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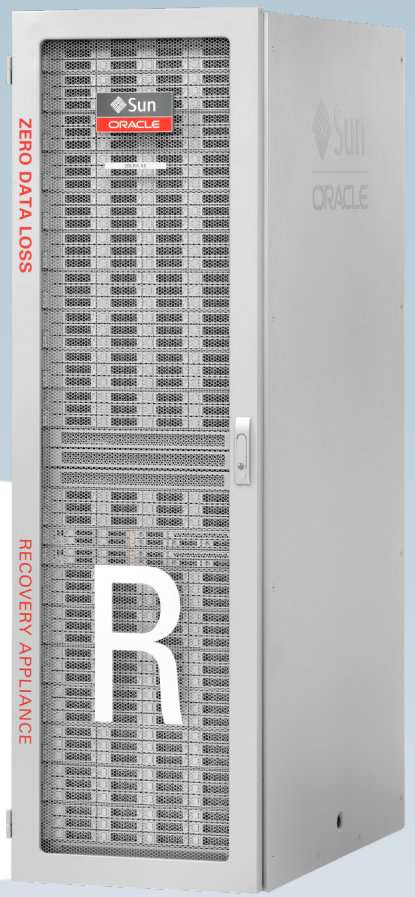
Zero Data Loss Recovery Appliance: Overview and Benefits

MAA Best Practices Team
Server Technologies
May 2018



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What a ZDLRA Is Not?

It is not an **Exadata**

It is not a **Storage Appliance**

What's a ZDLRA then?

It is a state of the art **Recovery Appliance**

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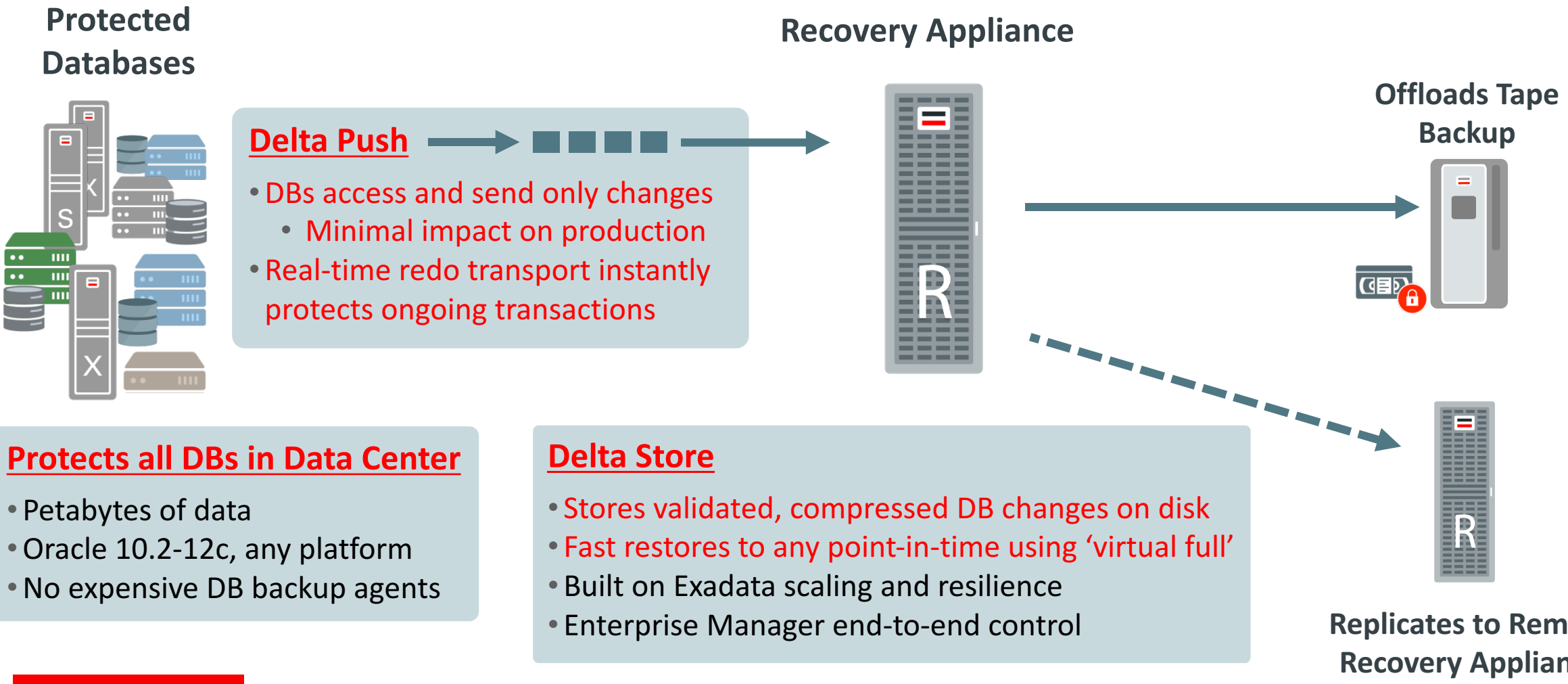
Zero Data Loss Recovery Appliance Overview



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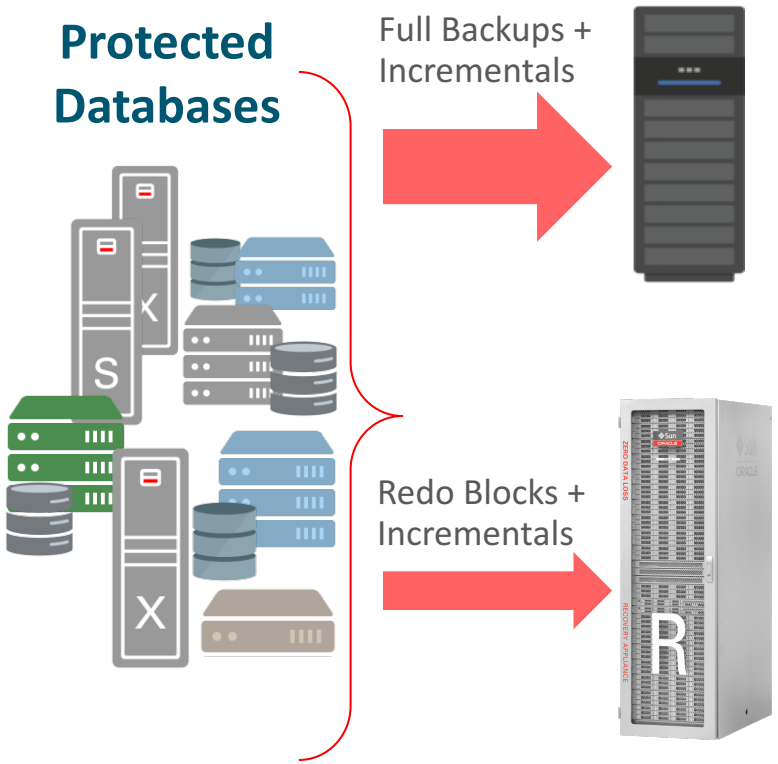
Zero Data Loss Protection for All Databases



Generic Bit-Copy Backup Appliance

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

Zero Data Loss Recovery Appliance

- Uses Data Guard continuous real-time redo transport from in-memory buffers to immediately protect ongoing transactions

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

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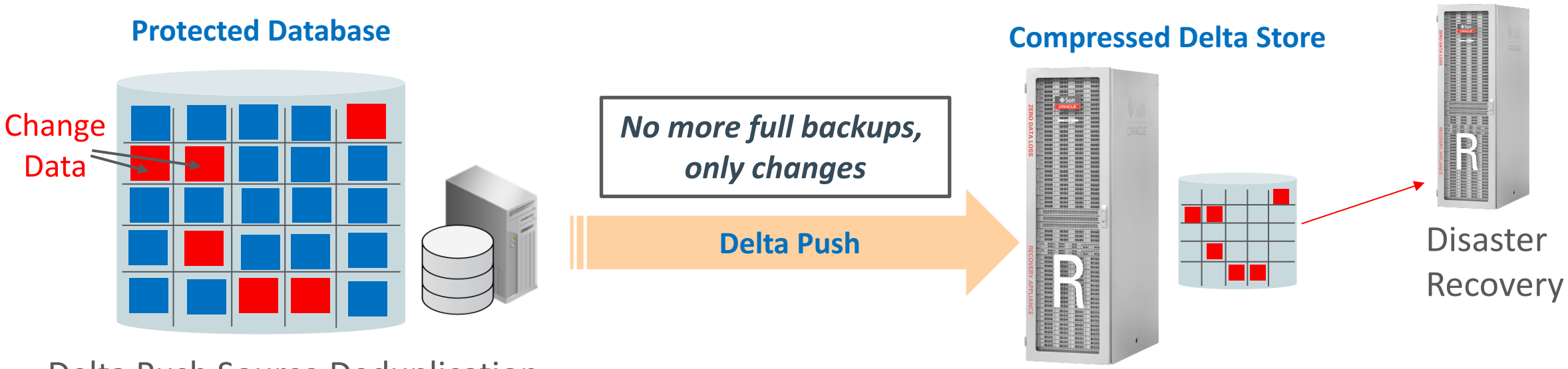
Delta-Only Architecture

No More Full Backups: Database Optimized Incremental-Forever



Delta Push Source Deduplication

- Fast Incremental Backup
  - Never reads duplicate blocks
  - Never sends duplicate blocks
- Eliminates Undo Blocks for committed transactions
- Eliminates Unused Blocks

Delta Store Backup Management

- Stores only change data
- Compresses at block-level
- Ships only Deltas to Replica

Dramatic Database I/O & Network Savings

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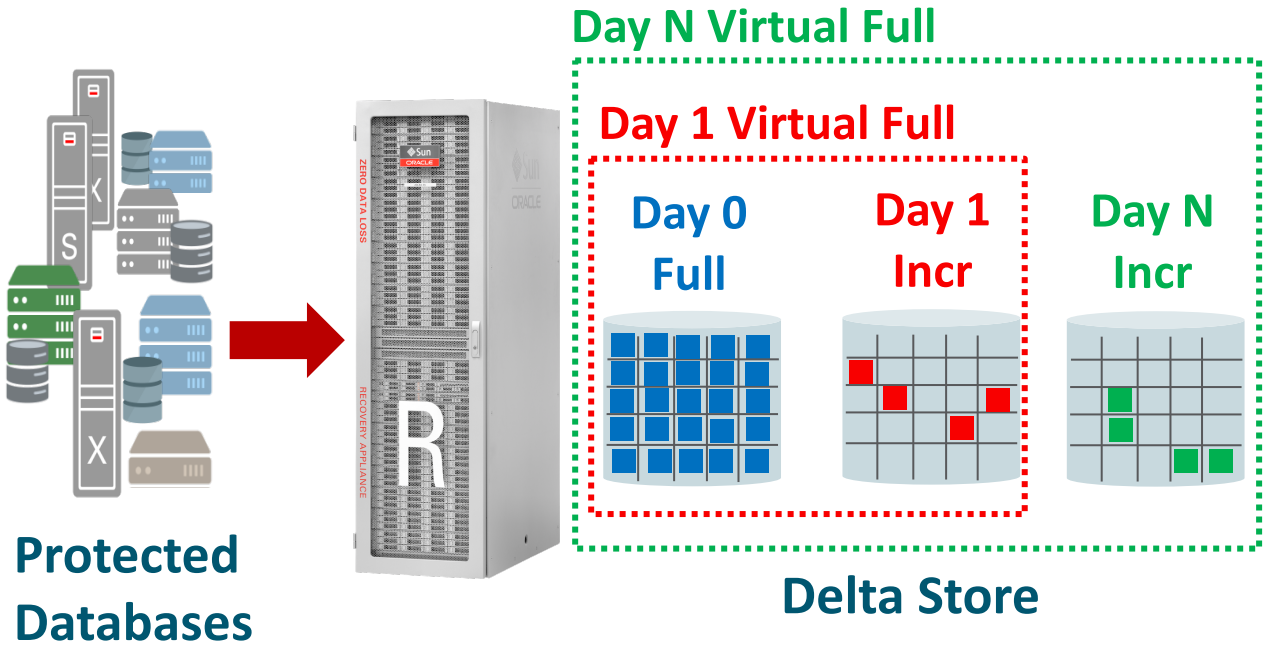
Space-Efficient “Virtual” Full Backups

No More Full Backups: Incrementals 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**

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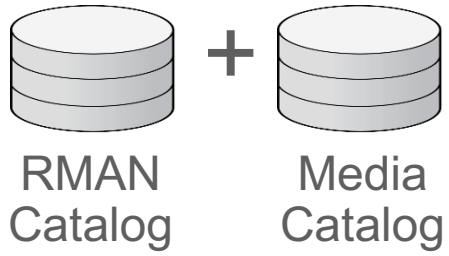
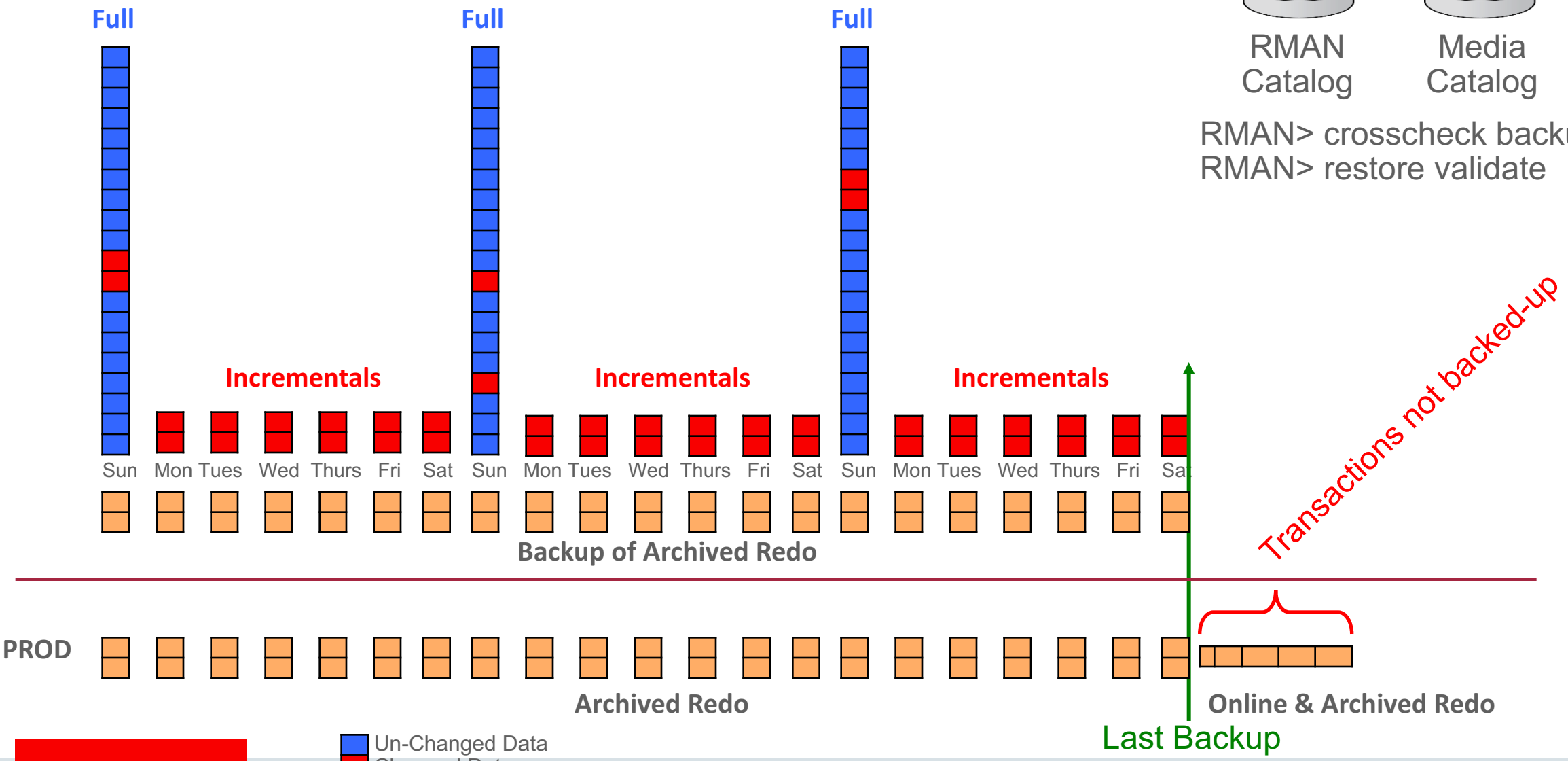
Traditional Weekly Full, Daily Incremental

More efficient backup, slow and more difficult recovery



RMAN> crosscheck backup
RMAN> restore validate



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ZDLRA – Superior Approach

Incremental Forever + Remote Logging

Integrated
Catalog within ZDLRA

One Time
Full

Day N Virtual Full

Day 1 Virtual Full

Day 0
Full

Day 1
incremental

Day N
incremental

Zero Data Loss

Last Incremental

Daily Delta Push (BCT reset)

Sun Mon Tues Wed Thurs Fri Sat Sun Mon Tues Wed Thurs Fri Sat Sun Mon Tues Wed Thurs Fri Sa

Real-Time
Redo
Protection

PROD

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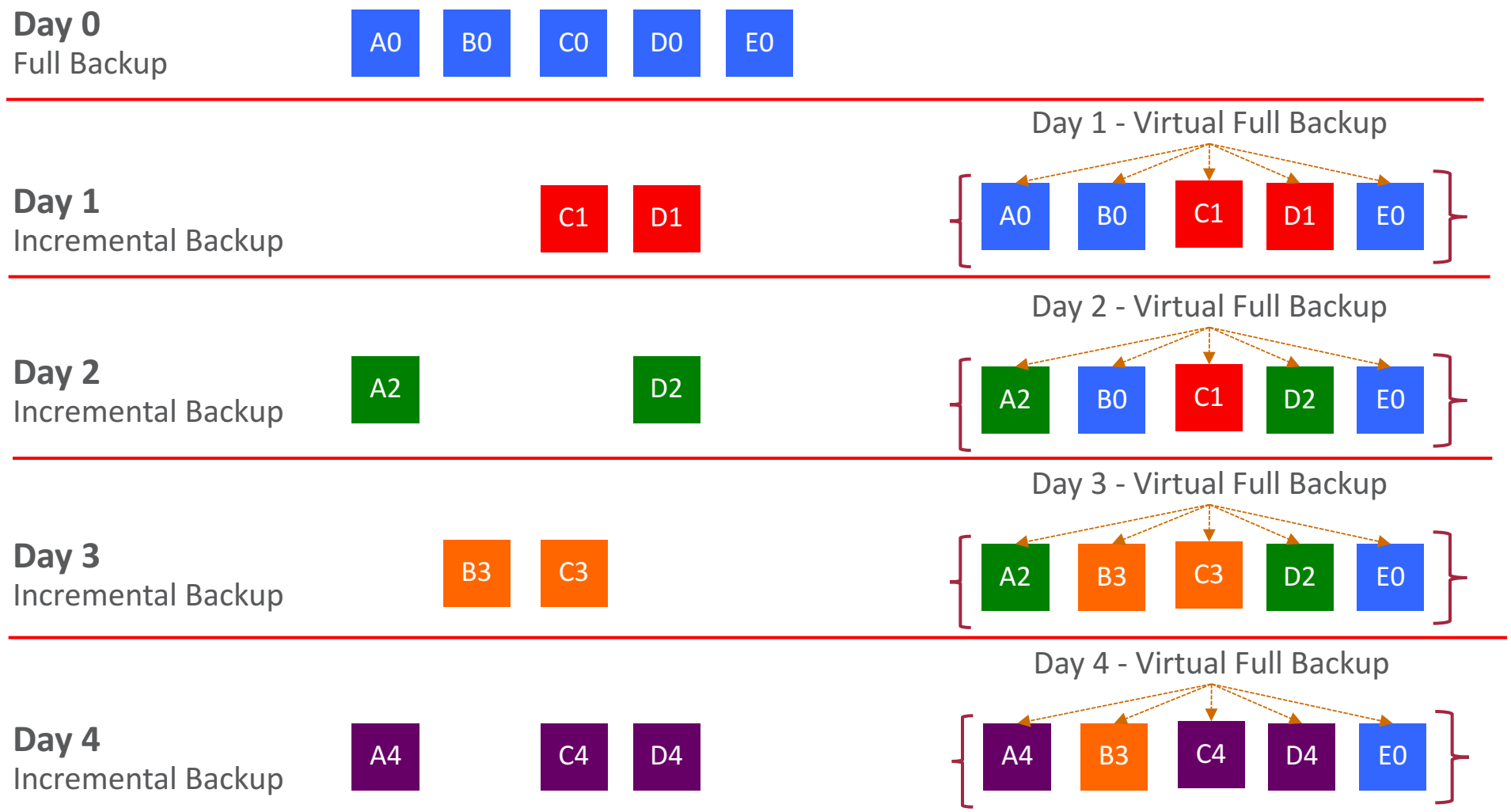
Delta Store – Efficient Indexing



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Delta Store – Efficient Storage Management

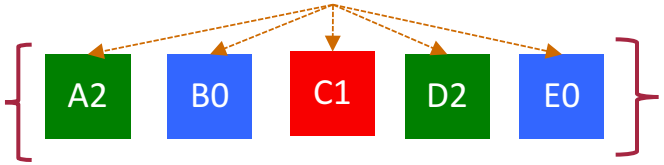
Day 0
Full Backup

Day 1
Incremental Backup

Day 1 - Virtual Full Backup

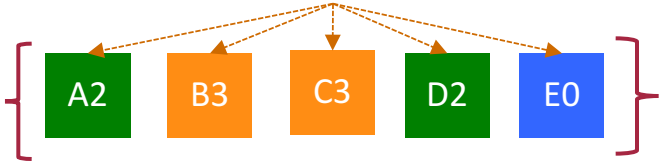
Day 2
Incremental Backup

Day 2 - Virtual Full Backup



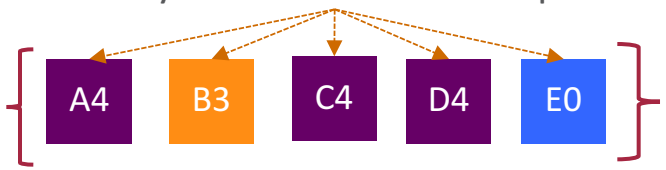
Day 3
Incremental Backup

Day 3 - Virtual Full Backup



Day 4
Incremental Backup

Day 4 - Virtual Full Backup



Space released for blocks not needed for recovery window goal.

<u>On Day 4</u> Assuming 3-day recovery window, upon space pressure …

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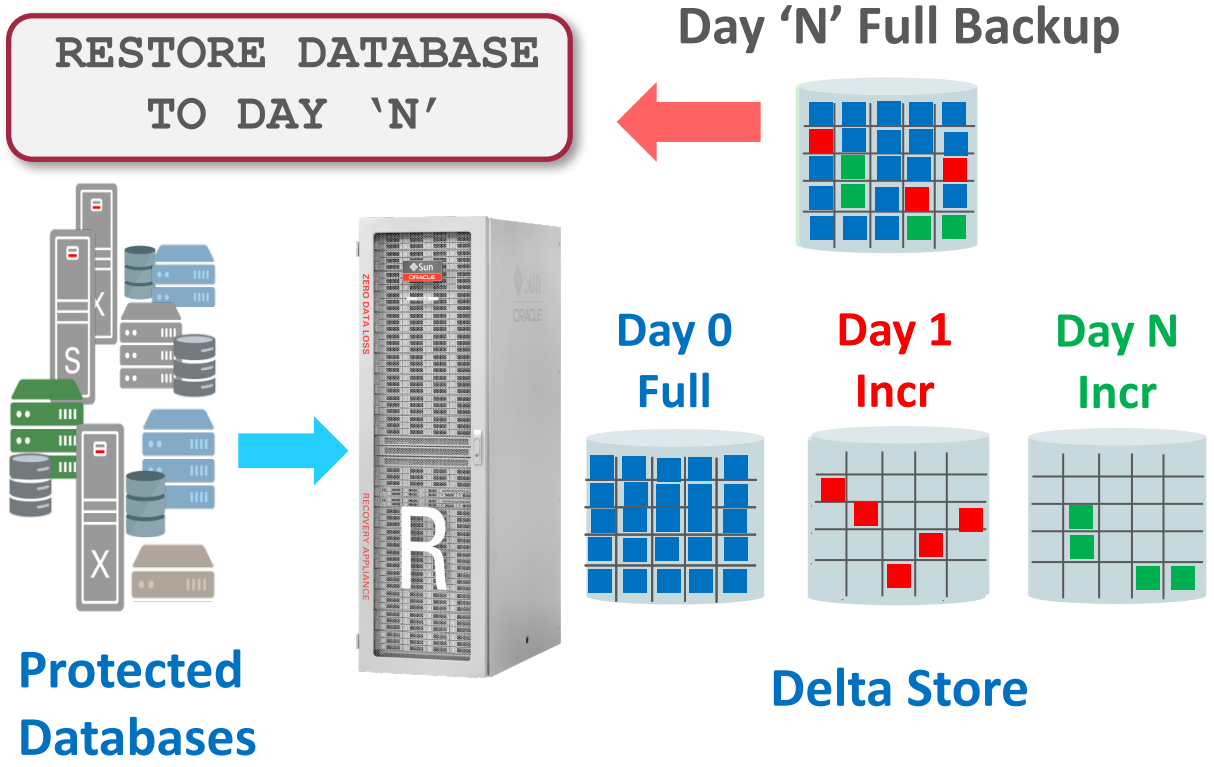
Fast Restore to Any Point-in-Time

No Load On Production Servers to Merge Old Backups



- Directly restore any virtual full backup
  - All blocks referenced from virtual full are efficiently retrieved
  - Eliminates production server overhead of traditional restore and merge of incrementals
- Supported by the scalability and performance of the underlying Exadata hardware architecture

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Delta Store – Periodic Optimization for Restore

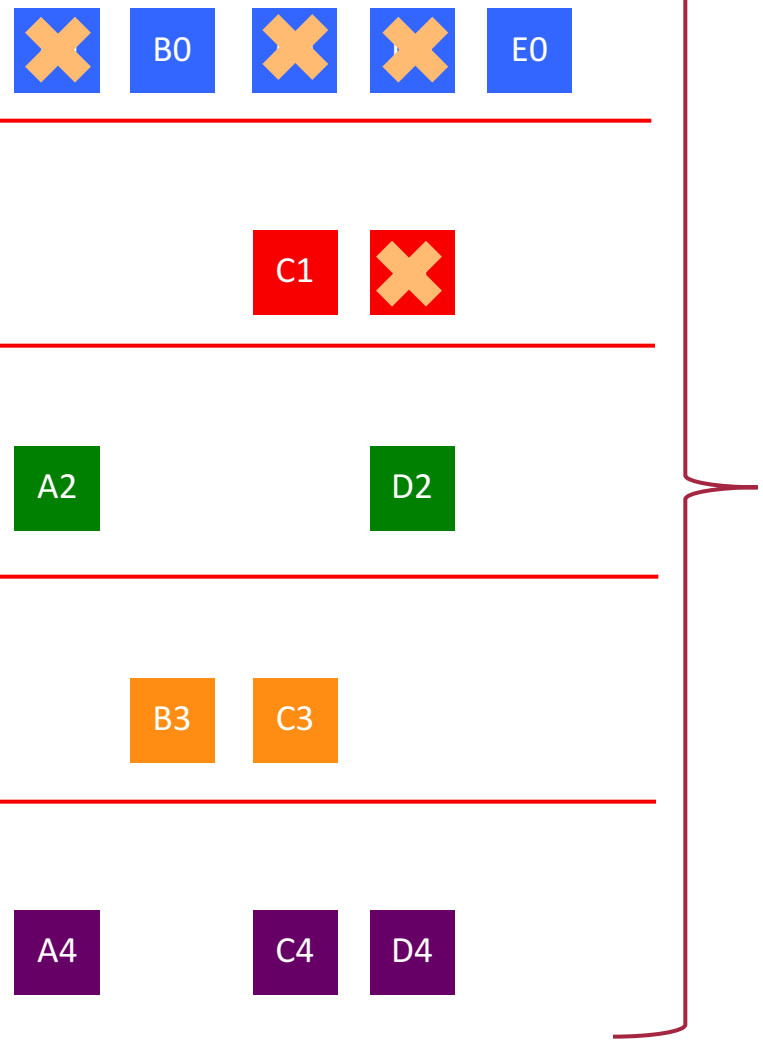
Day 0
Full Backup

Day 1
Incremental Backup

Day 2
Incremental Backup

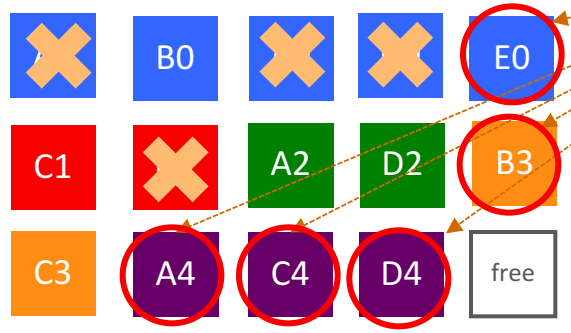
Day 3
Incremental Backup

Day 4
Incremental Backup



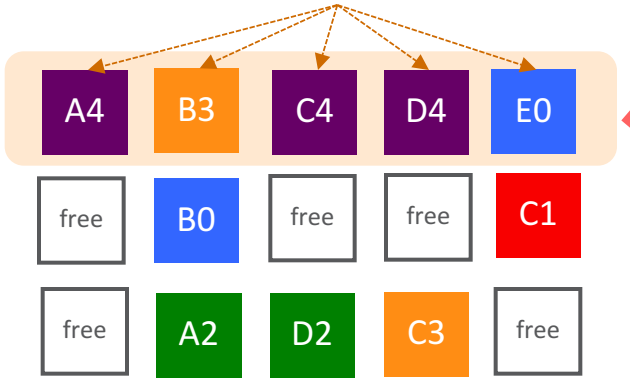
Physical Layout

Day 4 - Virtual Full Backup (Non-Optimized for Restore)



Optimization

Day 4 - Virtual Full Backup (Optimized for Restore)



Reorder blocks for most recent backup so as to read sequentially with minimal I/O overhead

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Data Loss Protection from Corruptions

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

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

Production Appliance

Tape Archive

- Data validated when copied to and restored from tape

Remote Replica

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

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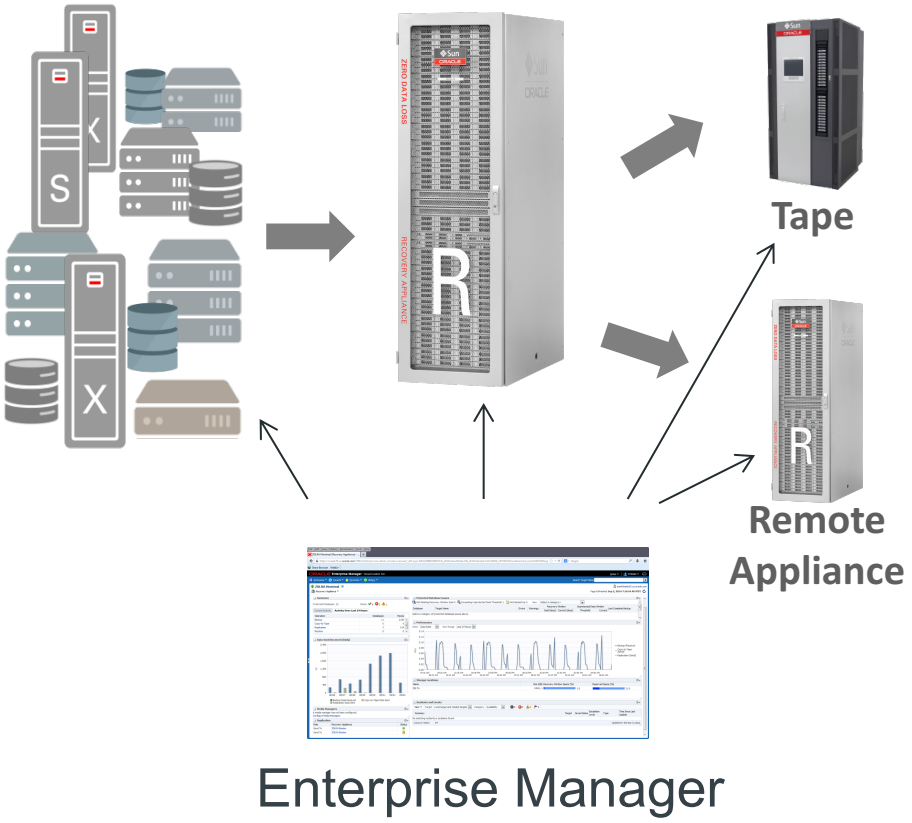
Unified End-to-End Control



- Recovery Appliance Admin centrally monitors and manages all database protection activity across all tiers
- Database Admin monitors the protection status of their database from disk, to tape, to replica
  - Offloaded replicas and tape backups appear in Recovery Catalog

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Zero Data Loss Recovery Appliance – Innovative Value

Versus Traditional Backup Infrastructure

Eliminate Data Loss

Real-time redo transport provides instant protection of ongoing transactions

Zero to Sub-1s RPO

Minimal Impact Backups

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

Savings, Backup Time Shrinks

Database Level Recoverability

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

Recovery Readiness, Validations

Cloud-Scale Protection

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

HA & Scalable Architecture

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Recovery Appliance Benefits

Revolutionary:

- Zero Data Loss enabled by Innovative Delta Push Technology
- Zero Impact Backup Solution with Incremental Backups Forever
- Smart On-Demand Recovery within Recovery Window
- Built-in Recovery Validation and High Availability

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