

# Maximum Availability Architecture Evolving

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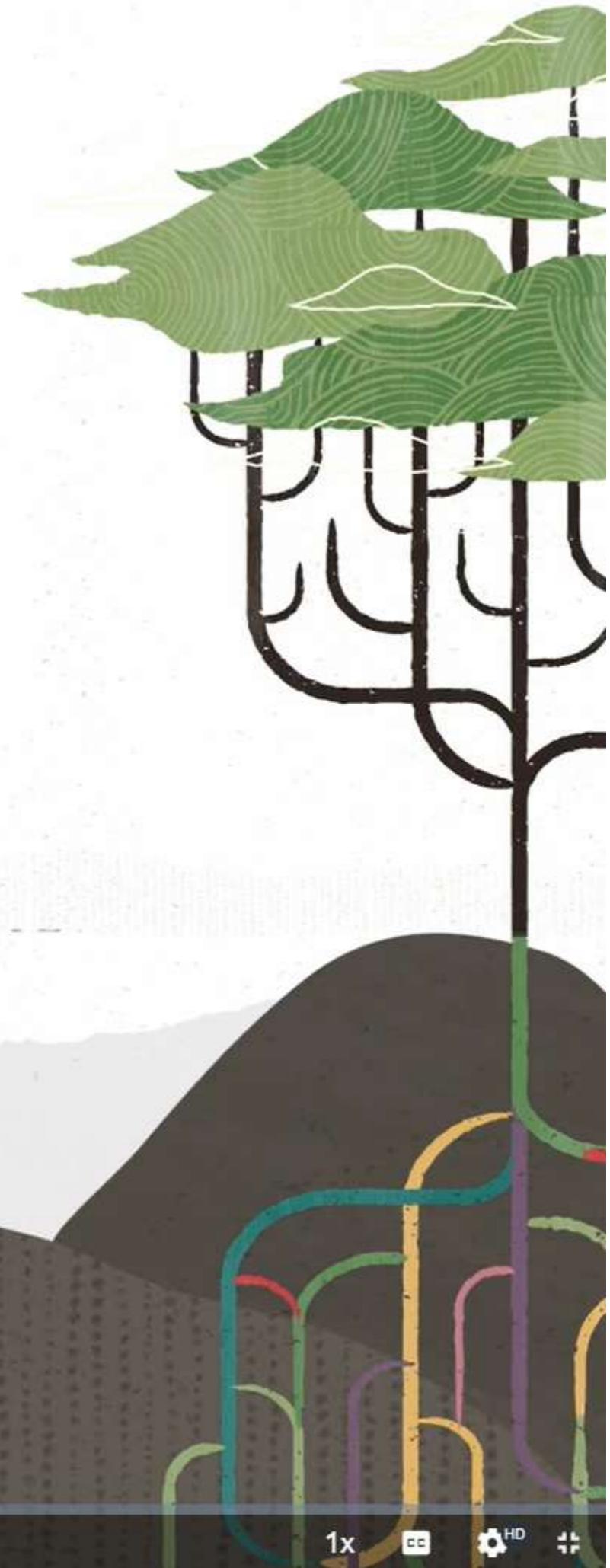


University

**Oracle Cloud Infrastructure**

# Maximum Availability Architecture Evolving

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# Impact of Database Downtime

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Database Downtime and Data Protection

# Impact of Database Downtime



**\$350K**

average cost of  
downtime per hour



**87 hours**

average amount of  
downtime per year



**\$10M**

average cost of  
unplanned data  
center outage or  
disaster



**91%**

percentage of  
companies that have  
experienced  
an unplanned data  
center outage in the  
last 24 months

# Key Terminology

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**High Availability**



**Scalability**



**Rolling  
Updates/Patches**



**Disaster Recovery**



**Recovery Point  
Objective (RPO)**



**Recovery Time  
Objective (RTO)**

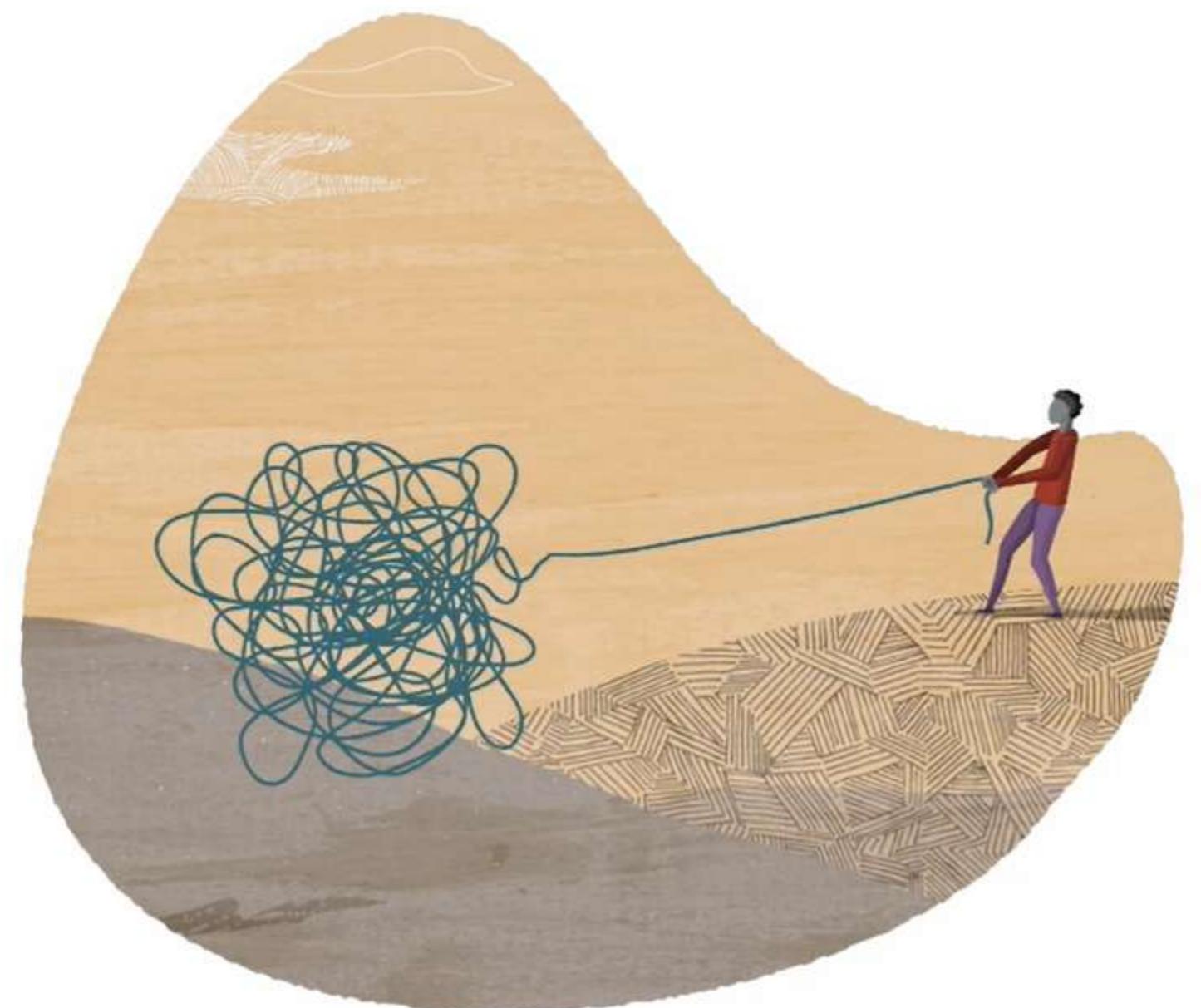
# MAA and Chaos Engineering

Breaking things to ensure your peace of mind

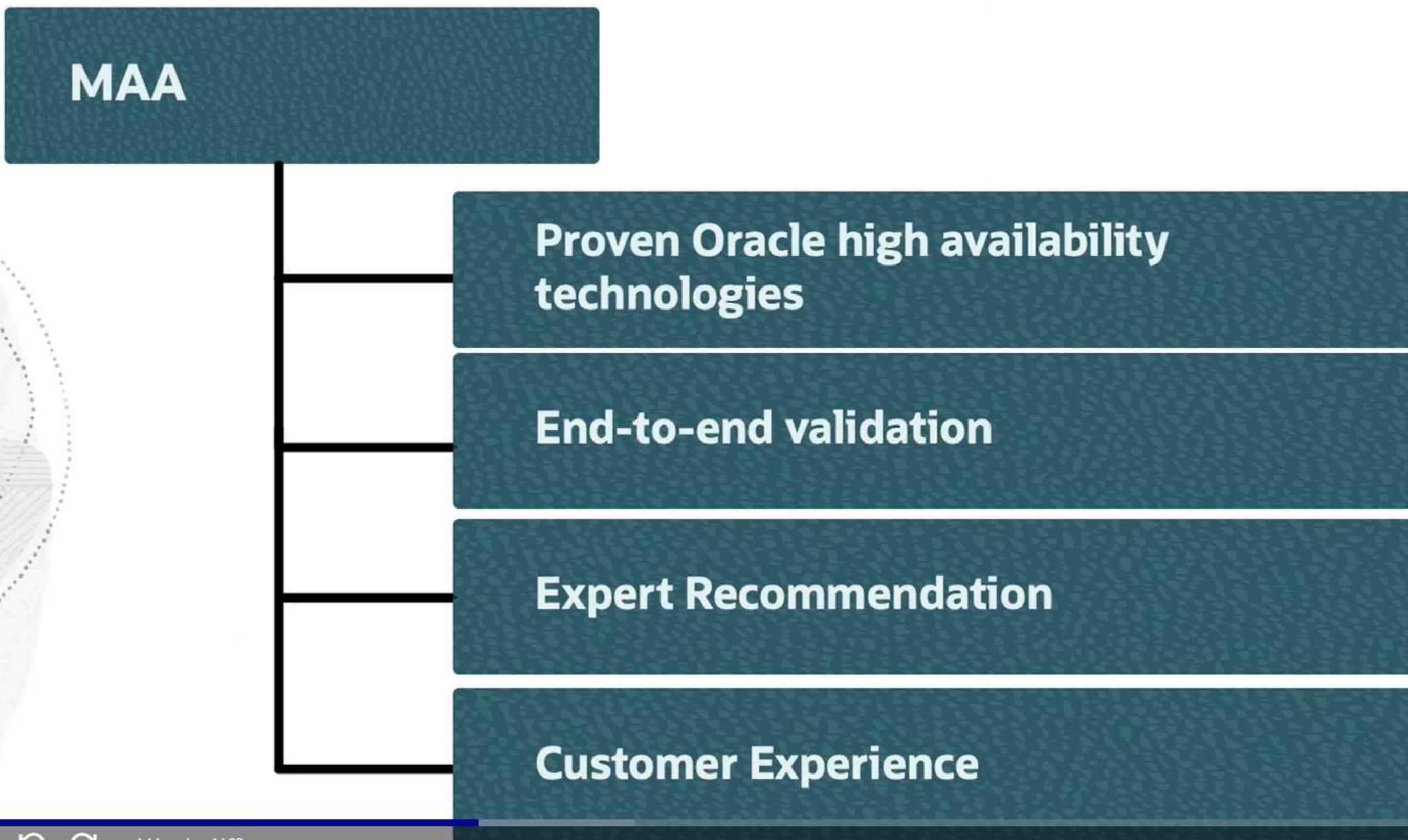
## Chaos Engineering

What may go wrong

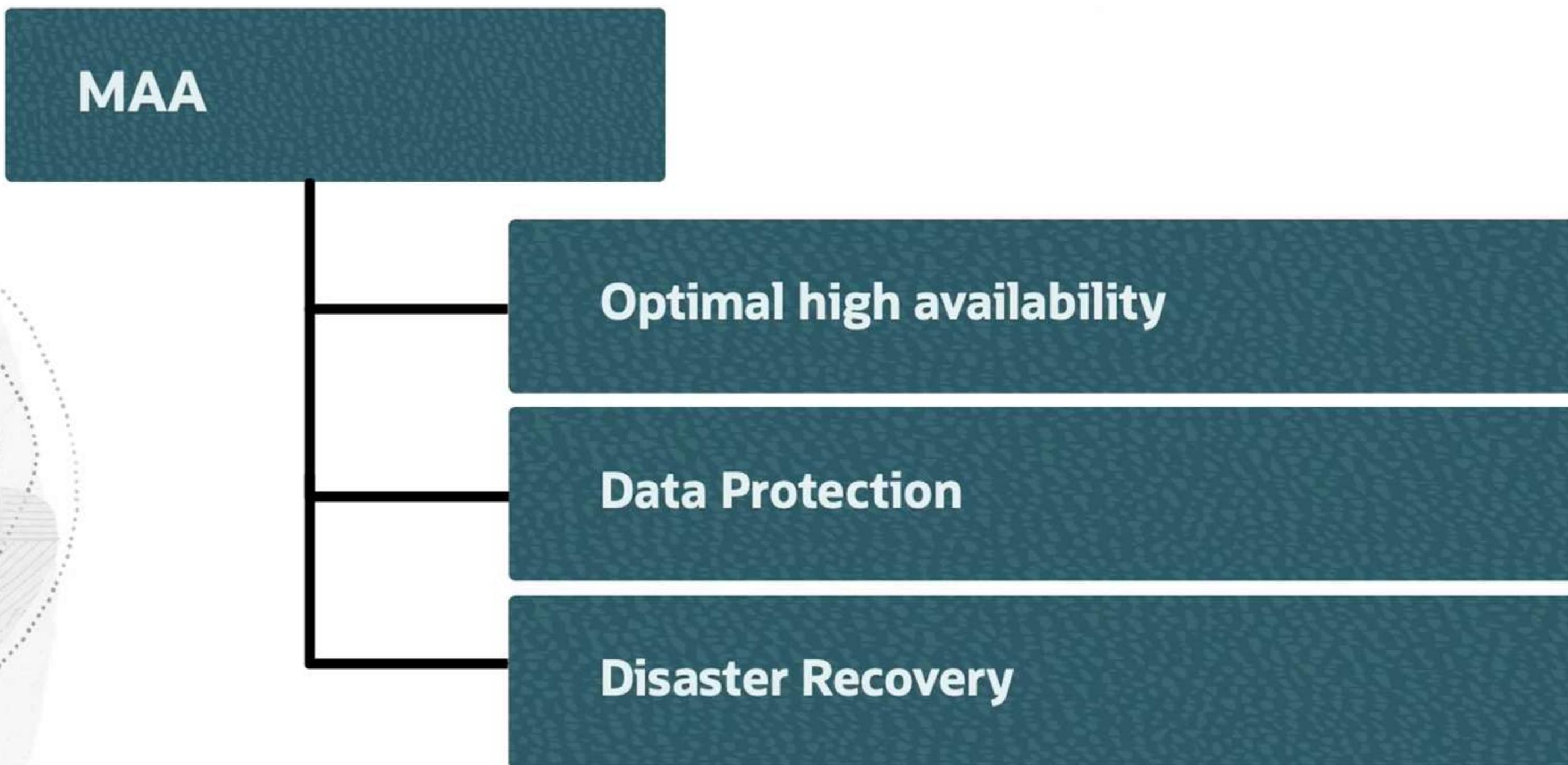
- Network, server, and storage failures
- Human errors and data corruption
- Data corruption
- Power failures or site failure (i.e. Godzilla attack or hurricane)
- Application, database, and server software updates
- Data reorganization or changes
- Application changes and optimizations



# Oracle Maximum Availability Architecture (MAA)



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MAA

Reference Architectures

HA Service Level  
Agreements

Configuration practices

HA Life Cycle operational  
best practices

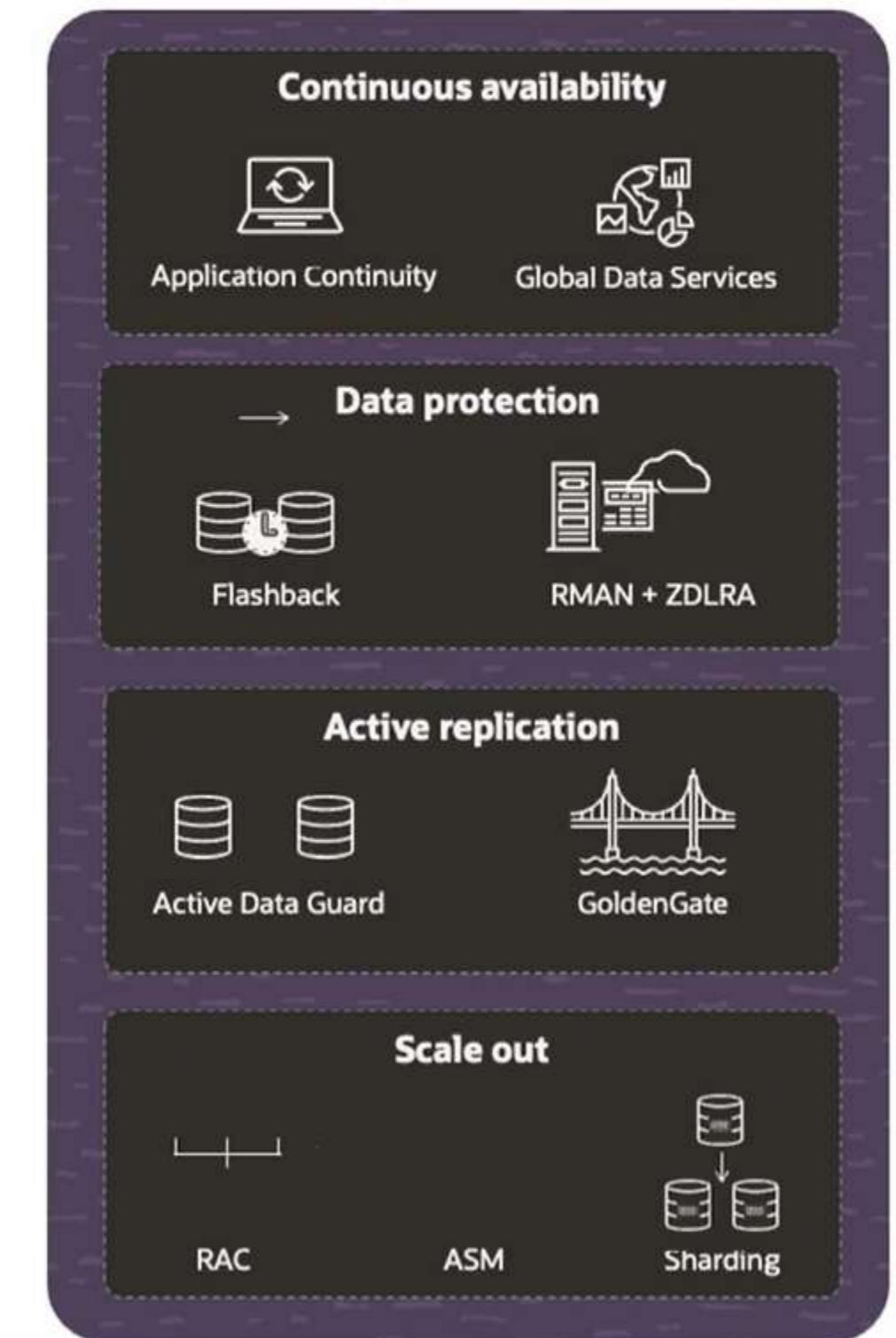
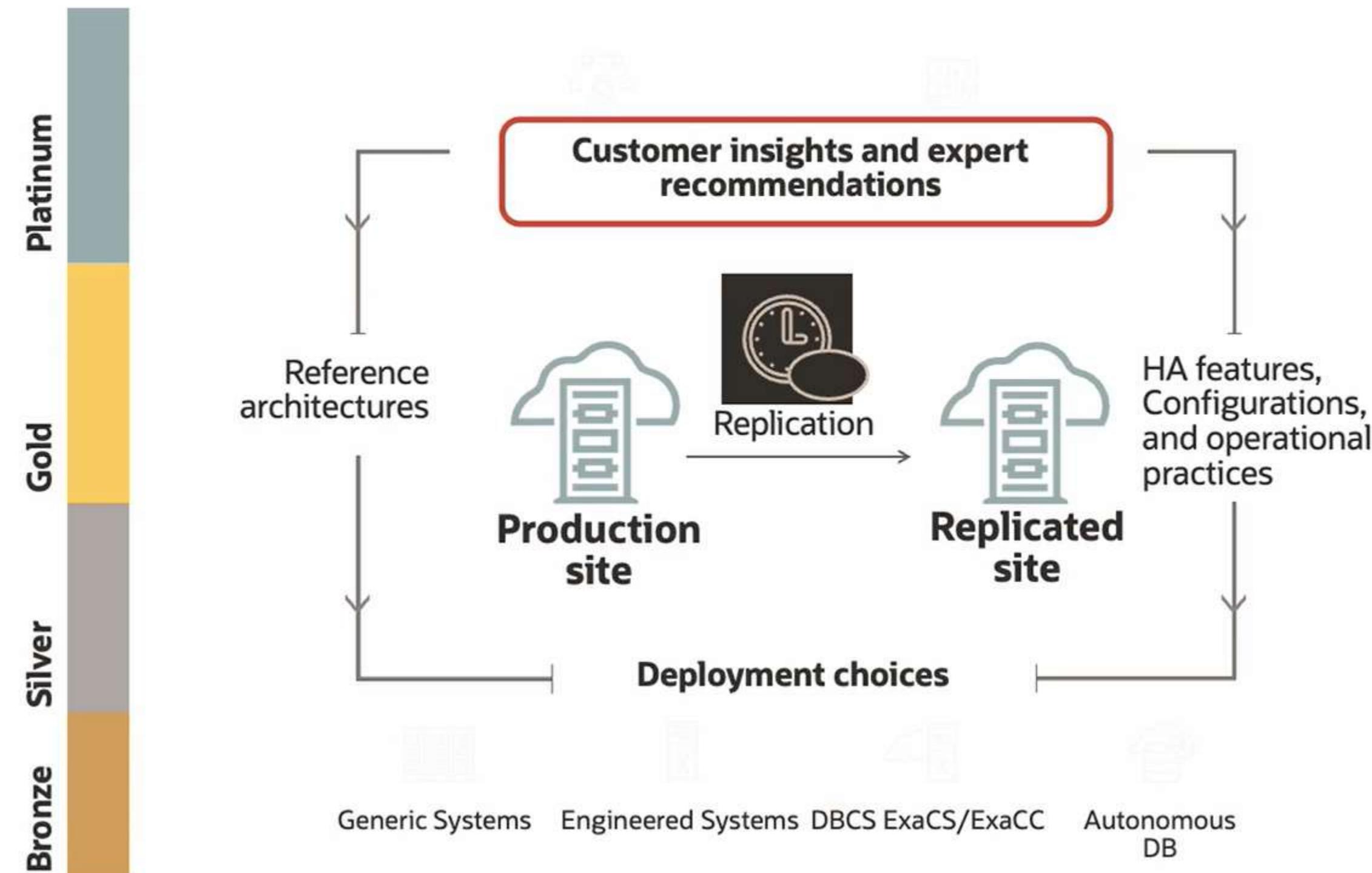
Non-engineered systems

Engineered systems

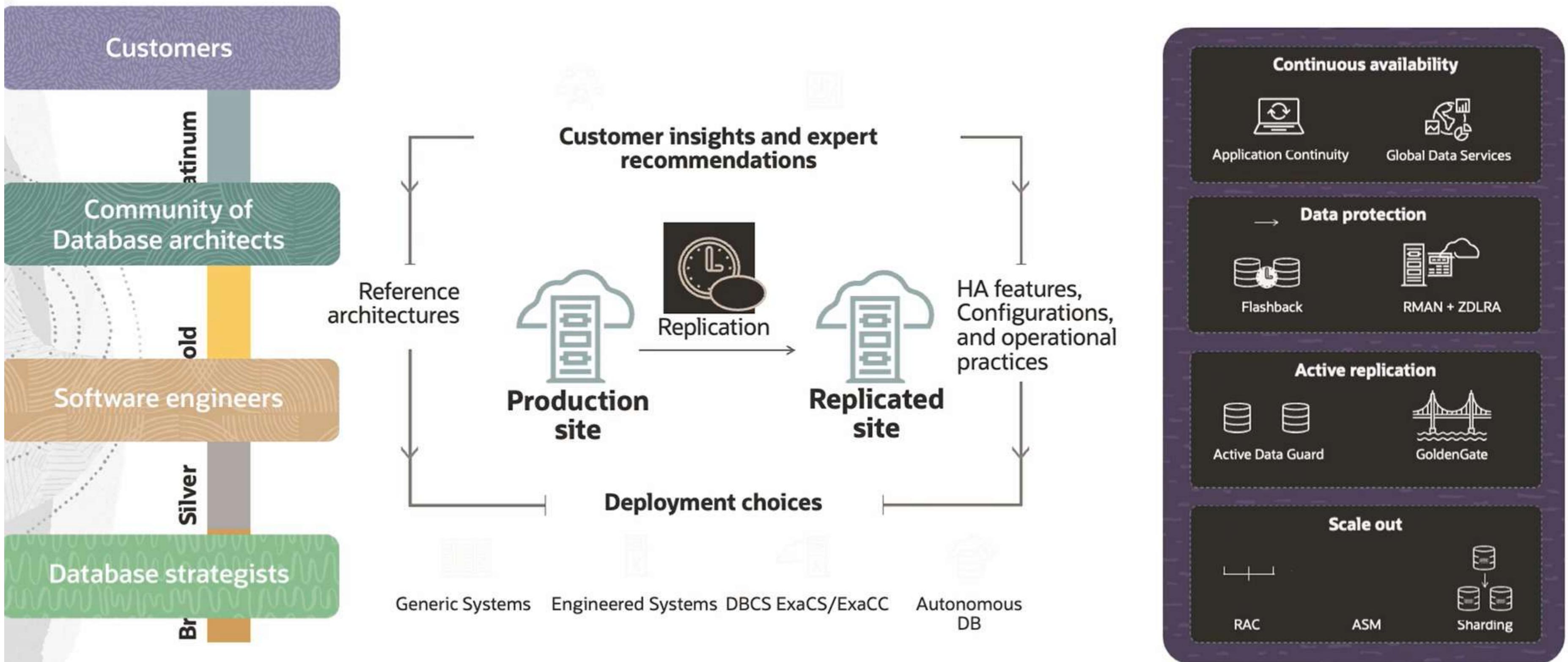
Non-cloud deployments

Cloud deployments

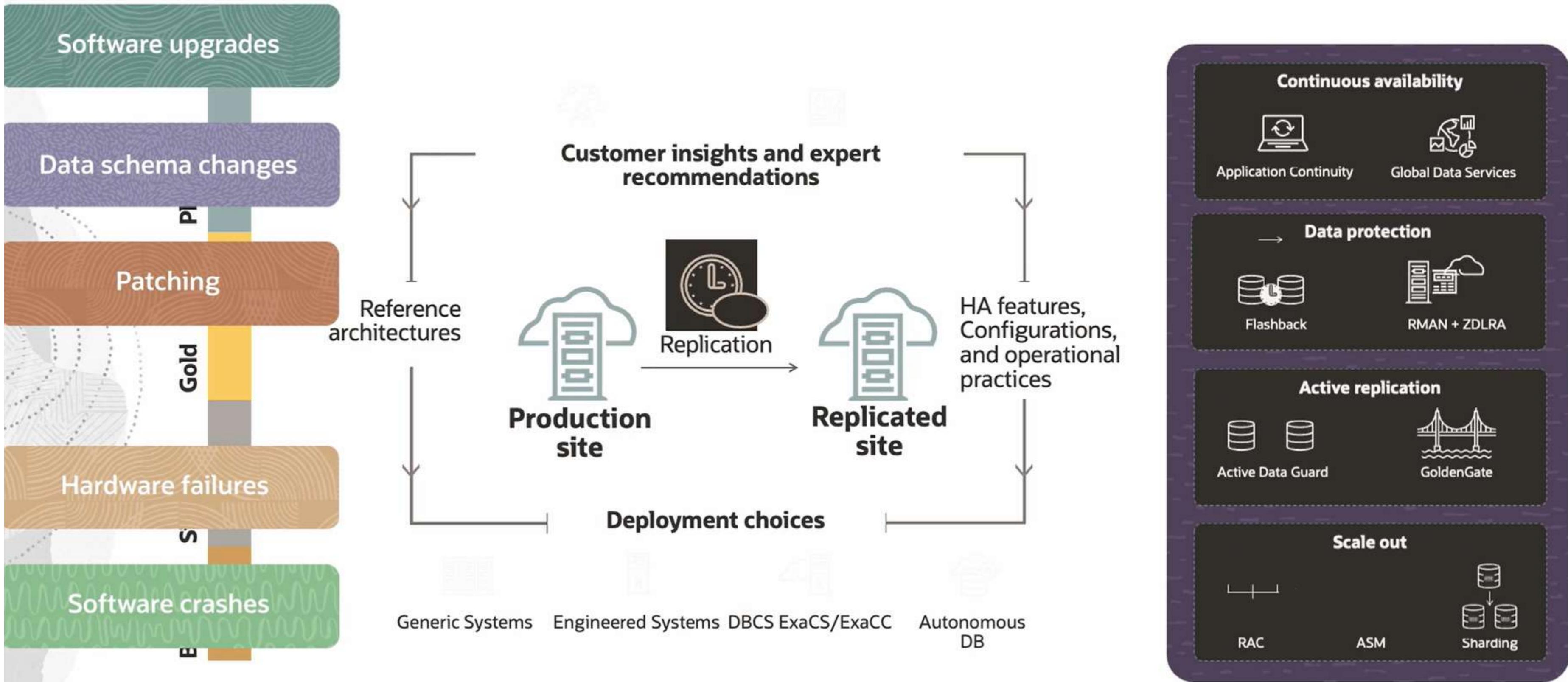
# Oracle Maximum Availability Architecture (MAA)



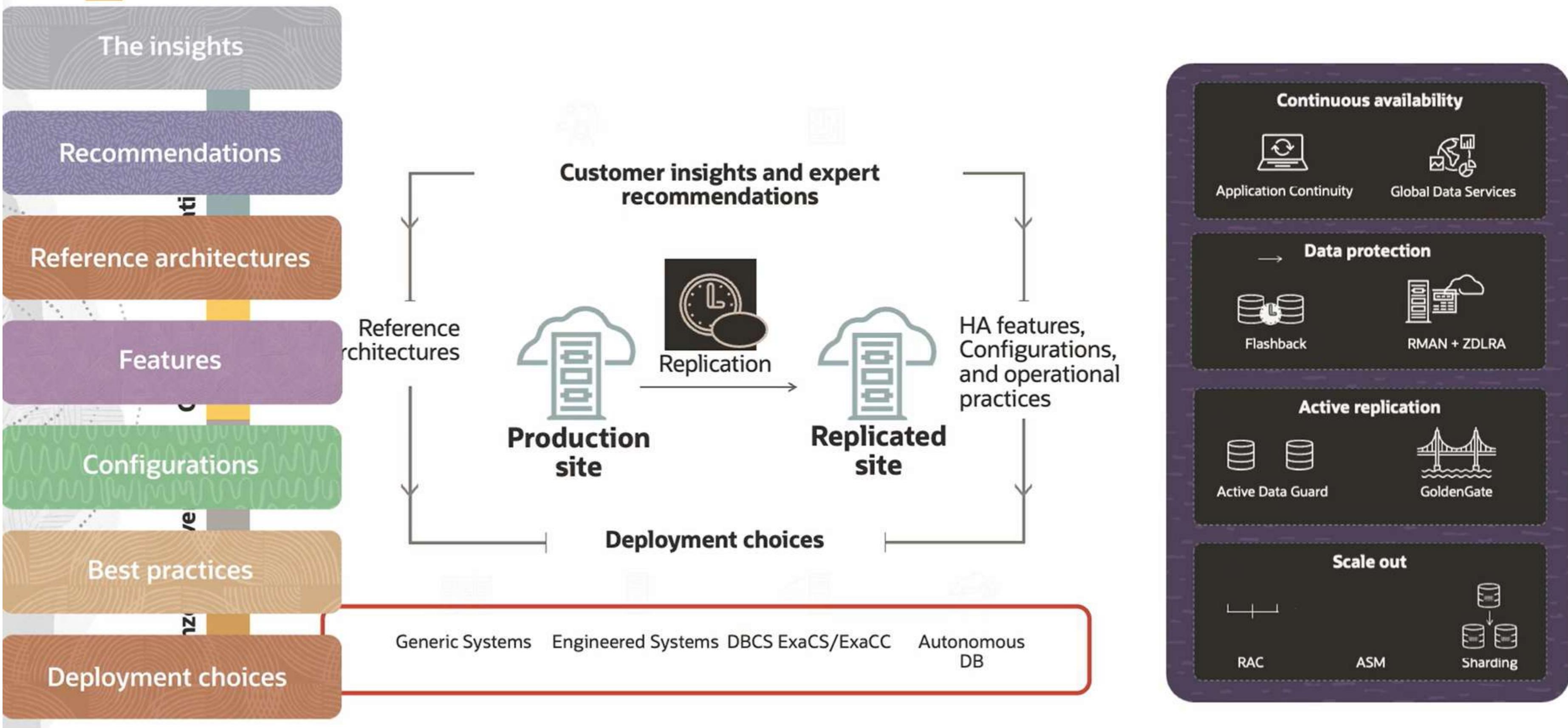
# Oracle Maximum Availability Architecture (MAA)



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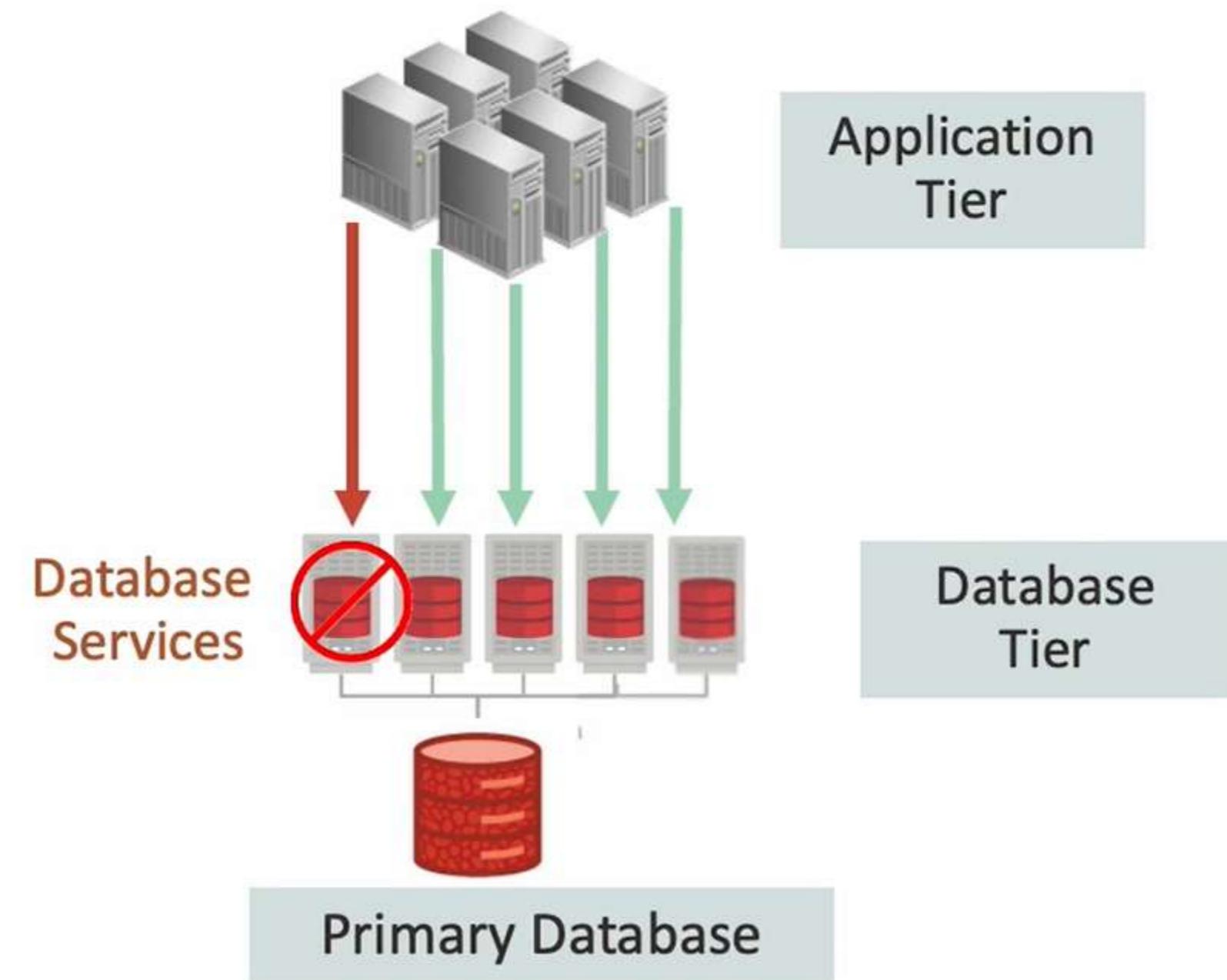
# Oracle Maximum Availability Architecture (MAA)



# Feature Highlights: Oracle Real Application Clusters (RAC)

## Node failure, instance failure, rolling maintenance

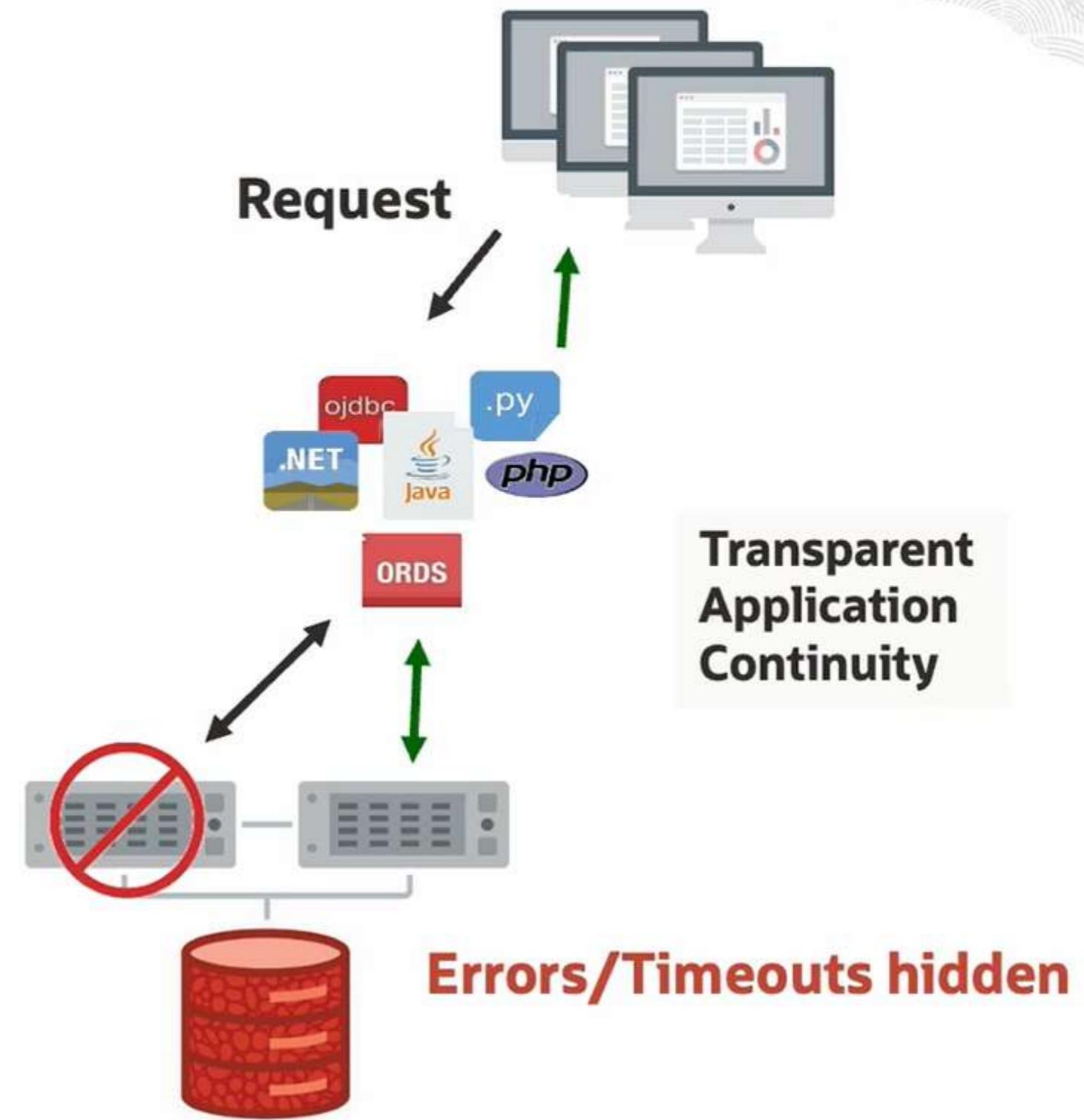
- Utilizes two or more instances of an Oracle Database concurrently
- Very Scalable
  - All instances active; add capacity online; ideal for database consolidation
- Highly Available
  - Auto-failover of services to an already running instance
  - Outage is transparent to user, in-flight transactions succeed
  - Zero downtime rolling maintenance



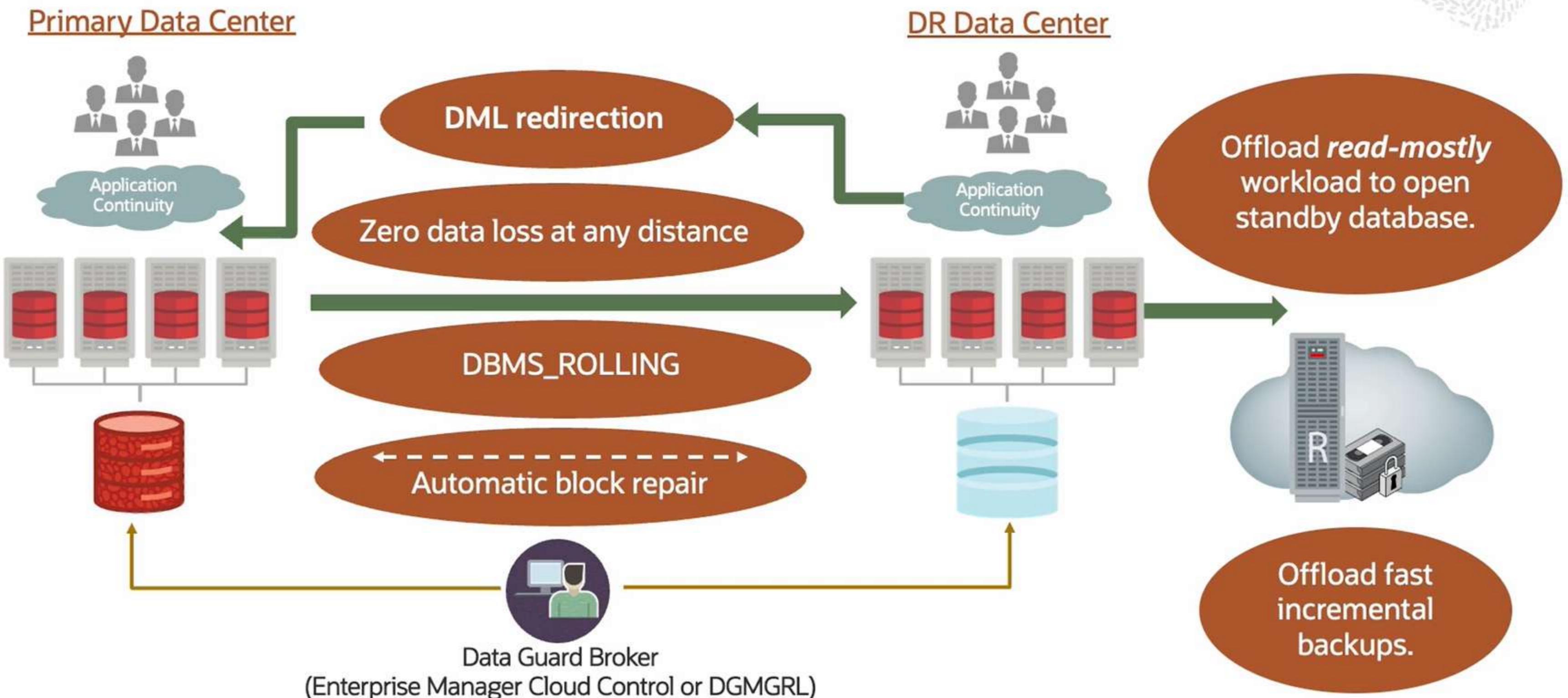
# Feature Highlights: Transparent Application Continuity (TAC)

## Application does not see errors during outages

- Uses Application Continuity and Oracle Real Application Clusters
- Transparently tracks and records session information in case there is a failure
- Built inside of the database, so it works without any application changes
- Rebuilds session state and replays in-flight transactions upon unplanned failure
- Planned maintenance can be handled by TAC to drain sessions from one or more nodes
- Adapts as applications change: protected for the future



# Active Data Guard: Expanding on Data Guard



# Oracle Cloud Database Services

Built from the ground up to be highly available



- Database-aware HA architecture
- Quick migration via ZDM
- Highly availability via RAC with Application Continuity
- Automated back-ups
- Integrated cross-regional DR with Active Data Guard

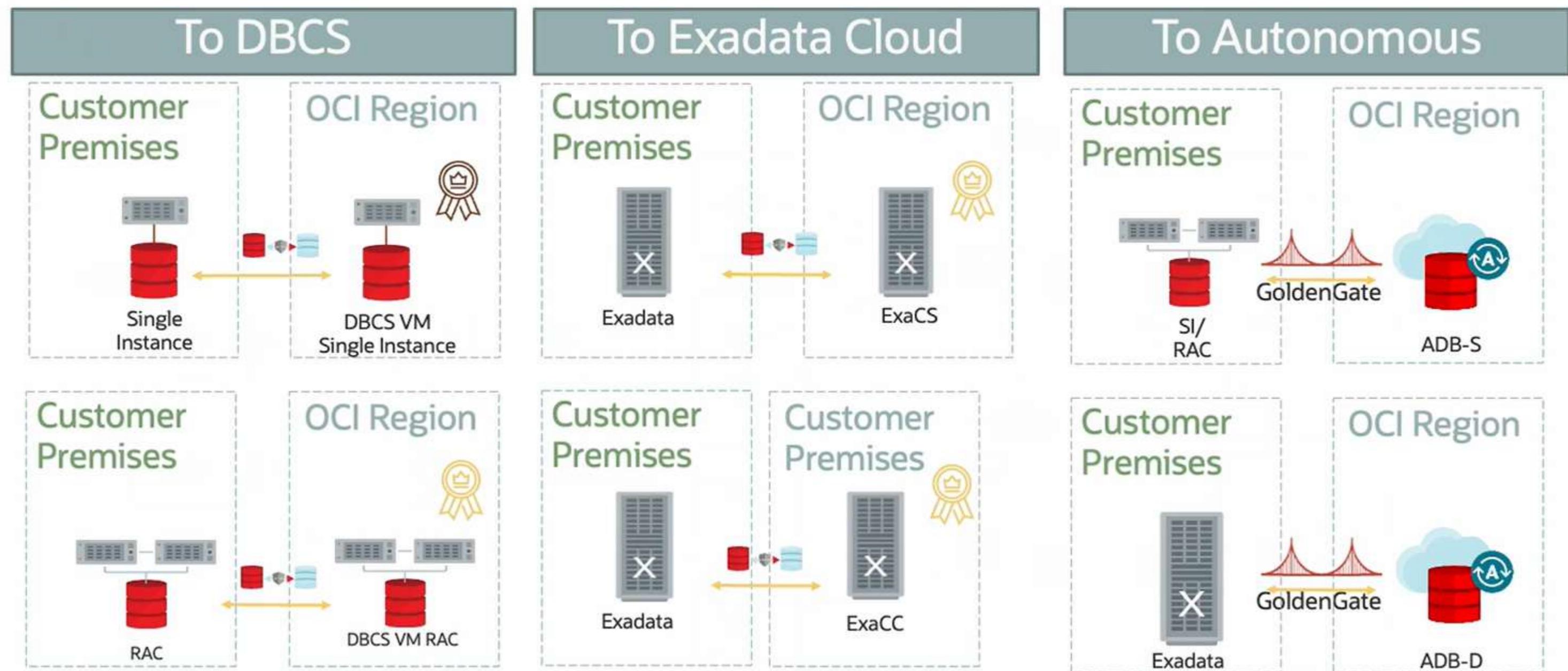


- Integrated with Oracle Engineered Systems (Exadata)
- Fully-managed flexibility
  - Public Cloud or Cloud @ Customer
- HA capabilities (RAC, Active Data Guard) fully integrated with Exadata



- Autonomous Data Guard
  - Simple 2-click configuration
  - Cross-regional or AD
- Expanded flexibility with shared or dedicated Exadata infrastructure
- Highly available multitenant RAC on Exadata infrastructure by default

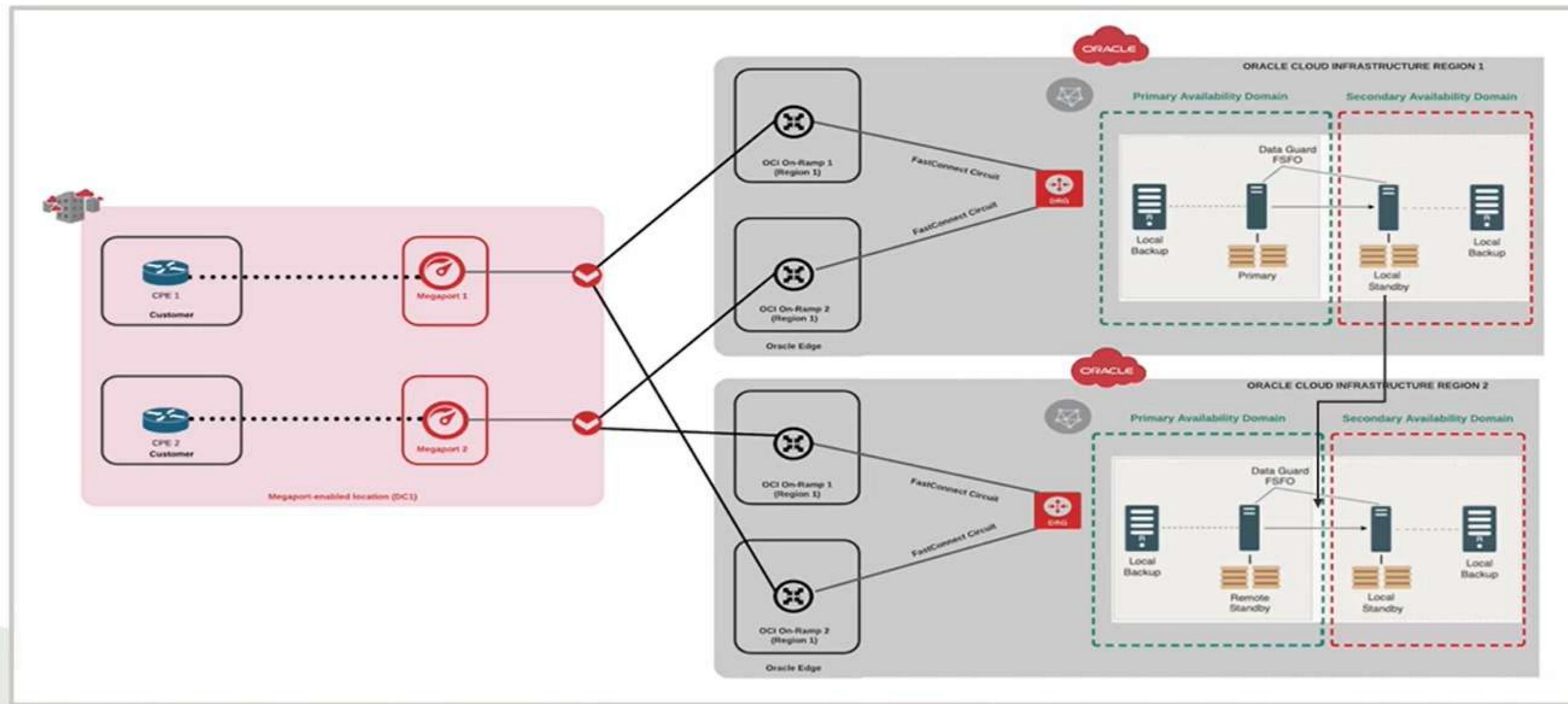
# Hybrid Cloud: Recommended Hybrid Sources/Destinations



- All Hybrid configurations are achieved manually: no Control Plane automation.
- On-premises non-Exadata to ExaCC/ExaCS is possible but beware of exclusive features.

# Maximum Availability Architecture for Multicloud

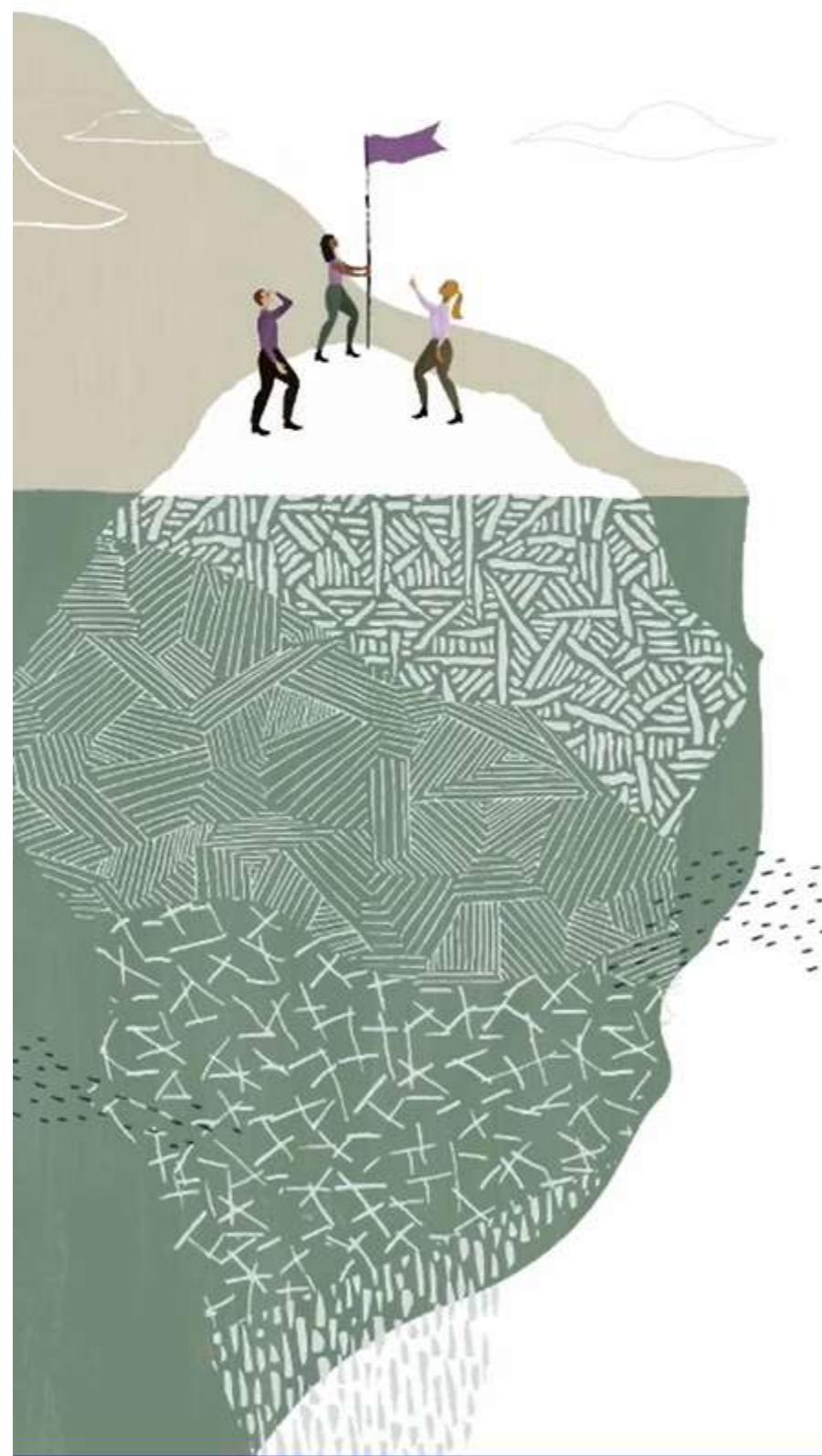
## Gold tier MAA example



- All multicloud configurations are achieved manually: no Control Plane automation.
- Azure Interconnect is available in some regions.

# Summary

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High Availability and Disaster Recovery are essential requirements for businesses today which require operations around the clock.

Oracle Maximum Availability Architecture (MAA) provides a tiered set of blueprints tailored to meet your RTO and RPO requirements.

Oracle MAA can be utilized to optimize business continuity for both planned maintenance and outage events across many different platforms spanning on-premises and cloud.