

  Choose your patches with custom engine versions (CEV)

- Database storage up to 64 TiB

Service experience

- Physical infrastructure managed by AWS
- Managed database infrastructure
  - Host monitoring and replacement
  - Patching
- Ability to customize and self-manage infrastructure
- Host (SSH) and SYS/SYSTEM access
  Install agents/software on host

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Use case: Self-managed on Amazon EC2

Application/requirements

- Custom, legacy, complex applications that require full control and customization
- Choice of database versions
- Choice of instance and volume types
- Database storage up to hundreds of terabytes

Service experience

- Physical infrastructure managed by AWS
- Database infrastructure and operations fully customer-managed

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POLL: What are the top challenges that block you from migrating workloads to Amazon RDS for Oracle?

- Size/performance requirements
- Database features and permissions
- TCO/value proposition
- Don’t know enough about the service

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Amazon RDS Custom for Oracle at Jefferies

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Agenda

Who is Jefferies

Why did Jefferies leverage RDS Custom for Oracle

Jefferies Reference Architecture on RDS Custom for Oracle

How Jefferies solved challenges

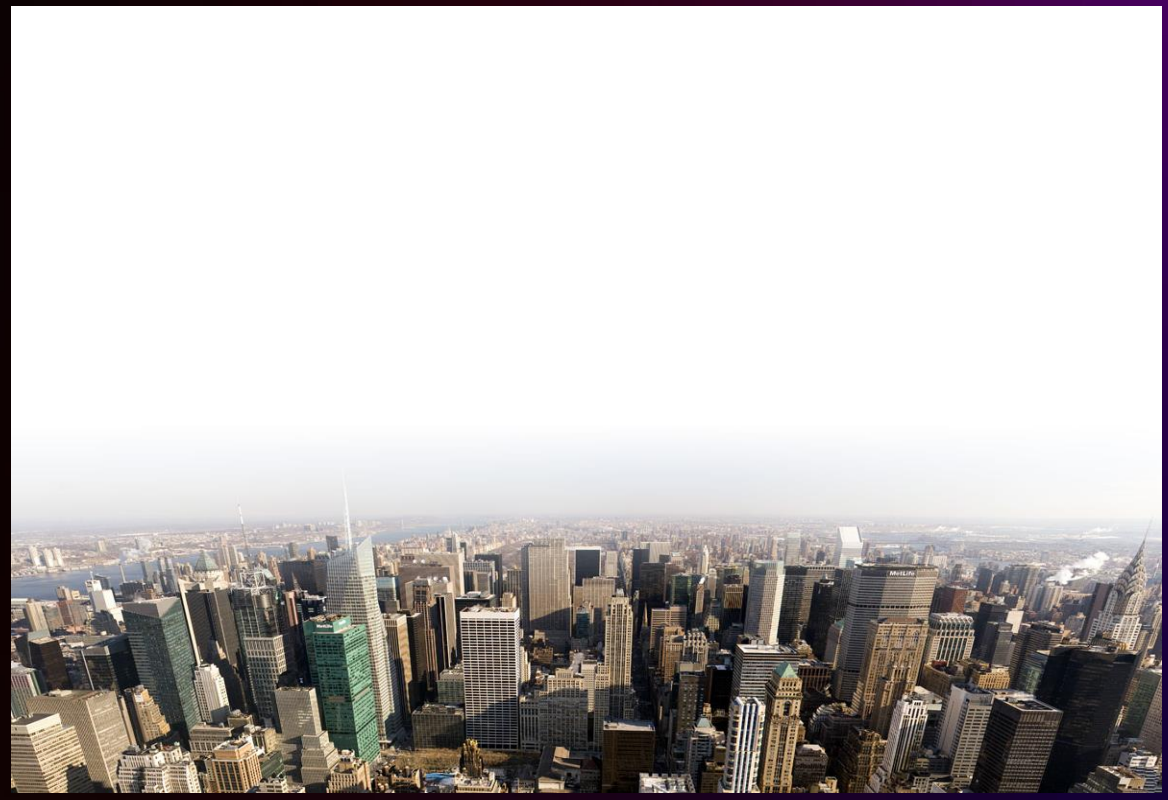
Conclusion and Takeaway

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Jefferies

Jefferies is the largest independent full-service global investment banking firm headquartered in the U.S. and provides investment banking, advisory, sales and trading, research and wealth management services across the Americas, Europe and Asia

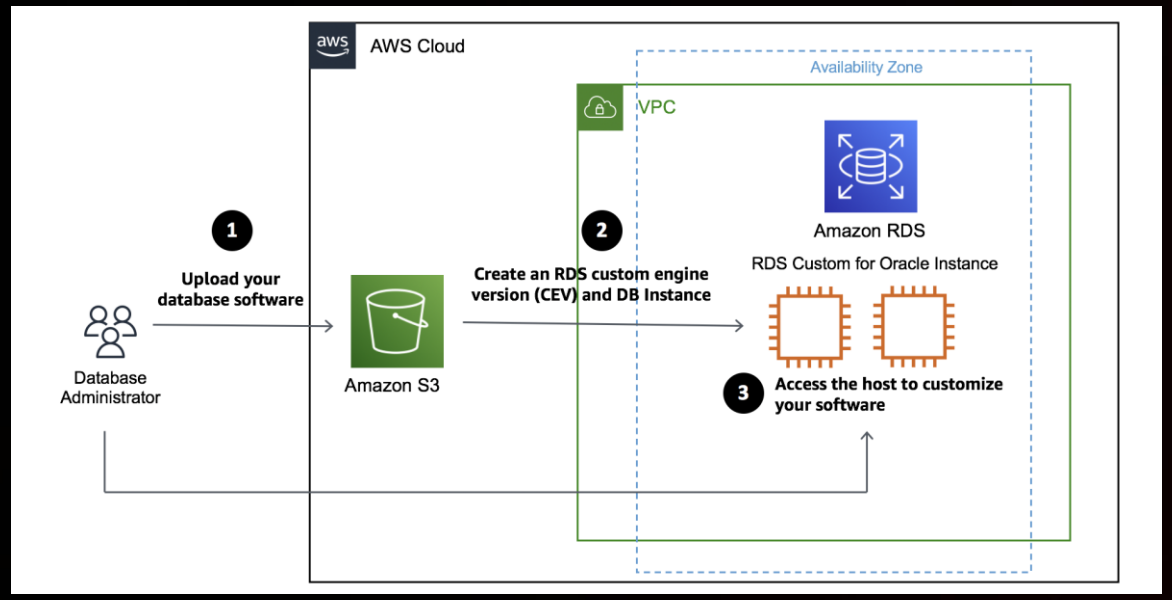
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- Offices in over 30 cities around the world
- 4,508 Jefferies Group employee-partners
- Wholly owned subsidiary of Jefferies Financial Group Inc (NYSE: JEF)



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Why Amazon RDS Custom for Oracle

PACKAGED APPLICATION DEPENDENT ON ORACLE RDBMS

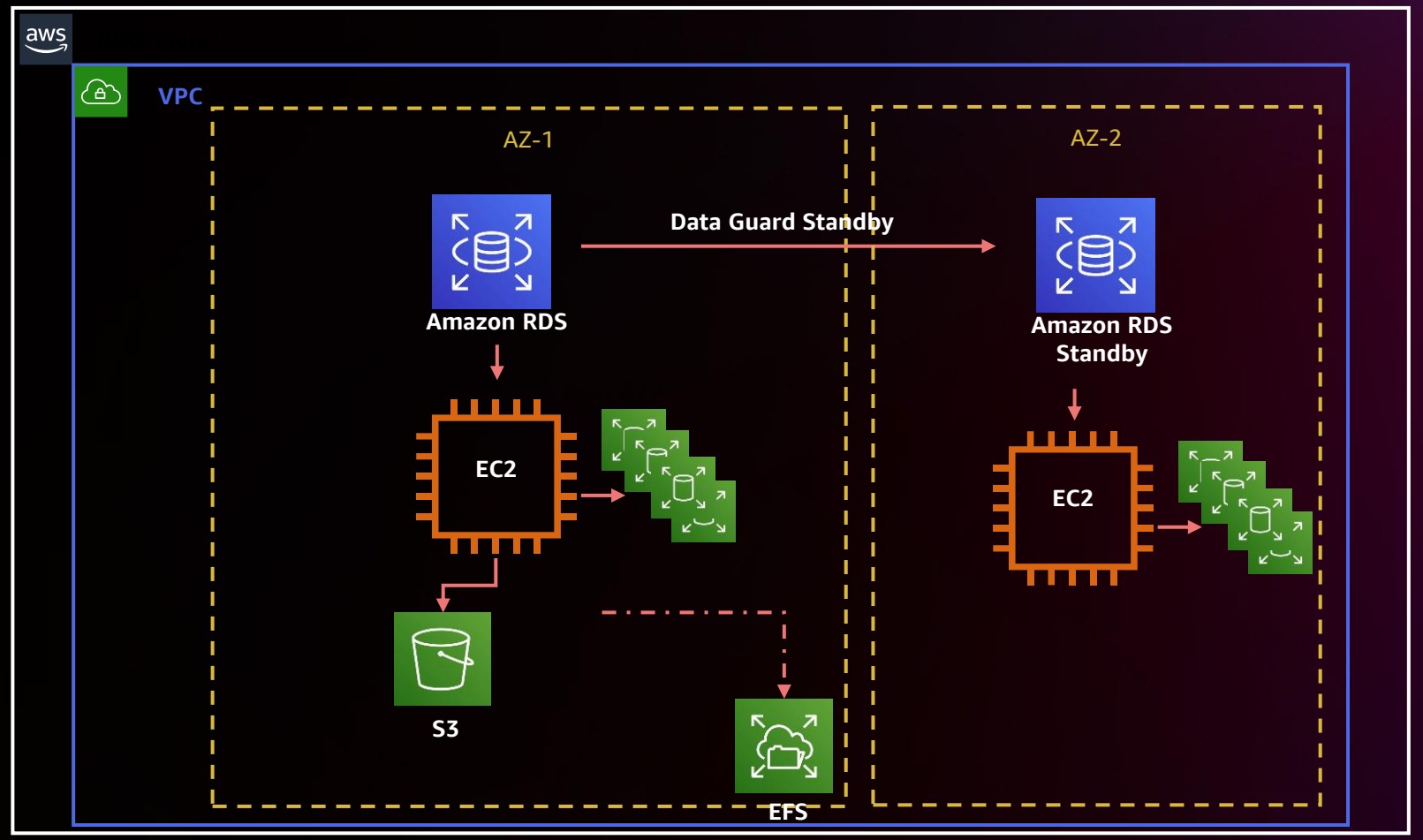


Key features from the Service

- License portability and enterprise support
- AWS managed provisioning
- Automated backups
- Automated monitoring and alerting
- Cloud scale
- Integration opportunities with standard security tooling
- Root level customer transparency
- Service Roadmap driven by the customers

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Jefferies RDS Reference Architecture



IBM Guardium

Oracle Enterprise Manager

Oracle Unified Directory

Splunk

Crowdstrike

Zabbix

Atlassian DevOps Toolset

Amazon Route 53

Ansible

AWS Key Management Service (AWS KMS)

AWS Secrets Manager

Amazon CloudWatch

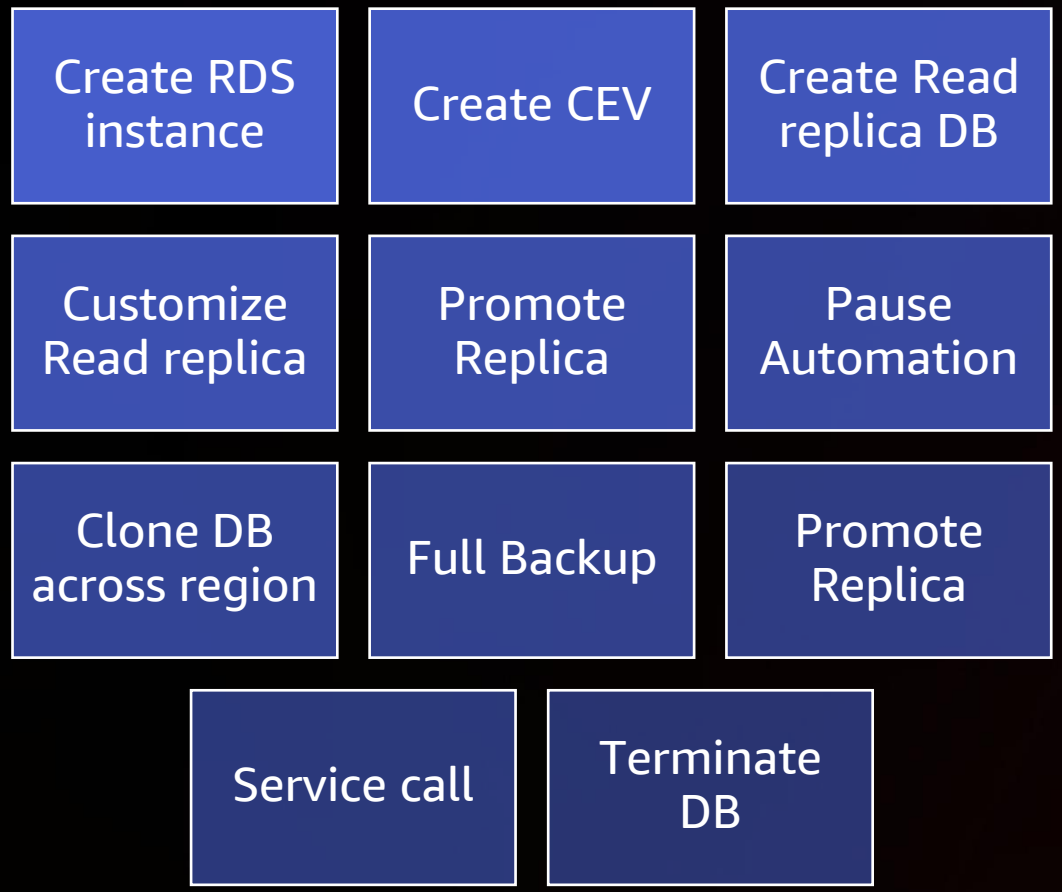
AWS Systems Manager

AWS Service Catalog

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Automation Challenge

SYSTEMS MANAGER – AUTOMATION DOCUMENTS AT THE CENTER OF AUTOMATION



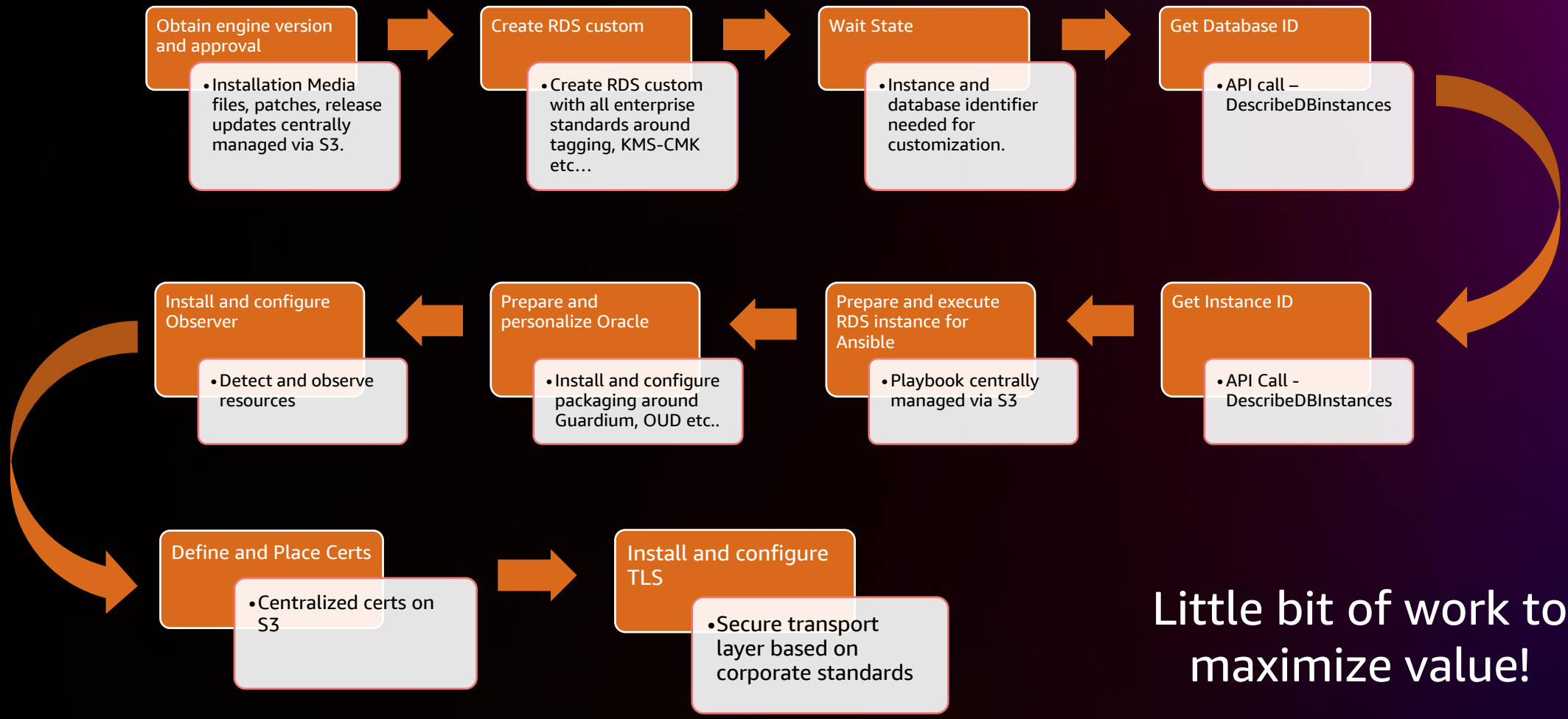
Capabilities via automation

- Centralized CEV Management
- Tagging standards
- Centralized Encryptions KMS-CMK
- Ansible playbooks
  - AD Integrations
  - Software packaging
- Prepare and personalize Oracle RDS
- Secure Certs for TLS
- Setup Monitoring for operations and security
- On-demand features like local replica, remote replica, failover, terminate DB

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Workflow – create RDS Custom for Oracle instance



Little bit of work to maximize value!

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Conclusion

- RDS Custom for Oracle provided a significant value proposition with legacy, custom, and packaged application where Jefferies don’t want to fully manage Oracle databases.
- Leverage the automation mode and support perimeter capabilities to leverage RDS managed services.

Stop spending money and time on undifferentiated heavy lifting!

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Learn more

- AWS documentation – Getting started with Amazon RDS – step-by-step instructions
  https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/CHAP_GettingStarted.html
- AWS Partner, House of Brick – Understanding your options for deploying and licensing Oracle on AWS
  https://aws.amazon.com/blogs/apn/understanding-your-options-for-deploying-and-licensing-oracle-on-aws/
- AWS Database Blog – Role of the DBA when moving to Amazon RDS
  https://aws.amazon.com/blogs/database/part-1-role-of-the-dba-when-moving-to-amazon-rds-responsibilities/
- AWS Database Blog – Category: Amazon RDS for Oracle
  https://aws.amazon.com/blogs/database/category/database/amazon-rds/rds-for-oracle/
- Amazon RDS for Oracle additional resources
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Thank you!

Michael Barras (he/him)
mbarras@amazon.com

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