

ORACLE

Zero Data Loss Recovery Appliance

Technical Overview



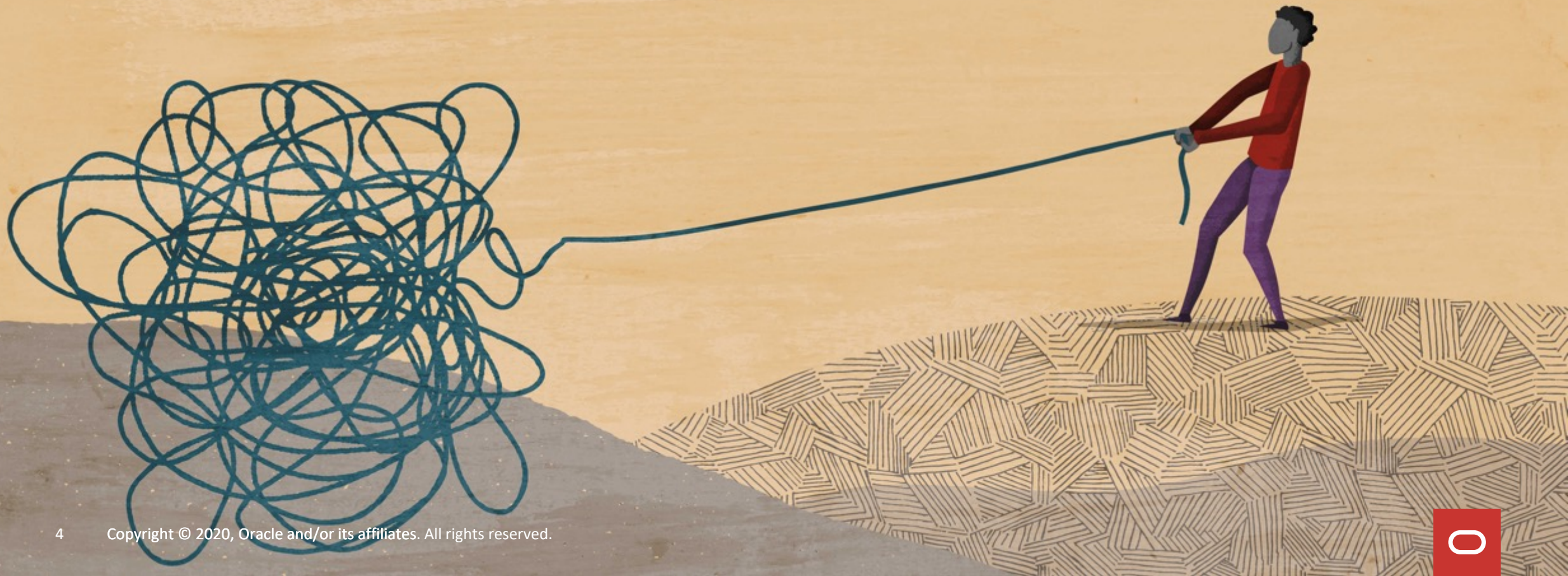
Safe harbor statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, timing, and pricing of any features or functionality described for Oracle's products may change and remains at the sole discretion of Oracle Corporation.

Agenda

1. Challenges of Backup & Recovery
2. Zero Data Loss Recovery Appliance Overview
3. Key Technology Pillars
4. Customer Success Stories
5. Summary

Challenges of Backup and Recovery



Ideal Backup & Recovery Solution

- **Minimal Impact Backup**
 - Backups finish quickly, with **no impact on applications**
 - Backups consume **minimal resources** and storage
- **Complete, Reliable, & Fast Recovery**
 - All completed transactions are recoverable (**zero data loss**)
 - **Point-in-time** recovery available (user error, ransomware...)
 - Recoverability status **validated** & **monitored** in real-time
- **Low Downtime Database Cloning & Migration**
 - Refresh test/dev environments using production backups
 - Move from legacy to modern OS platforms in a few steps



All Capabilities Scale-Out with Growing Database Environments

Most Backup Solutions Fall Short

- **High Impact to Production Applications**
 - Prolonged CPU & I/O load for full backups + dedupe
 - Application performance suffers
- **Inadequate Recovery Assurance**
 - Changes since last backup may be lost
 - Corrupt backups not easily discovered
 - No comprehensive DB recovery validation & status
- **Complex, Non-Scalable Cloning & Migration**
 - Myriad of scripts/procedures left over the years
 - Deploy larger and more backup servers and appliances



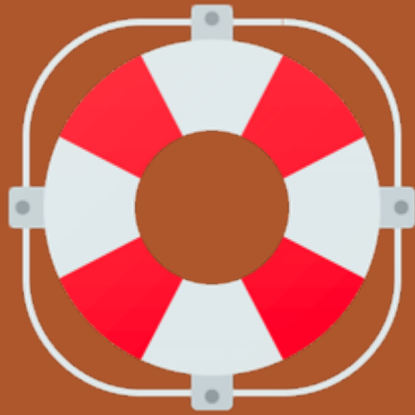
Cost and Complexity Rapidly Increase to Handle Scale

Greater Assurance for Less Cost

Technology Overview & Customer Perspective



Recovery Appliance: Key Technology Pillars



Recovery Assurance

Peace of Mind



Backup Savings

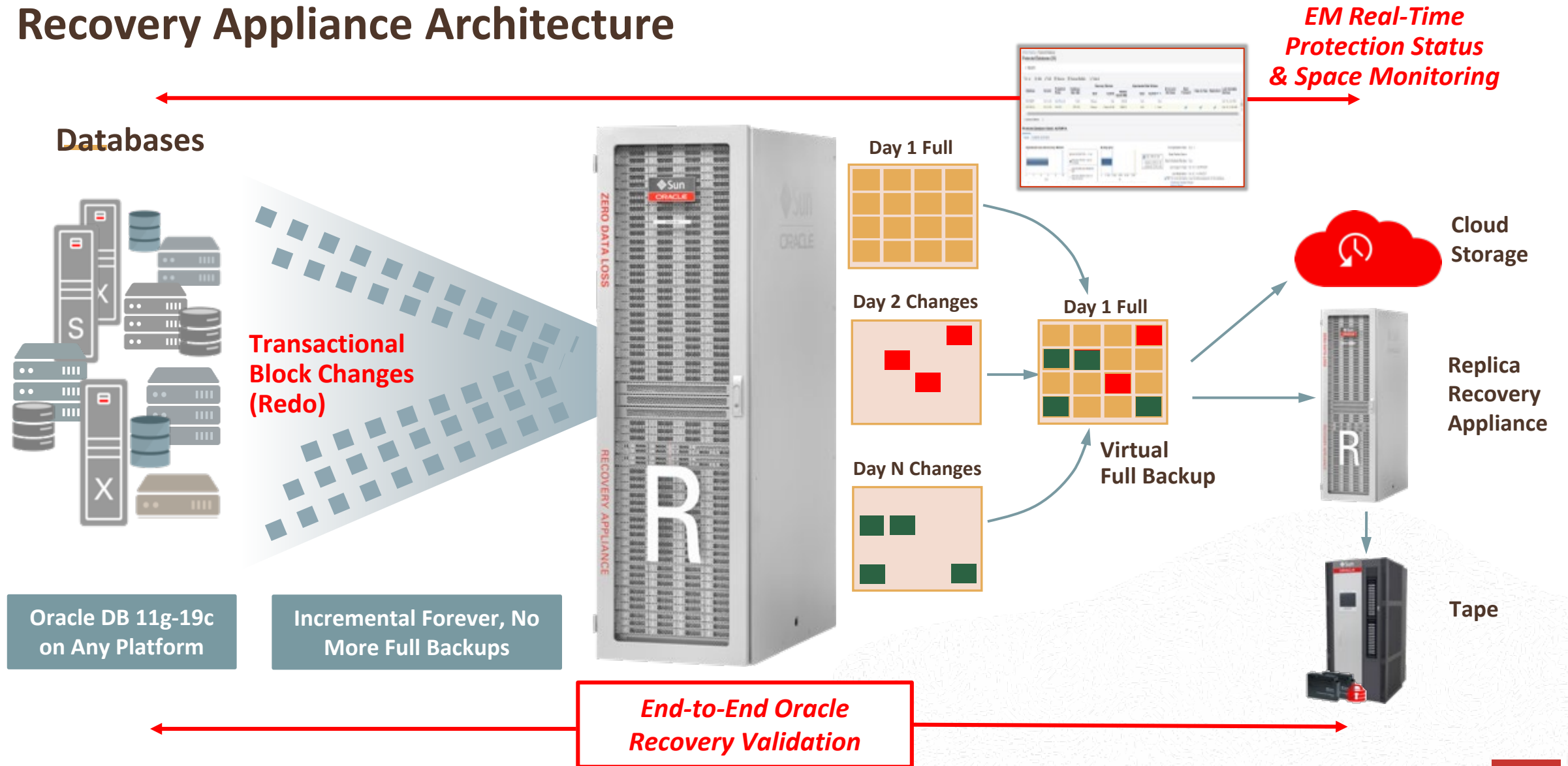
Efficient Enterprise



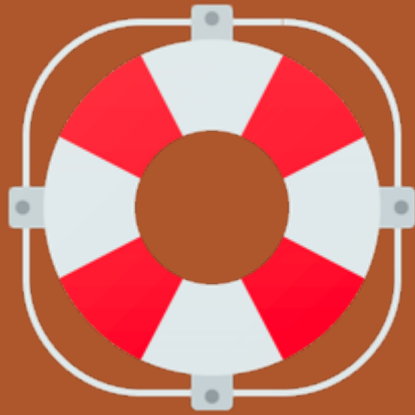
Cloud Scale

Flexible Growth Path

Recovery Appliance Architecture



Recovery Appliance: Key Technology Pillars



Recovery Assurance

Peace of Mind



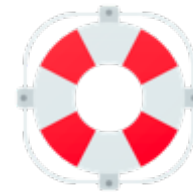
Backup Savings

Efficient Enterprise



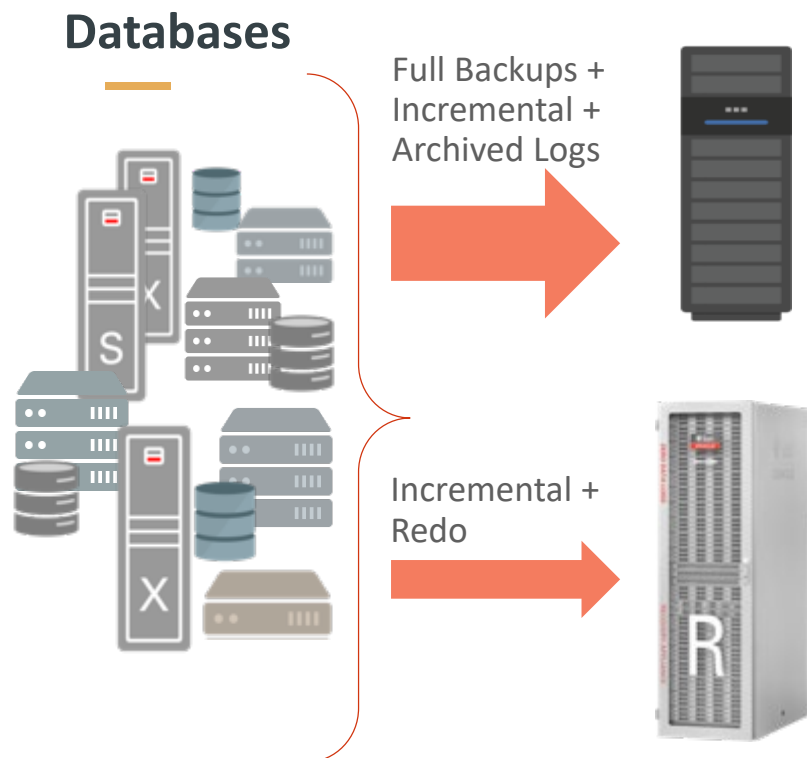
Cloud Scale

Flexible Growth Path



Recovery
Assurance

Recovery Appliance: Real-Time Database Protection



Generic Bit-Copy Backup Appliance

- Backup taken once a day
- Data loss exposure: all transactions since last backup

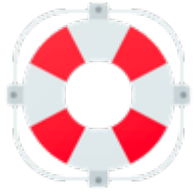
Zero Data Loss Recovery Appliance

- Continuous real-time redo from database memory buffers for immediate transaction protection

Data loss is inherently bad
Even worse..it creates *massive consistency issues across databases*

Data Loss Protection from Corruptions

Recovery Appliance Understands and Validates Database Formats End-to-end



Recovery Assurance

- Data validated on receive
- Data periodically revalidated
- Data validated on restore

Production Appliance



Cloud / Tape Archive



- Data validated when copied to and restored from cloud/tape

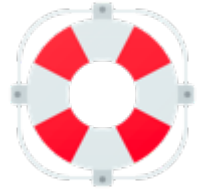
Remote Replica



- Data validated on receive, restore, & periodically on-disk

Real-Time Database Recoverability Status

Enterprise Manager-Integrated Monitoring, Alerting, and Reporting



Recovery Assurance

Real-time recoverability status for all databases at your finger tips:

Target Name	Database Size (GB)	Recovery Window			Unprotected Data Window		Errors/Warnings	Redo Shipping	Copy-to-Tape	Replication	Last Complete Backup
		Goal (days)	Current (days)	Needed Space (GB)	Threshold	Current					
store32	573.0	2.0	6.2	465.4	24.0 hrs	5.7 hrs			✓		Sep 4, 11:12 PM PDT
store33	473.0	2.0	6.4	449.0	24.0 hrs	< 1 sec		✓	✓		Sep 4, 11:16 PM PDT
store34	463.0	2.0	6.4	444.5	24.0 hrs	< 1 sec		✓	✓		Sep 4, 11:19 PM PDT

Current point-in-time-recovery window

Current amount of unprotected data



Alerts and warnings issued if a database is not meeting user-defined recovery goals or thresholds



Data Protection-as-a-Service: Policy-based management to meet Recovery SLAs throughout the enterprise



Recoverability Status & System Utilization Reports

World Leader in Aircraft Engine Manufacturing Eliminates Data Loss Exposure

5X to 10X Faster restore times

Up to the moment

Recovery possible

Gained Validated backup confidence



- **Zero data loss:** real-time protection; recover up to the moment without transaction loss
- **Data integrity:** ongoing validation; know backups are good
- **Data recovery:** database-level corruption detection & repair
- **Quick restore:** < 1 hour
- **Confidence and peace of mind:** no more late night calls!

Recovery Appliance: Key Technology Pillars



Recovery Assurance

Peace of Mind



Backup Savings

Efficient Enterprise



Cloud Scale

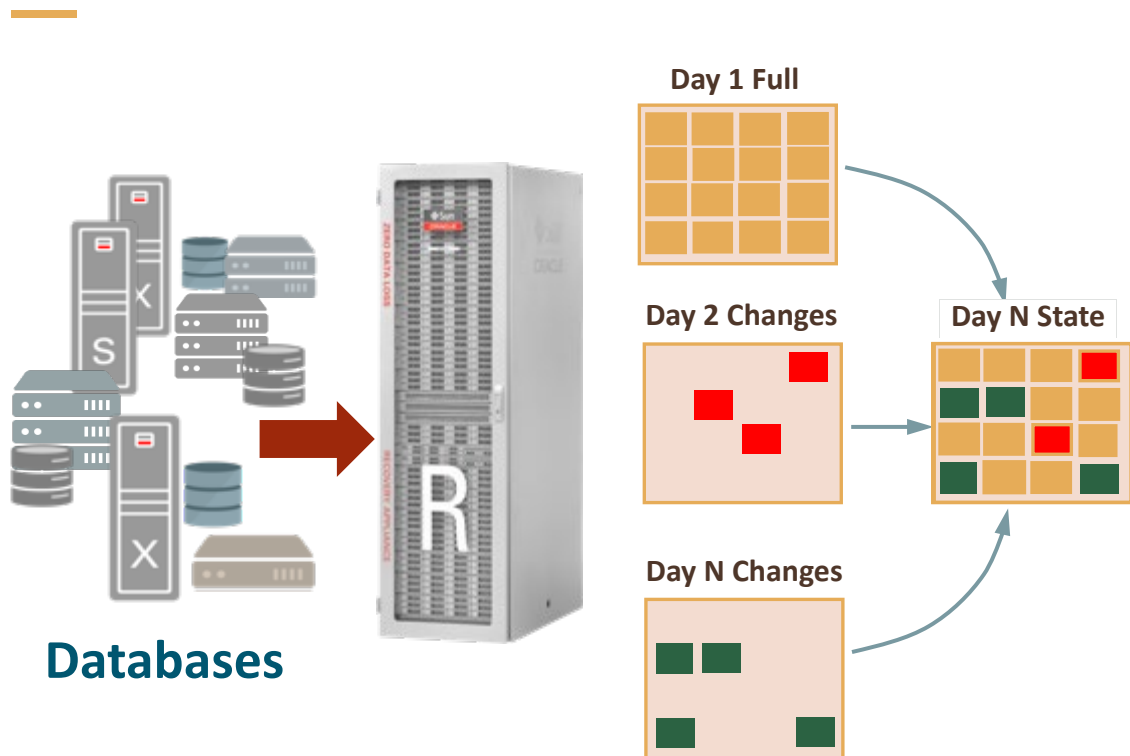
Flexible Growth Path



Backup Savings

Space-Efficient “Virtual” Full Backups

No More Full Backups: Incremental Forever Architecture



- After one-time full backup, incrementals used to create **virtual** full database backups on a daily basis
 - Pointer-based representation of physical full backup as of incremental backup time
 - Virtual backups typically 10x space efficient
 - Enables long backup history to be kept with the smallest possible space consumption
 - **“Time Machine” for database**
- 10X less backup processing on production servers
- 10X less backup network consumption

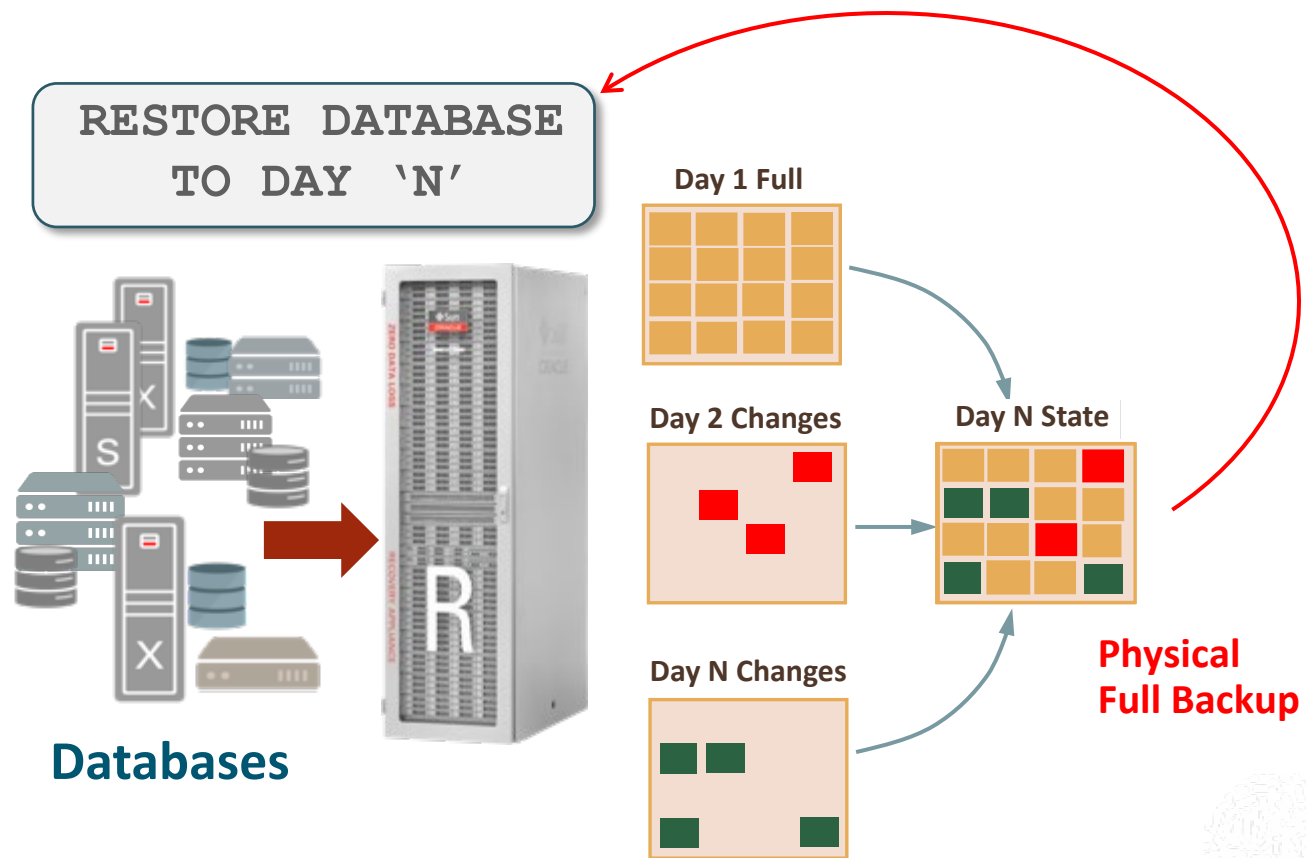




Backup Savings

Fast Restore to Any Point-in-Time

No Incremental Apply = No Load on Production Server



- Directly restore any virtual full
 - All blocks referenced from virtual full are efficiently retrieved to create physical full
 - Eliminates production server overhead of traditional restore and merge of incrementals

Inherits scalability and performance via Exadata-based hardware platform



Korean Credit Card Issuer Achieves Sub-Second Recovery Point Objective

13X

Faster backup
performance

65%

Capacity savings over
Data Domain

\$850M

a month in payments processed
without data loss



KEB Hana Card

“We selected Oracle’s Zero Data Loss Recovery Appliance over Data Domain because only Oracle could offer the incremental-forever backup feature, enabling us to virtually eliminate data loss exposure and ensure data security.”

Iljoon Lee, Senior Manager, IT team,
KEB Hana Card Co., Ltd.

New York Stock Exchange Backup and Restore Experience



Oracle Solution

RA X6 - 5 cells (180 TB)

Backup Rate – 11.84 Gbs

Backup Size – 8.5 TB

Backup Time – 67 Min

Restore Rate – 9.33 Gbs

Virtual Restore Time – 124 Min

of channels: 16

+ Stores Real-Time Redo &
Eliminates Archived
Log Backup Time



Recovery Appliance
is just

FASTER



3X Faster Backup

2X Faster Restore

4X Faster Restore

Other Storage Team Solution

Leading Deduplication Device

Backup Rate – 7.26 Gbs

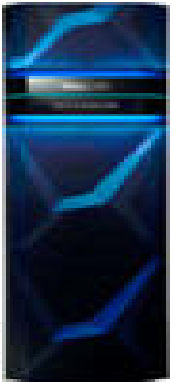
Backup Size – 12.64 TB

Backup Time* – 237 Min

Restore Rate – 7.03 Gbs

Restore Time** – 245 Min

of channels: 48



Recovery Appliance: Key Technology Pillars



Recovery Assurance

Peace of Mind



Backup Savings

Efficient Enterprise



Cloud Scale

Flexible Growth Path



Cloud Scale

Recovery Appliance X8 / X8M

Entry-Level to Multi-Rack Configurations



Base Rack

2 Compute Servers, 3 Storage Servers
155 TB Usable / 1.55 PB Virtual
15 TB/Hr Restore

**Add
Storage
Servers
As Needed**



Full Rack

2 Compute Servers, 18 Storage Servers
949 TB Usable / 9.5 PB Virtual
24 TB/Hr Restore

**Add
Racks
As Needed**



18 Racks

36 Compute Servers, 324 Storage Servers
17 PB Usable / 170 PB Virtual
432 TB/Hr Restore

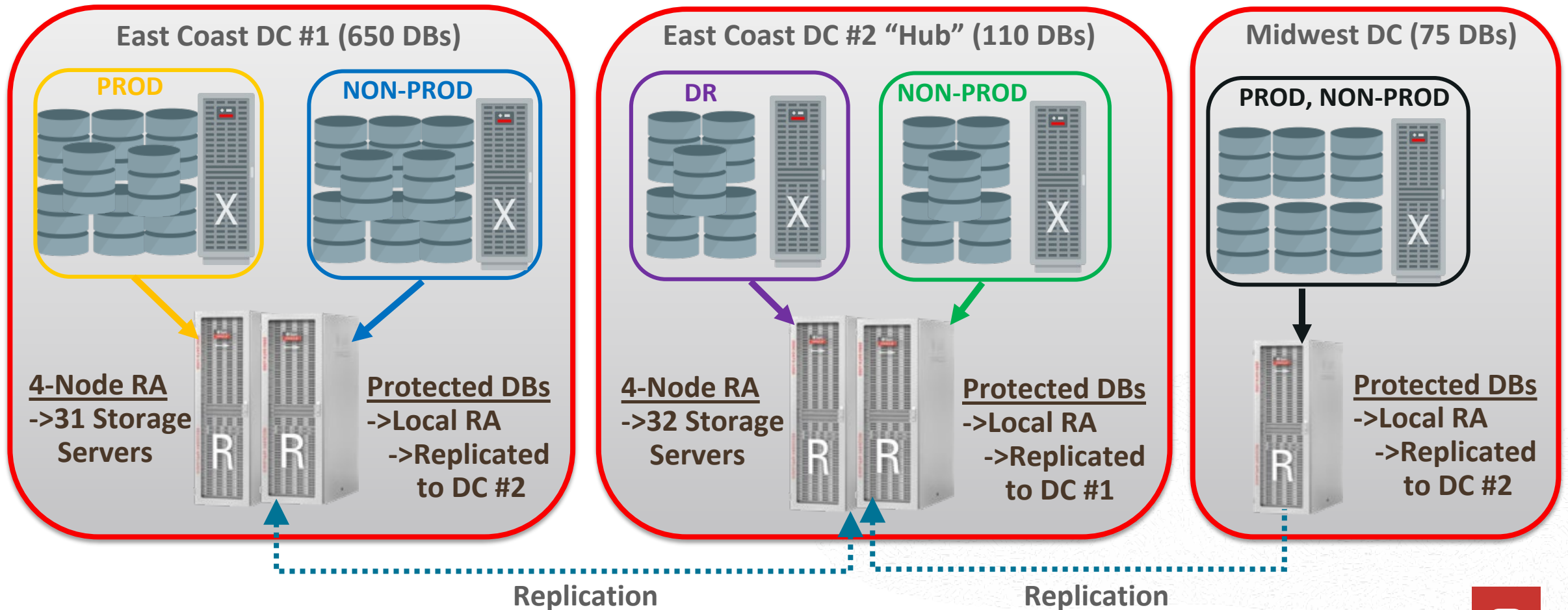


Cloud Scale

Anthem Recovery Appliance Architecture

Leading North America Health Benefits Company – 40M+ Members

800+ Protected Databases, 3 Data Centers, Bi-Directional + Hub & Spoke Replication



Anthem Recovery Appliance Benefits Realized

3X to 5X

Faster backup and
recovery rates

Incremental
Forever

Significantly
reduced backup times

Visibility

End to end control of
backup and recovery
process

“We’ve seen significant cost savings using Recovery Appliance. We are on target to meet our savings goal in the first 3 years with the appliance.”

Global Financial Services Company Experiences



Cloud Scale

Before Recovery Appliance

- 60% Restore Failure Rate
- 4000 Failed Backups per Month
- Regulatory Non-Compliance
- Costing \$2.5M per Year to Correct

With Recovery Appliance

- Consistent 4X Faster Recovery
- Consistent 4X Faster Backup
- Saving Multi-\$M per Year by eliminating Tier 1 staging disk
- *Enterprise-Wide Protection Monitoring*
- *Automated Backup Failover for High Availability*
- *Looking into Oracle Cloud Storage as alternative to tape for long-term needs: \$20M+ savings over 5-year period*

Recovery Appliance Archive to Cloud

- **Easily extend backup retention with Cloud Backups**

- Leverage a cost-effective, integrated cloud storage tier managed by Oracle (DB Backup Cloud Service)
- Eliminate tape vaulting services in regulated environments
- All archival policies/schedules managed by the appliance

- **Backups in the Cloud use standard RMAN format**

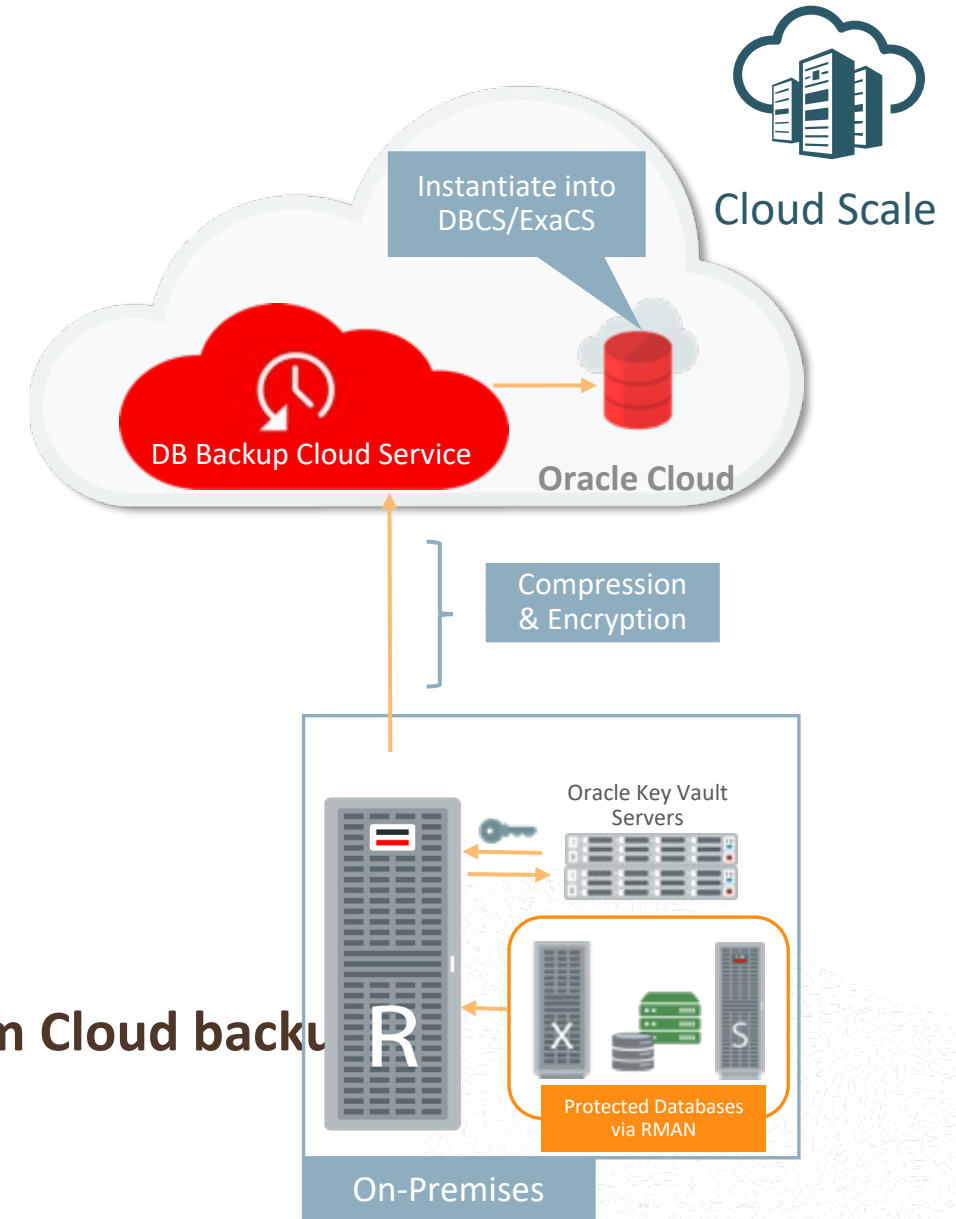
- Fully restorable directly from Cloud

- **Accelerates journey into Cloud**

- Easy provisioning of Cloud Databases directly from Cloud backups

- **Archive backups are encrypted**

- Leverages Oracle Key Vault for Key Management



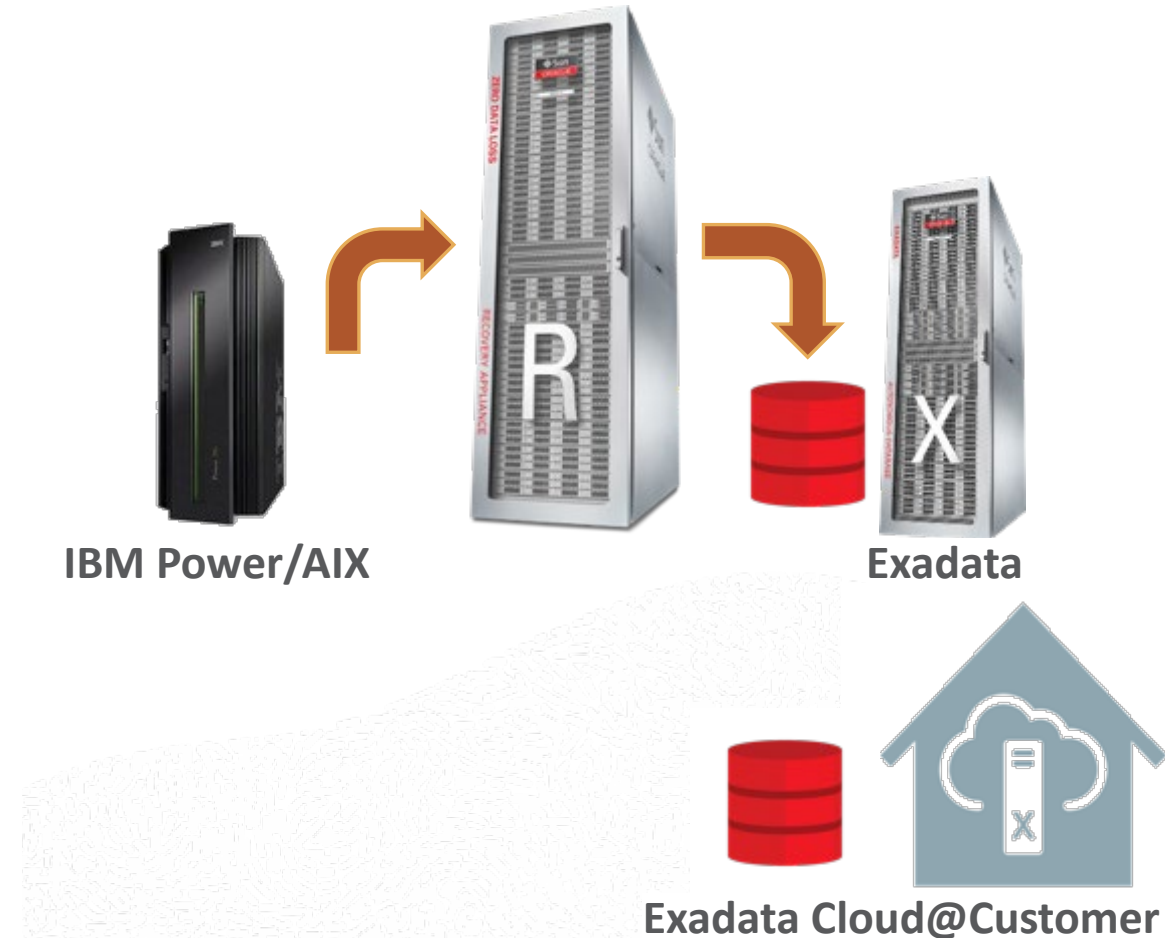


Cloud Scale

Zero Data Loss Cross-Platform Database Migration

Simple Platform Migration for On-Premises and Cloud@Customer Environments

- Significant **reduction in downtime** – less than 2 hour read-only downtime, regardless of size.
- New automation tool **simplifies & speeds** platform migration steps - especially useful for large databases
- Supports **same and cross-endian platform** migration activities
- Cross Platform Database Migration using ZDLRA (MOS Note 2460552.1)



Global Food Distributor and Retailer Enables Rapid Recovery

30X Faster backups

4PB Of critical data rapidly protected

900 DBs Migrated to Exadata C@C using ZDLRA with minimal downtime

A woman with dark hair, wearing a dark blue jacket and a high-visibility yellow safety vest, is looking at a handheld device. The background is a blurred warehouse or store aisle with blue shelving units.

“The Recovery Appliance helps us migrate databases, especially when you have to do cross-platform migrations. And what we want to do in the next couple of years is to migrate from IBM to Oracle Cloud at Customer.”

Soner Toraman, Product Owner – Relational Databases

METRONOM

Summary

World's Best Database Protection

Recovery Assurance

- Real-time Database Protection
- Real-time Recovery Validation Status
- Fast Virtual Full Recovery

Backup Savings

- Efficient Incremental Forever
- Offload All Backup Processing
- Free Production Resources

Cloud Scale

- Start Small, Grow Incrementally
- Unlimited Cloud Storage Tier
- Simplify Database Migration



Additional Resources

Recovery Appliance on Oracle.com

- <https://oracle.com/recoveryappliance>

Maximum Availability Architecture Best Practices

- <https://tinyurl.com/zdlramaa>

Product Collateral & Customer Presentations

- <https://tinyurl.com/zdlraresources>



Thank you





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