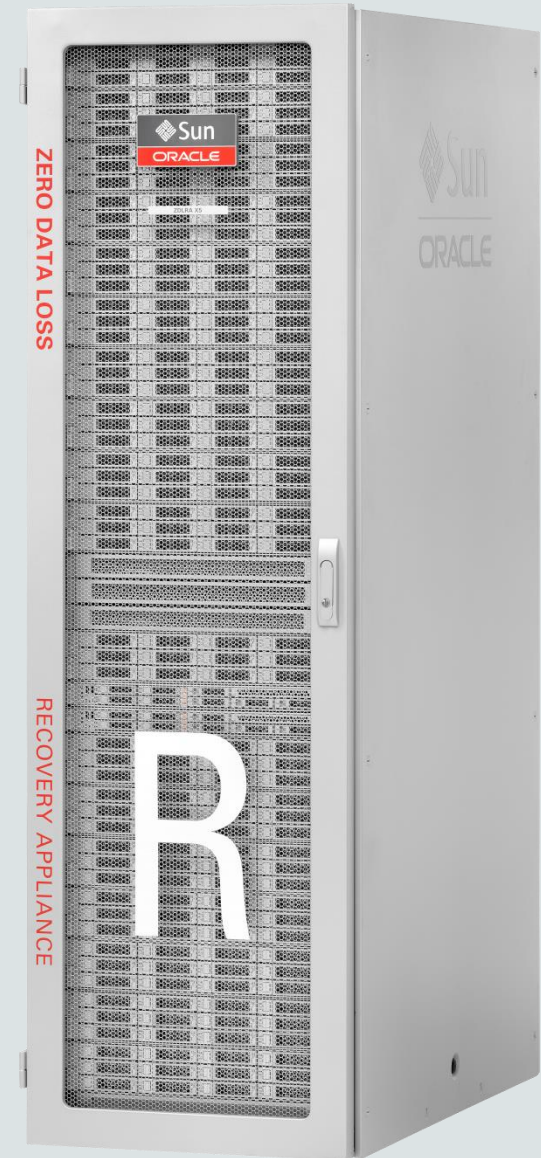# Zero Data Loss Recovery Appliance

Technical Overview

Sudhakar Kotagiri
Recovery Solutions Specialist

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, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

BACKUP IS ONE THING
RECOVERY IS EVERYTHING

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Program Agenda

1 Today's Data Protection Goals & Challenges

2 Recovery Appliance: A Fundamentally Different Approach

3 Protection as a Service

4 Centralized Data Protection Management

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Key Database Protection Goals

- **Business Goals**
  - <u>Never</u> lose critical business data
  - <u>No impact</u> on business applications
  - Reduce Storage Spend (ROI)

- **I.T. Goals**
  - Ensure <u>database level</u> recoverability
  - Speed and Agility
  - <u>Centralized service</u> to protect all databases
  - End-to-end control and visibility of the environment

Current backup appliances fail to achieve these goals

Backup Appliances Are Not Designed for Database

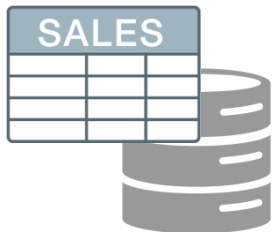**Treat Databases as Just Files to Periodically Copy**

Data Loss Exposure

Lose all data since last backup

Daily Backup Window

Large performance impact on production

Poor Database Recoverability

Many files are copied but protection state of database is unknown

Many Systems to Manage

Scale by deploying more backup appliances

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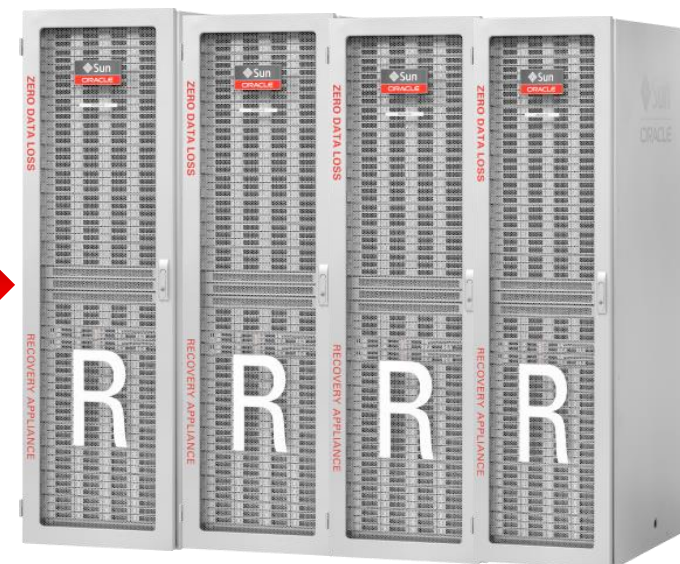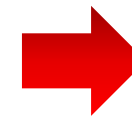# Need a Fundamentally Different Approach to Protect Business Critical Database Data

Zero Data Loss Recovery Appliance

Recovery Appliance Scale-Out Configuration

Base Rack
2 Compute Servers
3 Storage Servers
94TB usable capacity
5TB/hr backup/restore

Base Rack +
6 Storage Servers
2 Compute Servers
9 Storage Servers
288TB usable capacity
7TB/hr backup/restore

Full Rack
2 Compute Servers
18 Storage Servers
580TB usable capacity
12TB/hr backup/restore

Expand to 18 Racks
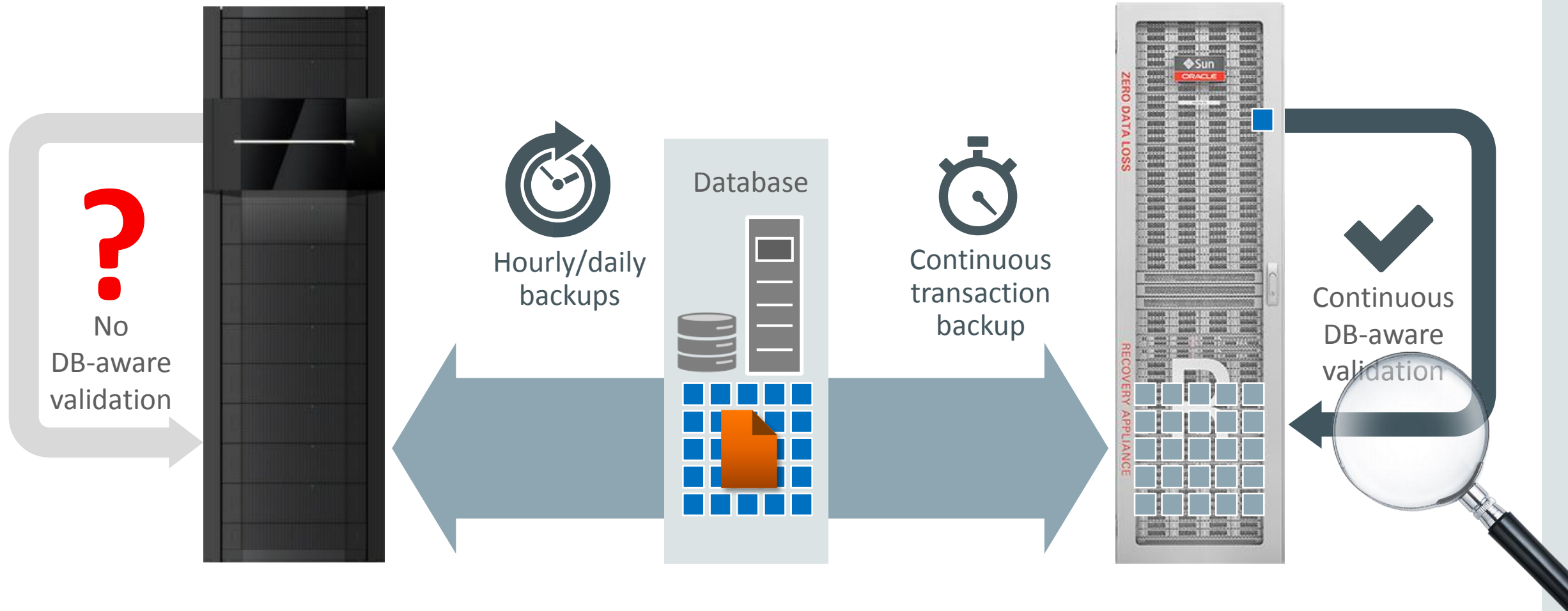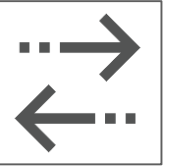**36 Compute Servers**
324 Storage Servers
10PB usable capacity
216TB/hr backup/restore

General Purpose Backup Versus Fiduciary Class Backup

Continuous Protection and Integrity Checking

?

No
DB-aware
validation

Hourly/daily
backups

Database

Continuous
transaction
backup

ZERO DATA LOSS

RECOVERY APPLIANCE

Continuous
DB-aware
validation

General Purpose Backup Deduplication Increases Risk

Multiple Security Gaps, Management Fragmentation and Insertion Points

Security Gaps and Inefficiencies

Encryption and redaction at the Database

Risk

Risk

Risk

Data unencrypted, uncompressed and full copies given to third-party deduplication agent

Unencrypted, uncompressed, deduplicated backups sent to deduplication appliance then encrypted

Fragmented backup management with no ownership

BLAKE
DBA

Risk

LIZ
Backup Admin

Risk

TURNER
Storage Admin

Risk

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Oracle Database Best Practices: Fully Integrated Security

Defense In-Depth From End-to-End Keeps Cyber-Attacks At Bay

TDE encryption and redaction at the Database

Integrated with RMAN Backups

Encrypted, compressed, incremental backups direct to Recovery Appliance
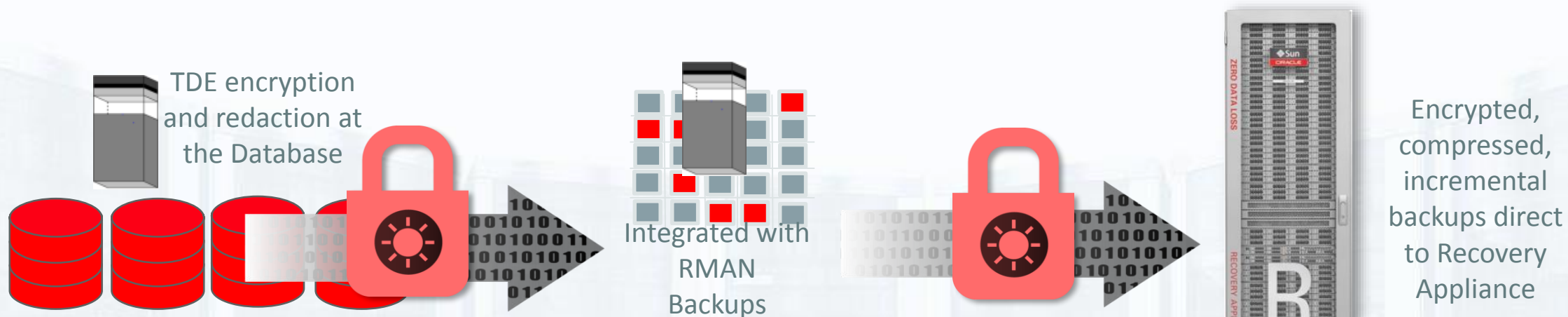
Enterprise Manager centrally monitors and manages database protection
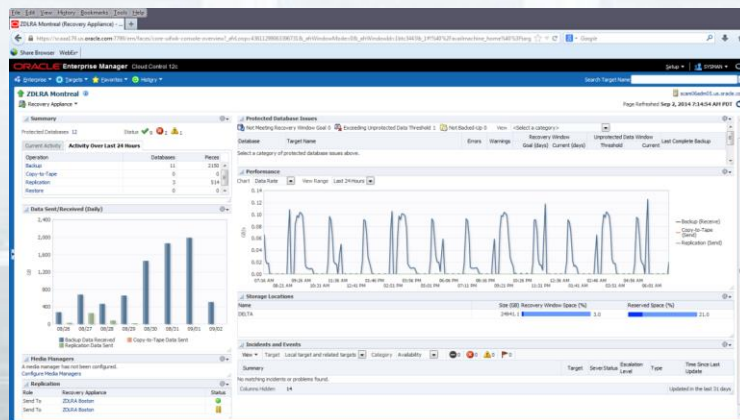
Recovery Appliance Unique Benefits for Business and I.T.

Eliminate Data Loss

Real-time redo transport provides instant protection of ongoing transactions

Minimal Impact Backups

Production databases only send changes. All backup and tape processing offloaded
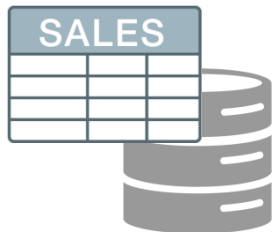
Database Level Recoverability

End-to-end reliability, visibility, and control of databases - not disjoint files

Cloud-Scale Protection

Easily protect all databases in the data center using massively scalable service

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ZDLRA Architecture
Delta Store, Incremental Forever, Virtual Full Backups, Remote Logging

Restore

Copy to Tape/VTL

Restore Database to Day "N"

Day N Virtual Full

Day 1 Virtual Full

Delta Push

Day 0 Full

Day 1 incremental

Day N incremental

Protected Databases

Remote Log Capture

Replica

Delta Store

Online & Archived Redo
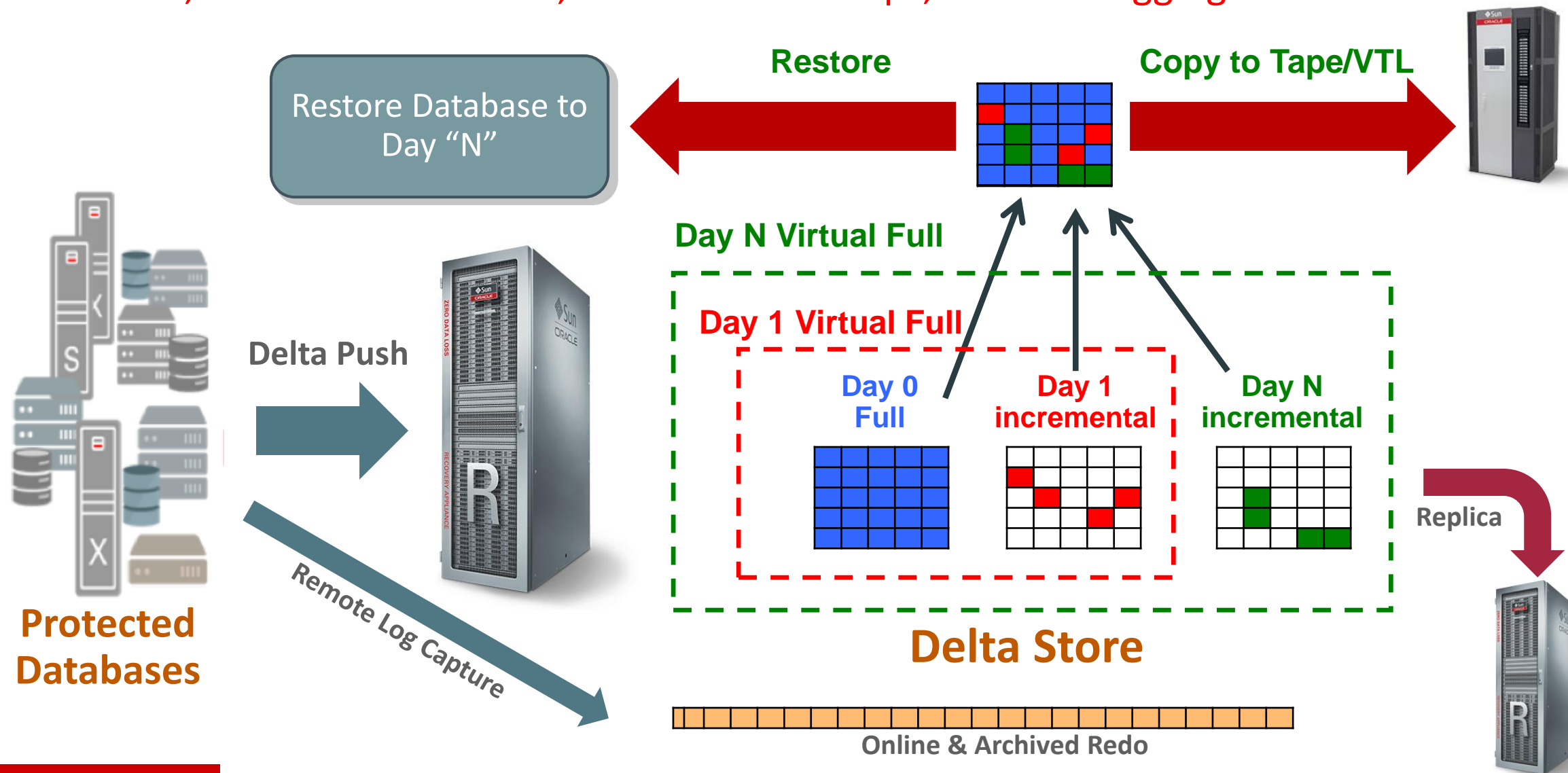
ZDLRA – Superior Approach (Virtual Full)

Incremental Forever + Remote Logging

One Time Full

Day N Virtual Full

Day 1 Virtual Full

Last Modified Blocks

Day 0 Full

Day 1 incremental

Day N incremental

Oracle Enterprise Manager Cloud Control

Integrated Catalog within ZDLRA

Zero Data Loss

Last Incremental

Daily Delta Push

Sun Mon Tues Wed Thurs Fri Sat Sun Mon Tues Wed Thurs Fri Sat Sun Mon Tues Wed Thurs Fri Sa
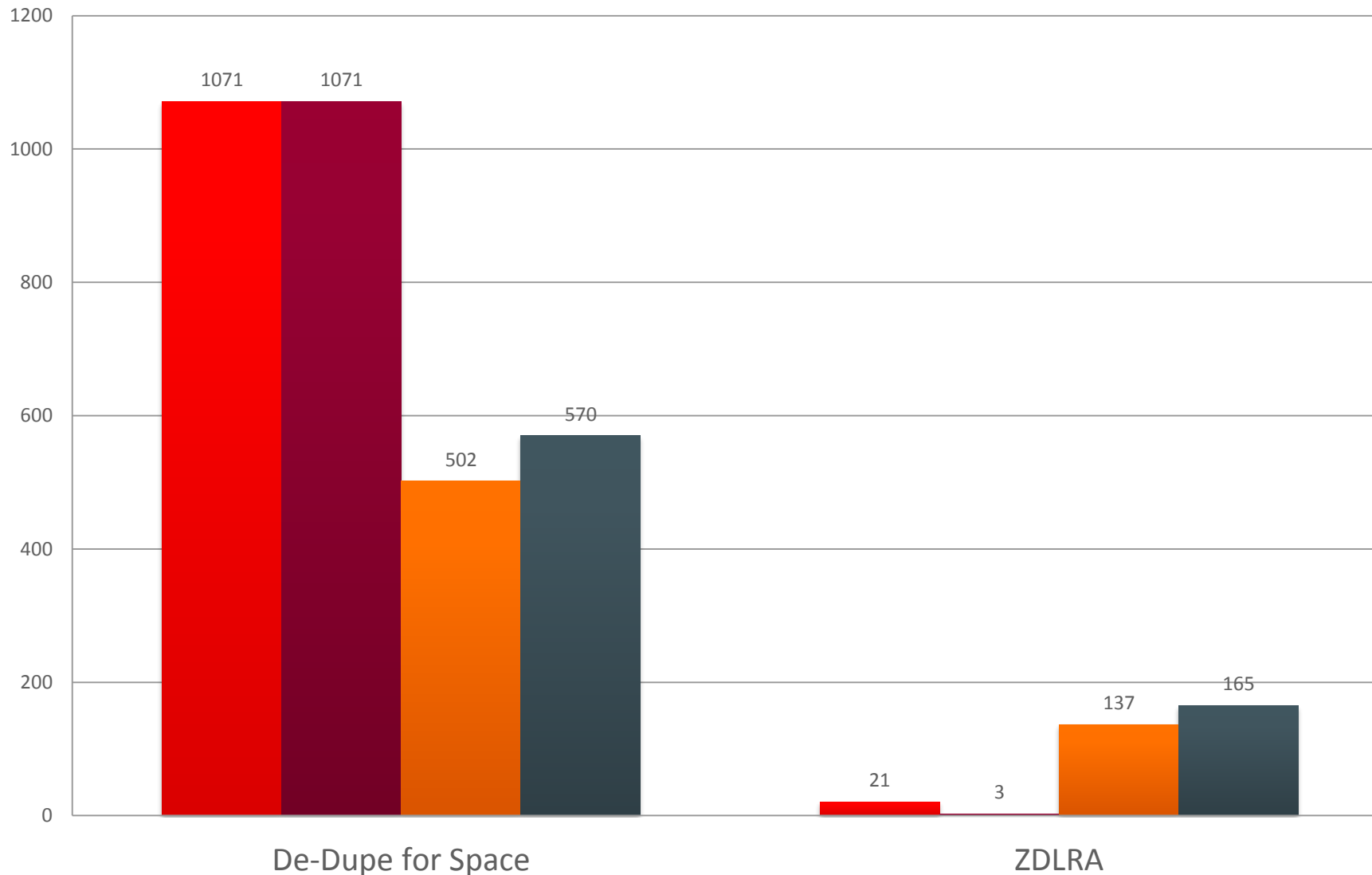
Multiple Restore Points

Remote Mirrored Redo Stream

PROD

NOTE: Recovery Appliance has the advantage that RMAN can recover virtual full backups to any point in time *without applying incremental backups.*

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Daily Full Backup vs. ZDLRA

200 Databases
150TB Data
2% Daily Change
2% Daily Redo Generation

- ■ Weekly SAN I/O (TB)
- ■ Weekly Backup Time (h)
- ■ Monthly WAN Transfer (TB)
- ■ Space (TB) - 30 day retention

US Based Manufacturing Company

De-Dupe for Space: 1071, 1071, 502, 570

ZDLRA: 21, 3, 137, 165
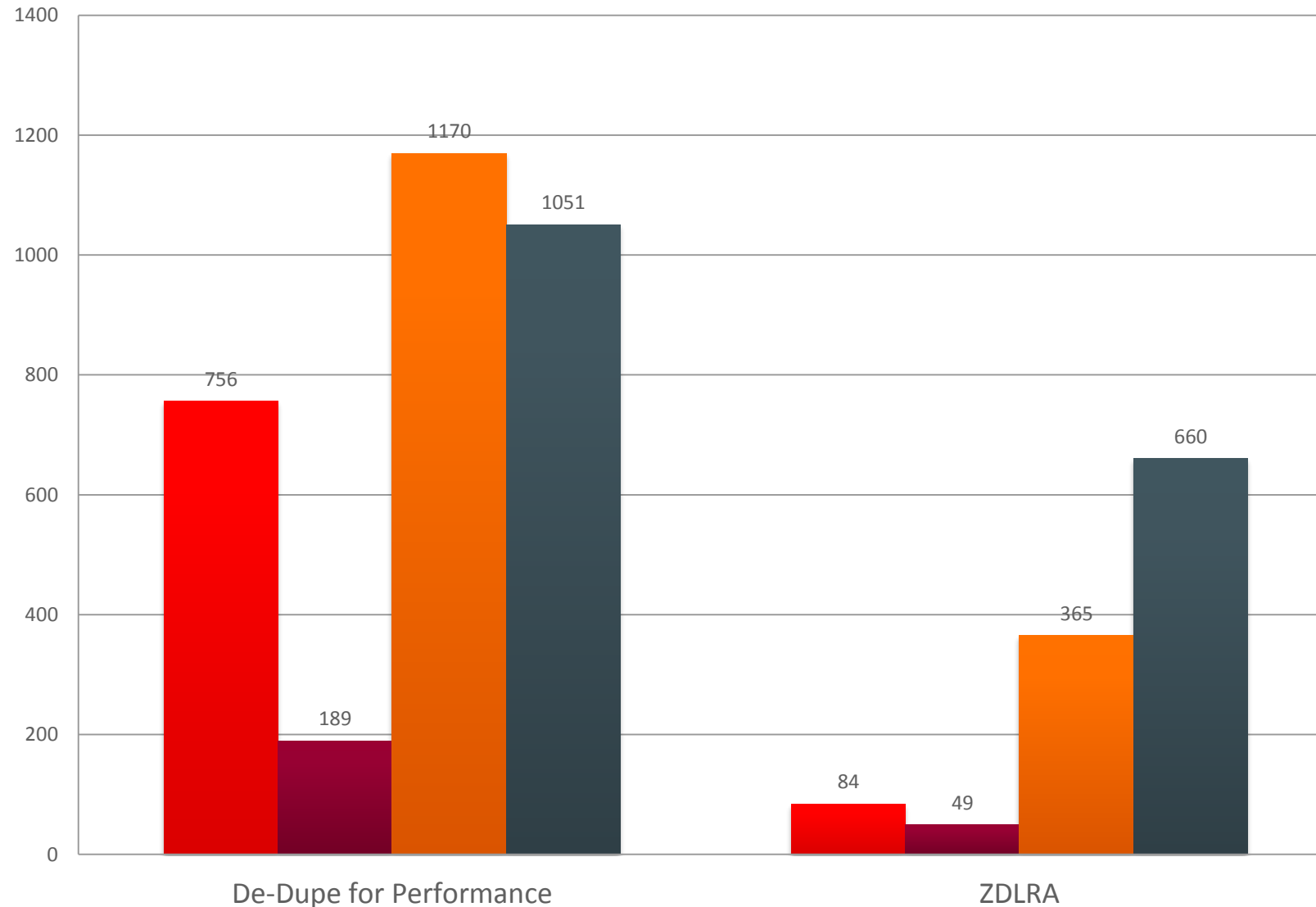
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Weekly Full Daily Incremetal vs. ZDLRA

800 Databases
600 TB Data
2% Daily Change
2% Daily Redo Generation

- Weekly SAN I/O (TB)
- Weekly Backup Time (h)
- Monthly WAN Transfer (TB)
- Space (TB) - 30 day recovery window

US based Healthcare Company

De-Dupe for Performance: 756, 189, 1170, 1051
ZDLRA: 84, 49, 365, 660

AMMROC

Leading Military Maintenance, Repair and Overhaul Provider for Jet Aircraft

32X

faster backups—from 48 hours to 90 minutes

8X

faster restores—from 8 hours to 1 hour

Any point-in-time
Recovery now possible

Renee Reed
U.S. ERP Platform Leader
GE Aviation

Restore
2 to 4 hrs
vs.
20 hrs

DB Clone
hours
vs.
days

Recovery
Recovery now possible up to the point of loss

Database Protection as A Service
- Defined Class of Service

Data Validation & Repair

Points of Validation

- Ingest of Backupsets & Redo Logs
- Indexing Backupsets into Delta Store
- Replicating Backupsets & Redo Logs
- Optimization of the Delta Store
- Timer Based Validation
- Validation during Restore
- Mirror Sync Validation

Automated Data Repair

- Fill redo gaps using FAL
- Repair using source database
- Repair using replicated data
- Mirrored disk repair

Reporting Validation Status

- Alerts on Unable to Repair
- Reports on Repair Actions
- Repair Job Execution

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Policy-Based Cloud-Scale Database Protection

Gold Policy – Customer Critical

Disk: 35 days
Tape: 90 days

Silver Policy – Internal Critical

Disk: 10 days
Tape: 45 days
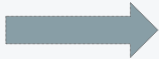
Bronze Policy - Test/Dev

Disk: 3 days
Tape: 30 days
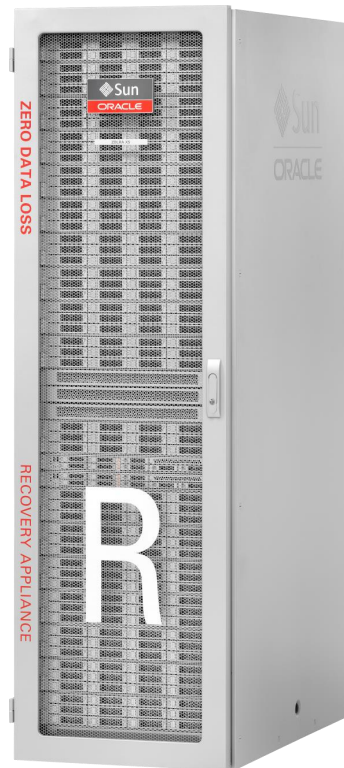
Tape

Replica

<u>Recovery Appliance
Protection Policies</u>

• Standardized
  recovery window,
  tape retention,
  replication policies

Replica Recovery
Appliance also
Policy-Based

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Data Loss Protection from Site Disasters

Local Data Center

Remote Data Center

One Way

Bi-Directional

Hub & Spoke

Tape Library
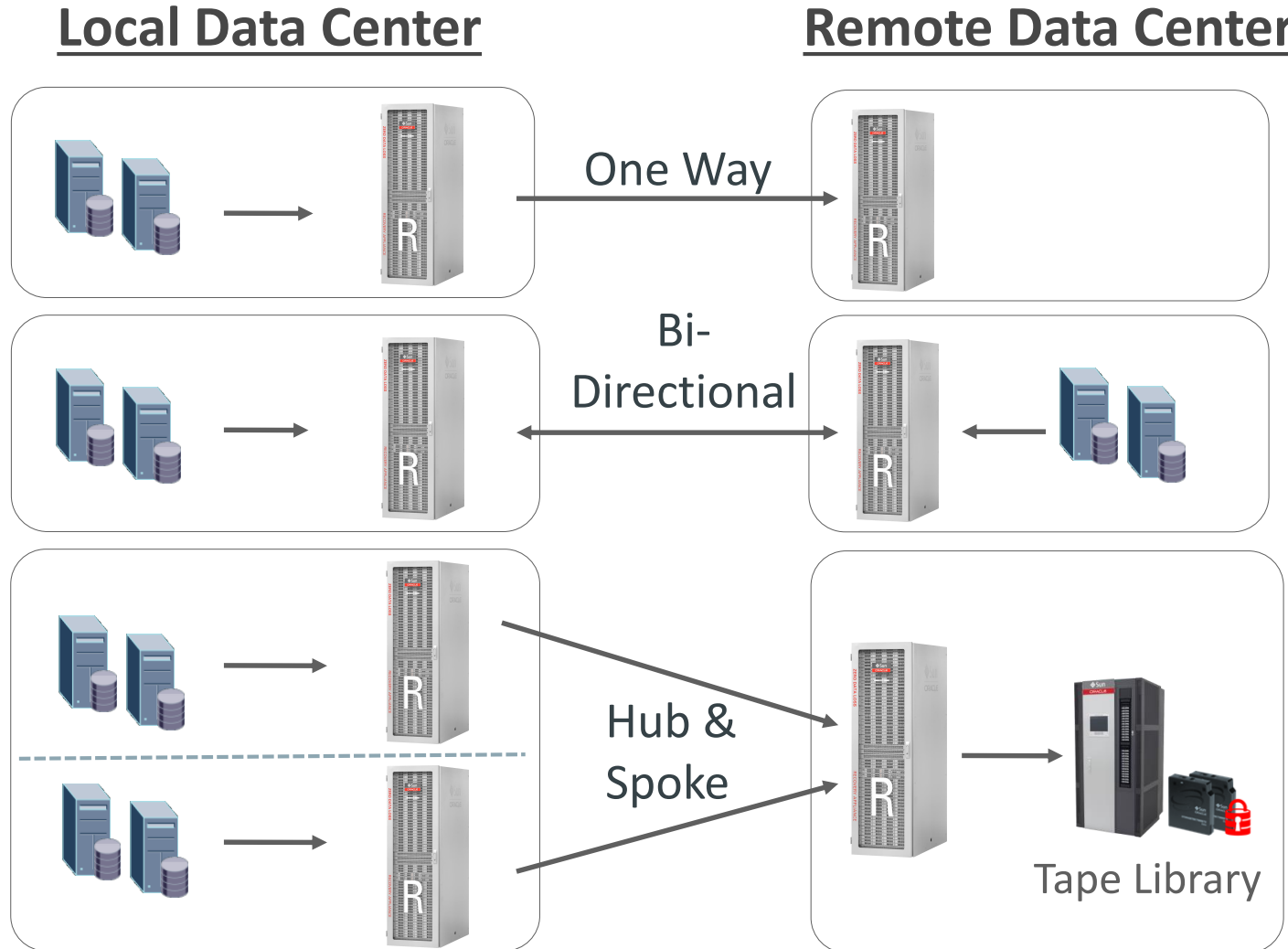
- Replication to Remote Appliance protects data from disasters or site failures
- Automated restore from Local Appliance or directly from Remote Appliance

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Enhanced Separation of Duty

- New parameter in protection policy to block RMAN DELETE operations on backups stored in the appliance

  – Prevents single admin (DB or RA) from deleting DB **and** its backups

  – Storage appliances have **zero awareness** of errant DELETE operations, which can lead to compromise of business SLAs

  – Significant differentiator illustrating *centralized, database-aware protection as a service* vs. generic file backups

Gold Tier Protection Policy

"DELETE BACKUP .."

"DELETE BLOCKED!"

ALLOW_BACKUP_DELETION = 'NO'

ZERO DATA LOSS

RECOVERY APPLIANCE
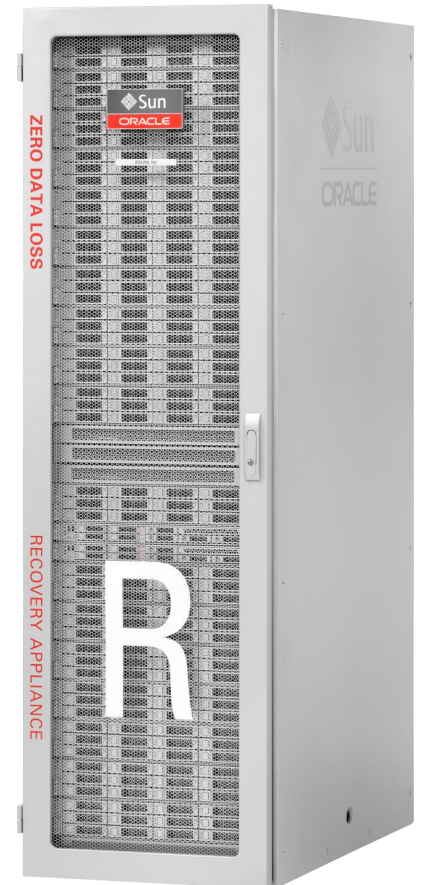
Centralized Management of 100s of Databases

Recovery Appliance Home Page

Dashboard for Current Status of the Backup Domain

- Sections include:
  - Summary of current and recent activity
  - Protected database backup/recovery issues
  - Daily data sent / received
  - Performance
  - Media Manager status
  - Replication status to / from
  - Storage Location status
  - Incidents and Events
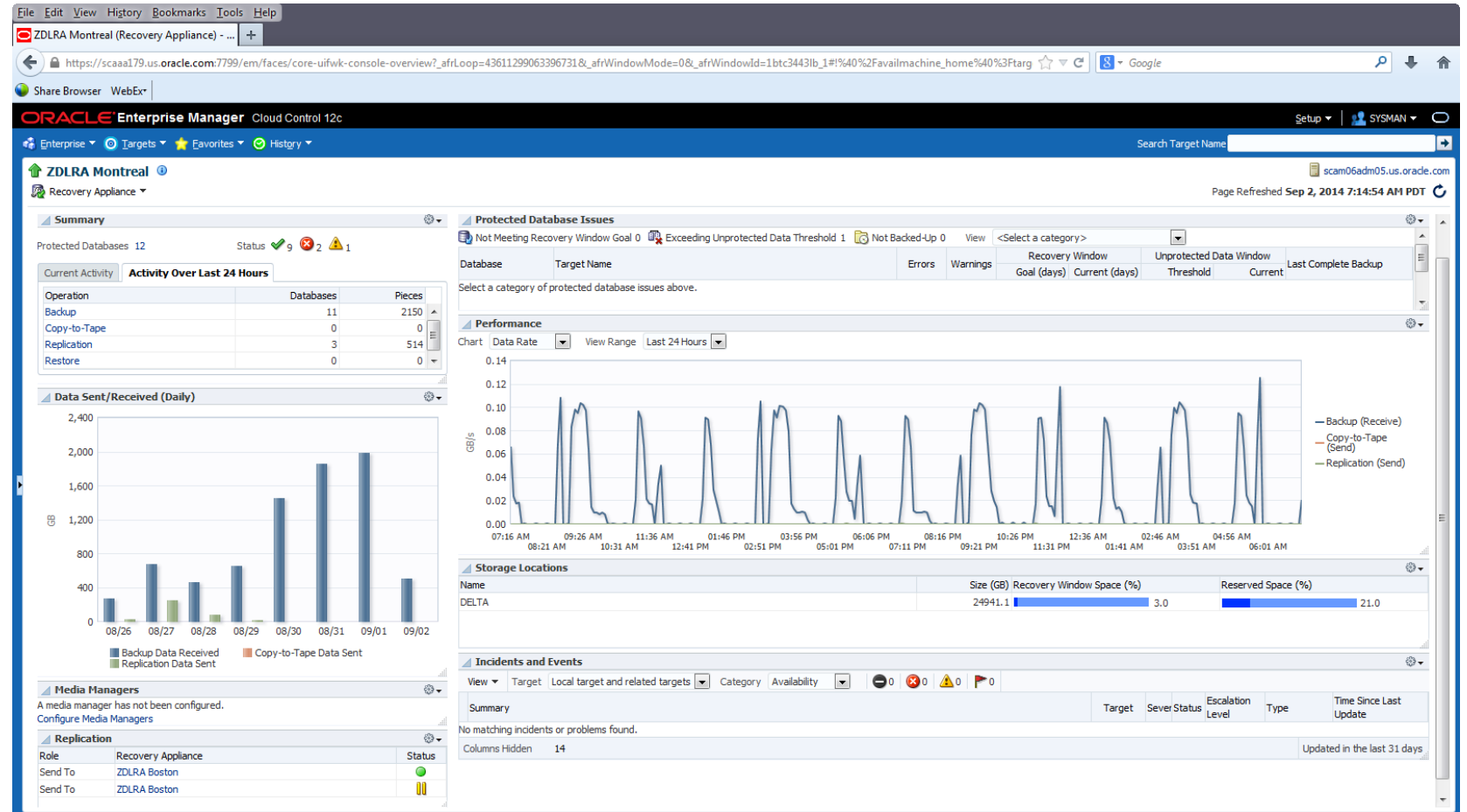
ZDLRA – Backup Status (EM)

Recovery Appliance: Recovery Window Summary

Recovery Window Summary: ZDLRA

16.67%

83.33%

Databases Meeting All Recovery SLAs Databases Not Meeting Recovery SLAs
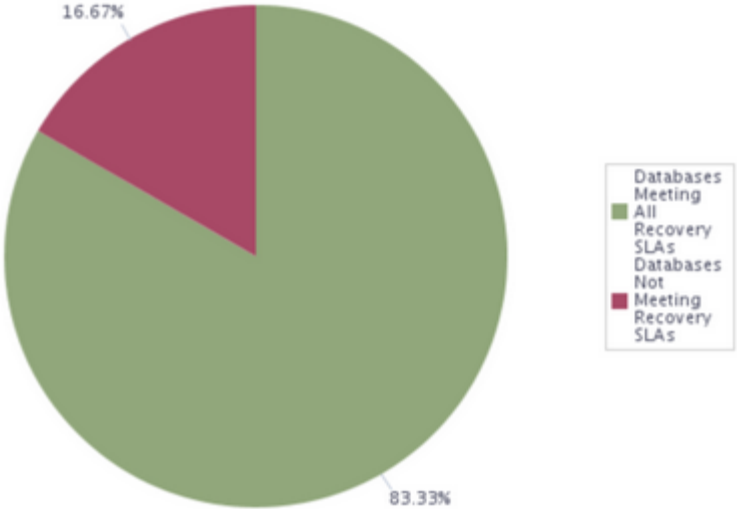
		ZDLRA	Total
		PRODUCTIONSTANDARD	
Databases Meeting All Recovery SLAs	Meeting Recovery Window Goal and Within Unprotected Data Window Threshold	5	5
	Exceeding Unprotected Data Window Threshold and Not Meeting Recovery Window Goal	0	0
Databases Not Meeting Recovery SLAs	Exceeding Unprotected Data Window Threshold but Meeting Recovery Window Goal	1	1
	Not Meeting Recovery Window Goal but Within Unprotected Data Window Threshold	0	0
Total		6	6

Database Requiring Attention.

NOTE: Partial REPORT Displayed

ZDLRA - Capacity Planning (EM)

Recovery Appliance: Capacity Planning Details

Storage Capacity Planning Details

Last 7 Days

Database Count

Storage Available

Auto Capacity Adjustment when Window Goal reset

Recovery Window Space

Legend:
- Storage Location Size
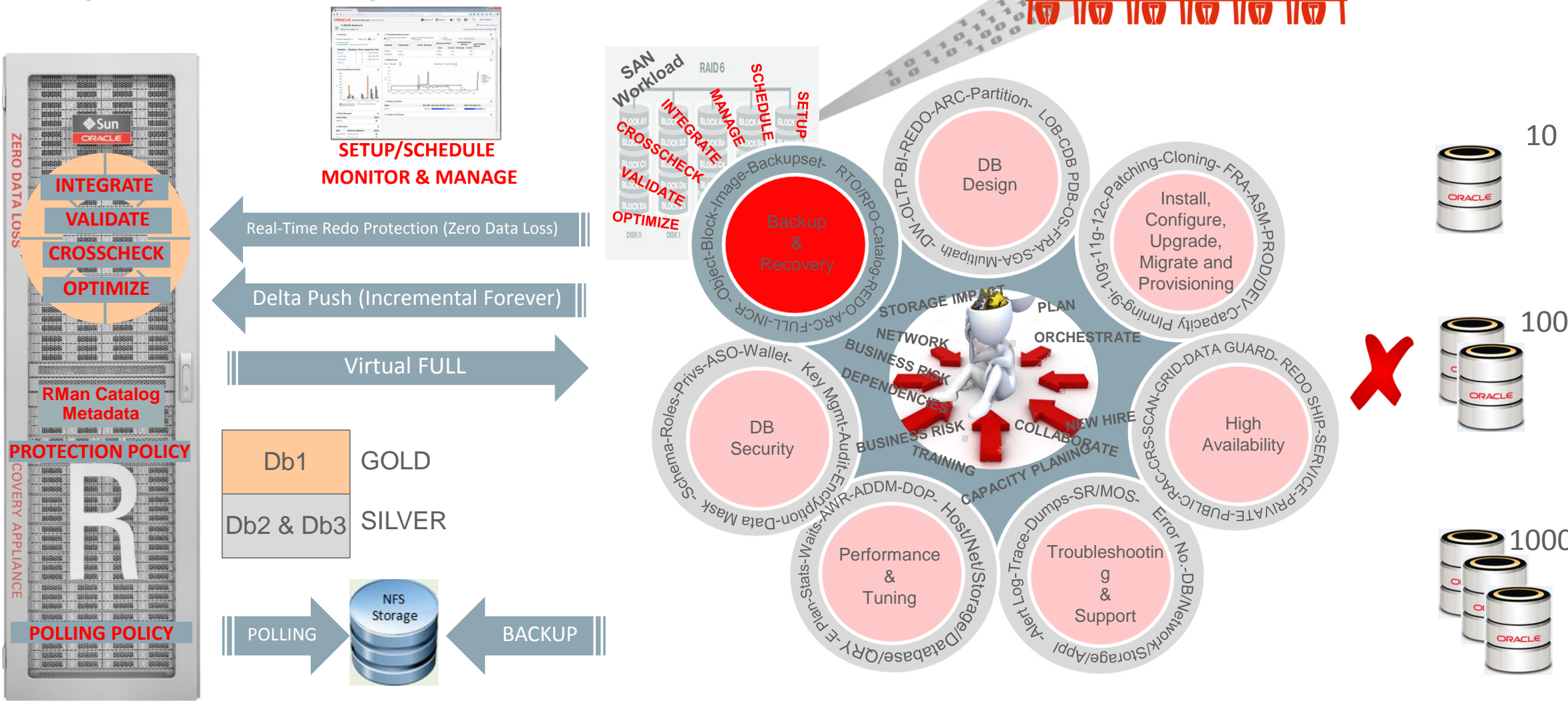- Aggregate Recovery Window Space
- Number of Protected Databases

ZDLRA – Database Protection
Backup and Recovery

SETUP/SCHEDULE
MONITOR & MANAGE

ZERO DATA LOSS

INTEGRATE
VALIDATE
CROSSCHECK
OPTIMIZE

Real-Time Redo Protection (Zero Data Loss)

Delta Push (Incremental Forever)

Virtual FULL

RMan Catalog Metadata

R

PROTECTION POLICY

RECOVERY APPLIANCE

| Db1 | GOLD |
| Db2 & Db3 | SILVER |

POLLING POLICY

POLLING

NFS Storage

BACKUP

SAN Workload   RAID 6

SETUP
MANAGE
SCHEDULE
INTEGRATE
CROSSCHECK
VALIDATE
OPTIMIZE

BLOCK A1 BLOCK A2
BLOCK B1 BLOCK B2 BLOCK Bp
BLOCK C1 BLOCK Cq BLOCK Co
BLOCK Dq BLOCK Dp
BLOCK Eq BLOCK Ep
DISK 0   DISK 1

Backup & Recovery

-Object-Block-Image-Backupset- RTO/RPO-Catalog-REDO-ARC-FULL-INCR-

DB Design
-DW-OLTP-BI-REDO-ARC-Partition- LOB-CDB PDB-OS-FRA-SGA-Multipath-

Install, Configure, Upgrade, Migrate and Provisioning
-Patching-Cloning- FRA-ASM-PROD/DEV-Capacity Plaining-9i-10g-11g-12c-

STORAGE IMPACT   PLAN
NETWORK   ORCHESTRATE
BUSINESS RISK
DEPENDENCIES   NEW HIRE
BUSINESS RISK   COLLABORATE
TRAINING   CAPACITY PLANING

High Availability
-DATA GUARD- REDO SHIP-SERVICE-PRIVATE-PUBLIC-RAC-CRS-SCAN-GRID-Error No.-DB/Network/Storage/Appl-

DB Security
-Key Mgmt-Audit-Encryption-Data Mask- -Schema-Roles-Privs-ASO-Wallet-

Performance & Tuning
-Host/Net/Storage/Database/QRY-E Plan-Stats-Waits-AWR-ADDM-DOP-

Troubleshooting & Support
-Alert Log-Trace-Dumps-SR/MOS-

10

100

1000

NOTE: Replication and Tape capabilities are not shown in this slide

Next Steps - Backup and Recovery Assessment

YES we can help and it is FREE

KEY FEATURES AND BENEFITS

Recovery Assessment for Oracle Databases is a focused, collaborative engagement that identifies new opportunities to improve the speed and quality of Oracle Database backups and recovery. Oracle Recovery specialists work with you to assess your current environment and to ensure it continues to be aligned with your business objectives.

The Recovery Assessment will

✓Provide on-site, collaborative assessment of your Recovery Strategy.
✓Identify opportunities to achieve additional business benefits.
✓Deliver complimentary, actionable results onsite in only a few days.

Contact:: David Guilbeault - david.guilbeault@oracle.com / 214-846-7046

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Summary / Q&A