



ORACLE

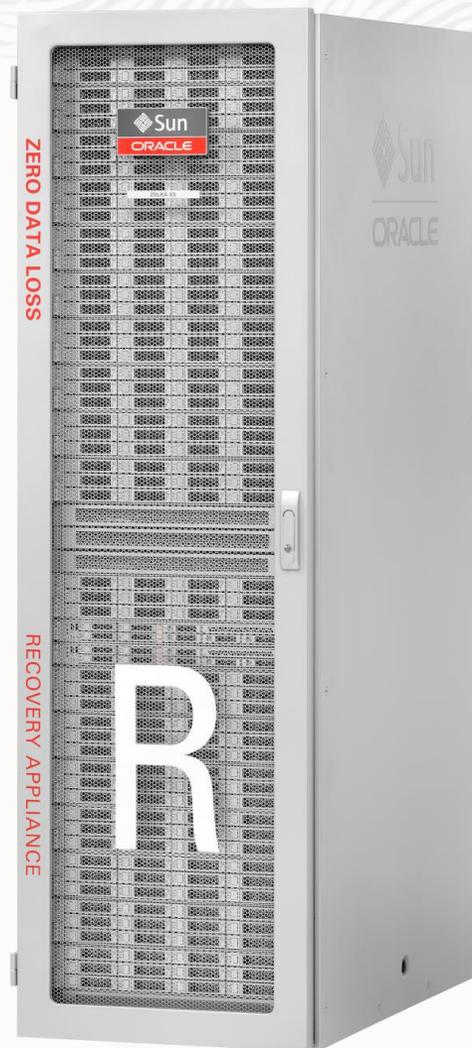
ORACLE

零数据丢失恢复一体机 (ZDLRA) 架构基础与运维介绍

数据库与云系列公益讲座 (五十六期)

全优

SeHub Solution Engineer



Agenda

- 1 ZDLRA 产品介绍
- 2 部署架构设计与技术细节
- 3 备份与恢复
- 4 运维与监控

零数据丢失恢复一体机X8

基本机架配置

➤2台 计算服务器每台计算服务器包含:

- 1 个 1 Gb 铜缆以太网端口（管理）
- 2 个 10 Gb 铜缆 Base-T 以太网端口，或者 2 个 10/25 Gb 光纤 SFP+/28 LOM 以太网端口
- Sun 双 10/25 Gb 以太网 SFP+/28 PCIe 2.0 矮版适配器，内置 Intel 82599 10/25 Gb 以太网控制器并且支持可插拔 SFP+ 收发器。ROHS-5。
 - 2 个 10/25 Gb 光纤以太网端口
- 适用于磁带连接的 Sun 存储双 32 Gb 光纤通道 PCIe 通用 HBA，QLogic（可选）
- 2 个 32 Gb 光纤通道端口
- 最多 2 个 10 Gb 或 2 个 25 Gb 端口用于摄取网络
- 最多 2 个 10 Gb 或 2 个 25 Gb 端口用于复制网络

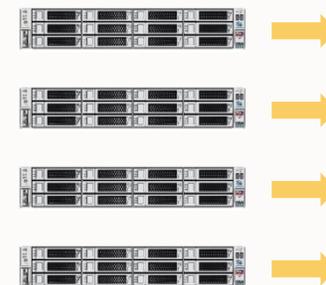
➤3台存储服务器，每个服务器配备:

- 12 个 14 TB（物理）7200 RPM 磁盘
- 能为传入备份提供155TB的可用容量

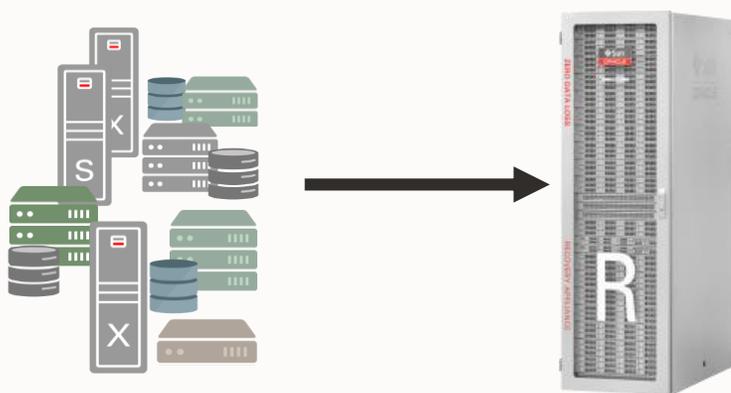
可以通过添加更多存储服务器对基本机架进行增量式升级（全机架最多可达**18个存储服务器**），每台存储服务器可增加**53TB的可用容量**，全机架可用**总容量为949TB**，为**虚拟全备份提供9.5PB的有效容量**。

Recovery Appliance X8 Base Rack

Extra Storage



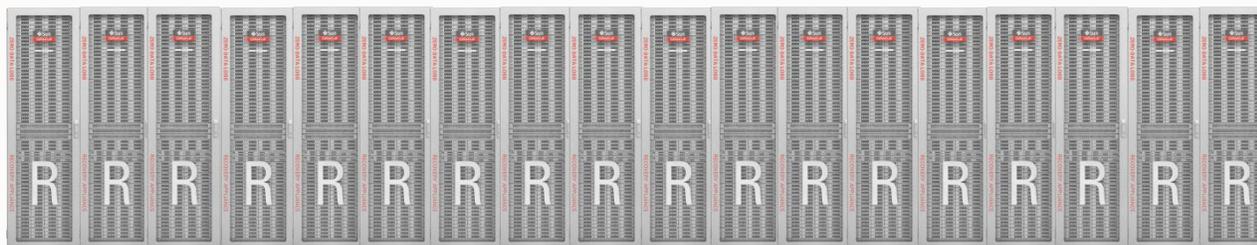
完全横向扩展的架构



单个全机架回复一体机性能:

- 240 TB/小时虚拟完全备份
- 24 TB/小时持续增量摄取速度
- 24 TB/小时恢复速度

- 通过高速InfiniBand(X8)或者100Gb/sRoCE(x8M)连接另一个基本机架
- 新增机架自带两台计算服务器为整个系统带来更多的连接能力和处理能力
- 最多可将18个全配置机架连接在一起
- 最多17PB可用容量，即170PB虚拟完全备份容量
- 虚拟完全备份速度可高达4PB/小时
- 增量摄取和恢复速度可高达432TB/小时



完全横向扩展的架构



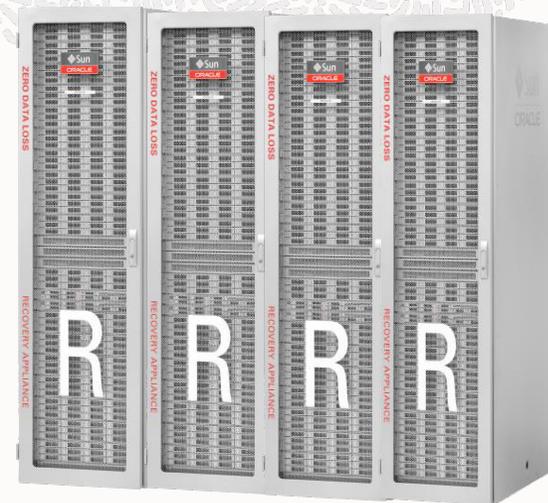
按需增加
存储服务器



按需增加
存储服务器



按需增加
机架



基本机架

2 计算服务器
3 存储服务器
155 TB 可用 /
1.55 PB 虚拟
15 TB/小时 恢复

半配机架

2 计算服务器
9 存储服务器
473 TB 可用/
4.7 PB 虚拟
24 TB/小时 恢复

满配机架

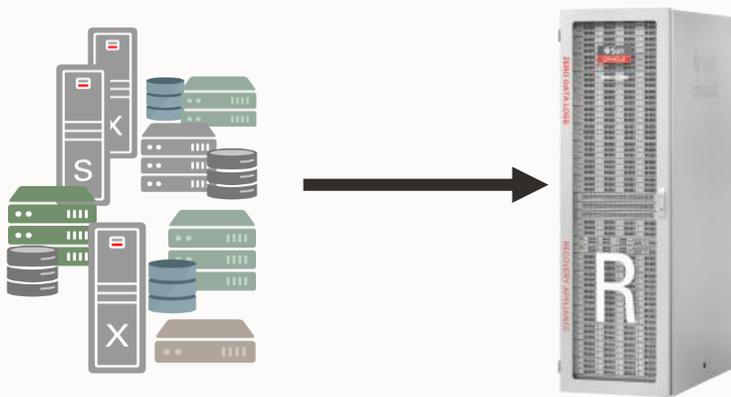
2 计算服务器
18 存储服务器
949 TB 可用/
9.5 PB 虚拟
24 TB/小时 恢复

扩展至18机架

36 计算服务器
324 存储服务器
17 PB 可用/
170 PB 虚拟
432 TB/小时 恢复



零数据丢失恢复一体机 容量估算



- 每个全机架可用总容量为949 TB
- 每个全机架虚拟完全备份9.5 PB
- 能够在恢复窗口为10天的策略下保护约949TB大小的源数据库。
- 可以存储10个949TB虚拟完全备份以及为该10天周期生成的所有重做数据

- 每个受保护数据库在零数据丢失恢复一体机中需要的容量通常大约为数据库大小的1~2倍
- 估算所需容量需要考虑如下要素：
 - 数据库大小与增长率减去临时、可用空间，提交的undo
 - 数据库每天的变化率
 - Redo生成速率
 - 要求的回复窗口（天数）
 - 数据库压缩率

零数据丢失恢复一体机 X9M

增加30% 备份容量

基本机架: 207 TB (3台存储服务器)
每台存储服务器: 70 TB (单个机架最多 18 台)
满配机架: 1.26 PB (18 台存储服务器)



按需增加
存储服务器



按需增加
存储服务器



按需增加
机架



基本机架
2 计算服务器
3 存储服务器
207 TB 可用 / 2 PB 虚拟
15 TB/小时 恢复

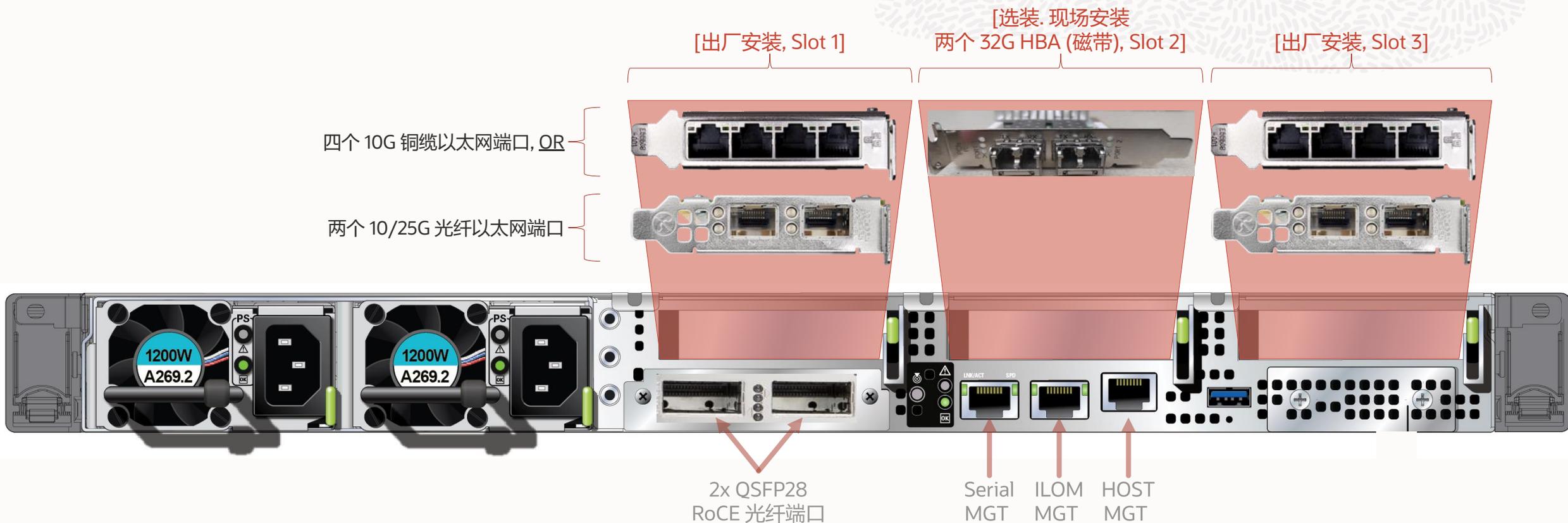
半配机架
2 计算服务器
9 存储服务器
627 TB 可用 / 6 PB 虚拟
24-35 TB/小时 恢复

满配机架
2 计算服务器
18 存储服务器
1.26 PB 可用 / 13 PB 虚拟
24-35小时 恢复

扩展至18机架
36 计算服务器
324 存储服务器
22.7 PB 可用 / 234 PB 虚拟
432 TB/小时 恢复



零数据丢失恢复一体机 X9M



- 每台计算服务器最多 2 个 10/25G 摄取网络与 2 个 10/25G 复制网络, 配置为 2 个 LACP 绑定链路
- 每个机架最多 4 个 10/25G 绑定链路 (2 台计算服务器)
- 复制网络可用于独立的摄取网络 (MOS Note 2126047.1)
- 摄取网络支持 VLAN 标记 (MOS Note 2047411.1)
- 插槽 2 不能用于附加网卡



Agenda

- 1 ZDLRA 产品介绍
- 2 部署架构设计与技术细节
- 3 备份与恢复
- 4 运维与监控

数据库保护关键目标



业务需求

- 从不丢失关键业务数据
- 对业务应用没有影响



IT需求

- 确保数据库级别的恢复
- 为所有数据库保护提供中心化的服务

目前其他的备份方案无法满足以上的需求



备份技术的发展



长期以来行业的关注焦点一直在优化存储的容量，而不是在应用的可用性。

其他的备份方案都不是为数据库而设计

仅把数据库视为需要定期复制的文件对象



数据损失风险

丢失自上次备份以来的所有数据



每日备份窗口

对生产的巨大性能影响



数据库可恢复性差

许多文件被复制，但数据库的保护状态未知



需要管理许多系统

通过部署更多备份设备进行缩放



数据保护：仍然是一项复杂的任务

数据保护面临的最大挑战？
#1 备份和管理日益庞大的数据量



参考资料 Oracle Database And Data Protection Survey (200 IT professionals), January 2014
<http://www.dbta.com/DBTA-Downloads/ResearchReports/Oracle-Database-and-Data-Protection-Survey-Results-4331.pdf>



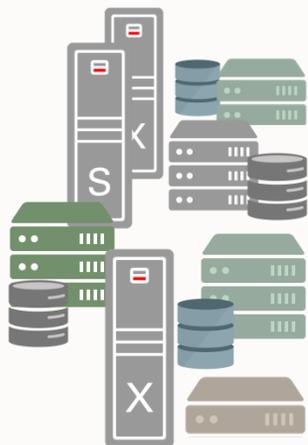
需要一种完全不同的方法来保护
关键业务数据库数据

零数据丢失恢复一体机 Zero Data Loss Recovery Appliance



零数据丢失恢复一体机

Protected Databases



增量推送

- 被保护数据库只需要访问和送出变化的数据
- 最小化对生产系统的影响
- 实时重做日志传输为进行中的交易提供即时保护

为数据中心所有Oracle DB提供保护

- PB 级数据管理能力
- 支持全部平台的10.2 到12c Oracle 数据库
- 不需要昂贵的备份代理客户端

Recovery Appliance



变量/增量存储

- 只在磁盘上存储验证和压缩过的数据库变化数据
- 自动组合增量数据提供任意时间点的快速回复
- 构建于Exadata架构的扩展性和可靠性
- 基于企业管理器提供端到端的管理和控制

自动磁带归档

- 卸载磁带备份压力
- 全天利用磁带设备



Offloads Tape Backup



Replicates to Remote Recovery Appliance



零数据丢失恢复一体机独一无二的优势



避免数据丢失

实时redo传输为正在进行的事务提供即时的保护。



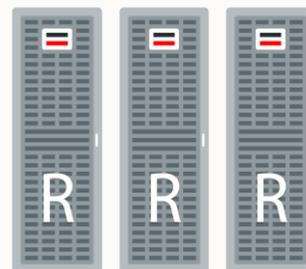
最小化备份的影响

生产数据库仅需发送更改的数据，不必在负担备份和磁带处理工作。



数据库级别的可恢复性

端到端的可靠性，可见性及控制 - 不再是互不关联的文件。

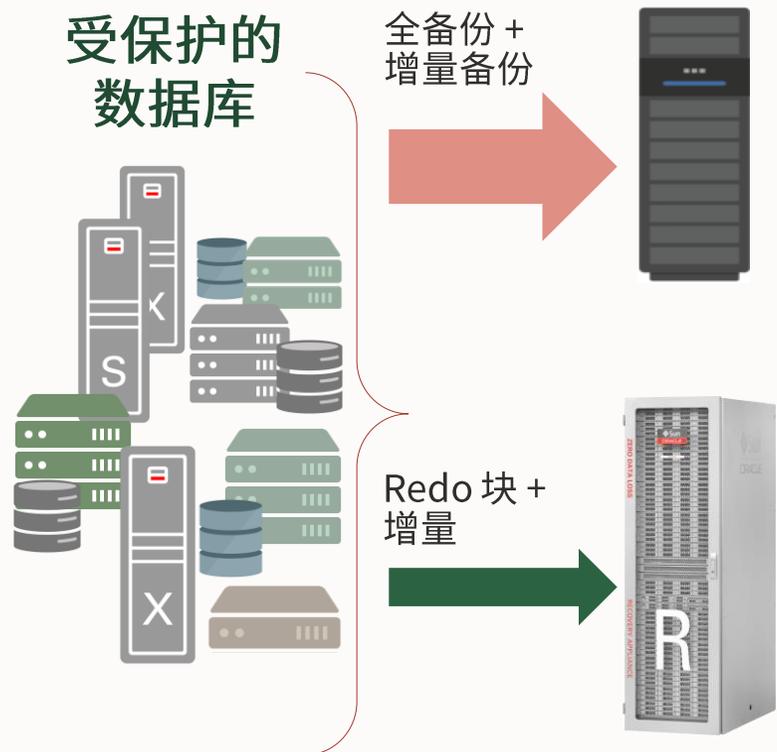


云级别的保护

使用大规模可扩展的服务轻松保护数据中心中的所有数据库。



ZDLRA: 如Data Guard一般保护所有数据库



通用的基于比特拷贝 (bit-copy) 的备份设备

- 每天备份一次
- 数据损失风险：自上次备份以来的所有事务

零数据丢失恢复一体机 (ZDLRA)

使用Data Guard 从内存缓冲区连续实时redo传输，即时保护正在进行的事务

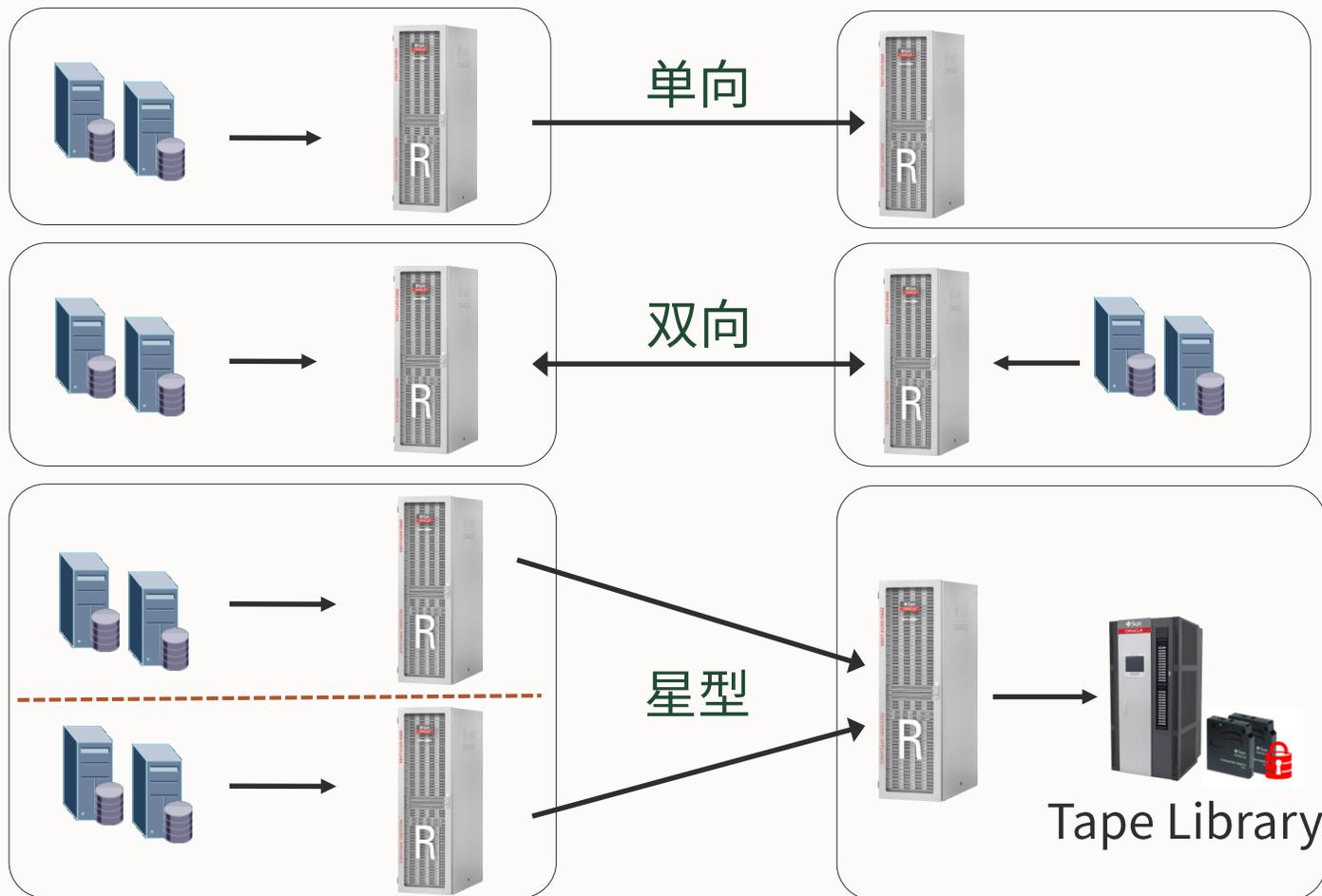
数据丢失是糟糕的。
更糟的是它在数据库中产生巨大的一致性问题的



零数据丢失一体机灾备架构

本地数据中心

远程数据中心



- 复制到远程数据中心确保数据万无一失
- 定期复制到磁带库，增强备份生命周期管理
- 直接从本地或磁带库或远程零数据丢失一体机恢复数据



永久增量与虚拟全备



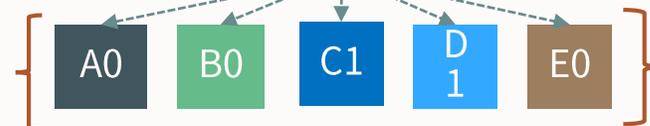
Day 0
全备份



Day 1
增量备份



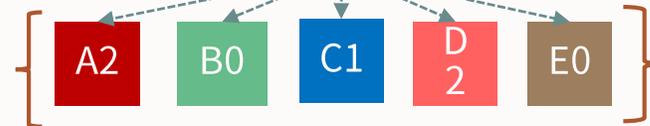
Day 1 - 虚拟全备份



Day 2
增量备份



Day 2 - 虚拟全备份



Day 3
增量备份



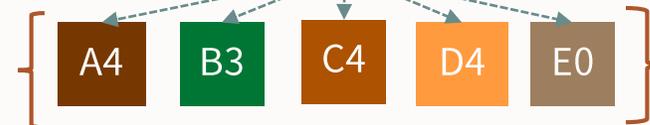
Day 3 - 虚拟全备份



Day 4
增量备份



Day 4 - 虚拟全备份



备份数据时效性管理



Day 0
全备份



Day 1
增量备份



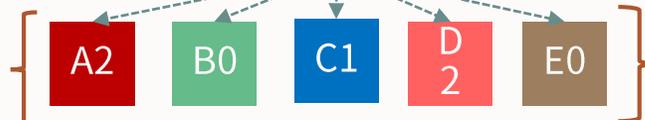
Day 1 - 虚拟全备份



Day 2
增量备份



Day 2 - 虚拟全备份



Day 3
增量备份



Day 3 - 虚拟全备份



Day 4
增量备份



Day 4 - 虚拟全备份



Day 4
由于设置了三天的恢复窗口，过期备份集的部分数据不再有任何备份集需要使用，可释放其中失效数据块的容量。



为恢复优化

Day 0
全备份



Day 1
增量备份



Day 2
增量备份



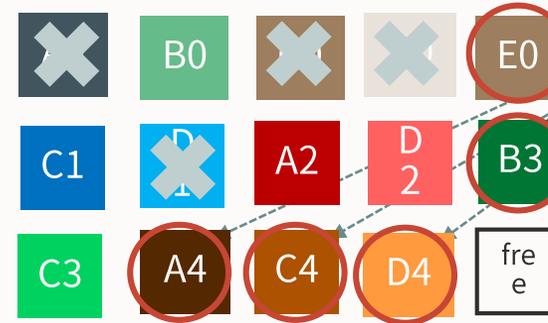
Day 3
增量备份



Day 4
增量备份



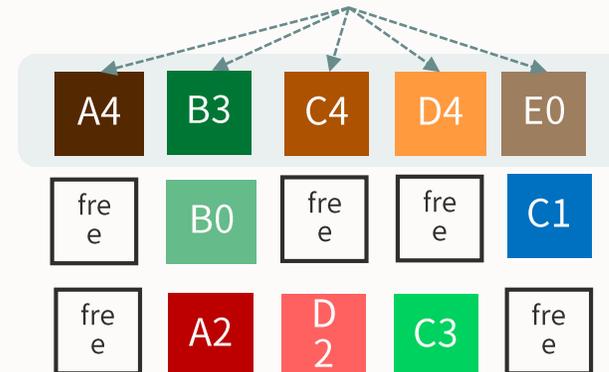
物理布局



Day 4 - 虚拟全备
(未为恢复优化)

优化

Day 4 - 虚拟全备
(为恢复优化)

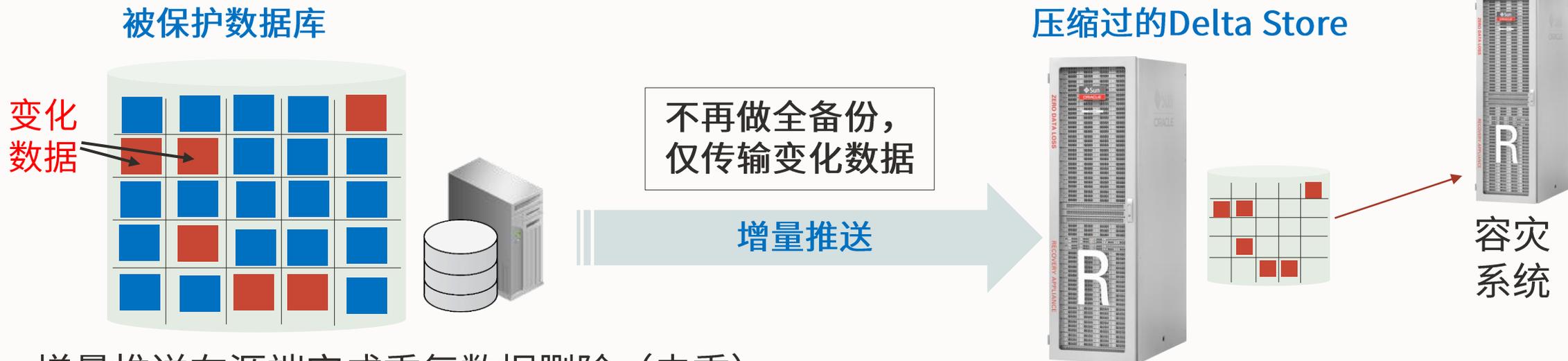


将最近的虚拟备份进行顺序排列，减少的定位时间，加快恢复数据读取速度



永久增量备份

自动合成虚拟全备



增量推送在源端完成重复数据删除（去重）

- 快速增量备份
 - 永不读取重复的数据块
 - 永不发送重复的数据块
- 消除对已提交事务Undo Block的备份
- 消除对未使用数据块的访问与备份

Delta Store 备份管理

- 只存储变化数据
- 数据块级压缩
- 只复制变化数据到容灾系统

“虚拟”全备份提供可预见的恢复效率

不再需要全备份：永久增量架构



当完成初始的全量备份后,后续的增量备份按天生成
虚拟 数据库全备份

- 展现为增量备份时间点的全备份，内部以指针的方式组织数据
- 虚拟备份典型情况下可以提供 10 倍的存储空间
- 以尽可能最小的存储空间来实现长期保存备份数据

提供数据库保护的“时间机器”机制



基于策略的云级别数据库保护



白金策略 – Customer Critical



Disk: 45 天
Tape: 90 天



黄金策略 – Customer Critical



Disk: 35 天
Tape: 90 天



白银策略 – Internal Critical



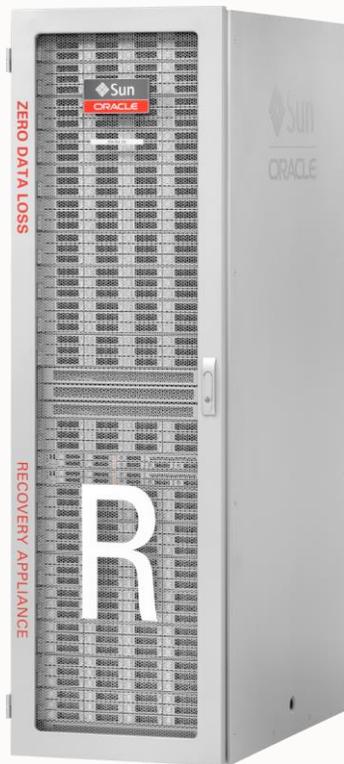
Disk: 10 天
Tape: 45 天



青铜策略 – Test/Dev



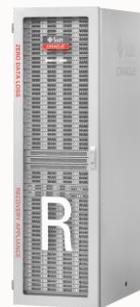
Disk: 3 天
Tape: 30 天



磁带



复制



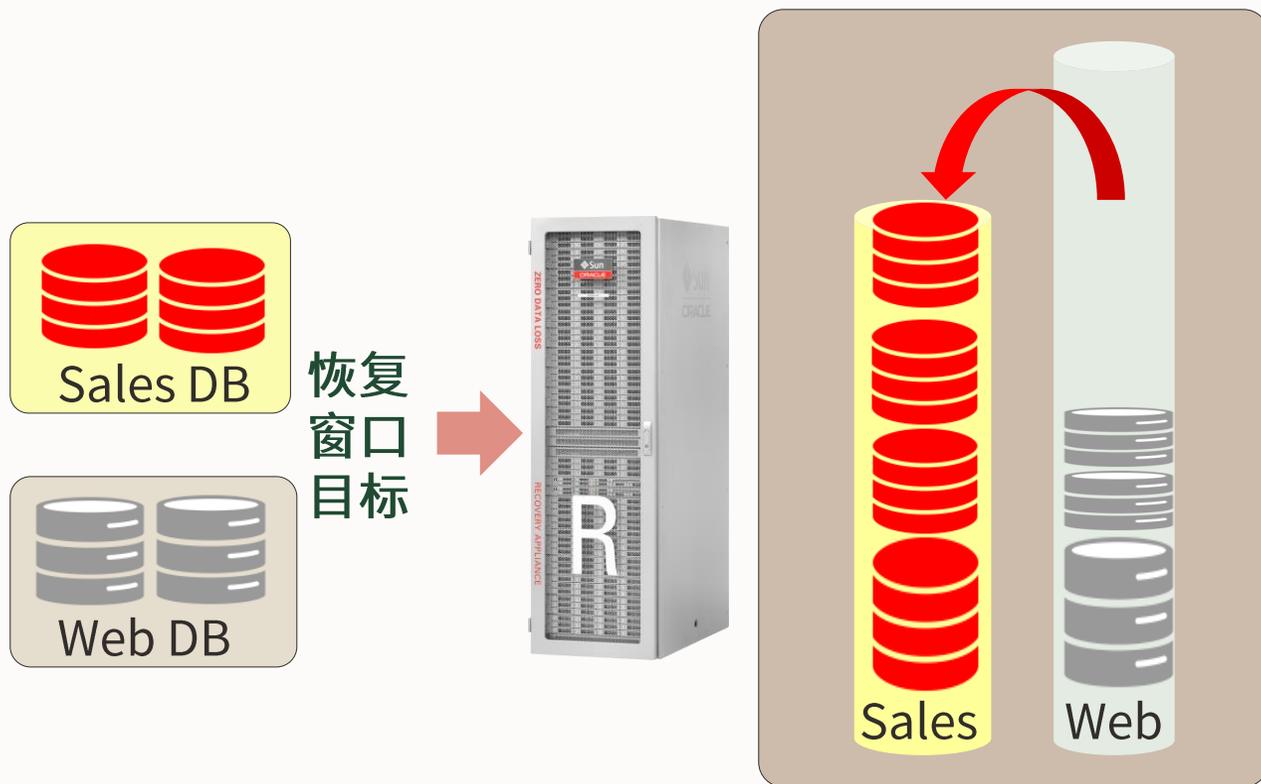
远程复制目标端
ZDLRA同样基于
策略管理

ZDLRA 保护策略

- 标准化恢复窗口大小、磁带保留时间、远程复制策略
- DBA熟悉的管理配置图形化界面
- 远比传统备份软件容易理解和使用
- 让系统管理员和存储管理员从数据库备份中解脱出来



基于策略的云级别数据库保护



- 存储空间在数据库之间**动态分配**来确保实现保护窗口的设定目标
 - ✓ 例如：可以恢复到过去35天之内的任意时间点
- 有效避免基于存储或LUN的存储分配方式造成的**存储孤岛**与**过度空间预留**



保护策略

自定义保护策略来统一管理同一类型的数据库：

The screenshot displays the Oracle Recovery Appliance interface. On the left, a table lists protection policies: BRONZE, GOLD, OSC_PP1, PLATINUM, and SILVER, all using the DELTA storage location. On the right, the 'Edit Protection Policy' window for 'PLATINUM' is open, showing configuration options for storage location, recovery window goals, and retention policies. Red annotations with arrows point to specific fields: 'Storage Location' (存储池), 'Recovery Window' (磁盘保留策略), 'Threshold' (数据不受保护最大时间), 'Recovery Window' (磁带保留时间), and 'Maximum Retention' (磁盘上最大保留时间默认有空间就不删除).

Name	Disk Recovery Window Goal	Unprotected Data Window Threshold	Media Manager Recovery Window Policy	Maximum Disk Backup Retention	Storage Location
BRONZE	3 days		30 days		DELTA
GOLD	35 days		90 days		DELTA
OSC_PP1	1 day		1 day		DELTA
PLATINUM	45 days		90 days		DELTA
SILVER	10 days		45 days		DELTA

Name	Size (GB)	Reserved Space (%)	Reserved Space (GB)
DELTA	63926.7	32.0	20480.0

说明：先按规划自定义保护策略，在通过OEM添加受保护数据库时，要求选择与数据库关联的保护策略。



基于策略的职责分离

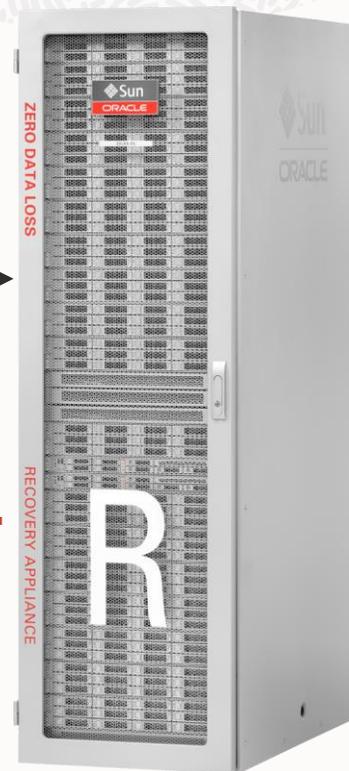
- 在保护策略中可以通过高级参数，来阻止对存储在ZDLRA中的备份执行RMAN DELETE操作
- 任何管理员（DB或RA）都不能删除数据库及其备份
- 存储设备没有意识到错误的删除操作，这可能导致业务SLA受损
- 集中化、数据库感知的“保护即服务”与常规文件备份的显著区别



删除备份



删除操作
被阻止



基于策略的职责分离

编辑保护策略

指定用于使用磁盘备份的时间点恢复。 Recovery Appliance 指定恢复的恢复窗口目标。

* 恢复窗口 1 天

未受保护数据库窗口阈值

指定与此保护策略关联的数据库具有潜在数据丢失风险的最大时间。如果与此策略关联的数据库超出此时间，将会生成

阈值 天

介质管理器恢复窗口策略

指定一个较长的窗口，将在其中维护从介质管理器 (例如, Oracle Secure Backup) 进行时间点恢复的能力。

恢复窗口 31 天

磁盘备份最长保留期

指定应保留磁盘备份的最长时间。此值必须大于或等于磁盘恢复窗口目标。如果未指定，只要空间允许，备份的保留时间窗口目标。

最长保留期 2 天

高级参数

备份和重做故障转移

指定使用此保护策略的受保护数据库是否将使用该 Recovery Appliance 作为备份和重做故障转移策略的替代目标。有时存储使用此保护策略的受保护数据库的备份和重做，以便在以后转发到主 Recovery Appliance，此后将从该 Recovery Appliance 删除这些内容。

备份和重做故障转移

备份删除

针对与此保护策略关联的数据库，指定 Recovery Appliance 是否允许通过 RMAN DELETE 命令来删除备份。

备份删除 **不选择表示不允许通过 RMAN DELETE 命令来删除备份**

备份轮询位置

Recovery Appliance 可管理写入共享目录的常规磁盘备份。指定 Recovery Appliance 将监视使用此保护策略的数据库备份的目录。

位置 /ufs/poll_location/

确定 取消

```
RMAN> delete backuppiece "VB$_2972038354_34133_2"
2> ;

allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=1214 device type=DISK
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=1334 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: RA Library VER=3.17.1.26

List of Backup Pieces
BP Key   BS Key   Pc#   Cp#   Status   Device Type Piece Name
-----
34165   34164   1     1     AVAILABLE SBT_TAPE   VB$_2972038354_34133_2

Do you really want to delete the above objects (enter YES or NO)? YES
RMAN-00571: =====
RMAN-00569: ===== ERROR MESSAGE STACK FOLLOWS =====
RMAN-00571: =====
RMAN-03009: failure of delete command on ORA_SBT_TAPE_1 channel at 03/23/2021 22:05:15
ORA-19509: failed to delete sequential file, handle="VB$_2972038354_34133_2", parms=""
ORA-27027: sbtremove2 returned error
ORA-19511: non RMAN, but media manager or vendor specific failure, error text:
          KBHS-01404: See trace file /u01/app/oracle/product/12.2.0.1/dbhome_1/rdbms/log/sbtio_3051_140473146543904.log for details
KBHS-00719: Error 'recovery appliance Error'; ORA-64766: backup deletion using RMAN prevented by protection policy
ORA-45199: Error 0

RMAN>
```

说明：在高级参数中如果没选择“备份删除”则表示不允许通过RMAN DELETE命令来删除ZDLRA中的备份，此时如果通过rman连接执行删除备份的操作时会报错：

“ORA-64766: backup deletion using RMAN prevented by protection policy”



Agenda

- 1 ZDLRA 产品介绍
- 2 部署架构设计与技术细节
- 3 备份与恢复
- 4 运维与监控

备份与恢复 – OEM设置

使用 Enterprise Manager Cloud Control 备份和配置数据库：

1. 在恢复设备 (RA) 上创建保护策略。
2. 将受保护的数据库添加到 RA。
3. 配置受保护数据库的备份设置。
4. 使用“自定义备份”安排一次性Level 0（完整）备份，然后使用“Oracle 建议的恢复设备备份”安排Level 1备份。



备份与恢复 – 创建策略

Protection Policies

▶ A protection policy contains Recovery Appliance properties for multiple protected databases in a single object.

Create Edit Delete

Name	Disk Recovery Window Goal (days)	Unprotected Data Window Threshold	Media Manager Recovery Window Policy (days)	Maximum Disk Backup Retention (days)	Storage Location	Location	Backup Polling Frequency (days)	Delete Backups After Copy	Guaranteed Backup Copy	Copy-to-Ta
BRONZE	850.0	7 sec			DELTA					

1. 磁盘恢复窗口目标 (Disk Recovery Window Goal)
指定恢复一体机使用磁盘备份进行时间点恢复时应尝试满足的恢复窗口目标。
2. 未受保护的数据窗口阈值(Unprotected Data Window Threshold)
数据丢失的最大容许间隔。
3. 媒体管理器恢复窗口策略(Media Manager Recovery Window Policy)
选择指定一个更大的窗口，在该窗口内将维护来自媒体管理器的时间点恢复。
如果不需要磁带备份，则将此字段留空。
4. 最大磁盘备份保留(Maximum Disk Backup Retention)
恢复设备必须保留磁盘备份的最长时间。
将此字段留空，这意味着恢复一体机不会清除备份。

Create Protection Policy

Name

Description

Storage Location

Select the storage location where backups will be placed for all databases using this protection policy.

Name	Size (GB)	Reserved Space	
		%	GB
DELTA	45471.4	26.0	11903.0

Disk Recovery Window Goal

Specify a recovery window goal that Recovery Appliance should attempt to meet for point-in-time recovery using disk backups.

Recovery Window days

Unprotected Data Window Threshold

Specify the maximum amount of time in which there is potential data loss exposure for databases associated with this protection policy. If this amount of time is exceeded for a database associated with this policy, a warning will be generated.

Threshold days

Media Manager Recovery Window Policy

Specify a longer window within which point-in-time recovery capability from a media manager (e.g., Oracle Secure Backup) will be maintained.

Recovery Window days

Maximum Disk Backup Retention

Specify the maximum time that disk backups should be retained. This value must be greater than or equal to the disk recovery window goal. If not specified, backups will be retained beyond the disk recovery window goal as space permits.

Maximum Retention days

▶ **Advanced Parameters**

OK Cancel



备份与恢复 – 添加受保护数据库

Protected Databases (4)

Search

View **+ Add** Edit Remove Detach

Database	Target Name	Version	Protection Policy	Database Size (GB)	Recovery Window	
					Goal (days)	Current (days)
DB1123M	db1123m	11.2.0.3.0	GOLD_REP_DEST	0.0	7	0
DB1211ZS	db1211zs	12.1.0.1.0	SILVER_PROTECTION_POLICY	133.0	5	0.08
DB12ORCL	db12ord	12.1.0.1.0	GOLD_REP_DEST	8.0	7	0
DB12REP	db12rep	12.1.0.1.0	GOLD_REP_DEST	7.5	7	6.61

注意：当您使用 Cloud Control 将数据库添加到恢复一体机时，恢复一体机分配的默认保留空间为数据库大小的 **2.5 倍**。您可以接受或更改此大小。

预留空间不是硬性限制。随着收到不同大小的备份和清除旧的备份，实际消耗的空间量会发生变化。

如果恢复一体机有可用空间，消耗的空间**可以超过分配的空间一段时间**而不会出现问题。

但是，当恢复一体机空间完全不足并且所有数据库的恢复窗口处于危险之中时，保留空间将确定首先清除哪个数据库的备份。出于这个原因，**更重要的数据库应该比不太重要的数据库具有更大的预留空间。**

+ Add Protected Databases

Databases

Select one or more databases to enroll as protected databases with this Recovery Appliance.
TIP Pre-12.1 databases require a local installation of the Recovery Appliance backup agent.

+ Add Remove

Database	Version	Host/Cluster
No data to display		

Protection Policy

Select the protection policy that will be used for the protected databases specified above.

Name	Recovery Window Goal	Backup Polling Location	Description
GOLD	35 days 00:00		Default Gold Protected Policy
BRONZE	30 days 00:00		Default Bronze Protected Policy
PS-TST	30 days 00:00		
SILVER	10 days 00:00		Default Silver Protected Policy
ENC-TST	1 day 00:00		

Next Cancel

+ Add Protected Databases

Reserved Space

Specify the minimum amount of disk space that will be reserved for each protected database. The total reserved space for all protected databases being added cannot exceed 33,568.059 GB (the unreserved space in storage location DELTA).

* Reserved Space 3555.0 GB

Recovery Appliance User

Specify credentials for an existing Recovery Appliance database user that will be given the ability to backup and restore the protected databases.

Credential Named New

* Username

* Password

* Confirm Password

Role Normal

Save As NC_ZDLRA8_2017-07-07-113650

Set As Preferred Credentials

Test

Credential Access Grantee

Enterprise Manager users that administer backup and restore operations for the protected databases will need access to the above Recovery Appliance database user credentials in order to configure the databases to backup to and restore from the Recovery Appliance. Specify the Enterprise Manager users that will be given access to the credentials.

Enterprise Manager Users

Back OK Cancel



备份与恢复 – 备份计划

Schedule Backup

Oracle provides a choice of automated backup strategies. Alternatively, you can implement your own customized backup strategy.

Oracle-Suggested Recovery Appliance Backup
Schedule a backup to the configured Recovery Appliance using the recommended incremental-forever strategy. This option will back up the entire database. [Schedule Oracle-Suggested Backup](#)

Oracle-Suggested Backup
Schedule a disk or tape backup using Oracle's automated backup strategy. This option will back up the entire database. The database will be backed up on daily and weekly intervals. [Schedule Oracle-Suggested Backup](#)

Customized Backup
Select the object(s) you want to back up. [Schedule Customized Backup](#)

Whole Database
 Tablespaces
 Datafiles
 Archived Logs
 All Recovery Files on Disk
Includes all archived logs and disk backups that are not already backed up to tape.

Backup Strategies
Oracle-suggested:

- Provides an out-of-the-box backup strategy based on the backup settings
- Schedules recurring and immediate backups
- Automates backup management

Customized:

- Specify the objects to be backed up
- Choose disk, tape, or Recovery Appliance backup destination
- Override the default backup settings
- Schedule the backup

[Cancel](#)

Oracle Database > Performance > Availability > Security > Schema > Administration

db12102 > Job Activity Page Refreshed Jun 12, 2014 10:05:23 PM PDT [Auto Refresh](#) Off

Job Activity

Advanced Search

Name: Job Type: Database Backup
Owner: All Status: Succeeded
Start: Last 31 days [Go](#) [Simple Search](#)

Show jobs scheduled to start during or after the selected period.

[View Results](#) [Edit](#) [Create Like](#) [Copy To Library](#) [Suspend](#) [Resume](#) [Stop](#) [Delete](#) | [View](#) [Runs](#) [Create Job](#) [OS Command](#)

Select	Name	Status (Executions)	Scheduled
<input checked="" type="radio"/>	BACKUP_DB1123ME_000021	1 Succeeded	May 26, 2014 10:41:57 AM GMT-07:00
<input type="radio"/>	BACKUP_DB12ORCL_000022	1 Succeeded	May 26, 2014 2:13:41 PM GMT-07:00
<input type="radio"/>	BACKUP_DB1211ZS_000051	1 Succeeded	May 29, 2014 10:38:00 AM GMT-07:00
<input type="radio"/>	BACKUP_DB1211ZS_000056	1 Succeeded	May 29, 2014 12:35:50 PM GMT-07:00
<input type="radio"/>	BACKUP_DB12CDB_000083	1 Succeeded	Jun 12, 2014 7:25:15 PM GMT-07:00



备份与恢复 – 建立RMAN连接

连接受保护的数据库与恢复一体机：

➤ Non-CDB:

```
% rman
RMAN> CONNECT TARGET sys as sysdba;
RMAN> CONNECT CATALOG ra_rman_user@ra1;
```

➤ CDB:

```
% rman
RMAN> CONNECT TARGET c##bkuser@my_cdb;
RMAN> CONNECT CATALOG ra_rman_user@ra1;
```

使用连接命令将受保护的数据库作为**TARGET**连接到恢复设备目录作为**CATALOG**

查看备份信息

永久增量及自动合成虚拟全备极大的减少了备份所需的存储空间；在OEM上查看受保护数据库保护策略、空间使用、去重率等备份的详细信息：

The screenshot displays the Oracle Enterprise Manager Cloud Control 13c interface. The main section shows a table of Protected Databases (4). The table has columns for Database, Target Type, Version, Protection Policy, Database Size (GB), Recovery Window (Goal, Current, Needed Space (GB)), Unprotected Data Window (Threshold, Current), Errors and Warnings, Redo Transport, Copy-to-Cloud, and Copy-to-Tape. The DB19DB row is highlighted, with its Database Size (10.00 GB) and Unprotected Data Window Current value (< 1 sec) circled in red. Below the table, the Protected Database Details for DB19DB are shown, including a De-Duplication Ratio of 14.0 : 1 (circled in red), a bar chart for Unprotected Data and Recovery Window, and a bar chart for Backup Space showing Used (1.17 GB), Needed (10240.0 GB), and Reserved (10240.0 GB) space.

Database	Target Type	Version	Protection Policy	Database Size (GB)	Recovery Window			Unprotected Data Window		Errors and Warnings	Redo Transport	Copy-to-Cloud	Copy-to-Tape
					Goal	Current	Needed Space (GB)	Threshold	Current				
DB12C	Database Instance	12.2.0.1.0	DB12C	1.42	1 day	N/A	100.00	N/A	N/A				
DB19DB	Cluster Database	19.4.0.0.0	OSC_PP1	10.00	1 day	1 day 20:08	10240.00	N/A	< 1 sec		✓	✓	
DB1DB1	Cluster Database	19.4.0.0.0	OSC_PP1	1540.92	1 day	0 days 15:49	1056.16	N/A	< 1 sec		✓	✓	
TST1DB	Cluster Database	19.4.0.0.0	BRONZE	6.33	3 days	1 day 13:42	2.75	N/A	< 1 sec		✓	✓	

Protected Database Details: DB19DB

De-Duplication Ratio: 14.0 : 1

Keep Backup Space: None

Next Scheduled Backup: N/A

Last Copy To Tape: Jan 12, 2021 7:48 PM CST

Last Copy To Cloud: N/A

Last Replication: N/A

Unprotected Data and Recovery Window

Unprotected Data: < 1 sec

Recovery Window: 1 day 20:08:17

Unprotected Data Threshold: N/A

Recovery Window Goal: 1 day 00:00:00

Backup Space

Used: 1.17 GB

Needed: 10240.0 GB

Reserved: 10240.0 GB



备份与恢复 – 恢复数据库（1）

➤ 使用现有当前控制文件恢复和恢复整个数据库

```
STARTUP MOUNT;  
RUN  
{  
  RESTORE DATABASE;  
  RECOVER DATABASE;  
  ALTER DATABASE OPEN;  
}
```

➤ 将整个受保护的数据库（包括控制文件）恢复到特定的时间点

```
SQL> set linesize 222  
SQL> select name, current_scn, scn_to_timestamp(current_scn) "Time"  
       from v$databases;  
NAME          CURRENT_SCN    TIME  
-----  
ORA121        122019556     22-APR-14 12.30.15.000000000 PM  
  
SQL> STARTUP NOMOUNT;  
RUN {  
  SET UNTIL TIME "TO_DATE('2014-14-04:12:30:15','yyyy-dd-mm:hh24:mi:ss')";  
  RESTORE CONTROLFILE; ALTER DATABASE MOUNT;  
  RESTORE DATABASE;  
  RECOVER DATABASE;  
  ALTER DATABASE OPEN RESETLOGS;  
}
```

备份与恢复 – 恢复数据库 (2)

- 如果无法链接受保护的数据库，可以查询恢复设备目录视图以获取 SCN 编号：
 - 必须提供**恢复窗口的范围日期和时间**以及受保护数据库的**db_unique_name**。
 - 当连接到恢复设备目录时，运行以下查询（包括示例输出）

```
SELECT a.db_key, a.db_name, a.sequence#, a.first_change#, a.next_change#, a.completion_time
FROM rc_archived_log a, db b
WHERE b.reg_db_unique_name = 'PTDB2' AND a.db_key = db.db_key
      AND to_date('16-Jul-2014 06:55:23', 'DD-Mon-YYYY HH24:MI:SS') BETWEEN
      a.first_time AND a.next_time;
```

DB_KEY	DB_NAME	SEQUENCE#	FIRST_CHANGE#	NEXT_CHANGE#	COMPLETION_TIME
24201	PTDB2	9911	288402086	288430116	14/07/2014 5:27:49 PM

```
SQL> STARTUP NOMOUNT;
RUN {
  SET UNTIL TIME "TO_DATE('2014-14-07:17:27:49', 'yyyy-dd-mm:hh24:mi:ss)";
  RESTORE CONTROLFILE; ALTER DATABASE MOUNT;
  RESTORE DATABASE;
  RECOVER DATABASE;
  ALTER DATABASE OPEN RESETLOGS;
}
```

与磁带库连接 (1)

在实施ZDLRA时会自动安装并配置OSB，在OEM上可直接管理磁带库：

The screenshot shows the Oracle Enterprise Manager Cloud Control 13c interface. The 'Setup' menu is open, and the 'Devices and Hosts' option is selected. The 'Devices' sub-menu is also open, showing options like 'Media Servers', 'Clients', and 'Map Hosts'. The main content area displays a table of devices, including 'robot0' and 'robot0_tape01'. The table has columns for Name, Type, Drive Number, Status, State, Maintenance, Media Server, Vendor, and Firmware.

Select	Name	Type	Drive Number	Status	State	Maintenance	Media Server	Vendor	Firmware
<input type="checkbox"/>	Devices								
<input type="checkbox"/>	robot0	library			idle	none required	osbadminvip	STK SL150	0372
<input checked="" type="checkbox"/>	robot0_tape01	drive	1		idle		x5zdingest01,x5zdingest02	HP Ultrium 5-SCSI	Y6KS

The screenshot shows the Oracle Enterprise Manager Cloud Control 13c interface. The 'Devices' page is displayed, and the 'View Device Details' action is selected in the 'Actions' menu. The main content area displays a table of devices, including 'robot0' and 'robot0_tape01'. The table has columns for Name, Type, Drive Number, Status, State, Maintenance, Media Server, Vendor, and Firmware.

Select	Name	Type	Drive Number	Status	State	Maintenance	Media Server	Vendor	Firmware
<input type="checkbox"/>	Devices								
<input type="checkbox"/>	robot0	library			idle	none required	osbadminvip	STK SL150	0372
<input checked="" type="checkbox"/>	robot0_tape01	drive	1		idle		x5zdingest01,x5zdingest02	HP Ultrium 5-SCSI	Y6KS

The screenshot shows the Oracle Enterprise Manager Cloud Control 13c interface. The 'Devices' page is displayed, and the 'Reuse Volume' action is selected in the 'Actions' menu. The main content area displays a table of devices, including 'robot0' and 'robot0_tape01'. The table has columns for Name, Type, Drive Number, Status, State, Maintenance, Media Server, Vendor, and Firmware.

Select	Name	Type	Drive Number	Status	State	Maintenance	Media Server	Vendor	Firmware
<input type="checkbox"/>	Devices								
<input type="checkbox"/>	robot0	library			idle	none required	osbadminvip	STK SL150	0372
<input checked="" type="checkbox"/>	robot0_tape01	drive	1		idle		x5zdingest01,x5zdingest02	HP Ultrium 5-SCSI	Y6KS



与磁带库连接 (2)

在OEM上配置定时任务自动将全备/增备/归档复制到磁带库

The screenshot displays the Oracle Enterprise Manager Cloud Control interface for configuring a backup template. The main window is titled "编辑复制到介质作业模板" (Edit Copy-to-Media Job Template) and shows the configuration for a template named "MV_ORA12C_FULL_TO_TAPE".

Key configuration details include:

- 名称: MV_ORA12C_FULL_TO_TAPE
- 介质管理器库: ROBOT0
- * 属性集: ROBOT0_DRIVE_COUNT_1
- * 范围: 保护策略 BRONZE, 数据库 ORA12DB
- 备份类型: FULL (highlighted with a red box and arrow)
- 完全备份模板: MV_ORA12C_FULL_TO_TAPE
- * 压缩算法: 不压缩
- * 加密算法: 不加密

The "Advanced Properties" section is expanded to show "Queue Copy-to-Media Tasks". The description states: "Specify the schedule and properties for the procedure that will queue backup pieces for copy to media using the template above."

调度 (Schedule) details:

- 上次执行此复制到介质模板是在 2021-1-18 上午11时32分00秒 CST。此后未再调度执行。
- 指定新的复制到介质作业调度。
- 启动: 立即, 以后 (2021-1-24 2:01:01) (UTC+08:00) Shanghai - China Time (CT)
- 重复: 每周特定星期几
- 每周星期几: 星期一, 星期二, 星期三, 星期四, 星期五, 星期六, 星期日 (highlighted with a red arrow)
- 结束重复: 从不, 结束截至时间

The "属性" (Properties) section is also visible at the bottom.

On the right side of the interface, a table shows backup queue data:

排队数据 (GB)	上次复制活动	压缩算法
		不压缩



与磁带库连接 (3)

备份从ZDLRA上复制到磁带库之后，通过RMAN查看备份信息如下

```
BS Key Type LV Size
-----
22396 Incr 0 294.45M
List of Datafiles in backup set 22396
File LV Type Ckp SCN Ckp Time Abs Fuz SCN Sparse Name
-----
1 0 Incr 2689742 19-JAN-21 NO /u01/app/oracle/oradata/db12c/system01.dbf

Backup Set Copy #1 of backup set 22396
Device Type Elapsed Time Completion Time Compressed Tag
-----
SBT_TAPE 01:03:25 19-JAN-21 NO TAG20210119T195422

List of Backup Pieces for backup set 22396 Copy #1 ← ZDLRA 上的备份
BP Key Pc# Status Media Piece Name
-----
22397 1 AVAILABLE VB$_2972038354_22388_1

Backup Set Copy #2 of backup set 22396
Device Type Elapsed Time Completion Time Compressed Tag
-----
SBT_TAPE 01:03:25 19-JAN-21 NO TAG20210119T195422

List of Backup Pieces for backup set 22396 Copy #2 ← 磁带库上的备份
BP Key Pc# Status Media Piece Name
-----
22611 1 AVAILABLE x5zddbadm01_db-000002 RA_SBT_DB12C_1515830650_22600_tcvl207e_1_2_22396
```



与磁带库连接 (4)

如果恢复所需要的备份不存在ZDLRA而存在于磁带库中，则可以透明的直接调用磁带库中的备份来执行数据恢复操作

```
[oracle@db122server ~]$ rman target / catalog rasy/welcome1@x5zdingest-scan1:1521/zdlradb

Recovery Manager: Release 12.2.0.1.0 - Production on Tue Jan 19 21:49:56 2021

Copyright (c) 1982, 2017, Oracle and/or its affiliates. All rights reserved.

connected to target database: DB12C (DBID=1515830650, not open)
connected to recovery catalog database
recovery catalog schema release 19.03.00.00. is newer than RMAN release

RMAN> run{
2> ALLOCATE CHANNEL ch01 DEVICE TYPE 'SBT_TAPE' PARMS "SBT_LIBRARY=/u01/app/oracle/product/12.2.0.1/dbhome_1/lib/libra.so, SBT_PARMS=(RA_WALLET='location=file:/u01/app/oracle/pro
duct/12.2.0.1/dbhome_1/dbs/zdlra credential_alias=x5zdingest-scan1:1521/zdlradb:dedicated')";
3> restore database;
4> recover database;
5> RELEASE CHANNEL ch01;
6> }

allocated channel: ch01
channel ch01: SID=1817 device type=SBT_TAPE
channel ch01: RA Library VER=3.17.1.26

Starting restore at 19-JAN-21

channel ch01: starting datafile backup set restore
channel ch01: specifying datafile(s) to restore from backup set
channel ch01: restoring datafile 00001 to /u01/app/oracle/oradata/db12c/system01.dbf
channel ch01: reading from backup piece RA_SBT_DB12C_1515830650_22600_tcvl207e_1_2_22396
channel ch01: piece handle=RA_SBT_DB12C_1515830650_22600_tcvl207e_1_2_22396 tag=TAG20210119T195422
channel ch01: restored backup piece 1
channel ch01: restore complete, elapsed time: 00:01:55
```



与磁带库连接 (5)

➤ 注册磁带库备份信息

```
RMAN> configure channel device type sbt_tape parms 'SBT_LIBRARY=/osb/osb_12.2.0.1.0_linux.x64_release/lib/libobk.so';

old RMAN configuration parameters:
CONFIGURE CHANNEL DEVICE TYPE 'SBT_TAPE' PARMS 'SBT_LIBRARY=/osb/osb_12.2.0.1.0_linux.x64_release/lib/libobk.so';
new RMAN configuration parameters:
CONFIGURE CHANNEL DEVICE TYPE 'SBT_TAPE' PARMS 'SBT_LIBRARY=/osb/osb_12.2.0.1.0_linux.x64_release/lib/libobk.so';
new RMAN configuration parameters are successfully stored

RMAN> catalog device type sbt_tape backuppiece 'RA_SBT_DB12C_1515830650_26639_ufv192f3_1_2_26585';

allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=1 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Oracle Secure Backup
cataloged backup piece
backup piece handle=RA_SBT_DB12C_1515830650_26639_ufv192f3_1_2_26585 RECID=95 STAMP=1062526736

RMAN> catalog device type sbt_tape backuppiece 'RA_SBT_DB12C_1515830650_26639_ffv192f3_1_2_26589';

released channel: ORA_SBT_TAPE_1
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=1 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Oracle Secure Backup
cataloged backup piece
backup piece handle=RA_SBT_DB12C_1515830650_26639_ffv192f3_1_2_26589 RECID=96 STAMP=1062526842

RMAN> catalog device type sbt_tape backuppiece 'RA_SBT_DB12C_1515830650_26639_mvvl92f3_1_2_26593';

released channel: ORA_SBT_TAPE_1
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=1 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Oracle Secure Backup
cataloged backup piece
backup piece handle=RA_SBT_DB12C_1515830650_26639_mvvl92f3_1_2_26593 RECID=97 STAMP=1062526873
```

说明:

如果当前控制文件中没有备份片信息，如果是**磁盘**则使用catalog start with '/xxx' 命令来注册此目录下的备份片信息到控制文件中；然而磁带设备来说无法做到这一点，必须指定备份片名称才能注册指定的备份片到控制文件中，使用如下命令：

```
RMAN>catalog device type sbt_tape backuppiece '<backuppiece_name>';
```

要获取备份片的名称可以从备份日志中查询，也可以使用obtool工具来查看：

```
ob>lspiece -d DBNAME
```

➤ 执行磁带库恢复操作

```
RMAN> restore database;

Starting restore at 2021-01-22 18:28:08
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=1 device type=DISK
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=970 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Oracle Secure Backup

channel ORA_SBT_TAPE_1: starting datafile backup set restore
channel ORA_SBT_TAPE_1: specifying datafile(s) to restore from backup set
channel ORA_SBT_TAPE_1: restoring datafile 00001 to /u01/app/oracle/oradata/db12c/system01.dbf
channel ORA_SBT_TAPE_1: reading from backup piece RA_SBT_DB12C_1515830650_26639_ufv192f3_1_2_26585
channel ORA_SBT_TAPE_1: piece handle=RA_SBT_DB12C_1515830650_26639_ufv192f3_1_2_26585 tag=DB12C_1_POLL
channel ORA_SBT_TAPE_1: restored backup piece 1
channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:03:15
channel ORA_SBT_TAPE_1: starting datafile backup set restore
channel ORA_SBT_TAPE_1: specifying datafile(s) to restore from backup set
channel ORA_SBT_TAPE_1: restoring datafile 00003 to /u01/app/oracle/oradata/db12c/sysaux01.dbf
channel ORA_SBT_TAPE_1: reading from backup piece RA_SBT_DB12C_1515830650_26639_ffv192f3_1_2_26589
channel ORA_SBT_TAPE_1: piece handle=RA_SBT_DB12C_1515830650_26639_ffv192f3_1_2_26589 tag=DB12C_1_POLL
channel ORA_SBT_TAPE_1: restored backup piece 1
channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:25
channel ORA_SBT_TAPE_1: starting datafile backup set restore
channel ORA_SBT_TAPE_1: specifying datafile(s) to restore from backup set
channel ORA_SBT_TAPE_1: restoring datafile 00002 to /u01/app/oracle/oradata/db12c/users00002.dbf
channel ORA_SBT_TAPE_1: reading from backup piece RA_SBT_DB12C_1515830650_26639_mvvl92f3_1_2_26593
channel ORA_SBT_TAPE_1: piece handle=RA_SBT_DB12C_1515830650_26639_mvvl92f3_1_2_26593 tag=DB12C_1_POLL
channel ORA_SBT_TAPE_1: restored backup piece 1
channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:25
channel ORA_SBT_TAPE_1: starting datafile backup set restore
channel ORA_SBT_TAPE_1: specifying datafile(s) to restore from backup set
channel ORA_SBT_TAPE_1: restoring datafile 00007 to /u01/app/oracle/oradata/db12c/users01.dbf
```



迁移已有备份方案到恢复一体机（1）

将受保护的数据库的元数据（Metadata）导入ZDLRA

当决定从现有的备份策略转向使用ZDLRA进行数据保护时，需要对现有策略进行一些修改。当前使用的所有 RMAN 备份和恢复脚本稍作修改后即可在ZDLRA环境中工作。

1. 修改 RMAN 通道配置或通道分配，以便他们使用与零数据损益恢复设备备份模块（ZDLRA备份模块）对应的 SBT 通道，而不是磁盘或磁带通道。
2. 修改 RMAN 备份脚本并删除在ZDLRA中修改其行为的命令。

参考文档：[不受支持的 RMAN 命令](#)

https://docs.oracle.com/en/engineered-systems/zero-data-loss-recovery-appliance/19.2/ampdb/rman_diffs.html#GUID-78844C95-D1B0-485F-BC7C-9E7070064064

3. 通过删除ZDLRA环境中不需要的命令来简化现有的 RMAN 脚本。

通常，RMAN 备份和恢复脚本包含验证备份的命令。这包括诸如VALIDATE和CROSSCHECK等命令。

由于ZDLRA将在所有备份写入存储之前会自动验证受保护数据库中的所有备份，因此在迁移现有数据保护策略以使用恢复设备后不再需要这些命令。



迁移已有备份方案到恢复一体机（2）

准备将 RMAN 恢复目录导入ZDLRA

➤ 在ZDLRA与受保护的数据库中准备导入RMAN恢复目录
[Migration Considerations for Protected Database Administrators \(oracle.com\)](https://www.oracle.com/technetwork/middleware/backup-recovery/migration-considerations-for-protected-database-administrators-2312811.pdf)

➤ 使用IMPORT CATALOG命令导入受保护数据库的元数据：

1. 启动 RMAN 并使用 rasy 用户作为目录进行连接。

注意，rasy 是恢复设备目录的所有者。

```
# rman CATALOG rasy/ra_pswd@ra-scan:1521/zdlra5
```

2. 将源 RMAN 恢复目录导入ZDLRA目录。

源 RMAN 恢复目录的凭据由受保护的数据库管理员提供。

```
IMPORT CATALOG rman_cat11/rmancat11_pswd@dbrcat11 NO UNREGISTER;
```

3. 通过查询RC_BACKUP_PIECE_DETAILS视图验证所有备份件是否包含在恢复设备目录中。

迁移已有备份方案到恢复一体机（2）

➤ RMAN 备份到磁盘或 NFS 共享（包括数据域共享）选择以下方式中的一个：

- 在ZDLRA中配置可以放置所有现有的受保护数据库备份的backup polling location。设置ZDLRA来对此位置进行polling，获取受保护的数据库备份。
- 配置与ZDLRA备份模块对应的 SBT 通道，使用RMAN命令：`BACKUP AS BACKUPSET COPY OF DATABASE`将存储在本地的镜像备份作为备份集备份到ZDLRA。

➤ 使用第三方备份软件进行备份时：

1. 将agent留在受保护的 DB 主机上，直到保留期满
2. 如果在此期间需要，则利用双重备份（磁盘和磁带）策略
3. 最后删除代理节省系统资源

备份最佳实践

- 使用透明数据加密（TDE）而不是 RMAN 加密
 - RMAN 加密将阻止 ZDLRA 创建虚拟完整备份（VB\$）。
 - **避免 RMAN 对 TDE 表空间进行压缩**，因为 RMAN 加密将自动启用，从而阻止 ZDLRA 创建虚拟备份。
- 使用数据库本地压缩而不是 RMAN 压缩
 - RMAN 压缩将导致受保护数据库客户端的 CPU 利用率增加
 - RMAN 压缩备份需要对 ZDLRA 进行减压和再压缩

```
rman target <target string> catalog <catalog string>
backup device type sbt
cumulative incremental level 1
filesperset 1 section size 64g database
plus archivelog not backed up filesperset 32;
```

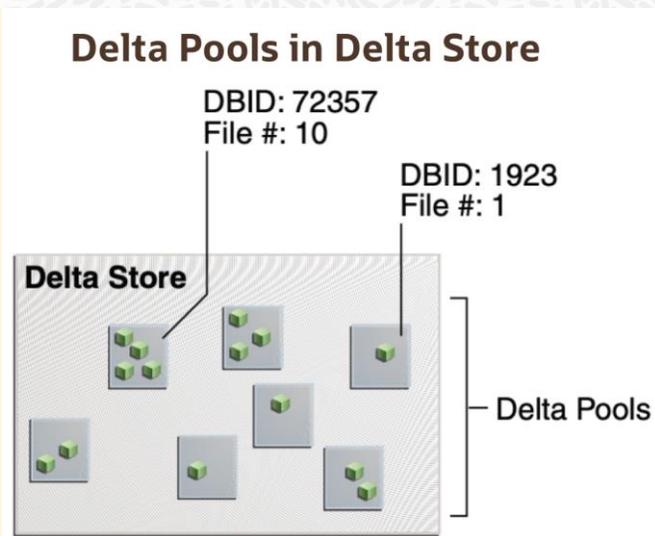
查看备份信息 (1)

BS Key	Type	LV	Size	Device	Type	Elapsed Time	Completion Time
34134	Incr	0	761.08M	SBT_TAPE		00:00:01	21-MAR-21
BP Key: 34135 Status: AVAILABLE Compressed: YES Tag: BACKUP_DB12C_20210321T120742 ← 相同的 Tag							
Handle: VB\$_2972038354_34133I Media:							
List of Datafiles in backup set 34134							
File	LV	Type	Ckp SCN	Ckp Time	Abs Fuz	SCN	Sparse Name
1	0	Incr	17051694	21-MAR-21		NO	/u01/app/oracle/oradata/db12c/system01.dbf
2	0	Incr	17051694	21-MAR-21		NO	/u01/app/oracle/oradata/db12c/users00002.dbf
3	0	Incr	17051694	21-MAR-21		NO	/u01/app/oracle/oradata/db12c/sysaux01.dbf
4	0	Incr	17051694	21-MAR-21		NO	/u01/app/oracle/oradata/db12c/undotbs01.dbf
5	0	Incr	17051694	21-MAR-21		NO	/u01/app/oracle/oradata/db12c/SUN12DB_5_TBS_TRANSFER_1062444061.dbf
7	0	Incr	17051694	21-MAR-21		NO	/u01/app/oracle/oradata/db12c/users01.dbf
8	0	Incr	17051694	21-MAR-21		NO	/u01/app/oracle/oradata/db12c/TS_SUN_2.dbf
BS Key Type LV Size Device Type Elapsed Time Completion Time							
34144	Incr	0	306.03M	SBT_TAPE		00:00:01	21-MAR-21
BP Key: 34145 Status: AVAILABLE Compressed: YES Tag: BACKUP_DB12C_20210321T120742							
Handle: VB\$_2972038354_34133_1 Media:							
List of Datafiles in backup set 34144							
File	LV	Type	Ckp SCN	Ckp Time	Abs Fuz	SCN	Sparse Name
1	0	Incr	17051694	21-MAR-21		NO	/u01/app/oracle/oradata/db12c/system01.dbf
BS Key Type LV Size Device Type Elapsed Time Completion Time							
34148	Incr	0	450.81M	SBT_TAPE		00:00:01	21-MAR-21
BP Key: 34149 Status: AVAILABLE Compressed: YES Tag: BACKUP_DB12C_20210321T120742							
Handle: VB\$_2972038354_34133_3 Media:							
List of Datafiles in backup set 34148							
File	LV	Type	Ckp SCN	Ckp Time	Abs Fuz	SCN	Sparse Name
3	0	Incr	17051694	21-MAR-21		NO	/u01/app/oracle/oradata/db12c/sysaux01.dbf
BS Key Type LV Size Device Type Elapsed Time Completion Time							
34152	Incr	0	1.52M	SBT_TAPE		00:00:01	21-MAR-21
BP Key: 34153 Status: AVAILABLE Compressed: YES Tag: BACKUP_DB12C_20210321T120742							
Handle: VB\$_2972038354_34133_4 Media:							
List of Datafiles in backup set 34152							
File	LV	Type	Ckp SCN	Ckp Time	Abs Fuz	SCN	Sparse Name
4	0	Incr	17051694	21-MAR-21		NO	/u01/app/oracle/oradata/db12c/undotbs01.dbf

初始0级

数据库0级
整体备份

针对每个数据文件的虚拟全备



Delta Store: 是ZDLRA设备中所有受保护的数据库备份数据的总和。所有数据文件和已归档的重做日志备份都驻留在Delta Store中。Delta Store包含所有受保护数据库中所有数据文件的Delta Pool。

Delta Pool: 是一组数据文件块，ZDLRA从这些数据文件块构造虚拟完整备份。ZDLRA会自动管理Delta Pools，以便它可以创建一个虚拟完整备份，该备份对应于所接收到的任何增量备份。



查看备份信息 (2)

BS Key	Type	LV	Size	Device	Type	Elapsed Time	Completion Time
24245	Incr 1		1.13M	SBT_TAPE		00:00:01	2021-01-20 12:09:55
BP Key: 24246 Status: AVAILABLE Compressed: YES Tag: TAG20210120T120954							
Handle: VB\$ 2972038354 24244I Media:							
List of Datafiles in backup set 24245							
File	LV	Type	Ckp	SCN	Ckp Time	Abs Fuz	SCN Sparse Name
1	1	Incr	3139382		2021-01-20 12:09:55	NO	/u01/app/oracle/oradata/db12c/system01.dbf
3	1	Incr	3139382		2021-01-20 12:09:55	NO	/u01/app/oracle/oradata/db12c/sysaux01.dbf
4	1	Incr	3139382		2021-01-20 12:09:55	NO	/u01/app/oracle/oradata/db12c/undotbs01.dbf
7	1	Incr	3139382		2021-01-20 12:09:55	NO	/u01/app/oracle/oradata/db12c/users01.dbf
24252	Incr 0		294.73M	SBT_TAPE		00:00:01	2021-01-20 12:09:55
BP Key: 24253 Status: AVAILABLE Compressed: YES Tag: TAG20210120T120954							
Handle: VB\$ 2972038354 24244_1 Media:							
List of Datafiles in backup set 24252							
File	LV	Type	Ckp	SCN	Ckp Time	Abs Fuz	SCN Sparse Name
1	0	Incr	3139382		2021-01-20 12:09:55	NO	/u01/app/oracle/oradata/db12c/system01.dbf
24256	Incr 0		64.00K	SBT_TAPE		00:00:01	2021-01-20 12:09:55
BP Key: 24257 Status: AVAILABLE Compressed: YES Tag: TAG20210120T120954							
Handle: VB\$ 2972038354 24244_7 Media:							
List of Datafiles in backup set 24256							
File	LV	Type	Ckp	SCN	Ckp Time	Abs Fuz	SCN Sparse Name
7	0	Incr	3139382		2021-01-20 12:09:55	NO	/u01/app/oracle/oradata/db12c/users01.dbf

通过RMAN查看备份信息:

- 虚拟备份的备份片名称以VB\$开头
- 增量备份(Incr1)之后针对每个数据文件自动合成虚拟全备 (Incr0)
- 恢复时使用每个数据文件对应的虚拟全备来直接快速恢复
- 增量备份 (Incr1) 在特殊场景下也会使用, 如跨平台数据迁移时会直接使用增量备份

增量备份TAG与其下面各个数据文件备份片的TAG一样

整体1级增量备份

虚拟备份片名称

每个数据文件自动合成虚拟全备



ZDLRA信息查看

ZDLRA磁盘组信息、数据库信息及Catalog自动备份:

```
[oracle@x5zddbadm01 ~]$ asmcmd
ASMCMD> lsdg
State      Type      Rebal    Sector  Logical_Sector  Block      AU      Total_MB  Free_MB  Req_mir_free_MB  Usable_file_MB  Offline_disks  Voting_files  Name
MOUNTED   HIGH     N        512     512             4096      4194304  7864320  2007196      327680         559838         0              Y          CATALOG/
MOUNTED   NORMAL  N        512     512             4096      4194304  172376064  28762992      3591168         12585912        0              N          DELTA/
ASMCMD>
```

Last login: Fri Jan 22 12:49:27 CST 2021 on pts/1
[oracle@x5zddbadm01 ~]\$ srvctl config database -d zdlrddb
Database unique name: zdlrddb
Database name: zdlrddb
Oracle home: /u01/app/oracle/product/19.0.0.0/dbhome_1
Oracle user: oracle
Spfile: +CATALOG/ZDLRADB/PARAMETERFILE/spfile.270.1055592933
Password file: +CATALOG/ZDLRADB/PASSWORD/pwdzdlrddb.258.1055592005
Domain:
Start options: open
Stop options: immediate
Database role: PRIMARY
Management policy: AUTOMATIC
Server pools:
Disk Groups: CATALOG,DELTA
Mount point paths:
Services:
Type: RAC
Start concurrency:
Stop concurrency:
OSDBA group: dba
OSOPER group: dba
Database instances: zdlrddb1,zdlrddb2
Configured nodes: x5zddbadm01,x5zddbadm02
CSS critical: no
CPU count: 0
Memory target: 0
Maximum memory: 0
Default network number for database services:
Database is administrator managed
[oracle@x5zddbadm01 ~]\$

```
[root@x5zddbadm01 ~]# ls -atl /etc/cron.hourly
total 24
drwxr-xr-x 105 root root 12288 Jan  8 16:33 ..
drwx----- 2 root root 4096 Nov  4 14:42 .
lrwxrwxrwx  1 root root  46 Nov  4 14:42 ra_export.sh -> /opt/oracle.RecoveryAppliance/bin/ra_export.sh
-rwx----- 1 root root  191 Jun  9 2019 mcelog.cron
-rwx----- 1 root root  392 Jun  9 2019 @anacron
[root@x5zddbadm01 ~]# ls -atl /raacfs/raadmin/ra_export
total 20729608
drwxr-xr-x  4 root root    20480 Jan 22 12:45 ra_backup.2021113.81.147041
drwxr-xr-x  3 root root    20480 Jan 22 12:45 .
-rw-r--r--  1 root root 958566762 Jan 22 08:03 ra_backup.2021122.81.5506.tar.gz
-rw-r--r--  1 root root 958583143 Jan 21 20:03 ra_backup.2021121.201.281670.tar.gz
-rw-r--r--  1 root root 958543877 Jan 21 08:03 ra_backup.2021121.81.168754.tar.gz
-rw-r--r--  1 root root 958599592 Jan 20 20:03 ra_backup.2021120.201.203150.tar.gz
-rw-r--r--  1 root root 958553022 Jan 20 08:03 ra_backup.2021120.81.306079.tar.gz
-rw-r--r--  1 root root 958580479 Jan 19 20:03 ra_backup.2021119.201.84754.tar.gz
-rw-r--r--  1 root root 958537725 Jan 19 08:03 ra_backup.2021119.81.76458.tar.gz
-rw-r--r--  1 root root 958562928 Jan 18 20:03 ra_backup.2021118.201.250716.tar.gz
-rw-r--r--  1 root root 958509574 Jan 18 08:03 ra_backup.2021118.81.339223.tar.gz
-rw-r--r--  1 root root 958479705 Jan 15 08:03 ra_backup.2021115.81.5693.tar.gz
-rw-r--r--  1 root root 958527344 Jan 14 20:03 ra_backup.2021114.201.78057.tar.gz
-rw-r--r--  1 root root 958479427 Jan 14 08:03 ra_backup.2021114.81.110353.tar.gz
-rw-r--r--  1 root root 958491952 Jan 13 20:03 ra_backup.2021113.201.224904.tar.gz
-rw-r--r--  1 root root 958448341 Jan 12 20:03 ra_backup.2021112.201.127852.tar.gz
-rw-r--r--  1 root root 958546302 Jan 12 08:03 ra_backup.2021112.81.294852.tar.gz
-rw-r--r--  1 root root 958422540 Jan 11 20:03 ra_backup.2021111.201.166433.tar.gz
-rw-r--r--  1 root root 958499526 Jan 11 08:03 ra_backup.2021111.81.136438.tar.gz
-rw-r--r--  1 root root 958415573 Jan 10 20:03 ra_backup.2021110.201.284161.tar.gz
-rw-r--r--  1 root root 958502003 Jan 10 08:03 ra_backup.2021110.81.15804.tar.gz
-rw-r--r--  1 root root 958384995 Jan  9 20:03 ra_backup.202119.201.47718.tar.gz
-rw-r--r--  1 root root 958469101 Jan  9 08:03 ra_backup.202119.81.280214.tar.gz
-rw-r--r--  1 root root 978990883 Jan  8 20:03 ra_backup.202118.201.236802.tar.gz
drwxr-xr-x 16 root root    32768 Nov  4 14:37 ..
[root@x5zddbadm01 ~]#
```



开启REDO实时传输 (1)

开启REDO实时传输操作很方便，只需要在备份设置中选择”启用实时重做传输”即可：

db12c (容器数据库) | 登录身份 sys | Oracle.com

Oracle 数据库 | 性能 | 可用性 | 安全性 | 方案 | 管理

备份设置 | 设备 | 备份集 | 策略

Recovery Appliance 设置

此数据库配置为将备份发送到 Recovery Appliance。

以下列出的虚拟专用目录用户是已授予了备份受保护数据库所需权限的 Recovery Appliance 数据库用户，这些用户的已命名身份证明已设置为可供 Recovery Appliance 管理员访问。

提示 此数据库将配置为使用 HTTP 协议将备份发送到 Recovery Appliance。有关配置 HTTPS 协议的说明，请参阅 Recovery Appliance 文档。

Recovery Appliance: ZDLRAX5
虚拟专用目录用户: cdbvpc1

选择有权将备份从此数据库发送到所选 Recovery Appliance 的 Recovery Appliance 虚拟专用目录用户。

启用实时重做传输

为了避免丢失数据，数据库会配置为将内存中重做数据实时传输到 Recovery Appliance。此操作可能需要重新启动数据库。

测试备份 | 清除配置

显示高级设置

此过程完全由OEM自动完成，期间需要重启数据库，通过点击作业来查看开启的操作的详细步骤及相关的日志信息，开启之后检查数据库参数变化如下：

- *.log_archive_config='dg_config=(zdlradb,db12c)'
- *.log_archive_dest_2='SERVICE="x5zdingest-scan1:1521/zdlradb:dedicated"',
'ASYNCR DB_UNIQUE_NAME=zdlradb VALID_FOR=(ALL_LOGFILES, ALL_ROLES)'
- *.log_archive_dest_state_2='ENABLE'
- *.redo_transport_user='CDBVPC1'



开启REDO实时传输 (2)

- 开启REDO实时传输后通过RMAN查看在ZDLRA上归档的重做日志备份片的名 称 以\$RSCN开头，并且进行了压缩存储；
- 如果数据库关闭则数据库当前的重做日志在ZDLRA上就会立即生成一个不完 整的归档日志，在进行数据库恢复时可以依据需要利用这个不完整归档日 志 来执行恢复操作，数据库可恢复的最大SCN记录在rc_database视图中。

```
RMAN> list backup;
```

```
List of Backup Sets
```

```
=====
```

BS Key	Size	Device Type	Elapsed Time	Completion Time
23643	69.00K	SBT_TAPE	00:00:00	20-JAN-21

BP Key: 23644 Status: AVAILABLE **Compressed: YES** Tag: TAG20210120T104703
Handle: \$RSCN_2684885_RTIM_1062272958_THRD_1_SEQ_13_CTKEY_23430_BACKUP Media:

```
List of Archived Logs in backup set 23643
```

Thrd	Seq	Low SCN	Low Time	Next SCN	Next Time
1	13	3025185	20-JAN-21	3025623	20-JAN-21

```
SQL> SELECT name,final_change# FROM rc_database where name='DB1DB1';
```

NAME	FINAL_CHANGE#
DB1DB1	93631386

注意： rc_database视图中的 final_change#字段的值只有在数据库关闭的状态下才可查到。

端到端的数据验证（1）



数据校验时刻：

1. 数据备份与恢复环节
2. 日常数据自动巡检（默认每7天，可调整）
3. Oracle ASM 数据块校验与自动修复
4. ZDLRA至磁带库的读取与写入 环节
5. ZDLRA至其它ZDLRA的复制环节
6. 这是 Oracle 确保备份数据真实、有效、可恢复的关键
7. 这是用户放心使用“永久增量 备份”技术的基础

参考文档：

https://docs.oracle.com/cd/E88198_01/AMAGD/amagd_intro.htm#GUID-BFFA12EA-E8D0-4E4F-A312-B942B6E9F4DA ZDLRA



端到端的数据验证 (2)



```
SYS@zdlrdb1>select * from ra_config;
```

NAME	VALUE
check_files_days	7
crosscheck_db_days	1
network_chunksize	134217728
optimize_chunks_days	7
percent_late_for_warning	100
validate_db_days	7

6 rows selected.

- ZDLRA针对每个数据库自动验证默认检查周期为7天
- 可以通过DBMS_RA.CONFIG包来修改检查周期，但需要在Oracle支持的指导下操作

```
SYS@zdlrdb1>select DB_UNIQUE_NAME, CREATION_TIME, COMPLETION_TIME, ELAPSED_SECONDS  
2 from ra_task where TASK_TYPE='VALIDATE'  
3 order by DB_UNIQUE_NAME, CREATION_TIME;
```

DB_UNIQUE_NAME	CREATION_TIME	COMPLETION_TIME	ELAPSED_SECONDS
DB12C	21-JAN-21 12.01.39.045647 PM +08:00	21-JAN-21 12.02.00.705074 PM +08:00	13.211383
DB12C	28-JAN-21 12.28.40.805306 PM +08:00	28-JAN-21 12.30.11.225431 PM +08:00	65.592005
DB19DB	18-JAN-21 11.50.23.973832 AM +08:00	18-JAN-21 11.51.22.114289 AM +08:00	37.15
DB19DB	25-JAN-21 12.13.45.829042 PM +08:00	25-JAN-21 12.15.40.922685 PM +08:00	95.385715
DB1DB1	20-JAN-21 07.59.04.421520 PM +08:00	20-JAN-21 08.19.09.083877 PM +08:00	1173.17618
DB1DB1	27-JAN-21 08.25.21.125283 PM +08:00	27-JAN-21 09.33.18.331437 PM +08:00	4052.6321
ORA12DB	21-JAN-21 10.03.12.997068 PM +08:00	21-JAN-21 10.03.46.870331 PM +08:00	21.330471
ORA12DB	28-JAN-21 10.30.44.966585 PM +08:00	28-JAN-21 10.31.30.976812 PM +08:00	21.183131



端到端的数据验证 (3)

在数据库的“备份报告”中有详细的端到端的概要信息：

Oracle Enterprise Manager Cloud Control 13c

db12c

Oracle 数据库 性能 可用性 安全性 方案 管理

备份报告

查看 总计 3 (已完成 2 | 失败 1)

备份名	状态	命令	目标					开始时间	所用时间	输入大小 (GB)	输出大小 (GB)	输出速率 (MB/秒)
			类型	目标								
2021-03-21T12:07:43	✓	DB INCR	Recovery Appla...	ZDLRAX5	✓	✓	三月 21, 2021 12:07:44 下午	00:00:21	2.5920	2.3718	115.6548	
2021-03-21T12:06:29	✓	CONTROLFILE	Recovery Appla...	ZDLRAX5			三月 21, 2021 12:06:34 下午	00:00:10	0.0204	0.0210	2.1500	

备份报告: 作业 2021-03-21T12:07:43

端到端概要 输出 输入

备份操作	源	目标	所得到的备份					
			存储	输入类型	输出类型	级别	还原大小 (GB)	完成时间
RMAN 备份	db12c	ZDLRAX5				完整	2.6416	三月 21, 2021 12:07:48 下午
						增量	N/A	N/A
复制到磁带	ZDLRAX5	磁带				完整	0.3863	三月 21, 2021 12:08:03 下午
						完整	2.6416	三月 23, 2021 09:46:52 下午

具有 N/A 的单元表示恢复目录中不存在该备份类型的数据。



备份轮询

在备份策略中设置备份轮询的 (NFS) 地址路径及检查频率:

Edit Protection Policy

Advanced Parameters

Backup and Redo Failover

Specify whether protected databases using this protection policy will use this Recovery Appliance as an alternate destination in a backup and redo failover strategy. If enabled, backups and redo for protected databases that use this protection policy will be stored temporarily for later forwarding to a primary Recovery Appliance, after which they will be deleted from this Recovery Appliance.

Backup and Redo Failover

Backup Deletion

Specify whether Recovery Appliance will allow deletion of backups via the RMAN DELETE command for databases associated with this protection policy.

Backup Deletion

Backup Polling Location

Recovery Appliance can manage conventional disk backups written to a shared directory. Specify the directory that Recovery Appliance will monitor for backups from databases that use this protection policy.

Location:

Frequency: minutes

Delete Backups After Copy

Backup Copy Policy

Select whether Recovery Appliance should ensure that new backups are replicated or copied to media before being removed from Recovery Appliance storage.

TIP Note the dependency on copy to media or replication.

- Always accept new backups even if it requires purging existing backups not yet copied to media or replicated.
- Refuse new backups if needed space can only be obtained by purging backups not yet copied to media or replicated.

Archived Log Backup Compression

Specify the compression algorithm that will be used for archived log backups created by the Recovery Appliance.

Compression Algorithm:

OK **Cancel**

磁盘上备份

BS Key	Type	LV	Size	Device Type	Elapsed Time	Completion Time
26542	Incr	1	184.00K	DISK	00:01:31	22-JAN-21
BP Key: 26545 Status: AVAILABLE Compressed: NO Tag: DB12C_1_POLL						
Piece Name: /u01/app/oracle/dbbackup/db_ora12_8vvl92f3_1_1.bak						
List of Datafiles in backup set 26542						
File	LV	Type	Ckp SCN	Ckp Time	Abs Fuz SCN	Sparse Name
1	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/system01.dbf
2	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/users00002.dbf
3	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/sysaux01.dbf
4	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/undotbs01.dbf
5	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/SUN12DB_5_TBS_TRANSFER_1062444061.dbf
7	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/users01.dbf

自动迁移到 ZDLRA上

BS Key	Type	LV	Size	Device Type	Elapsed Time	Completion Time
26556	Full		10.56M	DISK	00:00:01	22-JAN-21
BP Key: 26563 Status: AVAILABLE Compressed: NO Tag: TAG20210122T121533						
Piece Name: /u01/app/oracle/product/12.2.0.1/dbhome_1/dbs/c-1515830650-20210122-04						
SPFILE Included: Modification time: 22-JAN-21						
SPFILE db_unique_name: DB12C						
Control File Included: Ckp SCN: 3766889 Ckp time: 22-JAN-21						

自动合成 虚拟全备

BS Key	Type	LV	Size	Device Type	Elapsed Time	Completion Time
26576	Incr	1	136.00K	SBT_TAPE	00:00:01	22-JAN-21
BP Key: 26577 Status: AVAILABLE Compressed: YES Tag: DB12C_1_POLL						
Handle: VBS_2972038354_265751 Media:						
List of Datafiles in backup set 26576						
File	LV	Type	Ckp SCN	Ckp Time	Abs Fuz SCN	Sparse Name
1	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/system01.dbf
2	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/users00002.dbf
3	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/sysaux01.dbf
4	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/undotbs01.dbf
5	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/SUN12DB_5_TBS_TRANSFER_1062444061.dbf
7	1	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/users01.dbf

BS Key	Type	LV	Size	Device Type	Elapsed Time	Completion Time
26585	Incr	0	295.64M	SBT_TAPE	00:00:01	22-JAN-21
BP Key: 26586 Status: AVAILABLE Compressed: YES Tag: DB12C_1_POLL						
Handle: VBS_2972038354_26575_1 Media:						
List of Datafiles in backup set 26585						
File	LV	Type	Ckp SCN	Ckp Time	Abs Fuz SCN	Sparse Name
1	0	Incr	3766871	22-JAN-21	NO	/u01/app/oracle/oradata/db12c/system01.dbf

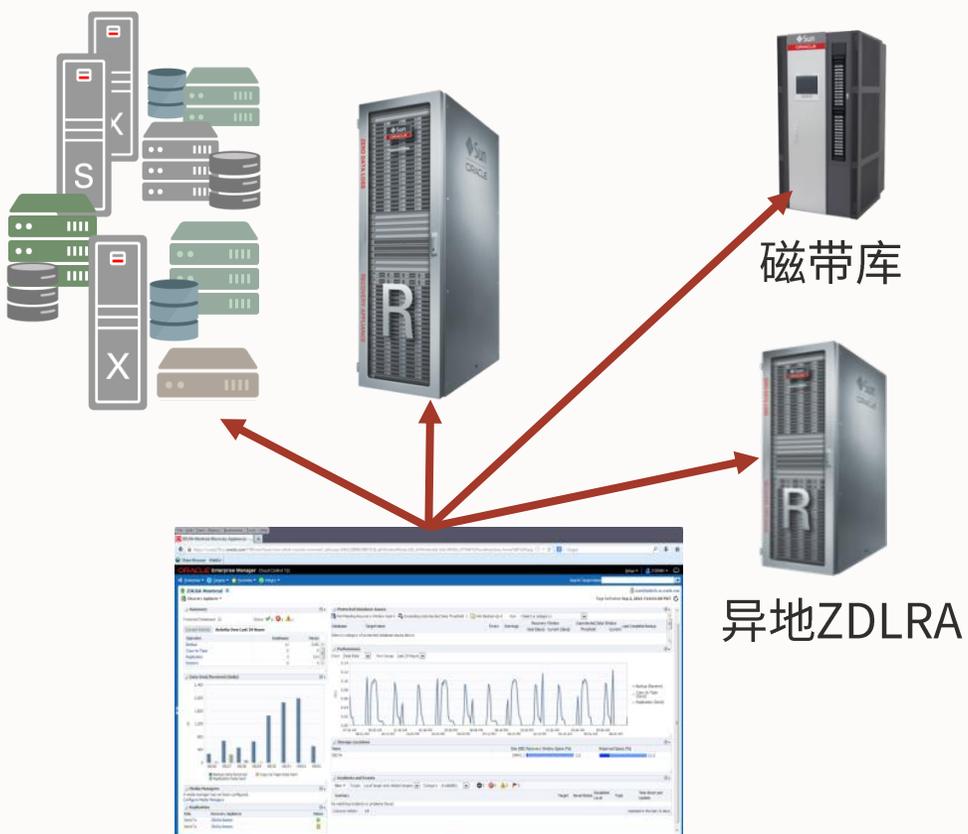
BS Key	Type	LV	Size	Device Type	Elapsed Time	Completion Time
26589	Incr	0	221.93M	SBT_TAPE	00:00:01	22-JAN-21



Agenda

- 1 ZDLRA 产品介绍
- 2 部署架构设计与技术细节
- 3 备份与恢复
- 4 运维与监控

统一监控和管理工具 (OEM)



- ZDLRA管理员集中监控和管理备份作业
- 可视化程度高，操作简便快捷
- 数据库管理员监控从磁盘到磁带到异地副本的所有数据库备份状态
- 卸载远程复制和到磁带库备份压力



统一监控和管理工具 (OEM)

OEM上直接管理ZDLRA、磁带库、远程ZDLRA、数据库备份/恢复及监控等

The screenshot displays the Oracle Enterprise Manager Cloud Control 13c interface, divided into three main sections:

- Top Left: Recovery Appliance Overview**
 - Navigation menu: 所有目标 (All Targets), 收藏夹 (Favorites), 历史记录 (History), 设置 (Settings).
 - Target list table:

名称	状态
ZDLRAX5	↑
 - Target details table:

受保护数据库	成员状态	意外事件和事件
0	↓ ↑ ↻ ⏸ ⏹	6 32
 - Target type dropdown menu:
 - 组 (Group)
 - 系统 (System)
 - 服务 (Service)
 - 主机 (Host)
 - 数据库 (Database)
 - 中间件 (Middleware)
 - 业务应用程序 (Business Application)
 - 组合应用程序 (Composite Application)
 - Exadata
 - Recovery Appliance (highlighted)
- Top Right: Recovery Appliance Configuration**
 - Target: ZDLRAX5 > 介质管理器 (Media Manager)
 - Table of media managers:

名称	目标	状态	错误	最大流数	还原流数	介质管理供应商参数	介质管理供应商命令	需要加密
ROBOTO	工厂	↑		1	0	SBT_LIBRARY=/usr/local/oracle/backup/ro/robok.so		
 - ROBOTO 属性集 (ROBOTO Properties):

名称	池 ID	流	介质管理供应商参数	介质管理供应商命令
ROBOTO_DRIVE_COUNT_1		1		
- Bottom Left: ZDLRAX5 复制 (ZDLRAX5 Replication)**
 - Section: 复制 (Replication)
 - Text: Recovery Appliance 可以将备份数据复制到其他本地或远程 Recovery Appliance.
 - Steps:
 - 在配置复制之前, 要复制其备份的受保护数据库必须:
 - 先向下游 Recovery Appliance 注册, 然后在上游 Recovery Appliance 上配置复制。
 - 已在配置了复制信息的上游 Recovery Appliance 上分配给保护策略。
 - 要在上游 Recovery Appliance 上配置备份复制, 请执行以下操作:
 - 创建复制服务器, 其中包含下游 Recovery Appliance 的连接信息。
 - 将保护策略添加到复制服务器, 其中包含要复制其备份的受保护数据库。
 - 提示: 要创建和查看可添加到复制服务器的保护策略, 请转到 保护策略.
 - Buttons: 创建复制服务器 (highlighted), 编辑复制服务器, 添加保护策略, 删除, 暂停, 恢复.
 - Table:

复制服务器	下游 Recovery Appliance	最大流数	保护策略	任务			排队数据 (GB)	状态	上次复制活动
				已排队	正在运行	已完成 (过去 24 小时)			
- Bottom Right: Oracle Database Configuration (WINDB19C_192.168.8.101)**
 - Target: WINDB19C_192.168.8.101
 - Menu: Oracle 数据库 > 性能 > 可用性 > 安全性 > 方案 > 管理
 - Sub-menu: 备份和恢复 (Backup and Recovery) - 调度备份... (highlighted)
 - Sub-menu: 添加备用数据库 (Add Standby Database) - Data Guard 管理 (highlighted)
 - Sub-menu: 验证 Data Guard 配置 (Verify Data Guard Configuration)
 - Sub-menu: 管理当前备份 (Manage Current Backups) - 备份报告 (highlighted)
 - Sub-menu: 配置 Oracle Cloud 备份 (Configure Oracle Cloud Backups)
 - Sub-menu: 还原点 (Restore Points) - 执行恢复... (highlighted)
 - Sub-menu: 事务处理 (Transactions) - 备份设置 (highlighted)
 - Sub-menu: 恢复设置 (Recovery Settings) - 恢复目录设置 (highlighted)



OEM监控

在两个计算节点上通过手动添加目标方式来安装代理：

The screenshot displays the Oracle Enterprise Manager Cloud Control 13c interface for adding a target. The left pane, titled '手动添加目标' (Manual Add Target), shows three options: '添加主机目标' (Add Host Target), '添加非主机目标 使用指导式流程' (Add Non-Host Target using Guided Process), and '添加非主机目标 使用声明式流程' (Add Non-Host Target using Declarative Process). The '添加主机目标' section has a red box around the '在主机上安装代理' (Install Agent on Host) button. The right pane, titled '添加目标' (Add Target), shows the '添加主机目标: 主机和平台' (Add Host Target: Host and Platform) wizard. The wizard is in step 1 of 3, '主机和平台' (Host and Platform). The '会话名称' (Session Name) is 'ADD_HOST_SYSMAN_2020-11-4_下午04时08分24秒'. The '代理软件选项' (Agent Software Options) section shows a table with two rows of hosts and platforms.

主机	平台
x5zddbadm01.cn.oracle.com	Linux x86-64
x5zddbadm02.cn.oracle.com	Linux x86-64



OEM监控

使用指导式流程添加数据库集群：

The screenshot displays the Oracle Enterprise Manager Cloud Control 13c interface. The main window is titled "手动添加目标" (Manual Add Target) and shows a guided workflow for adding a database cluster target. The workflow is divided into two main sections: "添加主机目标" (Add Host Target) and "添加非主机目标" (Add Non-Host Target). The "添加非主机目标" section is active, showing a list of target types under "指导式搜索" (Guided Search). The "Oracle 集群和高可用性服务" (Oracle Cluster and High Availability Services) target type is selected and highlighted with a red box. A red arrow points to the "使用指导式流程添加" (Use Guided Workflow to Add) button. The right-hand pane shows the configuration details for the "添加目标: 集群和 Oracle 高可用性服务" (Add Target: Cluster and Oracle High Availability Services). The configuration includes fields for "指定主机" (Specify Host), "集群目标属性" (Cluster Target Properties), and "Oracle 高可用性服务目标" (Oracle High Availability Services Target). The "保存" (Save) button is highlighted with a red box and a red arrow. The table below shows the mapping of host targets to Oracle High Availability Services targets.

主机目标名称	Oracle 高可用性服务目标名称
x5zddbadm01.cn.osc.oracle.com	has_x5zddbadm01.cn.osc.oracle.com
x5zddbadm02.cn.osc.oracle.com	has_x5zddbadm02.cn.osc.oracle.com



OEM监控

使用指导式流程添加数据库集群：

The screenshot displays the Oracle Enterprise Manager Cloud Control 13c interface. The main window is titled "手动添加目标" (Manual Add Target) and shows a guided process for adding database clusters. The process is divided into three steps: "添加主机目标" (Add Host Target), "添加非主机目标 使用指导式流程" (Add Non-Host Target Using Guided Process), and "使用指导式流程添加" (Use Guided Process to Add). The "使用指导式流程添加" step is highlighted, showing a list of target types. The "Oracle 数据库, 监听程序和自动存储管理" (Oracle Database, Listener and Automatic Storage Management) option is selected. The "测试连接" (Test Connection) button is highlighted, and a dialog box shows the successful connection test result for the "zdiradb" database.

Oracle Enterprise Manager Cloud Control 13c

手动添加目标

添加主机目标

添加非主机目标 使用指导式流程

使用指导式流程添加

指导式搜索

Oracle Fusion Middleware/WebLogic 域

Oracle MiniCluster

Oracle Public Cloud Machine

Oracle SuperCluster

Oracle Tenant Automation System

Oracle Virtual Platform

Oracle 数据库, 监听程序和自动存储管理

Oracle 集群和高可用性服务

Private Cloud Appliance

Recovery Appliance

Traffic Director (11g)

全局数据服务

在主机上安装代理

安装代理结果

使用远程安装过程安装代理来添加主机目标。查看过去代理安装的状态。

在主机上运行指导式搜索以查找可管理的目标。选择此项可将搜索到的部分或全部目标提升为受管目标。

Oracle Enterprise Manager Cloud Control 13c

数据库搜索: 结果

信息

zdiradb: 连接测试成功。

确定

数据库

已在此集群上搜索到以下数据库。提供监视身份证明并保存目标以开始监视这些数据库。您可以使用“指定常用监视”

集群数据库

查看 指定常用监视身份证明 配置 测试连接

选择	目标名称	监视身份证明			目标组
		监视用户名	监视口令	角色	
<input checked="" type="checkbox"/>	zdiradb	dbsnmp	正常	

集群 ASM

在此集群上搜索到以下集群 ASM 目标。

查看 配置 测试连接

选择	目标名称	监视身份证明			目标组
		监视用户名	监视口令	角色	
<input checked="" type="checkbox"/>	+ASM_Cluster-XSHC	asmsnmp		SYSDBA	
	+ASM1_x5zddbadm01.cn.oracle.com				



OEM监控

使用指导式流程添加ZDLRA:

The screenshot displays the Oracle Enterprise Manager Cloud Control 13c interface. On the left, the '手动添加目标' (Manual Add Target) page is visible, with the '使用指导式流程添加' (Add using guided process) option highlighted. A red box and arrow point to this option. The main area shows a '使用指导式流程添加' (Add using guided process) dialog box. In this dialog, the 'Recovery Appliance' option is selected and highlighted with a red box. Below the dialog, a detailed view of the 'Recovery Appliance' configuration is shown, including sections for '计算节点/服务器' (Compute Nodes/Server), 'Oracle Exadata Storage Server', 'Infiniband 交换机' (Infiniband Switch), and '以太网交换机' (Ethernet Switch). A red box and arrow point to the '继续 Recovery Appliance 搜索' (Continue Recovery Appliance Search) button at the bottom of the configuration page.



OEM监控

发现ZDLRA



设置:

- ZDLRA名称
- 管理员身份证明
- 主机身价证明

设置:

- OSB域属性

复查后提交



OEM监控

ZDLRA监控界面



ORACLE Enterprise Manager Cloud Control 13c

手动添加目标

添加主机目标

添加非主机目标 使用指导式流程

添加非主机目标 使用声明式流程

Recovery Appliance 目标创建成功.

目标导航

ZDLRA Hardware x5.cn.oracle.com

目标	严重性	状态	升级级别	类型	自上次更新以来的时间



OEM监控

ORACLE Enterprise Manager Cloud Control 13c

ZDLRA Florence

Recovery Appliance

Page Refreshed Jul 25, 2017 7:21:34 AM PDT

Auto Refresh Off

Summary

Protected Databases 284 Status ✔ 280 ✘ 0 ⚠ 4

Current Activity Activity Over Last 24 Hours

Operation	Databases	Pieces
Backups	33	18665
Copy-to-Tape	2	206
Replications	22	3569
Restores	0	0

Protected Database Issues

Not Meeting Recovery Window Goal 0 Exceeding Unprotected Data Threshold 0 Not Backed-Up 1 View Not Backed-Up

Database	Target Name	Errors	Warnings	Recovery Window		Unprotected Data Window		Last Complete Backup
				Goal	Current	Threshold	Current	
FLTDW				35 days	< 1 sec		N/A	

Performance

Chart Data Rate View Range Last 7 Days

Storage Locations

Name	Size (GB)	Recovery Window Space (%)	Reserved Space (%)
DELTA	462950.3	88.5	91.9

Media Managers

Library Name	Status
ROBOT0	●

Replication

Role	Recovery Appliance	Status
Send To	ZDLRA Baltimore	●
Receive From	ZDLRA Baltimore	●

Incidents and Events

View Target Local target and Related targets Category All 0 0 5 0

Summary	Target	Severity	Status	Escalation Level	Type	Time Since Last Update
ORA-45159: RECOVERY_WINDOW_GOAL is lost for database D12102E16K_FLORENCE.		⚠	New	-	Incident	2 days 22 hours
ORA-45180: The crosscheck task has not run recently for database one or more databases.		⚠	New	-	Incident	4 days 8 hours
The total space required to meet the recovery window for all databases using storage location DELTA is 86.969% of...		⚠	New	-	Incident	6 days 6 hours
ORA-45160: Incremental forever strategy is lost for database LUKE.		⚠	New	-	Incident	6 days 6 hours
ORA-45171: The chunk optimization task has not run recently for one or more databases.		⚠	New	-	Incident	29 days 13 hours

Columns Hidden 14 Updated in the last 31 days



OEM监控

▲ Incidents and Events ⚙️

View ▼ Target Local target and Related targets Category All 0 6 4 0

Summary	Target	Severity	Status	Escalation Level	Type	Time Since Last Update
ORA-45159: RECOVERY_WINDOW_GOAL is lost for database [redacted] ORA-06512: at "SYS.DBMS_SYS_ERR..."	[redacted]	⚠️	New	-	Incident	0 days 14 hours
ORA-45159: RECOVERY_WINDOW_GOAL is lost for database [redacted] ORA-06512: at "SYS.DBMS_SYS_ERR..."	[redacted]	⚠️	New	-	Incident	0 days 18 hours
ORA-45159: RECOVERY_WINDOW_GOAL is lost for database [redacted] ORA-06512: at "SYS.DBMS_SYS_ERR..."	[redacted]	⚠️	New	-	Incident	1 days 0 hours
ORA-45172: The validation task has not run recently for one or more databases. ORA-06512: at "SYS.DBMS_SY..."	[redacted]	⚠️	New	-	Incident	7 days 5 hours
Internal error () detected in /u01/app/oracle/diag/rdbms/zdhrax4/zdhrax4/alert/log.xml at time/line number: Fri Jan...	[redacted]	❌	New	-	Incident	10 days 5 hours

Columns Hidden 14 Updated in the last 31 days

▲ Incidents and Events ⚙️

View ▼ Target Local target and Related targets Category Error 0 4 36 0

Summary	Target	Severity	Status	Escalation Level	Type	Time Since Last Update	Created
ORA-64760: Database [redacted] has had tasks in ordering wait state for over 2 days.	[redacted]	⚠️	New	-	Incident	13 days 15 hours	Jan 8, 2018 9:1...
ORA-64748: trace file writing initiated using _debug_flags	[redacted]	⚠️	New	-	Incident	13 days 23 hours	Jan 8, 2018 1:2...
ORA-45173: The checkfiles task has not run recently for one or more storage locations.	[redacted]	⚠️	New	-	Incident	14 days 1 hours	Jan 8, 2018 11:...
ORA-45167: unable to validate backup piece with BP_KEY 16123913 ORA-45109: metadata for database ; file is corrupt ORA-4...	[redacted]	❌	New	-	Incident	15 days 15 hours	Jan 6, 2018 9:2...
ORA-64737: unable to copy a full backup of database [redacted] to tape or replicated Recovery Appliance	[redacted]	⚠️	New	-	Incident	15 days 20 hours	Jan 6, 2018 4:5...

Columns Hidden 13 Updated in the last 31 days



OEM监控

Recovery Appliance alert notification setup using Oracle Enterprise Manager (Doc ID 2262003.1)

旧备份的警报和通知示例：

▲ Incidents and Events ⚙

View ▼ Target Local target and Related targets Category All 0 29 300 0

Summary	Target	Severity	Status	Escalation Level	Type	Time Since Last Update
The last complete backup for database NENC was on 2017-05-08 08:00:21 -07:00.		✖	New	-	Incident	0 days 0 hours
The last complete backup for database YENC was on 2017-05-08 08:00:20 -07:00.		✖	New	-	Incident	0 days 0 hours
The last complete backup for database DB1212 was on 2017-04-28 20:00:52 -07:00.		✖	New	-	Incident	0 days 0 hours
The last complete backup for database COR1212 was on 2017-05-08 09:01:50 -07:00.		✖	New	-	Incident	0 days 0 hours
The last complete backup for database MAACDB1 was on 2017-05-08 09:00:58 -07:00.		✖	New	-	Incident	0 days 0 hours

Host=
Target type=Recovery Appliance
Target name=ZDLRA Montreal
Categories=Availability
Message=The last complete backup for database 2995 minutes old.
Severity=Critical
Event reported time=May 8, 2017 1:35:56 PM PDT
Operating System=Linux
Platform=x86_64
Associated Incident Id=27852
Associated Incident Status=New
Associated Incident Owner=
Associated Incident Acknowledged By Owner=No
Associated Incident Priority=None
Associated Incident Escalation Level=0
Event Type=Metric Alert
Event name=dblra_protected_database:last_backup_age
Metric Group=dblra_protected_database
Metric=last_backup_age
Metric value=2995
Key Value=
Key Column 1=db_unique_name
Key Column 1 Value=MAACDB1
Key Column 2=policy_name
Key Column 2 Value=CDB_PROT
Key Column 3 Value=
Key Column 4 Value=
Key Column 5 Value=
Key Column 6 Value=
Key Column 7 Value=
Rule Name=RULE_LAST_BACKUP_AGE,rule 190
Rule Owner=SYSMAN
Update Details:
The last complete backup for database MAACDB1 is 2995 minutes old.



ZDLRA 系统活动脚本

Zero Data Loss Recovery Appliance System Activity Script (Doc ID 2275176.1)

<https://support.oracle.com/epmos/faces/DocContentDisplay?id=2275176.1>

该文档包含多个查询，提供理解系统活动的辅助工具：

- Catalog version
- General state of the system
- Examination of running tasks on the system
- Task history for the last day
- Space usage
- Locking information
- Check status of replication server if it exists
- Incidents for the last five days
- Display each database's current progress processing their datafiles
- API commands over the last 2 weeks
- Notable config changes

查看ZDLRA的健康状态

问题报告案例

VERSION	NAME	CURRENT_TIME			
27-11-2017 15:21:40 ZDLRA_12.1.1.1.8.201711_LINUX.X64_RELEASE	GLPZDLRA	09-DEC-2017 19:41:04			
TASK_TYPE	STATE	CURRENT_COUNT	LAST_EXECUTE_TIME	WORK_TYPE	MIN_CREATION
CROSSCHECK_DB	EXECUTABLE	1		Maintenance	08-DEC-2017
PLAN_DF	EXECUTABLE	498,959		Maintenance	22-NOV-2017
VALIDATE	EXECUTABLE	228		Maintenance	02-SEP-2017
REBUILD_INDEX	EXECUTABLE	805		Maintenance	21-OCT-2017
OPTIMIZE	EXECUTABLE	224		Maintenance	28-NOV-2017
OPT_DF	EXECUTABLE	98		Maintenance	22-NOV-2017
RESTORE_RANGE_REFRESH	EXECUTABLE	203		Maintenance	08-DEC-2017
DB_STATS_REFRESH	EXECUTABLE	1		Maintenance	08-DEC-2017
RM_INC_FILES	EXECUTABLE	1		Work	28-NOV-2017
OBSOLETE_SBT	EXECUTABLE	1		SBT	28-NOV-2017
PURGE_DUP	EXECUTABLE	213		Work	13-NOV-2017
INDEX_BACKUP	EXECUTABLE	179,451		Work	01-DEC-2017
CROSSCHECK_DB	EXECUTABLE	10		Work	29-NOV-2017
BACKUP_ARCH	EXECUTABLE	1,072		Work	09-DEC-2017
PURGE_DF	EXECUTABLE	298,722		Work	09-DEC-2017
INDEX_BACKUP	ORDERING_WAIT	112		Work	13-NOV-2017
PURGE_DUP	RUNNING	1	09-DEC-2017 18:47:01	Work	13-NOV-2017
BACKUP_ARCH	RUNNING	2	09-DEC-2017 19:38:15	Work	09-DEC-2017
PURGE	RUNNING	1	09-DEC-2017 06:36:12	Work	08-DEC-2017
PURGE_DF	RUNNING	94	09-DEC-2017 19:38:11	Work	09-DEC-2017
DEFERRED_DEL	RUNNING	4	09-DEC-2017 19:40:04	Work	09-DEC-2017
PURGE_DUP	STALL_WHEN_WAIT	172,675		Work	31-OCT-2017
CHECK_FILES	TASK_WAIT	1		Maintenance	19-NOV-2017
VALIDATE	TASK_WAIT	1		Maintenance	12-JUN-2017
OPT_DF	TASK_WAIT	293		Maintenance	09-OCT-2017
CROSSCHECK_DB	TASK_WAIT	218		Work	21-NOV-2017
PURGE_DF	TASK_WAIT	3		Work	09-DEC-2017

- 是否有任务的‘WORK TYPE’为‘WORK’的任务在‘RUNNING’状态，且任务开始时间在一天前。
- 是否有‘WORK TYPE’类型为‘MAINTENANCE’或者‘SBT’的任务，且开始时间在一周以上。
- 是否有大量的有相同任务类型（TASK_TYPE）的任务在‘EXECUTABLE’状态。
- 相同的任务类型（TASK_TYPE）的‘CURRENT_COUNT’计数一直在增长。
- 任务状态停留在‘ORDERING_WAIT’超过一天

Diagnostic SQL script for tasks in ORDERING_WAIT status on Recovery Appliance (Doc ID 2095949.1)



查看ZDLRA的健康状态

```

VERSION                                NAME      CURRENT_TIME
-----                                -
27-11-2017 15:21:40  ZDLRA_12.1.1.1.8.201711_LINUX.X64_RELEASE  GLPZDLRA  11-JAN-2018 19:58:14

--## General state of the system
--##
--## When a ZDLRA is healthy the system should look like:
TASK_TYPE          STATE          CURRENT_COUNT  LAST_EXECUTE_TIME  WORK_TYPE  MIN_CREATION
-----
INDEX_BACKUP      EXECUTABLE          1              Work              11-JAN-2018
INDEX_BACKUP      RUNNING            93 11-JAN-2018 19:34:36 Work              11-JAN-2018
BACKUP_ARCH       RUNNING            4 11-JAN-2018 19:55:58 Work              11-JAN-2018
PURGE_DUP         RUNNING            5 11-JAN-2018 19:56:21 Work              11-JAN-2018

--## Task history for the last day:
--## Seeing what work has completed recently can be informative.
--## It is a basic indication of what has happened.

```

TASK_TYPE	STATE	CNT	MIN_COMPLETION_TIME	MAX_COMPLETION_TIME
BACKUP_ARCH	COMPLETED	11,046	10-JAN-2018 19:58:16	11-JAN-2018 19:57:40
DB_STATS_REFRESH	COMPLETED	131	10-JAN-2018 20:06:01	11-JAN-2018 19:55:40
DEFERRED_DEL	COMPLETED	24,602	10-JAN-2018 19:58:14	11-JAN-2018 19:58:09
HISTOGRAM	COMPLETED	8	10-JAN-2018 20:11:02	11-JAN-2018 17:12:22
INDEX_BACKUP	COMPLETED	24,599	10-JAN-2018 19:58:14	11-JAN-2018 19:58:06
OBSOLETE_SBT	COMPLETED	1	11-JAN-2018 05:10:31	11-JAN-2018 05:10:31
PURGE_DUP	COMPLETED	266	11-JAN-2018 00:29:46	11-JAN-2018 19:58:11
RESTORE_RANGE_REFRESH	COMPLETED	29,737	10-JAN-2018 20:06:02	11-JAN-2018 19:55:52
RM_INC_FILES	COMPLETED	131	10-JAN-2018 20:06:00	11-JAN-2018 19:55:37



查看ZDLRA的健康状态

- 确定未处理的任务列表是否在增长（超过7天）：

```
SELECT count(*)  
FROM ra_task  
WHERE archived='N';
```

问题：任务队列随着时间的推移而增长
行动：审查系统活动报告/EM 提交 SR

- 确定因工作繁忙而延迟的事件是否有效：

```
SELECT error_text  
FROM ra_incident_log  
WHERE status='ACTIVE'  
AND error_text like '%has not run%';
```

问题：活动事件日志表示繁忙工作不运行
操作：审查系统活动报告/EM 提交 SR

- 优先级最高的任务（RA_TASK.PRIORITY）是繁忙的工作任务

```
DB_STATS_REFRESH, RESTORE_RANGE_REFRESH, OPT_DF, OPTIMIZE,  
REBUILD_INDEX, VALIDATE, CHECK_FILES, CROSSCHECK_DB
```

查看ZDLRA的健康状态

Oracle Recovery Appliance Assessment Report System Health Score is 97 out of 100 (detail)

Cluster Summary

Cluster Name	zdlra01
OS/Kernel Version	LINUX X86-64 OELRHEL 6 2.6.39-400.286.3.el6uek.x86_64
CRS Home - Version	/u01/app/12.1.0.2/grid - 12.1.0.2.160419
DB Home - Version - Names	/u01/app/oracle/product/12.1.0.2/dbhome_1 - 12.1.0.2.160419 - zdlra01
EM Agent Home	/u01/app/emagent/agent_13.2.0.0.0
Exadata Version	12.1.2.3.3
Number of nodes	16
Database Servers	2
Storage Servers	11
IB Switches	2
exachk Version	12.2.0.1.3_20170719
Collection	exachk_ra01dbadm01_zdlra01_083017_101537.zip
Duration	7 mins, 53 seconds
Executed by	root
Collection Date	30-Aug-2017 10:16:18

Note! This version of exachk is considered valid for 78 days from today or until a new version is available

Table of Contents

- Database Server
- Storage Server
- InfiniBand Switch - All Checks Passed
- Cluster Wide - All Checks Passed
- Infrastructure Software and Configuration Summary
- Findings needing further review
- Systemwide Automatic Service Request (ASR) healthcheck
- Component Elapsed Times
- Top 10 Time Consuming Checks

Report Feature

- Show Failed checks only
- Show checks with the following status:
 - Fail Warning Info Pass
- Show details of the following regions:
 - Infrastructure Software and Configuration Summary
 - Findings needing further review
 - Systemwide Automatic Service Request (ASR) healthcheck
 - Component Elapsed Times
 - Top 10 Time Consuming Checks

Information Center: Overview Zero Data Loss Recovery Appliance (Doc ID 1683791.2)

Information Center: Overview Zero Data Loss Recovery Appliance (Doc ID 1683791.2)

Overview | Troubleshoot | Install and Configure | Upgrade | Optimize Performance | Appliance Patching | Documentation

Hot Topics | Resources

Welcome to the Zero Data Loss Recovery Appliance (ZDLRA) Information Center.

This is the main entry point for all the technical information relative to your ZDLRA.

Be [Proactive](#) and don't hesitate to use all our resources for facilitating your daily activity using this Information Center but also our [ZDLRA Community](#) where you can exchange with Experts from Oracle and other customers sharing their knowledge and experience with you.

Starting Points

- [Zero Data Loss Recovery Appliance Supported Versions](#) (Updated: 09/14/2017)
- [Zero Data Loss Recovery Appliance Critical Issues](#) (Updated: 06/16/2017)
- [Recommended Protected Database Patches for Zero Data Loss Recovery Appliance](#) (Updated: 10/03/2016)
- [Zero Data Loss Recovery Appliance Features Available per Oracle Database Release](#) (Updated: 04/17/2017)
- [Zero Data Loss Recovery Appliance - Installing Third-Party Software and Modifying Internal Appliance Software](#) (Updated: 04/25/2016)
- [How to Backup and Recover the Zero Data Loss Recovery Appliance](#) (Updated: 06/27/2015)
- [Creating Archival Backups for Long Term Backup Retention on the Zero Data Loss Recovery Appliance](#) (Updated: 02/26/2016)
- [SRDC - Zero Data Loss Recovery Appliance \(ZDLRA\) Data Collection](#) (Updated: 07/12/2017)
- [Protected Database sizes incorrectly configured on the Recovery Appliance](#) (Updated: 08/02/2016)
- [Consequences of modifying the Recovery Appliance](#) (Updated: 10/28/2016)
- [Comprehensive Recovery Appliance Validation](#) (Updated: 08/25/2016)
- [RMAN best practice recommendations for backing up to the Recovery Appliance](#) (Updated: 10/26/2016)
- [Allowed Changes to the Recovery Appliance](#) (Updated: 10/26/2016)
- [ZDLRA: Reviewing Recovery Appliance Internal Incidents](#) (Updated: 03/30/2017)
- [Zero Data Loss Recovery Appliance System Activity Script](#) (Updated: 08/07/2017)

News Announcements & Whitepapers

Read recently published news, announcements and White Papers about ZDLRA on OTN.

- [MAA Best Practices - Zero Data Loss Recovery Appliance](#)
- [Zero Data Loss Recovery Appliance Whitepaper](#)
- [Zero Data Loss Recovery Appliance - Installing Third-Party Software \(Document 2014361.1\)](#)
- [Recovery Appliance Platinum Customer Outage Classifications and Restoration Action Plans \(Document 2022047.1\)](#)
- [Deploying the Zero Data Loss Recovery Appliance in a Data Guard Configuration](#)

ZDLRA Community

Join in the conversation!

- [ZDLRA Support Community](#)

Important ZDLRA notes

1-11 of 12 [Show All](#)

Important ZDLRA Notes

- [Recovery Appliance alert notification setup using Oracle Enterprise Manager \(Document 2262003.1\)](#)
- [Prerequisites for Using the Oracle Zero Data Loss Recovery Appliance Plug-in \(12.1.0.1\) \(Document 1929507.1\)](#)
- [Oracle Exadata Database Machine exachk or HealthCheck \(Document 1070954.1\)](#)
- [Steps to shut down or reboot an Exadata storage cell without affecting ASM \(Document 1188080.1\)](#)
- [Cluster Verification Utility \(CVU\) FAQ \(Document 216817.1\)](#)
- [Oracle Sun Database Machine Setup/Configuration Best Practices \(Document 1274318.1\)](#)
- [Oracle Auto Service Request \(ASR\) \(Document 1185493.1\)](#)
- [Zero Data Loss Recovery Appliance support with SAP Oracle Databases \(Document 1997243.1\)](#)
- [How to change OS user password for Cell Node, Database Node, JLOM, XVM, InfiniBand Switch, Gigabit Ethernet Switch and PDU on Exadata Database Machine \(Document 1281766.1\)](#)
- [Creating Archival Backups for Long Term Backup Retention on the Zero Data Loss Recovery Appliance \(Document 2107079.1\)](#)
- [Enabling 8021Q VLAN Tagging in Zero Data Loss Recovery Appliance over Inest networks \(Document 2047411.1\) \(Document 2047411.1\)](#)



查看ZDLRA的健康状态

使用Exachk检查ZDLRA

Database Server				
Status	Type	Message	Status On	Details
FAIL	OS Check	System is exposed to ZDLRA Critical Issue RA12	All Database Servers	View
FAIL	OS Check	System is exposed to ZDLRA Critical Issue RA10	All Database Servers	View

升级 exachk:

How to update exachk outside ZDLRA Install, Patching and Upgrade (Doc ID 2399688.1)

<https://support.oracle.com/epmos/faces/DocContentDisplay?id=2399688.1>

Database Server				
Status	Type	Message	Status On	Details
FAIL	OS Check	System is exposed to ZDLRA Critical Issue RA12	All Database Servers	Hide
ZDLRA Critical Issue RA12				
Recommendation		<p>Benefit / Impact:</p> <p>This critical issue delivers 5 new fixes, including a rare race condition that can result in a corrupted backup within RA when a hang occurs in the servlet session. The patch will prevent any further corruption due to this bug but a new backup will have to be sent. Restore or subsequent validation of the corrupted datafile will detect the corruption. This patch supersedes critical issue (RA10).</p> <p>Other bugs fixed by the patch are</p> <ul style="list-style-type: none">A reporting issue with regards to the Recovery Window for a given database that has multiple incarnations and dropped files reporting no data - Bug 22187259A scheduling issue where the backup of archive logs received via Real Time Redo shipping will interrupt background tasks performed by the appliance - Bug 22213097The inclusion of patch 22304421 for systems running 12.1.0.2.BP13 Grid Infrastructure - Bug 23010146The RA-Automation RPM can be created with 0 bytes leading to a failure during the installation of the Recovery Appliance - Bug 23024869 <p>Action / Repair:</p> <p>See below document 2124925.1 for additional details</p>		
Links		<p>1. Note: 2124925.1 - (RA12) Backup sent to ZDLRA can become corrupted when there are hangs in servlet sessions (Doc ID 2124925.1)</p>		
Needs attention on				
Passed on		-		





ORACLE